via satellite's

# GLOB

## Satellite Industry Trends and Statistics

Each year, *Via Satellite* quantifies the satellite industry. We look at how the industry is changing based on information from our own internal database, as well as numbers compiled by some of the industry's leading experts. This data allows us to paint a picture of where the market is today and draw a broad outline of what it will look like in the near future.

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# ALL SATELLITE SURVEY

by Cynthia Boeke and Robustiano Fernandez

As of April 1999, there were 199 Western-built, geostationary, commercial communications satellites in orbit carrying some 4,500 C- and Ku-band transponders. Fifty-six more satellites are on order that will add approximately 1,800 C- and Ku-band transponders to the mix. The world's first two commercial LEO systems entered into operation, and a third was virtually completed, comprising 134 LEO satellites. In 1998, 31 commercial geostationary satellites were ordered and 22 launched. Total industry revenues reached nearly $66 billion, up 15 percent from the previous year.

## Worldwide Satellite Industry Revenue

The satellite services segment, particularly the subscription/retail sector, is driving overall growth in the industry, according to the Satellite Industry Association (SIA). This sector includes global direct-to-home services and, to a much smaller extent, nascent mobile satellite services. Transponder leasing, comprising the traditional use of satellites by broadcasters, cable programmers, private networks and telephony service providers, increased slightly.

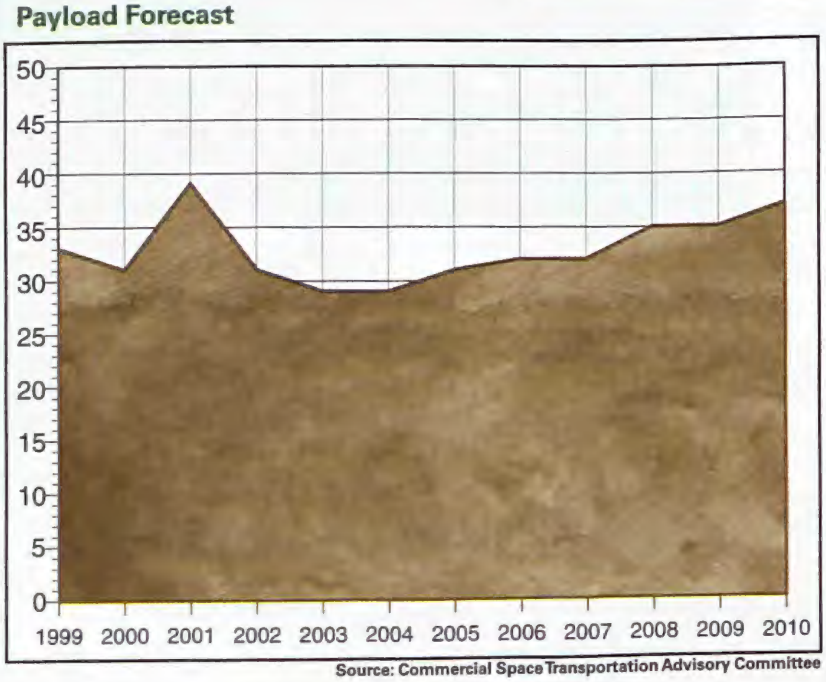
The SIA finds this growth encouraging, however, given the global economic crisis that affected much of the world last year and the continuing glut of satellite capacity in Asia. Much of the new growth is attributed to the rapid demand for Internet and data traffic. Although the satellite manufacturing segment grew by a healthy 10 percent, the SIA says several large government contracts provided the bulk of last year's growth. In the ground equipment sector, the SIA has witnessed a rapid growth rate, not only in the consumer market for DBS/DTH dishes and set-top receivers, but in the more traditional markets for VSATs and large TT&C stations as well. The launch industry was the one satellite sector that showed a decline last year, due to technical delays in satellite programs that held up launch schedules and several high-profile launch failures.

| Satellite Industry Subsegment | 1996* | 1997* | 1998* | Change '96-'97 | Change '97-'98 |
|---|---|---|---|---|---|
| Satellite Manufacturing | $12.4 | $15.9 | $17.6 | 28% | 10% |
| Prime Contractors | $8.3 | $10.6 | $11.7 | 28% | 10% |
| Subcontractors | $4.1 | $5.3 | $5.9 | 29% | 11% |
| Launch Industry | $6.9 | $7.9 | $7.0 | 14% | -12% |
| Launch Services | $4.2 | $4.8 | $4.3 | 14% | -11% |
| Manufacturing Subcontractors | $2.7 | $3.1 | $2.7 | 14% | -14% |
| Satellite Services | $15.8 | $21.2 | $26.2 | 34% | 23% |
| Transponder Leasing | $5.2 | $5.8 | $6.1 | 11% | 5% |
| Subscription/Retail Services | $10.6 | $15.5 | $20.1 | 46% | 30% |
| Ground Equip. Manufacturing | $9.7 | $12.5 | $15.2 | 29% | 22% |
| TOTAL | $44.8 | $57.5 | $65.9 | 28% | 15% |

*in billions $

Source: Satellite Industry Association

## Geostationary Satellite Launch Forecast




Source: Commercial Space Transportation Advisory Committee

In 1998, 23 commercial geostationary communications satellites were launched, including one failure. The Commercial Space Transportation Advisory Committee (COMSTAC) had forecast 33 payloads to be launched in 1998. The difference, COMSTAC explains, is that the industry suffered from a record number of manufacturing and satellite processing center problems that resulted in significant delays of satellite deliveries to launch pads. COMSTAC predicts a total of 394 addressable payloads will be launched from 1999 to 2010, or an average of 33 payloads per year.

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## Leo Satellites in Orbit

For the past four years, low earth orbiting constellations have been touted as harbingers of what the industry will have to offer. Whether they are "big LEO" systems designed for handheld satellite telephony, such as Iridium and Globalstar, or "little LEO" systems for handheld paging and data services, such as Orbcomm, these constellations have raised some $13 billion to get off the ground.

Since last year's survey, the number of LEO satellites in orbit has jumped from 87 to 131, and two LEO constellations, those of Iridium and Orbcomm, were completed. Globalstar, recovering from the fiery loss of 12 satellites on a single rocket last year, was on the verge of completing its system as we went to press. ICO, which plans to implement a medium earth orbit, or MEO system, will begin launching its 12-satellite system later this year. Not surprisingly, these systems constituted almost half of all commercial launches worldwide, according to COMSTAC, including 14 launches for the Iridium, Globalstar and Orbcomm systems alone. Over the next 10 years, COMSTAC predicts 975 LEO payloads will be deployed.

| Company | Satellites |
|---|---|
| Orbcomm | 28 |
| Globalstar | 20* |
| Iridium | 86 |
| TOTAL | 134 |

* 4 more scheduled for launch at presstime

The financial picture for LEO systems was less stellar. Iridium, in particular, was in the hot seat for radically underestimating the number of subscribers and revenue that its system would garner and had become the target of multiple shareholder-led lawsuits, as we went to press.

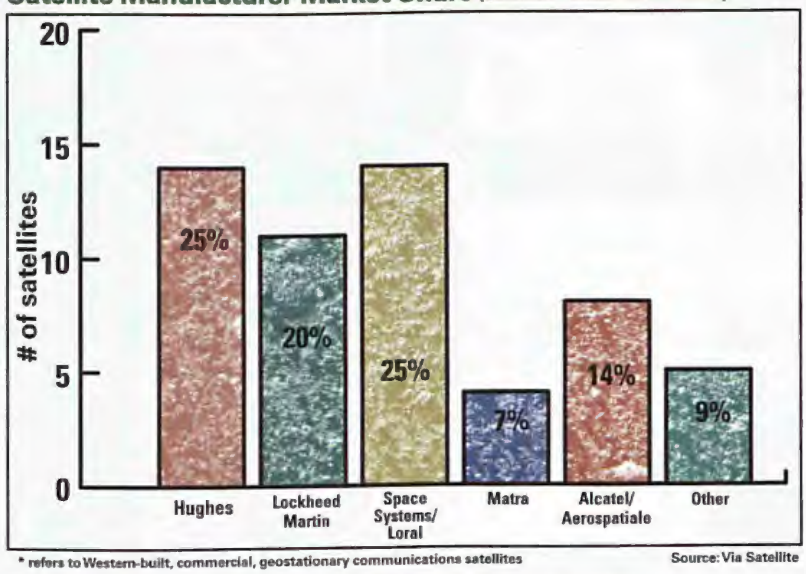
## Geostationary Satellite Manufacturing

The satellite manufacturing sector has been rocked by several trends that are affecting its overall growth rate and stability. In 1998, 31 commercial, geostationary satellite projects were announced, although this does not necessarily mean contracts were signed or metal was cut. Several highly speculative ventures were included in this number, along with a satellite program rescinded due to new, strict U.S. regulatory controls.

A new U.S. export licensing regime was implemented by the U.S. Congress in the wake of possible missile technology transfers to the People's Republic of China during and after launches on Chinese rockets. Export licensing and controls are now so difficult to obtain that traditional U.S. satellite customers from around the world are openly stating they might buy European satellites rather than deal with the red tape. This trend could reshape satellite manufacturing market shares in favor of European companies during the next 12 months.

Satellite manufacturers' excellent record of technical quality was marred over the past year when in-orbit anomalies reached record-breaking heights. One benefit for satellite manufacturers is that large operators are ordering more spacecraft for redundancy.

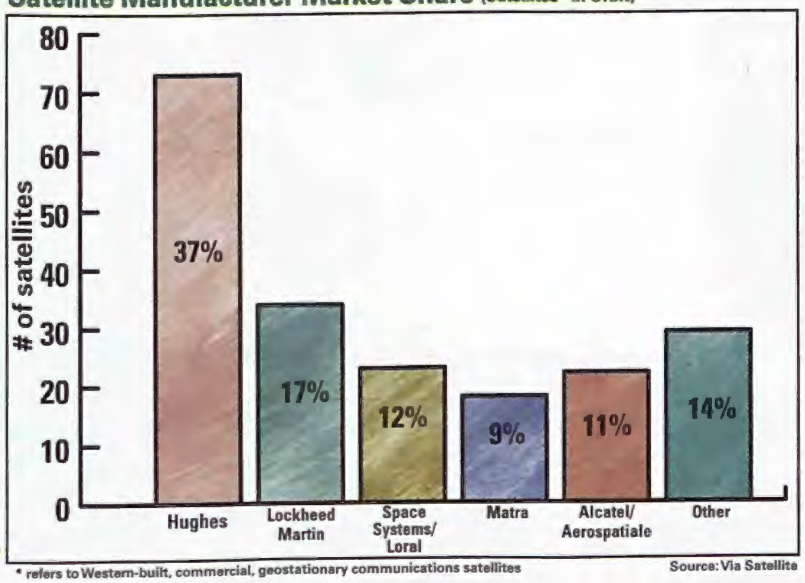
**Satellite Manufacturer Market Share** (Satellites* under construction)




* refers to Western-built, commercial, geostationary communications satellites

Source: Via Satellite

**Satellite Manufacturer Market Share** (Satellites* in Orbit)




* refers to Western-built, commercial, geostationary communications satellites

Source: Via Satellite

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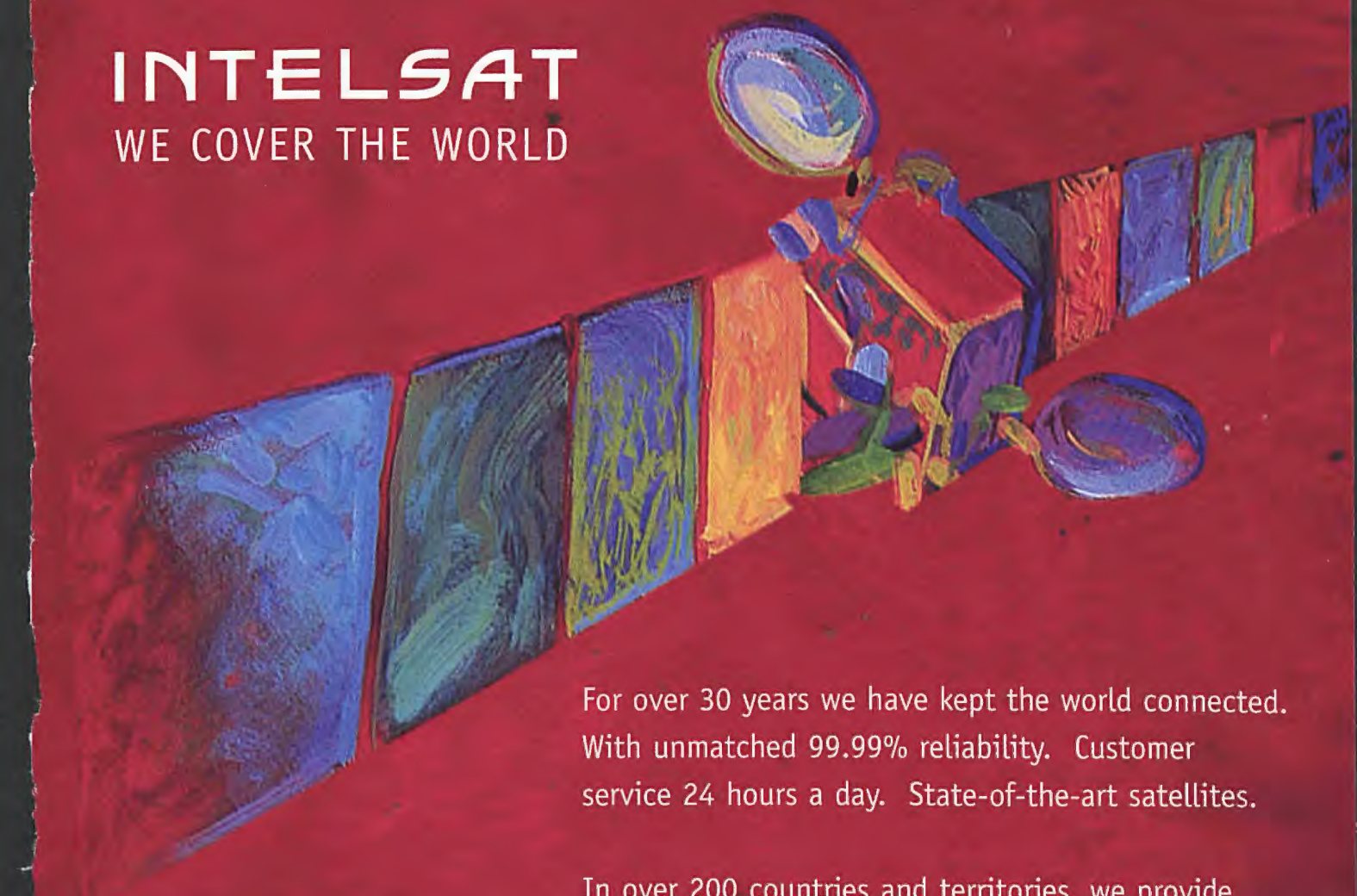

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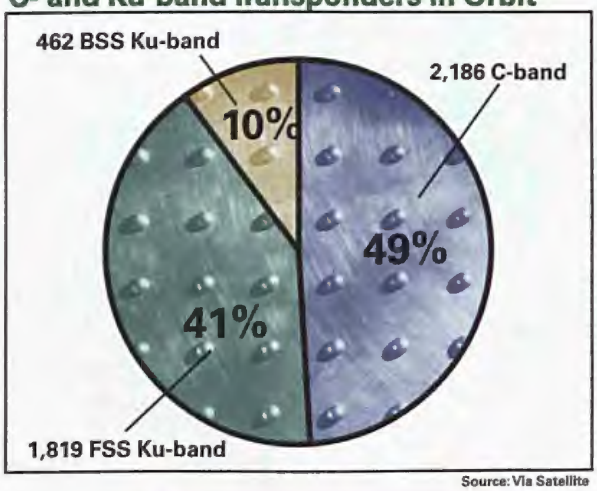
## Transponders

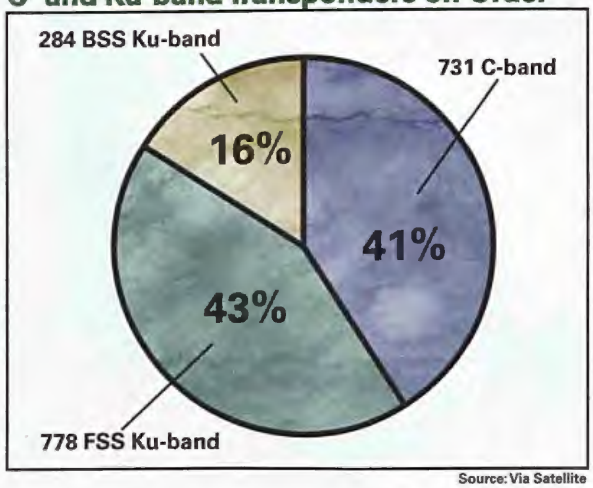
The mix of transponders reflects several broad trends that have been taking place in the satellite industry over the past several years. C-band continues to decline slightly as a proportion of the overall mix, as more satellites are built and launched for DBS/DTH services using the BSS and FSS Ku-band. Also on order (but not shown here) are satellites carrying a small number of Ka-band transponders for commercial multimedia services, and L- and S-band payloads for digital audio services to users. The first digital audio satellite was scheduled to enter service at presstime.

### C- and Ku-band Transponders in Orbit




Source: Via Satellite

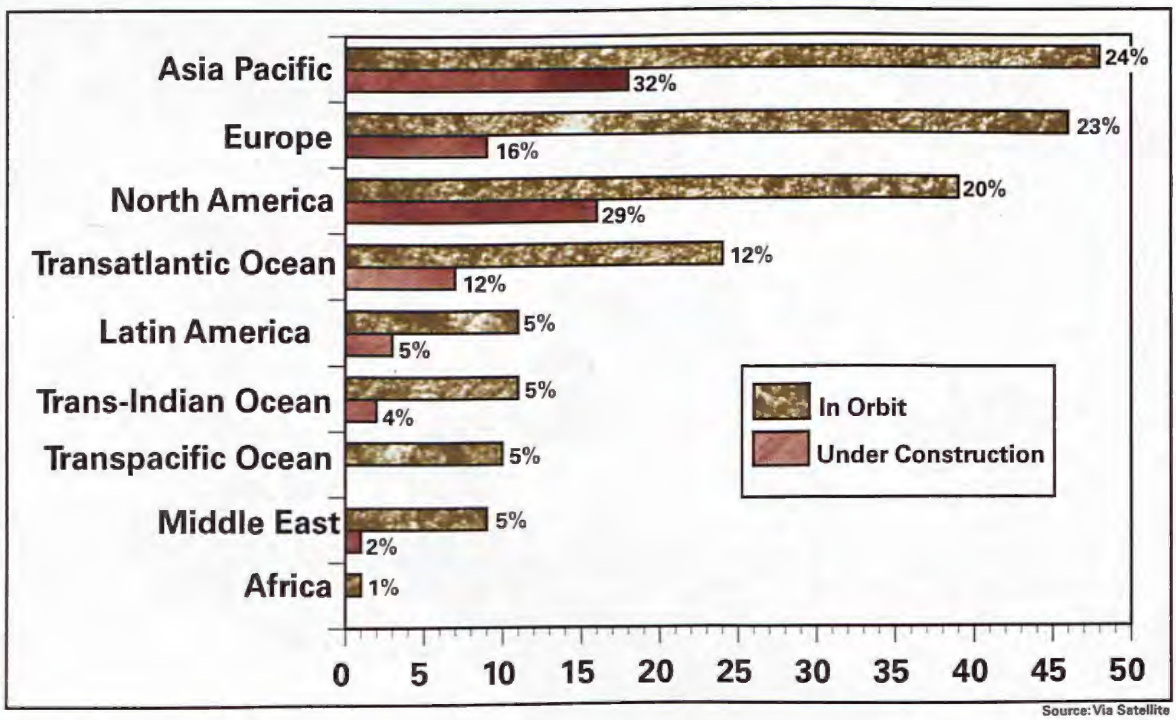
### C- and Ku-band Transponders on Order




Source: Via Satellite

## Satellites By Region

Overall, virtually every region of the world is reached by a healthy amount of capacity, as the competition between large, commercial operators continues to heat up. Although some regions have few dedicated satellites, such as Africa, they are covered by the Intelsat, Panamsat and other global fleets, which have trans-oceanic satellites providing footprints of all or part of the various continents and regions of the world. Except for space on coveted "hot birds" providing video distribution and DBS/DTH services in the various regions of the world or during major news and sporting events, there appears to be an ample, if not an overabundant, supply of space segment.




Source: Via Satellite

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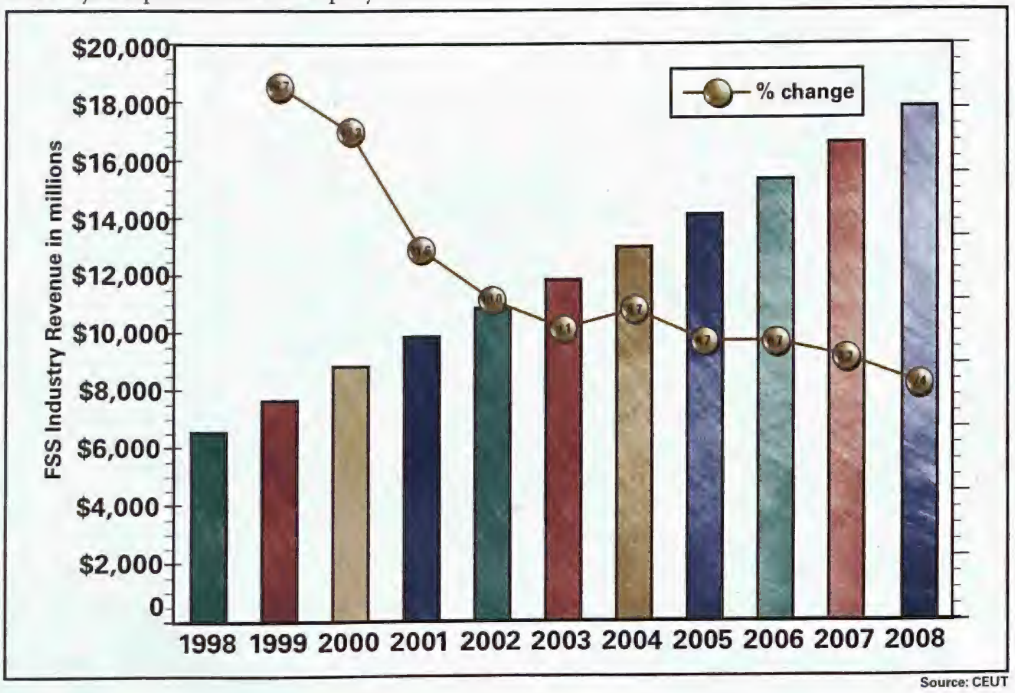
## FSS Transponder Leasing Revenue

C.E. Unterberg, Towbin (CEUT) believes that a large amount of FSS transponder growth in 1998-2000 may lead to a short-term, over-capacity scenario: "While worldwide demand is increasing gradually, supply is increasing in a step-like function." CEUT expects the mismatch between supply and demand to be the most acute in Asia and Eastern Europe. In the meantime, Internet services will become an important demand driver that CEUT says is expected to increase rapidly.




Source: CEUT

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| | |
|---|---|
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## Broadband Satellite Projects

Satellite broadband projects continue to capture the imagination, but not the pocketbooks, of the industry. The chart below provides details of some of the recent broadband satellite projects, although their technical and financial details are subject to constant change, as system backers struggle to cut costs and make their programs more technically feasible.

Potential satellite broadband providers face numerous obstacles, says CEUT, including making the requisite hardware affordable to consumers using the Ka-band and raising billions in required financing. Over the past year, projects such as Motorola's Celestri were dropped, Loral's Cyberstar scaled back, and the Bill Gates/Craig McCaw 288-satellite Teledesic system was rumored to be radically downsized. This sector was given a boost, however, in recent months when Hughes and Lockheed Martin/Telespazio/TRW announced they would pump huge amounts of their own money into their respective systems. For Spaceway, Hughes will pony up $1.4 billion; and Astrolink, the Lockheed Martin-led coalition, will contribute $900 million.

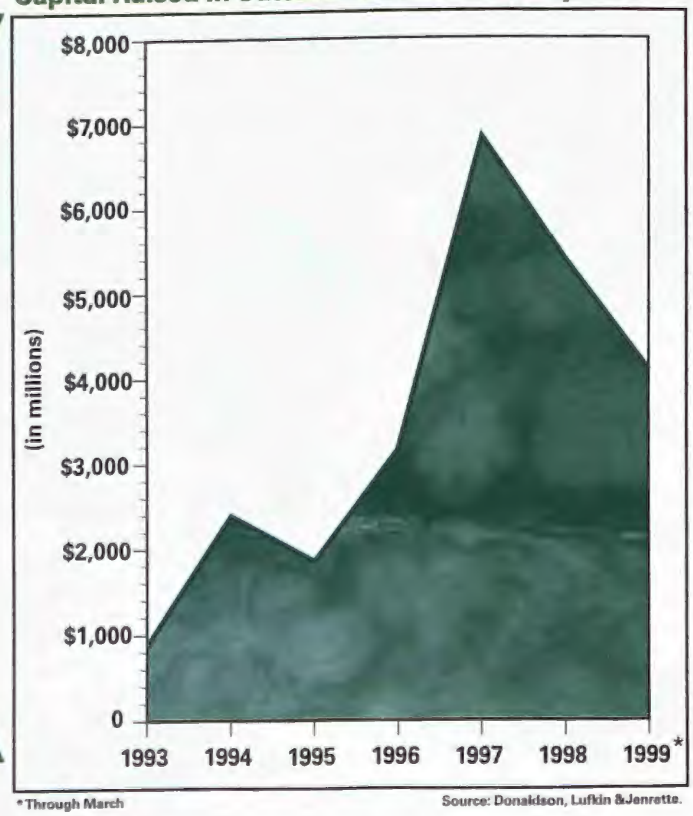
### Summary of Major Broadband Systems

| Program | Orbit | Band | Satellites | Cost ($millions) |
|---|---|---|---|---|
| Astrolink | GEO | Ka | 9 | 3,994 |
| Cyberstar | GEO | Ka | 3 | 1,050 |
| EuroSkyWay | GEO | Ka | 5 | 1,200 |
| GE*Star | GEO | Ka | 9 | 2,676 |
| Skybridge | LEO | Ku | 80 | 6,100 |
| Spaceway | GEO | Ka | 8 | 3,200 |
| Teledesic | LEO | Ka | 288 | 8,895 |
| WEST | GEO | Ka | 6 | 2,600 |
| TOTAL | | | 402 | 29,715 |

Source: Telastra

## Satellite System Financing

### Capital Raised in Satellite Services Industry




*Through March

Source: Donaldson, Lufkin &Jenrette.

Since the mid-'90s, Wall Street has contributed $24.6 billion of capital for the satellite industry. Much of the money was used to fund new satellites, as well as new ventures targeting services never seen before on the satellite market. These systems, funded over the past several years, are now coming to fruition.

All eyes are now on Iridium, whose stock has fluctuated in the past when technical and/or market-oriented milestones were met. Recently, the stock took a deep plunge when bankers realized they would not be paid, based on Iridium's subscriber base of only 10,000 users and revenues of $1.45 million.

Over the past year, investors have come to realize first-hand the risks associated with the satellite industry, as emerging economies—which included a large potential market for satellite services—took a downturn; a large number of high-profile, in-orbit and launch failures occurred; and Iridium dramatically underestimated its early growth potential. Despite these factors, investors have continued to place large bets on the satellite industry, pumping more than $4 billion into it in the first three months of 1999 alone. They appear to be taking a more cautious approach to broadband systems, however, leaving vendors to contribute large amounts of their own money to jumpstart projects.



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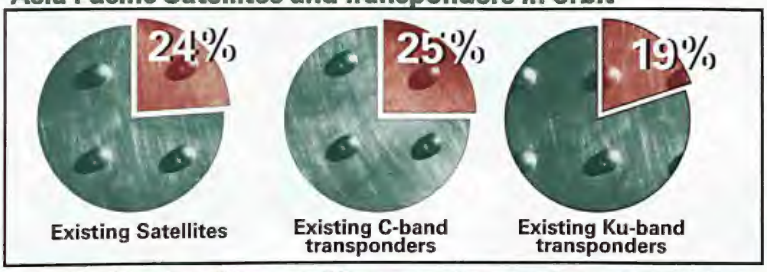
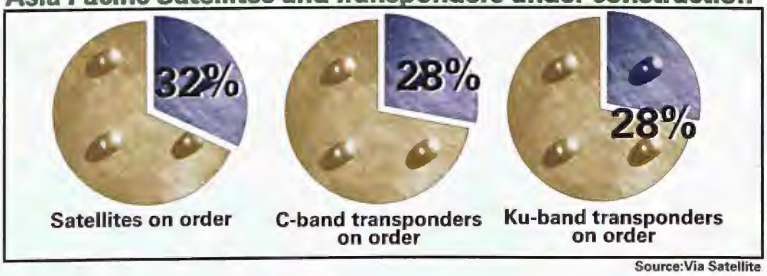
## Regional Breakdowns
## Asia Pacific

The Asia Pacific continues to lead the world in the number of satellites in orbit and on order, despite the ongoing economic downturn that has created a glut of capacity in the region. Some of the satellites on order were contracted before the downturn occurred; others have been put on hold for economic or regulatory reasons, creating questions about whether they will ever actually be launched. In addition, Japan continues to order a surprisingly large number of satellites for all applications, despite the country's small size and advanced terrestrial infrastructure.

**Asia Pacific Satellites and Transponders in orbit**




**Asia Pacific Satellites and Transponders under construction**



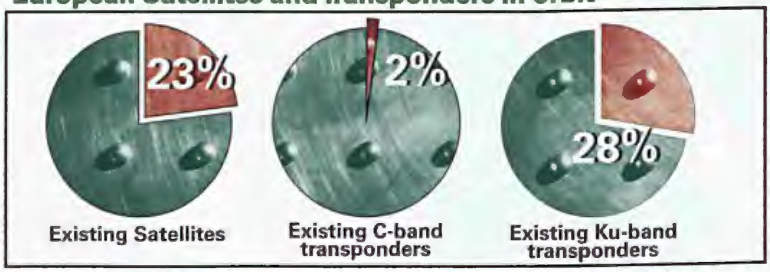

Source:Via Satellite

## Regional Breakdowns
## Europe

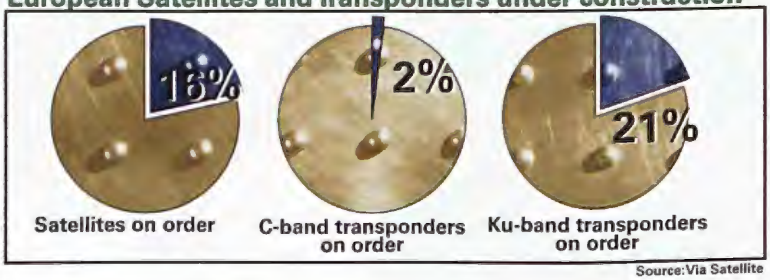
Europe has become the No. 2 region in terms of spacecraft in orbit, thanks to the launching of new generations of satellites for SES Astra and Eutelsat. These two operators are now joining their U.S. counterparts, targeting regions beyond their traditional territories. SES Astra purchased a major stake in Asiasat, and Eutelsat has announced plans to target North America with its services.

DBS/DTH/cable distribution are by far the biggest applications for European satellite systems, although a number of large VSAT contracts have been awarded in recent months. The region continues to rely on Ku-band for small-dish applications, with only a few C-band transponders in orbit and under construction.

**European Satellites and Transponders in orbit**




**European Satellites and Transponders under construction**

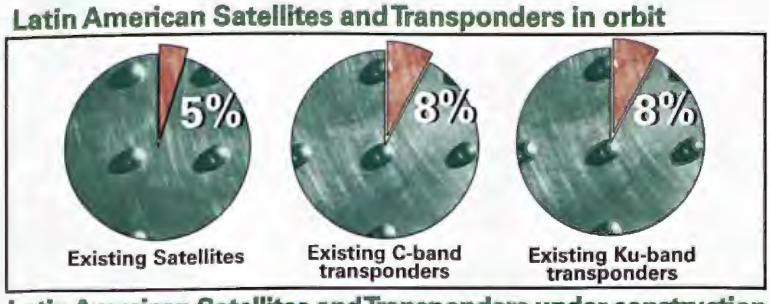



Source:Via Satellite

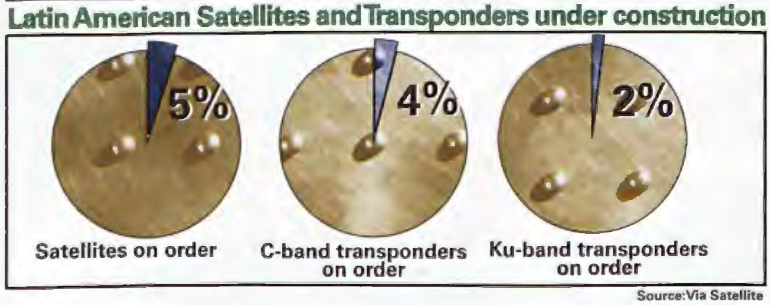
## Regional Breakdowns
## Latin America

The Latin American satellite scene is changing dramatically, as domestic players auction off their systems to U.S. companies and expand their areas of coverage. Mexico, Brazil and Argentina are targeting customers throughout Latin America and, in the case of Mexico, reaching well into the United States. This region is a hotbed of activity, with more than 30 satellites providing some type of coverage of South America.

**Latin American Satellites and Transponders in orbit**




**Latin American Satellites and Transponders under construction**

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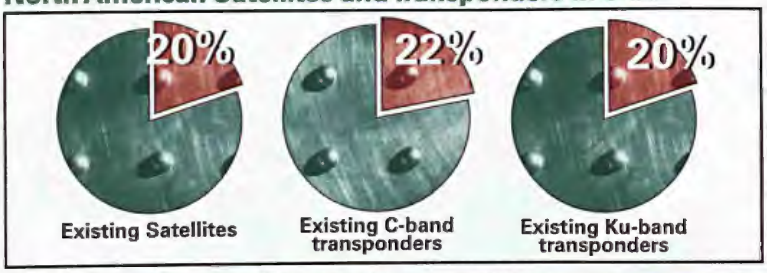
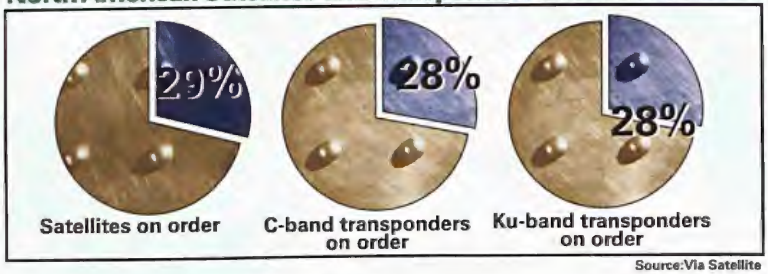
## Regional Breakdowns
# North America

North America, primarily the United States, used to have by far the largest number of satellites in orbit. With the gradual aging of the fleets of the former GTE Spacenet and others, the number has declined, especially as current operators decreased the amount of replacement satellites that were launched. This trend is being reversed in part due to the high number of partial or total in-orbit satellite failures. As a result, U.S. operators have purchased a large number of replacement or spare satellites to ensure redundancy for their customers. U.S. DBS fleets continue to expand as operators launch satellites for redundancy and spotbeam coverage that will allow local channels to be provided to viewers.

### North American Satellites and Transponders in orbit

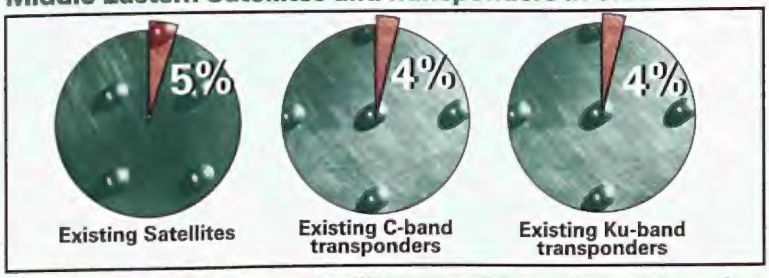



### North American Satellites and Transponders under construction

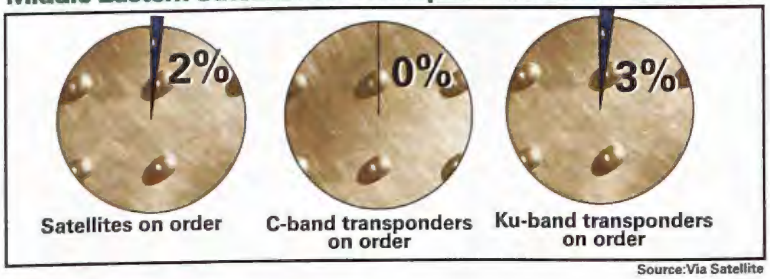



Source:Via Satellite

### Middle Eastern Satellites and Transponders in orbit




### Middle Eastern Satellites and Transponders under construction




Source:Via Satellite

## Regional Breakdowns
# Middle East

With its deep ties to virtually all Arab nations, Arabsat continues to be a mainstay of satellite communications in the Middle East and is expanding the types of services it offers. The organization celebrated the launch of its first DBS satellite this year. Meanwhile, Israel and Egypt are expanding their respective Amos and Nilesat systems, and non-traditional players such as Eutelsat are extending their coverage into the Middle East.

## Overall Trends

Many experts continue to predict a radical shift in the satellite industry from industrial to consumer applications such as DBS, DARS and mobile telephony. At the same time, predictions of the success of such services have not matched expectations, or in the best-case scenario, they have evolved more slowly than was foreseen. Traditional applications for video distribution, private network communications and rural telephony services are expected to grow at a more even pace.

Satellite manufacturing in particular was hit hard over the past year. Technical failures and, in the case of U.S. manufacturers, strict licensing controls are affecting the way in which these companies do business. In 1998, there were 24 in-orbit anomalies or failures, which resulted in about $1.4 billion in insurance claims. Added to these woes is a number of studies predicting a short-term decline in geostationary satellite contracts as systems are replenished and economic difficulties prevent some customers from ordering new birds. At the same time, LEO satellites for all types of applications—telephony, paging and multimedia—will comprise a growing number of satellite launches over the coming years, although financial setbacks to existing and proposed systems may affect the number of systems that actually make it into orbit. More often than not, these systems are becoming captive to manufacturers who now must invest hundreds of millions of their own dollars in order to build them.

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Consolidation and expansion may both be used to describe what is happening in the field of satellite operations. Trends affecting satellite operators include the growth of commercial, mega-operators providing global coverage in competition to Intelsat; the merging of regional and domestic satellite systems with mega-operators through partnerships, auctions, investments and purchases; deregulation of telecommunications services that are allowing domestic satellite markets to open up to international competition (although these efforts sometimes move more slowly than planned); the continuing privatization of international, treaty-based organizations; and growth in the use of satellites for Internet and data traffic.

This past year has been one misfortune and great achievement for the satellite industry. Record-breaking satellite anomalies occurred in orbit, and manufacturers' efforts to eradicate them led to a one-third decrease in the number of satellites launched. The U.S. satellite industry was embroiled in a national security scandal relating to technology transfers to other countries. New regulations implemented by Congress are crushing many U.S. companies' ability to do business. Amazing technical feats were accomplished as two LEO systems went into operation; however, financial difficulties relating to service adoption have become paramount. New launch vehicles were introduced, although one, the Delta 3, has resulted in two major launch failures.

Despite such setbacks, the commercial satellite industry continues to play an increasingly important role in the way the world communicates. Satellites have extended the Internet into the farthest reaches of the world, and allowed breaking news and sporting events to be transmitted instantaneously across the globe. New digital satellite television offerings are being coupled with data broadcasting and Internet services, and DBS/DTH operators are partnering with the biggest names in the computer and Internet world to advance these new services to consumers. Entrepreneurial companies from around the world are developing and perfecting a bevy of innovative products for Internet and data broadcasting applications that will allow distance educators, businesses and people around the globe to learn, conduct business and enjoy themselves with the most advanced communications technologies the world has to offer. ❖

CYNTHIA BOEKE IS THE EDITOR OF VIA SATELLITE. ROBUSTIANO FERNANDEZ IS THE MANAGING EDITOR OF VIA SATELLITE.

# BIG FISH *in a very* BIG POND

by Theresa Foley

**As the new century approaches, the satellite industry is facing a rebirth with the dawning of the age of the global mega-operator, a phenomenon that promises to further revolutionize the 42-year-old industry. Customers, manufacturers and smaller operators all will feel the impact of a handful of big operators—with a dozen or more satellites, global footprints and strong revenues—who will dominate the satellite industry in the next decade.**

Who will be among them, how many mega-operators can the business support, and how much of the $100-billion-a-year plus in estimated future annual revenues will be subject to their influence? Intelsat, Panamsat and Loral are clearly in the front ranks of operators who should be counted among the "megas" by virtue of their large fleets, global coverages and ongoing operations. Another five or six firms have business plans in place that would put them in the ranks as well, although chances are, not all will make it.

The original mega-operator, Intelsat, has gotten smaller in the past year as it slimmed down to 17 satellites when it handed five over to the Intelsat spinoff, New Skies Satellites. At that lower number, Intelsat was forced to turn over the title of world's largest satellite operator to Panamsat, with its 19 active satellites.

John Stanton, Intelsat vice president for sales and marketing, says consolidation and acquisition has raised the number of larger players with fleets of 10 to 20 satellites but, "we're not looking over our shoulder; we're looking at our customers."

"Access to global capacity strikes me as the thing that defines you as a mega-operator," says Joan Byrnes, vice president of marketing and sales for Loral Skynet. She believes there ultimately will be three or four global players. "Loral is positioning itself to be one of them. It will be difficult for smaller operators to stay outside of those arrangements. They will need to have a link to a global player to sustain a favorable business model."

The mega-operators have many advantages over smaller, regional operators. For one thing, they clearly do better with the financial community than their smaller counterparts, according to Armand Musey, senior satellite analyst at Banc of America Securities. "They can provide backup to customers, handle worldwide business and they have deeper pockets to take advantage of situations like empty orbital slots. If their satellites fall apart, they can still pay back the banks. One issue won't bury them."

## PANAMSAT

"When Panamsat and Hughes Galaxy were combined in 1997, it created a mega-operator and a powerhouse for the industry," says Panamsat CEO Douglas Kahn. "What has brought us to the truly great position we are in today? The company has always been innovative. To be willing to get out ahead means that you will be in a position to reap rewards when you get it right. And we have gotten it right."

Panamsat and Hughes Galaxy together have a long list of industry firsts that reflect the firm's desire to take risks to grow. Together the companies were the first to launch a satellite dedicated to cable; the first to launch a dedicated international private satellite; a pioneer in the launch of digital video services; and the first satellite company to tap the public markets for financing.

To stay on top, Panamsat is committed to being a force of innovation, broadening its service offerings and expanding its fleet. Seven more satellites will go up in the next 18 to 24 months. This "broader, deeper" fleet will give Panamsat several competitive advantages, Kahn says, including more system reliability. "We are committed to providing uninterrupted service," which he says reflects the new thinking within the customer base. "It will be harder for smaller satellite service providers to compete. We are also providing global distribution that smaller carriers can't. For large entertainment companies, we are better able to accomplish distribution." The alternative is to go to multiple carriers.

Kahn doesn't like to make 10-year forecasts of revenue, but he says next year Panamsat projects 30 to 40 percent higher revenue than in 1999, and "it won't end there." Expansion will include the development of new orbital slots, even though they are becoming more scarce; getting into new frequencies such as Ka-band and finding partners among other satellite, Internet and telecom operators.

## INTELSAT

Intelsat does not intend to expand beyond the 18 satellites in its fleet for the moment, but does plan to triple its revenues in the next decade, Stanton says. "During the first decade of the new millennium, we will go from a $1 billion annual turnover to close to $3 billion," he predicts.

Five Intelsat 9 satellites are on order, but those will replace the Intelsat 6 series rather than fill new positions. The organization may order Ka-band satellites as it heads toward privatization, but as of mid-summer did not have the necessary internal approval to move ahead.

A new business plan to position the post-privatization, "New Intelsat," for growth was written during the summer. Intelsat's coverage may move more in the direction of landmass satellites as the broadband market heats up, but Stanton says the mandate to provide universal coverage of all countries will influence the deployment of new satellites.

## LORAL

"We're amassing all the building blocks and addressing our global coverage by continuing to evaluate new partners to fill in places where we need to," says Byrnes, citing the addition of Skynet do Brasil as the latest company to join the Loral alliance.

Loral has North and South America covered, as well as much of Europe, by its Skynet, Satmex and Orion satellites. It is working toward covering more of the European landmass and connectivity beyond via its partnership with Alcatel in the Europestar company, which should be in operation with its first satellite by 2000. In Asia, Loral experienced a major setback in expanding operations when the Orion 3 satellite experienced a launch failure and was placed in a useless orbit. Loral lost customers, including Dacom, which turned to Koreasat for capacity to start its DTH business when Orion 3 was lost. However, Loral was able to find a close subistitute for Orion 3 by acquiring virtually the entire transponder payload of Apstar 2R, which is already in orbit at 76.5°E. Additionally, the company has capacity on Mabuhay's Agila 2 satellite to serve some customers. Another trans-Atlantic satellite, Orion 2, will be launched in the fall.

Customers are increasingly asking for global coverage when buying satellite services, Byrnes says. "Companies that we might not have expected in the past are multinational today. It sounds like a cliche, but the Internet is fueling it. Companies that look small in scope are on a growth curve because of the Internet, and they are in the business of transporting information from one region to another," she says. "Traditional entertainment companies also have stepped up their international efforts with liberalization" of markets around the world. The global footprint becomes increasingly important.

**MEGA SATELLITE OPERATORS AT A GLANCE**

| Company | Existing Satellites | Planned Satellites | Coverage | 1998 Annual Revenue |
|---|---|---|---|---|
| Eutelsat | 16 | 5 | Europe, N. America, Asia Pacific, Africa | 455 million Euros ($481 million) |
| SES Astra | 9 | 4 | Europe | 516.9 million Euros ($546.6 million) |
| New Skies | 5 | 3 | Asia Pacific, N. America, S. America, Europe, Africa | $116.7 million |
| Panamsat | 19 | 7 | Atlantic Ocean region, Pacific Ocean region, Indian Ocean region, North America | $767.3 million |
| GE Americom | 13 | 4 | North America, Europe | $555 million* |
| Intelsat | 18 | 5 | Indian Ocean region, Altantic Ocean region, Pacific Ocean region, Asia Pacific | more than $1 billion |
| Loral | 9 | 3 | Americas, Europe, Africa, Middle East, Asia Pacific | $254.2 million* |

Source: Via Satellite, *Euroconsult

## WORLDWIDE SATELLITE OPERATORS

| Operator | Capacity*** | 1998 Revenue** | 1998 Profits (Loss)** |
|---|---|---|---|
| Intelsat | 1,260 | 1,020 | 547.2 |
| Panamsat Corp. | 665 | 767.3 | 124.6 |
| Société Européene des Satellites | 136 | 584 | 199 |
| GE American Communications Inc. | 340 | 555 | N/A |
| Eutelsat | 238 | 385.6 | 112.7 |
| Loral Space and Communications Inc. | 144 | 254.2 | N/A |
| Telenor AS | 30* | 202.1 | N/A |
| Japan Satellite System Inc. | 148 | 180 | 30 |
| Space Communications Corp. | 85 | 178 | 29.7 |
| Arab Satellite Communications Organization | 68 | 169.4 | 84.6 |
| Telesat Canada | 120 | 165 | N/A |
| Insat | 79 | 150 | N/A |
| Embratel | 84 | 130 | N/A |
| Satelites Mexicanos SA | 144 | 128 | N/A |
| Asia Satellite Telecommunications Co. Ltd. | 34 | 116.5 | 59.7 |
| Binariang Sdn. Bhd. | 44 | 90 | N/A |
| Hispasat SA | 26 | 84.1 | 26.1 |
| APT Satellite Co. | 107 | 76 | 7.6 |
| Satelit Indonesia Palapa | 64 | 70 | N/A |
| Nahuelsat SA | 27 | 63 | N/A |
| Russian Satellite Communications Corp. | 67 | 60 | N/A |
| Cable and Wireless Optus | 67 | 60 | N/A |
| Shinawatra Satellite plc. | 66 | 56.8 | 44.5 |
| NSAB | 33 | 55.3 | 0.56 |
| Mabuhay Philippine Satellite Corp. | 42 | 53 | N/A |
| Turk Telekomünikasyon AS | 44 | 50 | N/A |
| Telekomunikasi Indonesia | 48 | 25 | N/A |
| Singapore Telecom/Chunghwa Telecom Co. Ltd. | 38 | 25 | N/A |
| Pasifik Satelit Nusantara | 14 | 11.3 | 10.2 |
| Korea Telekom | 28 | N/A | N/A |
| Spacecom Satellite Communications Services | 14 | N/A | N/A |
| Egyptian Satellite Co. | 11 | N/A | N/A |
| France Telecom | 118 | N/A | N/A |
| Deutsche Telekom | 32 | N/A | N/A |
| New Skies Satellites NV | 204 | 0 | - |

*excluding Intelsat leases, ** In U.S. millions, ***36 MHz equivalent transponders

Source: Euroconsult.

### GE AMERICOM

GE American Communications (GE Americom), with its 13-satellite fleet, annual revenues estimated to be in the $555 million range, according to Euroconsult, and a long history of company investment in expanding the satellite business, will quickly be among the world's mega-operators if it isn't already there. By virtue of partnerships and acquisitions, Americom has connectivity in most of the world's regions and an ambitious plan to add 10 satellites by 2005 will provide it with global coverage.

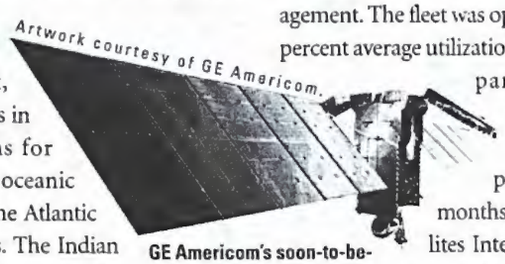
Andreas Georghiou, GE Americom senior vice president for global satellite services, says staying power, industry presence and credibility are as important as global coverage in singling out who deserves recognition as a mega-operator. "Just owning a license and putting together a few satellites does not do it," he says. GE is investing in new satellites at a $500 million a year rate as it carries out a vision of achieving global coverage and reaching 90 percent of the world's population with its satellites.

How does a company make itself into a mega-operator? GE applied for a dozen more slots through the U.K.-administered country of Gibraltar. In 1996, the company extended its reach into South America by investing in Nahuelsat; GE Americom currently owns 28 percent. Then in late 1997 in cooperation with NSAB, it established its first payload over Europe, GE 1E. At the end of 1999 the hybrid GE 4 will become operational with switchable Ku-band capacity with cross strapping capability between North and South America.

In 1998 GE Americom and Lockheed Martin formed a joint venture, Americom

Asia-Pacific. Its first satellite will be GE 1A, which is to be operational in early 2000 and will provide three beams of coverage to greater China, South Asia and Northeast Asia/Philippines.

The next phase for GE will be to connect its regional satellites with international spacecraft, and the company is in final negotiations for contracts for two oceanic satellites to serve the Atlantic and Pacific regions. The Indian Ocean region will be covered by GE 1A.



**GE Americom's soon-to-be-launched GE 4 satellite.**

Even though the industry is moving toward an era where mega-operators may control much of the business, Georghiou does not believe customers will suffer from any cartel-like attempts to keep prices up or limit competition to just a few global operators. "It will be an extremely competitive marketplace. The customers are very sophisticated buyers...who know how to negotiate big deals" with favorable terms. They also will benefit from dealing with mega-operators by getting higher reliability, better backup and more "stability and know-how," he says. Some smaller regional operators will find themselves struggling with higher marketing costs and more susceptibility to local economic problems, but those with resources and a "close to the ground" marketing advantage are more likely to survive, he adds.

## NEW SKIES

New Skies Satellite N.V. does not view itself as a mega-operator, but as a leading contender among the second tier of satellite powerhouses, says Bob Ross, CEO of the new company, spun off last year from Intelsat and headquartered in the Netherlands.

Mega-operators can be defined by the number of satellites, the amount of revenues or by having a huge dominance in one part of the market, Ross says. New Skies, with five satellites in orbit and one more on order, does have global coverage but its market is focused on trans-oceanic traffic due to the slots and operations it inherited when it was spun off by Intelsat. The company is lacking in landmass coverage and a big revenue stream, but has strategies to overcome both those shortcomings, Ross says. Those strategies include extending its coverage with more satellites and either acquiring or partnering with an operator who can provide better landmass distribution—specifically into North America and Europe, the places where New Skies landmass footprints are weakest.

The lightly loaded satellites transferred by Intelsat to New Skies are behind many of the marketing decisions made by New Skies' management. The fleet was operating at about a 48 percent average utilization rate when the company began, and has improved that by a few percentage points in the first six months of 1999. "The satellites Intelsat transferred were among the most lightly loaded," he says. He believes the half empty satellites are an advantage rather than a detriment: "I've got a huge inventory to sell and an opportunity to generate increased revenues."

Ross's goal is to get the load factors up to the industry norm of 80 percent or higher in the next two years, meaning that his sales and marketing department has a big job ahead. Landmass satellites tend to operate with higher load factors than oceanic ones, Ross says. He believes this is because operators have an easier time quantifying traffic patterns and requirements for land services that are market specific, such as DTH, while oceanic transport satellites are designed to serve multiple functions and are more of a guessing game. "Eight years ago, who would have guessed that Internet traffic would be where it is," he says.

Intelsat's rate-based structure also resulted in averaging of prices across markets and of load factors across the system, and little pressure to achieve a high fill factor, according to Ross. New Skies, on the other hand, will have to seek maximum efficiency in operating and filling its birds to be competitive. The New Skies staff, all 75 of whom have been hired since last fall, has spent much of their time analyzing the reasons behind each empty transponder and beam, and then looking for a way to sell it.

"We'll be able to sell where Intelsat didn't," by taking a different approach, Ross adds. Sometimes that will be due to lower prices than Intelsat offers, and sometimes because New Skies does not have to follow

**WORLD TRANSPONDER UTILIZATION (DECEMBER 1997)**

| System Utilization | Voice and Data | Video | Unused |
|---|---|---|---|
| North America | | | |
| Domestic | 22.5% | 70.3% | 7.2% |
| International | 14.2% | 41.4% | 44.4% |
| Total | 21.9% | 68.2% | 9.9% |
| Western Europe | | | |
| Domestic | 25.6% | 61.8% | 12.6% |
| International | 21.3% | 55.8% | 22.8% |
| Total | 25.0% | 61.0% | 14.0% |
| Middle East and Africa | | | |
| Domestic | 36.4% | 54.5% | 9.0% |
| International | 9.7% | 90.3% | 0.0% |
| Total | 27.9% | 66.0% | 6.2% |
| Southern Asia | | | |
| Domestic | 70.0% | 30.0% | 0.0% |
| International | 0.3% | 94.8% | 4.9% |
| Total | 34.6% | 62.9% | 2.5% |
| Asia-Pacific Region | | | |
| Domestic | 48.8% | 33.9% | 17.3% |
| International | 32.5% | 51.1% | 16.4% |
| Total | 47.7% | 35.0% | 17.3% |
| Latin America | | | |
| Domestic | 40.7% | 40.7% | 18.6% |
| International | 6.5% | 93.5% | 0.0% |
| Total | 29.3% | 58.3% | 12.4% |
| Weighted Average-97 | 33.4% | 54.1% | 12.5% |

**Source:** Euroconsult-98, ING Barings estimates. Figures exclude Intelsat results..

some rules that Intelsat does, for example, requiring a bank guarantee to lease a transponder which some customers may not be able to obtain. New Skies doesn't have a published rate card, preferring instead to negotiate the correct price to match the market.

An IPO is planned for the first half of 2000, and part of those funds would be used to expand the satellite fleet.

## SES ASTRA

Société Européenne des Satellites S.A. (SES Astra) may be a regional operator in terms of footprint, but from the nine satellites it operates, its 1998 revenues were $547.7 million and its EBITDA was $441.2 million, so the company can easily be counted in the top ranks of mega-operators. Astra Director General and Chairman Romain Bausch says SES continues to work toward global connectivity, with its Asian presence acquired through its 34.1 percent Asiasat stake and an ongoing search for a partner to land its signals into the Americas expected to bear fruit by year-end.

Astra's satellites are clustered at two orbital positions, 19°E and 28.2°E, which give it the advantage of owning strong, marketable neighborhoods of service but has the disadvantage of limiting geographic coverage to one main region. Bausch's strategy to overcome that is through partnerships such as the one with Asiasat.

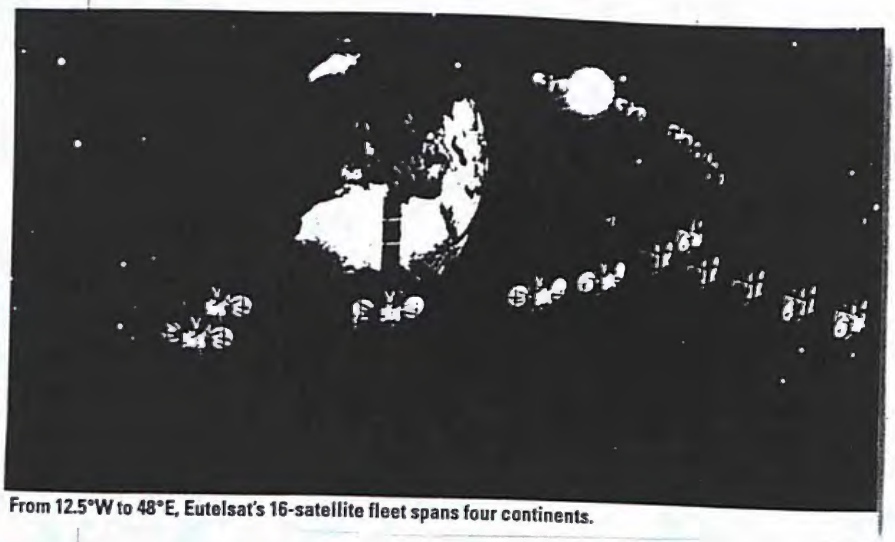
Astra's satellites operate at probably the highest load factors in the industry, with the one bird at 28.2°E at 97 percent fully loaded and the eight at 19.2°E at 95 percent full. Bausch says lower load factors are better from many respects, since a fully loaded operator has nothing to sell to new customers. To break into the Italian DTH market, for example, it would need to offer six to 10 transponders. Astra handles that problem by buying more satellites to place into its slots, and is buying another satellite, Astra 2C, to put into the 28.2°E position in 2001. Astra 2D, also ordered this summer, is for 28.2°E in 2000.

Backup and sparing plans are more complex for mega-operators than for systems with only a few satellites. Bausch says backup capacity is guaranteed on Astra by having more total transponders in orbit than it has authority to use frequencies for, assuring that spare capacity is always ready to be used if an emergency occurs. Besides the nine satellites in orbit, Astra has a total of four on order.

## EUTELSAT

Eutelsat, with 16 satellites, ranks among the largest operators by the number of spacecraft and is trying to expand its coverage regionally beyond its traditional pan-European base of Europe, North Africa and the near Middle East. At least five more satellites are due for launch by 2001. Eutelsat's strategy in ascending the ranks of mega-operators is to expand coverage geographically, as it did in early 1999, when it positioned three satellites to reach into North America. Another strategic step toward growth will be to privatize by breaking into a limited French company and a small intergovernmental organization in early 2001.

Giuliano Berretta, who took over as director general of Eutelsat in January, says mega-operators may be defined as those organizations able to finance their new projects out of yearly cash flow, which gives their customers price and availability advantages. "Eutelsat (with $477 million in revenue in 1998) is going strongly into this direction, but has not yet reached this order of magnitude. Nevertheless we have created a non-negligible market for satellite manufacturers, launch service providers and ground infrastructure



From 12.5°W to 48°E, Eutelsat's 16-satellite fleet spans four continents.

manufacturers with a total expenditure to date of over three billion Euros ($3.15 billion)," he says.

The situation for smaller operators is getting more difficult, according to Berretta. "This space capacity provision business bears risks, which customers are not willing to accept. Only large fleets like ours can handle this."

An operator the size of Eutelsat is able to reschedule satellite deployments and maneuver around launch or satellite problems to guarantee a level of service quality and security. "Small systems do not have those possibilities. This is one of the reasons why they find themselves in economically weak positions. The best solution for them to achieve good results is in the context of a larger fleet."

Eutelsat is trying to recruit smaller systems to join its fleet. Eutelsat's shareholders, for example, agreed earlier this year to integrate France Telecom's Telecom 2 satellite and Deutsche Telekom's DFS-Kopernikus network into the Eutelsat system.

## LOAD FACTORS

"Load factors," the term to describe what percentage of transponders on a given satellite are used or empty, largely determine how profitable a satellite operator is. As mega-operators consolidate their operations in various regions, it is becoming apparent that there is little consistency in satellite loading around the world. Some regions, such as North America, have fleets that are loaded to the brink, while places such as Asia and Latin America are served by satellites with large amounts of unused capacity and accompanying business problems.

The satellite industry has no rule of thumb as to how fully utilized a satellite ought to be in order to ensure profitability. United States' capacity has been tight for the last few years, in part due to failures, and in part due to the practice of U.S. operators of not launching a new satellite until available capacity on other spacecraft is used, allowing the operators to keep pricing relatively stable. When a region has satellites with low load factors, prices can be driven down. Although, in most places, the quality of the technology on various satellites will dictate which operators can ask premium prices for service, by providing better power or antenna patterns on the ground.

The operators say they employ several strategies to maximize profits from their fleets, to assure sufficient excess capacity for protection under numerous failure scenarios, and to have some capacity left over to sell to emerging customers. Having a fleet that is entirely loaded can be almost as much of a headache, albeit of a different sort, to a marketing department, as is having one that is nearly empty.

"The ideal filling factor has to a be a compromise between high revenues today and the need for spare capacity in order to have the immediate flexibility to host new key projects tomorrow," Berretta says.

"You are successful if you reach a fill rate of 88 percent," Brynes says. Loral's satellites serving the United States have very high fill rates-in the high 80s and low 90s—in part due to recent launch delays and failures. Orion 1 also has a load factor in the high 80s, she says, due to demand for transatlantic traffic.

However, Loral's new Telstar 7 satellite was expected to start service this fall with a 50 percent load factor, according to Vijay Jayant, Bear Stearns and Co.'s managing director of satellite equity research. The Orion 2 satellite, due for launch by Loral in the fall for transatlantic services, will have a much lower rate of 25 percent at the outset, he says. The satellites over North America tend to fill quickly, as Loral has demonstrated with Telstars 5 and 6, which will have load factors of 90 and more than 80 percent, respectively.

In Asia and Latin America, Loral's load factors are lower. Asia is "abnormally low," Byrnes says, but the region has turned the corner, and she expects the pent-up demand to be unleashed soon. Satmex 5, the new high-powered satellite launched last December for the Mexican satellite licensee Satmex, which is partially owned by Loral, is an example of a satellite project that has proven the "build it and they will come" theory. Satmex 5 was launched with a low load factor of 15-20 percent, but only seven months after launch, the satellite was almost fully booked, she says.

APT Satellite Ltd. of Hong Kong, which targets the Chinese market, operates with some of the lowest load factors in the industry, according to a research report from Merrill Lynch in February. The report says the take up rate on Apstar 2R will be just 33 percent in 1999 for C-band and 46 percent in 2000. The new lease by Loral of all the Apstar 2R capacity will change that loading. Ku-band usage was worse, at around 15 percent. The company's other satellites, Apstar 1 and Apstar 1A, have higher load factors, in the 77 to 85 percent range, Merrill says. The investment community has a lack of confidence in APT's management, which has hurt its stock price, plus the supply of transponders outstripped demand.

Neighboring operator Asiasat had higher load factors on its first two satellites, in the 80 to 90 percent range. But the yet-to-be-launched Asiasat 3S was expected to have only a 60 percent uptake for C-band and 20 percent for Ku-band when it goes into service in 2000, even after taking on the traffic currently on Asiasat 1, Merrill Lynch says.

Japan's JCSat 5 had a 60 to 70 percent utilization rate in December 1998, with JCSats 3 and 4 loaded at 70-80 percent.

Panamsat does not release any load factors. Kahn says return on investment comes over a period of years in this business. "We look at load factors and evaluate what we can do to fill the satellites faster, but we're committed to the industry over the long term, and we're convinced there are many applications still in their infancy," he says. "We will put up satellites in areas with high and low load factors because we're in this for the long haul."

GE Americom's load factors are well over 90 percent in North America, and they are still building up in Europe and are at the early marketing stages in Asia, in preparation for the upcoming deployment of GE 1A. "We have the intention to even out the loading as we increase our presence in each region, but this is one of the advantages of being global. You don't depend on one region or one group of satellites to make the company profitable," says Monica Morgan, GE Americom's director of marketing communications.

Americom spends a lot of time managing its transponder inventory to provide overlap of time between the launch of a new satellite and retirement of its slot predecessor, something that its customers asked for, Georghiou says. Thus, next generation, usually higher powered satellites with greater levels of redundancy are made available a bit sooner. In conjunction, this strategy also involves making older satellites available as generic, less expensive capacity on which to grow new businesses, in hopes that the new clients then become secure, established customers. Numerous customers have followed this path, he says. Among them is a Capital Broadcasting subsidiary, Microspace, and Qualcomm, which has become a huge satellite user after starting out about 12 years ago as a small niche user of capacity.

For unexpected problems like the technical failure of a spacecraft, GE Americom manages its transponder and satellite inventory so that it can offer its customers a four-level protection plan that provides a variety of backup options in case of a satellite problem. If capacity is lost, GE moves along a four-step process: First, traffic is moved to unused transponders; then to spares onboard the affected satellite; then onto capacity used by preemptible customers, and finally to the dedicated spare satellite kept in orbit to provide service in case of a catastrophic loss of part of the fleet. GE had to implement its protection scheme on March 12 when the GE 3 satellite lost service for five hours. Only one customer with a preemptible service contract was down temporarily, Georghiou says. The other customers were smoothly transferred to backup capacity.

"It's easier for us to manage capacity than for an operator with a smaller fleet," he says.

Intelsat operates with average load factors in the high 60 percentile rank, says Stanton. If "guaranteed reservations" for future contracts were counted, those load factors would be closer to 80. The busiest two satellites are located over the Atlantic and Asia-Pacific, where satellites operate at around 90 percent loaded. Due to the global nature of Intelsat's fleet and the fact that generic satellites are moved from location to location, some satellites are operating at lower fill factors, in part because they often have some amount of unusable capacity, for example beams that hit the ocean instead of populations, Stanton says.

"Commercial health is not just about load factors. We don't have a hard and fast target...but we would like to stay about at the 70 mark," Stanton says.

Intelsat has a long history of using its empty capacity for free demonstrations and testing of new services. It tested ATM networking protocols over satellites and high-speed Internet backbone links, both of which

have begun to generate new customers and uses. Today, the organization is running tests of wireless local loop rural telephony, interactive Ku-band, Internet caching and multicasting, and broadband VSAT applications on otherwise unused capacity as it demonstrates one of the benefits of having some spare capacity and a large, global fleet.

Eutelsat offers lower prices for new capacity over places like Africa and India when load factors are low, and also uses the capacity to develop services such as Skyplex, which allow digital carriers to directly uplink to a satellite.

Wall Street analysts track each operator's load factors as one of the many tools they use to place a value on a company's satellite operations, but Musey admits that much of the loading analysis is guess work, as it is not based on firm loading data, which the operators do not like to release.

But load factors will be only one of several indicators to watch as the mega-operators compete for the top ranking positions in the global satellite business in the years ahead. Quality of service, pricing and efficient management of their fleets also will determine who holds the top spots in the satellite industry after the current round of consolidation and fleet buildout is completed.

## THE END OF AN ERA?

Just how worried should the smaller operators be by the trend toward huge global operators, and away from regional operations?

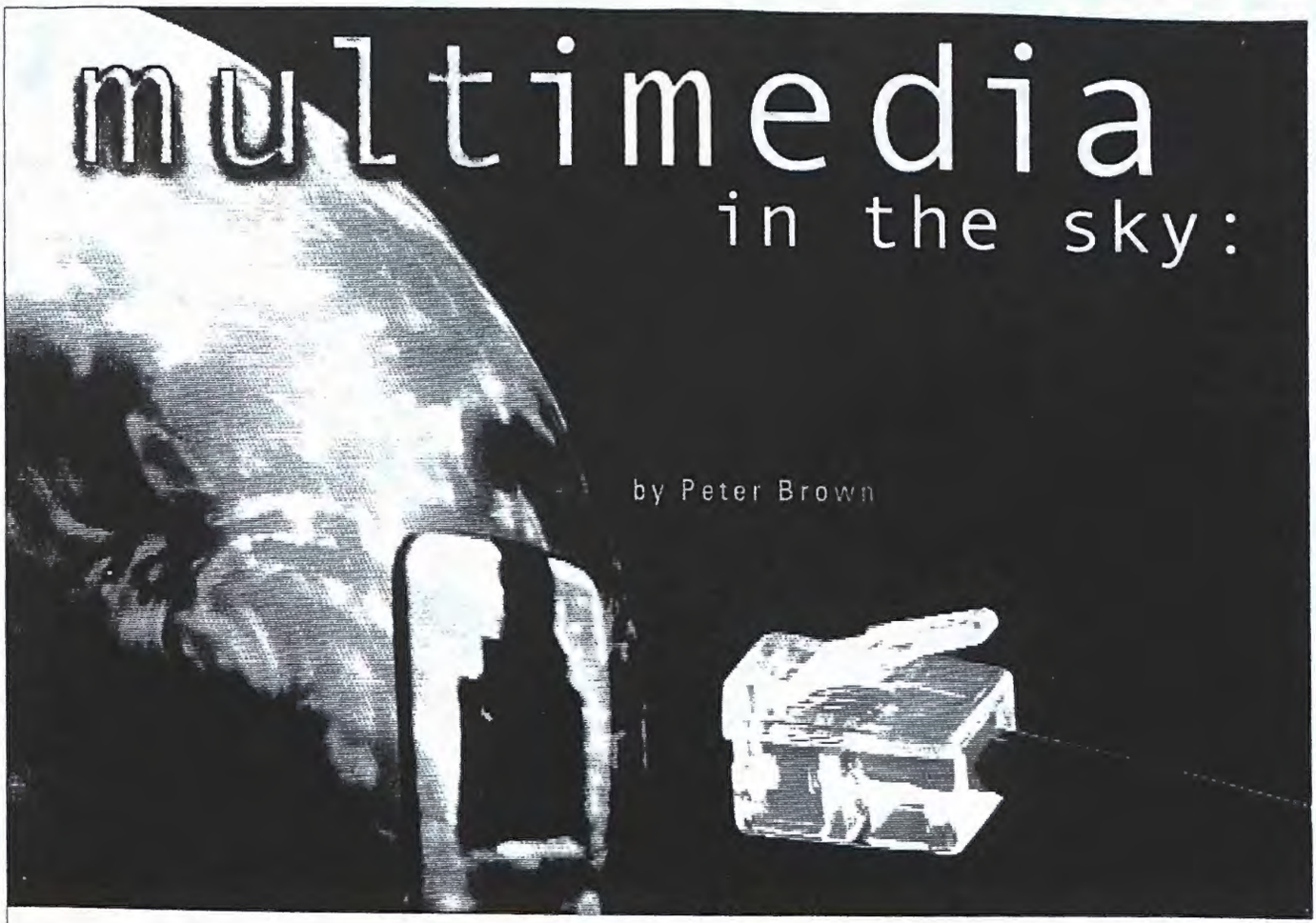
"I don't share the view that all the business is going to the mega-operators," says Ross. "It ignores the idiosyncratic nature, and the depth and breadth of the industry with its multiplicity of users."

New Skies' position in the second tier of operators has forced it to create innovative marketing approaches to win business despite its smaller size, a strategy that Ross says other smaller operators will be able to use in the future to survive. He cites the New Skies 806 satellite, a cable distribution bird for South America, as an example of a satellite that is loaded with customers who have 10-year contracts. Neither Loral nor Panamsat will be able to displace New Skies' business there, he believes. "We are doing well and can beat them on getting business," Ross says.

Smaller operators also can design specialized capacity on their satellites to serve niche markets. Ross says the New Skies 803 satellite has two transponders that perform Ku-/C-band cross-strapping out of the Middle East, making them perfect for some broadcast and video operations out of Baghdad, a place of frequent interest to TV companies who are heavy satellite users. New Skies has no trouble selling that capacity. Creative marketing also helps, as does the ability to drop prices when a satellite isn't selling out. New Skies has come up with a strategy to sell capacity on its 513 satellite in the Pacific Ocean, which was a fully depreciated, inclined orbit satellite that Intelsat had used for cable restoration services, but had much unused capacity when turned over to New Skies. Transponder sales for the 513 have been achieved by using it for Internet services and dropping the prices low enough to be competitive with undersea cable, Ross says.

THERESA FOLEY IS VIA SATELLITE'S SENIOR CONTRIBUTING WRITER.

# multimedia in the sky:



by Peter Brown

SATELLITES AND MULTIMEDIA ARE COMING TOGETHER IN A VERY COMPELLING FASHION. THE EXPLOSIVE DEMAND FOR MULTIMEDIA-BASED CONTENT—BOTH IN THE PUBLIC AND PRIVATE SECTORS—IS HAVING AN IMPACT ON SATELLITE COMPANIES. SOME WOULD GO AS FAR TO SAY MULTIMEDIA IS RESHAPING THE MARKET FOR SATELLITE-RELATED PRODUCTS AND SERVICES FOR BOTH CONSUMER AND CORPORATE APPLICATIONS. EXISTING SATELLITE SERVICE PROVIDERS ARE ACTIVELY SEEKING NEW INTERNET-BASED MARKETS AND TRYING TO DETERMINE HOW TO BEST CAPITALIZE ON THE GROWING DEMAND FOR INTERNET PROTOCOL (IP)-BASED CONTENT. DBS COMPANIES, FOR THEIR PART, ARE PUSHING ENHANCED AND INTERACTIVE SERVICES IN AN ATTEMPT TO WOO CUSTOMERS.

Will all of them succeed? While that remains to be seen, this trend demonstrates the wide range of exciting IP-related possibilities in the satellite arena.

## WHAT IS MULTIMEDIA?

The term "multimedia" as it applies to this article is fairly straightforward. "Multimedia is the integration of text, graphics, animation, audio and video in a single interactive computer-based environment," says Gordon G. Miller III, former director of multimedia at Virginia Tech and president and CEO of G3 Systems Inc. in Blacksburg, VA. He labels any attempt to broaden the definition of multimedia as erroneous.

Three current trends dominate the multimedia world today, according to Miller. Internet-based multimedia content is slowly achieving an equal status with, although not quite displacing, prepackaged content such as DVDs and CD-ROMs. Aside from increased Web-based distribution of multimedia, Miller sees the emergence of database technology as another major factor shaping the multimedia world.

Having the ability to devise new satellite-delivered, multimedia-based training models, for example, is allowing G3 Systems to pursue a number of innovative alternatives for one of its larger clients, the U.S. Army. G3 Systems is contributing to the development of what is referred to as a systems architecture for a "Shareable Courseware Object," which will be able to flow over a 256 kbps satellite link. The goal is to greatly increase the effectiveness and the manageability of training-related multimedia content for the Army, as well as other branches of the U.S. military.

Miller believes satellites might represent better end-to-end solutions, and he characterizes Microsoft's investment in the $9 billion Teledesic project as evidence of that fact, too. However, as more emphasis is placed on interactivity, this, in turn, is

**CURRENT ESTIMATED INTERNET CAPACITY BY COMPANY**

| System | Known capacity |
|---|---|
| Intelsat | 583 Mbps+ |
| Panamsat | 500 Mbps |
| Loral Orion | 287 Mbps* |
| Columbia | 204 Mbps |
| New Skies | 204 Mbps+ |
| Eutelsat | 90 Mbps |
| Total | 1.87 Gbps |

* Loral Orion figure is averaged out from the range of 275 to 300 Mb

Source: Irwin Communications

increasing the challenge faced by satellite service providers and hardware vendors.

Finally, Miller also sees a growing shift in multimedia content distribution away from the much-publicized procedure involving "push" content delivery strategies, to a highly synchronized process of flowing multimedia directly into a storage device or cache. This creates the effect or achieves a virtual simulation of real-time access, but with the focus shifting to the end-user, who may "pull" the content to his or her desktop or display on demand.

## EYEING 27 MILLION DISH-EQUIPPED HOUSEHOLDS

Candace Johnson, founder and CEO of Europe Online, has been in the satellite business for a very long time. Her list of accomplishments include a leadership role, both in the creation of SES Astra in 1981 and in the creation of Teleport Europe—now Loral Orion Europe—in 1990, which emerged as Europe's first private sector satellite venture. She served as an executive with Iridium from 1994 to 1996 as well.

Now her latest venture, Europe Online, has its eye on the Internet and the 27 million dish-equipped households that are found throughout Europe in a broad belt stretching east as far as the Ural Mountains. Europe Online offers multimedia caching and streaming services, and is headquartered in the Media Center in Betzdorf, Luxembourg, where one also finds the offices of SES Multimedia. And just 50 meters down the street is the château that serves as SES Astra's headquarters. So, when Europe Online announced in May that it was taking two full transponders on Astra 1G, it seemed quite logical.

"Our goal from the beginning has been to bring freedom of choice to European citizens. It started with TV and radio, but today it has expanded to mean the Internet as well," Johnson says. "This is opening up a whole new world."

In Eastern Europe, for example, the opportunities are wide open. TV stations that could not previously afford a full Astra transponder are finding ways to fund the $180,000 to $360,000 that Johnson ballparks as the cost to stream their content at between 300 kbps and 600 kbps via Europe Online for a full year.

Europe Online is caching at every single part of the network, according to Johnson. In order to maintain the most efficient multicast stream, Europe Online is not multiplexing, while at the same time aggregating IP content at the Astra uplink in Betzdorf.

"We are offering full pull capabilities at up to 8 Mbps at the downlink. Why are we not multiplexing? It simply takes up too much overhead. With the vast improvement in throughput that results, we find ourselves running 34 Mbps through a 34 MHz transponder," Johnsons says.

Europe Online has tapped Inktomi and Sun Microsystems for its caching platforms, among other providers. According to Johnson, the lengthy list of satellite PCI card and set-top box vendors for Europe Online includes Harmonic Data Systems, Philips, Telemann, Nokia, Technisat, Broadlogic, Technotrend, Media Star, Sagem, Kathrein, Grundig, Lemon and Radix. Prices for either the PC cards or set-top boxes are in the range of 200 and 350 Euros—at presstime this converts into only $209 to $366.

"We estimate that 200,000 subscribers will sign up in the first year, and we have hundreds of ISPs wishing to offer this service. These end-users can receive all of the Astra digital television and radio content as well," Johnson says. "We have an option for more transponders. We also have as much terrestrial Internet backbone available through KPNQwest as satellite capacity. We are speaking with other backbone providers, too. We have done this in order to ensure a good Internet pull service for end users, in addition to offering broadband streaming video and audio, as well as file transfers at up to 8 Mbps."

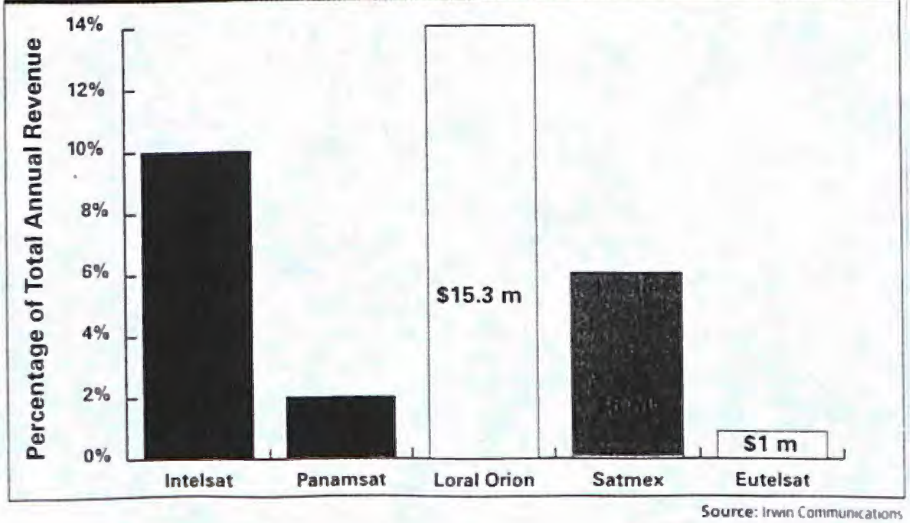
## TEN-TV: A SIMPLE SOLUTION VIA SATELLITE

When considering multimedia over satellite with a strong emphasis on multicasting, it is important to step back and take a good look at one satellite-based enterprise that locked onto a solid bread-and-butter solution for content distribution in 1992—straight multiple-channel digital satellite broadcasts on separate channels—and is now adopting a more flexible approach.

"In 1998, we did no Webcasting to speak of, and this year, the trend here has been toward both digital satellite and Internet-based distribution of video content," says Bruce Hanson, president and CEO of Ardsley, New York-based Technology Education Network Inc. (TEN-TV). "We are technology-agnostic. When it comes to choosing the right tools to deliver content, we want to use the best of breed."

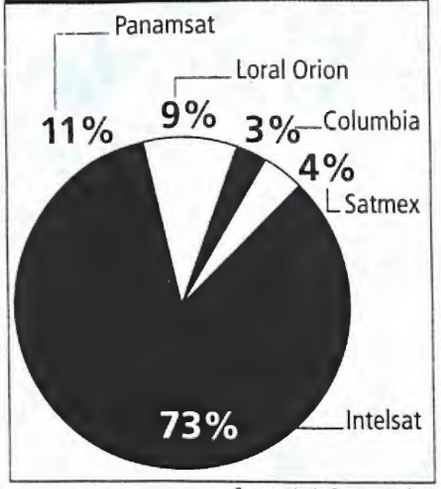
When TEN-TV does any Webcasting, it eliminates the terrestrial links and skips over the Web entirely to deliver the video. TEN-TV's signal is replicated via its satellite network to so-called collocation facilities around the world. These facilities are similar to cable headends, but instead of using hybrid fiber-coax (HFC) as its last-mile solution, TEN-TV uses the Internet to stream the video, according to Hanson, thus eliminating or bypassing

**1998 U.S. BACKBONE INTERNET CONNECTIVITY REVENUE BY OPERATOR**




Source: Irwin Communications

**SHARE OF TOTAL REVENUE FROM U.S. BACKBONE ACCESS, 1998**




**Source:** Irwin Communications

the congestion that often clogs the Internet.

TEN-TV has 600 downlink sites in the United States and between 35 and 40 downlink sites in Europe, according to Hanson. With a client list that instantly raises eyebrows on the IT circuit, TEN-TV recently added CompUSA Inc., which has 211 CompUSA Computer Superstores nationwide, featuring on-site classrooms. Microsoft, IBM, Lotus, Cisco Systems, Bay Networks and Compaq Computer Corp. are already on TEN-TV's list of top 10 customers.

Since 1997, TEN-TV's mix of special presentations and educational and training programs have been beamed at 3.3 Mbps all across North America using a satellite feed on SBS 6 reaching Digitalxpress terminals. In Europe, TEN-TV uses Intelsat K to access its growing customer base via Williams Global Access Services' facilities in London, which have been rolling out Powervu and Powervu IP-based networks from Scientific-Atlanta. This transatlantic traffic flow is two-way, according to Hanson, who points out that many of the Lotus broadcasts on TEN-TV originate in Europe.

"We use satellite to our advantage, replicating the video in by using satellite receivers. It results in a dramatic improvement in performance over the Internet. Otherwise, there are simply too many bandwidth constraints and too many hops. Nothing we do over satellite is videoconference quality. It is all studio based with professionally produced lighting and sound," Hanson says. "With a satellite feed, the video can be split off easily to a projection TV or multiple TV monitors.

"Webcasting sounds great, but you really need to understand bandwidth. For example, one person on a dial up connection will have dramatically better performance than, say, 15 people on a single T1," Hanson adds. "That essential degree of quality or watchability drops down dramatically when anything beyond a mere handful of viewers is involved on a single connection. However, it is never quite that simplistic."

TEN-TV itself will account for roughly 40 percent of the 406 hours of the network's programming this year, according to the company, with programs such as "TEN Tech Live." That may not seem like much, but it breaks down to more than 30 hours per month, and it includes live coverage of Comdex each year. High-tech events in Europe, along with a selection including content from the Gartnergroup, IBM PC Institute, Compaq, Hewlett-Packard and Nortel Networks, are on TEN-TV's programming menu as well.

"Our set-top box approach, where the customer never even moves the dish nor turns off the receiver, may sound almost too simple and too easy in this day and age," Hanson says. "But there are still many customers without multimedia PCs or who are unable to install plug-ins and streaming video for one reason or another. We never have to worry about latency, and in terms of a video-rich experience, nothing can beat satellite."

## ABOVENET COMMUNICATIONS: DOING DEALS IN THE SKY

What do Panamsat, Loral Orion, Ibeam Broadcasting and ATC Teleports all have in common? Besides the fact that these are forward-thinking companies with a strong interest in shaping the future of satellite communications, each has struck a deal recently with Abovenet Communications, which was created in 1996 in San Jose, CA. And each agreement or alliance represents another chapter in the ongoing tale of how companies are effectively meshing together their point-to-multipoint, satellite-based agendas with Internet service providers on the ground.

According to Michael Brookins, Abovenet's manager of systems engineering, Abovenet is a solid, ultra-reliable, Internet-based facility on the ground with incredible redundancy. Congestion goes away entirely thanks to Abovenet's way of addressing the needs of large and fast-growing Internet-centric businesses. Not only is service maintained at the highest possible level, according to Brookins, but he describes Abovenet as a "Switzerland of the Internet," which carefully avoids competing with its customers and partners as well.

"We deploy a clean network via Ethernet, while bringing as many content providers and ISPs together as possible on the same floor," Brookins says. "We will peer with anybody. We want to be connected to as many places as we can in order to provide both our customers, and their customers in turn, with the best possible experience on the Internet."

Abovenet is the creator of the Internet Service Exchange, or ISX, concept that includes more than 10 Gbps of global capacity and is a critical component in Abovenet's "Global One-Hop Network."

"ISX is all about putting Abovenet and the content providers on the same LAN, although in this instance, our LAN extends out to users on a global basis," Brookins says. "A good deal of the infrastructure in many countries is quite old and limited in capacity. In addition, as far as undersea cables are concerned, there is much more trans-Atlantic fiber capacity than trans-Pacific fiber capacity. This stems from the fact that, among other things, Asian countries are less likely to work together, thereby necessitating arrangements with each country."

Abovenet co-founder and chief technology officer Dave Rand is the inventor of Multi-Router Traffic Grapher (MRTG), which allows network operators to see exactly how much bandwidth they are using. It also enables operators to plot the history of a circuit to identify more precisely all the inherent usage trends on that circuit. Abovenet's expertise in this area of Internet performance has manifested itself in Abovenet's policy of providing 100 percent headroom. In other words, any aggregated traffic on an Abovenet line can burst to double its baseline flow in an instant without disrupting the network as a whole.

One look at a map of Abovenet's facilities tells the story. The company deliberately places its enormous clusters of Cisco systems 12000-series routers and other high-performance internetworking gear close to the critical exchanges or intersections on the Internet, such as San Jose, CA, and Tysons Corner, VA, for example. These two locations are where Metropolitan Area Exchange-West (MAE-West) and MAE-East are located. Abovenet also connects to Uunet in eight different locations, for example. Abovenet is taking the ISX concept to Europe, too, by leasing space from

Telehouse in New York City and London for a transatlantic service that will tie into new, jointly run Abovenet facilties in Frankfurt, London and Vienna.

The satellite service providers mentioned above enter into Abovenet's equation in vastly different ways. The one-hop world of Abovenet is ideally addressed by satellite-based services in general. For Loral Orion—which is busy serving a growing list of clients in Eastern Europe and Asia with a wide range of satellite-based multicast services, for example—Abovenet offers a very attractive networking option.

All of Loral Orion's clients have a vital stake in accessing the most reliable Internet backbone service possible in the United States. Abovenet already handles 40 percent to 50 percent of total Asian traffic arriving in the United States at its ISX in San Jose, involving 22 of the largest Asian-based ISPs, according to Brookins.

By placing its servers in Abovenet's ISXs on the East and West coasts, Loral Orion is better able to feed its Internet traffic directly into the U.S. backbone. Brookins emphasizes the presence of seven different telco facility providers, which together bring 25 Gbps of capacity directly to the floor of the Abovenet ISX in San Jose.

While Abovenet's link to Loral Orion is based on an agreement, the announcement in March between Abovenet and Ibeam about a strategic alliance is nothing less than a major matchup in the streaming media world. Given recent investments in Ibeam by companies such as Intel and Liberty Media, this tie with Abovenet is significant because content providers can now blend together the network performance advantages of Abovenet's ISX infrastructure and Global One-Hop Network with the Ibeam Maxcaster on-site server solution.

ATC Teleports signed on with Abovenet in May, and now has an interconnection with Abovenet's ISX in Tyson's Corner, VA. Coordinating Internet traffic so it passes through a teleport that taps into an Abovenet ISX is a great way to ensure that customers are receiving the best treatment possible. ATC Teleports also has facilties in New York City and Dallas, where it ties into other major Internet exchange points such as 60 Hudson Street and MAE Dallas.

"We are giving everybody a better feel for the Internet. We see all of our satellite-related agreements and partnerships as joint business relationships where we all benefit. These extend the reach of our customers, while Panamsat, Loral Orion, Ibeam and ATC Teleports are able to deploy Internet services, with the assurance of knowing that Abovenet offers the highest level of reliability for their customers in the most cost-efficient manner possible," Brookins says.

## EDN: INTERACTIVE TERMINALS ARE HERE

Atlanta-based Echostar Data Networks (EDN)—formerly Media4—is in the process of rapidly growing its work force, and it is moving into a new 27,000-square-foot facility, according to David Schmitt, marketing manager for data services at EDN.

While EDN's parent company, Colorado-based Echostar Communications Corp., is focused upon taking the Internet to the consumer in a number of ways via a new line of DVB-compliant products such as the Dishplayer, EDN is focused upon enterprise solutions.

News of EDN's expansion comes at the same time Intelsat is "proof of concept" testing four of EDN's two-way satellite terminals that have been designated by Intelsat as the Interactive Multimedia Service System (IMSS). IMSS is derived from work at EDN on the so-called ICE, or Internet Commerce Engine, technology.

"We have already deployed Ice Box products for video-on-demand applications in Europe, and we will be using them to support private IP video applications for Dish Network customers in the United States," Schmitt says.

Echostar and EDN are taking full advantage of the demand for Internet-based services, and together they are finding numerous enterprise and consumer applications. With Echostar's Dish Network DBS service, for example, subscribers may now access a growing list of interactive services that seem to support the notion that Echostar has a few more surprises up its sleeve as far as the Internet world is concerned. Echostar's set-top box-based Dishplayer, for example, taps into WebTV.

At the same time, EDN and Swedish Internet/telecom powerhouse Telia, have undertaken a joint pilot program to explore satellite platforms with push applications, among other things.

"We're at the forefront of the rapidly emerging markets for streaming satellite services," Schmitt says. "With our powerful combination of technology and DBS bandwidth, we're going to make a big impact."

## AND THE LIST GOES ON

Any attempt to provide an exhaustive list of satellite companies involved in the multimedia market is doomed from the start because of the shear volume of participants. The above companies represent just a small sampling of the many ways in which multimedia and satellites have been wed successfully, and more importantly, profitably. Many more business plans are on the discussion table even now, and industry observers have only to wait for whole new methods and markets to emerge. ❖

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PETER BROWN HAS BEEN TRACKING THE SATELLITE AND DTH SECTORS IN THE UNITED STATES AND CANADA AS A FREELANCE WRITER SINCE THE MID-1980S. HE LIVES ON MOUNT DESERT ISLAND, ME.

**DEMAND FOR SATELLITE INTERNET BANDWIDTH (GBPS)**

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| North America | 1.3 | 2.0 | 2.8 | 3.6 | 4.4 |
| Latin America | 1.4 | 2.3 | 3.4 | 4.7 | 6.1 |
| Europe | 1.7 | 2.7 | 3.9 | 4.9 | 6.1 |
| Asia | 5.4 | 8.3 | 12.2 | 16.5 | 21.7 |
| Rest of World | .09 | 1.5 | 2.3 | 3.0 | 3.8 |
| World Total | 10.7 | 16.8 | 24.6 | 32.7 | 42.1 |
| Internet Share of Total Satellite Bandwidth | 5% | 7% | 8% | 12% | 9% |

Source: Tellus Venture Associates

# New Directions in Multimedia: Internet via Satellite

*In 1998 we are four years into a 20-year development of Internet as a global and ubiquitous communications tool. Microsoft's self-proclaimed ambition is to see Internet in every household. As IP grows to become the de facto standard within corporate IT, what role will satellite communications play in this area?*

Roger Stanyard and Steve Roberts

May 1998

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The Internet and the myriad services associated with it are set to radically change the structure and services of satellite communications. There are four key developments in Internet which affect the satellite communications industry:

- the need for copious capacity for Internet backbone and ISP links;

- the demand for high-speed access to Internet by end users;

- the development of video-on-demand within the Internet environment;

- and the demand for ubiquitous and universal access.

At present, the satellite industry is struggling to identify its markets in the Internet environment. It has numerous plans for broadband multimedia satellites. The Internet is now the prime driver behind these projects. There are at least 111 plans for multimedia satellite systems involving 528 geostationary satellites, 874 low earth orbit satellites and 161 middle earth orbit satellites. The plans come from some 69 existing or new venture satellite operators.

Most have not revealed the expected capital costs of their projects. However, those that have, involve capital expenditure of at least US$ 99.5 billion. Of this, they appear to have raised less than US$ 1 billion in financing. While such multimedia satellite projects have attracted a great deal of industry attention and publicity, the satellite operators have been busy exploiting their existing capacity to support Internet.

## Opportunity is in ISP Links

In the provision of bent-pipe capacity for linking ISPs with US backbone infrastructure and intra-regional backbone capacity, satellite operators have scored a major success. Within the past two years they have leased the equivalent of thirty-three 36 MHz equivalent transponders, either directly to end-users or to major or specialised carriers. As of March this year, at least another 20 full transponders on current or near-to-launch satellites were earmarked for such traffic. DTT Consulting estimates that the size of the market for transponders for such traffic is doubling every five months -- by the year 2002, this market could be worth between US$ 750 million and US$ 2.5 billion a year to satellite operators.

Less spectacular has been the growth in the use of satellite transponders for the so-called highly asymmetrical or hybrid Internet

services, which use satellite capacity for data coming into a customer's premises, and a modem connected to the terrestrial network for data going the other way. These services include DirecPC and the current ESM Astra-Net service in Europe. However, growth in use of DirecPC has been modest (less than 100,000 dishes installed) and a number of services based on the European DVB standard have only recently been launched. In total, these services currently account for about fourteen 36 MHz equivalent transponders.

The value of leased capacity to satellite operators in the ISP and backbone markets is worth approximately US$ 108 million a year. This excludes carrier mark-ups. However, only a handful of satellite operators have a significant presence in the increasingly lucrative market for ISP connections and backbone. Without exception, these are international satellite operators which can provide interconnection to US terrestrial Internet backbone infrastructure. ISPs outside the US want this connection because it avoids congestion on local terrestrial backbone infrastructure and because 80 per cent of Web content is on servers located in the US.

Unfortunately, very few satellite operators at present can offer interconnection to US backbone infrastructure for ISPs located outside North America. Therefore, the market is dominated by four main players -- Intelsat, Orion, PanAmSat and Satmex. Of these, Intelsat is by far the biggest carrier of ISP and backbone traffic.

The received wisdom about the Internet backbone is that terrestrial infrastructure outside the US is poorly developed, with low capacity and few high-speed intra-regional links. That wisdom suggests that this is being eliminated as new infrastructure is put in place, in turn allowing ISPs to inter-connect with backbone locally. Associated with this development is the perception that the percentage of Web content held on non-US servers will increase. The implication is that in the medium- to long-term (5-10 years), satellite ISP and backbone traffic will move to fibre-optic links, leaving a lot of surplus satellite capacity.

It also looks clear that even in the long term, much of the world will be poorly served by terrestrial infrastructure capable of supporting rapid growth in Internet datarate requirements. Indeed, US attempts to reform the accounting rate mechanism will remove the wherewithal of a lot of nations to upgrade their national and international telecoms infrastructure. Moreover, the growing dominance of US owned global satellite operators in provision of Internet capacity gives them a strong base from which to leverage their position into the next generation of satellite technology specifically designed for Internet -- the Ka-band and V-band multimedia satellites.

**Fragmented market**

At present, the rest of the world's satellite operators are left with the highly uncertain and smaller market for Internet based data broadcasting and highly asymmetrical DirecPC-type services. Many of the world's regional satellite operators have invested heavily in space segment to provide digital satellite television services. Nominally, provision of associated Internet services to consumers should provide them with a tool to leverage their market position.

In addition, digital satellite seems to have largely failed outside the US. In practice, Internet provides a major threat to broadcast satellite operators. But the traditional business model for digital satellite television has been largely invalid outside the US. The result is an expected over-supply of capacity on regional satellite systems. For example, Ku-band capacity serving the European market is likely to increase by 51 per cent by the end of 1999 (over 1997 year-end).

The France-based analyst firm, Euroconsult estimated that the global capacity of transponders as at the end of 1997 was 3006. It forecasts that this will grow to between 6840 and 8035 by 2002. Transponder prices are already falling rapidly in Asia, and the last two years has seen in fall in orders for new spacecraft. There were orders for 20 commercial communications satellites in 1997, down from 53 in 1995.

Worse still, Internet is likely to be offering video-on-demand on a mass scale within 5-10 years. The worst case scenario is that broadcasting will then be left to survive on real-time programming, such as sports. The broadcasting industry remains largely locked out of 'convergence,' and the television is unlikely to become a significant device for browsing the Internet. Nor will the PC develop as a tool for viewing digital or analogue television -- they will remain two separate devices. However, the DBS market is very healthy in the US. This makes it extremely difficult to use digital satellite television as a platform for Internet. The most likely scenario is that US DSB operators will integrate high-speed Internet access and television services to provide effective communications for rural areas.

**Business Drivers**

Ka-band multimedia satellites offer the prospect of ubiquitous high-speed Internet access to consumers. However, the main market for such satellites in the Internet environment will be for professional users and business. The cost of two-way earth stations will be prohibitive when installation costs are taken into consideration. Despite claims from SkyBridge that terminals will be available for US$ 650, we expect that the minimum installed price will be in excess of US$ 1500.

US experiences in 1998 show that consumers are increasingly unwilling to pay more than a US$ 1000 for an Internet ready PC. Indeed, there are now suggestions that the price of a basic Internet-ready PC will drop to US$ 350. This also reinforces the conclusion that WebTV is a commercial dead-end as an Internet access tool.

A possible market scenario for Ka-band Internet consumer access will be for professionals working partly from home, or telecommuters where employers or medium to large companies foot the bill both for the two-way terminals and transmission charges (likely to be well above competing alternatives). Even though corporate IT managers perceive satellite communications as expensive and inherently insecure, recent IT Developments will favour Ka-band. IP is becoming the de facto standard for internal data communications and intranets are now seen as extremely cost effective and powerful corporate IT tools. There is also a growing trend to centralise processing and storage power in the IT environment, including management and control of software. Internet telephony and the associated massive reductions in telephone call or leased-line charges, is set to emerge as a mainstream IT application on

managed networks within the next year. All these point to the substantial economic arguments in favour of equipping home workers with high-speed Internet/intranet access to corporate networks.

But satellites will face intense competition from other high-speed local loop. The most formidable of these is the xDSL family of technologies that use existing copper wire telephone infrastructure. In the consumer environment, the model is 'ADSL Lite', a scaled-down version now being marketed. This is a killer system which provides a platform from which to launch higher capacity or enhanced xDSL services such as VDSL (aimed at businesses) and VoD (aimed at consumers).

But forecasting demand for Ka-band services is extremely difficult. Indeed, the basic model for the Ka-band market is based on an addressable market of would-be users, all outside the 18,000 feet line length capability of ADSL Lite. There are no reliable statistics to show how many households lie outside this line length, but the figure appears to be between 5 and 20 per cent of households. This suggests an addressable world market by 2001 of around 50 million to 200 million households. Motorola, in contrast, has suggested that the addressable market for its Celestri system is around 691 million sites worldwide.

Cable modems are proving to be a commercial dead-end in both the business and consumer marketplace. The PC and software industries have already signalled the demise of the cable modem by agreeing on ADSL Lite standards. The costs of upgrading a pure coax cable system to support two-way Internet access is so great as to require a 54 per cent penetration rate to break-even. Consumers will also reject cable modem technology as it is not compatible with ADSL and requires expensive installation.

A more promising Internet delivery infrastructure is wireless local loop technology. Outside Europe, this looks likely to be in the form of Ka-band LMDS; the European equivalent (MVDS) is stuck in the high-cost/poor performance ghetto of 40.5-43.5 GHz. However, it remains unclear how the LMDS market will develop. Current thinking suggests that it will centre on serving the business environment. There is a possibility that Ka-band satellites will be used to extend LMDS to rural or remote areas.

**Uncertainties in Technologies**

The corporate environment also overlaps with emerging and unpredictable demand for multimedia services that do not necessarily involve the IP standard. That in turn overlaps with the need to forecast in the fickle consumer markets. Related to this is the still unproven market for push-based services. They remain a technology in pursuit of a market.

The overall technological and market uncertainties imply that satellite companies heavily dependent on broadcasting traffic will need to re-deploy their assets and refocus their business plans due to the impact of Internet. In fact, there are serious shortcomings for Ka-band satellite operators in the 1997 WTO agreements on satellite communications. The agreements do not cover many potential key markets. Moreover, the US retains formidable powers to stop access to its domestic marketplace. In the long run, this favours US backed global satellite

operators at the expense of regional and domestic operators.

Other key regulatory matters have yet to be fully addressed, including inter-operability of earth stations between different satellites, numbering of terminals, spectrum grabbing, and inter-satellite link compatabilities. Related to this are issues of standardisation of terminal designs needed to gain economies of scale in production of earth stations used for Internet access. The bigger picture also identifies key problems in Europe in establishing industrial policies needed to combat the technical and content advantages of US business.

Clearly, WebTV will not provide a platform for satellite broadcasters moving into the multimedia environment. Nor is there a significant market for digital satellite television within the PCTV environment. In turn, broadcasters and other media organisations will need to refocus away from digital satellite television towards Internet, the PC and content. In particular, the strategy pursued by News Corporation over the last decade of diversifying from the print medium to broadcasting is now dated, inappropriate and dangerous for its shareholders.

The first generation of mobile satellite systems to offer high-speed Internet access to end-users will launch with relatively low data rates. However, in the long term, these systems may 'merge' with fixed satellite systems. In this environment, the likely winners are Hughes (including PanAmSat), Loral (including Orion, SatMex, SkyBridge and Cyberstar), Motorola (Celestri), Lockheed Martin (Astrolink), Intelsat and Inmarsat. To add to this, a host of specialised carriers are now active in the satellite marketplace including Teleglobe, Global One and Telenor, as well as new smaller ventures such as Taide. This scenario points to likely key players in the provision of earth terminals, data broadcasting and ISP roles.

*Roger Stanyard is principle consultant at DTT Consulting and Steve Roberts is technical manager. This article is based on the Internet Via Satellite report by DTT Consulting.*

[TOP]

# multicasting

## propelling the next wave of satellite growth

By Theresa Foley

**Caching and multicasting weren't even in the dictionary a few years ago. Today they are next in line to become the big revenue generators for satellite service providers.**

Now that satellite operators have gotten a firm foothold in the provision of intercontinental links to Internet service providers (ISPs), new services are being demonstrated that promise to take hold in the next 12 months, further reshaping the satellite data business.

Recent reports released by Irwin Communications and DTT Consulting (*see box on p 48*) have indicated that caching and multicasting services support the Internet community by making the Web operate more efficiently. Both also are of great interest to the huge private networking community that borrows Internet-related technology to fuel its expansion.

In caching, the most popular Web pages are to local servers, where they are stored and can be accessed by users who enter the Web through that particular portal. The user does not have to navigate the Internet network to retrieve the data, but can get the content from the server, which saves time and reduces congestion on the Internet. Multicasting is the broadcasting of data, rather than video, in a single satellite transmission that can reach an infinite number of dishes aimed at the satellite.

Neither report quantifies the development of caching or multicasting services in a absolute terms, since both applications are just moving beyond demonstration into early usage. These new applications have only begun to produce the first trickle of revenues, but service providers and analysts see that trickle turning into a torrent, possibly by next year, as the media stream riding the Internet changes. Information-rich sources and real-time video services are climbing in popularity, bumping up the demand for bandwidth all along the distribution line.

"Skycache is representative of where caching is headed," says Adam Toll, Irwin Communications' director of research and principal author of the study *Internet Delivery Via Satellite*. The entrepreneurial firm Skycache was formed in 1997 to use satellites for Internet cache distribution and is currently developing a streaming audio/video service as well. "At the end of 1998, Skycache had about 50 ISPs in the United States as customers, using a 4-megabit cache stream over GE 3," he says. "In early 1999, the company expanded into Europe with a similar feed on GE 1E, and they are planning to upgrade both feeds to 45 megabits by the end of the summer. We believe they have upwards of 120 customers currently, which includes more than 20 European ISPs.

"We are probably looking at a killer application, especially for satellites," if ISPs continue to respond strongly and streaming media services are launched successfully by Skycache and others, Toll says.

Roger Stanyard, author of DTT's report, *Internet Via Satellite 99*, is more cautious. He believes satellite cache transmissions sound great but the actual performance is less impressive, "because it is an add-on to existing terrestrially based caching techniques."

The two above-mentioned reports agree on several points, including the observation that Internet traffic patterns are bound to shift regionally, thus having less emphasis on accessing U.S. Web sites, and that Internet Protocol (IP) has emerged as a key factor. Internet Protocol is set of rules that allow an unknown number of computers of different types exchange information over the Internet. And IP, as it turns out, is affecting more than just Internet-related services. Irwin Communications says IP-based networks are being adopted by business television and VSAT customers, who are becoming consumers of broadband services along with the Internet community. IP-based services are being developed for business networks by companies such as Hughes, with its DirecPC product. Companies such as GM, Kmart and Re/Max are using IP-based VSAT networks for a variety of corporate communications applications.

Demand for Internet services into the home also will impact the fixed satellite services (FSS) business. Satellite operators expect to see healthy demand for data streaming to cable headends to support the introduction of new cable Internet services such as @home and Roadrunner, once the cable industry starts rolling out these services in larger numbers. The cable operators who have been delivering video over satellite might need substantially more capacity to deliver Internet content updates to their subscribers.

Projects are under way that would allow broadcasters such as CNN—which already uses satellites for program distribution—to mix Internet data into their broadcast feeds so that it can be stored at the cable headend

## QUANTIFYING THE INTERNET

Internet services over satellite grew by the phenomenal rate of 300 percent to 400 percent in the last year. Leading satellite companies are realigning their operations to compete for a share of the broadband/multimedia satellite market, an industry sector that is estimated to grow from zero just two to three years ago, to $30 billion in the next eight years.

"Independent data supports CEO claims of 100 percent to 200 percent annual growth in revenues," says Susan Irwin, president of Irwin Communications. New satellite/Internet reports were issued in March and April by Irwin's firm (*Internet Delivery Via Satellite*) and DTT Consulting (*Internet Via Satellite 99*), a U.K.-based company.

Statistics in each report point to a fast-growing, dynamic business. Irwin's study found that as of mid-April, two gigabytes of Internet traffic were being transmitted over satellites annually, compared to 500 megabytes at the end of 1997. The Internet service provider (ISP) customers get a modest start with a 64 or 124 kbps link, then quickly move to take a fatter pipe, often signing on for 1 to 2 megabytes, according to Adam Toll, Irwin Communication's director of research and principal author of the study.

Roger Stanyard, author of DTT's report, counted a total of 948 satellite-provided ISP links to the Internet backbone in January 1999, compared to 222 a year before. The 948 is roughly one-tenth of his total estimated number of ISPs worldwide. While a quadrupling of the number of links is impressive, he says this phenomenal rate is diluted by the fact that a greatly increased number of companies is competing to serve the ISPs. In 1999, the report counted 107 such companies, compared to 24 in 1998. Besides satellite owners, carriers and value-added companies have joined the fray. On average, each competitor carries nine links, or about one transponder's worth of capacity, bringing in an estimated $3.9 million a year, or $443,000 per ISP link per year—modest for an "exploding" market, to be sure.

The amount of capacity the ISPs are using has increased threefold in a year, by Stanyard's count, to 93.6 transponders, valued at $210 million in revenues for the year ending in January 1999. The whole ISP-linkage market was worth an estimated $420 million in 1998, up from $70 million the year before.

Looking further out, other analysts' estimates are that broadband satellite services will be worth $30 billion to $32 billion a year by 2007. Current operators are working feverishly to develop the market with existing satellites, while their Ka-band brethren take their time building advanced technology satellites that could change the economics greatly for satellite broadband. A new Merrill Lynch estimate says 45 percent of this business will be over low earth orbit constellations, while 55 percent will be transmitted over geostationary satellites.

As total worldwide Internet users grow, forecasters see a large market for satellite services to support both the Internet infrastructure and for direct access by users who can't connect via landlines. At year end 1998, the Computer Industry Almanac estimated some 147 million Internet users worldwide, compared to 61 million at the end of 1996. Of the total, 52 percent, or 76 million, were in the United States.

Where will it end? The forecast calls for 320 million worldwide Internet users by year end 2000 and more than 720 million by year end 2005.

"We see data and Internet transforming every area of satellite communications," says Tom Watts, first vice president at Merrill Lynch. A new Merrill Global Satellite Marketplace Forecast predicts that, "Data, Internet and IP multicasting (will) outstrip available FSS capacity within the next few years."

International demand for Internet backbone access should grow at more than 100 percent annually, Merrill says, with more caching by ISPs coming after another year. Huge growth in the number of Web hosts and servers will occur in the next five years, creating a big surge in demand for satellite multicasting of Web data with it.

Merrill sees data and Internet demand driving satellite revenues across the board. In total, the bank projects $63 billion in annual revenues by 2008 when data and Internet revenue over FSS, broadband, VSAT and DBS satellites are included.


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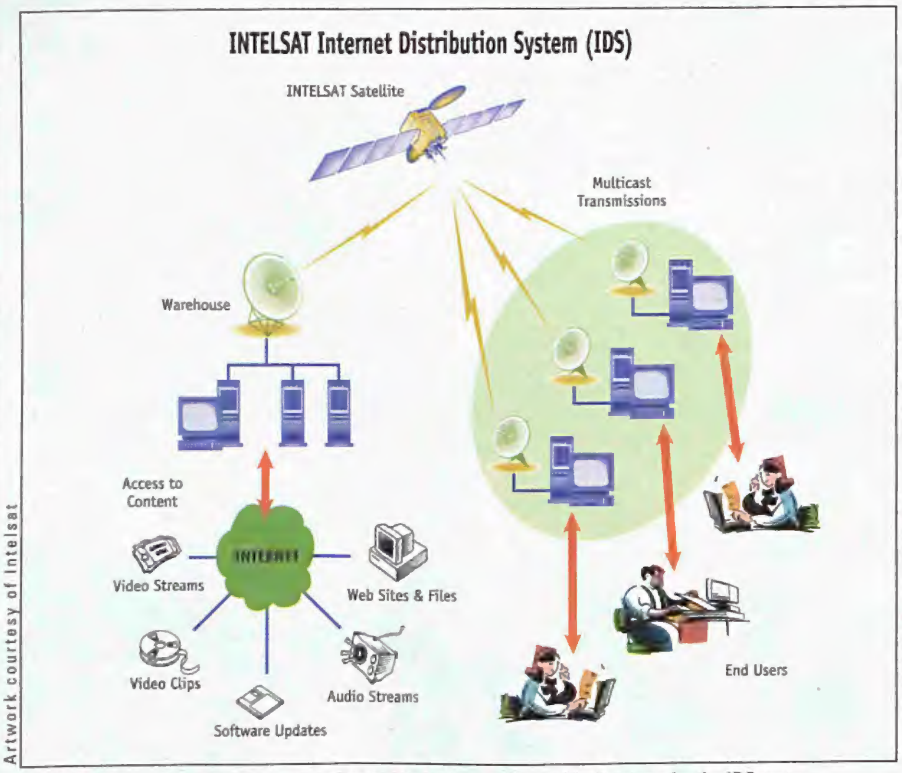



Artwork courtesy of Intelsat

**Satellite latency is a non-issue, according to Intelsat, as evidenced by its plans for the IDS system.**

for access by cable modem users, according to Toll. "By pushing data to the outer edges of the Internet, this type of streaming allows users to access rich-media content directly from their local service provider, avoiding the congestion typically encountered when accessing content elsewhere on the Internet," he says.

Robert Bednarek, chief technology officer for Panamsat Corp., says the distinction between broadcast and data will disappear as broadcasting goes digital and data adopts full motion video. "Telecom will have a broadcast component," he predicts.

Meanwhile, every few weeks, another new satellite/Internet service is announced by the leading operators in the business, including Intelsat, Loral Orion and Panamsat, and telecom carriers such as Teleglobe, Telenor, Worldcom, EUNet, Global One, Impsat and Interpacket.

Intelsat, for example, began trials of an Internet distribution system multicasting/caching service in April with the participation of its customers—British Telecom, Comsat, Embratel, France Telecom, KPN International, Telecom Authority of Cypress/Cytanet, Telecom Egypt/IDSC, Teleglobe and Telia. Intelsat will transmit popular Internet Web pages to a central warehouse for retransmission to "kiosks" around the world, where users can connect by local means for faster download.

Loral Orion's plan to expand into the Asian market has been impacted by the May failure of a Delta 3 rocket that carried the Orion 3 satellite. The company will continue to use Mabuhay, a satellite partially owned by Loral, and will then further expand into the region in the next 18 months using new satellite capacity. As another part of its global expansion, the company will break into the Latin American market using Loral and other regional satellites in the coming months and in the fall after the Orion 2 satellite launch.

Orion will announce several new Internet services this summer. Orion's Worldcast Premier, a dedicated ISP link service, will evolve into two service levels. One involves the delivery of data "feeds" such as "the best of the Web" to ISP sites, and the second the narrowcasting of special data of interest to particular ISPs or regions, according to Neil Bauer, Loral Data Services group vice president.

## SES ASTRA

Société Européenne des Satellites' (SES) strategy to develop broadband services on existing satellites differs in several ways from other industry leaders. First, SES has been focused to date on the European market, although that is changing with the acquisition of a large stake in Asiasat and plans to partner with a U.S. operator later this year. Second, SES will operate a commercial Ka-band payload following the June launch of Astra 1H, which will enable SES' 18-month old Astranet service to employ a Ka-band return path for its multimedia users. SES customers may lease either a transponder for their Internet-related usage and run the network themselves or use the SES brand-name platform Astranet, which provides them network support.

Romain Bausch, director general of SES, says SES multimedia traffic has gone from a half transponder dedicated to Astranet in January 1998 to 2.5 transponders this spring following a contract from Europe On Line for two transponders for Internet services. Europe On Line will sell the satellite service to ISPs, who then can offer a satellite connection to the Internet in addition to terrestrial access methods.

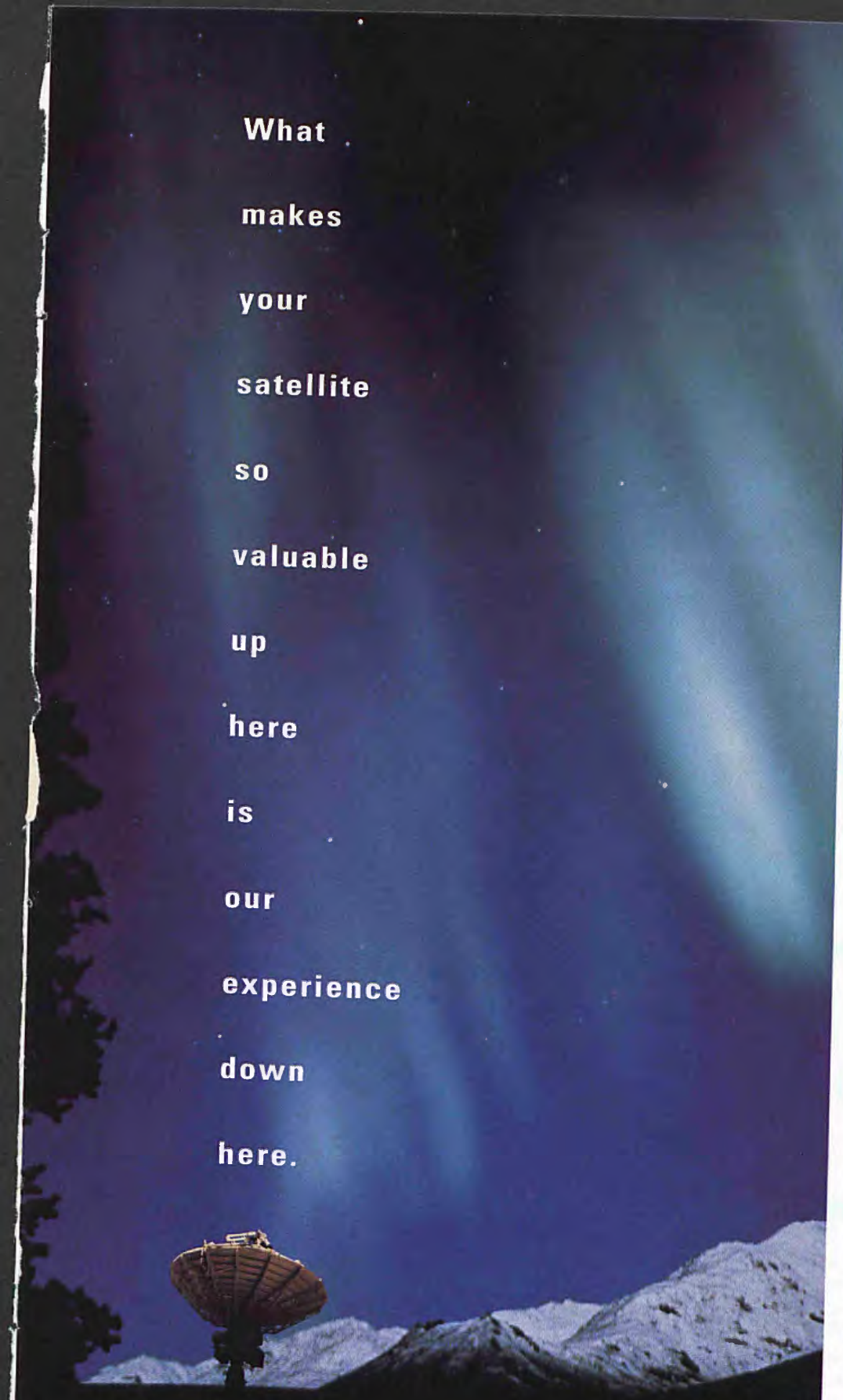
Perhaps because it has taken twice as long as anticipated to begin generating demand and revenue, many in the industry believe Astranet has not been a huge success. "We thought the build-up of traffic would take place six months to eight months after contracting," Bausch admits, but instead almost 18 months were needed. By the end of March, however, SES Multimedia was headed in the right direction with 30 customers using its Astranet platform.

Not only did SES have to convince service providers that both satellites and SES were the way to go, it had to wait for the service providers to convince the users. Then SES met resistance from potential clients, like bankers, who were enthusiastic about the service's capabilities but disappointed by SES' answer to their question of whether they could use the network for offices in Asia and Latin America. Bausch says business users are demanding global coverage for many of their applications.

The satellite industry will get its first real taste of two-way Ka-band services in first quarter 2000, when SES puts its Astra Return Channel Service (ARCS) into operation.

Bausch says tens of thousands of dishes will use ARCS practically from the start, since SES is negotiating with multiple service providers who could be customers, and each has 10,000 or so users. He predicts 100,000 users within two to three years.

SES is pursuing the business network market first, but eventually plans to take multimedia services to the consumer level via service providers. But this transition won't be possible until terminal prices drop

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to 500 Euros (approximately $533.50), down from the 2,000 Euros (approximately $2,134) price that will be the starting point, a price that terminal suppliers Nortel and Philips have committed to in advance. Terminal prototypes are due in early August. The 60 cm dish will receive in Ku-band at 38 Mbps and transmit in Ka-band at 150 kbps.

In the long term, SES hopes for 20 percent to 30 percent of the global broadband satellite market. SES has filed for 21 orbital slots for Ka-band satellites, and Bausch says the company will require at least four to six of those. Some of the slots likely will be impossible to coordinate and use by SES, and thus might be available to other filers. In the meantime, the exact plans for putting Ka-band payloads into more slots are not firm. As SES replaces its existing satellites, more Ka-band payloads for service enhancement will be added. But Bausch says bent pipe satellites can perform most of the applications. "The need to invest in onboard processing is not urgent," he adds.

On the other hand, he does see the need for geostationary broadband satellites to be augmented by low earth orbit constellations, and he says to watch for SES to take a role in one of the LEO ventures.



## ORION/CYBERSTAR

Loral Orion expects to see its Internet service revenues grow to 40 percent of its business this year with 300 megabits to 400 megabits of capacity devoted to the service. Those figures are twice the 1998 level, Bauer says. Orion has concentrated on serving European ISPs with backbone connections into the United States but has planned two new satellites going up in the next year and a half to expand into Latin America and Asia. Nonstop revenue growth will be made possible by the new satellites, Bauer says. Orion's plan to expand into the Asian market will be delayed by the May failure of a Delta 3 rocket that carried the Orion 3 satellite, but the company still plans to break into the Latin American market with its Orion 2 satellite, due for launch this fall.

Loral also hopes to create revenue-sharing arrangements, perhaps in the form of advertising or e-commerce, with some of the hot new Internet-related companies that may be customers or partners in some new services. Along those lines, in late April, Loral Data Services joined with Neoplanet Inc., an Internet software company, to develop custom navigation tools for accessing broadband services. Loral introduced a free "customizable" desktop enterprise portal also known as an "on-ramp to the Internet" in May that would help business users of the Internet access pre-program sites and services related to their needs. The free software was posted on Cyberstar's Web site in May.

Bauer's boss, Loral Space and Communications CEO Bernard Schwartz, believes the data services business is one of the keys to getting Loral into the black in 2000 if he can correctly position his divisions to win customers. Toward that end, Loral has combined Orion and its broadband services venture, Cyberstar, into the data services company that Bauer was assigned to head earlier this year. Operational responsibility for the Orion satellites was handed over to sister company, Loral Skynet, leaving the Data Ser-


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vices group to focus on its customers. Orion and Cyberstar, with a total staff of about 350, will continue to be run as separate entities for the foreseeable future. Cyberstar will try to develop IP-based products and services to sell to business clients, primarily in the United States for the time being. Orion will focus on the international ISPs and will also offer IP services to multinational clients needing to reach worldwide destinations.

Orion's data services business brought in about $40 million in 1998 revenues, but lost about $13 million, Schwartz said in February. This year, he forecast $70 million for Orion Data Services, the point at which the operation should break even. But the Orion 3 loss will impact those figures, according to Wall Street analysts. With Cyberstar included, data revenues for Loral should be $100 million this year, Schwartz predicts. The company has invested in Cyberstar for two years at an annual rate of $32 million but won't receive first revenues until 1999. He hopes to see Cyberstar generating $150 million to $200 million in revenues by 2000.\

## HUGHES/PANAMSAT

With its decision to put $1.4 billion of its own money into its Spaceway Ka-band system, Hughes appears to have finally reconciled how it will tackle the broadband business by giving its multiple satellite operating units all a piece of the action. Hughes Network Systems, by virtue of its position in the VSAT business, has been handed responsibility for Spaceway and the development of business terminals and services for its multimedia offering. DirecTV will cross-promote the service to consumers, and Panamsat will retain its focus on Internet infrastructure services.

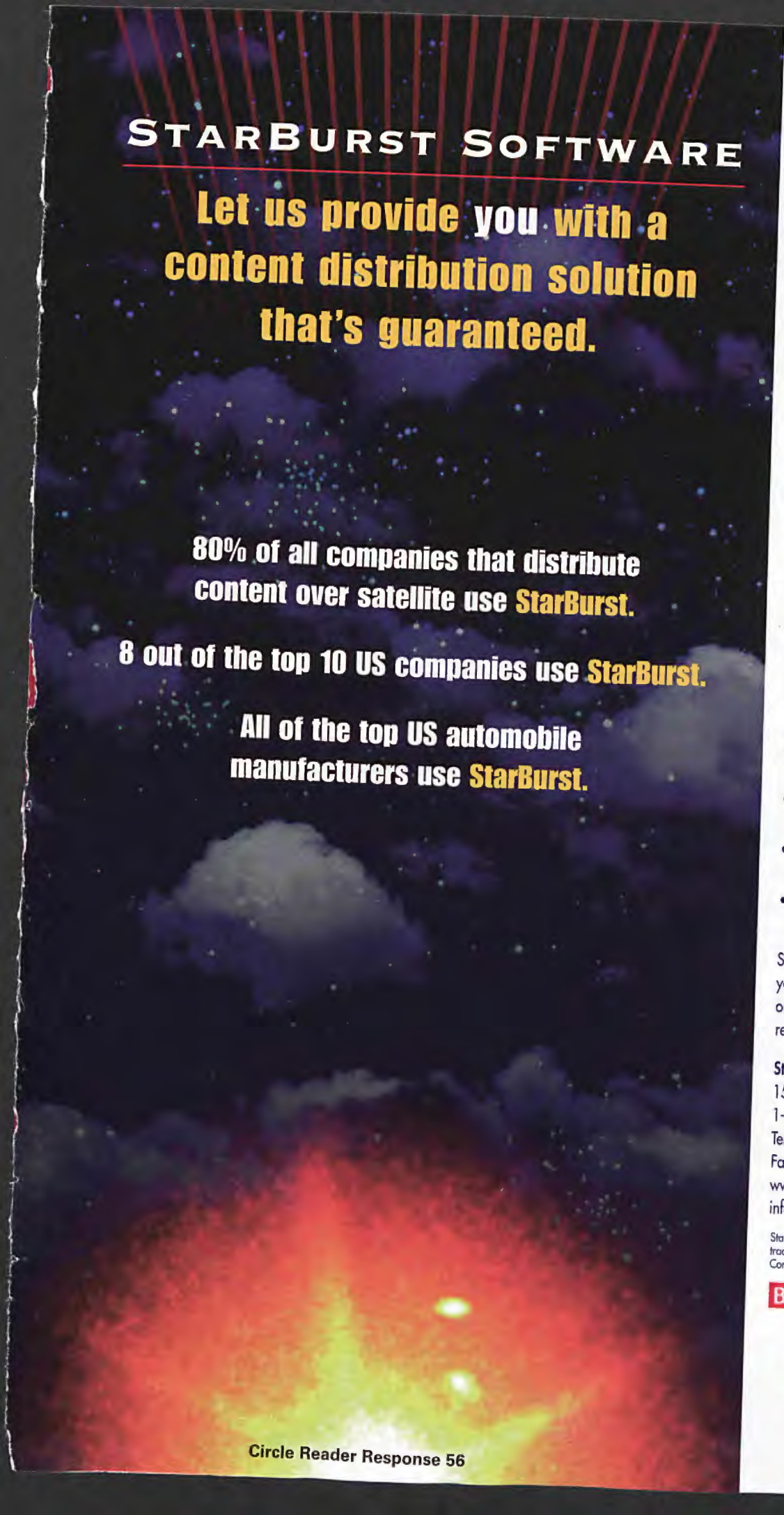
Photo courtesy of Panamsat.

**Doug Kahn, CEO of Panamsat**

At Panamsat, CEO Fred Landman stepped aside in April to be replaced by COO Douglas Kahn, an executive from the information technology sector who had been with the company only a few months. The change was interpreted by some as tied to Panamsat's growing Internet-related business. Panamsat's traffic mix of 80/20 broadcast-to-data is expected to shift to 70/30.

"Right now, three to four percent of our revenue and bandwidth is Internet-related," says Bednarek. "We expect at least a doubling of Internet-related revenue year after year." In 1998, Panamsat revenues totalled $767 million.

Panamsat sells Internet services either as straight capacity leasing, or as services that combine space segment and support. Spotbytes, an ISP backbone connection service, is the most popular of the services. The

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company also serves as an ISP in some regions to help support private network/Internet services.

Multicasting has yet to produce noticeable changes in revenues, Bednarek says. Panamsat demonstrated its multicasting services—both for file transfer and video streaming—at the National Association of Broadcasters conference in Las Vegas in April. Bednarek says the appetite for putting motion video over the Internet is just being whetted, citing efforts by lingerie retailer Victoria's Secret and Internet software provider, Real Networks, to run video over the Internet.

"It's not a 1999 revenue story," Bednarek says. "I don't think the issue is convincing people of [multicasting's] utility. We'll spend this year introducing the technology. The issue is how to integrate it into the existing Internet ground network. In 2000, we will see this use becoming very active."

Panamsat also hopes to make technical changes to reroute Internet traffic in a more efficient manner. Today, "Internet traffic that does not need to go through the United States does anyway. It chews up bandwidth," Bednarek says. If the links are set up correctly, a decision can be made on the ground to route the traffic more directly, lowering the cost of inter-country Internet connections, he says.

Bednarek predicts Panamsat will be forming more strategic relationships with vendors, customers and service providers as it expands its Internet business presence, but not to go as far as Orion in seeking to share advertising or e-commerce revenues. A partner might provide content, while Panamsat supplies bandwidth.

## INTELSAT

Intelsat earned approximately 10 percent of its $1 billion 1998 revenues from Internet services, according to Conny Kullman, Intelsat's CEO. Kullman forecasts 15 percent to 20 percent of Intelsat's revenue this year will come from the Internet.

Intelsat watched its Internet business take off after convening an Internet Summit two years ago. At that time, there was a widespread misconception that the latency in geostationary satellites would impact Internet applications. Internet leaders attended, and the myths were debunked, to a large extent. Intelsat, by focusing on this issue and by dedicating resources in its technical laboratory and in its sales and marketing division to disproving it, has been at the forefront of proving latency to be a non-issue. Kullman says Intelsat's labs try to bridge the expertise gaps between the different engineering communities involved: satellite, computer and Internet.

Photo courtesy of Intelsat.

Conny Kullman, CEO of Intelsat

The ability of Intelsat to thrive in the broadband business over the long term is highly dependent on a successful restructuring into a private entity. Intelsat hopes to win approval of its owners this fall to go private, followed by implementation by 2001. Kull-

man says Intelsat will not require the $10 billion to $16 billion investment of projects like Teledesic for its broadband satellite system, but will instead spend $3 billion to $4 billion. Intelsat is assembling a business case for a new broadband satellite system, for which it will seek board approval in June, followed by issuance of a request for hardware proposals by year end. That money can only be obtained after the restructuring, with political support from major Intelsat owners such as Comsat in the United States.

The operators continue to track the Internet market on a daily basis, shifting their strategies to match the constantly changing landscape of the new information world. "It's very difficult for the network planners to figure out where the hot spots are going to be," Kullman says. Satellite operators such as Intelsat will need global footprints, a reliability track record and numerous service options to come out on top, he says.

But Toll says that while technology is important, the real challenge is to develop services for the Internet market that leverage the inherent strengths of satellite communications systems in response to rapidly evolving market needs. "Once you're in the Internet world, it's not the steady-on satellite business we all know. The quickest and most innovative ones will be the most successful," he says. ❖

Intelsat began trials of an IDS multicasting/caching service in April with the participation of several international customers.

Artwork courtesy of Intelsat

THERESA FOLEY IS VIA SATELLITE'S SENIOR CONTRIBUTING WRITER

# VSATs in a Ka-Band World

## Are They Ready for Broadband?

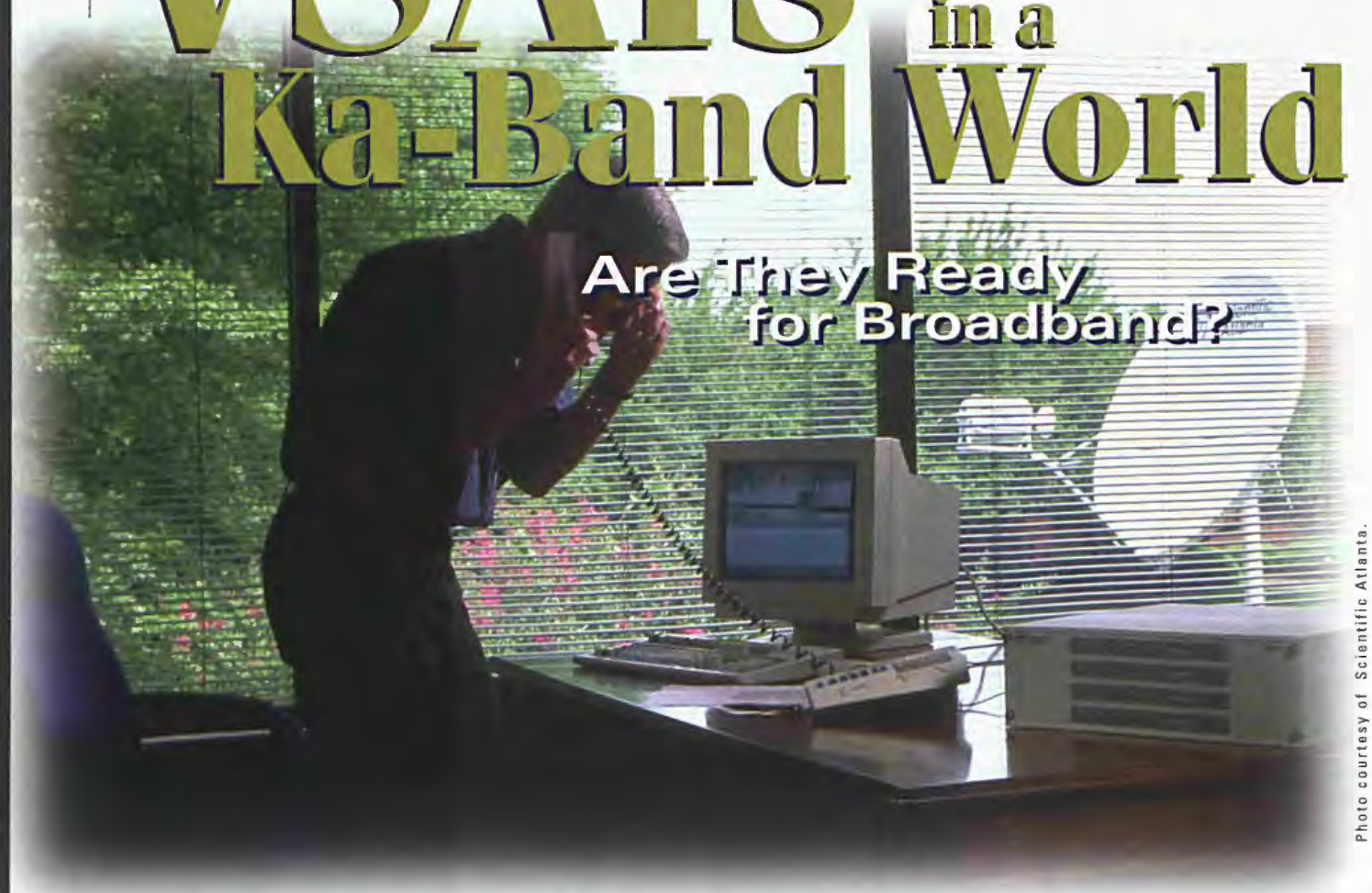


Photo courtesy of Scientific Atlanta.

THERE WAS A TIME WHEN SOME TELECOMMUNICATIONS ANALYSTS PROPOSED THAT VSATS WERE AN INTERIM PRODUCT THAT WOULD EVENTUALLY BE REPLACED BY TERRESTRIAL SOLUTIONS LIKE COAXIAL CABLES AND FIBER OPTICS. BUT THOSE PEOPLE WERE WRONG. VERY WRONG. VSATS ARE EVERYWHERE. TODAY, THERE ARE APPROXIMATELY 300,000 VSATS AROUND THE WORLD, COMPARED TO JUST 800 IN 1984 WHEN THE FIRST INTERACTIVE VSATS WERE INSTALLED.

by Katie McConnell

From credit card authorizations to inventory control, VSATs provide the technological capability for many businesses to thrive in today's fast-paced environment. Add voice and video to the data needs of businesses, and one can easily see why VSATs are a mainstay.

And once the Ka-band systems are launched, industry experts predict that not only will the C- and Ku-band VSAT systems continue to thrive, but a new generation of VSATs will arise.

### KA-BAND AND VSATS

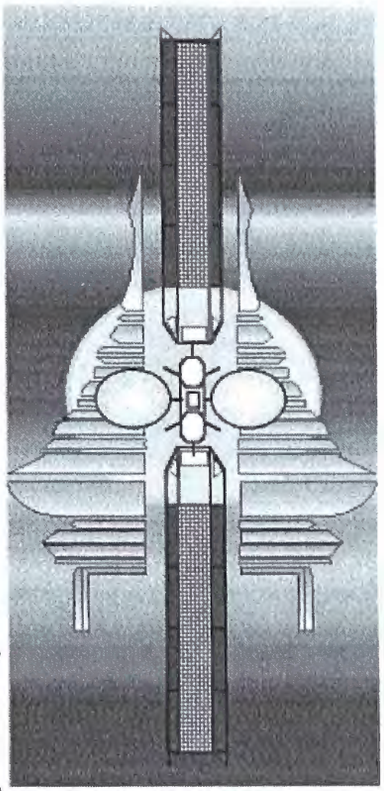
Just as the introduction of two-way capability jumpstarted VSATs' proliferation into the worldwide telecommunications marketplace, the promise of Ka-band systems such as Teledesic, Spaceway and Skybridge is expected to push these very small aperture terminals into even more businesses, and eventually consumers' homes.

Now, some people will say the earth stations that are going to be used for Ka-band are not VSATs. Well, that's simply not true. Yes, the terminals will most likely have a more marketing-friendly term so they will be easily transitioned into the consumer marketplace. The new generation terminals, however, will be small, two-way units evolved from their VSAT ancestors.

For instance, Simon Bull, senior consultant of Comsys, notes that Hughes Network Systems (HNS), which already has garnered nearly 50 percent of the VSAT market, is researching and ultimately developing the ground segment for the Hughes' Ka-band system, Spaceway. The system will comprise eight geostationary satellites, allowing users to transmit and receive video, audio, multimedia and other digital data at uplink rates between 16 kbps to 6 Mbps. Operating in the Ka-band spectrum, Spaceway will consist of interconnected regional satellite systems providing service to nearly all the world's population. The Spaceway terminal, Bull says, is going to be

Dateline Asia

# 2001: A Satellite Odyssey



## A "crystal ball" view of satellite-delivered entertainment in the new millennium

### by Mark Long

First published in the November, 1997 issue of SatFACTS magazine



**January 1, 2001. Chiang Mai, Thailand.** My last night in the Twentieth Century started in the midst of a rowdy party at Chiang Mai's effervescent Bubble Disco and ended on a nearby mountain summit where I joined thousands of other celebrants to watch the "official" dawn of the new millennium, at least according to the Gregorian calendar. I"ve got it all on digital video tape too, from the chanting monks in their flowing saffron robes, to the dancing hill tribe people and awe-struck tourists who were treated to a dazzling sunrise that lit the golden spires of Chiang Mai's mountain-top temple of Doi Sutep. Now that I'm back home, I'll need to transfer today's video onto my computer system.

Like most people who work at home these days, I have a "living office" instead of separate living and office rooms. Why duplicate video, stereo audio, and Internet delivery systems in both the office and the living room when a single streamlined system can do the job?

In the 21st Century, the distinction between satellite TV receivers and personal computers has all but disappeared. The on-going global switch from telephone modem to satellite dish for data downloads off the World Wide Web is making the Internet a viable home entertainment medium. The expansion slots in my new Pentium IV computer are filled with MPEG video, satellite tuner, and smart card reader boards for receiving more than 500 digital DTH channels from various satellites. I can also download Web sites at dizzying speeds and even access pay per view video programmes directly from my favourite satellite-based Internet server. Best of all, I can view everything on a new high definition digital TV monitor which serves as the heart of my integrated work/play environment.

All of this was made possible by the global telecom deregulation that occurred at the end of the Twentieth Century. Several of the newly privatised national telcos, as well as their multinational competitors, now offer high-speed satellite access to the Internet with data downloads at dizzying speeds that are thousands of times faster than what the average telephone modem link used to deliver. I still shudder when I recall the days when my typical Internet download made a Bangkok traffic jam look like the Indianapolis 500!

In light of the region's limited ground-based infrastructure, it was inevitable that certain Asian countries with protective media access policies would eventually be forced to allow individuals to connect their computers to satellite dishes. Each nation's new generation of cyber-cops continues to control the satellites, of course, so that no unwanted visitors get through the front door.

#### Digital Convergence

In case you've been marooned on a desert island for the past year, let me be the first to tell you that on January 1, 2000, a group of university students in Seoul, Korea founded the Virtual Channel. An endowment from a couple of the Ka-band satellite operators made it possible for "Virtual [C]" to establish an Internet server onto which anyone can now upload their own digital TV programmes. If you have a video camcorder and an Internet/MPEG capable multimedia computer system you too can become a satellite TV programmer!

"Asia's Weirdest Home Videos" was the first Virtual [C] programme to attain widespread popularity. More recently, "Eyewitless News" has been in vogue. Amateur videographers now carry their digital pocket camcorders virtually everywhere in the hope that they will encounter something zany that's also newsworthy so they can get their footage aired on both programmes. Several cable TV operators even carry Virtual [C] programming these days. They use satellite dishes to download programme fare off the Internet

and then play out selections according to their own scheduling needs.

If the region's new Ka-band satellite operators have their way, the distinction between a digital DTH programme bouquet and a satellite-based Internet download may soon be history. Why just last month, Hughes moved one of its new Ka-band Spaceway satellites to an orbital assignment over the Andaman Sea. The hot news is that for a limited promotional period, Hughes is providing dirt cheap satellite uplink time. The new Ka-band personal earth station (PES) that I bought over the Christmas holidays transmits as well as receives satellite signals. It may have been a bit dear at US$ 4,000, but then again I paid more than that for my first satellite TV system back in 1981.

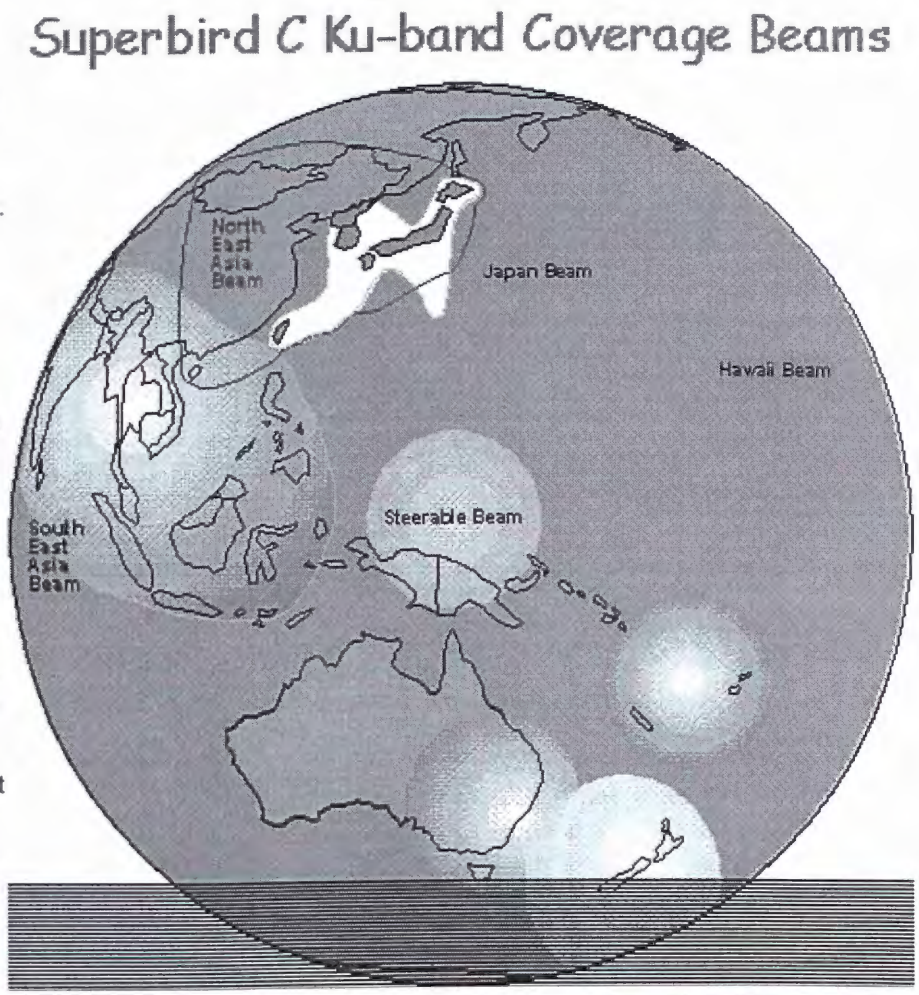
Spaceway is just one of the many new Ka-band satellites which will soon be offering "bandwidth on demand" services, which means that I only have to pay for the satellite capacity that I use and the amount of time that I actually use it. The Spaceway satellite footprint produces a network of cellular beams, one of which covers Chiang Mai province quite nicely. To uplink my video I merely have to tell the computer to find an open Spaceway transponder frequency and command the satellite to route my programme contribution to the Virtual [C] via Spaceway's Seoul, Korea downlink spot beam. My new video is on its way at the touch of the keyboard. Now all we need to do is make the popcorn, kick back and enjoy. ###

### Waking Up to the Multimedia Revolution

If the speculations outlined above seem a bit farfetched, they shouldn't. The technologies and trends needed to make this crystal ball vision of the future a reality are already present and accounted for. Of course not every technological wonder is an instantaneous hit among consumers: witness the long time lag between the initial development of HDTV in the mid-1980s and its formal adoption by the International Telecommunication Union in 1997. The Internet's ever-increasing demand for additional bandwidth, however, coupled with Asia's inadequate landline infrastructure, appear to make the marriage of Internet and satellite technologies as close to a sure thing as I can imagine. In Singapore, Hong Kong, Kuala Lumpur, or even a sprawling metropolis like Bangkok, fibre-optic cable is one answer to the Internet's voracious appetite for bandwidth. For those of us who live outside the region's major metropolitan areas, however, satellites are the only feasible solution on the horizon.

In today's operating environment, it is as if every local Internet service provider (ISP) is trying to drink the entire Mekong River through a soda straw. Satellites are the perfect choice for the implementation of asymmetrical communications networks where the receiving site uploads information requests at low data rates using a telephone line and the transmit site downloads the requested information to a PC at a very high data rate.

Satellite-based Internet servers have been operating in the USA and Europe for a while already. In September of 1997, Zak-Net inaugurated a regional C-band Internet using the AsiaSat 2 satellite. what's more, DirecTV Japan expects to launch its high-speed "DirecPC" Internet service on the new Superbird C satellite beginning this December. The new DirecPC service for Japan will offer three different types of service: a periodic, on-demand service; a real-time multimedia data pipe delivering MPEG-based video programmes; and a high-speed Turbot Internet/Intranet service for business use. DirecPC customers will be able to receive the new service throughout Japan using antennas ranging from 45 to 60cm in diameter.




The new "World-wide Satellite Web" coming our way can even send TV programmes directly to the computer desktop or "living office." Today's international pay-TV programmers use automated video servers to format their programme line-up at the satellite uplink. These servers consist of bar-coded tape libraries and automated cart machines that insert the tapes in the correct order and at the proper time. In the 21st Century, the Internet will also be a video server, but one which the viewer rather than the programmer controls.

### Turn On, Plug In and Play Out

Zak-Net, DirecPC and many of the other Internet service providers coming soon to a satellite near you intend to build their satellite

data receivers onto PC cards that can plug into the expansion ports on any IBM PC compatible computer system. The installation is similar in all respects to that of a regular satellite TV receiving system, except that instead of connecting the coaxial cable from the outdoor dish and LNB to a stand-alone receiver, the cable connects to the back of the computer terminal. In some cases, however, the operators of certain national satellite systems will require that the Internet interface be built into the nationally approved digital IRD. This will allow restrictions to be placed on access to the World-wide Web and offer indigenous DTH operators a measure of protection from satellite-based Internet video servers.

Several new satellite TV products are already targeting the computer's "plug and play" operating environment. Germany's Galaxis currently offers a complete satellite TV receiver on a PC card, which plugs into a computer expansion slot. Called the Sat-Surfer PCI, the new product displays PAL or SECAM satellite TV signals in an enhanced resolution, 800 x 600 pixel format that is superior to what most conventional TV sets currently deliver. Sat-Surfer can also display teletext from satellite TV sources or even capture individual frames of video from a satellite TV programme so that they can be printed at leisure. Meanwhile, Hitachi and Pace Microsystems have announced plans to jointly develop an MPEG-2, DVB-compliant PC card which will allow computer operators to download video, audio and data from a wide variety of sources.

### I Want My Digital TV

In the Summer of 1997, the ITU formally defined a new universal digital TV standard which combines features from separate digital HDTV standards which America's Advanced Television Standards Committee (ATSC) and Europe's DVB Group have already adopted. The result is a single compatible system that will soon be implemented by TV set manufacturers worldwide to produce wide screen TV pictures with a resolution equal to, or even exceeding, the clarity of 35mm film. The new standard also will offer sixteen sound channels for multilingual broadcasting and support a variety of picture formats including a wide-screen display comprised of 1080 x 1920 pixels.

The new all-digital TV sets are slated to appear in the marketplace before the end of next year, when digital terrestrial TV is scheduled to begin in Europe and the USA. Leading TV set manufacturers already have agreed on a common interface that will allow consumers to connect their new digital TV sets to terrestrial, cable and satellite signals. The new digital TV sets also will support a wide range of Conditional Access (CA) systems and software applications. Best of all, there will be no proprietary designs to prevent the new digital TV sets from interacting with any of the available digital programme streams. With its high-resolution video monitor, CD player, and stereo sound system, today's multimedia computer system has become a state of the art home entertainment system. Once the digital TV sets begin arriving next year, there should be little incentive for individuals working at home to duplicate in the living room what they already have in their home office. Hence my earlier coinage of the term "living office" to describe the integrated work/play environment in the year 2001.

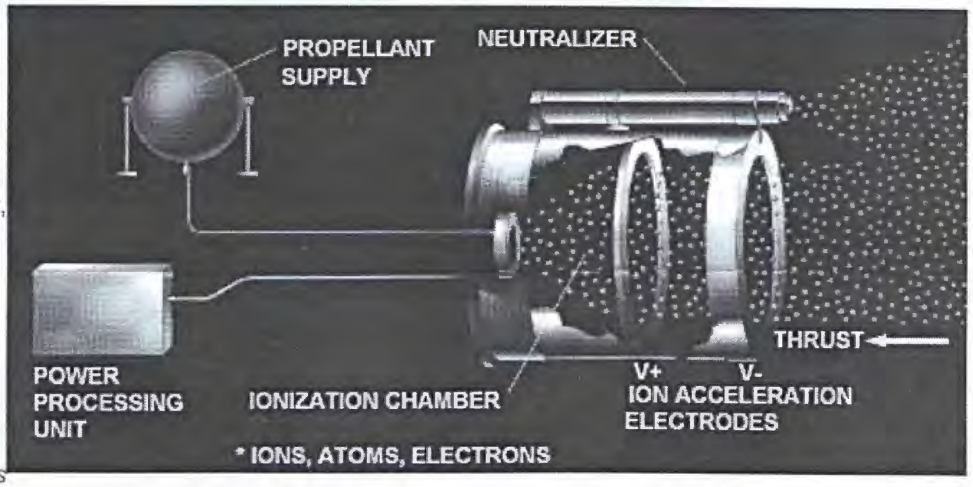
### Asia's Communications Satellite Explosion

One important economic limitation to downloading TV programmes off the Internet is the current high cost of satellite capacity. At today's prices, a C-band satellite transponder can be leased for as low as 1.5 million U.S. dollars per year. This translates into a transponder cost of about US$ 170 per hour. A single wide-band (54 MHz or greater) satellite transponder could theoretically carry approximately thirty simultaneous movie transmissions at 1.28 Megabits/sec. which translates into a raw cost of $8.5 per 90 minute download. With royalty payments, overhead and profit factored in, the cost of delivering pay TV movies on demand over an Internet/Satellite link is quite high in comparison to other delivery options. But that's about to change.

The good news is that transponder pricing should soon come down dramatically. Between now and the year 2001, more than thirty new geostationary satellites will be launched to cover the Asia/Pacific region. The total number of available C-band transponders in the region will grow by over 33 percent, while the number of available Ku-band transponders will increase by a staggering 85 percent.By the year 2001, the region's available satellite capacity will be expanding at a rate that far surpasses the projected economic growth for most nations of the region. The transformation of the Asia/Pacific from a seller's to a buyer's market will come about through the intense competition for hard western currencies as the region's satellite system operators scramble to compensate for lower than expected growth in their local markets.

New spacecraft construction technologies are also helping to lower the cost of satellite capacity. Given the high reliability of today's electronic circuitry, a communication satellite's life in orbit is predominantly a function of the amount of on-board station keeping fuel which it carries into space. Until now, every communication satellite has had to carry tanks filled with a heavy hydrazine gas that is used for spacecraft station keeping while in orbit.

Propulsion systems using new xenon ion technology, however, use the impulses generated by pairs of thrusters that eject electrically charged particles at a speed of 30 kilometres per second or nearly ten times the velocity of conventional hydrazine thrusters. Fuel weight can therefore be reduced by up to 90 percent, which gives manufacturers several attractive options: launching a lighter spacecraft at a lower cost; installing a more complex, heavier communications payload which can lower the cost per transponder; extending the mission lifetime of the spacecraft; or any combination of these options.

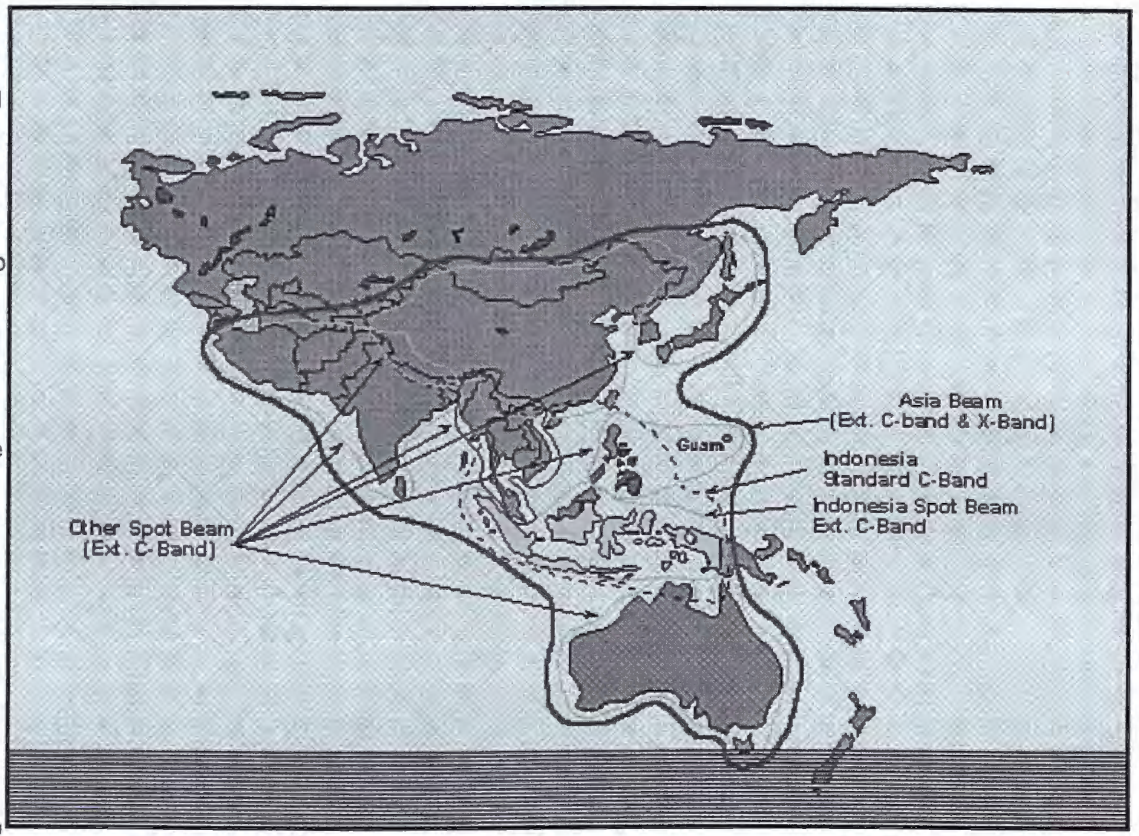



*Above: illustration courtesy of Hughes Space and Communications Group*

A $300 million investment typically was required in the mid-1990s to put a twenty-four transponder C-band satellite into geostationary orbit for a ten year mission lifetime. By 2001, a $300 million investment will be able to produce a thirty-six transponder satellite which achieves a mission lifetime of fifteen years.

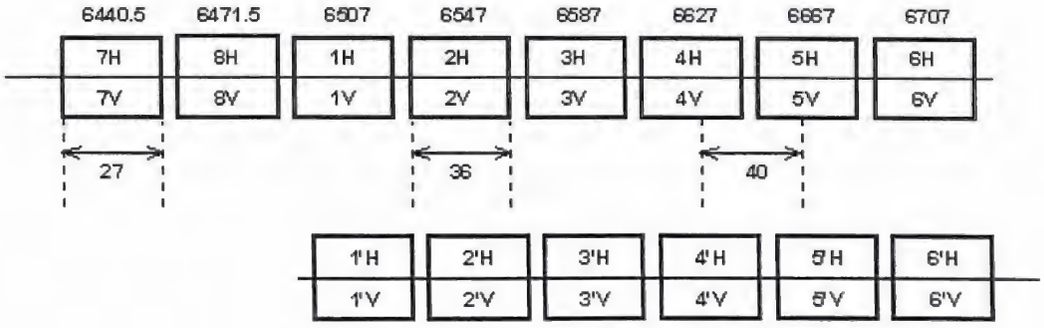
**Multi-Media Satellites**

In December of 1996, PT Pasifik Satelit Nusantara of Indonesia contracted with Space Systems/Loral to build a high-powered multimedia satellite and deliver it to orbit at either 134 degrees east or 118 degrees east in early 1999. The agreement also calls for the construction of long lead parts for a second spacecraft as well as options for the constructions of five additional satellites.PT Pasifik's M2A satellite, the most powerful C-band spacecraft ever, will generate more than 11 kilowatts of electrical power and transmit more than 4 kilowatts of radiated power. The spacecraft will have the ability to operate 54 transponders in the standard C-band, extended C-band and the X-band. M2A will also be the first C-band satellite to provide direct broadcast services to small terminals with apertures comparable to what are currently used for reception of Ku-band DTH services.

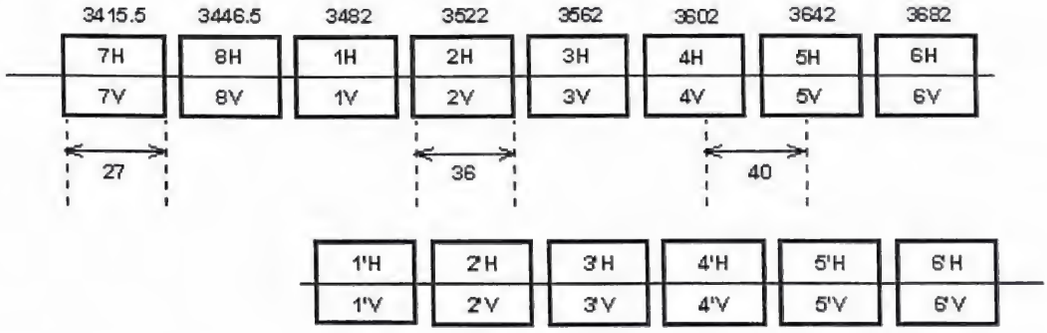


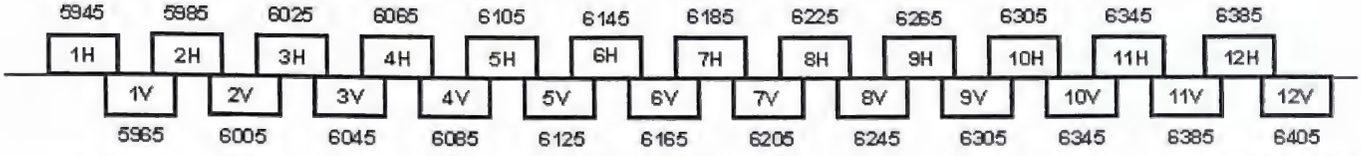

The M2A spacecraft will provide a total of seven shaped spot beams and one regional beam. The high power, the frequencies selected and the broad coverage of the satellite will enable customers to use small, inexpensive terminals to access video, audio, Internet content, VSAT data services and telephony and even have the option of transmitting as well as receiving data and voice signals. With an approximate project cost of $350 million, the 54 transponder M2A satellite is on track to deliver more "bang per buck" over its twelve year mission lifetime than any other satellite to date: a raw transponder cost of only $ 540 thousand per year.

## Extended C_Band Uplink




## Extended C-Band Downlink



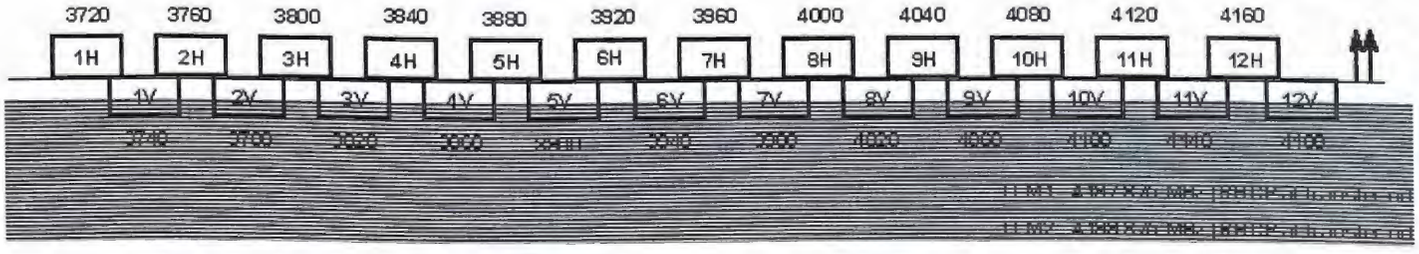




**CMD1 : 5925.5 MHz**
**LHCP**

**CMD2 : 6425 MHz**
**LHCP**

## STANDARD C-BAND DOWLINK

TLM1 : 4197.875 MHz (H On Station)
TLM2 : 4199.875 MHz (H On Station)



### The World Above 18 Gigahertz

Several international satellite operators have already announced their plans to begin serving the Asia/Pacific region through a new series of Ka-band satellites operating in the 19.2 to 20.2 Gigahertz frequency range. A single geostationary Ka-band satellite will be able to simultaneous reuse the available Ka-band frequency spectrum dozens of times by dividing the earth into a honeycomb of highly focused spot beams, each no more than 400 miles in diameter. An on-board processor will allow users to automatically route their transmissions between any two spot beams or retransmit within the same beam.

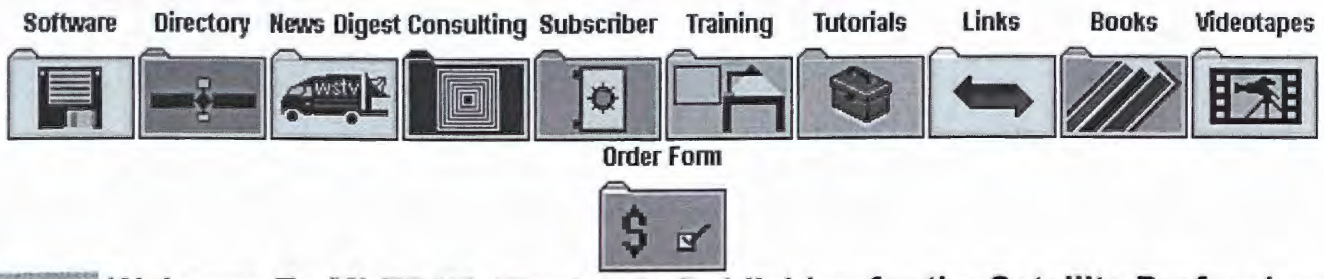
A single Ka-band Spaceway satellite will be able to form a virtual Internet in the sky by simultaneously carrying up to 11,520 duplex circuits operating at a data rate of 384 kilobit/sec. Hughes estimates that a single Ka-band satellite will be able to support hundreds of thousands of subscribers because most subscribers will only need access on an occasional-use basis. What's more, consumers will be able to directly uplink as well as downlink Ka-band satellite signals. Because Ka-band satellites use super high frequencies, the beam width produced by each personal uplink antenna will be so narrow that the interference problems which plague satellites operating in the lower satellite frequency bands will be almost non-existent, even when small dishes are used down on the ground.

Putting the uplink under the personal control of each subscriber also helps to cut down on operational costs; the subscriber doesn'?t have to pay to send the signal to an uplink or bear the cost of supporting the facility. If you thought that the Ka-band represented the new satellite frontier you'd better hold onto your hat. U.S. based PanAmSat recently filed an application with the FCC to construct, launch and operate a series of twelve V-band geostationary satellites downlinking in the 40 Gigahertz frequency spectrum. At least one of these new V-band satellites is slated to provide service in the Asia/Pacific region. To reach fruition, all the technological wonders described above will ultimately depend on what the regulatory environment is like in the year 2001. Fortunately deregulation is THE "buzz word" for the global telecom industry this year. Recent international agreements guarantee that previously isolated national markets throughout the Asia/Pacific region and elsewhere will be much more open by the early 21st Century.

### Information Resources for the New Millennium

Back in 1994, I realised that I needed to make a dramatic change in the way that I provided technical information to my readers if I was going to retain a competitive edge in the 21st Century. With today's information overload, technical almanacs, annuals, encyclopaedias and other printed reference materials struggle to keep pace with the latest changes and are inevitably out of date the day they roll of the presses. The question in my mind was how to create a dynamic publication that could be accessed by virtually everyone and easily updated. The first time that I sat down to use an Internet browser I knew that I had found the answer. The HTML software used to create web pages is a universal language that bridges the gaps between otherwise mutually incompatible computer systems. Moreover, web browsers such as Internet Explorer and Netscape Navigator are freely available, either in trial versions that can be downloaded off the worldwide web or on diskettes that are given away by the major computer magazines. Even better, you don't need an Internet connection to use an HTML based software product. You can store an HTML program on your computer's hard disk, browse its contents at your leisure, and use the available hyper links to quickly track down the information you need.

Best of all, you can download the latest information updates from the Internet while sipping coffee at your local cyber cafe. The Asia/Pacific Satellites on Disk Library is the first in a new series of HTML-based satellite technology software resources that I am developing for satellite TV enthusiasts and professionals worldwide. Further information on this product appears elsewhere in this issue of SatFACTS. Moreover, a demo version of this exciting new product is now available at my web site at http://www.mlesat.com. Through the conversion of Internet and satellite technologies, users of this information resource will be able to instantaneously download the information that they need to stay abreast with the rapid fire changes that are slated to take place between now and dawn of the new millennium.




**Welcome To MLESAT: Electronic Publishing for the Satellite Professional**

# *Direct-Broadcast Satellite Companies Expected to Face Public-Interest Rules*

By JOHN SIMONS
*Staff Reporter of* THE WALL STREET JOURNAL

WASHINGTON—Federal regulators are expected to approve on Thursday rules requiring direct-broadcast satellite operators to set aside between 4% and 7% of their channel capacity for public-interest programming.

The Federal Communications Commission is expected to force direct-broadcast satellite companies, which beam TV signals directly to consumers using small receiving dishes, to offer a smattering of "noncommercial programming that is educational or informational in nature," FCC officials said. The rules, which were widely anticipated, carry out provisions of a 1992 cable-television law.

But the FCC's action had been slowed for nearly six years because of court challenges by TV programmers who feared the rules would limit the number of channels that could carry their programming. A recent appeals-court decision paved the way for the FCC ruling.

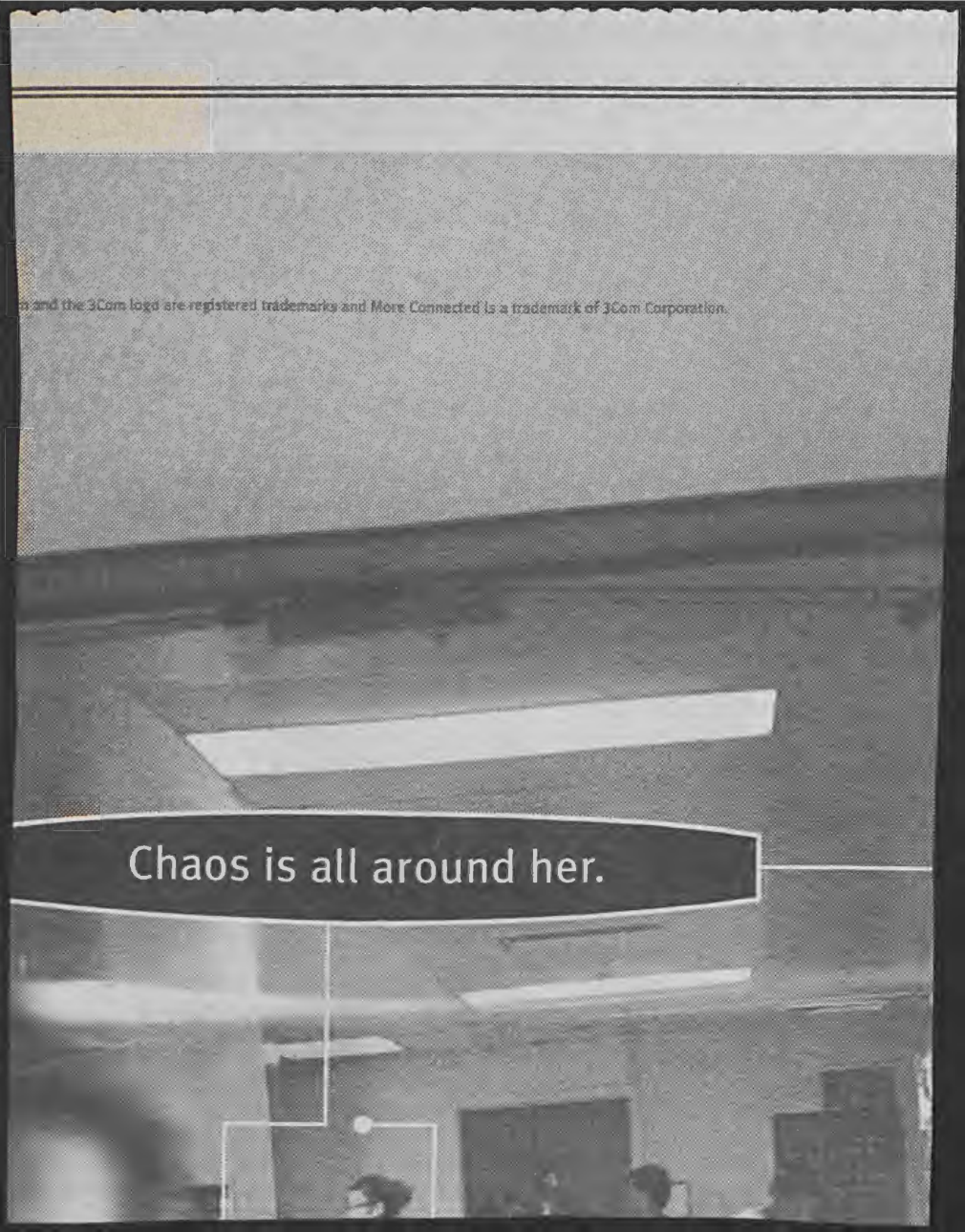
Direct-broadcast satellite subscriptions have been swelling, with 10 million households nationwide now signed up. Regulators are counting on continued growth to give cable companies significant competition, which could lead to lower prices for cable-TV service. Roughly 69 million Americans subscribe to cable services.

Although it is unclear how the FCC rules will work, satellite-broadcast companies complain that the public-service requirement is burdensome. "We're going to live by what the law and the FCC demands, but it's pretty onerous," said Andy Paul, vice president of the Satellite Broadcasting and Communications Association. He complained that the rules "haven't been well thought out at this point."

Local cable operators have long complied with public-interest rules that require cable providers to give the public access to the airwaves. These are usually handled on a local basis. If citizens want to produce programs for cable, they lease blocks of time from the cable company at prices deemed "reasonable." The shows generally appear on public-access channels.

The satellite rules will have to be different, however, mainly because the satellite services send their signals to a national audience. The commission will need to outline, for instance, how satellite companies choose programs and determine who will be eligible as an "informational" or "educational" programmer.

"We hope the FCC will grant DBS providers maximum flexibility in choosing an optimal mix of educational and informational programming that will interest a national audience," said Jeff Torkelson, a spokesman for DirecTV Inc., the parent of which, Hughes Electronics Corp., is owned by General Motors Corp.



# Developments to Watch

**EDITED BY CATHERINE ARNST**

## PUTTING ALL RADIOS ON THE SAME WAVELENGTH

FOR DECADES, THE MOBILE radios used by taxi dispatchers have been plagued by a problem that troubled older generations of computers: different makes were incompatible and couldn't "talk" to each other. For the computer world, change came with Intel-based PCs. Now Motorola Inc. has come up with what it hopes will be the PC of the radio world: digital modular radio.

The new device is a 40-pound digital computer with a radio transmitter and receiver built in. The radio's bandwidth, modulation, and other features can be reprogrammed so it can communicate with other radios. The U.S. Navy has said it will buy up to $337 million worth of the radios over five years.

While sales in the beginning will be confined to the military and public safety organizations, Durrell W. Hillis, senior vice-president at Motorola's Systems Solution Group, says that fleets of trucks, taxicabs, planes, and ships all could employ the technology. *Stan Crock*

## MOTHER NATURE IS STRIKING BACK

A NEW ANALYSIS OF POPULATION, CLIMATE CHANGE, pollution, and disease concludes that mankind has nothing to fear but mankind itself. In a study published in the October edition of the journal *BioScience*, a team of researchers from Cornell University report that 40% of the world's deaths are due to human degradation of the environment.

David Pimentel, an agricultural sciences professor at Cornell, headed a team of 11 researchers who analyzed data from a variety of international sources, including the U.N.'s World Health Organization and the U.S. Centers for Disease Control. He acknowledges that the data are not exact, noting that it is difficult to "decide whether death is from malnutrition or a waterborne disease." But his team, says Pimentel, stuck strictly to the death classifications used by official government bodies. Among their conclusions:

- Cigarette smoking causes 3 million deaths worldwide each year, with two-thirds in developing countries.
- About 3 million human pesticide poisonings are reported globally each year, leading to some 220,000 deaths.
- Smoke from indoor cooking fires causes the death of an estimated 4 million children a year globally.
- Lack of sanitary conditions contributes to approximately 2 billion diarrhea infections and 4 million deaths annually.
- There are 1.2 billion people in developing nations that lack clean water, and waterborne infections account for 90% of all infectious diseases in those countries.
- An estimated 1.7 million children in the U.S. have dangerously high levels of lead in their blood.
- Radon radiation in the U.S. is considered a significant cause of lung cancer, leading to 14,000 deaths a year.

Pimentel says humans are, more than ever, living in crowded urban centers that are ideal for the spread of disease, exacerbated by malnutrition and an unprecedented increase in air and water pollution. □

## NOW, HIGH-DEFINITION HEARING AIDS

OF THE 25 MILLION HEARING-impaired Americans, 90% have problems that could be fixed by a hearing aid. But only 20% have bought one, says the Better Hearing Institute. And almost half of those return it, citing poor sound quality or poor fit. The latest attempt at a better hearing aid is the tiniest yet of a new generation of digital devices—the Natura, small enough to fit deep into the ear canal.

Unlike analog hearing aids with only bass and treble controls, digital aids introduced over the past two years have multiple frequency channels that can be fine-tuned to each patient's requirements. The Natura, made by Sonic Innovations Inc. in Salt Lake City, is built around a proprietary digital signal-processing microchip with nine audio channels programmed by a handheld computer. Craig Newman, head of audiology for the Cleveland Clinic Foundation, says the device allows him to "precisely fit each hearing aid to my patient's exact hearing needs." It costs from $2,200 to $2,600. □


## A FASTER METHOD FOR DETECTING *E. COLI*

THREE PROFESSORS AT THE University of New Mexico at Albuquerque have come up with a fast, portable method for testing bacteria such as *E. coli* and salmonella in meat and produce before the food hits supermarket shelves—and not a moment too soon. Some 9,000 Americans die each year from food contamination, a circumstance that caused President Clinton to issue an executive order in August requiring improved inspection efforts.

Right now, tests of perishable food are far too time-consuming. The most common method places food samples in high heat in a laboratory until the bacteria multiply to the point where they can be easily spotted with a microscope, a process that takes about 48 hours. By the time the results are known, the tested products are on store shelves.

Ebtisam Wilkins, Plamen Atanasov, and Andrey Ghilindis, chemical engineering professors at the University of New Mexico, have come up with a shoebox-size device that they say detects contamination in 10 to 20 minutes. It is based on a chemical test, called ELISA, that uses antibodies to detect bacteria. The antibodies are attached to enzymes that can be quickly detected and counted electronically. BioDetect Inc. in Albuquerque has licensed the detector and expects to have it ready for market in two years, at a price of about $1,500. *Nellie Andreeva*

PHOTOGRAPH COURTESY SCHWARTZ COMMUNICATIONS; ILLUSTRATION BY RANDALL ENOS

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As fans gather at Meadowlands stadium in early November to watch the Buffalo Bills take on the New York Jets, CBS producers will be seeing double. Inside two separate production trucks, different directors will be barking orders at two camera crews. Two on-air teams of commentators will be calling the plays: One is for regular broadcast. The other will comment on action that's shot in a state-of-the-art, high-definition format for digital broadcast. Says CBS Corp. Chairman and Chief Executive Michael H. Jordan: "It will be a spectacular experience." Maybe. But at best, only a few hundred people will be able to watch it, clustered around a dozen or so high-definition TVs in New York.

Across the country, in San Diego, Anna Galloway will be clicking on her $5,500, 56-inch Panasonic HDTV. But the executive director of a San Diego real estate service center won't be watching any cinema-quality HDTV pictures. "I'll be watching the cooking channel," she says. San Diego TV stations won't start digital broadcasts until next year. Even if digital shows were available now, Galloway would need another $1,500 hunk of equipment—a special broadcast set-top box—to decode the new over-the-air signals. For now, her cable box won't do the trick.

A fitful dawn is breaking over the digital-TV revolution. On Nov. 1, 42 TV stations will transmit the first digital broadcasts, marking a watershed in "convergence"—that magical state where computing, telecommunications, and entertainment seamlessly intermin-

# DIGITAL

DIGITAL ILLUSTRATION BY TOM WHITE IMAGES; (OCEAN) HARALD SUND/IMAGE BANK

gle. From now on, however messy the process, no high-tech industry will be left untouched. Fortunes will be made and lost as broadcasters, cable operators, computer makers, consumer-electronics companies, and many others scramble for positions in the shifting digital hierarchy.

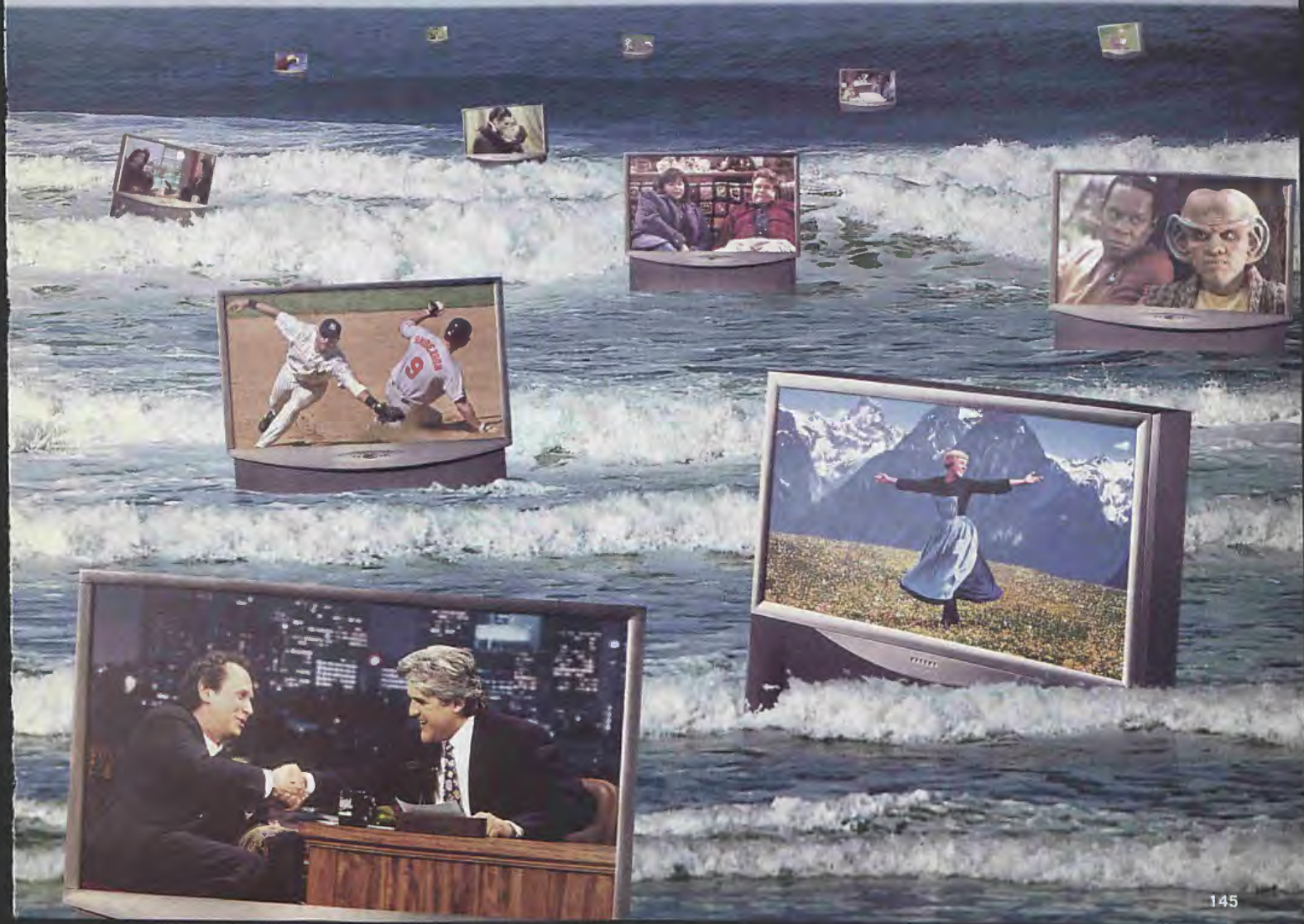
Some industries will see their worlds turn upside down. Cable seems the best-defended, with its lock on American homes. But if broadcasters and TV makers capture the digital living room, companies such as Dell Computer, Compaq, and Intel could have a problem. Who needs a Pentium PC if simpler, cheaper appliances let you browse the Web or videoconference with friends on a giant high-resolution screen? Broadcast equipment makers, such as Harris Corp. and Lucent Technologies, Inc., are already having a heyday. Hollywood and the computer-game gang also stand to gain, as interactive-TV programmers look for more compelling content.

But for broadcasters more than any other group, this is Digital D-day. Networks and their affiliates are dead last to climb aboard the digital bandwagon, while industries competing for the same eyeballs are already well on their way. Eight million American households already get TV from satellite broadcasters via transmissions that are 100% digital (although viewers are watching the signals on conventional analog

Cover Story

# D-DAY

## On Nov. 1, HDTV makes its debut. Is anyone ready for this big event?

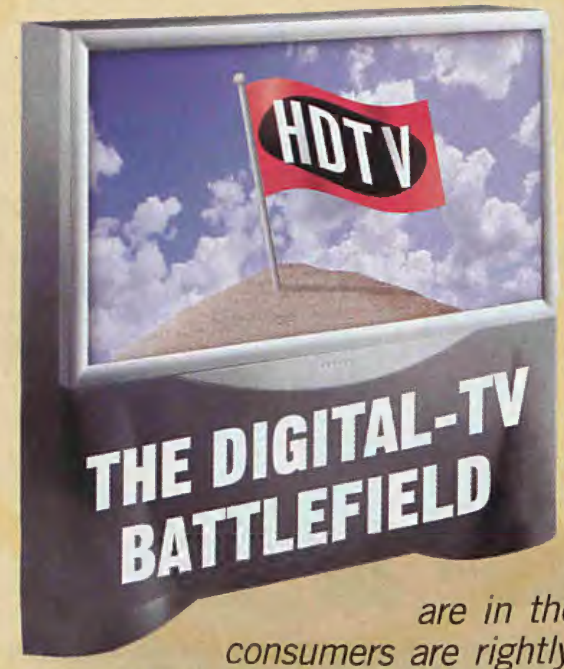


## GAME COMPANIES

Video games look great on big, wide screens—a point not lost on Nintendo, Sony, Electronic Arts, and other game-masters. They may release new titles that take advantage of the screen and exploit it in online games, too.

## TELECOM, CHIPS, AND DATA-NETWORK COMPANIES

TV stations preparing for digital broadcasts are buying expensive new equipment from Lucent Technologies, Harris, IBM, and many digital-broadcast startups. Cisco and Northern Telecom can sell high-speed switches to route the digital signals.




# THE DIGITAL-TV BATTLEFIELD

*Digital TVs are in the stores, but consumers are rightly wary. Every industry has a different take on digital TV, spelling a long, messy transition. Don't touch that dial!*

## TV EQUIPMENT MAKERS

They think digital TV is a gold mine. The new sets, costing $5,500 and up, carry cushy premiums, and may also spur sales of DVD players, VCRs, and audio gear. But technical glitches could foil the launch. And confused shoppers may decide to wait—slowing sales of regular TVs as well.

## CABLE SYSTEMS

Cable systems are at odds with broadcasters. Cable is experimenting with fast cable modems and flashy set-top boxes that link TVs to the Internet. But right now, cable can't display broadcasters' HDTV signals. If you want digital TV, you'll need an antenna.

## COMPUTER COMPANIES

Microsoft is working with cable, positioning Windows CE as key software for the set-top box. Compaq and Gateway did poorly selling large-screen PC/TVs for the living room, but they'll probably come out with low-cost set-top boxes or other appliances.

## THE U.S. GOVERNMENT

It wants to speed broadcasters' introduction of HDTV, especially since the industry was given extra airwaves for free. The faster HDTV takes off, the sooner the Feds can reclaim and auction off airwaves now used for analog broadcasts.

## SATELLITE BROADCASTERS

DirecTV/USSB and EchoStar Communications are starting high-definition broadcasts. Startups such as St. Louis' Unity Motion are leasing transponders on satellites to beam high-definition movies and other programming to areas that can't receive digital broadcasts.

## BROADCASTERS

Most will offer some high-definition programming, to see if it attracts viewers. Some may split their new broadcast spectrum into 6 or more standard-definition channels, which they'll use for local programming, pay-per-view movies, or fast Internet service. No one has come up with a slam-dunk business model.

## HOLLYWOOD

Movie studios and cable pay-per-view programmers won't release new shows for high-definition TV until copyright issues are resolved. They're worried about illegal copies made on digital VCRs. But Sony is converting hundreds of older films into high-definition formats.

ILLUSTRATIONS BY JOHN UELAND

sets). Cable systems will have spent $33 billion on digital upgrades by 2001 and are beginning to offer 300 channels, high-speed Internet access, and even TV Web-browsing. PC makers, facing slower growth, are mapping their own thrusts into the living room. Web startups are snatching away viewers with alluring online games and chat rooms. "We're not going to remain in the analog world for long," says Federal Communications Commission Chairman William E. Kennard.

But the road from broadcasters' analog past to the digital future is already beset with technical fumbles and fiascos, along with shaky broadcast business plans—or, worse, no plans at all. Once heralded as a gold mine, digital TV is starting out as a minefield. Contrast this with the last big change in TV: from black-and-white to color. In the 1950s, one company, RCA, controlled key segments of the business—from TV-set making to the NBC network. Today, a dozen different industries all want to be in RCA's shoes.

If this is the broadcasters' last stand against their rivals, it's not an auspicious start. Advertisers are reluctant to spend anything on HDTV until there is an audience. And here's another big hitch: Cable operators, whose customers make up 67% of all TV-watching homes, have resisted carrying broadcasters' digital programs.

Clearly, cable will be hard to beat, even when broadcasters are armed with new digital transmissions. Attempting to break cable's stranglehold, frustrated broadcasters such as Rupert Murdoch's Fox Broadcasting Co. are backing off HDTV programming altogether. Fox and others are experimenting with alternative uses for the airwaves allotted for HDTV. One radical—but legitimate—option is splitting the spectrum into six or more digital channels. If several local stations banded together, they could create the equivalent of miniature over-the-air cable systems that might earn far more money than a single HDTV channel.

**THE LOOK**
*On a small screen, HDTV isn't so impressive. But on a wide screen with high-quality surround sound, it's dazzling*

It's puzzling that broadcasters are still searching for moneymaking schemes in digital TV, after all the pains they took to get it. In 1996, after a decade of fierce lobbying by broadcasters and TV makers—mostly European and Japanese—Congress lent TV stations each an extra six-megahertz slice of the airwaves for free, to transmit digital TV. That was in addition to their existing analog spectrum. By law, stations in the top 10 markets must begin these broadcasts by next May, but most are starting this fall. Stations in the top 30 markets must start by next November, and the rest by 2003. By 2006—or whenever 85% of homes finally get digital TV—broadcasters are supposed to return their analog airwaves. Then, the government could auction it off for new uses. But it could take two decades before the market hits 85%, according to Paul Kagan Associates.

**"PIPE DREAM."** Broadcasters won't get far with HDTV unless consumers buy the sets. And with prices in the stratosphere, prospects for that are uncertain. "It's a pipe dream that large numbers of people will spend $6,000 to $9,000 on a new TV," says David E. Mentley, vice-president for display research at Stanford Resources Inc. in San Jose, Calif.

Confusion and unresolved technical problems could also frighten buyers away. The expensive HDTV sets on sale this year can handle many different display formats (page 150). At one extreme stands HDTV, which more than doubles the number of scanning lines that form TV pictures. Other formats are only slightly better than ordinary TVs. Shoppers will face a dizzying array of choices—just as PC buyers must learn their way around megahertz and megabytes.

If a salesperson tells you, for example, that the HDTV you purchase today is "future-proof"—that it will cope with all upcoming improvements—then you should shop somewhere else. Digital TVs are like PCs: The one you buy today may look dated next year. None of the first crop of HDTVs in stores now can display all the information, or "pixels," in an HDTV broadcast. In five years, or maybe 10, they will all do so.

The set you finally buy will need careful testing. In the rush to HDTV, broadcasters' technical committees didn't have time to test all the different broadcast gear against the sets of all manufacturers. The "encoder" boxes used at stations to prepare the digital signals for broadcast aren't identical. So sets purchased by consumers in some areas may not be able to decode the signals from the local TV station.

Then there's the dreaded "cliff effect." As signals on the airwaves bounce between buildings and other obstructions in big cities, they get muddled, a phenomenon known as multipath. It's an especially serious problem in UHF bands allotted for digital broadcasts. If this happens with analog signals, viewers get static or blurry artifacts called ghosts. With your new digital TV set, the image simply "falls off the cliff"—the screen goes blank. The sets are not at fault. Instead, some of the technology for digital transmission is not robust enough, and broadcasters have not tested it in varying geographies.



The Consumer Electronics Manufacturers Assn. (CEMA) says that setmakers can correct such problems with more powerful antennas. "Don't worry, we'll get it worked out," insists CEMA President Gary Shapiro. But engineers can't patch problems until they understand them—too late, in this case, to help "early adopters" who purchase the first digital sets.

Equipment makers just want to sell the heck out of giant HDTVs. These range from $5,500 to $10,000 and up, and deliver fatter profit margins than current sets, even large-screen ones. Some, like the Panasonic HDTV that Anna Galloway uses in San Diego, are sold like monitors, and the tuner/decoder boxes are sold separately. William L. Mannion, general manager at Panasonic Consumer Electronics Co., a unit of Matsushita Electric Industrial Co., predicts that all HDTV vendors combined could sell about 50,000 digital TVs in the next 12 months, including set-top boxes.

To create consumer momentum, Sony Corp. is subsidizing CBS's high-definition National Football League broadcasts. And Philips Electronics will spend $100 million in the coming year to promote digital TVs and other products. "This is a gold rush," says Cees Jan Koomen, president and CEO of Philips Consumer Electronics in Palo Alto, Calif. Koomen and others believe flat screens will eventually replace today's hulking space-hogs. Large plasma screens from Fujitsu, NEC, or Pioneer cost $10,000 or more. For top performance, HDTVs may always cost that much. But in a few years, there should be some wide-screen digital TVs offering less-than-HDTV resolution for under $1,000.

If the future is bright, the present is anything but. Without new TVs in viewers' homes, how will broadcasters make the digital gambit work? There's no easy answer. HDTV was never linked to any proven market demand. The campaign for HDTV started in 1986 as an effort by the National Association of Broadcasters (NAB), to keep control of the airwaves. Motorola Inc. and other companies were then demanding a slice of the broadcasters' unused frequencies for two-way radio service. The

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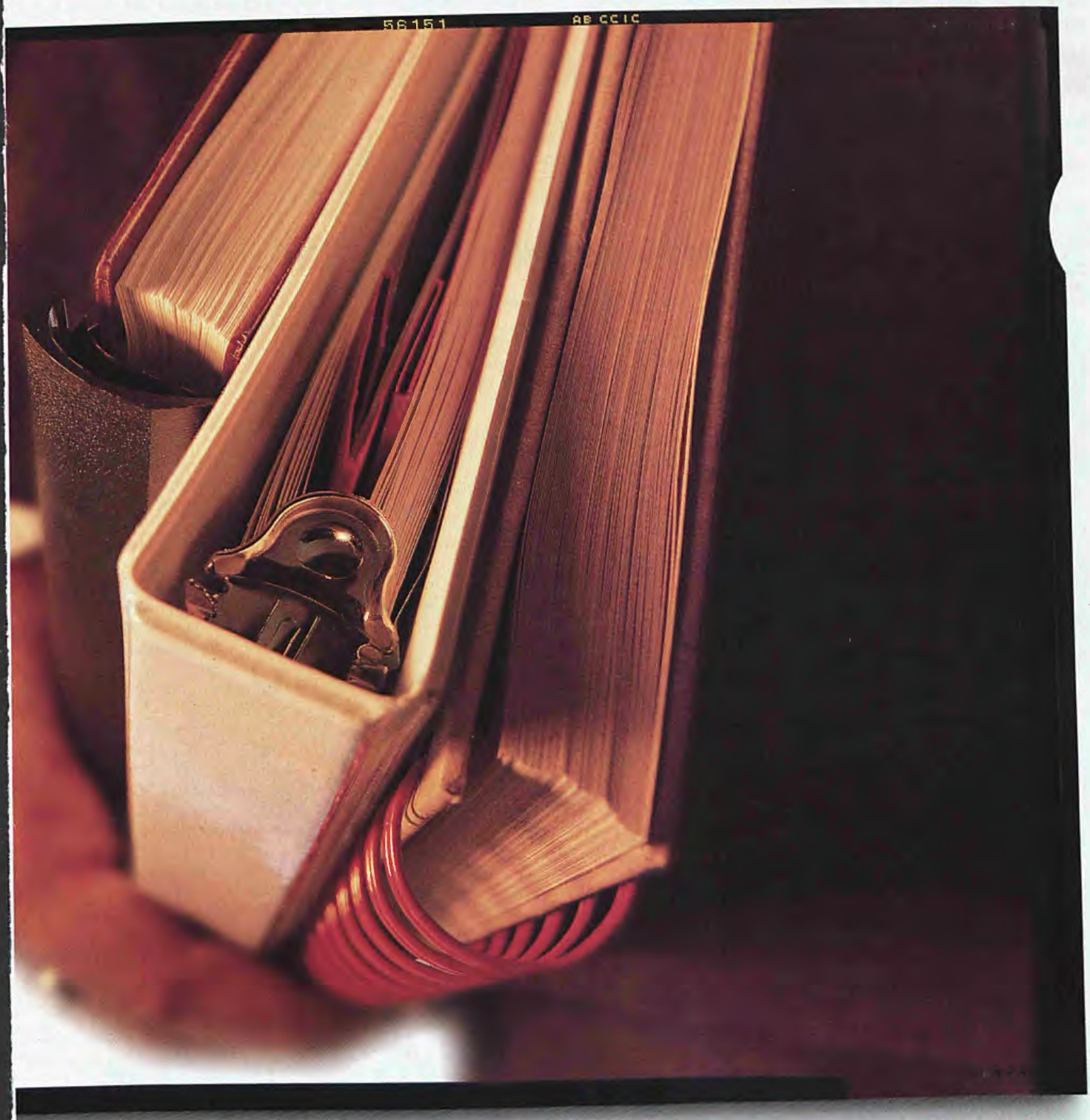


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broadcasters insisted that they needed to keep their spectrum in order to launch HDTV, so they could catch up with Japan, which was ready to test its own HDTV plan.

Cover Story

Now that they have it, how do they make it pay off? Big money is being spent. The NAB estimates the nation's 1,576 TV stations will shell out $16 billion over the next 10 years to convert to digital. Still, without enough TV sets out there, broadcasters have little incentive to produce HDTV programs—which can cost $25,000 more per hour than ordinary shows. (That might not sound like much, but it adds up. There are 11,000 prime-time hours in a year.) And without programming, viewers won't be persuaded to buy HDTVs. "Nobody has come forth with a convincing business plan," says CBS Senior Vice-President Martin Franks.

There are almost as many strategies as there are channels on the dial. ABC will start by airing the Disney movie *101 Dalmatians* in HDTV. NBC will start showing *The Tonight Show with Jay Leno* in high definition next spring and the films *Men*

# DEFINING TERMS ON HIGH DEFINITION

*High-definition televisions are in the stores, with pictures—and prices—that will take your breath away. The sets start at about $5,500, which is enough to discourage most shoppers. And they're not fully standardized—another good reason to wait. If you really want to buy now, here are the basics:*

**Do I really need a digital TV?**
No—or not yet. Until at least 2006, broadcasters will continue to "simulcast" any new digital or HDTV programs in analog form, viewable on any TV. After that, so-called converter boxes costing less than $500 will convert the digital signals for older TVs.

**What do words such as "480i," "720p," and "1080i" mean?**
These are three of the 18 display formats that the Federal Communications Commission has approved for digital-TV broadcasts. The numbers refer to scanning lines that make up a TV picture. "I" stands for "interlace," a way of splitting and scanning images that is used in today's analog sets. The alternative is progressive ("p"), where all the lines of the picture are scanned in each frame. Computer monitors use this approach. Roughly speaking, 480i means picture quality equal to today's best analog sets. True high definition begins at 720p. The best you will see on today's HDTVs is 1080i.

**Will TV pictures ever exceed 1080i?**
Yes. In a few years, even better 1080p displays will be available. What's more, none of today's HDTV sets can display the full number of picture elements that some broadcasters are sending—1,920 pixels on each horizontal line. Professional monitors that can show that kind of resolution cost about $25,000.

**Does a digital TV need a separate set-top box to display images?**
Some manufacturers, such as Sony, have built tuner/decoders into the TVs. Others sell the monitors and set-tops separately. There are good reasons for that. The technology is still evolving, and the "interfaces"—meaning jacks and sockets for connecting different components—are not yet standardized. Compatibility with cable is also up in the air. That means changes might be needed in the set-top box's electronics.

**Do you mean the new sets can't connect to cable?**
It depends on what you mean by "connect." You can plug them in and watch ordinary cable programs. But your cable box, right now, can't decode the new digital broadcast signals. To watch the broadcasts in digital form, you'll probably have to put an antenna on the roof, and maybe use a separate converter box.

**Then what's the big advantage of digital television?**
There are many. First, the digital broadcasts will look great—if you can receive them. In addition, most of the digital sets will clean up analog signals, using tricks such as "line-doubling" to make certain TV shows look crisper. Some of the wide-screen models will subtly "stretch" ordinary TV shows to fill up the screen, giving a more cinematic look. A new generation of digital video disk players, arriving this fall, will allow "digital to digital" output, meaning the images will be displayed exactly as they were recorded.

**Are there other cool applications?**
Most of the sets will double as giant computer monitors. And low-cost digital "appliances" are on the way, which will facilitate Web-browsing, video-conferencing, 3-D chat, and video games. All of these activities are a lot more compelling on giant, high-resolution screens than on cramped PC monitors.

**Is HDTV better than a digital satellite-TV system?**
Your satellite picture right now, on an analog TV, is as good as most low-end digital TVs will deliver. But there's no question that the picture on an HDTV set showing high-definition programming is far better than anything you get on today's satellite systems. Soon, Hitachi and RCA/Thomson will sell digital TVs with built-in HDTV and satellite receiver circuitry. These sets will display all digital-TV formats plus ordinary satellite programs and new HDTV satellite signals.

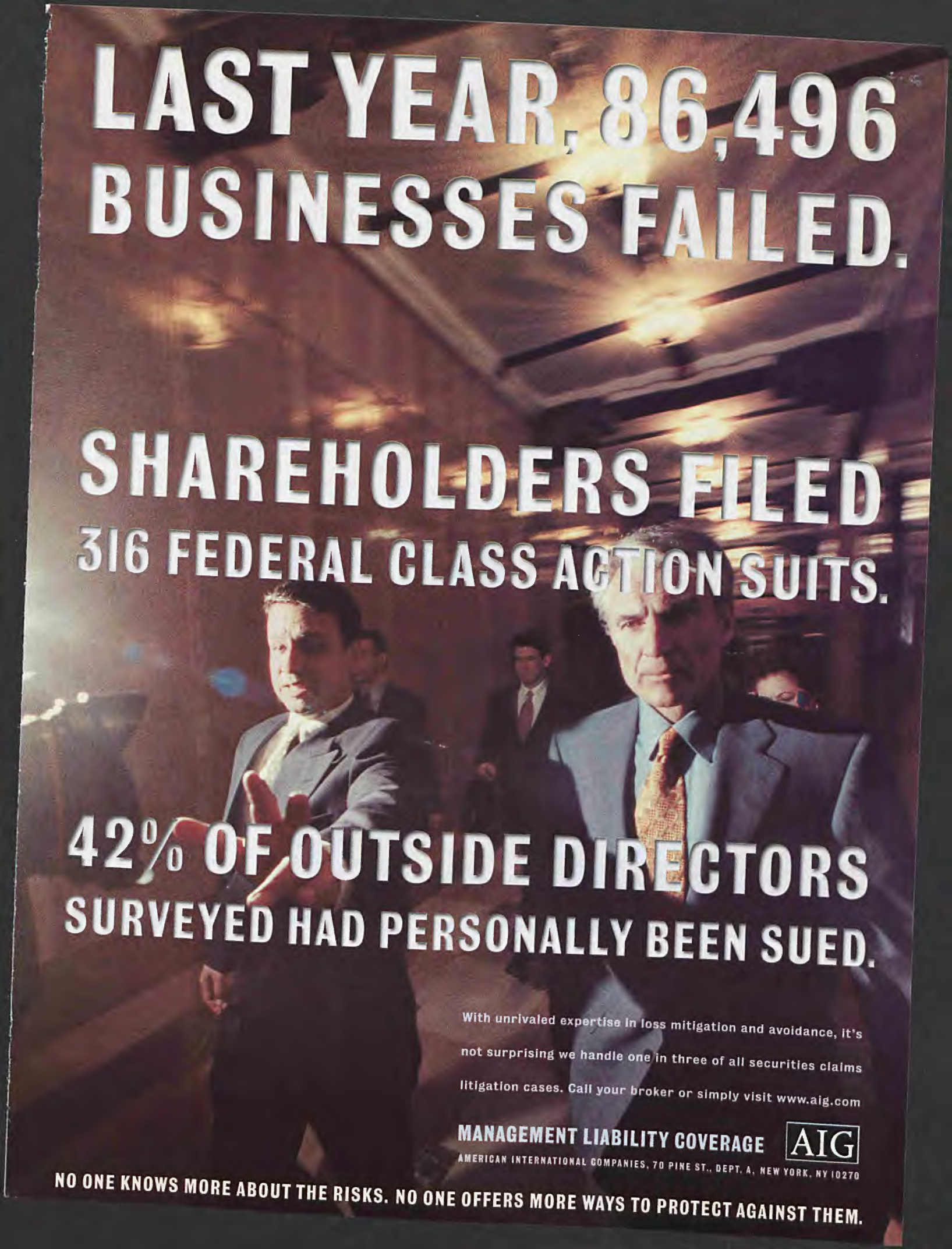
*By Neil Gross in New York*

## WHAT *IS* DIGITAL TV?

*A digital TV receives signals as computer code, produces sharper images than a conventional TV, and includes digital surround sound. But not every digital TV is an HDTV. Here are the differences:*

| HIGH-DEFINITION TV (HDTV) | STANDARD-DEFINITION TV (SDTV) |
|---|---|
| ▶ Pictures consist of at least 720 progressive scanning lines | ▶ Picture resolution is less than 720 scanning lines |
| ▶ Has a wide screen like a movie (the tech term is "16:9") | ▶ Sound is digital audio, but not necessarily Dolby |
| ▶ Offers Dolby Digital audio or equivalent | ▶ Displays any digital broadcasts, but not with HDTV clarity |

DATA: CONSUMER ELECTRONICS MANUFACTURERS ASSN.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**THE BATTLE** *Cable companies and broadcasters are at odds on digital TV. The cable guys are resisting broadcasters' requests to carry their HDTV programs*

*in Black* and *Titanic* down the road. Affiliates will likely go with digital sports shows first and then produce their own high-definition local newscasts. "We're going in early for competitive reasons," says Michael J. Fiorile, CEO of the Dispatch Broadcast Group, which owns a CBS and an NBC affiliate. A. H. Belo Corp, with stations in Dallas, Houston, and Seattle, is also mounting an aggressive HDTV strategy (page 158).

Broadcasters think that digital TV could be a potent weapon against the encroaching cable networks. For years, broadcasters have bristled at cable-only channels such as CNN, ESPN, and HBO, which siphon away advertisers and get subscription revenues via the cable and satellite operators that carry them. According to Warburg Dillon Read, cable-TV advertising will grow 15% annually through 2000, outpacing the 5% to 7% growth of the networks.

Cover Story

Now, broadcasters think prettier pictures will deliver a premium look, giving them an edge over smaller specialty cable channels, such as the Food Network, that can't afford to produce shows in high definition. Well-heeled cable channels, though, are already hatching HDTV plans: Both HBO and Discovery Network plan next year to offer high-definition versions of their service, charging high subscriber fees.

**HOME THEATER:** *Large plasma screens, such as this 42-inch display from Fujitsu, can run $10,000*

(BOTTOM) TODD FRANCE

Broadcasters don't levy any such fees, and HDTV may not allow them to charge premium ad rates. "We never ended up charging more for color [after black-and-white]," notes Charles H. Jablonski, NBC's vice-president for broadcast and network engineering. Even the few advertisers interested in HDTV now aren't sure when they would pay more for those ads. "There's only three people watching, and we don't have any way today to track them," says Jim Gosny, associate director of commercial productions at Procter & Gamble Co., which has produced seven experimental ads in high definition.

Some broadcasters, sharing that skepticism, are mapping out strategies that don't involve HDTV. In fact, there are many ways to use multiple channels: Fox, for example, could replay hit shows in different time slots. (Imagine reruns of *Beverly Hills 90210* at 6, 7, 9, and 11 o'clock.) The networks also could give sports fans even more views on the action. Says Fox TV Network President Larry Jacobson: "We can have the Mark McGwire-cam."

**RAISING HACKLES.** It sounds good, but where are the bucks? Fox's Jacobson is also looking at straight, cable-like pay-per-view. This, too, is fraught with challenges. Most broadcasters have never had to deal with individual subscribers and have no means of billing them. "Challenging cable to a war would be like a Civil War army taking on General Patton," says Nat Ostroff, vice-president for new technology at Baltimore's Sinclair Broadcast Group.

Meanwhile, the very suggestion of such "multicasting"—splitting the allotted spectrum—has raised the hackles of lawmakers in Washington. The FCC is likely to impose a levy on such services. After all, Congress lent the airwaves to the broadcasters for free, despite budgetary pressures to auction them off. "We didn't intend to give spectrum to them for any purpose other than over-the-air broadcast," says House telecom subcommittee Chairman W. J. "Billy" Tauzin (R-La.). He would like broadcasters to air at least some HDTV programs. Otherwise, the spectrum give-away "would be unfair to other communications players who had to buy theirs," he says.

Cable companies did spend billions—not to buy spectrum, but to upgrade their systems. Now, they're on their way to owning the digital battlefield. They have added fiber optics, better set-top boxes, and more powerful computers and switches. Using the same compression and encoding tricks employed by satellite broadcasters, they will soon be squeezing 10 or 15 channels into the space that used to carry just one.

Broadcasters may try to enlist cable operators, to help launch HDTV. But the cable industry hasn't gone out of its way to make its systems technically compatible with digital broadcasts. At this moment, cable boxes can't display HDTV broadcasts at all. The two industries use different "modulation" schemes—the methods of getting digital bits onto so-called carrier waves. Cable systems and digital transmissions can theoretically be made to work together—and it might happen in time for the Nov. 1 broadcasts. But the solution could require servicing equipment in the homes of early purchasers of the new HDTVs.

To make matters worse, cable operators may not agree to

## STORY #7:

# *Meanwhile, Back at the Ranch*

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carry broadcasters' new digital programming. By law, cable systems are obliged to transmit broadcasters' existing analog channels—but not necessarily their new digital telecasts. Broadcasters say their huge investment in digital TV will go down the tubes if cable doesn't carry the new programs and nobody sees them. "It's like bringing a baby into the world and not supporting it," says Sinclair's Nat Ostroff.

But Atlanta's Cox Communications Inc. and other cable operators don't want to give up any room on their pipe for nothing. "Bandwidth is the single most important asset we've got," says Lynne Elander, director of product development at Cox. "We've spent billions of dollars of investment on it, and we're not in the position to be paring it away willy-nilly."



Capitol Hill is not amused by this wrangle. Although the FCC prefers to let the networks negotiate their own deals for carriage with the major cable systems, lawmakers threaten tougher cable "must-carry" legislation. If the FCC punts, "I'm almost certain Congress will act," says Rep. Tauzin.

**SCRAMBLE FOR CONTENT.** Now, with the exploding popularity of the World Wide Web and the premium consumers place on interactivity, cable has landed in the catbird seat. Its upgraded connections allow for two-way interaction, including fast Internet cruising. In contrast, to browse the Web over satellite or terrestrial broadcast, consumers have to tie up their phone line. The cable industry is now gearing up to sell everything from more TV channels to phone service to video-on-demand movies and interactive TV. With its massive audience, it is the linchpin industry of digital convergence. "Cable is the ultimate infrastructure," says Time Warner Inc. chariman Gerald M. Levin.

As digital convergence gathers force, Hollywood and computer-game makers are ready to cash in on the scramble for better content. Sony, for one, has already converted a library of 300 films to high-definition format ready for broadcast. And hundreds of movie titles for digital video discs are already formatted for digital broadcast as well. But with new digital VCRs due out soon to accompany HDTVs, Hollywood is unlikely to unleash its shows without copyright protections built into HDTV systems.

Meanwhile, Silicon Valley is eyeing digital TV warily. Computers, after all, are in just 43% of U.S. homes—most of which have more than one TV. The PC camp fears that digital TVs could supersede PCs as the entry point to the Web. Intel, Microsoft, and Compaq have suffered a string of humiliations in the TV arena. Their early designs for PC/TV hybrids have gone nowhere. And they didn't dominate the first incarnation of digital broadcasting—namely, satellite TV.

**ALL-DIGITAL STUDIO:** *NBC will start airing* The Tonight Show with Jay Leno *in high definition next spring*

Microsoft Corp. and Intel Corp. have also failed to seize control of digital cable boxes, although moguls such as Tele-Communications Inc. Chairman John C. Malone have been careful not to shut either company out. All Microsoft and Intel have managed, so far, is to make minority investments at the edges—Microsoft in Comcast Corp. and in the Road Runner cable-modem service and Intel in At Home, another cable-modem service.

Intel and Microsoft scoff, however, at the notion that an $8,000 HDTV set is a winning convergence product. Instead, they're pinning their hopes on set-top boxes and other appliances, which will also work with digital TVs. Compaq Computer Corp. hopes to supply sub-$300 set-top boxes that hook into a home network. "If you want to place bets, Intel, Microsoft, and Compaq will be there at the end," says Trey Smith, Compaq's vice president for advanced products. Adds Thomas A. Galvin, director of market development at Intel's content group: "TV is just another form of information delivery that's going digital."

At the digital dawn, each industry is racing for higher ground. People have compared the birth of terrestrial digital broadcast to the transition from black-and-white to color TV in the 1950s. They're wrong. It's vastly more complex and risky. "It's more like the transition from radio to TV," says Fox's Jacobson. The visual improvement may not be as obvious. But the impact on industry is greater.

Today, broadcasters have the hardest road ahead, and PC companies have a lot of adjustments to make. Cable companies rule the roost—for now, at least. And whichever camp the future favors, better pictures spell big bucks for the Sonys and Philipses of the world. If Intel and Microsoft are in a

**THE MARKET**

***In 2004, HDTVs will make up less than 2% of cathode-ray-tube TVs sold in North America, according to Stanford Resources Inc.***

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tight corner, they'll likely innovate or buy their way out of it. Consumers will get clobbered with choices. We will all become guinea pigs in experiments with convoys of new digital gear, rife with complex incompatibilities. "It will take a lot of work to put the last 50 years of broadcast, the last 20 in cable, 15 in PCs, and five for the Internet—all at the same time—on the home screen," says Steven Guggenheimer, Microsoft's group product manager for digital television. "It requires cooperation." Right now, that's the last thing on anybody's mind.

*By Catherine Yang in Washington and Neil Gross and Richard Siklos in New York, with Steven V. Brull in Los Angeles*

BusinessWeek ONLINE

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# WILL THEY ROPE 'EM WITH DIGITAL IN DALLAS?

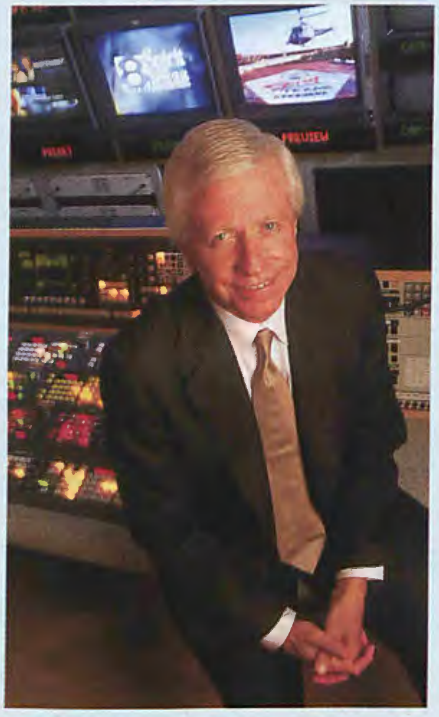
Big Tex, the world's only 52-foot-tall, talking-and-waving cowboy, wasn't the only larger-than-life attraction at this fall's Texas State Fair. In addition, Dallas television station WFAA managed to captivate fairgoers with a preview of the lushly detailed high-definition images that it will begin broadcasting on Nov. 1.

Indeed, many TV-station-owners wonder whether HDTV is nothing more than a wildly expensive carnival attraction—requiring millions of dollars of new equipment for broadcasters and new TV sets on the part of consumers. Some broadcasters across the country are scrounging around for other uses for the digitized airwaves.

Not WFAA-owner A. H. Belo Corp. Dallas-based Belo is betting big that high-definition TV will help it lasso more viewers, as people begin buying the sleek new sets. The company has earmarked $137 million to convert its 17 stations, which stretch from Honolulu to Norfolk, Va., by 2003. Through its affiliation with ABC, WFAA's first high-definition broadcasts will consist mainly of movies and sports.

**NOSE FOR NEWS.** But Belo executives are counting on this programming to keep viewers tuned to his channels and even to boost viewership of what really matters to Belo's bottom line: top-rated local newscasts. News programs make up about 20% of WFAA's lineup, yet they bring in 45% to 50% of all revenues, and an even higher percentage of profits. Belo's stations reported earnings of $48 million, on revenues of $163 million, in the quarter ended June 30. The higher the station's audience ratings, the better it does in Dallas' $500-million-a-year TV-advertising market. "We really believe the high-quality product will win out," says Ward L. Huey Sr., president of Belo's broadcast division.

Fellow station-owners don't all share Huey's zeal for HDTV. (Even so, all of the country's 1,576 stations will be required to convert to digital broadcasting in the course of the coming decade.) Among the skeptics is Baltimore's Sinclair Broadcast Group, which owns or programs 56 stations. Instead of using the airwaves allocated by Washington for high-definition broadcasts, it plans to transmit more standard-definition TV. Once they are digitized, as many as six regular channels can be compressed into the same space as a high-definition television signal. That opens up the possibility of broadcasting popular shows in multiple time slots, carrying new channels, or using spectrum for other services, such as paging.



**HUEY:** *Counting on HDTV movies and sports to boost news ratings*

Why no HDTV? Sinclair serves mostly midsize markets and doesn't share Belo's news focus. Plus, the smaller the market, the longer it will take for sales of HDTVs to justify broadcasting in the jazzy format. Even those who are bullish on high-definition don't expect to air it all day. In fact, broadcasters may also choose to transmit high-definition images that are not of the highest clarity (low-high definition, if you will), conserving spectrum for other uses. "The way we're looking at the digital spectrum is: We've got a commodity that we think lots of uses are going to develop for," says Dennis J. Fitz-Simons, president of Tribune Broadcasting Co., which owns 18 stations. "We think there's ultimately a lot of value out there."

**HEAVY ON JUICE.** The payoff won't come in the short term, however. WFAA need look no further than its own half-finished digital control room to realize that there is a complicated scramble going on. With its HDTV launch just days away, WFAA has yet to install more than half the equipment it needs—including a master control switch and a studio-to-transmitter link. "Debugging will happen on the air," says Bob Turner, Belo's vice-president for engineering.

There's also the expense of maintaining both an analog and digital channel. All but one of Belo's 17 new digital frequencies are UHF—and a UHF signal consumes $30,000 a month in electricity, compared with $1,000 for VHF. For big markets such as Dallas, analysts think the added cost of HDTV is worth it. Says William Myers of BancBoston Robertson Stephens: "There's no direct economic return, but it enhances the quality of their overall product."

It's no wonder, though, that Belo has tried to hasten the acceptance of HDTV with public demonstrations. The broadcaster can only hope that, by next year, high-definition TV will be so enticing that some Texans will skip the State Fair and stay home to watch it.

*By Steven V. Brull in Dallas*

DAN BRYANT

# Advisory Committee on Public Interest Obligations of Digital Television Broadcasters

## INDEX



Today's meeting is currently being broadcast live via RealAudio. See the Novemember 9 meeting page for details.

**The draft report of the Advisory Committee is available:**

- Section I: The Origins and Future Prospects of Digital Television
- Section II: The Public Interest Standard in Television Broadcasting
- Section III: Recommendations of the Advisory Committee

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By Executive Order No. 13038, President Clinton established the Advisory Committee on Public Interest Obligations of Digital Television Broadcasters (PIAC). The Committee will study and recommend the public interest responsibilities that should accompany the broadcasters' receipt of digital television licenses. NTIA serves as the Secretariat for the Advisory Committee.

The President selected 22 members from the broadcasting industry, public interest community, computer industry, academia, and labor community. Members are appointed for the duration of the Committee, which will present its report to Vice President Gore on October 1, 1998 and terminate on or before October 31, 1998, unless renewed by Executive Order.

Please see the "About the Committee" page for copies of the Executive Orders, a list of members, member biographies and other Committee information. Summary minutes, transcripts, and materials provided to the members in advance of or at each meeting are available for each meeting. Where possible, the Secretariat provides an electronic copy of meeting materials either directly on the PIAC website or through a link to the organization which submitted the material.

*Please note that this site includes links to private and other public sites that contain related information, public comments provided to the Committee, statements of Committee panel members, and other material that may be of interest to the public. Provision of these links does not express or imply endorsement by the Commerce Department, NTIA, or the Advisory Committee.*

Committee information, meeting minutes, and documents produced for and by the Committee are available at this site and can also be obtained by calling 202-482-8056, or by written request to:

Karen Edwards
Advisory Committee on Public Interest Obligations of Digital Television Broadcasters

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## SECTION I

## THE ORIGINS AND FUTURE PROSPECTS OF DIGITAL TELEVISION

Digital television is not simply a superior television format featuring better pictures and sound, greater efficiency in its use of spectrum, and versatility in its range of applications. Digital television, or DTV, also represents a new technological infrastructure for broadcast television, and thus a new economic and competitive paradigm for the industry.(1) The new transmission technology invites a broad reassessment of established programming practices, business strategies and regulatory requirements, including the public interest obligations that have long been considered fundamental to broadcast television.

In order to understand the new framework of legal and technical standards that will guide the development of digital television -- and thus the likely business models and most appropriate public interest standards -- it is important to understand how digital television has evolved over the past eleven years. This section recounts that history. It also explains the statutory and regulatory standards that will govern DTV, the possible barriers to implementing the new technology, and the unresolved policy issues that will require action by the Federal Communications Commission.

### I. WHAT IS DIGITAL TELEVISION?

Digital television is a new, more sophisticated technology for transmitting and receiving broadcast television signals. Using an additional 6 megahertz (MHz) of broadcast spectrum temporarily granted by Congress, broadcasters will be able to develop a diverse range of new digital television programming and services while continuing to transmit conventional analog TV programming on their existing allotments of spectrum, as required by the Telecommunications Act of 1996.

A digital standard is superior to analog because of its greater accuracy, versatility, efficiency and interoperability with other electronic media. Digital signals also have the advantage of generating no noise or "ghosting," and being more resistant to signal interference. Within the range of the signal, this results in a perfect signal.

The chief rationale for the nation's transition to digital television is high-definition television, or HDTV. This transmission standard contains as much as six times more data as conventional TV signals and at least twice the picture resolution. HDTV images have a 16-to-9 aspect ratio (the ratio of width to height), providing a wider image than the 4-to-3 ratio that has characterized television since 1941. Because of its higher resolution and different aspect ratio, HDTV images are remarkably more vivid and engaging than the existing television format, an effect that is enhanced by five discrete channels of CD-quality audio.

But DTV is not just about HDTV. As a digital (and not analog) signal, DTV enables broadcasters to offer a variety of innovations. Instead of sending an HDTV signal of 19.4 megabits per second, for example, a broadcast station may decide to send as many as five digital "standard-definition television" (SDTV) signals, each of which might consist of four to five megabits per second. SDTV images are not as sharp as HDTV, but still superior to existing TV images. This new capacity, known as "multicasting" or "multiplexing," is expected to allow broadcasters to compete with other multichannel media such as cable and direct broadcast satellite systems. As new advances in compression technology are made in the years ahead, broadcast stations may be able to fit even more SDTV signals into the same spectrum allotment.

Another DTV capability is the ability to provide new kinds of video and data services, such as subscription TV programming, computer software distribution, data transmissions, teletext, interactive services and audio signals, among others. These broadcast services are known, under the Telecommunications Act of 1996, as "ancillary and supplementary services." They include such

potentially revenue-producing innovations as the providing of stock prices, sports scores, classified advertising, paging services, "zoned" news reports, advertising targeted to specific TV sets, "time-shifted" video programming, closed-circuit television services, and more.

None of these choices -- HDTV, multicasting and innovative video/information services -- are mutually exclusive. Within a single programming day, a broadcaster will have the flexibility to shift back and forth between different DTV modes in different day parts. During the day, for example, a station might show four SDTV channels, and then show a single HDTV program (perhaps a movie or wide-screen sporting event) during prime time. Since different gradations of HDTV and SDTV picture resolution are possible -- there are 18 different transmission formats -- a station can mix and match video programming with data services, so long as the various signals fit within the 6 MHz bandwidth.

As all this suggests, DTV over the next ten to fifteen years will usher in a sweeping transformation of broadcast television -- its programming and services, its revenue sources, its corporate partnerships and ownership structures. While many existing programming genres and styles will surely continue, many innovative types of video programming and information services will arise, fueled in no small part by the anticipated convergence of personal computer and television technologies. Through DTV, furthermore, broadcast television may develop new services in alliance with other telecommunications media, such as wireless telephony, a scenario made possible by digital code, increasingly the common language for all electronic media.

At this point, it is difficult to predict which business models broadcasters will choose to develop as they commence DTV transmission. The Telecommunications Act of 1996, which authorized the FCC to give an additional 6 MHz channel to existing broadcasters for digital transmissions, is deliberately flexible. Much will depend upon the competitive opportunities that broadcasters identify as promising, as well as on emerging market conditions and the regulatory ground rules for conducting business.

## II. A BRIEF HISTORY OF DIGITAL TV TECHNOLOGY

For nearly sixty years television broadcasters have transmitted signals based upon the "NTSC standard." This technical format, developed and recommended by the National Television System Committee, has remained largely unchanged since its adoption by the FCC in 1941. The most significant modifications have been the introduction of color TV in 1953, "ghost cancelling" provisions to enhance picture clarity; the use of a previously unused portion of the transmission signal called the "vertical blanking interval" to send closed captioning; and stereophonic sound.

While television engineers had long envisioned ways to upgrade the existing NTSC standard, there had been little enthusiasm in the broadcast industry, Congress or the FCC to undertake such a large, complex challenge. This changed in the mid-1980s as Japanese consumer electronics firms forged ahead with the development of HDTV technology. In particular, the Muse analog format proposed by NHK, a Japanese company, was seen as a pacesetter that threatened to eclipse U.S. electronics companies. During this same period, the FCC was contemplating the reassignment of some vacant portions of the broadcast spectrum to so-called Land Mobile users -- police departments, emergency services, delivery companies, and others. At that point, broadcasters showed an interest in developing this portion of the spectrum.(2)

To explore the issues posed by HDTV, the FCC in July 1987 issued its First Notice of Inquiry on Advanced Television Service.(3) A few months later, the FCC appointed a 25-member advisory panel, the Advisory Committee on Advanced Television Service (ACATS). Chaired by former FCC Chairman Richard E. Wiley, the panel was charged with reviewing the technical issues and recommending an ATV system to the FCC.

The first congressional hearing on HDTV was held in October 1987, an event that helped galvanize the ACATS to announce an open competition for development of the best advanced television standard. Among more than twenty-three different technical concepts, the Japanese Muse standard, based on an analog system, was the leader until June 1990, when an American company, General Instrument, demonstrated the feasibility of a digital TV signal. This was a breakthrough achievement, significant enough to persuade the FCC to delay its imminent decision on an ATV standard and require a digital-based standard.

Once it became clear that a digital standard was feasible, the FCC in March 1990 made a number of critical decisions. The Commission declared, first, that the new ATV standard must be more than an enhanced analog signal, but be able to provide a genuine HDTV signal with at least twice the resolution of existing television images. It also decided that the new ATV standard must be capable of being "simulcast" on different channels. This would assure that people who did not want to buy new digital TV sets could continue to receive conventional television broadcasts.

The new ATV standard also allowed the new DTV signal to be based on entirely new design principles. While incompatible with the existing NTSC standard, the new DTV standard would, as a result, be able to incorporate many improvements. These include:

*Progressive scanning*, as explained below, is a more demanding technical format than the current "interlaced scanning" that will allow for a smoother sequencing of video picture frames and interactivity between computers and television sets.

*Square pixels*, or the most basic element of video image data, facilitate the interoperability of the new video standard with other imaging and information systems, including computers. With 1,920 pixels per line displayed on 1,080 lines per frame, the resolution of HDTV images is much sharper than the current NTSC format.

*Increased frame rates* allow a smoother simulation of motion in TV signals; the more frames per second, the more realistic the portrayal of motion. The ACATS proposal allowed three different frame rates - 24, 30 and 60 frames per second.

*Additional lines per frame* allow video images to be sharper in resolution. The current NTSC format provides for 525 horizontal lines of picture data, while the two HDTV standards provide for either 720 or 1080 horizontal lines.

*Different aspect ratios* give viewers a wider field of view, so that the viewing experience is more encompassing in the manner of a film. In the existing NTSC format, the aspect ratio, or relation between the width to height of the screen, is 4-to-3. In HDTV, the aspect ratio is a wider, more rectangular 16-by-9 aspect ratio, which is the same dimensions as 35 millimeter film.

*Sound* is more vivid in digital television, too, because there are five discrete channels of CD-quality audio, along with a sub-woofer channel for deeper sounds. Over time DTV programming is likely to exploit these new capabilities.

While these technical improvements would help make television programming more appealing, the overarching goal of the ATV standard, the FCC later stated, is to:

promote the success of a *free*, local television service using digital technology. Broadcast television's universal availability, appeal and the programs it provides -- for example, entertainment, sports, local and national news, election results, weather advisories, access for candidates and public interest programming such as educational television for children -- have made broadcast television a vital service.(4)

By deciding to adopt a uniform technical standard rather than leaving the outcome to marketplace competition, the Commission wanted to assure stability and continuity in the broadcast market. TV set manufacturers in particular wanted assurance that any digital TV set would work and thus could be sold in all regions of the country.

The Advisory Committee on Advanced Television Service, or ACATS, which was hosting the competition for the best digital standard, decided to collaborate with the Advanced Television Systems Committee (ATSC), an industry group, to recommend a series of technical specifications. By early 1993, this subgroup affirmed the superiority of digital over analog after a rigorous technical review of four digital HDTV standards and one analog proposal. But the ATSC subgroup also found that each of the four digital proposals was deficient in one respect or another.

This prompted the remaining seven ATV competitors to form a coalition called the Grand Alliance to pool their expertise.(5) Working with ACATS, the former competitors agreed in May 1993 to jointly develop a new, multi-faceted standard that would incorporate the best of each system. By November 1995, after extensive testing at three laboratories, the ACATS formally recommended a set of prototype DTV protocols -- the Grand Alliance standards -- to the FCC. Key technical criteria in selecting the final standards were video/audio quality, interoperability with other video delivery media, spectrum efficiency issues, and cost.

In May 1996 the FCC formally proposed adopting the Grand Alliance standards for terrestrial broadcasting.(6) In December 1996 the FCC adopted the DTV standards proposed by ACATS with some modifications.(7) Neither cable nor direct broadcast satellite transmissions would be directly affected. The standards covered five major technical subsystems: scanning, video compression, audio compression, packetized data transport, and radio-frequency transmission. The standards included eighteen distinct transmission formats, a compromise that satisfied the sometimes-conflicting interests of various industries (broadcasting, TV set manufacturers, film studios, computer and software makers) while assuring great flexibility in how digital television could be used.

The final standard adopted by the FCC did not require a single standard for scanning formats, aspect ratios or lines of resolution; instead, a number of options were specified. This outcome resulted from a dispute between the broadcast and computer industries over which of two scanning processes -- interlaced or progressive -- is superior. "Interlaced scanning," which is used in televisions worldwide, scans even-numbered lines first, then odd-numbered ones. Progressive scanning, which is the format used in computers, scans video lines in sequences, from top to bottom.

The computer industry argued that progressive scanning is superior because it does not "flicker" in the manner of interlaced scanning. It also argued that progressive scanning enables easier connections with the Internet, and is more cheaply converted to interlaced formats than vice versa. The film industry also supported progressive scanning because it offers a more efficient means of converting filmed programming into digital formats. Broadcasters, for their part, argued that progressive scanning cannot transmit high-definition signal formats, which require 1,080 lines per picture and 60 frames per second. Broadcasters also favored interlaced scanning because it is more spectrum-efficient, and because they have a vast archive of interlaced programming that would not be readily compatible with a progressive format.

In the end, the FCC acknowledged but did not adopt any of the eighteen recommended formats; broadcasters can choose the scanning format that suits them best. Of the eighteen formats, six are HDTV formats. Three are based on progressive scanning, and three on interlaced scanning. Of the remaining formats, eight are SDTV (four wide-screen formats with 16x9 aspect ratios, and four conventional 4x3 aspect ratios), and four are VGA (formats that are of lower quality than the current analog NTSC standard; VGA stands for "Video Graphics Array Adaptor). A key rationale for adopting so many formats was to allow broadcasters to explore what works best for them in the

marketplace. "We anticipate that stations may take a variety of paths," the FCC said in its April 1997 *Fifth Report and Order on ATV*:

Some may transmit all or mostly high resolution television programming, others a smaller amount of high resolution television, and yet others may present no HDTV, only SDTV, or SDTV and other services. We do not know what consumers may demand and support. Since broadcasters have incentives to discover the preferences of consumers and adapt their service offerings accordingly, we believe it is prudent to leave the choice up to broadcasters so that they may respond to the demands of the marketplace. A requirement now could stifle innovation as it would rest on a priori assumptions as to what services viewers would prefer.(8)

In its *Fifth Report and Order*, the Commission also established a tentative eight-year transition schedule for moving from the current NTSC standard to DTV.

## III. HOW DIGITAL TELEVISION WILL EVOLVE: THE PLAN

While ACATS was wrestling with technical challenges and inter-industry disagreements, Congress in 1994 and 1995 was debating legislation that, on February 8, 1996, became the Telecommunications Act of 1996. The law was enacted to spur competition in the telephone and cable industries, and to foster the development of new electronic media.

Section 201 of the 1996 Act specifies the basic terms under which digital television would move forward. Existing broadcasters are assigned a new DTV license and an additional 6 MHz channel to facilitate the transition from analog to digital television. Broadcasters retain their original 6 MHz channel for analog broadcasts until the expected completion of the transition in 2006, at which point the channels are returned to the FCC.(9)

DTV licensees are granted great flexibility in how they can use their new spectrum, provided that its uses do not interfere with the provision of over-the-air television programming. DTV licensees are still bound by the public interest standards that apply to broadcast television. Finally, DTV licensees are to pay the federal government an as-yet-to-be determined set of fees of the market for ancillary and supplementary (subscription) DTV services.

In moving to a digital format, the FCC, broadcasters, public-interest organizations and others agreed that it is important to keep free, over-the-air TV universally available to the American people. The grant of free additional spectrum to broadcasters for DTV was seen as a way to assure that over-the-air television would continue to be universally available in the future, and that broadcast television as an industry would continue to remain competitive.

By giving broadcasters use of the airwaves until 2006, rather than auctioning the spectrum or charging a fee, the federal government hoped to ease the transition to digital TV: broadcasters would have time to make considerable investments in new digital equipment and make strategic and operational changes in their businesses; TV set manufacturers would have time to develop new products, improve them and lower prices, and consumers would have time to buy new sets.

To help the industry meet the transition deadline of December 31, 2006, the FCC established an accelerated schedule for the introduction of DTV so that all Americans could have access to it by the year 2002.(10) Affiliates of the top four networks (ABC, CBS, NBC and Fox) in the top ten markets must have a digital signal on the air by May 1, 1999. The same network affiliates in markets 11 through 30 must be on the air by November 1, 1999. And all other commercial stations must be on the air by May 1, 2002.

By the end of November 1998, forty-one stations began DTV broadcasting, according to FCC Chairman Kennard, which will make digital TV signals available to more than one-third of television

households in the U.S. by year's end. The National Association of Broadcasters expects this coverage to rise to 50 percent of the nation's TV households by the end of 1999. Total DTV coverage for commercial stations is intended to be available by 2002.

When Congress passed the Balanced Budget Act of 1997, it adopted two provisions that will allow broadcasters to keep their analog TV service beyond 2006 if 1) one or more of the largest TV stations in a market do not begin DTV transmission by the 2006 deadline through no fault of their own; or 2) if fewer than 85 percent of the TV households in a market are able to receive digital TV signals (either off the air or through a cable-type service that includes DTV stations).(11)

## IV. CHALLENGES THAT REMAIN

The advent of digital television will bring some remarkable, exciting changes to broadcasting. Consumers will gain a much wider set of choices from broadcast television, from sharp high-definition TV programming and multicasting of niche-audience channels to new information services and computer-interactivity. Broadcasters will have new opportunities to develop innovative programming and services, along with new revenue streams and market franchises. DTV will help the broadcasting industry evolve and compete in the new media environment, while assuring that public interest needs are still met through over-the-air broadcasting.

Resolving all of these issues will take time. This section reviews some of the more significant issues that need to be addressed.

**What kinds of DTV programming and services to offer?** Because of the inherent versatility of digital transmissions and the still-evolving terms of market competition, it is unclear how broadcasters will in fact use their digital signals. One of the first-threshold choices that broadcasters must make is whether to transmit HDTV programming, to multicast, or to choose some combination of the two.

According to a survey conducted by the Harris Corporation, a provider of broadcast and radio equipment, 44 percent of broadcasters in December 1997 were not sure exactly what they would do with DTV programming.(12) Some 33 percent said they definitely plan to do multicasting; another 23 percent said they definitely would do high-definition TV. For those broadcasters who will use high-definition television, most plan to do so during prime-time and not other day parts.(13)

For those broadcasters who plan to multicast, 50 percent predicted they would offer news and regular network programming; 47 percent said they planned to transmit information services and 26 percent planned to air local news and public affairs. One of the more significant findings of the Harris survey was that broadcasters will move to DTV local program origination *faster* than generally anticipated, and that they expect to offer more locally produced news with DTV.

Some industry observers caution that that the ways in which DTV will interact with media markets will be highly unpredictable for years. While it is likely that multicasting will be economically feasible for some types of programs and dayparts, there are no clear business models for how to attract viewers and keep them tuning in regularly in a multicasting environment. Nor is it clear how interactive services will be treated under must-carry rules.

There are questions as well about how much revenue the new channels - whether HDTV, SDTV or data - can generate. Will broadcasters cannibalize their primary signals as they pursue new DTV opportunities, or will they expand their business?(14) Anticipating the nature of DTV programming and services is also made complex by the new competition among different media, especially cable, direct broadcast satellite and the Internet. Digital television offerings could also be affected by new ownership patterns for TV broadcasting, which in turn might blur the boundaries between once-distinct media. Some industry observers speculate that information providers may see television

stations as distribution vehicles for their data, which may encourage new corporate owners to acquire broadcast stations.(15)

**Technical issues.** Only a few technical problems stand in the way of a full rollout of digital television. The broadcast and cable industries have agreed to channel numbering for virtual channels with multicasting. A consensus standard for ensuring that DTV is technically compatible with cable television systems, through which 65 percent of Americans receive TV programming, is still being sought.(16)

**Investment costs.** The Harris Corporation's survey of broadcasters in December 1997 suggested that the average cost to broadcasters of converting to digital would be in the vicinity of $5.7 million. This sum is "soft" in the sense that TV stations serving larger, urban markets will likely bear greater expenses than smaller TV stations. The timing of purchase of DTV equipment will make a significant difference as well. Also, the kinds and amount of equipment that stations choose to buy for local origination of DTV programming can vary immensely. For all these reasons, previous estimates of DTV conversion costs of $6 to $10 million per station are expected to decline rapidly, probably even faster than the 20 percent annual price decrease that now prevails.(17)

**Consumer demand for DTV.** Another uncertain variable is how quickly consumers will see value in DTV programming and services, and choose to buy DTV sets. Perhaps the most significant factor here will be the cost of DTV sets. Original projections by TV manufacturers indicate that new sets would cost $1,000 to $1,500 more than conventional high-end projection sets, or about $4,000 to $5,000.

But the first high-definition television sets offered for sale in September 1998 were $8,000; about 100,000 are expected to be manufactured in 1998 (out of a universe of one million conventional sets sold each year).(18) A Samsung Electronics Company official estimates that HDTV sets will sell for $3,000 by the year 2002, considerably higher than the $500 or less that most Americans now pay for new TV sets.(19) But as new digital programming and services become more plentiful, it is expected that consumer demand for DTV sets will rise and set prices will decline.

**Must-carry regulations.** In order for digital television to become fully operational, several regulatory issues must be resolved. One of the most important is clarifying how the must-carry provisions of the Telecommunications Act will apply to digital television.(20) Historically, cable televisions systems have had to carry the signal of local broadcasters, as mandated by the 1992 Cable Act and affirmed in the 1997 Supreme Court ruling of *Turner Broadcasting System, Inc. v. FCC* (*"Turner II"*).(21) The arrival of digital television transmission raises questions about how must-carry precedents should apply in the new TV environment. Should cable systems be obliged to carry DTV signals at all, or only one TV signal, as they have under the existing must-carry rules? Or should cable systems be obliged to carry the same amount of *bandwidth* as they currently do, even though that same spectrum may now be carrying several programming channels and perhaps subscriber-based services? Do analog and digital broadcasts constitute separate "broadcasting stations" for the purposes of retransmission consent and digital broadcast signal carriage?

Resolution of the must carry and retransmission consent requirements will affect the kind of access that cable households will have to digital TV signals, what stations and channels are available over cable systems, and the rates that subscribers will have to pay. There is also concern about how must-carry rules in the new DTV environment might affect noncommercial video outlets such as the Public Television System, and public affairs and public access cable channels. To help it address the must carry/retransmission consent issue, the FCC released a Notice of Proposed Rulemaking on July 10, 1998, which proposes seven different alternatives for implementing the must-carry provisions of the Telecommunications Act.

**Fees for ancillary and supplementary services.** Another regulatory issue that the FCC must decide is how to structure the fee system for ancillary and supplementary services, pursuant to the Telecommunications Act of 1996. In requiring fees for these envisioned services, Congress sought to assure that broadcasters would pay approximately what they might have paid had the spectrum been auctioned, for any subscription services (as opposed to free over-the-air programming).(22) This way, the public would receive some portion of the value of the spectrum assigned to broadcasters. To help it in establishing a new fee system for any pay services on DTV, the FCC initiated a Notice of Proposed Rulemaking in December 1997.(23)

**Siting and construction of DTV towers.** Another pending Notice of Proposed Rulemaking invites comment on whether federal law should allow the preemption of local zoning rules in order to facilitate the siting and construction of digital broadcast towers. This proceeding was initiated in August 1997 in response to a petition by the National Association of Broadcasters, which expressed concern that the local approval process for new towers could take too long, delaying the introduction of DTV.

**Public interest obligations.** Finally, one of the largest unresolved issues is what public interest obligations should govern digital broadcasters in the new media marketplace. Congress specified in the Telecommunications Act of 1996 that broadcasters would continue to serve as trustees of the public's airwaves and that public interest obligations should extend into the digital TV environment:

Nothing is this section shall be construed as relieving a television broadcasting station from its obligation to serve the public interest, convenience and necessity. In the Commission's review of any application for renewal of a broadcast license for a television station that provides ancillary or supplementary services, the television licensee shall establish that all of its program services on the existing or advanced television spectrum are in the public interest.(24)

While Congress' general intent is clear, the substantive meaning of public interest obligations in the new television environment is likely to change. To determine the precise contours of a DTV licensee's public interest obligations, the FCC plans to initiate a rulemaking in the near future. This process will be enhanced by understanding the historical development of the public interest standard in broadcasting: the focus of Section II. This is followed in Section III by the Advisory Committee's formal recommendations.

For all the challenges that remain, the opportunities to build a new, more robust broadcasting system have never been greater. The sheer technological capabilities of DTV offer sweeping possibilities for program creativity as well as for the increased competitiveness of broadcasting and public interest service. The most important task at hand is to devise the most appropriate structures to facilitate all these goals.

1.

[1] DTV is often referred to as "advanced television," or ATV. Because ATV embraces any enhancements to the existing TV format (known as the NTSC standard, for National Television Systems Committee), ATV is a more inclusive term than "digital television" or "high-definition television." Once digital technology was shown to be feasible and the most desirable technical standard for advanced television, however, DTV became virtually synonymous with ATV.

2.

[2] *In the Matter of Further Sharing of the UHF Television Band by Private Land Mobile Radio services,* General Docket No. 85-172; RM-3975 RM-4829, 101, 852. Adopted May 31, 1985;

Released June 10, 1985. See also Joel Brinkley, *Defining Vision: The Battle for the Future of Television* (Harcourt Brace and Co., 1997).

3.

[3] *In the Matter of Advanced Television Systems and Their Impact on the Existing Television Broadcast Service*, MM Docket No. 87-268 RM-5811, 2 FCC Rcd 5125, Adopted July 16, 1987; Released August 20, 1987.

4.

[4] FCC, *Fifth Report and Order*, MM Docket No. 87-268, April 3, 1997, p. 13.

5.

[5] The seven members of the Grand Alliance were AT&T (now Lucent Technologies), David Sarnoff Research Center, General Instrument Corporation, Massachusetts Institute of Technology, Philips Electronics North American Corporation, Thomson Consumer Electronics and Zenith Electronics Corporation.

6.

[6] FCC, Fifth Further Notice of Proposed Rulemaking on Advanced Television Systems, MM Docket No. 87-268. Released May 20, 1996.

7.

[7] FCC, Fourth Report and Order, DC 96-117, MM Docket 87-268. Released December 27, 1996.

8. [8] FCC, *Fourth Report and Order*, MM Docket No. 87-268, 11 FCC Red 17771 (1996), p. 19.

9.

[9] The law directs the FCC to auction the so-called analog spectrum in 2002, and return it to the FCC in 2006. The FCC will then assign it to the auction winners.

10.

[10] FCC, Fifth Report and Order, MM Docket No. 87-268, Paragraph 76. Adopted April 3, 1997; Released April 21, 1997.

11. [11] Some industry observers question whether the full transition to DTV and the return of analog spectrum will be consummated by 2006, as intended by the Telecommunications Act of 1996. This stems from doubts about consumer enthusiasm for DTV if sets are too expensive and, in turn, a likely triggering of the two contingency clauses adopted by Congress in 1997.

Based on existing projections of the market penetration of DTV over the next eight years, many analysts believe it is unlikely that 85 percent of TV households will be equipped to receive DTV by 2006. Josh Bernoff, a principal analyst with Forrester Research, an independent market research firm based in Cambridge, Massachusetts, estimates that only 23 percent of U.S. households (nearly 20 million) will have DTV sets by 2004 and only 48 percent (42 million) by the year 2007.

12.

[12] Presentation by Bruce Allen, vice president and general manager of the Harris Corporation's broadcasting division, to the Advisory Committee on the Public Interest Obligations of Broadcasters, January 16, 1998.

13.

[13] Bruce Allen presentation to the Advisory Committee on the Public Interest Obligations of Digital Broadcasters, January 16, 1998, p. 16. The survey interviewed 401 TV executives who represent approximately 480 stations.

14.

[14] Josh Bernoff of Forrester Research speculated in his presentation to the Advisory Committee (January 16, 1998, p. 79): "If you look at the fragmentation [of the existing TV marketplace], it's possible to imagine a world in which there's all of this wonderful programming. But if you look at the fragmentation that's happened so far with things like cable, a lot of what is available is reruns of prime time fare....Maybe we'll have the ability to see *Three's Company* at seven different times during the day, but I'm not sure that there's the capability to produce all of this original programming, given that the audience for the lepidoptery channel is not likely to be that large."

15. [15] Statements by Josh Bernoff, Forrester Research, and Robert W. Decherd, Chairman of A.H. Belo Corporation, to Advisory Committee on the Public Interest Obligations of Digital Broadcasters, January 16, 1998, p. 53 and 82. If new permutations of ownership and blurring of media technologies do occur, some observers envision a rivalry between the personal computer and television, or perhaps a novel blending of the two media. Already, Intel and Zenith are collaborating on a digital TV decoder card for PCs, an innovation that could open up the PC market to digital television. On the other hand, there are reasons to believe that PCs and TV will remain distinct media. The experience of interacting with a PC from a distance of twelve to eighteen inches is quite different from relaxing in front of a TV screen, which is best viewed from six to ten feet away (and even further for big-screen HDTV). And adding interactive features to TV programming would entail great expense, competition among several different technical protocols, and the absence of an established audience.

16.

[16] Letter by Chairman Kennard to the National Cable Television Association, August 13, 1998, at http://www.fcc.gov/Speeches/Kennard/Statements/stwek862.html, or Joel Brinkley, "FCC Wants HDTV Glitch Solved Soon," *The New York Times*, August 24, 1998, p. C4.

17.

[17] Gary Arlen of Arlen Communications, in "Making the Transition: A New Kind of Television: A White Paper," April 1998, p. 19. Arlen predicts that new digital equipment may cost barely 20 percent more than today's comparable analog facilities, which suggests that the most cost-efficient way to proceed is scaled purchases of DTV equipment that parallel development of the market.

18.

[18] Joel Brinkley, "HDTV: High in Definition, High in Price," *The New York Times*, August 20, 1998, p. E1.

19.

[19] Ibid.

20.

[20] 47 U.S.C. 534(b)(4)(B).

21.

[21] *Turner Broadcasting System, Inc. v. FCC*, 117 U.S. 1174 (1997).

22.

[22] 47 U.S.C. Section 336(e)(2)(B).

23.

[23] FCC, *Fees for Ancillary or Supplementary Use of Digital Television Spectrum Pursuant to Section 336(e)(1) of the Telecommunications Act of 1996,* Notice of Proposed Rulemaking, MM Docket 97-247. Adopted December 18, 1997; Released December 19, 1997.

24.

[24] 47 U.S.C. Section 336(d).

## SECTION II

## THE PUBLIC INTEREST STANDARD IN TELEVISION BROADCATING

The federal government's oversight of broadcasting has had two general goals: to foster the commercial development of the industry and to ensure that broadcasting serves the educational and informational needs of Americans. In many respects, the two goals have been quite complementary, as seen in the development of network news operations, and in the variety of cultural, educational and public affairs programming that has been aired over the years.

In other respects, however, Congress and the FCC have sometimes concluded that the broadcast marketplace by itself is not adequately serving public needs. Accordingly, there have been numerous efforts over the past seventy years to formally encourage or require programming or airtime to enhance the electoral process, governance, political discourse, local community affairs, and education. Some initiatives have sought to help underserved audience-constituencies such as children, minorities and the disabled.

In essence, the public interest standard in broadcasting has attempted to invigorate the political life and democratic culture of our nation. Commercial broadcasting has often performed this task superbly. But when it has fallen short, Congress and the FCC have developed new policy tools that try to achieve those goals. Specific policies try to foster diversity of programming, assure candidate access to the airwaves, provide diverse views on public issues, encourage news and public affairs programming, promote localism, develop quality programming for children, and sustain a separate realm of high-quality, noncommercial television programming.

It has been an ambitious enterprise, imperfectly realized. Part of the challenge has been to use public policy, with all its strengths and limitations, to integrate vital public goals into a commercial milieu. This challenge has been complicated in recent years by rapid and far-reaching changes in technology and market structures, not to mention evolving public needs. As competition in the telecommunications marketplace becomes more acute and as the competitive dynamics of TV broadcasting change, the capacities of the free marketplace to serve public ends is being tested as never before.

Before presenting the Committee's recommendations for how the public interest standard in broadcast television should evolve in the digital era, it is important to understand the historical forces that have shaped the public interest standard in the past. Section A discusses the origins and development of the public interest standard, with special attention to the role of spectrum scarcity and government licensing in creating the "public trustee" model of broadcast regulation. Section B examines six primary realms of public interest concern in broadcast television: programming diversity, political discourse, localism, children's educational programming, access for persons with disabilities, and equal employment opportunity.

### A. THE ORIGINS OF THE PUBLIC INTEREST STANDARD

#### 1. Spectrum Scarcity and the Public Trustee Model

A recurring challenge facing Congress and the FCC has been how to reconcile the competitive commercial pressures of broadcasting with the needs of a democratic polity when the two seem to be in conflict. This struggle was, in fact, at the heart of the controversy that led to enactment of the Radio Act of 1927 and the Communications Act of 1934.

Under the antiquated Radio Act of 1912, the Secretary of Commerce and Labor was authorized to issue radio licenses to citizens upon request. Because broadcast spectrum was so plentiful relative to demand, it was not considered necessary to empower the Secretary to deny radio licenses. By the

1920s, however, unregulated broadcasting was causing a cacophony of signal interference, which Commerce Secretary Hoover was powerless to address. The lack of a legal framework for regulating broadcasting not only prevented reliable communication with mass audiences, it thwarted the commercial development of broadcasting.

Thus began an extended debate over how to allocate a limited amount of broadcast frequencies in a responsible manner. A prime consideration was how to assure the free speech rights of the diverse constituencies vying for licensure. Some groups -- especially politicians, educators, labor activists and religious groups -- feared that, under a system of broadcast licensing, their free speech interests might be crowded out by inhospitable licensees, particularly commercial interests. They therefore sought (among other policy remedies) a regime of common carriage. A common carrier system would have required broadcasters to allow anyone to buy airtime, ensuring nondiscriminatory access.

Existing broadcasters, for their part, sought to maintain editorial control and to develop the commercial potential of forging individual stations into national networks. They wanted Congress to grant them full free speech rights in the broadcast medium and *not* be treated as common carriers.

This basic conflict was provisionally resolved by passage of the Radio Act of 1927, and seven years later, by the Communications Act of 1934. The 1934 Act, which continues to be the charter for broadcast television, ratified a fundamental compromise by adopting two related provisions: a ban on "common carrier" regulation (sought by broadcasters) and a general requirement that broadcast licensees operate in the "public interest, convenience and necessity" (supported by Congress and various civic, educational and religious groups).(1) The phrase was given no particular definition; some considered it necessary in order for the government's licensing powers to be considered constitutional.(2)

By prohibiting a common carriage regime, Congress essentially prohibited non-licensees from having free speech rights in the broadcast medium except as authorized by "public interest" requirements. Only government-sanctioned licensees would, as a rule, have free speech rights in broadcasting. While the limited number of licensees was in one respect dictated by the physics of the electromagnetic spectrum (only so many stations could operate without chaos resulting), the "scarcity" was also dictated by the government licensing scheme, which banned a regime of common carriage. The scarcity of access to the airwaves is, in this sense, a creature of government licensure.

The government's exclusionary licensing arrangement was justified by requiring that broadcasters act as public fiduciaries. Their primary duty would be to serve the "public interest, convenience and necessity," as expressed in both the 1927 and 1934 Acts. The Federal Radio Commission that was created by the 1927 Act described the "public trustee" model in this manner:

> [Despite the fact that] the conscience and judgment of a station's management are necessarily personal....the station itself must be operated as if owned by the public....It is as if people of a community should own a station and turn it over to the best man in sight with this injunction: "Manage this station in our interest..." The standing of every station is determined by that conception.(3)

To give substance to the public interest standard, Congress has from time to time enacted its own requirements for what constitutes the public interest in broadcasting. But Congress also gave the FCC broad discretion to formulate and revise the meaning of broadcasters' public interest obligations as circumstances changed.

The FCC's authority, while extensive, is constrained by traditional First Amendment principles. Government may not censor broadcasters (under Section 326 of the Act), for example, nor may it regulate content except in the most general fashion, such as favoring broad categories of programming such as public affairs and local programming. The FCC can intervene to correct

perceived inadequacies in overall industry performance, but it cannot trample on the broad editorial discretion of licensees.

As the foregoing history suggests, the fundamental legal framework that governs the broadcast industry sets it apart from other media. In broadcasting the federal government grants exclusive free speech rights to licensees, while denying such freedom to others. To justify this privileged treatment, Congress and the courts have mandated that licensees serve as "public trustees" of the airwaves.

The public trustee model has given rise to a distinct genre of First Amendment jurisprudence. Unlike newspapers and magazines, broadcasters have affirmative statutory and regulatory obligations to serve the public in specific ways. Despite the philosophical complications and political tensions that this arrangement entails, the U.S. Supreme Court has repeatedly upheld the public trustee basis of broadcast regulation as constitutional.(4)

The reason that broadcasters have substantial, but not complete, First Amendment protection, said the Court, is the scarcity of broadcasting frequencies and the government licensing that is necessary:

When there are substantially more individuals who want to broadcast than there are frequencies to allocate, it is idle to posit an unabridgeable First Amendment right to broadcast comparable to the right of every individual to speak, write or publish....A license permits broadcasting, but the licensee has no constitutional right to be the one who holds the license or to monopolize a radio frequency to the exclusion of his fellow citizens.(5)

Therefore, the Government may require a licensee "to share his frequency with others and to conduct himself as a proxy or fiduciary with obligations to present those views and voices which are representative of his community and which would otherwise, by necessity, be barred from the airwaves."

While the reasoning of the *Red Lion* case has been challenged by many commentators, it stands as the prevailing ruling in this area. (6) Much of the criticism focuses on how the "scarcity rationale" has been invalidated by the proliferation of new media outlets. Many broadcasters and others also argue that scarcity is a basic economic fact of life affecting all media, so why should it justify broadcast regulation?(7) Defenders of *Red Lion* assert that there are still more applicants for broadcast licenses than licenses available - a basic definition of scarcity -- and that government selection of one licensee over another justifies the continuing application of the public interest standard.

**2. Broadcast Television and Democratic Deliberation**

The licensing arrangements that gave rise to public interest obligations were an attempt to reconcile the prerogatives of commercial interests on the one hand with the needs of the democratic polity on the other. Yet they also introduced tensions in First Amendment jurisprudence and gave rise to different visions of free speech.

One vision, often associated with Justice Oliver Wendell Holmes, sees the First Amendment as a guarantor of the "free marketplace of ideas" against government encroachment. Under this familiar metaphor, a "free trade in ideas" in a pluralistic society will yield the most freedom, the closest approximations to truth, and the greatest common good.

An overlapping perspective with a different emphasis is associated with James Madison, the great champion of free speech during the framing of the Constitution and Bill of Rights. For Madison, the First Amendment was important as a way to assure political equality, especially in the face of economic inequalities, and to foster free and open political deliberation.(8) This conception of the First Amendment sees free speech as servicing the civic needs of a democratic polity. Free speech, in

Madison's view, expresses the sovereignty of the people. Justice Louis Brandeis, also associated with this vision of the First Amendment, emphasizes the vital role of citizens in coming together as political equals to engage in rational political discussion.(9) In Brandeis' view, free speech is not just an end unto itself, or simply a freedom from government meddling; it is a necessary means for democratic self-governance.

The philosophical distinction between the free marketplace of ideas metaphor and the Madisonian notion of a deliberative democracy is not academic. It lies at the heart of the public interest standard in broadcasting. From the beginning, broadcast regulation in the public interest has sought to foster certain basic needs of American politics and culture, over and above what the marketplace may or may not provide. It has sought to cultivate a more informed citizenry, greater democratic dialogue, diversity of expression, a more educated population, and more robust, culturally inclusive communities.

The Madisonian concept of free speech helps clarify, then, why public interest obligations have been seen as vital to broadcast television - and why a marketplace conception of free speech may meet many, but not all, needs of our democratic polity. As a number of constitutional scholars have noted, the famous "marketplace of ideas" metaphor associated with Justice Holmes presumes that diverse ideas have the ability to compete for public acceptance.

Some scholars say the marketplace metaphor obscures the extent to which political outcomes require active deliberation and debate. This requires public fora that can give serious, sustained attention to different perspectives. These public fora must be open and accessible to divergent viewpoints, and they must be able to facilitate citizen participation in matters of democratic concern.(10) The marketplace may or may not serve these needs well. When Congress and the FCC have determined that public policy is needed to fulfill conditions that Madison saw as primary to the First Amendment, they have developed new applications of the public interest standard.

Another view of the First Amendment, propounded by many broadcasters and others, is that the marketplace alone is the best guarantor of diversity of expression. Government's role is likely to be intrusive and inimical to diverse expression, according to this perspective; only a robust, free marketplace can duly honor the free speech rights of speaker and listener. As one commentator from this perspective writes:

The question of whether or not an unregulated marketplace produces "enough" valuable speech, or conversely, "too much" worthless or harmful speech, assumes an ability to determine the optimal amount separate from the voluntary choices of speakers and listeners. It presumes that the "public interest" should outweigh traditional First Amendment concepts of speaker and listener autonomy.(11)

By this view, any government policy that presumes to affect the content of broadcasting (such as limitations on advertising, guidelines for public affairs programming or requirements for children's educational programming) represents an abridgement of broadcasters' First Amendment rights.

The philosophical disagreements between the marketplace and Madisonian interpretations of the First Amendment have ebbed and flowed over time. But in general, when the public interest standard has been applied by Congress or the FCC, they have cited the need to help the American democratic polity to function more effectively and to help civic culture thrive. While some applications of the public interest standard have been highly controversial, others have gained wider acceptance and proven quite durable.

We turn, then, to six major arenas in which the public interest standard has most often been applied: diversity of programming; political discourse; localism; children's educational programming; access to persons with disabilities, and equal employment opportunity.

## B. THE PRIMARY APPLICATIONS

## OF THE PUBLIC INTEREST STANDARD

### 1. Encouraging Diversity of Programming

If broadcasters are meant to act as trustees for the public interest, then a corollary is that they must affirmatively present a wide diversity of perspectives. This is clearly a central role of the First Amendment, and the reason why the federal government from the beginning of broadcasting has sought to encourage programming diversity.

The first major initiative in this regard was a set of guidelines known as *Great Lakes Broadcasting Co.*, issued by the Federal Radio Commission in 1929. To assess the performance of licensees under the public interest standard, the FRC declared that a station should meet the

tastes, needs and desires of all substantial groups among the listening public...in some fair proportion, by a well-rounded program, in which entertainment, consisting of music of both classical and lighter grades, religion, education and instruction, important public events, discussions of public questions, weather, market reports, and news, and matters of interest to all members of the family, find a place.(12)

The FRC held that programming along these lines would be considered part of a station's public interest obligation at the time of license renewal. Apart from pushing "propaganda stations" off the air, the FCC did not flex its muscle significantly to affect programming during the 1930s and 1940s.(13)

The Supreme Court in 1943 affirmed the FCC's broad powers over the broadcasting industry - including its authority over programming content -- in its landmark ruling, *National Broadcasting Co. v. United States*.(14) This decision declared that the public interest standard is the touchstone of FCC authority; that the standard is not unconstitutionally vague; that the scarcity rationale justifies the public interest standard as well as content regulation; and that FCC license revocations and nonrenewals do not violate the First Amendment rights of broadcasters.

Despite the FCC's reticence toward content regulation in the 1930s, the changing economies of network radio and proliferation of entertainment programming prompted the Commission in 1946 to issue another general policy statement about programming. This was the *Blue Book*, so-named because of its blue cover but formally known as *Public Service Responsibility of Licensees*. The *Blue Book* defined how the FCC would assess the public interest performance of licensees at renewal time. It required four basic components: live local programs, public affairs programming, limits on excessive advertising, and "sustaining" programs. (Sustaining programs were unsponsored network shows that were deliberately created to showcase high-quality programming having experimental formats or appealing to niche audiences.)

Important symbolically, the *Blue Book* never had legal force. The FCC neither ratified nor rejected the *Blue Book* guidelines. If the Commission's goals in developing the guidelines were seen by many as laudable, the idea of government mandating specific programming, even to public trustees of the airwaves, was seen as contrary to the First Amendment. The National Association of Broadcasters, which had a voluntary code of programming standards, used this occasion, nonetheless, to issue a new and stronger code in 1948.

The challenge facing the FCC, then and on other occasions since, has been to give substance to the broad public interest standard without becoming too prescriptive or intrusive. This is an inherently difficult task, since the first duty - to assure licensee compliance with public trustee responsibilities -

quickly threatens to run athwart the First Amendment. After a number of scandals in the late 1950s involving rigged quiz shows and radio "payola" (the paying of bribes for radio airplay of certain songs), public confidence in broadcasting was shaken. The FCC decided that it was an appropriate moment to clarify the meaning of the public interest standard once again and articulate guidelines for programming.

The result was nineteen days of hearings and testimony from more than ninety witnesses, culminating in the FCC's 1960 report, *Report and Statement of Policy re: Commission en banc Programming Inquiry*. Widely known as the *1960 Programming Policy Statement*, the report listed fourteen "major elements usually necessary to the public interest":

1. Opportunity for local self-expression.

2. The development and use of local talent.

3. Programs for children.

4. Religious programs.

5. Educational programs.

6. Public affairs programs.

7. Editorialization by licensees.

8. Political broadcasts.

9. Agricultural programs.

10. News programs.

11. Weather and market services.

12. Sports programs.

13. Service to minority groups.

14. Entertainment programming.The FCC noted that the categories were not intended as "a rigid mold or fixed formula for station operations," but rather were "indicia of the types and areas of service" that constitute the public obligations of broadcasters, as evaluated at license renewal time.

This general approach to defining the public interest standard prevailed for the next two decades. In the years following the *Statement*, the FCC adopted guidelines for minimum amounts of news, public affairs and other non-entertainment programming,[15] and prime-time access rules (to encourage non-network and local programming).[16] Without specifying actual program content, the FCC's goal was to mandate certain market parameters as an indirect means of stimulating programming of civic importance.

The FCC's vision of the public interest standard - and how to achieve diverse programming -- underwent a significant transformation in the 1980s. As new media industries arose and a new set of FCC Commissioners took office, the FCC made a major policy shift by adopting a marketplace approach to public interest goals. In essence, the FCC held that competition would adequately serve public needs, and that federally mandated obligations were both too vague to be enforced properly

and too threatening of broadcasters' First Amendment rights.[17] Many citizen groups argued that the new policy was tantamount to abandoning the public interest mandate entirely.

Pursuant to its marketplace approach, the FCC embarked upon a sweeping program of deregulation by eliminating a number of long-standing rules designed to promote program diversity, localism, and compliance with public interest standards. These rules included requirements to maintain program logs, limit advertising time, air minimum amounts of public affairs programming, and formally ascertain community needs.[18] The license renewal process -- historically, the time at which a station's public interest performance is formally evaluated -- was shortened and made virtually automatic through a so-called "postcard renewal" process.[19] The FCC also abolished the Fairness Doctrine, which had long functioned as the centerpiece of the public interest standard.[20]

In 1996, Congress expanded the deregulatory approach of the 1980s with its enactment of the Telecommunications Act.[21] Among other things, the Act extended the length of broadcast licenses from five years to eight years, and instituted new license renewal procedures that made it more difficult for competitors to compete for an existing broadcast license. These changes affected the ability of citizens and would-be license applicants to critique (at license renewal time) a broadcaster's implementation of public interest obligations. The 1996 Act also lifted limits on the number of stations that a single company could own, a rule that historically had been used to promote greater diversity in programming.

The range of programming has expanded as the number of broadcasting stations and other media has proliferated over the past twenty years. Yet market forces have not necessarily generated the kinds of quality, non-commercial programming that Congress, the FCC and others envisioned. Hence Congress and the FCC have retained rules regarding children's educational programming, local news and public affairs, and candidate access, among other things.

**2. Broadcasting as a Forum for Political Discourse**

**a. Candidate Access to the Airwaves.** Even though Congress, in enacting the Communications Act, gave broadcasters broad editorial control of the airwaves, it did retain one common-carrier-like provision to ensure access for legally qualified candidates for federal office. The "equal opportunities" provision of the Act -- often referred to as "equal time," or Section 315 -- gives candidates the legal right to airtime if their opponents are given or buy airtime.

The equal opportunities rules were enforced without complication until 1959, when Lar Daly, a political opponent of Chicago Mayor Richard Daley, demanded free airtime from a TV station after Mayor Daley was shown on the evening news at a ceremonial event. This unexpected use of Section 315 prompted Congress to amend it, exempting the news from equal-opportunity requirements. Another complication arose in 1960 when Congress decided to suspend the rules to allow the JFK-Nixon debates to proceed without networks having to grant airtime to minor candidates. This exception for candidate debates was formalized and broadened in 1975, when the FCC exempted "bona fide news events" and other categories of news programming from Section 315.

The FCC has issued other rules governing candidate access to the airwaves. The *Zapple* rule requires that if a broadcaster sells airtime to one candidate, it must sell similar airtime to opposing candidates.[22] In the same vein, the FCC has mandated that candidates have a right of reply to political editorials and candidate endorsements and attacks made by licensees. If a broadcast licensee airs an editorial that either endorses or opposes a legally qualified candidate, the licensee must notify all other candidates for that particular office within 24 hours, provide them with a script or tape, and offer them a "reasonable opportunity to respond through the use of the licensee's broadcast facilities."[23]

Finally, Congress in the early 1970s determined that it was in the public interest for candidates to be able to buy airtime for their campaigns even if broadcasters did not want to sell any time. Congress guaranteed that if a broadcaster offers to sell time to political candidates (including state and local candidates), the broadcaster must charge them the "lowest unit charge of the station" for the "same class and amount of time for the same period," during the 45 days preceding a primary election and the 60 days preceding a general or special election.(24)

While candidates have guaranteed access to the airwaves under prescribed conditions, political editorial advertising (also known as "issue advertising") does not enjoy such protection. The 1973 Supreme Court ruling in *CBS v. Democratic National Committee* held that broadcasters have total discretion over whether to accept or reject editorial advertisements.(25) Essentially, the Court held that broadcasters, as licensees, enjoy broad editorial control to serve the public interest, and need not function as common carriers open to any paying customer. But this editorial control was justified in part, the Court noted, because the Fairness Doctrine (discussed below) and broadcast news otherwise ensure that the public can hear diverse perspectives on controversial issues.

**b. Citizen Access to the Airwaves.** If politicians have the equal-time provisions, the chief legal vehicle for citizens to gain direct access to the airwaves -- or hear diverse viewpoints on controversial public issues - was the Fairness Doctrine. The principles behind the Fairness Doctrine were first expressed by the *Great Lakes Broadcasting Co.* guidelines issued by the Federal Radio Commission in 1929. That statement affirmed the need for broadcasters to serve a diverse public with well-rounded programming.

In pursuit of the utmost even-handedness, the FCC held in the *Mayflower* ruling in 1940 that a broadcast station could *never* editorialize because it would flout the public interest mandate that all sides of a controversial issue be fairly presented. Licensees, the FCC said, must present "all sides of important public questions fairly, objectively and without bias."(26)

By 1949, in its *Report on Editorializing by Broadcast Licensees*, the Commission reversed its *Mayflower* ruling that editorializing was inconsistent with the public interest. But the FCC reaffirmed its holding that licensees must not use their stations "for the private interest, whims or caprices [of licensees], but in a manner which will serve the community generally."(27) To achieve this goal, the FCC promulgated the "Fairness Doctrine" to ensure that "all sides of important public questions [are presented] fairly."

For decades, the Fairness Doctrine was seen as a primary feature of the public interest standard. It consisted of two prongs: that broadcasters devote a reasonable amount of time to cover controversial issues of public importance, and that they provide a reasonable opportunity for the presentation of contrasting viewpoints. A licensee's compliance with the Fairness Doctrine was considered a major performance criterion at renewal time.

In the 1960s the procedures for enforcing the Fairness Doctrine were fortified. Complaints about one-sided coverage were adjudicated not just at license renewal time as part of a station's overall performance, but on a case-by-case basis. This change increased the gravity of complaints, instigated long procedural reviews, and encouraged greater FCC involvement with broadcast content.

In addition, the substantive scope of the Fairness Doctrine was expanded to include advertising, news coverage and personal attacks. The FCC decided in 1963 that the presentation of only one side of an issue during a sponsored program (such as an attack on the proposed Nuclear Test Ban Treaty) required free airtime for opposing views -- a rule known as the *Cullman Doctrine*.(28) Cigarette advertising, and later, controversial advertising in general, became subject to the Fairness Doctrine.(29) In 1967 the Commission issued the "personal attack rule," which required licensees to

notify any individuals or groups who are attacked during broadcasts about controversial issues, and to give them a reasonable opportunity to respond.(30)

Broadcasters, objecting to the "chilling effects" of the Fairness Doctrine on their free speech, eventually challenged the constitutionality of the Fairness Doctrine. The case that came before the U.S. Supreme Court involved Red Lion Broadcasting of Red Lion, Pennsylvania, which had refused to give writer Fred J. Cook an opportunity to reply to a personal attack on him during a paid program. Cook sued, citing the Fairness Doctrine, and prevailed in the Supreme Court.

The landmark *Red Lion Broadcasting v. FCC* decision in 1969 upheld the constitutionality of the public interest standard in general and the Fairness Doctrine in particular.(31) One of the oft-quoted principles of the decision echoes Herbert Hoover and the Federal Radio Commission: "It is the right of the viewers and listeners, not the right of the broadcasters, which is paramount," the Supreme Court stated.

Since the legal contours of the Fairness Doctrine had changed over the course of more than two decades (e.g., its applicability to advertising had been rescinded(32)), the FCC in 1974 issued *The Handling of Public Issues Under the Fairness Doctrine and the Public Interest Standard of the Communications Act, Fairness Report* to guide broadcasters and the public.(33) This was the heyday of the Fairness Doctrine, in which citizen groups and others periodically complained about one-sided coverage and negotiated airtime to respond. Broadcasters complained that the rule had a "chilling effect" on their free speech by discouraging them from airing programming on controversial issues.

In 1985, the FCC agreed, and formally determined that the Fairness Doctrine was incompatible with the public interest. But because of legal contention over whether the doctrine was a statutory or regulatory creation (and thus over who had the authority to revoke it), the FCC invited either Congress or the courts to make a determination. The D.C. Circuit obliged by declaring that the FCC had the authority to rescind the Fairness Doctrine.(34) During this time, Congress failed in its attempt to codify the doctrine through legislation (because of a presidential veto). Pursuant to the Circuit Court ruling, the FCC then rescinded the Fairness Doctrine in 1987.(35)

**3. Broadcasting as a Force for Localism**

Another long-standing tradition in broadcast regulation has been the affirmative need of stations to serve their local communities. The principle was a part of the 1927 Radio Act and 1934 Communications Act, and it has been periodically cited by the FCC as an important component of programming and the license renewal process.

Two of the four programming requirements cited by the *Blue Book* in 1946 were "local live programs" and "programming devoted to discussion of local public issues." The *1960 Program Policy Statement* gave a similar emphasis, citing "opportunity for local self-expression" and "the development and use of local talent" as the first two of fourteen programming priorities. This statement also declared that the "principal ingredient" of the public interest standard "consists of a diligent, positive and continuing effort by the licensee to discover and fulfill the tastes, needs and desires of his service area. If he has accomplished this, he has met this public responsibility."

This concept of seeking out the needs of the local audience, known as "ascertainment," is a procedure that a great many broadcasters follow as a simple matter of good business practice. But others have been less conscientious. Deficiencies in local engagement prompted the FCC to issue a formal *Ascertainment Primer* in 1971 to "aid broadcasters in being more responsive to the problems of their communities" and to "add more certainty to their efforts in meeting Commission standards."(36) The primer advises broadcasters to consult with community leaders and members of the general public, in order to help stations develop suitable local programming and public service announcements.

While some TV stations have criticized ascertainment procedures as an empty and costly formalism, many community leaders have seen it as a useful requirement that can lead to responsive local programming. In any case, the FCC struck ascertainment requirements from its books in 1987 as part of its new deregulatory approach. The FCC now relies upon broadcasters and the marketplace to meet their general obligation to serve their local communities.

Localism was one reason that Congress enacted the "all-channel" law in 1962 requiring television receivers to be capable of receiving both VHF and UHF signals. The idea, according to a House committee report, was to "permit all communities of appreciable size to have at least one television station as an outlet for local self-expression."(37) With varying degrees of success, the FCC has also sought to promote locally originated programming through the Prime Time Access Rule (which limits networks to three hours of programming during prime time) and through policy statements that mention local news and public affairs programming as inherent to the public interest standard.

The bond between broadcasters and their local communities was given a new and stronger dimension in the 1960s as a result of *United Church of Christ v. FCC*. After the station owner of WLBT in Jackson, Mississippi, aired a program urging racial segregation while consistently refusing to air the views of civil rights activists or even to meet with them, the United Church of Christ and others in 1964 petitioned for legal standing to challenge the renewal of WLBT's broadcast license. A circuit court ruling in 1966 held that citizens do have the right to participate in the FCC license renewal process.(38) This ruling opened the door to active citizen participation with local broadcasting and the FCC, a major development that gave greater substance to the principle that broadcast licensees must serve their local communities.

Localism has been such a central feature of broadcast television that Congress in 1992 declared: "A primary objective and benefit of our Nation's system of regulation of television broadcasting is the local origination of programming. There is a substantial governmental interest in ensuring its continuation."(39) Pursuant to this and other goals, Congress enacted the Cable Television Consumer Protection and Competitive Act of 1992 to assure that local broadcast programming would be available to the millions of Americans who cannot afford cable TV or do not have access to free local programming. The so-called "must-carry" rules that resulted require cable operators to distribute broadcast television programming over their systems. While the cable industry challenged the constitutionality of the must-carry rules, the Supreme Court in *Turner Broadcasting v. FCC* recognized Congress' rationale for the must-carry rules and upheld them as consistent with the First Amendment.(40)

As the must-carry and other regulations illustrate, policymakers view broadcast television primarily as a local service. Community programming and service are public interest responsibilities that distinguish broadcasting from most other electronic media.

**4. The Public Interest in Children's Educational Programming**

The public interest standard did not explicitly mention the needs of children until 1960, when the FCC's *Program Policy Statement* cited children's programming as one of the fourteen components "usually necessary to meet the public interest, needs and desires of the community." That commitment has been unevenly fulfilled, given the commercial pressures on broadcasters to expand the number of advertising minutes per hour. It is also difficult to define "quality" programming in an enforceable way.

The essential debate over children's television has revolved around specific ways in which children's programming could or could not be exempted from the customary workings of the marketplace in order to produce "better" programming. The earliest, most ambitious attempt to develop extra-market standards for children's television was initiated by Action for Children's Television. The group sought

fourteen hours of children's programming per week per station; age-appropriate programming for different groups of children; bans on performers promoting products during programs; and the clustering of commercials at the beginning and end of programs. (In the meantime, on a separate front, a new genre of noncommercial children's programming, exemplified by *Sesame Street*, arose, largely insulated from customary commercial pressures.)

The FCC initiated a rulemaking in 1970, and what ultimately resulted, in 1973, were a number of voluntary changes to the National Association of Broadcasters' code. The NAB agreed to separate commercials from programming and ban host selling; to forbid ads for vitamins and drugs during children's shows; and to reduce the number of ads per hour from 16 minutes to 12 minutes during weekdays, and to 9-1/2 minutes during the weekend.

After the NAB adopted its voluntary industry code, the FCC chose not to exercise its authority and issue new requirements for children's programming. The Commission did, however, issue a *1974 Policy Statement* declaring that "broadcasters have a special obligation to serve children."[41] The statement had no specific mandates, opting instead for a general, ad hoc approach to the problems documented. Still, the authority of the FCC to require programming to meet the needs of children was later upheld by the D.C. Circuit Court in *ACT v. FCC*, which wrote: "It seems to us that the use of television to further the educational and cultural development of America's children bears a direct relationship to the licensee's obligations under the Communications Act to operate in the 'public interest.'"[42]

Reporting rules for children's programming were tightened in 1975,[43] and the guidelines reaffirmed in the *1978 Children's Television Report*, which determined that self-regulation was not working. A 1979 report showed continued shortcomings,[44] and proposed somewhat more prescriptive rules.[45]

This initiative never came to fruition, however, as a new set of commissioners took office in the early 1980s and a new chairman, Mark Fowler, decided in 1984 that the marketplace could sufficiently meet children's needs and serve the public interest.[46] On this basis, the FCC repealed the *1974 Policy Statement* that stations should air "education and informational programming" for children. Critics charged that the amount of children's programming dramatically declined as a result, and that the toy merchandising tie-ins to programming increased.[47] The Reagan Justice Department, meanwhile, challenged the provision in the NAB's voluntary code limiting advertising on children's programming as a violation of antitrust law. After this effort succeeded in 1982, the NAB decided to eliminate the remainder of its code.

Disturbed at the failure of a deregulated marketplace to generate adequate educational programming for children and to curb over-commercialization, Congress in 1990 enacted the Children's Television Act of 1990.[48] It mandated that broadcasters air three hours of educational children's programming per week which "furthers the positive development" of children 16 years and younger. Advertising on children's programming would be limited to 12 minutes per hour during weekdays, and 10.5 minutes during weekends. The Act also declared that the "educational and informational needs of children" would be a criterion for assessing a broadcaster's public interest performance at license renewal time.

The FCC under Chairman Hundt developed processing guidelines that assured automatic license renewals for those stations that aired three hours of children's educational programming, but full Commission review for those stations that did not. It also issued more specific definitions of what constitutes educational and informational programming for children.[49]

The public interest in affirmatively serving children has had a number of other expressions. Broadcasters are forbidden from transmitting any obscene, indecent or profane language over the airwaves from 6 a.m. to 10 p.m.[50] The Telecommunications Act of 1996 also encouraged the TV

industry to develop a voluntary ratings system, which allows parents to assess the suitability of programming for their children. This measure is designed to be used in conjunction with a so-called V-chip in television sets, which will enable parents to block objectionable programming.

**5. Access for Persons with Disabilities**

Just as Congress has expanded choices for children and parents through federal mandates, it has done the same for the deaf and hard-of-hearing through legislation that promotes closed captioning on television programming. Closed captioning is a technology that uses the "vertical blanking interval" in analog television signals to transmit captions on TV screens that display the words being spoken on programming. Since captioning services were first begun in 1980 through a cooperative agreement among several major networks, closed captioning has grown, and become widely used among the 28 million Americans with hearing disabilities.

Congress has recognized the public interest of extending television to the deaf and hearing impaired through two key legislative acts. The Television Decoder Circuitry Act of 1990 requires all new TV sets to have special decoder chips to display closed captioned television transmissions. To rectify a market failure, the Telecommunications Act of 1996 sets forth extensive requirements for the provision of closed captions on television. An FCC rulemaking in 1997 established a series of deadlines that will make 95 percent of all new programming captioned over an eight-year period that began January 1, 1998.(51)

**6. Equal Employment Opportunity**

Another important component of the public interest standard in broadcasting is the assurance of equal employment opportunities at the workplaces of broadcast licensees. Equal employment opportunity is, of course, a well-established national policy, first mandated by Section VII of the Civil Rights Act of 1964, and overseen by the Equal Employment Opportunities Commission and the Department of Justice. The FCC has also required that broadcast licensees provide equal employment opportunities (EEO) in order to meet the public interest standard. This authority is exercised as part of the Commission's expansive powers to assure that licensees serve the "public interest, convenience and necessity," as specified in the Communications Act.(52) The FCC is obliged to ensure that licensees act as responsible public trustees, and that requires an attentiveness to the concerns of minorities and women in a number of areas.(53)

For example, the character qualifications of broadcast licensees is one factor that the FCC must consider in granting licenses, a principle that may entail practices that affect minorities and women.(54) Serious questions about the character of a licensee would be raised if a broadcaster consistently discriminated in its employment practices. Similarly, the FCC, in implementing the public interest standard, has long sought to assure that diverse viewpoints, including those of minorities, are expressed in programming and included in programming decisions.(55) One important way of fulfilling this mandate, the FCC has determined, is through the recruitment and employment of a reasonable number of minorities and women.

Historically, the public interest standard has required licensees to ascertain community needs as part of their public trustee function, in order to help make programming more responsive to local communities. A licensee who discriminates in employment policies or practices is not likely to fulfill the ascertainment function well. As the FCC noted in 1968, the existence of discriminatory employment practices "immediately raises the question of whether [the licensee] is consulting in good faith with Negro community leaders concerning programming to serve the area's needs and interests. Indeed, the very fact of discriminatory hiring policies may effectively cut the licensee off from success in such efforts."(56)

As these examples suggest, the FCC's policymaking in equal employment opportunities, while supportive of a general national policy, is based on the distinctive character of broadcasting as a unique mass medium and by the specific statutory mandate of the Communications Act and its administrative implementation.

The FCC first issued EEO rules in 1969 when it prohibited discrimination among licensees and required them to review their employment policies and practices to identify any barriers to equal opportunities.(57) The FCC's policies and enforcement have evolved over the years to take account of other, more specific needs. Broadly speaking, FCC rules prohibit broadcasters from overt discrimination on the basis of race, color, national origin, religion and gender.(58) They also require broadcasters to show that they have made systematic efforts to recruit, hire and promote minorities and women.(59)

In addition, the rules require annual reporting of data showing the results of those efforts. Starting in 1973, the Commission began to review this employment data in considering broadcasters' license renewal applications; it required broadcasters whose results fell below certain benchmarks to demonstrate that they had in fact sought to recruit minorities and women. Since the FCC adopted its EEO rules, broadcast industry employment at all levels, including management, has improved more rapidly than in the rest of the American workforce.(60)

The specific regulatory approaches for promoting equal employment opportunity in broadcasting have changed over time, and are likely to continue to evolve. But the FCC's basic commitment to promoting equal employment opportunity in broadcasting and diversity of programming and viewpoints remains unchanged.

One modification to the FCC's EEO policy occurred in 1998 when the U.S. Court of Appeals declared the FCC's recruitment rules unconstitutional.(61) The Court left in place the FCC's reporting requirements and anti-discrimination provisions. It is unclear to some parties whether the ruling struck down the FCC's processing guidelines only, or the FCC's broader authority even to issue EEO recruitment rules. As of November 1998 the FCC and Department of Justice were still deciding whether to seek Supreme Court review of the D.C. Circuit's decision. In any case, many broadcast entities have made voluntary commitments to comply with the FCC's EEO principles, including recruitment of minorities and women, regardless of the rule's constitutional fate.

Shifts in the regulatory implementation of EEO goals over time are inevitable. But the FCC's authority to advance equal employment opportunities remains intact, and is an important component of the public interest standard.

## Conclusion

Although some of its specific applications have been controversial, the public interest standard has become widely accepted as integral to broadcasting. The standard has provided the legal basis for promoting greater diversity in programming, more robust political discussion, candidate access to the airwaves, programming that serves local communities, children's educational programming, access to programming for Americans with sight disabilities, and equal employment opportunities within broadcasting.

As the new era of digital television arrives, the times demand a thoughtful re-engagement with the meaning of the public interest standard. Many existing principles of public interest performance are likely to need new interpretations in light of the new technology, market conditions and cultural needs. In this spirit, we turn now to some imaginative, flexible and effective strategies that the Committee believes will help assure that the traditional public purposes of broadcast television will

continue to be met in the digital era.

1.

1

See, e.g., Max D. Paglin, editor, *A Legislative History of the Communications Act of 1934* (New York: Oxford University Press, 1989); the legislative history of the Act recounted in *CBS v. DNC*, 412 U.S. 94, 103-110; and Tracy Westen, "Government-Created Scarcity: Thinking About Broadcast Regulation and the First Amendment," in *Digital Broadcasting and the Public Interest*, Charles M. Firestone and Amy Korzick Garmer, editors (Queenstown, Md: The Aspen Institute, 1998).

2.

[2] See Louis G. Caldwell, "The Standard of Public Interest, Convenience or Necessity, as Used in the Radio Act of 1927," *Air Law Review* 1, July 1930, pp. 295-330., and William D. Rowland, Jr., "The Meaning of 'The Public Interest' in Communications Policy - Part I: Its Origins in State and Federal Regulation," paper presented to International Communications Association, 1989 Annual Meeting, San Francisco, CA, cited in Robert W. McChesney, *Telecommunications, Mass Media and Democracy: The Battle for Control of U.S. Broadcasting, 1928-1935*, p. 18.

3. [3] See *The Federal Radio Commission and the Public Service Responsibility of Broadcast Licensees* 11 Fed. Com. B.J. 514 (1950), quoted in *Freedom, Technology and the First Amendment*, at p. 176. The Committee is grateful to attorney Erwin G. Krasnow for his briefing paper "The 'Public Interest' Standard: The Elusive Search for the Holy Grail," presented to the Committee on October 22, 1997, from which this and several other citations are taken.

4.

[4] *Red Lion Broadcasting Company v. FCC,* 395 U.S. 367 (1969).

5. [5] *Op. cit.*, 388.

6.

[6] The Supreme Court has either relied upon *Red Lion* or cited it approvingly in *CBS v. DNC*, 412 U.S. 92 (1973); *FCC v. NCCB*, 436 U.S. 775 (1978); *CBS v. FCC* 453 U.S. 367 (1981); *FCC v. League of Women Voters*, 468 U.S. 364 (1984); *Turner Broadcasting v. FCC*, 114 S.Ct. 2445 (1994); and *Reno v. American Civil Liberties Union*, 117 S.Ct. 2329 (1997). Some constitutional law scholars, however, cite language in many of these cases to suggest that the Court might be willing to reconsider *Red Lion* under appropriate circumstances.

7.

[7] Expressions of this viewpoint include Thomas G. Krattenmaker and Lucas A. Powe, Jr., *Regulating Broadcast Programming* (Cambridge, Mass.: MIT Press, 1994), pp. 204-219; and Laurence H. Winer, "Public Interest Obligations and First Principles," Issues in Broadcasting and the Public Interest, Paper No. 1, The Media Institute.

8.

[8] Cass R. Sunstein, *Democracy and the Problem of Free Speech* (New York: The Free Press, 1993), p. xvii.

9.

[9] A key statement of Brandeis' understanding of the First Amendment can be seen in *Whitney v. California*, 274 U.S. 357, 372, in which he believes that "the greatest menace to freedom is an inert people; that public discussion is a political duty; and that this should be a fundamental principle of the American government...." An illuminating review of Brandeis' views of free speech can be found in Vincent Blasi, "The First Amendment and the Ideal of Civic Courage: The Brandeis Opinion in Whitney v. California," 29 *Wm. & Mary L. Rev.* 653 (1988), and in John Rawls, *Political Liberalism*, 351-56 (Cambridge, Mass., 1993).

10.

[10] Sunstein, p. 249.

11.

[11] Robert Corn-Revere, "Self-Regulation and the Public Interest," in *Digital Broadcasting and the Public Interest*, Charles M. Firestone and Amy Korzick Garmer, editors (Queenstown, Md.: The Aspen Institute, 1998). For similar perspectives, see Robert Post, "Equality and Autonomy in First Amendment Jurisprudence," 95 Mich. L. Rev. 1517 (1997), and Laurence H. Winer, "Deficiencies of the 'Aspen Matrix'," Issues in Broadcasting and the Public Interest, Paper No. 3, The Media Institute, 1998.

12.

[12] *Great Lakes Broadcasting Co. v. FRC*, 37 F.2d 993 (1930), which was instigated by the FRC in 3 FRC Ann. Rep. 32 (1929), *aff'd in part* and *rev'd in part*, 37 F.2d 993 (D.C. Cir.), *cert. dismissed*, 281 U.S. 706 (1930).

13. [13] One such propaganda station, for example, featured an evangelist stridently attacking other religions; another featured a "goat-gland doctor" hawking his own dubious medicines. See Erwin G. Krasnow, "The 'Public Interest' Standard: The Elusive Search for the Holy Grail," paper submitted to the Committee, October 22, 1997, pp. 12-13.

14.

[14] 319 U.S. 190 (1943).

15.

[15] FCC guidelines on non-entertainment programming, contained in delegations of authority to FCC staff, provided standards of at least 5% local programming, 5% informational programming (defined as news and public affairs) and 10% total non-entertainment programming. In general, any renewal or assignment application which fell short of the guidelines had to be sent to the full Commission for action. These guidelines, adopted in 1976, were repealed by the FCC in 1984. *Amendments to Delegations of Authority*, 59 FCC 2d 491, 493 (1976).

16.

[16] The Prime Time Access Rules generally limit the television networks from offering more than three hours of prime-time entertainment programming from Monday through Saturday. The rationale for the rule is to allow non-network production houses to produce programming for the vacated time periods. Amendment of Part 73 of the Commission's Rules and Regulations with Respect to Competition and Responsibility in Network Television Broadcasting, Report and Order, 23 FCC 2d 382, 385-7 (1970). See *NAIPTD v. FCC*, 516 F.2d 526 (2d Cir. 1975); *Mt. Mansfield Television Inc. v. FCC*, 442 F.2d 470 (2d Cir. 1971).

17.

[17] A leading statement of this approach to FCC regulation of broadcasters is set forth in a law review article by FCC Chairman Fowler and Daniel Brenner, his legal assistant, in "A Marketplace Approach to Broadcast Regulation," 60 Texas L. Rev. 2087 (1982).

18.

[18] These rules were all repealed in the same order, *TV Program Deregulation*, 98 FCC2d 1076 *recon. denied*, 104 FCC 2d 358 (1986), *remanded, Action for Children's Television v. FCC*, 821 F.2d 741 (D.C. Cir. 1987). The major litigation on deregulation and repeal of program guidelines concerned the repeal of radio rules in 1981, and was over before TV deregulation was adopted in 1984.

19.

[19] Postcard renewal was adopted in *Revision of Applications for Renewals of License of Commercial and Non-Commercial AM, FM and Television Licensees*, 49 RR2d 740 (1981), *aff'd. sub nom. Black Citizens for A Fair Media*, 719 F.2d 407 (D.C. Cir. 1981), *cert. denied*, 457 U.S. (1982).

20.

[20] The legal history of the Fairness Doctrine is complicated, but stated simply, the FCC stopped enforcing most applications of the Fairness Doctrine in *Syracuse Peace Council,* 2 FCC Rcd 5043, 5054-55 (1987), *recon. denied*, 3 FCC Rcd 2035 (1988), *aff'd. sub nom. Syracuse Peace Council v. FCC*, 867 F.2d 654 (D.C. Cir. 1989), *cert denied*, 493 U.S. 1019 (1990). The Commission continued to enforce several aspects of the Fairness Doctrine, including the political editorial and personal attack rules. In 1992, however, the Commission announced it would no longer apply the doctrine to ballot issues. *Arkansas AFL-CIO,* 7 FCC Rcd 541 (1992), *aff'd. on other grounds, sub nom. Arkansas AFL-CIO v. FCC*, 11 F.3d 1430 (8th Circ. 1993)(*en banc*).

21.

[21] Telecommunications Act of 1996, Pub. L. 104-104, 110 Stat. 56 (1996). A searchable version of the law can be found at the FCC's website, http:www.fcc.gov/telecom.html.

22.

[22] *Letter to Nicholas Zapple*, 23 FCC 2d 707 (1970). The personal attack and political editorial rules (subsets of the Fairness Doctrine) and the so-called "quasi-equal opportunities" policy (the *Zapple* rule) have at all times been subject to continued enforcement, even with rescission of the Fairness

Doctrine. In the summer of 1998, however, the FCC declared by a split vote of 2-2 (with Chairman Kennard recused) that it had no majority to repeal the personal attack and political editorial rules. *Personal Attack and Political Editorial Rules,* 13 FCC Rcd 13109 (1998). This decision is being challenged in court.

23.

[23] 47 CFR 73.1930.

24.

[24] The lowest unit rate requirement, codified as 47 U.S.C. Section 315(b), was adopted in 1972, in Pub. L. 92-225, and somewhat modified in 1974, in Pub. L. 93-442.

25. [25] *Columbia Broadcast System, Inc. v. Democratic National Committee*, 412 U.S. 94 (1973).

26. [26] *In the Matter of The Mayflower Broadcasting Corporation and The Yankee Network, Inc.* (WAAB), 8 FCC 333 (January 16, 1941).

27.

[27] 113 FCC 1246, 1248-9.

28.

[28] The *Cullman Doctrine* was set forth in a letter decision in 1963. *Cullman Broadcasting Co.,* 40 FCC 576 (1963).

29.

[29] This history is complicated, but one landmark was *Banzhaf v. FCC,* 405 F.2d 1082 (D.C. Cir. 1968), *cert denied,* 396 U.S. 842 (1969), in which the Court of Appeals held that cigarette ads were subject to the Fairness Doctrine. The Commission later held that there was no longer any controversy about tobacco, so anti-smoking public service announcements did not have to be balanced with pro-smoking messages. *Cigarette Advertising and Anti-Smoking Messages*, 27 FCC2d 453 (1970), *aff'd. sub nom. Larus & Brother, Inc. v. FCC*, 477 F.2d 876 (4th Cir. 1971).

30.

[30] Like *Cullman*, the personal attack and political editorial rules were integral to the Fairness Doctrine from the outset. Indeed, the *Red Lion* case was itself a personal attack case which predated the 1967 adoption of the specific rules. In response to criticism that the application of the Fairness Doctrine in those circumstances were too vague, the FCC adopted specific rules in *In re Personal Attack and Political Editorial Rules*, 8 FCC 2d 721 (1967). The two rules were also upheld in the companion case which was consolidated into *Red Lion* by the Supreme Court.

31.

[31] *Red Lion Broadcasting Company, Inc. v. FCC*, 395 US 367 (1969).

32.

[32] In *Friends of Earth v. FCC*, 449 F.2d 1164 (D.C. Cir. 1971), the Court of Appeals extended *Banzhaf* to gasoline ads. The Commission responded by changing its policy to repeal application of the Fairness Doctrine to all ads. *1974 Fairness Report*, 48 FCC2d 1, 24-26 (1974), *aff'd. sub. Nom. NCCB v. FCC*, 567 F.2d 1095 (D.C. Cir. 1977), *cert. denied,* 436 U.S. 926 (1978).

33.

[33] Docket No. 19260, 48 F.C.C.2d 1 (1974).

*34.*

*[34] TRAC v. FCC 801 F.2d 501, 517 (D.C. Cir.) pet. For reh'g. en banc denied, 806 F.2d 1115 (D.C. Cir. 1986), cert. denied, 482 U.S. 919 (1987). See also, Arkansas AFL-CIO v. FCC, 11 F.3d 1430 (8th Cir. 1993)(en banc). But see, Red Lion Broadcasting Co. v. FCC, 395 U.S. 367 (1969), Maier v. FCC, 735 F.2d 220, 225 nn. 4-5 (7th Cir. 1984); Larus & Brother, Inc. v. FCC, 477 F.2d 876 (4th Cir. 1971); Straus Communications v. FCC, 530 F2d 1001 (D.C. Cir. 1976).*

*35.*

*[35] Syracuse Peace Council, 2 FCC Rcd 5043, 5054-55 (1987), recon. denied, 3 FCC Rcd 2035 (1988), aff'd. sub nom. Syracuse Peace Council v. FCC, 867 F.2d 654 (D.C. Cir. 1989), cert denied, 493 U.S. 1019 (1990).*

*36.*

*[36] 27 FCC 2d 650, 682 (February 23, 1971), amended by 33 FCC 2d 394 (January 12, 1972).*

*37.*

*[37] Cited in Barry Cole and Mal Oettinger, Reluctant Regulators: The FCC and the Broadcast Audience (Reading, Mass.: Addison-Wesley Publishing, 1978), p. 174.*

*38.*

*[38] 359 F.2d 994 (D.C. Cir., 1966).*

*39.*

*[39] 106 Stat. 1461, Pub. Law 102-385.*

*40.*

*[40] Turner Broadcasting Co. v. FCC, 114 S.Ct. 2445 (1994).*

*41.*

[41] *Children's Television Report and Policy Statement, 50 FCC 2d, 1 5 (1974), aff'd sub nom. Action for Children's Television v. FCC, 564 F.2d 458 (D.C. Cir. 1977).*

*42.*

[42] *ACT v. FCC, 564 F.2d 458 (D.C. Cir. 1977).*

*43.*

[43] *Memorandum and Opinion and Order, 53 FCC2d 1344 (1975).*

*44.*

[44] *Television Programming for Children, A Report of the Children's Task Force, Vol. 1, at 3 (1979).*

*45.*

[45] *Notice of Proposed Rulemaking, 75 FCC2d 138 (1979).*

*46.*

[46] *1984 Children's TV Report and Order, 96 FCC2d 634 (1984), aff'd sub nom. ACT v. FCC, 756 F.2d 899 (D.C. Cir. 1985).*

*47.*

[47] *Newton N. Minow and Craig L. LaMay, Abandoned in the Wasteland: Children, Television and the First Amendment (New York: Hill and Wang, 1997).*

*48.*

[48] *Children's Television Act of 1990, Pub. L. 101-437, 104 Stat. 996 (1990).*

*49.*

[49] *Policy and Rules Concerning Children's Television Programming, 11 FCC Rcd 10660 (1996).*

*50.*

[50] *FCC authority to regulate obscene content is found at 18 U.S.C. Section 1464. The Commission's authority to prohibit indecency over the airwaves between 6 am and 10 p.m. was upheld by the federal courts in Action for Children's Television v. FCC, 58 F.3d 654 (D.C. Cir. 1995), cert. denied, 116 S. Ct. 701 (1996).*

*51.*

[51] *In the Matter of Closed Captioning and Video Description of Video Programming, Implementation of Section 305 of the Telecommunications Act of 1996, Video Programming Accessibility, Report and*

*Order, FCC 97-279, MM Dkt. No. 95-176 (August 22, 1997).*

*52.*

*[52] National Broadcasting Co. v. U.S., 319 U.S. 190, 218-19 (1943).*

*53.*

*[53] Nondiscriminiation in the Employment Policies and Practices of Broadcast Licensees, 60 FCC 2d at 229-30.*

*54.*

*[54] See, e.g., National Organization for Women v. FCC, 555 F.2d 1002 (D.C. Cir. 1977).*

*55.*

*[55] This authority was upheld by the Supreme Court in NAACP v. FPC, 425 U.S. 662, 670 (1976).*

*56.*

*[56] FCC, Nondiscrimination in Employment Practices of Broadcast Licensees, 13 FCC 2d at 770 (1968).*

*57.*

*[57] FCC, Nondiscrimination in Broadcast Employment, 18 FCC 2d 240 (1969).*

*58.*

*[58] 47 CFR Section 73.2080(a).*

*59.*

*[59] Ibid.*

*60.*

*[60] See, e.g., Implementation of the Commission's Equal Opportunity Rules, 9 FCC Rcd 2047, 2049-50 (1994).*

*61.*

*[61] Lutheran Church--Missouri Synod v. FCC, 141 F.3d 344 (D.C. Cir. 1998), rehearing denied, September 15, 1998.*

## SECTION III

## RECOMMENDATIONS OF THE ADVISORY COMMITTEE

### 1. INTRODUCTION

The Advisory Committee's responsibility is to make recommendations in a variety of areas. One such area relates to how the public interest obligations analog broadcasters currently have are applied in the digital era. That is not as straightforward as it sounds. Analog broadcasters send one signal, usually 24 hours a day. Digital broadcasters may send one or multiple signals, at different hours; some of those signals might be programs, others data transmission. So making a one-to-one transfer is not simple.

A second mandate for the Advisory Committee is to examine additional public interest obligations, which might accrue to digital broadcasters, given enhanced opportunities and advantages that may come with digital broadcasting. The grant by Congress of the use of digital spectrum to broadcasters is valuable. We are in no position to assess that value in monetary terms. The market value of the spectrum is impossible to determine. No one knows whether digital TV will maintain, much less increase, broadcasters' revenues. But if the digital portion of the public airwaves does provide a windfall, it is reasonable to recommend ways for the public to receive some benefit in return.

Windfall or no, digital broadcasting opens up unlimited opportunities to achieve a variety of important goals for our society. The vastly increased number of channels of communication, the sharpened clarity of images and the varied kinds of signals that can be transmitted digitally create multiple avenues for diverse groups in each community and in the society as a whole to have their voices heard. They create an opening to explore ways to improve political discourse, which is at the heart of deliberation in a democracy. At the same time, digital avenues can be applied in creative and constructive ways to improve early warning of impending natural disasters, enhance the opportunities for the visually and hearing-impaired to receive programming and communications, and improve the range, quality and delivery of educational programming to schools, libraries and communities at large. Some of these goals, like notification of disasters or expanded closed captioning , can be done at little or moderate additional cost. Others, like enhancing education, will cost more. In our recommendations, we explore ways of achieving these goals without putting undue or unreasonable burdens on broadcasters.

Making any recommendations in these areas is a difficult task, not only because the Advisory Committee has a diverse range of members, each with his or her own interests and perspectives. The greater challenge is that no one knows how digital broadcasting will develop--when receiver costs will come down to appeal to the larger public marketplace; when digital will supplant analog broadcasting; how much digital will rely on single-signal high definition broadcasting or multiple channel multiplexing. The answers to some of these questions may differ for different areas of the country, or for major metropolitan communities and rural ones. Huge technical questions linger--what formats will dominate, how much screen and compression technology will advance to enhance viewing and expand channel capacity.

As a consequence, the Advisory Committee has operated under several basic principles. The first is that the public, as well as broadcasters, should benefit from the transition to digital television. Second, we have tried wherever possible to build flexibility into our recommendations to accommodate the economic and technological uncertainties of the future. We also believe that information, voluntary self-regulation and economic incentives are preferable, as a matter of principle, to regulation. There may be disincentives, and marketplace forces do not always deliver important social benefits. In such cases, it can be appropriate for government to play a role.

If our preference is for minimal regulation, we are not proposing total deregulation or the erasure of

broadcasters' public interest obligations. Broadcasters have a long tradition of commitment to the public interest and have formally expressed their role as guardians of the public trust via the public airwaves. Congress, the executive, and the courts have consistently insisted that public interest obligations by broadcasters are appropriate and required in return for the loan of valuable portions of the public airwaves. Those obligations do not disappear in a digital era. With our recommendations, we hope that they can be continued and enhanced, in ways to serve the public and broadcasters alike.

## II. CORE RECOMMENDATIONS OF THE ADVISORY COMMITTEE

### 1. Multiplexing

Nobody knows what the digital future holds for broadcasters, their viewers, their advertisers, or their competitors. It is true that broadcasters were granted use of an extremely valuable piece of the electromagnetic spectrum to transition to the digital age. It is also true that to do so, broadcasters will have to make large capital outlays to purchase equipment, erect towers, and convert programming to digital formats with no clear picture of what will happen to their revenue. Congress and the FCC originally envisioned this grant of spectrum as a one-for-one exchange, with broadcasters using it primarily for a single high definition television (HDTV) signal. Under this scenario, the rationale for greatly increased public interest obligations or a massive new payment would be diminished. However, if broadcasters decide to use their digital real estate for multiple commercial channels (whether or not they are high definition), each generating its own revenue stream, then it is appropriate to consider whether the public interest requires a different formula-especially since, as compression technology evolves, the number of channels possible may increase substantially, to six, eight or more.

The Telecommunications Act provided for the Federal Communications Commission to assess fees to digital broadcasters who get paid for ancillary or supplementary services-subscription channels, paging services, pay-per-view and the like. It does not prohibit broadcasters from using multiple signals--multicasting several over-the-air channels that get revenue from commercials. There is good reason to let the marketplace settle whether a single high-definition broadcast signal, multiple standard-definition channels, or various combinations of them, will work best. Innovation and testing the markets in this area should not be unreasonably stifled, particularly since multichannel broadcasting could provide long sought new competition to cable and other multichannel program distributors.

Additionally, it is conceivable that broadcasters who apply multiplexing will simply cannibalize their single signal, achieving no additional revenues or perhaps merely stabilizing current market share. We recognize these facts. We also accept the principle that there should be some benefit to the public if its grant to broadcasters of the valuable digital television spectrum results in a substantial windfall for broadcasters.

We recommend the following: Once digital television becomes a reality, apply a two-year moratorium to provide ample opportunity for broadcasters to explore options in the marketplace. Thereafter, if broadcasters elect to multicast and in so doing realize a substantial increase in revenue, Congress or the FCC should apply a menu of options to multicasting broadcasters. The menu would start with a fee payment, either contingent upon the extra channels reaching a particular revenue goal or on some other formula judged fair and appropriate by the FCC. In lieu of the fee, broadcasters could turn to alternatives. They could dedicate one of their multicasted channels to public interest purposes, which would have to include a commitment to provide robust programming and access for local voices. They could provide in-kind contributions, such as free commercial time to the political parties or studio time and technical assistance to community groups producing PSAs or public interest programming, equal in market value to the assessed fee.

With this fee or in-kind arrangement in place, other statutory or regulated public interest obligations would apply to the primary channel, and not in equal amounts to all the other multiplexed signals

(unless the broadcaster could demonstrate the public interest benefit to the FCC of proportionally spreading specific obligations around the multicast channels. For example, it may prove advantageous to give a broadcaster flexibility to place political messages on whatever channels attract the right demographic audience to achieve maximum benefit.) We further recommend that, like the fees to be collected for ancillary and supplemental services, the fees collected for multiplexing be used to enhance the public interest in broadcasting, by applying them to educational or children's programming, using them as part of campaign finance reform for political airtime, or in some other fashion. In any event, these fees should not simply be used for deficit reduction or placed in the Treasury's general revenue accounts.

1. Education

The digital age will open up major new avenues for broadcasting information and entertainment to Americans, creating many new lanes on the information superhighway. In theory, the expansion in information resources and avenues should result in the marketplace driving a vast augmentation of programming in all areas, including those that serve the public interest. For the most part, it works well, as witnessed by the substantial amount of quality programming aired by commercial broadcasters. But we also know that the market alone does not provide programming that can adequately serve children, the governing process, special community needs, and the diverse voices in the country. To be sure, cable television's multiple channels have served commendably some of these needs, such as through Nickelodeon for children or C-SPAN for government and politics. But they are not available to large segments of the population, either because they are not carried on many cable systems or because cable itself is not available to a large share of the populace.

Free, over-the-air broadcasting has the virtue of being readily available to virtually all the people in America, but the marketplace dictates of commercial broadcasters do not automatically accommodate the public interest programming needs of our diverse population. That is why public broadcasting was created and why it has served the country so well. The role that public broadcasting has played in the analog era does not disappear in a digital age; to the contrary. We believe that public broadcasting will continue to be a vital link for many Americans who want access to high quality cultural, public affairs, children's and educational programs-indeed, that the exciting capabilities of the digital spectrum in terms of high definition pictures, multiple signals and data transmission should serve to enhance dramatically the value of public broadcasting to the country.

But there is a major challenge ahead for public broadcasting to fulfill its potential in the digital age. The startup costs of converting to digital signals are high, and just as significantly, the costs of producing digital programming are ten to twenty percent higher than those of comparable analog programming. We believe that public broadcasting will need the funding necessary to produce quality digital programming and to promote it so that viewers know what is available to them. Thus, we urge Congress to consider ways to provide enhanced funding for public broadcasting in the digital era, and to create a trust fund to make such funding assured and permanent.

Even if those steps are taken, we believe that there is more that can be done to exploit the move on the spectrum from analog to digital broadcasting to meet public interest needs. In particular, we recommend carving out space on the spectrum for channels devoted specifically to noncommercial educational programming and services, and funding them in ways that will vastly expand the educational opportunities for all Americans, and particularly for those now underserved by information resources.

Under current law, when digital channels are up and running and reaching substantial numbers of people, the existing analog channels are to be turned back to the government, repacked and auctioned off. We recommend that when this process occurs, the equivalent of one six megahertz channel in each viewing area be reserved instead for noncommercial educational purposes-defined as elementary, secondary and post-secondary education, lifelong learning, distance learning, children's educational, public affairs, multicultural, arts and civic education, and other programming directed to

the educational needs of underserved communities.

We recommend the creation of an orderly process to allocate these channels in a way that will serve each viewing community. A very high priority should be given to ensuring that these educational channels serve underprivileged and minority communities that have typically less access to the educational opportunities present in the information age. One option would be to give the first opportunity to take hold of and run each educational channel to the local public television station or stations. However, the license to operate the channels should be neither automatic nor eternal. The public television stations would first have to draft and submit a plan to the FCC indicating how they would involve the local community, including schools, universities, libraries and diverse and underrepresented groups, what kinds of noncommercial educational programming they might produce and air, and how the new channel devoted to education would be different from their existing public television stations.

The FCC would either accept or reject the plans; if rejected, the educational channel space would be open for bidding by others, including universities, libraries, minority organizations, other broadcasters or other groups.

We make this recommendation with one important condition. We believe that spectrum space alone, despite its enormous intrinsic value, will not be very meaningful if there are not adequate resources to provide appropriate and engaging programming. A new channel devoted to education can be of enormous benefit to the country if it has adequate financial backing. We recommend that Congress provide such funding, using as sources revenues from the auction of other spectrum, including the remainder of the analog spectrum; some of the fees from ancillary and supplementary services by digital broadcasters required by current law; and a portion of the fees we recommend implementing for the use of multiple commercial-driven broadcast channels by digital broadcasters.

We have two other recommendation in this area. First, the U.S. Department of Education should be involved as a clearinghouse for programming and datacasting ideas and as a center to monitor and evaluate the educational programming that emanates from these channels, once again with a particular sensitivity to the educational needs of minorities and other underserved communities. Second, some portion of the fees collected for these educational purposes should be set aside for bids by all broadcasters, including commercial ones and minority ones, to produce and air educational programming that would otherwise not be commercially feasible.

1. Voluntary Standards of Conduct

The Advisory Committee believes that most broadcasters feel a strong commitment to the public interest and the public trust, and behave accordingly. To reinforce public service interests and standards, beginning in 1952, the National Association of Broadcasters used a "Code of Conduct" to set out appropriate principles and standards, and to acknowledge those stations that adhered to the code. The code was abandoned in 1982 after the Department of Justice objected to certain aspects of the code's advertising provisions.

A new industry statement of principles updating the 1952 Code has many virtues. The most significant one is that it enables the broadcasting industry to identify the high standards of public service that most stations follow and that represent the ideals and historic traditions of the industry. A new set of standards can help counteract short-term pressures that have been exacerbated by the incredibly competitive landscape broadcasters now face, particularly when compared to the first thirty some years of the television era. Those competitive pressures can lead to less attention to public issues and community concerns. A renewed statement of principles can make salient and keep fresh general aspirations that can easily be lost in the hectic atmosphere and pressures of day-to-day operations.

To ensure that broadcasters fulfill their obligations as public trustees, we endorse self-regulation by

knowledgeable industry people. This could serve as an effective tool to minimize unnecessary government regulation. To that end, we recommend that the National Association of Broadcasters, acting as the representative of the broadcasting industry, draft a new set of statement of principles or standards. The Advisory Committee hopes that the NAB will develop and recommend self-regulatory standards to and for the industry. The standards should be drafted and implemented by the NAB and the industry, without pressure, interference, or direct or indirect enforcement by the government. The public, the marketplace, and the court of public opinion can then judge their efficacy.

What might a set of Standards of Conduct in the digital age look like? We include in Appendix A, a model draft, done by an Advisory Committee working group under the leadership of Professor Cass Sunstein of the University of Chicago Law School. Another model we have included is the State of Principles adopted by the Board of Directors for the NAB to replace the old Code.

1. Minimum Public Interest Requirements

The Advisory Committee has indicated its belief that having the broadcast industry adopt a strong set of voluntary standards of conduct, created and administered by the National Association of Broadcasters, would be a highly desirable step toward creating a digital world meeting the needs and interests of the American public. But we also recognize an additional reality: not all broadcasters will subscribe to voluntary guidelines. Importantly, a large number of broadcasters--perhaps as many as 400--are not members of the NAB and thus would not be affected by an industry-drafted and administered code.

Under the circumstances, and despite the Advisory Committee's stated preferences for voluntary self-regulation and maximum broadcaster flexibility, we recommend that voluntary standards of conduct be supplemented by a set of mandatory minimum public interest requirements for digital broadcasters. These minimum standards should be drafted in a way that would not impose an undue burden on broadcast stations, and should apply to areas generally accepted as important universal responsibilities for broadcasters as well as for cable and satellite providers. Any set of minimum standards should be drafted by the FCC in close conjunction with broadcasters themselves, and phased in over several years beginning with stations' transmission of digital signals. We include in Appendix B one such set of standards, drafted by a subcommittee of the Advisory Committee led by James F. Goodmon of Capitol Broadcasting.

Mandatory minimum standards express a recognition that it is in the public interest for digital broadcasting to reach most Americans and that digital broadcasting should meet significant public interest obligations. Thus, the Advisory Committee believes that its recommendation for mandatory minimum standards should be coupled with a recommendation for digital "must carry" by cable operators. The intent of the Telecommunications Act of 1996 was to expedite the advance of digital broadcasting to the American public. If it is in the public interest to have digital television broadcasting available as soon as possible to the largest number of Americans, policies that encourage that availability should themselves be encouraged. One of these is "must carry," the requirement that cable television providers carry the digital signals of broadcasters.

Most broadcasters understandably would like to have must-carry apply to both their digital and analog signals throughout the transition period of conversion from analog to digital. But "must carry" is controversial; in the short run, to require mandatory must carry for both digital and analog broadcasting might require cable operators to drop other programming they now carry. If digital must carry is implemented, it would be best to find a balanced process that would minimize dislocation. Whatever the process, must carry or any other steps designed to expedite the advent of digital broadcasting should be considered in the context of the obligations of broadcasters to meet the needs and interests of the American public.

1. Disclosure of Public Interest Activities by Broadcasters

Effective self-regulation by the broadcast industry in the public interest requires the availability to the public of adequate information about what a local broadcaster is doing. Some valuable information is currently made available. For example, all television broadcasters must prepare and place in their public file separate quarterly reports on their non-entertainment programming responsive to ascertained community needs and on their children's programming. We recommend that these reports be augmented by the addition of more information on stations' public interest programs and activities. That information should include but not be limited to contributions to political discourse, public service announcements, children's and educational programming and community-specific activities. We do not intend that such efforts should be onerous to broadcasters, but they should make readily available the most important information for community groups and other members of the public to assess. Information reporting requirements established for implementing the Children's Television Act are a useful model. Broadcasters must identify and describe the programming, when it was aired, and how it meets the broadcasters' obligation to serve the public. They submit electronic reports of this programming via the Internet. One possible form using a check-off approach is included in Appendix C.(1)

At the same time, digital television broadcasters should take steps to distribute such public interest information more widely, perhaps through cooperation with local newspapers and/or local program guides so that viewers can more readily identify and evaluate the efforts local broadcasters are making to address their interests. Similarly, many local television stations now maintain Internet websites where they could post on a regular basis this kind of information.

Enhanced disclosure of broadcasters' public interest activities would be a useful adjunct to a new statement of principles, but its implementation should not be contingent on creation or implementation of such a statement. The information is critical for citizens to evaluate their broadcasters. And since several hundred broadcast stations are not members of the National Association of Broadcasters, even the most expansive new statement of principles would not encompass the entire universe of broadcasters. For these stations, this information would be the only way for citizens to understand what public interest categories were being served or ignored.

Greater availability of relevant information will increase awareness and promote continuing dialogue between digital television broadcasters and their communities and provide an important self-audit to the broadcasters.

1. Political Discourse

That there are serious problems with American political campaigns and the system of campaign finance is indisputable. The "barriers to entry" for candidates to run, especially to challenge incumbents, are high and growing. A major reason is the burgeoning costs of getting messages across in a cacophonous society that consists of large and diverse districts and states. The quality of political discourse is declining. The problems in the campaign finance system are rooted in existing laws, the changing nature of communications in our society, and many other complicated factors. One of them is the growing role of television in campaigns, and its emergence as the single largest category of spending in elections. Television advertising expenditures increased eight hundred percent between 1970 and 1996, more than any other category in campaign finance.

Candidates have turned to television advertising, especially on broadcast television, because in many areas, it is the best medium to reach voters. They will continue to do so. At the same time, broadcast television remains the medium of choice for voters to learn about the campaigns and the candidates. Thus, any significant change in the campaign finance system will have to address the issue of the role of television. But no reasonable campaign finance reform can focus on television alone, or put the central burden for improving our political system on the backs of broadcasters. Reform must look at all the elements of the campaign system, recognizing broadcasting as one of them, albeit a vital one.

With some exceptions, broadcasters have played a major role in providing coverage, airtime and resources to enhance campaigns and provide voters with information about candidates and campaigns. The public interest is clearly served by a substantial role for broadcasters in this area. The digital age provides an opportunity to find enhanced ways for broadcasters to serve this interest, without necessarily imposing heavy-handed government mandates to do so. We believe that a better balance can be struck which can serve broadcasters, the political system and the public interest as well.

Broadcasters have frequently shown a commitment to providing a voice for candidates so that voters can evaluate their alternatives and so that campaigns can have an appropriate level of real debate and give-and-take to enhance the electoral and governing processes. Innovations by the major networks and station groups like Belo, Hubbard and Post-Newsweek have been models for other broadcasters. These efforts should be replicated and expanded upon. The industry should redouble its efforts voluntarily to enhance campaign discourse. To that end, we recommend two steps in this area:

First, that a critical mass of the television broadcasting industry enlist in an effort to provide five minutes each night for candidate-centered discourse in the thirty days before an election. There are creative ways to improve political discourse, provide opportunities for candidates to get messages across to voters and to enhance voter understanding without heavy monetary costs to broadcasters, regulation of the content of programming, without it being a kind of programming that will cause viewers to turn away. A broadcaster would make a voluntary commitment of five minutes for thirty nights (between 5p.m. and 11:35 p.m., or the appropriate equivalents in Central and Mountain time zones.) This idea need not be mandated by the federal government; it can and should be a voluntary standard agreed to and promoted by the industry and its leading members. We recommend a process with maximum flexibility for broadcasters in this area. Stations would choose the candidates and races, federal, state and local, in the election that deserved more attention.

We recommend that Congress give the FCC the authority to waive the "equal opportunities" requirements of Section 315(a) of the Communications Act to allow the broadcasters to give time only to major candidates in a race, or to give time only to one candidate if one or more opponents decline the offer of time. Stations would choose the format(s), with experimentation encouraged. Formats might include giving candidates one minute of airtime to get a message across; conducting "mini-debates;" or doing brief interviews with the candidates. The five minutes need not be in a contiguous block, but we hope the five minutes will not be subdivided into such short segments that serious discourse is precluded. This candidate-centered discourse could occur within station newscasts, but would not have to do so. If broadcasters chose to make the time available within newscasts, they could provide the five minutes each night without giving up a single minute of commercial time.

We do not intend for this recommendation to supersede the fine efforts of many broadcasters to improve political discourse in their own communities; we hope the proverbial thousand flowers bloom. But we see many advantages in the widespread adoption of this plan. For a modest commitment of time during a brief period every two years, broadcasters could provide an immense contribution to the political process and campaign discourse. If every station made this commitment during the period when voters pay the most attention to elections, it would send a powerful signal that elections matter. Not all stations would choose the same races and candidates to cover, but no doubt there would be considerable overlap. In this way, many candidates who otherwise would have no opportunity at all to address a larger audience would be given that chance, probably on several occasions at different times, and via different formats; likewise, many important races that are ignored in campaign season would have a chance to be covered.

We further urge that this commitment, of five minutes a night for thirty nights, be adopted by cable, satellite and other users of the spectrum. And we recommend that this effort not be delayed until the full implementation of digital broadcasting; efforts in this regard could begin in the next election

cycle, allowing experimentation with formats and lengths to go on before the digital era.

Second, we recommend that broadcasters issue a collective challenge to Congress: should Congress pass comprehensive campaign finance reform, broadcasters commit to doing their part to reform the role of television in campaigns. As we note above, television is only one part of a campaign system filled with serious problems. It is not reasonable to expect broadcasters alone to provide all the answers, or to make as the central component of reform federal mandates upon broadcasters. But it is equally unreasonable to expect any comprehensive approach to campaign finance reform to ignore television and the role of broadcasters. If Congress tackles comprehensive reform, which means including areas like the role of soft money, the role of parties, contribution limits, the costs, length and tone of campaigns, broadcasters should make clear that they will support reforms that encompass the broadcast role.

What might those reforms be?

One could be an exchange: the repeal of lowest unit rate in return for a commitment by broadcasters to provide some free time in return for paid time at market rates.

The so-called lowest unit rate, the mandated discount advertising rate for candidates, is a complex and cumbersome system that clearly does not work very well. It does not work for candidates, who are confused by the system, and whose time-buying practices often make the lowest unit rate meaningless or superfluous. It can be a bureaucratic nightmare for broadcasters, with extensive reporting requirements and frequent lawsuits from candidates convinced they are being cheated. In the digital age, lowest unit rate becomes even more cumbersome and costly.

With the uncertainty and fluidity that will characterize commercial time and time-buying in the digital era, it makes sense to let the market dictate the costs of campaign commercial time. But a simple repeal of lowest unit rate would exacerbate the costs of campaigns, not make it easier to create more opportunities for discourse. The best approach would be to exchange the repeal of lowest unit rate for a simple and better approach on political time-one in which those broadcasters who would be able to air political advertisements at market rates would provide some free time for the paid political time they sell at market rates. Congress could legislate the details of this system, or could delegate the duty to the FCC as the expert agency.

To be sure, this simple exchange would not solve the money chase or reduce overall the costs of campaigns. In the context of an overall campaign finance reform that addressed such issues as soft money and overall contribution limits, this change could be a significant component to making the system work better.

A second option would be the creation of a broadcast bank, money or vouchers that could be distributed to parties and candidates to use to purchase radio and television time. The broadcast bank could be funded in many ways. Some resources could come from the fees paid by broadcasters for multiplexing or for ancillary and supplementary services. One component could be from a provision of time by broadcasters as their contribution to overall campaign reform.

How would the time be distributed? One model would have half the time going to the political parties to distribute to candidates as they see fit, and half the time going to candidates who raise sums from small individual donors, as matching grants. Those details, of course, would have to be legislated by Congress.

There are other options involving broadcasting that could improve the campaign process, perhaps in conjunction with the ones above. One would be for Congress to shorten the period of time during which broadcasters must sell time to candidates.

Another is to require that candidates appear in the commercials they air. Many feel that a candidate

stating his or her own case, rather than through the kinds of slickly produced, almost anonymous ads that so predominate today, would greatly reduce the negative tone of current campaigns.

1. Disaster Warnings in the Digital Age

Broadcasters have always taken seriously their fundamental public interest responsibility to warn viewers about impending natural disasters and to keep them informed about disaster-related events. Digital technology will provide many new and innovative ways to transmit warnings to people at risk, including ways to warn hearing-impaired and visually-impaired individuals, and even to pinpoint specific households or neighborhoods at risk. According to the federal government's Working Group on Natural Disaster Information Systems, most of these innovations will require minimal use of the 6 MHZ bandwidth available to digital broadcasters. Broadcasters should work with appropriate emergency communications specialists and manufacturers to determine the most effective means to transmit important information that will be minimally intrusive on bandwidth and not result in undue additional burdens or costs on broadcasters.

The Advisory Committee also recommends that the appropriate regulatory authorities work with manufacturers of digital television sets to make sure that they are modified appropriately to handle these kinds of transmissions, to avoid the excess costs of retrofitting.

1. **Disability Access to Digital Programming**

It is a well-established public interest obligation of broadcasters, set in Sections 305 and 255 of the Telecommunications Act, to provide disability access to broadcast programming. That obligation to provide access will, of course, be continued in the digital era. But digital technology will open up many new avenues to enhance and expand access to disability communities, in part through the easy opportunity to expand the use of multiple audio channels. As broadcasters explore the new technologies available to them digitally, they should vigorously explore ways to provide better access to the disabled, including expanding captioning wherever possible to community news, public affairs programming and discussions of natural disasters and other emergencies, and creative uses of data streaming, in ways that will not create an undue burden upon the broadcasters. They should also examine innovative technologies to expand video description programming while reducing its costs.

Specific suggestions in this area drafted by Advisory Committee member Karen Peltz Strauss are in Appendix D.

Finally, just as with emergency notifications, we recommend that the FCC and other regulatory authorities work with set manufacturers to ensure that modifications in audio channels, decoders and other technical areas be built in to ensure the most efficient, inexpensive and innovative capabilities for disability access.

1. **A new approach to public interest obligations**

The broadcast world will soon change from one with some stability and certainty-one analog signal for each broadcast station, operating usually 24 hours a day-to one with unpredictability, uncertainty and fluidity. Some broadcasters will operate one signal, as before, only in digital instead of analog. Some may operate multiple signals, perhaps two, perhaps many more, throughout the day and night. Others will shift between one high-definition channel and multiple channels. Applying existing public interest obligations to this variegated universe will not be easy, and will certainly not entail a simple one-for-one exchange.

Looking ahead to the digital era, where the flexibility to fit the different patterns that will develop and that will change over time will be increasingly important, many members of the Advisory Committee believe that the White House, the Congress and the FCC should consider developing a whole new model of public interest obligations.

There are many models to consider. Several are outlined in Appendix E. For many of us, a very promising approach would be to move to a kind of "pay or play" model, a proposal made several years ago by Henry Geller, a telecommunications scholar and former FCC general counsel.(2) Under this model, broadcasters would be given the choice of maintaining the existing regime of public interest obligations, or of paying a share of revenues to bypass those obligations, while receiving in return an expedited license renewal process.

The revenues received could then be used to enhance the public interest, by purchasing educational or public affairs programming, providing more local access, or in other ways. All broadcasters, of course, would still have to provide closed captioning, emergency reports and reasonable access to political candidates. But allowing some stations, including religious and shopping channels, to pay in lieu of other public interest obligations would not only be less cumbersome, it would free up resources that could be used to enhance the public interest. A "pay-or-play" type model would replace the command-and-control regulatory approach with a marketplace model analogous to the trading of "pollution rights" in environmental regulation.

Advocates of pay-or-play on the Advisory Committee include broadcasters and non-broadcasters alike, attracted to the freedom of choice it provides to broadcasters, its simplicity, and the opportunity under the model to more efficiently allocate resources in the public interest. Pay-or-play would end the asymmetric regulation that treats broadcasting in a different fashion from cable television, leaving broadcasters to compete on an even footing with cable and other new competitors like satellite, telephones and the Internet, who do not have to meet the same specific public interest obligations as broadcasters.

But many Advisory Committee members, also including broadcasters and non-broadcasters, objected vigorously to the very idea of pay-or play, arguing that it would damage or destroy the ethos of public trusteeship on which broadcasting had been built. Some likened pay-or-play to the Civil War era policy allowing wealthy individuals to buy their way out of military service. Others had practical objections, wondering how it would be possible to set up an equitable fee structure for the "pay" option, and how to allocate the revenues achieved to enhance the public interest.

Some critics worried that pay-or-play would result in broadcasters dropping all public interest-oriented programming, leaving public interest programming segregated on public broadcasting outlets, resulting in less exposure by citizens to important information on public affairs or programming for children or others.

It was clear from our spirited discussions that the Advisory Committee would come to no consensus on any specific alternative model of public interest obligations. It was worthy of note that the divisions in viewpoint represented in the committee were not predictable based on affiliation or general perspectives. Even though we make no consensus recommendation in this area, we do believe that regulatory authorities, industry groups and public interest groups should explore carefully the range of alternative approaches to public interest obligations by broadcasters in the digital age, looking towards eventual adoption of a model that builds in more flexibility and efficiency while serving public needs and interests.

1. Note to Advisory Committee members: We had not yet received the final draft of this form from our subgroup when we put this draft report together; it will be forwarded to you under separate cover when we get it.

2. Henry Geller, "Public Interest Obligations of Broadcasters in the Digital Era: Law and Policy," paper prepared for the Aspen Working Group on Digital Broadcasting in the Public Interest, January 1998, at 6-8 and Appendix B 91995-2005: Regulatory Reform for the Principal Electronic Media, Position Paper, November 1994).

# Cable opposing presidential commission on digital

**November 9, 1998**

WASHINGTON, Reuters [WS] via NewsEdge Corporation : The panel named by President Clinton to recommend public interest obligations for broadcasters in the new digital television era ran into another hurdle on Friday, when the cable industry objected to a draft report of its conclusions.

The draft report, to be discussed at a meeting of the panel on Nov. 9, recommended that television stations be required to carry more public interest and educational programming as they change over to digital technology, which allows up to six channels to be broadcast over the same airwaves that currently carry only one analogue channel.

But the cable industry, in a letter released Friday, objected to a further recommendation in the report that to help speed the adoption of digital television and the new public interest programming, cable operators should be required to carry all digital broadcasts.

Before the cable industry raised its objections, public interest groups had complained that the draft conclusions were too weak and did not impose sufficient obligations on broadcasters. The panel is to complete its work and give final recommendations to the Federal Communications Commission by the end of the year.

Cable operators have already urged Congress and the FCC not to extend rules requiring cable systems to carry all broadcast stations in a market to also include new digital programming.

Because so few people have the expensive television sets needed for watching digital, during a transition period of eight years or more, most stations plan to broadcast in both analogue and digital, sometimes showing the same material.

The cable industry argues that forcing operators to carry analogue and digital shows will strain their channel capacity, forcing them to dump cable networks for the benefit of a small number of wealthy digital set owners.

``There is no reason that every broadcast

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station should be regarded as more important than any cable network," Decker Anstrom, president of the National Cable Television Association, wrote in a letter to the panel.

Norman Ornstein, co-chairman of the panel, said he had not yet seen the letter but explained that the new public interest obligations and so-called ``must-carry" rules for cable operators were ``intimately linked together."

``If there are no mandatory minimums, we don't endorse must- carry," Ornstein said. ``The circumstances under which we believe that must-carry would be in the public interest to expedite the advance of digital broadcasting would be if it is clear that there are some guarantees that there will be some public interest standards met."

Ornstein said the draft report included language making clear that required carriage of digital programmes should not take precedence over all cable channels, some of which are important providers of public interest shows.

Daniel Brenner, the cable association's vice president for law and regulatory policy, said the draft report needed to be more explicit on that point, however.

((Aaron Pressman, Washington newsroom, 202-898-8312))

# October 22, 1997

## PRESIDENT CLINTON NAMES MEMBERS OF THE ADVISORY COMMITTEE ON PUBLIC INTEREST OBLIGATIONS OF DIGITAL TELEVISION BROADCASTERS

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**THE WHITE HOUSE**

**Office of the Press Secretary**

**For Immediate Release October 22, 1997**

**PRESIDENT CLINTON NAMES MEMBERS OF THE ADVISORY COMMITTEE ON PUBLIC INTEREST OBLIGATIONS OF DIGITAL TELEVISION BROADCASTERS**

The Vice President today announced the President's intention to appoint the following individuals as Members of the Advisory Committee on Public Interest Obligations of Digital Television Broadcasters.

Mr. Charles Benton, of Chicago, Illinois, is currently Chairman and CEO of Public Media Incorporated, which is a distributor and publisher of film and video programs. He also serves as Chairman and CEO of the Benton Foundation, an organization whose mandate is to connect Americans with the emerging digital communications environment. Mr. Benton has extensive experience in the business, non-profit, and public service sectors. Mr. Benton holds a B.A. from Yale University and has completed graduate studies at Northwestern University and the National College of Education.

Mr. Frank Blythe, of Lincoln, Nebraska, is the Executive Director of Native American Public Telecommunications (NAPT), a 501(c)(3) non-profit corporation, where he manages the production and distribution of American Indian films, videos, and radio programming to the Public Broadcasting System and the American Indian Radio On Satellite Network. Previous to his work with NAPT, he spent 15 years working in commercial broadcasting in Phoenix, Lincoln and Omaha. Mr. Blythe holds a B.A. from Arizona State University and has done graduate work at Arizona State University and Harvard University. Mr. Blythe is an enrolled member of the Eastern Cherokee Tribe and the Sisseton Dakota Sioux Nation heritage.

Ms. Peggy Charren, of Cambridge, Massachusetts, is the founder of Action for Children's Television, a national child advocacy organization that encourages responsible broadcasting practices. She is currently a visiting scholar at the Harvard University Graduate School of Education. Ms. Charren holds academic honors from Radcliffe College and Connecticut College and honorary degrees from six colleges and universities.

Mr. Harold C. Crump, of St. Paul, Minnesota , is the Vice President of Corporate Affairs for Hubbard Broadcasting, Inc. Previous to joining Hubbard Broadcasting, Inc., Mr. Crump was President and CEO of Crump Communications, Inc. and owner and operator of WCSC-TV in South Carolina. Prior to that he was President of H&C Broadcast Group of Houston, Texas. Mr. Crump graduated from the University of Mississippi in 1953 with a B.B.A. in Advertising.

Mr. Frank Cruz, of Laguna Niguel, California, is a member of the Board of Directors of the

Corporation for Public Broadcasting. He is also a founder of Telemundo, the nation's second largest Spanish language network. Mr. Cruz is currently the President of Cruz & Associates Inc., a financial consultant group. He holds an A.A. from East Los Angeles College and a B.A. and an M.A. from the University of Southern California.

Mr. Robert Decherd, of Dallas, Texas, is Chairman of the Board, President, and CEO of A.H. Belo Corporation, which is a leading television broadcasting and newspaper publishing company. A.H. Belo Corporation owns 16 network-affiliated television stations, six daily newspapers, three local or regional cable news channels and a production company. Mr. Decherd is a graduate of Harvard University.

Mr. Barry Diller, of New York City, New York and Los Angeles, California, is the Chairman and Chief Executive Officer of HSN, Inc., the parent company of Home Shopping Network, Silver King Broadcasting, SF Broadcasting, the Internet Shopping Network, and Vela Research. Mr. Diller has previously served as Chairman and CEO of Fox, Inc. and Paramount Pictures Corporations. Prior to Paramount Pictures, Mr. Diller was Vice President of Prime Time Television for ABC Entertainment and pioneered the made-for television "Movie of the Week" known as mini-series.

Dr. William Duhamel, of Rapid City, South Dakota, is the President of Duhamel Broadcasting Enterprises, a family-held South Dakota corporation. Dr. Duhamel was one of the co-founders of South Dakota Cable Television, Inc., which brought the first cable television service to western South Dakota in 1966. Dr. Duhamel holds a B.A. and an M.A. from St. Louis University, and a Ph.D. from Stanford University.

Mr. Rob Glaser, of Seattle, Washington, is the founder and Chief Executive Officer of RealNetworks, an Internet company focused on using multimedia and on-line communications technologies. Prior to founding RealNetworks, he served as Vice President for Multimedia and Consumer Systems at Microsoft Corporation. Mr. Glaser holds a B.A., a B.S. and an M.A. from Yale University.

Mr. Jim Goodmon, of Raleigh, North Carolina, is the President and CEO of Capitol Broadcasting Company, Inc., which has eleven wholly owned subsidiaries and has been a family business for three generations. Mr. Goodmon attended Duke University.

Mr. Paul La Camera, of Newton, Massachusetts, is Vice President and General Manager of WCVB-TV, Channel 5 - Boston's ABC affiliate television station. Mr. La Camera's career in television began in community relations leading to station management, and includes many broadcast honors and awards, including several Peabody awards. Mr. La Camera holds a B.A. from Holy Cross College, Worcester, MA, a Master of Journalism and Master of Urban Studies from Boston University, and an M.B.A. from Boston College.

Mr. Richard Masur, of Los Angeles, California, is an actor who has appeared on numerous television series and feature films. He is the President of the Screen Actors Guild and is on the Board of Directors of the Hollywood Policy Center and The Creative Coalition.

Mr. Newton Minow, of Chicago, Illinois, is Counsel to the law firm of Sidley & Austin. He also serves as the Annenberg University Professor of Communications Policy and Law at Northwestern University. President Kennedy appointed him Chairman of the Federal Communications Commission in 1960. He served in the Kennedy Administration until 1963, when he became Executive Vice President and General Counsel of Encyclopedia Britannica, Inc. Mr. Minow holds a B.A. and a J.D. from Northwestern University.

Ms. Shelby Scott, of Boston, Massachusetts, is President of the American Federation of Television and Radio Artists (AFTRA), an 80,000 member union of broadcast journalists, announcers, performers, writers, technicians, and others. She is currently a freelance reporter for WBZ-TV in Boston. Ms. Scott holds a B.A. from the University of Washington.

Ms. Gigi Sohn, of Washington, D.C., is Executive Director of Media Access Project. The *American Lawyer* recently selected Ms. Sohn as one of the top 45 Public Sector lawyers under the age of 45. Ms. Sohn holds a B.S. from Boston University and a J.D. from the University of Pennsylvania.

Ms. Karen Peltz Strauss, of Washington, D.C., is the legal counsel for telecommunications policy for the National Association of the Deaf. In this capacity, she represents deaf and hard of hearing communities on all matters pertaining to telecommunications access. She is a former supervising attorney for the National Center for Law and Deafness at Gallaudet University. Ms. Strauss holds a B.A. from Boston University, a J.D. from the University of Pennsylvania and an L.L.M. from Georgetown University.

Mr. Cass R. Sunstein, of Chicago, Illinois, is the Karl N. Llewellyn Distinguished Professor of Jurisprudence at the University of Chicago. He is an expert in First Amendment issues. He is the author of Democracy and the Problem of Free Speech, 1995. Mr. Sunstein holds an A.B. from Harvard College and a J.D. from Harvard Law School.

Ms. Lois Jean White, of Knoxville, Tennessee, is president-elect for the national PTA, is a former member of the national PTA's Education Commission, Individual & Organizational Development Commission, and is past president of the Tennessee State PTA. She has also served as a member of the Board of the Knoxville Museum of Art. Ms. White holds a B.S. from Fisk University and has done extensive graduate work at Indiana University.

Mr. James Yee, of San Francisco, California, is the Executive Director of the Independent Television Service (ITS), a non-profit organization funded by, but independent of, the Corporation for Public Broadcasting, created to increase diversity and the scope of programming available to public television. Formerly he was the Executive Director at the National Asian American Telecommunications Association for 12 years. Mr. Yee received his B.A. in History from Fairleigh Dickinson University, his M.A. in Education from Antioch Graduate School of Education, and has done post graduate studies at Massachusetts Institute of Technology.

The Advisory Committee on Public Interest Obligations of Digital Television Broadcasters was created by Executive Order on March 11, 1997, to study and make recommendations on the public interest responsibilities accompanying broadcasters' receipt of digital television licenses. The Telecommunications Act of 1996 authorizes the Federal Communications Commission (FCC) to issue licenses for digital television services under the condition that the broadcasters remain subject to public interest obligations as deemed appropriate by the FCC, and the return of the analog spectrum used for broadcasting television signals. The Committee is expected to submit a report to the Vice President regarding their findings on or before June 1998.

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Press Release Executive Order

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# U.S. says satellite TV firms must have education fare

**November 20, 1998**

WASHINGTON, Reuters [WS] via NewsEdge Corporation : Satellite television services must begin carrying noncommercial, educational channels under rules approved on Thursday by the U.S. Federal Communications Commission.

Direct broadcast service providers Echostar Communications Corp. and Hughes Electronics Corp.'s DirecTV will be required to turn over one out of every 25 channels carrying video programming to educational public interest groups under the rules.

The FCC said the satellite services could select which organisations would provide programming but could not further interfere with programming decisions made by the educational channels.

Under the new rules, the satellite services would also be required to abide by political broadcasting rules that apply to television stations and require equal access for all political candidates with political advertising charged the lowest rates.

Congress required the FCC to develop the rules in the 1992 Cable Television Consumer Protections and Competition Act.

Commissioner Gloria Tristani voted for the rules but said she opposed the provision allowing satellite services to select which channels to carry to meet the new requirements.

``As a practical matter, the DBS (Direct Broadcast Satellite) operator is bound to have some influence over some of the programming that is shown,'' Tristani said, noting that the 1992 law said operators should not have ``any editorial control.''

Tristani said operators should have been required to compile a list of qualifying channels and poll their customers to determine which should be carried.

((Aaron Pressman, Washington newsroom, 202-898-8312))

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The Wall Street Journal Interactive Edition -- November 19, 1998

Tech Center

# FCC Sets Rules for Broadcasters Offering Services Via Digital TV

By JEANNINE AVERSA
Associated Press

WASHINGTON -- Digital broadcasters should pay the government 5% of their gross revenues for new pay-TV services such as all-movie channels or stock quotations, federal regulators decided Thursday.

No broadcaster has current plans to offer such "ancillary" services, but the industry is just beginning to offer higher-quality digital television. By 2006 all stations must be switched to digital.

In 1996, when Congress set that deadline, it decided that in the digital world television stations that charge for services beyond what they now provide must compensate taxpayers. Congress left it to the Federal Communications Commission to decide how much.

The FCC said Thursday the 5% fee approximates what the government would have been paid if spectrum for such services had been sold at auction. The FCC contends the fee is easy for broadcasters to calculate and won't discourage them from providing new services.

But the National Association of Broadcasters, which fought for a phased-in 2% fee, disagreed. "We're disappointed," spokesman Dennis Wharton said. "A lower fee would have provided greater incentives for broadcasters to offer the type of programming and data delivery that cable and others offer."

Gigi Sohn, of the public-interest law firm Media Access Project, said the FCC's plan won't represent fair compensation to the public for giving broadcasters valuable digital channels.

Ms. Sohn contends that the FCC too narrowly defined what constitutes an "ancillary" service that would be subject to the fees. As a result, she predicted that "the bank is going to be empty."

The Media Access Project and other public-interest groups wanted the FCC to make digital broadcasters pay the fee on revenues from home-shopping shows and infomercials that they air. They also wanted digital broadcasters to pay fees on any revenues they may receive from cable-TV companies to carry their digital services. Some broadcasters and cable companies are negotiating such carriage arrangements.

Separately, the FCC is considering exempting from the fees public stations that offer

ancillary services through the use of digital technology. The FCC tentatively concluded that public stations can offer advertiser-supported digital pay services.

"That runs contrary to the whole notion of being noncommercial," Ms. Sohn said.

Digital technology lets broadcasters squeeze more video and data into existing channel space, giving them numerous options. They could use that extra capacity to provide high-definition TV, which offers sharper pictures then standard TV. They could offer additional TV channels for sports or movies, or stock quotes and other data transmitted to home computers. Or they could offer a combination of the two.

The FCC requires digital broadcasters to continue offering at least one free broadcast as they currently do. No fee would be assessed on that.

The FCC also:

- Adopted rules for DirecTV, EchoStar and other direct broadcast **satellite** providers to serve the public. The rules require companies to reserve 4% of their total channels for noncommercial educational and informational programs and provide cheap ads to political candidates.
- Agreed by Jan. 1 to let an existing organization overseen by the FCC absorb a politically charged program providing cheap Internet hookups to schools, libraries and rural health-care providers.



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**MOVIES AND MONEY**
By David Puttnam with Neil Watson
Knopf • 337pp • $27.50

# WHY HOLLYWOOD RULES THE MOVIE WORLD

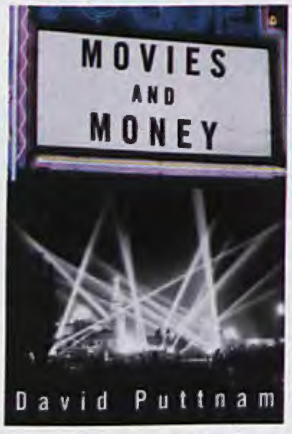
Age-old question: If Hollywood movies are so bad, why does the U. S. dominate world cinema with film production and distribution that are the envy of every other movie-producing nation? For decades, the standard answer has been that Hollywood reaches for the lowest common denominator of the audience, producing simple stories, told in broad visual strokes that minimize the importance of the spoken word. (For evidence, look no further than the grosses of *The Waterboy.*)

There's more than a grain of truth to that, but it isn't the whole story. At least so argues David Puttnam, a British ex-movie exec whose career embodies European moviemakers' love-hate relationship with Tinseltown: After producing such prestigious-yet-profitable pictures as *Chariots of Fire,* he was invited stateside to run Columbia Pictures in the 1980s. He strove to upgrade the intellectual level of American movies, Columbia's profits sagged, and he was swiftly shown the studio gate.

With the wounded nobility of a spurned lover, Puttnam insists again and again that he still loves Hollywood; like most European moviegoers, he was reared on a steady diet of its movies. But in *Movies and Money,* he paints a most unflattering picture of how America seized control, largely by appropriating and perfecting others' ideas. This goes back to the dawn of cinema when Thomas A. Edison patented the crude Kinetoscope movie projector while "borrowing" technology from such French inventors as Etienne-Jules Marey and Antoine Lumière.

Even Hollywood's basic structure turns out to be purloined. Another Frenchman, Charles Pathé, came up with the idea of a vertically integrated system of movie production and distribution—"I didn't invent cinema," he remarked, "but I did industrialize it." American immigrant pioneers such as Carl Laemmle and Adolph Zukor simply refined the practice and enlarged its scale, laying the foundation for an American studio system that no other country has seriously challenged.

Puttnam's title is something of a misnomer: It should be *Movies, Money, and Government.* To his ex-mogul's eye, much of the movies' history is that of trade agreements and other legislation. Early on, Hollywood studios formed legally sanctioned trusts, allowing them to squeeze out independent film companies. With World War I, the White House, recognizing movies' propagandistic value, facilitated their entry into foreign markets. In later decades, Congress granted studios valuable tax breaks to ease the flow of capital into Hollywood and that of movies into the marketplace. Even 70 years ago, it seems, bankers and politicians were dazzled by movie glamor—and happily threw a few more millions or a key piece of legislation at Hollywood in return for a weekend at William Randolph Hearst's San Simeon or a good seat at the Oscars.




As for the men who ran the studios, Puttnam chalks up much of their success to practicality and sheer will: "The American moguls had made the long journey to their Bel Air mansions from the slums of the Lower East Side," he writes. "They were genuinely driven men.... That was why, when it came to fighting for overseas markets, they found it so easy to put aside all their personal hatreds, their internecine rivalries and their quarrels over talent."

Meantime, on the other side of the Atlantic, European film companies struggled to form consortiums that could compete. While these had some success, they were undermined by cultural barriers—has France ever truly agreed on anything with anybody?—and countries' unfortunate tendencies to write individual protectionist policies that undercut the pacts' all-for-one spirit. Result: a jerry-built marketing and distribution system for European movies, many of which remain virtually unreleased, even in their home countries.

Much film-related legislation is, to use Puttnam's phrase, "insanely complicated," and he can't make it interesting. On the other hand, he excels at recounting how Hollywood faced and eventually triumphed over every crisis it ever met. Talkies? After experimenting with simultaneously shot foreign-language versions of its movies, using different casts, it embraced subtitling. Television? After fighting the monster-in-a-box with Cinemascope, 3-D, and stereophonic sound, it realized how lucrative TV could be, both as a revival-house-of-the-airwaves and a purchaser of studio-generated TV shows. Changing demographics? Exhibitors closed or subdivided aging movie palaces and built high-volume cineplexes at suburban malls. The 1948 Supreme Court antitrust ruling that forced studios to surrender their monopolistic hold over movie exhibition? That was a tough one. But expense-cutting, percentage-based salary deals with stars, and more movie-favorable legislation gradually restored studios to economic health.

Puttnam is at his best recounting the movies' early days—when, as one old-timer recalls, "all you needed was fifty dollars, a broad and a camera"—and in a frustratingly brief section on his tenure at Columbia. He can be a bore when he splashes around in the alphabet-soup of trade deals, trusts, and industry associations. For those who need to know the financial and legal arcana of moviemaking, these lengthy sections are useful repositories of acts, facts, and dates. But I'm not sure I'd pay to see the movie.

BY MARC MILLER

*Assistant Copy Chief Miller, a lifelong movie buff, prefers Frank Capra to Ingmar Bergman.*

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November 13, 1998:

# FCC Eyes Digital Fees, DBS Quotas

Washington -- The **Federal Communications Commission** is scheduled to approve two orders next Thursday that will impose new regulations on a pair of cable competitors.

In one, the FCC is expected to adopt rules requiring broadcasters to pay the government fees based on revenue derived from the use of digital-TV spectrum for subscription services.

The **National Association of Broadcasters** asked for a two-year grace period after the introduction of such services, and the NAB said fees should not exceed 2 percent of gross revenue obtained from such services.

In the second order, the FCC is expected to adopt rules requiring direct-broadcast satellite operators to devote between 4 percent and 7 percent of their channels for programming of an informational or educational nature.

The agency has to decide whether DBS operators may maintain editorial control, and whether traditional cable networks, such as **Discovery Channe**l and **C-SPAN**, will qualify toward fulfilling the quota.

Public-interest groups have been arguing for no editorial control by the DBS operator.

- 11/13/98

Multichannel News Weekly

# PANEL CLOSER TO ISSUING DIGITAL REPORT;

**November 16, 1998**

States News Service via NewsEdge Corporation : WASHINGTON Nov. 11 (States) -- A commission pondering broadcasters' public interest duties in the age of digital television is inching closer to finishing their report, last week concluding the final public debate on a rough draft of nine specific proposals.

"I think the combination of these recommendations would be a major step forward and is a kind of different way of looking at these problems,"

said Norman J.Ornstein, a Washington-based scholar and co-chairman of the advisory committee.

But Ornstein also acknowledged that there was significant disagreement about the most controversial proposals -- including a voluntary practice of free air time for political candidates and heftier obligations for broadcasters that split their digital signal into several channels. The 22-member panel, however, will take no up-or-down votes on any specific proposal.

"We are going to get some screaming from the broadcasters that this is outrageous and too onerous. And we are going to get screaming from the left that say this is too weak," said Ornstein, adding that he would consider some agreement among the public interest advocates and broadcasters on his commission "significant."

"I'm reserving all rights until I see how it is written out and how it comes out," said Leslie Moonves, the other commission chairman and president and CEO of CBS Television. Moonves said whether he ends up signing on to the final report will depend on the specific recommendations it contains.

Although the panel does not include direct representation from cable systems or companies, the draft report also includes a recommendation endorsing digital must carry. Barry Diller, chairman and CEO of USA Networks, is the only commission member with cable interests.

The report, which will be presented to Vice President Al Gore on December 18, said must carry would help make digital television available to the largest number of Americans.

But panel members stressed that digital must carry should be connected to broadcasters complying with a set of "mandatory minimum standards." These could include community outreach, accountability and public service announcements.

"We are suggesting that if there are such standards then it is in the public interest to get digital television out," said Ornstein.

The report acknowledges that must carry could be problematic for some cable systems, requiring them to drop some programming if they have to

carry both digital and analog signals."If digital must carry is implemented, it would be best to find a balanced process that would minimize dislocation," it read.

Another provision would require broadcasters that split their digital signal into several channels ("multicasting") to either pay a fee or dedicate a

channel to minority interests.

The commission members have two weeks to draft any rebuttals they want attached to the report. The recommendations, of course, are just that, and must be implemented by the Federal Communications Commission or Congress before becoming law.

By Laura Maggi

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Media Access PROJECT

# Program

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MEDIA ACCESS PROJECT

## Promoting Access to New Media

### Public Access Programming and Access Channels on Direct Broadcast Satellite Systems.

The 1992 Cable Act required the FCC to create regulations to define what public interest obligations must be met by DBS providers. This will include a requirement for them to set aside a portion of their channel capacity for low cost access by noncommercial, educational and informational programming. These provisions provide an opportunity for new voices to have access to a national multichannel video service that is growing by leaps and bounds.

Four years of litigation delayed implementation, but since the challenge has concluded favorably for the time being (in Time Warner Communications v. FCC) the Commission has reopened its proceeding.

In mid-1997, MAP filed comprehensive comments and reply comments on behalf of over 20 nonprofit organizations, including the Association of Independent Video and Filmmakers, the National Federation of Community Broadcasters, the Benton Foundation, the Denver Area Educational Telecommunications Consortium and the Center for Media Education. The comments emphasized the need for broad, low-cost access to the noncommercial channel capacity that is outside the DBS providers' editorial control.

MAP has met several times with FCC decisionmakers about the need for strong public interest obligations for DBS and broad, low-cost access to the set-aside for a wide variety of noncommercial voices. The FCC, in turn, has asked MAP to initiate a dialog with DBS providers about how this set-aside should be implemented. MAP will continue speaking with policymakers and industry on this matter. A decision is expected by Spring, 1998.

**Additional resources on DBS Public Service Obligations:**

Reply Comments of the coalition. (Summary of these Reply Comments.)

Comments of the coalition (Denver Area Educational Telecommunications Consortium, Inc., *et al.*). (Summary of these Comments.)

The FCC's Public Notice requiesting comments on DBS Public Service Obligations.

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FCC 97-24

January 31, 1997

MM Docket No. 93-25
Implementation of Section 25 of the Cable Television Consumer Protection and Compet
1992, Direct Broadcast Satellite Service Obligations

COMMENTS SOUGHT IN DBS PUBLIC INTEREST RULEMAKING

Comment Date: March 31, 1997
Reply Comment Date: April 30, 1997

Section 25 of the Cable Television Consumer Protection and Competition Act of Cable Act") added a new Section 335 to the Communications Act of 1934 that directed to initiate a rulemaking to impose public interest or other requirements for provid on direct broadcast satellite ("DBS") service providers. On March 2, 1993, the Co Notice of Proposed Rule Making seeking comment on its proposals to implement the di of section 25 ("DBS Public Interest NPRM"). On September 16, 1993, after the Commi received comments and reply comments in this proceeding, the United States District District of Columbia held that section 25 of the 1992 Cable Act was unconstitutiona effectively froze the DBS Public Interest NPRM pending the Commission's appeal of t Nearly three years later, on August 30, 1996, the United States Court of Appeals fo Columbia Circuit reversed the District Court and held that section 25 was constitut

In light of the relatively long interval between release of the DBS Public Int Court's recent decision upholding section 25, the Commission, by this public notice refresh the record in this proceeding. The DBS industry has grown and changed dram last four years. Accordingly, the Commission requests new and revised comments on raised in the DBS Public Interest Rulemaking and on any other issues relevant to im section 25.

Section 25(a) of the 1992 Cable Act (47 U.S.C. □ 335(a)) states:

> The Commission shall, within 180 days after the date of enactment of this sect initiate a rulemaking proceeding to impose, on providers of direct broadcast s service, public interest or other requirements for providing video programming regulations prescribed pursuant to such rulemaking shall, at a minimum, apply to broadcast time requirement of section 312(a)(7) and the use of facilities r of section 315 to providers of direct broadcast satellite service providing vi programming. Such proceeding also shall examine the opportunities that the establishment of direct broadcast satellite service provides for the principle under this Act, and the methods by which such principle may be served through technological and other developments in, or regulation of, such service.

With respect to this section of the statute we seek updated comments on issues are not limited to the following: How should the requirements of sections 312(a)(7 Communications Act be applied to DBS providers? What "public interest or other req any, should be imposed on DBS providers in addition to the minimum requirements des the 1993 DBS Public Interest NPRM we tentatively proposed not to adopt additional p requirements, based on "the flexible regulatory approach taken for DBS and its earl development." Should the rapid deployment of the DBS industry over the last severa technological advances that may in the near future allow DBS providers to offer som

programming alter this conclusion? If so, how?

We also seek updated comments on how we should apply the separate requirements section 25(b) of the 1992 Cable Act. Section 25(b)(1) mandates that a DBS provider of its channel capacity, equal to not less than 4 percent nor more than 7 percent, noncommercial programming of an educational or informational nature." Among the que in our NPRM on this section were whether, and if so how, we should define the term programming. Pursuant to section 25(b)(3), this channel capacity must be made avail educational programming suppliers, upon reasonable prices, terms, and conditions." if any, must be afforded access to channel capacity under this provision? How shou "reasonable prices, terms, and conditions" be defined? How should these section 25( interpreted and implemented?

Because DBS, as a satellite service, is likely to be delivered on a regional r basis, we seek comment on the international ramifications of any public interest ob adopt. Finally, we seek comment on any other issues relevant to the implementation

Comments filed in response to this Public Notice should be filed on or before and replies should be filed on or before April 30, 1997. Commenters should note th Notice references the original docket number (MM Docket No. 93-25), this proceeding by the International Bureau. Copies of relevant documents can be obtained in the F 1919 M Street, N.W., Room 239, Washington, D.C., and also may be purchased from the copy contractor, International Transcription Service, (202) 857-3800, 2100 M Street Washington, D.C. 20037. For further information contact John Stern at (202) 418-07 at (202) 418-2119.

Action By the Commission, January 30, 1997, Chairman Hundt, Commissioners Quello, N voting.

# SHOULD CABLE PROVIDE DIGITAL MUST-CARRY? YES, LOCALISM AND FREE OVER-THE-AIR TELEVISION MUST BE PRESERVED

**January 25, 1999**

Electronic Media via NewsEdge Corporation : Nearly 15 years ago, free over-the-air broadcasters embarked on a historic public-private partnership to provide American consumers the finest television technology the world has ever seen.

This journey was launched with explicit bipartisan support of Congress, the White House and the Federal Communications Commission and was supported overwhelmingly by each succeeding administration and Congress since 1985.

Our goal was simple: to develop a digital and high-definition television standard that would become the model for the world. Hundreds of millions of dollars were invested; top engineers from industry and academia pursued this vision with a single-minded focus.

The years of hard work paid off when the FCC in December 1996 adopted an industry-backed digital TV standard fashioned with the support of electronics makers, organized labor, computer companies and yes, broadcasters and the cable TV industry.

Today, more than 40 stations are broadcasting in digital. A year from now, network affiliates in the top 30 markets will be broadcasting digital television to a potential universe of more than half of all U.S. homes.

Free, local TV stations understand they must transition to digital to remain competitive with all other pay telecommunications services, including cable, satellite, computers and telephones. And that is why it is critical that digital cable carriage rules be adopted by the FCC to help jump-start the next generation of television.

The U.S. Supreme Court has had its say on the issue of must-carry and ruled that broadcasting is a unique service worth preserving. Why? In part, because of broadcasters' unmatched commitment to serving local audiences.

Localism is the franchise of broadcasters. It is ours and ours alone, and local stations take seriously their commitment to community.

In one year alone, NAB has documented that broadcasters provided $6.85 billion in community service, a figure that includes the value of station public service announcements, money raised for local charities and free airtime given for political candidates. It's that sort of investment in community that has prompted Congress, the FCC and the Supreme Court to support cable carriage of local broadcast channels.

The choices before Chairman Bill Kennard and his colleagues are simple: Do policy makers support the continuation of free, local television for the benefit of all viewers?

Does the FCC want to entrust the DTV transition to cable? Will a handful of cable moguls -- who favor replacing some local broadcast channels with lower

resolution pay cable channels -- be permitted to dictate programming options of viewers at the expense of local stations that routinely air news, life-saving weather alerts and PSAs? Does the FCC support early return of the analog broadcast channels -- which, without a cable digital must-carry mandate, would be highly unlikely?

NAB has presented irrefutable evidence to the FCC proving that the vast majority of cable systems will have more than sufficient channel capacity to carry all local broadcast stations in digital. Thus, the claims of a potential loss of C-SPAN or other cable networks are merely a rehash of cable's discredited assertions made when it argued against analog must-carry.

For the benefit of all viewers, we urge the FCC to act quickly and adopt digital must-carry rules to preserve localism and free, over-the-air television.#

<<Electronic Media -- 01-18-99, p. 36>>

## DAMATA, JASON

**From:** DAMATA, JASON
**Sent:** Tuesday, January 25, 2005 11:08 AM
**To:** 'tom@cwx.com'
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VIA SATELLITE

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HEADLINE: Legal Legacies: Milestones In Satellite History

BODY:

By Robert N. Wold

Welcome to Washington DC. This is where one sightsees.

The monuments, the White House, the Capitol, the Smithsonian, and in the spring, the cherry blossoms. It's where our President works, and where our Supreme Court Justices ponder.

Washington, DC, is also where 40,000 lawyers work. Among them, an estimated 3,000 work frequently on communications matters. Many have spent a considerable number of years encouraging the growth of the satellite communications industry.

Del Smith, senior telecommunications counsel at Jones, Day, Reavis and Pogue provides one perspective on the changes that have taken place in the legal profession. "What began as a governmental, regulatory practice has become primarily a private sector-based business practice," he says.

Via Satellite decided to poll a council of DC lawyers, to rehash history. We begin with scenes from the late 1950s and early 1960s.

The Political Beginning

During President Dwight D. Eisenhower's farewell State of the Union address on January 12, 1961, he relaxed and at last told U.S. citizens, "The 'bomber gap' of several years ago was always a fiction, and the 'missile gap' shows every sign of being the same."

He was responding, of course, to constant accusations from political foes who had painted Eisenhower as a president "asleep" in matters of defense, science and outer space. His foes invented the word "gap" and persuaded the news media to use it with frequency. "Gap" implied a wide lead supposedly held by the Soviets.

The public was still haunted by the Soviets' first two Sputnik overflights of the U.S. on October 4 and November 3, 1957. Would these frightening satellites turn outer space into a new battlefield?

Ike's "Stalking Horse"

What our former five-star general could not publicly talk about before

include transparent backgrounds, supports interlacing (providing a low-resolution preview of the graphic to the viewer while it downloads), and can be used as an image map (allowing the viewer to click on the graphic as they would a regular link to another site).

JPEG is short for Joint Photographers Experts Group. JPEG is superior in rendering color and detail found in photographs or graphics using blends, gradients, and other tonal variations.

Sometimes it's obvious that a graphic on someone's web page was saved in the wrong file format. Photos may look too grainy, or flat-color images may look too fuzzy. When selecting GIF or JPEG for your graphics conversion, it is important to consider the type of image you will be working with. Use a GIF format if your graphic consists primarily of line art or flat colors without gradients. JPEG-converted graphics are best for photographs or images with fine tonal variations in colors, such as images with gradients or metallic images. Choosing the right file format is not only important for the quality, but for keeping your image's file size to a minimum.

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**Fonts**

For your audience to view the same font (an unique set of type characters) you see on your own screen, they must also have the same font installed on their own individual computers. Otherwise, their browser will instead show a substitute font, which designers have no control over.

For this reason, be more conservative with your choice of fonts. Display only what the general public already has on their computers. If you're looking for a contemporary look, use standard fonts like Helvetica or Arial. If you're looking for a more sophisticated look, use fonts like Times or Verdana. If you absolutely MUST have everybody see your creative font, then convert the selected text into a graphic. Use this option sparingly, though, since it will increase your web pages' download time.

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**Typography**

The harsh reality of web design is that you simply don't have the kind of control over how your text appears. It is far less sophisticated than what is possible in print media. The choice of font, the exact size of the text, where the text breaks, and how the text reads - all are aspects of typography. And on a web page, they are mostly determined by the web browser, not by the

creator or owner of a web site.

At a screen resolution of only 72 dpi, text is nowhere near as sharp on screen as it is on a print publication. For this reason, be very careful not to overload your readers with too much text and allow for some open white space.

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**Plug-ins**

There are several mistakes designers can make when it comes to adding plug-ins (a software extension that provides added capabilities to the browser) to their site. They may:

1. fail to include a warning to the visitor in advance that a plug-in is needed to view the site and where they can download it, or

2. create a link to the plug-in creator's web page but the visitor is no longer at the original company's web site.

Some solutions to keeping your visitors' attention: code the link to the plug-in so that when it is clicked a new browser window will appear, rather than losing your web page. Better yet, try to obtain direct access to the plug-ins FTP site so that people will only see your web site while the plug-in downloads.

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**Navigation**

The web is a much more interactive experience than a print publication. The viewer controls the sequence of web pages and jumps from page to page using links. As a result, the web designer must organize the content on the web pages very differently from the way one might organize them from a brochure, newsletter, or book. Remember, your web site is not a document your audience can physically hold. You can't assume the viewer has seen previous pages or will proceed to subsequent pages on your web site. Each page must be able to stand on its own. Your audience always needs to be reminded where they are and how to get to anywhere else on your site.

Read more about different types of web site navigation.

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### Colors

The advantage of color on the web is that it's cheap. Technically, you can produce millions of colors on your screen, provided your monitor and video display are a decent quality. The disadvantage is that there are actually only 216 web-safe colors - meaning that these are the only colors that appear the same on all monitors and operating systems without dithering, be they PCs or Macs.

It is important to understand that colors from a print piece cannot be effortlessly transferred to a computer screen. Many print variables - paper thickness, texture, color, absorbency; inks - are not available for a computer monitor - a convex glass surface producing a screen flicker to project the image you see.

Also, too much color on a web page can be distracting and counterproductive. The most successful strategy is to use color sparingly. Adding too many colorful items can create the visual equivalent of noise. Instead, leave room for white space. This will help your visitors focus on the items that are highlighted in color - a perfect opportunity to showcase your promotional message.

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### Computer monitors

A web site that looks clean on a monitor with millions of colors could look dithered and jagged on a monitor with only 256 colors. Colors that appear bright and sharp on your screen may appear dark and dull on another's. A web page that appears well suited for a 17" or larger screen will appear cut-off on a smaller one. Even the operating system can affect your monitor display. Macintosh computers, for instance, have a higher gamma display, and web pages show up brighter on them than on Wintel PCs.

Before making any design revisions, first view your web page on several computers. If you only have one computer, go somewhere off-site and view it. See how the web site reads under poor lighting as well. All of these factors can be observed before reaching an acceptable medium.

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### Conclusion

A successful web site requires not only individuals who are skilled in their own particular fields, but a cohesive team effort where everyone performs their work with the other partners in mind. For the client, it means trusting in your designer's experience and an understanding of what are the realistic possibilities and limits of the web page. For the designer, it requires switching from the

mentality of "look what I can do," to "look what I can do for your business."

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1961 was his "stalking horse" strategy, a multi-faceted reconnaissance program that assured Eisenhower that the dastardly "gaps" were myths.

As early as 1954, the U.S. Air Force had been flying "weather balloons," equipped with automatic onboard cameras, from an air base in Germany across the wide expanse of the former Soviet Union to the Pacific Ocean, for retrieval from water by the United States.

By 1955, the Central Intelligence Agency (CIA) and aircraft manufacturer Lockheed Martin, working with the Air Force, began designing a low-orbit reconnaissance satellite system. The project was soon moved out of the Air Force and became the Discoverer "science" satellite system. From August 1960 through February 1962, Discoverer satellites were able to obtain a vast amount of reconnaissance photography, dropped in capsules to the Pacific Ocean for U.S. retrieval.

The third facet, also involving the CIA and Lockheed Martin, centered on the high-flying U-2 jet aircraft and CIA pilots engaged in "weather studies." The flights began in 1956 and continued flying over the Soviet Union until pilot Francis Gary Powers and his U-2 were shot down by Soviet missiles on May 1, 1960.

These reconnaissance tactics revealed clearly that the Soviets had far fewer bombers and intercontinental missiles than Soviet propaganda claimed. The photography enabled Eisenhower, before he left office, to hold back on the nation's defense spending, despite Congressional pressures.

The aviation overflights, however, threatened to be a major legal issue.

## International Overflights

Although he was not a law school graduate, Ike was one cool chess player.

He and Nikita Khrushchev attended a summit meeting in Geneva on July 21, 1955, both knowing that each side would soon launch peaceful scientific satellites. Eisenhower proposed a broad and peaceful "freedom of space" agreement, but the Soviets flatly rejected it.

Historian Roger Launius wrote, "The Eisenhower administration was working behind the scenes to achieve permanent free access to space and to avoid international overflight issues common to aviation. He was concerned ... that if the United States was the first nation to orbit a satellite, the Soviet Union could invoke territorial rights in space. Soviet Sputniks 1 and 2 had overflown international boundaries without provoking a single diplomatic protest.

"On October 8, 1957, Deputy Secretary of Defense Donald Quarles told the president, 'The Russians have ... done us a good turn, unintentionally, in establishing the concept of freedom of international space.' Eisenhower immediately grasped this as a means of pressing ahead with the launching of a reconnaissance satellite.

"The precedent held for Explorer 1 and Vanguard 1, and by the end of 1958 the tenuous principle of 'freedom of space' had been established. By allowing the Soviet Union to lead in this area, the Russian space program had established the U.S.-backed precedent for free access," Launius explained.

The issue arose, not surprisingly, for lengthy discussion at the United Nations in the early 1960s. In 1961, the Kennedy administration appointed Adlai Stevenson as U.S. Ambassador to the United Nations. His work on this issue was successful.

## Communications Satellite Act

In 1962, the 87th U.S. Congress created the Communications Satellite Corp. (Comsat). It opened the door for international space telecommunications, based on a determination that the technology of communications satellites should be exploited commercially.

"The regulatory framework which first was encompassed by the Comsat Act has become a user-based set of guidelines for maximizing corporate assets," says Smith.

There was heated debate in the Senate, followed by a vote to impose cloture for the first time in 35 years. One group strongly argued that the federal government should run Comsat. Another group advocated that AT&T, the major international communications carrier, should be in charge. The winning solution, in which neither the government nor AT&T would dominate, was sold to Congress by the Kennedy administration's Deputy Attorney General Nicholas Katzenbach. Half of the shares would be sold to the general public, and the

other half to established international carriers. Comsat would be the U.S. member of Intelsat, which would operate the international satellite system.

The initial offering of Comsat shares raised $200 million. Eyeing the future, the Federal Communications Commission (FCC) declared at the time, "Satellite communication is one of the most spectacular electronic developments of all time."

Intelsat became operational in 1964 and began relaying trans-Atlantic traffic on June 27, 1965, via the Hughes-built Early Bird 1 spacecraft.

The original Intelsat agreement was entered into ("done") on August 20, 1964, in Washington, DC. There were originally 14 countries that signed the Agreement: Australia, Canada, Denmark, France, Federal Republic of Germany, Italy, Japan, The Netherlands, Norway, Spain, Switzerland, United Kingdom, United States and Vatican City. Today's Intelsat serves about 200 countries.

## Domestic Satellites

The United States was the third country, after Canada (Telesat) and Russia (Molniya), to launch domestic satellites. The FCC had issued a Notice of Inquiry for its Docket 16495 on March 2, 1966.

Ben Fisher, senior counsel at Shaw Pittman, remembers it well. His Fisher Wayland Cooper Leader and Zaragoza law firm had been the FCC counsel for Hughes Aircraft from 1970 to mid-1984. Three years ago, the Fisher group combined operations with Shaw Pittman.

He recalls, "The FCC's Docket 16495 was not a high priority subject during the Johnson administration or at the FCC." In January 1970, however, the Nixon administration--with a pro-competition, pro-business attitude--proposed to the FCC, then headed by Dean Burch, a policy of maximum flexibility for private industry interests. In March 1970, the FCC instituted a proceeding that invited all interested parties to file applications for satellite services. Although the FCC used the term 'open entry,' the news media preferred 'open skies.'

"A rulemaking proceeding was instituted to develop an appropriate domestic satellite policy. In the period 1970-73, the disputes and differences of opinion were bitter, the stakes were high, and the entire future of a new industry was on hold. The final regulatory results reflect the incredibly successful adoption of a flexible and positive government policy. The first satellites were launched in 1974-75. Ten years later, in the mid 1980s, there were some 50 fixed service satellites in either C-band or Ku-band frequencies, or as C-/Ku- hybrids."

## Earth Stations

In June 1972, the FCC divined that "special purpose users (such as local broadcasters) should have the option of owning receive-only earth stations." The late A. James Ebel, chairman of the ABC-CBS-NBC Affiliate Satellite Committee, called this decision "the Magna Carta of the U.S. satellite industry." Affiliates would soon be able to unshackle the terrestrial bondages of the networks and AT&T.

In the early 1970s, an earth station license required an antenna diameter to be at least 9-meters (30 feet). The size requirement was reduced in 1976 to 4.5-meters (15 feet) and by 1979 all TVROs (TV-receive only), as well as small radio broadcast receiving dishes, had been deregulated. Consumers could access "satellite TV" by purchasing a "backyard dish."

## Reduced Orbital Spacing

By 1980, because traffic for both broadcast and cable TV programming had grown so voluminous in the Fixed Satellite Service (FSS) band, more satellites would soon be needed. The FCC undertook a lengthy study to determine whether reduced spacing between orbital slots could be accomplished without signal interferences. By 1983, the FCC was prepared to double the number of orbital slots by reducing all C- and Ku-band spacing from 4 degrees and 3 degrees down to 2 degrees.

## DBS In The United States

In October 1980, the FCC invited applicants to operate a Direct Broadcast Service (DBS) in the Broadcast Satellite Service (BSS) band, where 9 degrees

satellite separations would enable the use of high power signals plus antennas as small as 18 inches in diameter. The first application, less than two months later, came from Comsat's new subsidiary, Satellite Television Corp. (STC).

From the beginning, legal arguments were intense. For example, in a 200-page tome, the National Association of Broadcasters unsuccessfully argued that the FCC had no right under the Communications Act of 1934 to license a national broadcasting system that would pay no heed to the sacred duty of all broadcasters, known as "localism."

During more than two decades, many companies large and small were applicants. Numerous construction permits (CPs) were issued by the FCC but most of the applicants failed to satisfy due diligence requirements.

Four years after its application was filed, Comsat announced that STC would be discontinued. During 1984 and 1985, Comsat reported losses from STC that totaled $145 million. In addition, STC built two unused satellites at a cost of $113 million.

The survivors included United States Satellite Broadcasting (USSB), owned by Hubbard Broadcasting; Dominion Video Satellite Inc.; Hughes Communications and Echostar.

USSB entered into a joint agreement with Hughes in 1991, leading to the launch of Hughes' DBS 1 satellite and the start-up of DirecTV/USSB in June 1994. In May 1999, Hughes acquired USSB's assets and business in a transaction valued at $1.3 billion.

Echostar obtained its CP in 1989 and opened for business with its first satellite launch in early 1996. Dominion obtained its CP in 1984 but subsequently entered into a technical agreement with Echostar. Since December 1996, Dominion's program content has been carried on Echostar 3 at 61.5 degrees W.

## The Transponder Sales Decision

Selling, rather than leasing, became a major change in the commercial marketing of FSS satellite transponder capacity in 1982. Lawyer Phillip Spector, now a partner at Paul, Weiss, Rifkind, Wharton and Garrison, recalls, "Cable TV programmers were using domestic satellites to distribute programming to cable headends. Prices for satellite distribution were set at artificially high levels, in large part because of the FCC's regulatory approach.

"In a pioneering move," says Spector, "Hughes Communications sought FCC permission to break out of the common carrier mold with respect to Hughes' new Galaxy 1 satellite. Hughes proposed to sell transponders in individualized transactions, treating the satellite like a real estate condominium, with separately owned transponders and certain commonly owned elements, such as the satellite bus. Hughes also proposed to establish Galaxy 1 as a 'cable neighborhood' with certain key anchors (such as HBO and WTBS) making the satellite's orbital slot one at which all cable headends would have to have dishes pointed, thereby making the slot more valuable." In 1982, the FCC approved the concept and ushered in a period of competition.

Bruce Lederman was a senior partner and co-founder of Latham and Watkins, which represented Hughes from 1981 to 1997. Lederman is now the co-founder and COO of Assuresat Inc., working with ex-Hughes executive Jerry Farrell. His recollections of the Transponder Sales Decision are shared with Gary Epstein, who was chief of the FCC's Common Carrier Bureau from 1981 to 1983 and is now a Latham and Watkins corporate partner.

"In the early 1980s," they recall, "the satellite industry was hobbled by regulatory and financial constraints. Galaxy 1 knocked down many of these constraints. Clay (Tom) Whitehead, the head of Hughes Communications Galaxy, proposed a concept that Hughes supported, to create a 'cable bird' by selling selected programmers capacity on the bird. Whitehead felt that if he could convince HBO and at least one other major cable programmer to act as 'anchor customers', the other desirable programmers would be attracted to the satellite as if it were a shopping mall. By selling, rather than leasing, Hughes would obtain sufficient cash to justify the large investment required to build a fleet of at least three satellites, which became Galaxy 1, 2 and 3.

"The results exceeded everyone's wildest hopes. Ultimately, the value of Hughes Communications Galaxy, which merged with Panamsat, as well as DirecTV, represented a substantial portion of the value of Hughes' parent, General Motors."

## Separate Systems

In addition to the above Transponder Sales Decision, Spector was involved with the important "Separate Systems" issue that sought alternatives to Intelsat.

He recalls, "Intelsat was conceived as a means of connecting the world's nations. Under the Intelsat treaty, any nation seeking to provide international satellite services had to coordinate its proposed system with Intelsat, not only on technical grounds, but also to ensure there would not be 'economic harm' to Intelsat. This requirement effectively precluded any competitors to Intelsat from emerging for many years, until in the early 1980s U.S. policy began to change, allowing trans-border transmissions from U.S. satellites to Canada, Mexico and other points.

"In the mid-1980s, a frontal assault was launched on Intelsat's international satellite services monopoly, in the form of FCC applications filed by several companies--led by Rene Anselmo's Panamsat--to provide 'separate system' satellite services (called 'separate' because they were separate from the Intelsat system.) After extensive rulemaking, the FCC in 1985 approved the concept of separate systems and granted the applications of Panamsat and others to provide separate system services.

"It was 1988 before Panamsat launched the first separate system satellite, and even more years before Panamsat was able--in the face of stiff resistance from Intelsat's members, which included most of the world's then-monopoly telephone companies--to gain 'landing rights' in a sufficient number of countries to make its service economically viable.

"Today, Panamsat is one of the world's largest satellite operators, competing head-to-head with a now-privatized Intelsat and with other large operators."

Maury Mechanick, now counsel and a member of the Telecom Practice Group at the giant White and Case law firm, had a 20-year career at Comsat that included two years at Lockheed Martin Global Communications, which acquired Comsat in August 2000. He was chairman of the Intelsat Board of Governors in the period immediately prior to Intelsat's privatization in July 2001.

As to the Separate Systems issue, Mechanick recalls, "The reaction of the Intelsat community outside of the United States was to argue strenuously that allowing these systems to go forward would force the United States to violate its commitment not to cause economic harm to Intelsat. Generally, the separate systems were limited to services other than switched telephony, which was the core service provided by Intelsat.

"Over the course of the next decade or so," Mechanick recalls, "restrictions on the services that separate systems could provide fell away, and by the mid-1990s they had totally disappeared. Only two of the original six separate systems actually went into service--Panamsat and Orion, which is now part of Loral Skynet. The Orion 1 satellite is now Telstar 11 and Orion 2 is Telstar 12."

## Satellite Radio

Bruce Jacobs, a partner at Shaw Pittman, provided an update on the new satellite radio systems. He says, "The FCC's authorization of satellite digital audio radio systems (SDARS) in the mid 1990s is another important milestone for the satellite communications industry. The FCC faced a number of difficult issues in making its decision, but the one that may have the most long-term consequences for the satellite industry generally was the decision to permit XM and Sirius to operate terrestrial repeaters."

Jacobs notes, "This decision took a great deal of courage for the Commission, because it had to overcome the argument that the satellites were just a Trojan horse and the 'real service' would be provided by the repeaters. In fact, the FCC's confidence in the industry was justified, as both XM and Sirius launched state-of-the-art high-power satellites that provide excellent coverage. Urban repeaters have been used to provide the kind of high-quality signal availability that consumers expect in a broadcast service."

The SDARS repeater decision, Jacobs said, also helped to pave the way for the request by mobile satellite providers to be able to operate ancillary terrestrial facilities to improve their ability to serve customers in urban areas.

Amen

"The future will bring Washington telecommunication lawyers closer to the issue of cyberspace and the Internet. The practice will also become entirely regional and international as the character and size of the client telecom companies consolidate and expand. Multifaceted teams of lawyers will become commonplace, as the issues become more complex," says Smith.

At Wiley Rein and Fielding, young Texas-bred lawyer Todd Stansbury was asked how they describe communication satellites for new members of their Communications Practice Group. "A satellite business begins by placing a multi-hundred million dollar, high-technology asset on top of explosive fuel, and then lighting the fuse," he said. "It's a big risk, but from that risk comes, literally, out-of-this-world-rewards. What could be better than that?"

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LOAD-DATE: March 19, 2003

# EXTRA-TERRESTRIAL RELAYS

## Can Rocket Stations Give World-wide Radio Coverage?

ALTHOUGH it is possible, by a suitable choice of frequencies and routes, to provide telephony circuits between any two points or regions of the earth for a large part of the time, long-distance communication is greatly hampered by the peculiarities of the ionosphere, and there are even occasions when it may be impossible. A true broadcast service, giving constant field strength at all times over the whole globe would be invaluable, not to say indispensable, in a world society.

Unsatisfactory though the telephony and telegraph position is, that of television is far worse, since ionospheric transmission cannot be employed at all. The service area of a television station, even on a very good site, is only about a hundred miles across. To cover a small country such as Great Britain would require a network of transmitters, connected by coaxial lines, waveguides or VHF relay links. A recent theoretical study[1] has shown that such a system would require repeaters at intervals of fifty miles or less. A system of this kind could provide television coverage, at a very considerable cost, over the whole of a small country. It would be out of the question to provide a large continent with such a service, and only the main centres of population could be included in the network.

The problem is equally serious when an attempt is made to link television services in different parts of the globe. A relay chain several thousand miles long would cost millions, and transoceanic services would still be impossible. Similar considerations apply to the provision of wide-band frequency modulation and other services, such as high-speed facsimile which are by their nature restricted to the ultra-high-frequencies.

Many may consider the solution proposed in this discussion too far-fetched to be taken very seriously. Such an attitude is unreasonable, [illegible] logical extension of developments in the last ten years—in particular the perfection of the long-range rocket of which V2 was the prototype. While this article was being written, it was announced that the Germans were considering a similar project, which they believed possible within fifty to a hundred years.

Before proceeding further, it is necessary to discuss briefly certain fundamental laws of rocket propulsion and "astronautics." A rocket which achieved a sufficiently great speed in flight outside the earth's atmosphere would never return. This "orbital" velocity is 8 km per sec. (5 miles per sec), and a rocket which attained it would become an artificial satellite, circling the world for ever with no expenditure of power—a second moon, in fact. The German transatlantic rocket A10 would have reached more than half this velocity.

It will be possible in a few more years to build radio controlled rockets which can be steered into such orbits beyond the limits of [illegible]

cast scientific information back t the earth. A little later, manne rockets will be able to make sim lar flights with sufficient exce power to break the orbit and r turn to earth.

There are an infinite number possible stable orbits, circular an elliptical, in which a rocket woul remain if the initial conditio were correct. The velocity 8 km/sec. applies only to t closest possible orbit, one just ou side the atmosphere, and t period of revolution would about 90 minutes. As the radi of the orbit increases the veloci decreases, since gravity is dimi ishing and less centrifugal force needed to balance it. Fig. 1 sho this graphically. The moon, course, is a particular case a would lie on the curves of Fig. if they were produced. The pr posed German space-statio would have a period of about fo and a half hours.

It will be observed that o orbit, with a radius of 42,000 k has a period of exactly 24 hou A body in such an orbit, if [illegible]

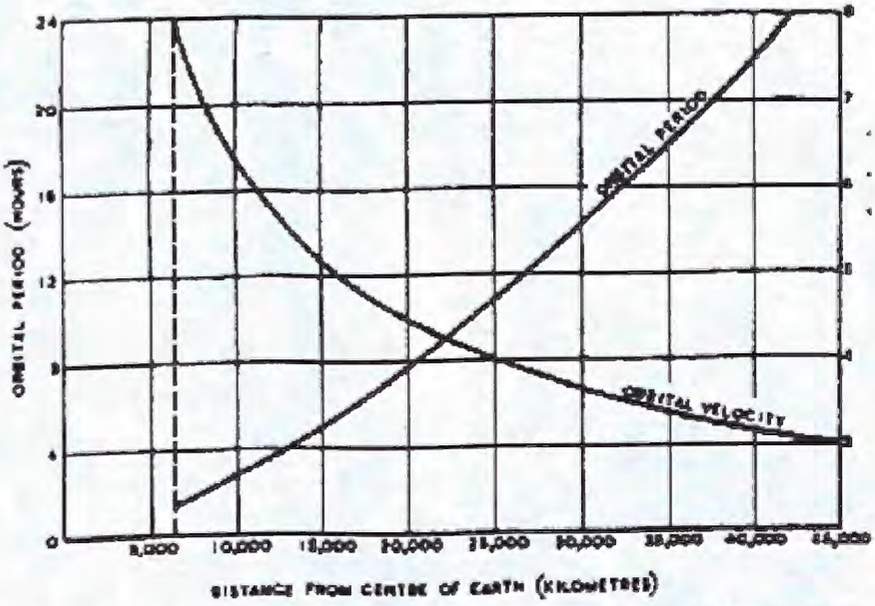


**Fig. 1. Variation of orbital period and velocity with distance from the centre of the earth.**

earth's equator, would revolve with the earth and would thus be stationary above the same spot on the planet. It would remain fixed in the sky of a whole hemisphere and unlike all other heavenly bodies would neither rise nor set. A body in a smaller orbit would revolve more quickly than the earth and so would rise in the west, as indeed happens with the inner moon of Mars.

Using material ferried up by rockets, it would be possible to construct a "space-station" in such an orbit. The station could be provided with living quarters, laboratories and everything needed for the comfort of its crew, who would be relieved and provisioned by a regular rocket service. This project might be undertaken for purely scientific reasons as it would contribute enormously to our knowledge of astronomy, physics and meteorology. A good deal of literature has already been written on the subject.[2]

Although such an undertaking may seem fantastic, it requires for its fulfilment rockets only twice as fast as those already in the design stage. Since the gravitational stresses involved in the structure are negligible, only the very lightest materials would be necessary and the station could be as large as required.

Let us now suppose that such a station were built in this orbit. It could be provided with receiving and transmitting equipment (the problem of power will be discussed later) and could act as a repeater to relay transmissions between any two points on the hemisphere beneath, using any frequency which will penetrate the ionosphere. If directive arrays were used, the power requirements would be very small, as direct line of sight transmission would be used. There is the further important point that arrays on the earth, once set up, could remain fixed indefinitely.

Moreover, a transmission received from any point on the hemisphere could be broadcast to the whole of the visible face of the globe, and thus the requirements of all possible services would be met (Fig. 2).

It may be argued that we have as yet no direct evidence of radio waves passing between the surface of the earth and outer space; all we can say with certainty is that the shorter wavelengths are not reflected back to the earth. Direct evidence of field strength above the earth's atmosphere could be obtained by V2 rocket technique, and it is to be hoped that someone will do something about this soon as there must be quite a surplus stock somewhere! Alternatively, given sufficient transmitting power, we might obtain the necessary evidence by explor for echoes from the moon. In meantime we have visual evide that frequencies at the optical of the spectrum pass through w little absorption except at cert frequencies at which resona effects occur. Medium high f quencies go through the E la twice to be reflected from the layer and echoes have been ceived from meteors in or abo the F layer. It seems fairly cert that frequencies from, say, Mc/s to 100,000 Mc/s could used without undue absorption the atmosphere or the ionosphe

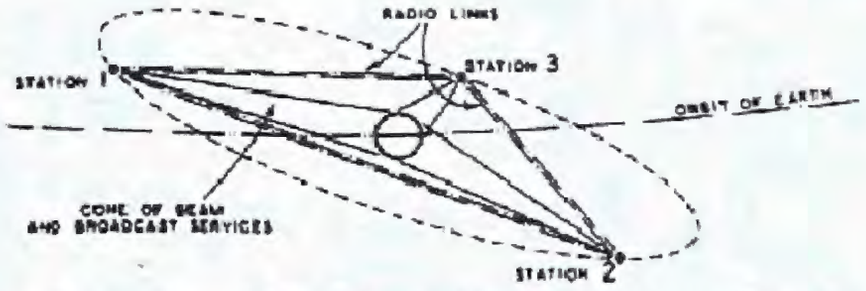


Fig. 3. Three satellite stations would ensure complete coverage of the globe.

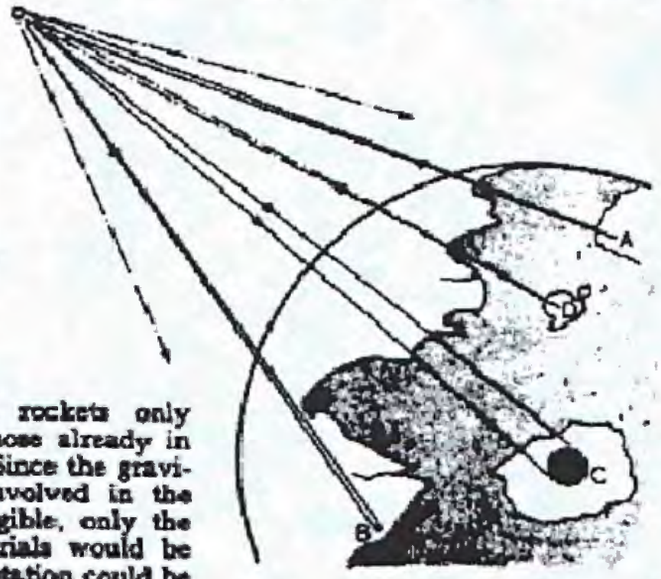


Fig. 2. Typical extra-terrestrial relay services. Transmission from A being relayed to point B and area C; transmission from D being relayed to whole hemisphere.

A single station could only p vide coverage to half the glo and for a world service th would be required, though m could be readily utilised. Fig shows the simplest arrangeme The stations would be arrang approximately equidistan around the earth, and the follo ing longitudes appear to be su able: —

30 E—Africa and Europe.
150 E—China and Oceana.
90 W—The Americas.

The stations in the chain wou be linked by radio or opti beams, and thus any conceival beam or broadcast service cou be provided.

The technical problems volved in the design of such s tions are extremely interestin but only a few can be gone in here. Batteries of parabolic flectors would be provided, apertures depending on the f quencies employed. Assumi the use of 3,000 Mc/s wave mirrors about a metre acro would beam almost all the pow on to the earth. Larger refle tors could be used to illumina single countries or regions for t more restricted services, with co

sequent economy of power. On the higher frequencies it is not difficult to produce beams less than a degree in width, and, as mentioned before, there would be no physical limitations on the size of the mirrors. (From the space station, the disc of the earth would be a little over 17 degrees across). The same mirrors could be used for many different transmissions if precautions were taken to avoid cross modulation.

It is clear from the nature of the system that the power needed will be much less than that required for any other arrangement, since all the energy radiated can be uniformly distributed over the service area, and none is wasted. An approximate estimate of the power required for the broadcast service from a single station can be made as follows:—

The field strength in the equatorial plane of a $\lambda/2$ dipole in free space at a distance of $d$ metres is

$$e = 6.85 \frac{\sqrt{P}}{d} \text{ volts/metre, where}$$

P is the power radiated in watts.

Taking $d$ as 42,000 km (effectively it would be less), we have

$P = 37.6\ e^2$ watts. ($e$ now in $\mu$V/metre.)

If we assume $e$ to be 50 microvolts/metre, which is the F.C.C. standard for frequency modulation, P will be 94 kW. This is the power required for a single dipole, and not an array which would concentrate all the power on the earth. Such an array would have a gain over a simple dipole of about 80. The power required for the broadcast service would thus be about 1.2 kW.

Ridiculously small though it is, this figure is probably much too generous. Small parabolas about a foot in diameter would be used for receiving at the earth end and would give a very good signal/noise ratio. There would be very little interference, partly because of the frequency used and partly because the mirrors would be pointing towards the sky which could contain no other source of signal. A field strength of 10 microvolts/metre might well be ample, and this would require a transmitter output of only 50 watts.

When it is remembered that these figures relate to the broadcast service, the efficiency of the system will be realised. The point-to-point beam transmissions might need powers of only 10 watts or so. These figures, of course, would need correction for ionospheric and atmospheric absorption, but that would be quite small over most of the band. The slight falling off in field strength due to this cause towards the edge of the service area could be readily corrected by a non-uniform radiator.

The efficiency of the system is strikingly revealed when we consider that the London Television service required about 3 kW average power for an area les than fifty miles in radius.[3]

A second fundamental problem is the provision of electrica energy to run the large number o transmitters required for th different services. In space be yond the atmosphere, a squar metre normal to the solar radia tion intercepts 1.35 kW of energy. Solar engines have already bee devised for terrestrial use and ar an economic proposition in tropi cal countries. They employ mirrors to concentrate sunlight o the boiler of a low-pressure steam engine. Although this arrange ment is not very efficient it could be made much more so in spac where the operating component are in a vacuum, the radiation i intense and continuous, and th low-temperature end of the cycl could be not far from absolut zero. Thermo-electric and photo electric developments may mak it possible to utilise the sola energy more directly.

Though there is no limit to th size of the mirrors that could b built, one fifty metres in radiu would intercept over 10,000 kW and at least a quarter of thi energy should be available for use

The station would be in con tinuous sunlight except for som weeks around the equinoxes, whe it would enter the earth's shado for a few minutes every day Fig. 4 shows the state of affair during the eclipse period. Fo

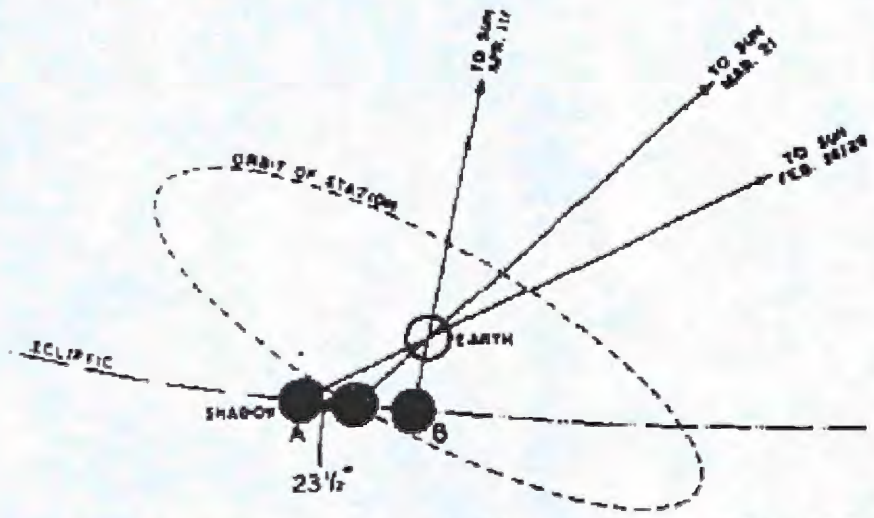


Fig. 4. Solar radiation would be cut off for a short period each day at the equinoxes.

this calculation, it is legitimate to consider the earth as fixed and the sun as moving round it. The station would graze the earth's shadow at A, on the last day in February. Every day, as it made its diurnal revolution, it would cut more deeply into the shadow, undergoing its period of maximum eclipse on March 21st, on that day it would only be in darkness for 1 hour 9 minutes. From then onwards the period of eclipse would shorten, and after April 11th (B) the station would be in continuous sunlight again until the same thing happened six months later at the autumn equinox, between September 12th and October 14th. The total period of darkness would be about two days per year, and as the longest period of eclipse would be little more than an hour there should be no difficulty in storing enough power for an uninterrupted service.

## Conclusion

Briefly summarised, the advantages of the space station are as follows:—

(1) It is the only way in which true world coverage can be achieved for all possible types of service.

(2) It permits unrestricted use of a band at least 100,000 Mc/s wide, and with the use of beams an almost unlimited number of channels would be available.

(3) The power requirements are extremely small since the efficiency of "illumination" will be almost 100 per cent. Moreover, the cost of the power would be very low.

(4) However great the initial expense, it would only be a fraction of that required for the world networks replaced, and the running costs would be incomparably less.

## Appendix—*Rocket Design*

The development of rockets sufficiently powerful to reach "orbital" and even "escape" velocity is now only a matter of years. The following figures may be of interest in this connection.

The rocket has to acquire a final velocity of 8 km/sec. Allowing 2 km/sec. for navigational corrections and air resistance loss (this is legitimate as all space-rockets will be launched from very high country) gives a total velocity needed of 10 km/sec. The fundamental equation of rocket motion is [1]

$$V = v \log_e R$$

where V is the final velocity of the rocket, $v$ the exhaust velocity and R the ratio of initial mass to final mass (payload plus structure). So far $v$ has been about 2-2.5 km/sec for liquid fuel rockets but new designs and fuels will permit of considerably higher figures. (Oxy-hydrogen fuel has a theoretical exhaust velocity of 5.2 km/sec and more powerful combinations are known.) If we assume $v$ to be 3.3 km/sec, R will be 20 to 1. However, owing to its finite acceleration, the rocket loses velocity as a result of gravitational retardation. If its acceleration (assumed constant) is $a$ metres/sec.$^2$, then the necessary ratio $R_g$ is increased to

$$R_g = R \frac{a + g}{a}$$

For an automatically controll rocket $a$ would be about 5$g$ and the necessary R would be 37 to Such ratios cannot be realised wi a single rocket but can be attain by "step-rockets"[4], while ve much higher ratios (up to 1,000 1) can be achieved by the princi of "cellular construction"[5]

## Epilogue—Atomic Power

The advent of atomic power h at one bound brought space tra half a century nearer. It seems u likely that we will have to wait much as twenty years befo atomic-powered rockets are d veloped, and such rockets cou reach even the remoter planets wi a fantastically small fuel/mass rat —only a few per cent. The equ tions developed in the appendix st hold, but $v$ will be increased by factor of about a thousand.

In view of these facts, it appea hardly worth while to expend mu effort on the building of long-di tance relay chains. Even the loc networks which will soon be und construction may have a workir life of only 20-30 years.

### References


[1] "Radio-Relay Systems," C. W Hansell. *Proc. I.R.E.*, Vol 3 March, 1945.

[2] "Rockets," Willy Ley. (Vikin Press, N.Y.)

[3] "Das Problem der Befahrung d Weltraums," Hermann Noo dung.

[4] "Frequency Modulation," A Hund. (McGraw Hill.)

[5] "London Television Service," MacNamara and Birkinshaw *J.I.E.E.*, Dec., 1938.

[6] "The Sun," C. G. Abbo (Appleton-Century Co.)

[7] *Journal of the British Inte planetary Society*, Jan., 193


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Created February 1, 1995

# Arthur C. Clarke Extra Terrestrial Relays

Here is the fac-simile of the paper published by Arthur C. Clarke where he lay down the principles of the satellite communication with satellites in geostationary orbits. (*Wireless World*, October 1945, pages 305-308)

# INTRODUCTION

In deference to Arthur Clark and Marshall McLuhan, this study begins with neither a quote from "Extraterrestrial Relays" nor a profound discussion of the satellite's molding of the human race into a global village.1 The existence of communications satellites is as second nature to the bicentennial American as moon landings. The "LIVE VIA SATELLITE" caption at the bottom of a television picture (if it's even indicated anymore) no longer gives special cause for notice or excitement. Today, without having direct involvement in either the aerospace or telecommunications industry, the average individual could easily conclude that the "communications by satellite" revolution was a product of the 60's and think no more of it. In fact, satellite technology has had and continues to have a major impact on the capabilities of today's world-wide telecommunication systems. Its applications to domestic communications are just beginning to be developed and several options are either in the proposal stage or being implemented. Telecommunications has been defined by the International Telecommunication Union as:

> Any transmission, emission or reception of signs, signals, writing images and sound or intelligence of any nature by wire, radio, optical, or other electromagnetic systems.

Unfortunately, there are many people who are unaware of this definition, or any simpler definition for that matter, of what telecommunications is and what it means to their individual lives. Complicating any understanding of telecommunications are the economic considerations of regulated and competitive markets. The United States, traditionally a competitive, free enterprise market, is one of the few countries of the world where telecommunications is part of the private sector, as opposed to national systems. Private concerns furnish communications services to the nation that are "affected with a public interest." Consequently these firms are designated as "public utilities" and from an economic standpoint, they possess technological characteristics that almost inevitably result in monopoly market structures. American Telephone and Telegraph (AT&T) has long dominated this nation's communications market.

Generally, it is agreed that where the common benefit is dominant, where the whole of

society is involved, economic functions will be performed by society itself. Further, where the common interest requires interference with private functions, government will intervene. Public utilities and similar regulated industries are a "halfway house" between completely government functions and free enterprise functions.2 Regulation is imposed by the government to fix reasonable prices for the services rendered as a substitute for competition. Under the present structure, the Federal Communications Commission (FCC) is the government body having primary responsibility for regulatory policy in the telecommunications area.

In domestic telecommunications, a changing market structure and a pervasive rate of technical innovation have fostered a dynamic regulatory environment. Since 1959 the communications common carrier industry has been undergoing a transition as a result of several new policies that have been instituted by the FCC to promote competition in the industry. Also the rapid rate of technological innovation of the 1960's has blended, if not merged, the computer and communications technologies together. One of the Commission's more recent policies, Domestic Satellite, stands out as unique and seems to be the embodiment of all the pro-competitive policies of the FCC to date.

The fact that the common carrier industry is a traditionally regulated industry makes this policy and the Commission's **role** as regulator only more important.

It has been suggested by Adams and Dirlam that nothing could better illustrate the pressures that a regulatory commission must resist [in the execution of its duties during periods of dynamic technological change] than the satellite.3 On March 2, 1966 the Commission formally initiated a Notice of Inquiry, Docket No. 16495 - In the Matter of Establishment of Domestic Noncommon Carrier Communications Satellite Facilities by Nongovernmental Entities, but it was over six years later before it finalized a "limited **open** entry" policy for domestic communications satellites. Through a review of official documents, literature searches, formal correspondence and personal interviews, this research examines the factors which appear to have influenced the Commission's Domestic Satellite [also to be referred to as DOMSAT] proceedings and identifies present considerations that have been placed before the Commission since that ruling.

Such analysis:

1. provides a comprehensive picture of the multi-faceted interface that the FCC has with its environment,

2. demonstrates how interrelated the issues can become when determining policy in an area of dynamic technological change,

3. shows how the inherent technical characteristics of communications satellites [which have no exact terrestrial equivalent] and the advances in computer-communications have contributed to the complexity of this issue, and

4. identifies instances where the satellite policies of four different presidential administrations, compounded with an assortment of study groups, personalities, industry postures and international considerations confounded the issue before the Commission.

The objective of this study is that it serve as a vehicle for increasing the "public's awareness" to the subject of telecommunications and to the status of the domestic satellite issue and, as a consequence, lend support to the Commission in its current and future efforts. The FCC's performance in the regulation of today's common carriers has not been receiving the respect it deserves. However, confidence in the Commission's capabilities and the effectiveness of the regulatory process is central to the public and national interest.4

The FCC comprises men and women' professionals in their fields, who are attempting to perform an enormous task with limited resources. It is impossible for them to have all the right answers all the time in such a complex world as theirs. Even Sir Arthur Clark, looking back on the proposition of patenting **his** 1945 concept, notes:

The idea of patenting the geostationary communications satellite concept never occurred to me and my excuse for this is sheer lack of imagination.5

This study offers a positive perspective of Commission's efforts in an area of dynamic technology. The adequacy of the FCC's organizational structure is not an issue but rather a factor which is addressed in passing only. The analysis of the Commission's domestic satellite considerations is arranged to follow the historical pattern of events surrounding DOMSAT. The problem, however, is initially set within the framework of the business considerations and the technical limitations that existed. The time value of such information played an important **role** in the policymaking process. Time controls the available technology, it defines the existing and projected business markets and it determines the political priorities of the day. The emphasis given to each of these factors varied throughout the DOMSAT proceedings.

This study of the policy-making process divides itself into three distinct periods:

- (1959-1965) - the precedents of DOMSAT.
- (1966-1972) - the development of the DOMSAT policy.
- (1973 to present) - DOMSAT policy today.

The logical starting date for this

review is 1959 as it was in December of that year that President Eisenhower first spoke of the commercial use of communications satellites. Also 1959 is a well-documented date for the beginning of the FCC's current policy of competition. The initial perio

d of discussion is from 1959 up until the DOMSAT question was raised by the American Broadcasting Company's filing in 1965 and is covered in Chapter II. This period includes the policy precedents of the Eisenhower and Kennedy Administrations that resulted

in the Communications Satellite Act of 1962.

Chapter III covers from March 2, 1966, the date of issuance of the Commission's Notice of Inquiry on DOMSAT (Docket No. 16495) through December 22, 1972, the date of the Commission's final Memorandum Opinion and Order. This is the period when formal DOMSAT policy was defined.

Chapter IV looks at DOMSAT from then until today, focusing briefly on some of the results of that decision, and more specifically on the activity surrounding the filing by Satellite Business Systems from current business, technical and regulatory perspectives.

Primary information sources used for this study were official FCC Notices, Reports, Orders and Memorandums as well as filings, briefs and comments submitted by the industries involved

in DOMSAT. Official Congressional documentation was used to a large extent as was current formal correspondence from the individuals listed in Appendix A. Automated data base searches were also used for this research and the opinions and analyses used in

the following discussions are viewpoints taken from the appropriate periods of time to the greatest extent possible. The formal correspondence noted served both as primary sources of information and as guides which provided direction to the research. Secon

dary sources of information were textbooks, journals, newspapers, presentations, and published reports.

## CHAPTER I

## HISTORICAL FOUNDATIONS AND

## BOUNDARY CONDITIONS

To understand the impact of the

Domestic Satellite

decision, an understanding of the o

rigins of regulation, the domestic com

munication common carriers and the Federal Communications Commission is required. The roots of the FCC date back more than fifty years to the early days of radio. The legislation by which Congress established this ind

ependent agency to regu

late the nation's communications and encourage the larger and more effective use of radio in the public interest remains essen

tially unchanged today.

The world of the FCC is far from simple. The Commission must interface with its

environment in a multitude of ways in the performance of its regulatory functions and, without a doubt, the common carriers dominate this interface. Technology and market considerations have shaped the industry's structure but both vary with time and both

have imposed constraints on the policy makers and have limited the alternatives for them.

This chapter reviews the foundations of the organizations and industries that participated in DOMSAT. These provide the initial conditions (as well as the constraint

s) from which a new domes

tic industry was launched with initial annual revenue estimated in excess of one-half billion dollars and initial investment esti

mates of almost three times that value.

6

Technology was a major consideration throughout the DOMSAT

proceedings. Thus definitions of the boundaries which it created will increase the reader's appreciation for the issues that were before the Commission. Working definitions of competition, regulation, the common carriers, the rate base and the public inter

est are also provided to establish the baselines that busi

ness considerations imposed on DOMSAT.

A.

The Federal Communications Commission

and the Common Carrier Industry

The one hundredth anniversary of the invention of the tele

phone and the beginning of the communications common carri

ers is being celebrated this year. In contrast the FCC is only forty

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two years old and generally considered to be a "late bloomer"; its e

ffectiveness as a regulator has only been notice

able during the last two decades. Perhaps this is because de

mands for new and different services surfaced during this period as a result of technological advances.

The improvements in the appearance of a m

odern telephone instrument over an antique device are in no way a measure of the service improvements available. Today's telecommunications systems, when compared against yesterday's predictions, are orders of magnitude greater than the wildest dreams imag

ined attainable by our ancestors and they extend far beyond the realm of voice communications and the traditional common carriers.

Although the Commission and the common carriers evolved separately, it is important that their origins be understood. These

perspectives which include information relative to the Commission's formation, the roots of the Nation's carriers, the concepts of regulation, the related legislation and the basic form of the industry are considered elementary but necessary background for

this study. The carriers, both old and new, and the FCC are the primary elements involved in DOMSAT.

1. Regulatory Origins

To operate a broadcasting station in the United States, one must first obtain a license from the Federal Communications Commission

. The delivery of a license is not an automatic func

tion but is at the discretion of the Commission; it is theirs to decide. How the Commission came to exist and how it acquired such power is a story that spans the first third of this century.

Radio was

first used commercially for ship

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to

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shore and ship

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to

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ship communication. However, as early as 1901, low frequency radio began to be used to provide overseas radiotelegraph services.

7

As a means of communication, radio's facilities are limited. Radio trans

mission, the transfer of messages by electromagnetic radiation through space rather than along wires or cable, makes use of the frequency spectrum, a limited natural resource.

8

Two radio transmission systems may not employ the same frequencies at the same

time in the same area without interfering with one another. Thus there is a fixed natural limitation upon the number of stations that can operate without interfering with one another. Prior to World War I, questions of interference arose rarely because the

re were more than enough frequencies for the existing number of stations and the state of the art.

9

On August 13, 1912, the Radio Act of 1912 received the approval of both the Senate and the House and became law. It provided that anyone operating a radio

station must have a license issued by the Secretary of Commerce. The main differ

ence between the Act and previous bills that had been intro

duced was that specific regulations were now set out in the Act whereas, previously, power to make regulations had

been given to the Secretary of Commerce.

10

Although the Act was primarily designed for maritime communication and "safety at sea" was the

reason usually cited for its introduction, R. H. Coase notes that public business, such as wireless telegraphy, was bei

ng hindered and that the true intent of the Act was to bring about government control of the operations of the industry as a whole.

11

The war accelerated the development of radio and the broad

cast industry came into being in the early 1920's. By November 1, 1922 there were 564 broadcasting stations in the United States and Mr. Herbert Hoover, as Secretary of Commerce, was responsible f

or the administration of the 1912 Act.

12

The first government/industry Radio Conferences were held in 1923, 1924 and 1925 at which recommendations were proposed to strengthen control over the establishment of radio stations and frequency allocations. The pr

oblem was that there were now more stations than could freely operate on available frequencies and Hoover was attempting to find room for every

one by limiting station's power output and hours of operation.

13

Although bills were introduced in Congress embod

ying such re

strictions, none were passed into law. The Secretary attempted to carry out the intent of the 1912 Act by inserting detailed conditions into the licenses, and declined renewals if conditions were not complied with. However, Hoover's attempts w

ere seri

ously undermined when the United States Court of Appeals for the District of Columbia Circuit ruled that the Secretary of Commerce lacked legal authority for such actions, concluding that Congress had never intended to delegate such authority to t

he Secretary of Commerce thus leaving him powerless to deal with the situation.

14

In July, 1926, as a stop

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gap measure designed to prevent licen

sees from establishing property rights in frequencies, both houses of Congress passed a joint resolution that n

o license should be granted for more than ninety days for a broadcast station or for more than two years for any other type of sta

tion. When Congress reconvened that December, the House and Senate quickly agreed on a comprehensive measure for the regulati

on of the radio industry. This Act, which became law in February 1927, brought into existence the Federal Radio Commission.

15

At this point the telephone and telegraph industry had not yet been identified with the radio industry but was "regulated" separate

ly, to a minor extent, by other elements of government.

a.

Common Carriers Defined

Using the example of transportation, the Encyclopedia Britan

nica's discussion of carriers is subdivided into common carriers and contract carriers. Common carriers are de

fined as being those who "hold themselves out" to serve all; their charges, schedules, and routes are regulated, they are bound to serve all without discrimination and are entitled to a fair return on their investment; a "certificate of convenience and nec

essity" is required for operation and interstate business is subject to regulation by the Interstate Commerce Commission. Contract carriers differ in that they are not restricted to serving on fixed routes at regulated rates,

except when the protection of

the common carriers from such competition is essential to the public welfare.

16

At the time of the Radio Act and the FRC, the telephone and telegraph industries fit this definition of common carrier exactly.

The Federal regulation of business is based on A

rticle I, section 8 of the Constitution, in which Congress is given the power "to regulate commerce...

among the several states". Consequently, it is Congress that is primarily charged with the regulation of activities affecting interstate commerce.

17

This

power has been delegated to "independent regulatory agencies" through general legislative statutes. Since communications by wire had grown up with the railroads, it had been placed under the regulatory jurisdiction of the Interstate Commerce Commission, no

t the FRC. However, during the period 1910 to 1934, the ICC had dealt with only eight telegraph rate cases, four telephone rate cases and two cable rate cases.

18

With so little activity, it might be rightly said that actual government regulation of the tele

phone/ telegraph industry did not start until later. This can also be considered a bit tardy since, according to common carrier statistics, the assets of the American Telephone and Telegraph Company (AT&T) alone had reached more than $5 billion by 1934.

19

b.

Domestic Common Carrier History

In the early days of telephony through the 1880's, the Bell Telephone Company dominated the industry through a strong patent position, which it vigorously defended against all com

petitors. Seventeen years after telepho

ne communications had originated there were 266,431 stations operating

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all owned by Bell. The expiration of the basic telephone patents in 1893 and 1894 marked the end of the Bell System's complete monopoly over the telephone field and numerous independen

t telephone companies and manufacturers were formed. They offered competing services and stimulated the growth of the telephone industry. Less than fifteen years later, the independent tele

phone companies owned 3.0 million stations compared to Bell's 3.1

million stations.

20

However, in 1907, when Baker

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Morgan banking interests gained control of the Bell system, Theodore Vail became its new president and reversed a number of Bell policies, emphasizing absorption of the competition.

21

Now called American Tele

phone and Telegraph (AT&T), the company had accumulated enough local operations to take over the industry simply by wielding financial and political power.

22

AT&T initially divided the indus

try with Western Union, telephone for the former and telegraph for

the latter. Having thus neutralized its strongest telephone competitor by this action, it consolidated long distance net

works and began to absorb the independents who were unable to compete. AT&T soon dominated the long distance service and no regulation

s or genuine authority existed at that time which required them to provide for interconnection with independent systems that remained.

The Bell system's acquisition attempts were strongly resisted by the independents; but only through threatened nationali

zation did the government, during the Wilson Administration, stop AT&T's rout of the independents. AT&T, in varying degrees, had refused to interconnect with independent exchanges for long distance service. The independents, complaining to Attorney General

George Wickersham, charged Bell with antitrust violations. The complaints were resolved by the Kingsbury Commitment of 1913, which was an AT&T

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offered compromise that in reality had no impact on its dominant position in the industry.

23

2. The Federal Comm

unications Commission

In response to a request from President Roosevelt for a study of the organization of radio regulation, in January 1934 Secretary of Commerce Daniel Roper issued a report recommending the consolidation of the communications regulatory

activities of the FRC, the ICC - Interstate Commerce Commission, the Post

master

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General, and the President into "a new or single regula

tory body to which would be committed any further control of two

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way communications and broadcasting."

24

The groundwork

was thus laid for Congressional action and the Communications Act of 1934 was passed.

25

The Federal Communications Commission is the creature Congress created by that Act to execute and enforce its provisions.

26

Originally intended to regulate the fledgling radio industry,

27

the Act also made various organizational changes to the Federal Radio

Commission and gave the agency broad powers over all communications, including telephone and telegraph (Title III of the 1934 Act, which dealt with radio, was almost identical with the Radio Act of 1927).

28

The language was broad in scope and was capable o

f application to a host of other activities.

29

The Act also established that the Commission's powers were not limited to the engineering and technical aspects of regulation of radio communications but rather to the "larger and more effective use of radio in

the public interest."

30

Congress acted upon the knowledge that if the potentialities of radio were not to be wasted, regulation was essential. The facilities of radio were not large enough to accommodate all who wished to use them. Methods were needed for

choosing from among the many who applied. Congress itself committed this task to the Commission providing as a touchstone the "public interest, convenience or necessity."

31

a.

The Public Interest

As far as domestic common carrier regulation is concerned,

the "public interest" factor seems to be something recognizable but difficult to define. Former FCC Chairman Dean Burch, in a speech before the American Bar Association, defined the public interest as those actions which:

create a prevailing climate in w

hich the widest possible range and variety of services are provided to the public by the great

est practical number of independent entities, each one seeking to satisfy public wants in its own way.

32

By this definition, "public interest regulation" appears

to be less than twenty years old, even though the regulator and **his** charter have existed for over twice that long and the telephone and telegraph industries have existed for over five times that long. Even the brief history of the industry's development p

rior to 1934 that has been presented shows that government regu

lation merely gave official approval to the historical accidents that had shaped the business and failed to provide national guidelines. A cursory look at the development of the industry from

1934 to 1959 lends additional support to this view. There was in fact little demonstrated action "in the public interest" shown by the carrier regulators prior to 1959, when the Commission's policy of increased competition was adopted.

33

The public interest considerations in the use of communications satellites involve more than just the question of trying to develop competition in the interest of the consumers. Some believe that it is important to secure maximum utilization of satellite

systems to accomplish purposes in education and health, and other fields which economically are unprofitable but which have great social implications.

34

Others see the satellite as a means to break AT&T's monopoly of the common carrier industry and as a cos

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cutting alternative to existing long

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distance costs. The "public interest" in satellites means many things and the diversity of congressional opinions on the subject of satellite communications, which is discussed in Chapter II, provides an excellent exa

mple of this. Since the issues surrounding DOMSAT were as complex as the common carrier industry itself, a brief description of the Nation's primary domestic communications carriers is believed to be necessary for a better understanding of the DOMSAT discu

ssions.

b.

The Regulated Common Carriers

The magnitude of today's telephone and telegraph systems is something that may not be visible to the average user. People often refer to Bell Telephone or Western Union as big and think no more of it. One cont

emporary viewpoint sums up competi

tion, regulation, and the nation's telephone industry as follows:

> First of all, capitalism is the best. It's free enterprise, right? Barter. . . Communism is like one big phone company; government control, man. And if I get too rank with that phone company, where can I go, man? I'll end up like a schmuck with a Dixie cup and a thread.35

An uninformed public can quickly relate to such commentary and for good reason. A current magazine advertisement reads:

> The Bell System. It's an incredible operation. It takes a mind-bending multitude of cables and switches and gear to make all 114 million telephones talk to each other. It takes a master plan to keep this system running 24 hours a day. It takes a totally unified system to make it all work together . . . The result of all this planning is, quite simply, the best phone system in the world. One Bell System . . . It works.36

The facts reveal that there are 1,785 landline telephone companies in the U.S. with operating revenues t

otaling more than $25 billion, with plant assets in excess of $84 billion and approximately one million employees. Sixty

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one of these carriers provide comprehensive reports to the Commission.

37

At the time of the Kingsbury Commitment, AT&T had been servicin

g about 5.1 million telephones while some 20,000 independent telephone companies were serving about 3.6 million telephones.

38

Today, in comparison, AT&T services approximately 109 million telephones while the 1500 independents serve the remaining 24 million

telephones of the nation's system.

39

A rough breakdown of the industry is as follows:

- AT&T (23 operating companies)-- 82 percent
    - GT&E (30 operating companies)--- 8 percent
    - Eleven holding companies and

      large independents) ---------- 6 percent
    - 1,500 small independents--------- 4 percent

The Bell companies serve approximately one-third of the geographical area of the United States and the independents serve a second third of the country. The remaining third is too sparsely populated to economically service by the traditional means of wire and cable.40

The Western Union Telegraph Company is basically the sole domestic telegraph carrier. Dollarwise, it is less than two percent the size of telephone system but because of the fact that it provides a specialized service (in the form of record communication and custom-built private systems), it is actually the forerunner of the specialized carrier industry that has been developing during the past five years and second only to AT&T in national importance.41 Western Union is also the proud owner of "Westar", the first domestic satellite system, which was put into orbit on April 13, 1974.

The Bell System owns approximately 98 percent of the Nation's long-distance facilities, which interconnect the individual telephone companies together across state lines.42 Such business is considered interstate commerce and falls under the jurisdiction of the FCC. AT&T Long Lines, the responsible Bell operating company in this area, has not been subjected to antitrust laws because of its holdings but has instead been shielded by the protection of regulation. Long Lines actively recruited this regulatory shelter for many years and its monopoly status actually predates the onset of regulation.43 Because of their insensitivity to distance, satellites have quickly become economically competitive in this area and have threatened to modify the industry's structure. In self-defense, the established carriers have assumed a variety of positions designed to neutralize and minimize the effects of communications satellites on established markets.

Although the satellite in space represents probably the most novel means of communications yet devised by man, the domestic common carriers initially looked upon this innovation as no more than a "telephone pole in the sky". However, when this technique was implemented for international communications, the potential impact on the domestic market became evident and the Commission's responsibilities were increased and expanded, as the international lawyers are fond of saying, "ad caelam" - to heaven itself.44

## B. The Constraints of Business and Technology

The market structure provided a setting in which the existing common carriers, on the one hand, and the potential entrants on the other, pursued conflicting courses of action, subject to the constraints of highly imperfect markets and dynamic technologies.45 But any policy must operate within existing technical constraints; policy making only begins at this stage. Revolutionary shifts in technology and aggressive innovation may be aborted if they do not receive the support of thoughtful public policy.

Organizational forms that would permit the greatest development of the technology and the widest play of operating alternatives had to be considered. This was critical since policy decisions that impact on the market structure (and the respective roles of competition and regulation) once made, are not easily reversed.46 To a large degree many of the problems that faced the domestic industry were associated with the pressures for change that arose from the technological advance and the economic growth of the postwar years.

### 1. The Market Structure

The Bell Telephone System, the independent or non-Bell telephone companies and Western Union operate virtually all of the nation's common carrier telephone and telegraph facilities. The telecommunications industry had developed under conditions of the so-called natural monopoly. Entry of new suppliers was restricted, if not foreclosed, with the result that competition was almost absent as a market force. The regulatory agency, for the most part, had confined itself to a concern for the economic well being of the regulated industry and to the correction of excesses in pricing practices.47 But what

could be considered a natural monopoly in some static efficiency sense might also be considered an "unnatural" one in terms of meeting the prerequisites for innovation and growth.48

Historically, it had been assumed that communications services were provided under conditions of natural monopoly, although the basis for this has never been made explicit.49 Since World War II the consolidated voice communications market had shown remarkable stability, increasing at an average annual rate of eight percent, the greatest imponderables were the demands for new services such as data and video transmission.50

The stakes were high for everyone involved since the horizontal market (that is, the percentage of all households and business firms with telephones) was rapidly approaching saturation.51 If the Bell System and the common carriers failed to establish a strong foothold in these future markets, they could look forward to drastically reduced rates of growth and a significant shrinkage of their relative importance.52

a. Market Economics

Economics deals with the allocation of limited resources towards satisfaction of unlimited wants. Resources are typically identified as land, labor and capital plus a technology that determines their transformation into consumer goods.53 The technology is viewed as a parameter like the weather, affecting the outcome of resource allocations but itself unaffected by them.54

The domestic telecommunications industry is characterized by rapid technological advance interacting with market changes in the level and composition of demand.55 However, it has also been demonstrated that the quest for profit is also a primary influence on the rate and direction of innovation, despite the large **role** of other goals motivating discovery that must be considered. Moreover, the relationship appears bi-directional, with the state of knowledge shaping and being shaped by profit opportunities and availability of resources.56 It is certain that the prospect of being permitted to enter an established multi-billion dollar industry for the purpose of competing with the established monopoly of that industry by means of a new technology stirred many a corporate heart.

Utility sectors commonly proceed through four stages, as elasticities of demand vary. In stage one, the system is invented, often leading to control by patents. It is usually a brief period but decisive for the form of the system. Stage two involves the system's creation and growth; often the system is displacing a prior "utility". Cross-subsidies are involved and the service usually seeks regulated status for permanence, legitimacy and market control. In stage three, the system becomes complete as a function of technology and market saturation and it shifts from the offense to the defense, competing with new technologies and challenged by the users. Finally, in stage four, the system yields to the pressures of competition and technology and, now no longer a utility, reverts to conventional competitive procedures.57

William Shepherd believes that the telephone industry has been in stage three since 1947. Was it not possible that DOMSAT could be the means that would potentially break the back of the AT&T monopoly? Dr. Burton A. Kolb, a Professor of Finance at the University of Colorado, has noted that:

> A public utility usually faces severe competition only twice in its life, once when it rises to prominence and again when it is superceded by a superior technology. In contrast the industrial enterprise is subject to the continual interaction of competitive forces, including technological change. But these forces rarely are of such magnitude as the technological revolution, which

seriously impairs or destroys the economic value of the public utility.58

Domestic satellites posed such a threat to the common carrier market. Satellite technology possessed a glamour that attracted widespread public interest as well as the potential for new, better and cheaper communications services. Communications satellites threatened to change the traditional **role** of the domestic carriers.59 New markets and new potential suppliers raised the possibility of rendering obsolete the traditional concept of "natural monopoly", a phrase that Professor James R. Nelson of Amherst labeled as "one of the most unfortunate . . .ever introduced into law or economics . . ." believing that "every monopoly is a product of public policy."60 Looking at the regulatory trend of the 1960's, the Commission was definitely working toward increased competition [the Interconnect (1968) and Specialized Carrier (1971) decisions are discussed in Chapter III]. While there was some apprehension that under certain conditions the common carrier would have an incentive to operate at a loss in competitive markets and shift financial burden to its other services61, others felt that the regulatory agency should take advantage of whatever competitive possibilities existed.62 New trends in demand and technology suggested that several parts of the point-to-point [as opposed to broadcast] communications industry might be amenable to even a fully competitive structure, particularly for the large-scale transmission of data and for domestic satellites as an alternative to land-based transmission.63

b. Rate of Return Regulation

Rate of return regulation, in conjunction with the market structure, can give rise to distorted investment decisions. In establishing the level of prices charged by public utilities, regulatory agencies commonly employ a "fair rate of return" criterion, which is computed as the ratio of net revenue to the value of plant and equipment (the rate base).64 Therefore what goes into making up the rate base is very important to the carrier. **His** incentives as a monopolist may be to retard the use of **his** inventions in favor of more costly technology, to engage in more inventive activity than an equivalent unregulated carrier, or to allow excessive requirements of reliability and quality to shape the whole direction of **his** technology.65 Because regulation limits **his** rate of return, he may tend to choose a more capital-intensive technology and enlarge **his** rate base.

The mere fact that a new entrant's rates for a particular route or a particular service are lower than those of the established carrier does not indicate that the new entrant's costs are necessarily lower than the existing carrier's long-run incremental costs for comparable service. In order to discourage uneconomical entry, it is essential to permit the carriers to respond by adjusting their rates toward their own incremental costs. Existing rates must not be frozen to provide an umbrella protecting uneconomical competitive activity. However, at the same time the danger exists of a carrier cutting prices to the point where revenues fall even below incremental cost in particular competitive markets if it has protected revenues from other markets.66

Therefore, the carriers may have special incentives to "select" innovations, to invoke regulatory procedures, and to control the flow of technological information so as to minimize the probability of new entry into any of their actual or desired markets.67 They have been seen in the past as slow to innovate and introduce new techniques and facilities.68 In the case of AT&T, its high inertia is particularly bad in many respects. Especially during the last decade, the legal monopoly has bitterly resisted many innovations that later proved beneficial to the users in general and neutral or even beneficial to AT&T itself.69

Depreciation policies are another example of the type of decisions that can contribute to an inflated rate base. Depreciation should reflect the economic cost of providing service and should include an allowance for obsolescence caused by technological advance. The depreciation policies of AT&T are

based on the straight-line methodology, the use of which does not appear to reflect the economic realities of a dynamic industry undergoing rapid technological change.70 In establishing a rate base there can be hundreds of accounting decisions that the carrier will make that will affect **his** rate of return and the cost to the customer. As former Commissioner Nicholas Johnson noted:

> In an industry whose annual revenues are roughly twice the yearly income tax collected by all fifty states combined, a fraction of a percent here and there may amount to millions of dollars in phone bill savings.71

Convincing arguments exist which show that conservative straight-line depreciation for rate making purposes will maximize the rate base and minimize the current charge to expenses.72 This may result in politically popular service rates, but it may also constitute a major barrier to innovation and technological advance.

A 1972 Business Week article summarized these arguments in a critique of depreciation policies:

> [I]n figuring depreciation, Bell takes very long equipment lifetimes. For example, New York Telephone writes off the cost of an electronic central office over 38 years, so it gets its investment back at the almost invisible rate of 2.6% a year. As an over-all average, AT&T depreciates its plant at a little more than 5% a year.
>
> From an accounting standpoint, the computer industry, which is also capital-intensive and service oriented, looks altogether different. Almost all computer makers capitalize only the manufacturing cost of the equipment they put out on rental, or about 20% of what they would get for it in an outright sale. They write off installation and customer service costs immediately as expenses.73

Such rapid write-offs encourage the use of new technology and represent the opposite extreme of the common carriers' accounting practices, which discourage the retirement of obsolete equipment and hence discourage the application of new technologies.74

c. Competition and Antitrust

Competing technology and the growth of new services posed several issues, which challenged the assumptions of market structure long associated with the communications industry. These forces confronted the regulator with two policy alternatives. The first policy choice was to protect existing competitors, or more specifically to opt for a market status quo. The second choice was to employ market structure as a means to exploit either new technical developments, new communications markets, or both. History and the FCC's activities since 1959 clearly show that the second choice was the chosen policy. Nevertheless, concern for antitrust was always in evidence also. This is important since fear of antitrust involvement can act as a constraint to major companies, like IBM, on any plans which such companies might consider in the field of communications, leaving the planning of new services or alternative methods for existing services either to the existing carriers or to companies which have fewer commitments.75

(l) Competition. In the telecommunications industry, competition has been a consideration since the early days of telegraph, when international overseas communications services were provided by undersea cable. In 1927 high frequency radio made possible for the first time both overseas telegraph

and telephone service.76 When this technology was first applied by companies interested in its commercial exploitation, Congress was persuaded that this new technology should be permitted to compete effectively with the older telegraph cable technology. Consequently the Radio Act of 1927 prohibited mergers of carriers-by-radio with carriers-by-cable if the purpose or effect of such mergers was substantially to lessen competition. This prohibition was designed to protect the development of the new technology, which required less capital, from being slowed down by the older cable technology, which required larger capital investments. This was reenacted as section 314 of the Communications Act of 1934.77

After the end of World War II, the demand for new types of bulk communications services, combined with advances in microwave radio technology, confronted policy makers with a variety of issues challenging the structure of the telecommunications industry.78 In 1959, the FCC's Above 890 decision removed all significant barriers to the installation and operation of private microwave systems. The Commission found no basis for concluding that the licensing of private communications systems would adversely affect the ability of common carriers to provide service to the general public or that it would adversely affect the users of such common carrier services.79 Although carriers could offer the communications service at a lower rate than private firms because of the economies of scale and the shared use of facilities, the Commission felt that the opportunity to introduce "competition" in the nation's system outweighed the small social loss due to diseconomies of scale and the nominal adverse effects upon carrier revenues.80 The seeds of competition were planted.81

Competition, or more properly economic competition, implies more than just the vying for customers or markets. It also means the absence of monopoly, on either the buying or the selling side, and the absence of government intervention in the market process. It denotes a sufficient number of well informed, independent competitors so that no individual can affect the market by restricting sales or purchases. Relatively easy entry into or exit from the market must also be possible.82 The obvious trend in FCC policy since 1959 has been towards "competition" in one way or another. But because entry into the carrier industry is determined by the Commission only,83 the established carriers choose to call it a policy of "regulated competition," giving it negative connotations. In any event "competition" was the Commission's policy throughout the satellite issue and remains that today.

The term "competition" has aroused more emotion in connection with common carrier matters before the FCC than any other word or phrase in recent memory. Depending on one's frame of reference, it is considered either disastrous, disruptive or terrific for the communications industry. As long as the pros and cons of competition were being argued in FCC hearing rooms and Federal courtrooms, none of the contentions advanced could be proven or disproven. However, since the Commission adopted policies fostering competition the action has shifted to the marketplace.84

(2) Antitrust. In addition to direct regulation by the Commission and its predecessors, the domestic communications industry has been the subject of antitrust action on a selective basis more than 60 years.

The first antitrust suit was threatened by the Justice Department in 1913. As noted earlier, the independent telephone companies charged that sell refused to provide satisfactory long-distance interconnections. In response to this pressure, Bell entered into the Kingsbury Commitment, which set forth minimum concessions only.85

In 1921, the Willis-Graham Act permitted telephone companies to merge or consolidate with competing companies subject to approval by state commissions and the ICC. This Act effectively terminated the Kingsbury Commitment and Bell again embarked on a program of acquisition. These efforts led to complaints by USITA (United States Independent Telephone Association). As a result, AT&T Vice

President E. K. Hall set forth Bell's policy on horizontal mergers in a memorandum in 1922 to the President of USITA. The Hall Memorandum stated that Bell was opposed to further acquisitions of the independents as a general policy, except in "special cases", which were broadly defined in terms of public convenience and service.86

AT&T is an excellent example of a holding company. It exercises control through stock ownership over some 23 operating or associated companies throughout the United States; it owns 100 percent of the stock of Western Electric, which accounts for some 85 percent of the domestic communications equipment market, and shares ownership with Western Electric of the Bell Laboratories, the research arm of the company.87

A major assault on the vertical relationships of AT&T and Western Electric occurred in 1949. In that year the Justice Department filed a suit alleging that Western Electric had, in monopolizing the manufacture and supply of communications equipment and apparatus, violated Section 2 of the Sherman Antitrust Act. The Government sought as its remedy both the divestiture of the Bell-Western Electric relationship and dissolution of Western Electric into three competing firms. It was hoped that this would introduce competition in the manufacturing and supply of related communications equipment. The suit ended in a 1956 consent judgment where AT&T was required to make its patent portfolio available on a royalty-free basis and technical information available to outside suppliers. However, the decree, in sanctioning the existing AT&T-Western Electric structure, preserved the vertical relationship of telephone carrier and telephone manufacturer.88

## 2. Satellite Technology

Artificial satellite technology, which established one of two major technical boundaries for DOMSAT, is less than twenty years old. The Soviet Union announced on October 4, 1957 that it had successfully launched the first manmade satellite into orbit around the earth. Sputnik I, as it was called, reportedly carried 184 pounds of scientific instruments and circled the earth every 96.2 minutes.89 The first step necessary for exploiting Arthur Clark's idea of communications relayed by satellite had been taken. But by 1961, it still seemed doubtful whether rocketry would achieve such accurate positioning in the near future or whether small solar-powered electronic devices could be used to establish noise-free communication links as Clark had perceived it.90

Clark had envisioned a system which would use three satellites, orbiting the Earth in geostationary orbit, and could relay point-to-point or broadcast communications to any location on the globe. The geostationary orbit is the band of space in which satellites circle the Earth at a speed equal to its rotation and appear to hang motionless above a fixed point on the Earth's surface. This band lies 22,300 miles above the equator and the number of satellites which can be accommodated along this orbit is a major determinant of potential satellite communications capacity. From its apparently stationary position above the surface of the Earth, a synchronous satellite has approximately forty percent of the surface of the earth constantly in view and can provide line-of-sight communications between any two points on that surface. The satellite has in this way introduced a new dimension into communications technology.91

Frequency spectrum utilization established the second major boundary condition. The portion of the spectrum that is used for radio transmission is actually very small. Although the radio spectrum range is considered to range from ten kilohertz (10,000 cycles per second) to three terrahertz (3 million-million cycles per second), only 40 gigahertz (40,000 million cycles per second) had been allocated through international agreement in the 1960's.92 This is equivalent to less than 7,000 television circuits. Although frequencies as high as 300 gigahertz (GHz) are sometimes used for experimental purposes, physical existence of the spectrum does not mean that it is technologically or economically useable. The

higher the frequency the more sophisticated the technology used must be. Propagation characteristics of radio waves vary with frequency also and with satellites in space, the attenuation and scattering of signals passing through the atmosphere and the ionosphere must be taken into account.

a. Orbit Considerations

The orbit of a communications satellite affects the service that can be provided since it determines the amount of time a satellite will be visible to an Earth station, in what locations these Earth stations will be and how complex and expensive they must be.

Clark's geostationary approach is one option. However, even if placed at the correct height and having the right velocity, the satellite will not remain stationary because of the Earth's equatorial ellipticity and perturbations resulting from movements of the Sun and the Moon. Corrections to height and velocity are required at regular intervals throughout the life of the satellite and, since it is not economic to correct the satellite too frequently, system design must allow for drift over a period of months.93

Random orbits, polar orbits and inclined elliptical orbits, using low to medium altitude satellites, are examples of nonstationary techniques. Although systems using these techniques each have applications where they provide specific advantages, such systems normally require multiple satellites for continuous coverage and expensive Earth station tracking systems. The average cost of a sophisticated Earth station today has been estimated at approximately $4.5 million. During the early considerations of satellite communication system alternatives, Bell had supported random orbital technology although the distinctly less capital-intensive synchronous orbit method was a possible alternative. Synchronous systems were adopted as preferred quickly after 1963 primarily because the technology necessary for deploying such systems had been perfected by an outsider, Dr. Harold Rosen of Hughes Aircraft, and was being promoted for competitive reasons.94

The coverage of a synchronous satellite varies with its location in the geostationary orbit and the restrictions on minimum elevation angles at the Earth stations. The minimum elevation restrictions arise from signal quality factors and increased coordination problems with terrestrial systems at the lower angles. For elevation angles greater than five degrees the useful arc for coverage of the contiguous U.S. ranges from about 53°W to 138°W longitude or approximately 85°. If the elevation angle restriction is increased to 10° the useful arc is reduced to approximately 70°.95 The separation of satellites on 70° of geostationary arc would be no problem if each satellite could use different portions of the frequency spectrum. But the problem is not one of physical space but one of available spectrum and of frequency interference.

b. Frequency Allocations

Originally no exclusive frequency bands were available for satellites in the rapidly crowding spectrum below 10 GHz, but because of the availability of proven techniques with terrestrial equipment in the 4 and 6 GHz bands it was natural that these bands should be initially used for satellite communications

and shared with terrestrial systems. But the clearly dominant consideration for future spectrum utilization is the advent of the communication satellite. In 1966, the existing technology made the satellite use of frequencies to about 15 GHZ feasible and had the potential of extending that range by an order of magnitude.96

Using the 4 and 6 GHz bands with approximately three degrees of orbital separation between satellites and ten degree minimum elevation angles, some 24 satellites could be accommodated, each using the total band for up and down transmission, without causing undue interference. Each satellite could have up to twenty-four 40 megahertz (40 million cycles per second) channels, each capable of up to 1,200 voice circuits or one television circuit per channel. But one of the most important parameters in determining minimum orbital spacing is Earth station antenna size. Antennas for such satellite systems would have to be on the order of one hundred feet in diameter for acceptable performance. At higher frequencies, particularly those above 10 GHz, interference is less likely to be a problem with terrestrial systems and trade-offs can be made between the size and spacing parameters of a satellite system.97

Because of ionospheric effects and high noise levels, the lower limit on frequencies for use in satellite links is around 70 megahertz (MHz). Until about 10 GHz transmission is relatively free, above which additional path loss caused by rain, clouds, or fog, begins to reduce efficient transmission. Higher powered satellites and highly directive antenna systems can be used to overcome some path loss problems. Modern solar panel arrays can provide a satellite with up to five kilowatts of power for operation if necessary.98

Hypothetical systems have emerged from studies by Bell and others, which have projected the possibilities for future satellite systems. Labeling spectrum and orbit space as "precious and limited resources which must be conserved", a system using frequencies in the 20 and 30 GHz bands was "designed" that used 50 satellites and 50 Earth stations and could offer up to 100 million voice circuits or equivalent. Each satellite weighed about five tons, used digital technology and had a total capacity of about four million voice circuits. Such systems far surpass today's needs but future telecommunications requirements may require such systems to be developed.99

. . . . . .

Except for the brief period of time around the turn of the century there was little if any true competition among the common carriers for residential telephone and long distance service. However, technological advances have since introduced important competitive elements into the communications industry. Although regulation of the carriers appeared at first to be only an afterthought in an attempt to control the AT&T monopoly, the Commission more recently has been working hard to change its image and to take a more positive **role** in the regulatory process.

By adopting its competitive attitude in 1959, the FCC chose not to leave initiative for the services to the public that the new technologies could provide up to the established carriers. By authorizing private ownership of microwave systems the Commission only increased its workload and gained the disfavor of the established carriers. The industry's structure was beginning to change with technology and so was the FCC; it was attempting to serve the public interest.

The FCC was primarily established to insure that there was equity, order and efficiency in the

assignment of the radio frequency spectrum. Technological advances in the use of this spectrum after World War II posed no major problem for the Commission, for Congress had given the agency, through the broad language of the 1934 Communications Act, the leeway it needed to keep step with technology.

In making the Above 890 decision, the FCC satellite issue was faced with the same public interest considerations that any group would have had in opening a new market that was based on a new technology. But such considerations by the FCC for domestic satellites would certainly have many factors; the impact of DOMSAT on existing market structures and the established carriers would be only one of the many that the Commission would have to consider.

## CHAPTER II

## THE PRECEDENTS OF DOMSAT

In the development of telecommunications policy, a relationship equally as important as that of Commission-to-carrier is that of Commission-to-Congress. The FCC was established by Congress, both as an independent regulatory commission and as "an arm of the Congress" and to Congress, this relationship may mean independence from White House domination, but not necessarily independence from its Congressional parent.100

Congress made a major amendment to the Communications Act of 1934 with the passage of the Communications Satellite Act of 1962 and expanded the FCC responsibilities. Sputnik I had helped Congress to recognize that the commercial utilization of space could promote a wide range of benefits for the public. This could be accomplished through either the economic improvement of existing concepts or through the processes of technical innovation. Among all the projected commercial uses of space, communications was the one which took the strongest foothold and offered the greatest potential.101 During the five years that elapsed between the launching of Sputnik I and the passage of this legislation which established the Communications Satellite Corporation (COMSAT), the questions of competition, ownership, operation, markets and boundaries were all addressed to some degree by a variety of parochial interests and activities.

The Corporation's creation provided policy foundations that were examined and challenged during the development of the DOMSAT policy (as discussed in Chapter III). This makes the understanding of the functions of the Commission and Congress in this area of telecommunications and the rationale for their actions important from the onset. In the 1960's, COMSAT's relationships with Congress, the FCC and the carriers were unique and added a level of complexity to the rapidly changing environment of the Commission and to its regulatory functions. Although DOMSAT compounded these complex relationships again ten years later, the foundations had been laid by the Commission and Congress in 1962 with COMSAT.

### A. The Communications Satellite Act of 1962

By means of the Communications Satellite Act of 1962, Congress created the Communications Satellite Corporation (COMSAT). This was a public corporation, half owned by the major communications companies and half owned by individual investors, established to develop a commercial, international communications system using satellites, put it into operation and manage it in cooperation with foreign countries. The advent of communications satellite technology, the aspirations of individual companies in exploiting it and public policies had brought about important changes in the structure of the U.S. overseas communications system. As in 1927 with the case of high frequency radio,102 the government was anxious to promote the fastest possible development of the new communications technology [as well as an improved world leader image].103

1. Congressional Hearings

As would be true with any complex piece of legislation, the process of its enactment was not simple. Not only had difficult questions of ownership been raised but also there had been a change in administrations by the time the issues had reached their full intensity. To complicate matters, there was no agreement on an ownership policy for commercial communications satellites either within the communications industry or the Congress.

In 1961, the Senate Subcommittee on Monopoly held hearings into the pros and cons of existing government policies and established organizations for space communications; so did the House Interstate and Foreign Commerce Committee and the House Committee on Science and Astronautics. More than eighteen months passed between Eisenhower's first statement of policy and the Kennedy legislation being signed into law. During that period, the FCC was the first to face the issues that were raised.

a. The Ownership Question

The alternatives of ownership for commercial communications satellites were basically (1) government ownership, (2) carrier ownership, and (3) private, broad-based ownership.104 Congressional interest was soaring. Between June 14 and August 24, five congressional committees held 21 days of hearings on 61 communications satellites despite the fact that there was no legislation pending on the subject.105

At the same time, the FCC initiated a formal Notice of Inquiry addressed to the question of ownership and operation of such a venture, specifically soliciting the views of industry as to what plan of participation was considered best. Twelve interested parties responded and there was some agreement for joint ownership and operation of the system.106 The options were being filtered through the political and psychological climate of the day.

The overseas carriers argued that potential economies of scale would be effected by treating satellites as an extension of existing submarine facilities. They proposed a joint venture whereby satellite ownership would be assigned exclusively to them. The aerospace industry took an entirely different view. General Electric and Lockheed, in particular, called for the creation of a carrier's carrier and argued that the entity's ownership should include equipment suppliers and the public at large as well as the overseas carriers.107

The response of all common carriers, domestic as well as international, generally expressed opposition to participation in ownership by noncarriers. As AT&T put it, such arrangements would enable hardware suppliers, who have no responsibility to the public for quality or scope of service, to influence the common carriers' future undertakings.108

AT&T Vice-President James E. Dingman testified before the Senate that communications satellites were really "no big breakthrough"; they would not make undersea cables obsolete and they certainly had no potential for domestic use. However, the carriers were still sincere and enthusiastic in their desire to help advance satellite communication [the Nation needs more public spirit like that]. He stated:

This position may be construed by some as stemming from the selfish interests of my company which is the largest of the carriers involved [it's the largest of ALL carriers!]. Let me assure you that it is not.

Let one thing be crystal clear: AT&T has no desire or intention of seeking to control the communications satellite system to its competitive advantage. . . Hard as it may be for some to understand, our sole interest is in the earliest practicable establishment of a worldwide commercial satellite system useful to all international communications carriers and agencies both here and abroad.109

The Justice Department neither suggested nor endorsed any specific plan, but instead specified four conditions necessary for joint ventures in order that they be consistent with antitrust considerations:

1. All interested communications common carriers be given an opportunity to participate in ownership of the system.

2. All interested communications common carriers be given unrestricted use (on nondiscriminatory terms) of the facilities of the system whether or not they elect to participate in ownership.

3. All interested parties engaged in the production and sale of communications and related equipment be given an opportunity to participate in ownership of the system.

4. All interested parties engaged in the production and sale of communications and related equipment be given unrestricted opportunity to furnish such equipment to the system whether or not they elect to participate in ownership.110

By reporting on its Notice of Inquiry, the FCC was the first agency to confront the policy choices, and it must be noted that it acted with unusual dispatch. In its report of May 24, 1961, it stated:

We fail to see why ownership or participation by the aerospace industry in the communications industry would be beneficial or necessary to the establishment of a satellite communications system to be used by the common carrier industry.111

With this observation the Commission rejected GE's plan to establish a satellite corporation, and placed the Justice Department and the Assistant Attorney General, Lee Loevinger, in a dilemma by failing to support a joint ownership policy. However, in apparent deference to the FCC, Justice modified its requirement for aerospace "ownership" rights, and substituted "participation" as its guideline for a satellite venture.112

b. The Kennedy Administration Bill

The voice of President Eisenhower had been one of the first heard on the subject of commercial satellite communications:

The commercial application of communication satellites, hopefully within the next several years, will bring the nations of the world closer together in peaceful relationships as a product of this Nation's

program of space exploration. . . . The Nation has traditionally followed a policy of conducting international telephone, telegraph and other communications services through private enterprise subject to government licensing and regulation. We have achieved communications facilities second to none among the nations of the world. Accordingly, the Government should aggressively encourage private enterprise in the establishment and operation of satellite relays for revenue-producing purposes.113

But by the Fall of 1961, the Washington environment had changed. The Kennedy Administration was now in the White House and the COMSAT controversy was fully monopolizing Congress. President Kennedy viewed Eisenhower's policy as "turning control of space communications over to AT&T"114 and on July 24, 1961 had announced that a policy of private ownership and operation of the U.S. portion of the system was favored provided that such ownership and operation met the following policy requirements:

1. New and expanded international communications services be made available at the earliest practicable date

2. Make the system global in coverage so as to provide efficient communication service throughout the whole world as soon as technically feasible, including service where individual portions of the coverage are not profitable

3. Provide opportunities for foreign participation through ownership or otherwise, in the communications satellite system

4. Nondiscriminatory use of, and equitable access to, the system by present and future communication carriers

5. Effective competition, such as competitive bidding, in the acquisition of equipment used in the system

6. Structure of ownership or control, which will assure maximum possible competition

7. Full compliance with antitrust legislation and with the regulatory controls of the Government

8. Development of an economic system, the benefits of which will be reflected in oversee communication rates.115

The Executive Secretary of the National Aeronautics and Space Council, Mr. E. C. Welsh, was tasked to prepare a coordinated draft proposal for translating Kennedy's policy into effective legislation. By January 1962, after many meetings of the Council, constructive language evolved. The Administration's bill (H.R. 10115 or S. 2814) provided for the establishment, ownership, operation and regulation of a commercial communications satellite system and authorized the creation of a "privately owned and profit-operated Corporation [COMSAT]." COMSAT was to be financed from the sale of securities to the public, which included, but was not limited to, common carriers or otherwise chosen companies or individuals. It would not be an agency or establishment of the U.S. Government but it would be subject to the pertinent provisions of the Communications Act of 1934, as amended, and of the District of Columbia Business Corporation Act.116

## 2. H.R. 11040 Becomes Law

Opinion in Congress was now oscillating between the two extremes of government and carrier ownership and private ownership was seen by some as a violation of antitrust laws and a giant giveaway of government investments in communications satellite technology.117 In an August 1961 letter to the President, the liberal Democrats in Congress (three Senators and thirty-two Representatives) had urged that a hasty decision on the space communications issue not be made in order that the general "national interest" might be determined. However, there was still no agreement within Congress as to what the national interest was or how it could best be determined or served.

a. Opposing Views

No fewer than ten bills on the subject were bouncing around Congress in 1962. In a simplified picture, the cast of characters looked like this. There was Senator Kerr of Oklahoma who favored private ownership with minimal government regulation, Senator Kefauver of Tennessee, who favored government ownership, at least initially, and Senator Pastore of Rhode Island, who wanted private ownership with strong government control specified in the enabling legislation. The President's proposal had been introduced to both houses on February 7, and questions concerning the **role** of the Executive and the bill's domestic and foreign policy implications were also causing debate.118

The first committee report on S. 2814, the President's legislation, was issued on April 2 by the Senate Space Committee. In the House on the same day, Congressman Oren Harris introduced H.R. 11040, which was identical to S. 2814 as amended by the Senate Space Committee. With minor refinements, H.R. 11040 was passed in the House on May 3 by a vote of 354 to 9. It was then sent to the Senate, where it was referred to the Commerce Committee.119 Senate activity continued independently on S. 2814. Changes were made by the Committee on Commerce, which would restrain the monopoly and protect the taxpayers to a far greater extent than what had been previously proposed.120 Senator Pastore was especially concerned that domination by one communications common carrier (AT&T) should be avoided.121 The committee amended subsection 102(c) to express the intent of Congress regarding Federal antitrust laws and 102 (d)) so that nothing in the act could preclude the use of such [COMSAT] systems for domestic communications services where consistent with the provisions of the act.122

Debate in the Senate was turned into a strategy of filibuster by the bill's opponents.123 As a consequence, cloture was imposed on August 14 (the first time it had been successfully used since 1927) to end debate and on August 17, the bill, which was in essence H.R. 11040 with everything after the enacting clause eliminated and the body of S. 2814 (as amended by the Commerce Committee) inserted in lieu thereof, finally passed the Senate and was sent to the House.124 The bill won final House approval on August 27, 1962.

b. The Final Act

When President Kennedy signed the Communications Satellite Act of 1962 on August 31, one of the most controversial pieces of legislation of the 87th Congress became law and the opponents of COMSAT were finally defeated.125

The purpose of the Act is best summarized by Sections 102 (a)) and (b) of the Act:

> (a) The Congress hereby declares that it is the policy of the United States to establish, in conjunction and in cooperation with other countries, as expeditiously as practicable a commercial communications satellite system, as

> part of an improved global communications network, which will be responsive to public needs and national objectives, which will serve the communication needs of the United States and other countries, and which will contribute to world peace and understanding.
>
> (b) The new and expanded telecommunications services are to be made available as promptly as possible and are to be extended to provide global coverage at the earliest practicable date. In effectuating this program, care and attention will be directed toward providing such services to economically less developed countries and areas as well as those more highly developed, toward efficient and economical use of the electromagnetic frequency spectrum, and toward the reflection of the benefits of this new technology in both quality of services and charges for such services.126

With respect to the Communications Act of 1934, the COMSAT Act states that the corporation that was created by the Act [Communications Satellite Corporation] shall be fully subject to the provisions of the Communications Act. However it further states that:

> Whenever the application of the provisions of this Act shall be inconsistent with the application of the provisions of the Communications Act, the provisions of this Act shall apply.127

In creating COMSAT as a joint venture, subject to Government influence but owned and operated by broad-based private interests, Congress rejected a number of alternatives such as completely governmental projects (like the Atomic Energy Commission or the Tennessee Valley Authority), purely commercial joint ventures, and single-company operations.128 COMSAT, like the FCC, is a creature of Congress, but not by accident. It was not created because "no entry would otherwise take place." The Government or AT&T could have acted alone or separate companies could have established individual segments of a global relay.129

Rapid development was a strong consideration (Kennedy's criteria - "at the earliest practicable date" - was in partial response to a projected deficiency in international communications capability and to meet the alleged requirements of national prestige in the "cold war"), probably stronger than commercial considerations would have dictated. If time had been of no concern, the country might have waited until the market could support multiple independent private systems or joint ventures limited to parties without vested communications interests.130 On the basis of costs, single-company ownership would have been easily possible, especially if NASA had charged no more than marginal costs for launching and tracking. Despite these considerations, opposition to a single-company ownership was overwhelming in view of the threat of monopoly, accompanied by antitrust and regulatory problems. Single-company ownership, in fact, was never formally proposed in Congress.131

The remedy, which Congress finally selected, was thus obviously not Commission regulation pure and simple. It was instead a set of special techniques intended to produce, by internal organizational constraints, some of the results that a competitive economic structure would have produced externally.132

## B. Space Age Regulation

The burden of satellite communications regulation falls primarily on the FCC. The COMSAT legislation imposed elaborate direct controls by the Commission on this "common carrier's common carrier", more comprehensive and more complex than any of the regulatory apparatus that had been used previously for the supervision of traditional communications carriers. In its expanded **role**, the Commission could require additional facilities from COMSAT if called for by the public interest. It could authorize construction, operation and ownership of ground terminal stations of the system by the Corporation, or by private communications carriers, or the two jointly. In general, the FCC was empowered to "make rules and regulations to carry out the provisions of this Act."133

The Commission now had an additional opportunity to expand on its competitive communications policy. It was evident to the drafters of the legislation that the new COMSAT Corporation would have to consider the many public and national interest considerations inherent in this new area of endeavor. Consequently to insure that all interests were faithfully considered, Congress had applied a scheme of regulation that was literally unprecedented.134 An example of the Commission's added duties in satellite matters is typified by the following excerpt from the Act which required the Commission to:

> insure effective competition, including the use of competitive bidding, where appropriate, in the procurement by the Corporation and communications common carriers of apparatus, equipment, and services for the establishment and operation of the communications satellite system and satellite terminal stations.135

In the exercise of its new authority, the Commission was quickly confronted with essentially three new considerations which surfaced. The use of outer space for communications had international ramifications that required some rethinking of the traditional international frequency allocation process that had developed through the efforts of the International Telecommunications Union (ITU) and its predecessors since 1903. In addition, this new technology offered cost and performance advantages that were attractive to both the carriers and businesses alike and questions of who was authorized to use the COMSAT system were quickly raised. Finally, in 1965, these questions gave birth to the idea of applying satellite communications technology to domestic communications applications and the domestic satellite policy issue was placed before the Commission.

### 1. International Considerations

Satellites, which are oblivious to national borders and physical obstructions such as mountains, oceans and great distances, make the distinction between domestic and international communications a purely artificial one.136 As the era of space communications progresses, it is important to recognize its impact on other nations of the world.137

Just as nations feel that a stockpile of weaponry is imperative for security and prestige, so too, is it believed that a domestic satellite link for communications is a guarantee for independence and status.138 The power elites of the developing countries are eager for the communications power that satellites might help to provide, consolidating national power and promoting a sense of national unity and loyalty.139 Although the considerations imposed by nationalism are becoming more pertinent in today's international arenas with the emergence of each new nation, this thought is only identified here as an international consideration to be addressed by the determiners of future telecommunications policy in forums like the ITU.

The basic questions that were addressed by the FCC in its communications satellite policy decisions were those that evolved from the use of international resources for the development of this technology.

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# Intelsat

From Wikipedia, the free encyclopedia

**Intelsat, Ltd.** is the world's largest commercial satellite communications services provider. On July 18, 2001, Intelsat became a private company, 37 years after being formed as **International Telecommunications Satellite Organization (INTELSAT)**, an intergovernmental consortium owning and managing a constellation of communications satellites (**Intelsats**) to provide international broadcast services. Ownership and investment in INTELSAT (measured in shares) was distributed among INTELSAT members according to their respective use of services. Investment shares determined each member's percentage of the total contribution needed to finance capital expenditures. The organization's primary source of revenue came from satellite usage fees which, after deduction of operating costs, was redistributed to INTELSAT members in proportion to their shares as repayment of capital and compensation for use of capital. Satellite services were available to any organization (both INTELSAT members and non-members), and all users paid the same rates.

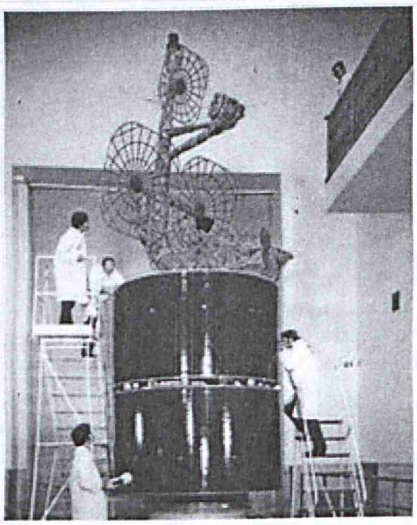
## Contents



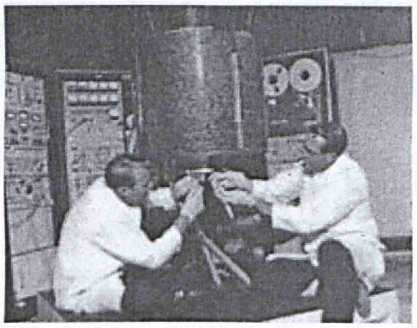
## History

The consortium began on August 20, 1964, with 11 participating countries. On April 6, 1965, Intelsat's first satellite, the *Early Bird*, was placed in geostationary orbit above the Atlantic Ocean by a Delta D rocket.

In 1973, the name was changed and there were 80 signatories. Intelsat provides service to over 600 Earth stations in more than 149 countries, territories and dependencies. By 2001, INTELSAT had over 100 members. It was also in this year when INTELSAT privatized and its name changed to Intelsat.



An Intelsat IVA Satellite



INTELSAT I *Early Bird*

Since its inception, Intelsat has used several versions (blocks) of its dedicated Intelsat satellites. INTELSAT competes each block of spacecraft independently, leading to a variety of contractors over the years. Intelsat's largest spacecraft supplier is Space

Systems/Loral, having built 31 spacecraft (as of 2003), or nearly half of the fleet.

The network in its early years was not as robust as it is now. A failure of the Atlantic satellite in the spring of 1969 threatened to stop the *Apollo 11* mission; a replacement satellite fired into orbit went into a bad orbit and could not be recovered in time to use; NASA had to resort to using undersea cable telephone circuits to bring Apollo's communications to NASA during the mission.[1] Fortunately, during the Apollo 11 moonwalk, the moon was over the pacific, and so other antennas were used, as well as INTELSAT III, which was in geostationary orbit of the Pacific ocean.[2]

Today, the number of Intelsat satellites, as well as ocean-spanning fibre-optic lines, allows rapid rerouting of traffic when one satellite fails. Also, modern satellites are themselves more robust, lasting several more years, with much larger capacity.

## Current operation

Intelsat was sold for U.S. $3.1bn in August 2004 to four private equity firms: Madison Dearborn Partners, Apax Partners, Permira and Apollo Management. The company is merging with PanAmSat. Intelsat maintains it corporate headquarters in Bermuda, with a majority of staff and satellite functions — administrative headquarters — located at the Intelsat Global Services Corporation offices in Washington, DC. This arrangement allows the company to lobby politicians in Washington while filing tax from Bermuda.

Spacecraft operations are controlled through ground stations in Clarksburg, Maryland (USA), Hagerstown, Maryland (USA), Riverside, California (USA), and Fuchsstadt, Germany [1] (http://www.intelsat.com/aboutus/careers/locations.aspx) .

Intelsat was operating Intelsat Americas-7 until it was lost on 29 November 2004 [2] (http://portal.wikinerds.org/node/152) .

## See also

- Eutelsat
- Inmarsat
- Intersputnik
- Intelsat Americas
- SES Global

## External links

- Company home page (http://www.intelsat.com/)

### Data

- Yahoo! - Intelsat, Ltd. Company Profile (http://biz.yahoo.com/ic/53/53101.html)
- Pacific Satellite Fails (http://www.dailywireless.org/modules.php?name=News&file=article&sid=3542)

## References

1. ^ Error on call to Template:cite web: Parameters **url** and **title** must be specifiedDonald E. Kimberlin (June 1, 1994). . Retrieved on September 22, 2006.
2. ^ On Eagle's Wings: The (http://www.parkes.atnf.csiro.au/apollo11/pasa/on_eagles_wings.pdf) Parkes

Observatory's Support of the Apollo 11 Mission (PDF). Astronomical Society of Australia (July 1, 2001). Retrieved on September 22, 2006.

Retrieved from "http://en.wikipedia.org/wiki/Intelsat"

Category: Communications satellites

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## The Seventies

Readings
1. Chap. 1, "Spaceflight and the Myth of Presidential Leadership."
2. Chap. 4 and 5, " Beyond Horizons."
3. Chap. 1 and 2, Wheelon.

Strategic Themes:

1. Retrenchment for NASA – NASA and the country out of sync.
2. A truck to nowhere – the seeds of the Challenger disaster
3. The growth of big science – Viking, Hubble and beyond
4. The seeds of use of space in war
5. The ABM treaty and the MIRV debacle
6. Détente verses competition with the Soviets
7. Growth in international and commercial space.

When President Nixon took office in 1969, NASA funding was already going down. The first Moon landing occurred in July 1969. The race was won! It was like the dog that caught the truck. What would it do now? To some extent NASA was caught in a time warp. NASA felt that after the first lunar landing it should get whatever funding it needed. In September 1969, a Space Task Group chaired by Vice President Agnew reported three possible long-range space programs for NASA. The first was a manned mission to Mars by mid-eighties, an orbiting lunar station and a fifty man Earth orbiting station served by a reusable shuttle. Funding for this option was $8 to $10 billion/yr. (Recall that at its peak NASA had received 5 billion/yr.). The second plan postponed Mars until 1986 and limited funding to $8 billion/yr. The third plan chose only the space station and shuttle, with annual spending between $4 billion-5.7 billion/yr. However relative to the long gone days of the early sixties, the mood of the country and of the President had changed. Nixon came from the Eisenhower mentality that saw the big manned effort as stunts. He was also much more interested in promoting cooperation rather than competition with the Soviets and the Chinese. Further he strongly believed in frugality in government spending. All these combined to make him cast a skeptical eye on the NASA requests. The country also had changed. In 1969, we had reached the Moon. The national mood was to turn to other issues especially in light of riots in cities, the war in Vietnam, etc. Flights to the Moon seemed boring. For NASA it was a boom or bust cycle. As a measure of this, the Congress reorganized the standing space committees out of existence and Nixon abolished the PSAC. Space became a secondary issue for the political establishment. Thus the last two Apollo flights were cancelled, the Apollo Application Program was reduced to one SKYLAB and in a blow to the Air Force the MOL was cancelled. President Nixon refused to support any of the options that NASA wanted. There was no congressional support for any big new initiative so NASA started to wither. It was only the 1972 election that saved something for NASA. The declining population in the aerospace industry in the big states of California, Texas and Florida forced the President to approve something for NASA. He chose half of half of option 3. The choice was for a Space Transportation System (STS), a space truck but the place it was to go to was cancelled. Thus a space truck to nowhere. It was even worse than that.

NASA had suggested a completely reusable design based around liquid rocket engines. The idea was to stop throwing away expensive hardware. Nixon would only give them half the money requested. Thus they did away with the completely reusable design and even worse with the liquid rocket engines. In a compromise to fit within a fixed $3.2 billion NASA budget, they chose a non-reusable main tank and worst of all, to make up the thrust they chose solid rocket motors. As an aside, Von Braun had said that no human should ever ride on solid rockets. They were just too dangerous. One in twenty-five blew up due to defects. They could not be stopped once lighted and thus had the potential for a major loss of life. However, to reduce development costs, NASA chose to go with solid rockets. In another first, they chose to go with Morton Thiokol, from the home state of the NASA administrator. Morton Thiokol was in Utah, which is where it manufactured the solid rocket segments. However a completed solid rocket would be too big to transport by road to a port to get it over to Cape Canaveral. Thus it had to be built in segments and integrated at Cape Canaveral. Thus the seeds were sown for the Challenger disaster of a decade or so away. As a continuation of the sixties mindset of higher, faster and farther, NASA chose to develop shuttle main engines which had the highest thrust to weight of any ever built. They would be wonders of technology. It was argued that each engine would be reusable for 100 flights and that the shuttle would fly 100 times a year. In the operational phase the cost for launch was supposed to be only $10 million a flight. Since its payload was 40000 lbs. To LEO it would give cost of $250/lb to LEO.

However even then some issues were seen. Since the STS could only go to LEO (~250km) it would have to carry an upper stage for it to be useful for any other obit. NASA thus sold itself to other organizations to get the support it needed. The Shuttle payload bay was sized for various military missions as well as the payload carrying capacity to LEO. It persuaded the Air Force to develop a solid propellant upper stage (IUS) to put 500 lbs. into LEO. It persuaded McDonnell Douglas to build two upper stages in return for a monopoly position. These were the PAM-D and PAM-A upper stages. It also started a cryogenic upper stage based on Centaur technology. NASA was in the desperate position (as it saw it) of having to do a big project to keep itself going and it was selling itself to get approval for the big project. The cost projections which finally sold the administration were based on a large number of flights a year which was based on a market which did not yet exist- (even today ~50 flights /yr worldwide). Thus there was a classic chicken and egg problem. In retrospect the fundamental problem was forcing a pioneering technical program to be justified in economic terms. In this sense there was a huge disconnect between NASA and the administration. Note that Apollo was never justified on economic terms.

The facts are that NASA has never managed more than eight STS flights a year, the SME needed to be replaced every flight and the cost estimates per launch range from $80 million to $500 million. There are three ways to estimate cost. The first is to take the total amount spent so far on STS and divide by the number of flights. This gives about $500 million/yr. The second is to take the annual amount in the NASA budget and divide by the annual flight rate. This gives about $250 million/yr. The last is to ask how much is saved when an STS flight is cancelled. This is about $80 million/yr. This last figure is telling since what are saved are only the consumables. Most of the cost is in the standing

army necessary to operate and maintain the shuttle. This cost and the low reliability of the shuttle were not appreciated in the initial estimates. There was also some specious thinking at NASA about markets and either wishful thinking or an underappreciation of the difficulty of developing a new engine. The new engine contributed to the delays of the first STS launch until 1981 and have contributed greatly to the poor reliability of the STS. A truck it is not, it is much more like a finely tuned racecar.

President Nixon never saw space as a race or as a competition with the Soviets. In his mind, space and defense were much more clearly linked going back to the Eisenhower policy. Unhappily, the NASA administration under him, Tom Paine never seemed to appreciate where the President's position came from. Paine felt that Agnew was important in the administration and paid much attention to him rather than building a constituency in the OMB. This is a mistake that Webb would not have made. Paine kept trying to persuade the President of the value of doing things like a space station before the Soviets built there own. He never appreciated that the President actually wanted détente not competition with the Soviets. Paine left in 1970 and was replaced by Fletcher. Fletcher however seemed to have completely bought the NASA position of needing to do the next big thing and he made the critical decision on STS.

The Nixon emphasis and choices led to the first Apollo-Soyuz mission in 1975 as well as the Skylab (the first space station). Unhappily, the SME caused delays in STS meant that Skylab literally crashed to the ground in Australia while the STS was unable to get up and save it. The Apollo-Soyuz mission was pursued at Nixon's insistence (although after he left). It was almost an after thought in the space program and given the worsening relations with the Soviets that occurred by 1979 ultimately did not lead far. In any case, it's real objective was foreign policy not space policy.

Since Nixon thought of space as defense first, an especially important agenda item for him was the ABM program. The ABM treaty in 1972 had important implications for space policy. The ABM treaty restricted both sides to limited ABM systems, one deployed around the national capital and one at an ICBM site (Grand Forks). It formally recognized the role of satellite reconnaissance and agreed that verification could be carried out by national technical means consistent with international law. It thus made credible the policy of mutual assured destruction (MAD). It had another provision that later proved contentious for SDI and today. It restricted each party not to develop, test or deploy ABM systems or components that are sea-based, air-based, space-based or mobile land based. The space-based piece is the one that has proven difficult as technology has marched on.

The ABM treaty had the effect of making the whole system of reconnaissance, warning and communication satellites even more important. They were necessary to verify Soviet compliance and warn of any possible attack.

Something else that happened in the seventies that had a profound effect on future thinking on space policy was the development of MIRV technology for ICBM's. The US developed the technology for MIRV's first and in an example of where

technology overtook policy, decided to MIRV its missiles and put multiple warheads on each missile. This was seen as destabilizing by the Soviets who rushed to develop their own MIRV capability. This capability on both sides led to a racketing up of the arms race and a destabilizing tension. Long detailed treaty negotiations then resulted which eventually succeeded in de MIRVing strategic missiles. Thus Pandora's box was barely closed. The implications for future space policy flow from the lessons learned from this. The doves on space weaponization quote this widely as an example of technology run amok. Where the opening of a technological door forced us down a path that in retrospect we wished we had not traveled down and from which we barely escaped. Thus it is feared the same thing will happen with space weapons.

The late sixties and early seventies also saw the seeds of what was to come in the first use of satellite systems in war. In the Vietnam War, there was extensive us of the directly downlinked weather data from DMSP and use of communication satellites. The DMSP data was to help target planners for figure out when to schedule raids on North Vietnam. The early DCCS satellites and COMSAT provided real time communications between Saigon and Washington. This enabled high-resolution imagery to be interpreted in Washington and sent back to Saigon. Whether this was a boon or a blessing is questionable because it later led to Washington based control of intelligence which was a handicap in the Gulf War. It also enabled command and control from DC of operations in Vietnam.

What also happened in the early seventies was the design of the GPS was laid down. It was conceived as a system to provide navigation data for long range bombers on the way to attack the Soviet Union. As a testament to the times, it had a large secondary payload of a nuclear detection monitor. Since it was only for long-range guidance it had a weak signal. It also had a civilian signal as an after thought. It was never intended for use in hostile regions, for precision use or for primarily civilian use.

The seventies were a period when several big science programs were started or came to fruition. Viking landed on Mars in 1976 and failed to find life. It cost almost $4 billion in today's money and represented another of the higher, faster, farther thinking. The Hubble Space Telescope and Galileo were started in this era. Each of these was a billion-dollar class program intended to do big science in a big way. While very successful the long time they took to come to fruition was instrumental in the calcification of NASA. No longer was it a big agency doing big things quickly; it became a small agency doing big things slowly. In a sense its heyday had passed and it was left mainly with past glories. NASA spending was down to 36% of its peak.

Under Presidents Ford and Carter, the space program continued at a steady but low pace. The urgency was gone and other issues e.g. energy now occupied the national agenda. This period has been called the NASA snooze. In the meantime, a space program was growing in Europe that would ultimately have significant consequences for American launch dominance.

As a matter of policy, the US was eager to share in scientific endeavors with the Europeans but refused to provide launch vehicle data unless the French agreed not to use any in military projects or do anything to undercut INTELSAT. To add insult to injury, the US sold the Thor-Delta technology to the Japanese when they had refused to do so for the French. Thus in 1972 a new European Space Agency was formed from the remains of the national programs. ESA developed an independent launch capability the Ariane that in 1979 succeeded in putting a European satellite in orbit from Korou. The French then formed a quasiprivate company to market the services of Ariane and the US launch share steadily eroded and after Challenger was lost for good.

In the meantime the Soviets turned their attention to space stations. They launched Salyut I in 1971 then a series of space stations staying for up to 6 months in space. They did experiments and learned how to live and survive in space. In contrast these were no US astronauts in space from 1975 to 1981. The Soviets also developed a Shuttle, used it once and then decided it was too expensive to operate and never used it again. The Soviets also developed satellite interceptors and had an operational ASAT system. The US never did develop an ASAT but did develop an F15 launched missile that destroyed one old satellite as a test in the 80's.

The commercial industry continued to grow under INTELSAT and the Open Skies policy in the US. The first domestic Comsat was launched in 1974 using C-band. By 1980, Ku band satellites were available. These ultimately enabled the now ubiquitous private networks (e.g. at Shell stations for card authorization). Once again the commercial market was growing.

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transmission of gravity-perception information within both plants and animals; 3) identify the interactive effects of gravity and other stimuli (e.g., light) and stresses (e.g., vibration) on the development of metabolism of organisms; 4) use gravity to study the normal nature and properties of living organisms; and 5) extend the limits of knowledge about plant and animal growth and metabolism to provide for long-term survival and multigeneration reproduction of life in space. This program provides basic ground-based information in support of future space flight experiments and life support systems environment. This includes assurances that physical welfare and performance is preserved and that adequate treatment of inflight illness or injuries is provided.

Exobiology is the study of the origin, evolution, and distribution of life and life-related molecules on Earth and beyond. Sophisticated analyses of life as we know it, its chemical precursors and its origin, coupled with extrapolation to extraterrestrial environments, affords a unique opportunity to address a most fundamental question regarding the existence of such processes beyond the Earth. Theories about chemical evolution and the origin of life are being refined to reflect results from the most recent planetary and astronomical explorations. The current research program also is uncovering an intimate association between the origin and evolution of life on Earth and the processes that shaped the evolution of the solar system itself. These discoveries have highlighted gaps in our knowledge which, when completed as the program expands, will ultimately allow tests of the concept of universality of biological processes.

It may be useful to describe one additional space science program that has now been significantly cut back, **because this cutback has ramifications for future international cooperation in space applications.**

**The international solar polar mission (ISPM) was a joint** NASA and European Space Agency mission designed to obtain the first view of the solar system from a new perspective—a view from far above and far below the plane in which the planets orbit the Sun's equator, i.e., over the poles of the Sun. The two spacecraft would have aided in the study of the relationship between the Sun and its magnetic field and particle emissions (solar wind and cosmic rays) as a function of solar latitude, and hence might have allowed us to gain insight into the possible effects of solar activity on the Earth's weather and climate. The objective of the international solar polar mission was to conduct an exploration of those regions of the heliosphere above and below the equatorial plane of the Sun. Observations in the extreme, high-latitude regions of the sun have not been made before, and evidence indicates that this region of space is greatly different from the region in which the Earth is located.

The U.S. spacecraft for ISPM was canceled on account of budget constraints. The issues raised by its cancellation are discussed in chapter 7.

## PUBLIC ATTITUDES ON SPACE

Democratic government is based on the premise that there should be some linkage between public attitudes and political choice, not only in general but also with respect to specific issues on the public agenda. This linkage is not a one-way path, of course; public officials are leaders, teachers, and molders of public attitudes and opinion as well as representatives of the public in the political process. Thus, the following account of public attitudes about the space program needs to be interpreted with the understanding that general public opinion is only one determinant of

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public policy, and that its influence is rarely direct. Public opinion more frequently acts as a general constraint, setting boundaries within which political leaders are free to chose, or as an indirect shaping influence on the attitudes of elites inside and outside of government; most often, it is these attitudes that are closely correlated with specific policy choices.

**From this analysis it follows that:**

1. During the early years of the U.S. space program, the general public was willing to accept the interpretation of society's leaders as to the significance of space activities. This made it possible for the United States to first adopt a moderate response to Soviet space achievement, then to reverse policy and to enter into competition with the Soviets, even though public attitudes seemed to be opposed to such competition.
2. More recently, public understanding of the space program, and a supportive public attitude toward that program, have increased to the point where they may have political impact. Although an official's position on space-related issues may not be a crucial determinant of electoral success, prospace attitudes, and particularly, groups organized to reflect them, appear to be having some impact in influencing public policy with respect to the U.S. space program.

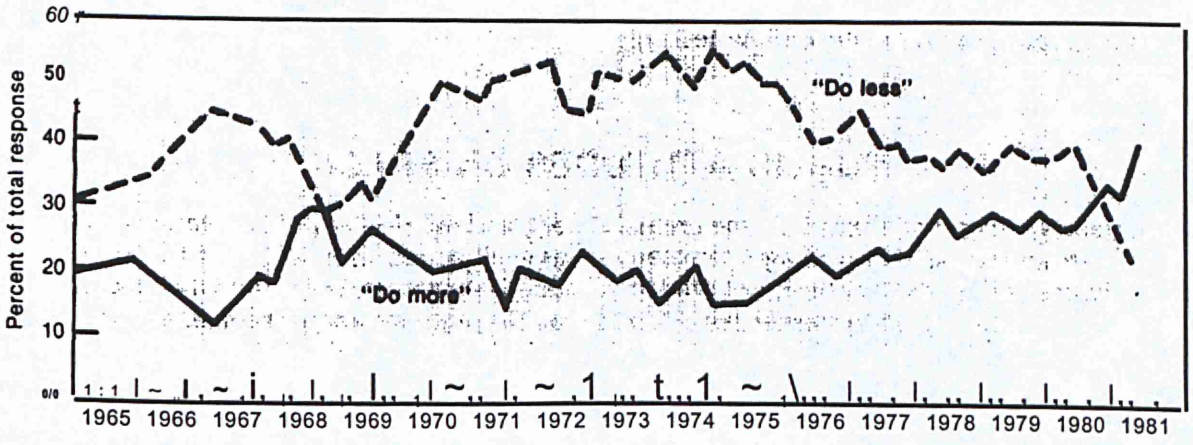
It is important, however, even if the second of these propositions is accepted, to recognize that "while it has considerable intellectual interest and entertainment value, space exploration is not a daily concern of the general public. . . . The levels of interest and information in this area are especially low."s Thus it is likely that public attitudes will provide the background, but not much more, against which national space policy will continue to be formulated.

## Public Opinion and Space Policy: 1965-80

A striking example of a leadership decision not being constrained by apparent public opinion is the U.S. commitment to a manned lunar landing. In the very month that President John F. Kennedy announced that he was setting as a national goal a lunar expedition before 1970, the Gallup Poll reported that the public was opposed by a 58 to 33 percent margin to spending the up to $40 billion such an enterprise would require, Until very recently, only once since 1965 has the percentage of U.S. adults calling for the United States to do more in space exceeded the portion believing that the Government should do less. Figure 9 compares this division of opinion for the period

'National Science Board, Science *Indicators, 1980,* p. 169.

**Figure 9.–Long-Term Trend Polling Results of U.S. Public Opinion on the Federal Space Effort**




NOTE: Responses to question of whether government should "do more" or "do less" In support of space exploration, 1985-1981.

SOURCE: For 1965-1975, Herbert Krugman, "Public Attitudes toward the Apollo Program, " Journal of Commurr/cations, vol. 27, No. 4 (1977), More recent data are derived from Trendex Polls taken for the General Electric Co.

**from 1965 to 1981; the recent shift toward a markedly more prospace position is clear from this chart.**

**Table 10, which reports opinions** for the 1973-**80 period,** is even more revealing, both in terms of the longer term trends and in terms of the current uprising in prospace opinion. Only in recent years have space "antagonists" comprised less than an absolute majority, and the explicitly prospace group grew only slowly, from **7.4** percent in 1973 to 11.6 percent in 1978. Most recently, however, the figure for those believing the United States is spending too little on space has jumped to 18 percent, and space antagonists are now only 39 percent of the total. The size of the "space neutral" segment has stayed constant, and thus the gain in support for expanded space spending appears to reflect a real shift in opinion. In 1980, for the first time, those of the opinion that space spending should not be lowered outnumbered those holding the opposite view, 53 percent to 39 percent.[6]

While prospace opinion appears ***to*** be increasing, the priority assigned to the space program has historically remained low. Tables 11 and 12 demonstrate this both for Government priorities in general (table 11) and for priorities within science and technology (table 12). What is most relevant in table 11 is that only the "military, armaments, and defense" category showed a greater increase in percentage in favor between 1977 and 1980 than did the "space exploration program," although this increase only moved space one rank up the priority scale. According to one analyst, "the increasing approval of space activities among Americans over the past several years is

[6]Robert D. McWilliams, **"The Improving** Socio-Political **Situation of the American Space Program in the Early 1980' s," paper prepared for Fifth** *Princeton/AIAA* **Conference** *on* **Space Manufacturing, May 1981, p. 2.**

**Table IO.—Distribution of Opinion Toward Federal Spending on the Space Program: 1973 Through 1980 (percentages)**

| | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1980 |
|---|---|---|---|---|---|---|---|
| Too little | 7.4 | 7.7 | 7.4 | 9.1 | 10.1 | 11.6 | 18.0 |
| About right | 29.3 | 27.5 | 30.1 | 28.0 | 34.4 | 35.0 | 34.6 |
| Too much | 58.4 | 61.0 | 58.1 | 60.2 | 49.6 | 47.2 | 39.1 |
| Don't know | 4.7 | 3.6 | 4.4 | 2.5 | 5.9 | 6.5 | 8.3 |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

SOURCE National Opinion Research Center Polls as reported in Robert D. McWilliams, "The Improving Socio-Political Situation of the American Space Program in the Early 1980s, " paper prepared for Fifth Princeton/AIAA Conference on Space Manufacturing, May 1981

**Table 11.—Percentages of Americans Favoring Increased Funding, and Relative Priority Rankings, for 11 Areas of Federal Government Spending, 1977 and 1980**

| | 1977 percent | 1977 rank | 1980 percent | 1980 rank | Percent increase |
|---|---|---|---|---|---|
| Halting the rising crime rate | 70.0 | 1 | 72.0 | 1 | 2.0 |
| Dealing with drug addiction | 59.5 | 2 | 64.5 | 2 | 5.0 |
| Improving-protecting Nation's health | 58.5 | 3 | 57.1 | 4 | – 1.4 |
| Improving-protecting the environment | 51.2 | 4 | 50.8 | 6 | – 0,4 |
| Improving Nation's education system. | 49.5 | 5 | 54.9 | 5 | 5.4 |
| Solving problems of the big cities | 46.9 | 6 | 45.8 | 7 | -1.1 |
| Improving conditions for blacks. | 27.3 | 7 | 26.2 | 8 | – 1.1 |
| Military, armaments and defense | 25.7 | 8 | 60.2 | 3 | 34.5 |
| Welfare | 13.0 | 9 | 14.0 | 10 | 1.0 |
| Space exploration program | 10.7 | 10 | 19.6 | 9 | 8.9 |
| Foreign aid. | 3.7 | 11 | 5.4 | 11 | 1.7 |

SOURCE' Robert D. McWilliams, "The Improving Socio-Political Situation of the American Space Program in the Early 1980s," paper prepared for Fifth Princeton/AIAA Conference on Space Manufacturing, May 1981

**Table 12.—Public Priorities for Federal R&D Spending**

| Funding objective | Most preferred | | Least preferred | |
|---|---|---|---|---|
| | Response | Rank | Response | Rank |
| Improving health care | 815 | 1 | 60 | 12 |
| Developing energy sources and conserving energy | 754 | 2 | 40 | 14 |
| Improving education | 630 | 3 | 55 | 13 |
| Reducing crime | 587 | 4 | 82 | 11 |
| Developing or improving methods for producing food | 368 | 5 | 253 | 8 |
| Reducing and controlling pollution | 358 | 6 | 113 | 10 |
| Developing or improving weapons for outer space | 266 | 7 | 403 | 6 |
| Preventing and treating drug addiction | 259 | 8 | 195 | 9 |
| Developing faster and safer public transportation | 210 | 9 | 430 | 5 |
| Improving the safety of automobiles | 155 | 10 | 284 | 7 |
| Finding better birth control methods | 139 | 11 | 705 | 1,5 |
| Discovering new basic knowledge about man and nature | 135 | 12 | 577 | 4 |
| Exploring outer space | 99 | 13 | 705 | 1.5 |
| Predicting and controlling the weather | 60 | 14 | 592 | 3 |

SOURCE: Institute for Survey Research, Temple University, *National Survey of the Attitudes of the U.S. Public Toward Science and Technology*, submitted to National Science Foundation, May 1980, pp. 178-180. (This was a survey of 1,635 people over 18. Respondents were asked: "Which 3 areas . . . would you *most* like to receive science and technology funding from your tax money?" and "Which 3 areas . . . would you *least* like to have science and technology funding from your tax money?"

not a trend that is riding mainly on the coattails of militarism or growing faith **in science and technology. Rather, it seems that Americans may be coming to view the space program as being conducive to the achievement of other types of goals of which they are in favor. "7**

**One indication of what the public expects from space exploration is presented in table 13. A national survey taken for** NSF asked adults to identify benefits they believed would result from exploring **outer space. Listed in table 13 are those benefits mentioned either first or second by respondents. What is striking about the results is the high ranking given to an indirect benefit of the program ("improve other technologies") and the low rankings given to direct economic** benefits ("find industrial use," "create jobs and other economic benefits"). Compared with other technology-related issues such as nuclear power or chemical food additives, a greater proportion of Americans see space exploration as producing substantially more benefits than potential harm.[8]

It is possible to construct a profile of those who most "support" and those who most "oppose" the U.S. space program, if "support" and "oppose" are defined as deviations of more than 10 percent from the average of all Americans. Table **14** contains such a profile, Those who support the space program tend to have one or more of the following characteristics: male, between 25 and 34, college-educated, professional or technical employment, working for government, income over $25,000/year, and living in the West. Opponents of the space program tend to be: female, over 65, black, less than a high school degree, laborers and service workers, and under **$5,000** income. One more relevant characteristic that emerges from another opinion study is that those who support increased space spending are significantly more likely to vote than those who believe that too much is spent on space; over 72 percent of those who supported an increase in space budgets in 1980 voted in the 1976 Presidential election, while only 56 percent of those calling for reduced spending voted that year.[9]

[7] Ibid., p. 8
[8] National Science Board, op. cit., p. 170.
[9] McWilliams, op. cit., p. 16.

**Table 13.—Perceived Benefits From Space Exploration**

| Benefits | First or second mention |
|---|---|
| Improve other technologies (e.g., computers) | 272 |
| Find mineral or other wealth, other resources, sources of energy | 200 |
| Increase knowledge of universe and/or of man's origins | 190 |
| Find new areas for future habitation | 134 |
| Contact other civilizations, other forms of life | 107 |
| Improve rocketry and missile (military) technology | 43 |
| Find industrial use for space | 27 |
| Find new kinds of food/places to raise more food products | 26 |
| Create jobs and other economic benefits | 16 |
| Learn about weather and how to control it | 13 |

SOURCE: Institute of Survey Research, p. 164

**Table 14.—Profile of Public Attitudes of Space Exploration: "In General, Do You Favor or Oppose the Exploration of Outer Space?"**

| Group characteristics | Percent favor | Percent oppose |
|---|---|---|
| All | 60 | 31 |
| Men | 71 | 22 |
| Women | 49 | 38 |
| Age 25 t0 34 | 70 | 23 |
| Age over 65 | 34 | 50 |
| Black | 38 | 49 |
| O to 8 years of schooling | 32 | 50 |
| 9 to 11 years of schooling | 40 | 50 |
| Some college, no degree | 74 | 19 |
| Bachelor' s degree | 79 | 15 |
| Graduate degree | 85 | 10 |
| Professional or technical job | 78 | 16 |
| Operatives and laborers | 43 | 43 |
| Service workers | 47 | 41 |
| Work for government | 76 | 17 |
| Under $5,000 income | 31 | 55 |
| $25,000 to $49,999 income | 76 | 17 |
| Over $50,000 income | 74 | 15 |
| Live in West | 74 | 20 |

[a]Only those characteristics that differ by more than 10 Percent 'rem overall opinion are included.

SOURCE: Institute for Survey Research, Vo/ *II, Detailed Findings*, p 170.

The demographic makeup of the "prospace" group appears to be undergoing some changes in recent years, although its general characteristics as profiled in table 11 have remained stable. Among those changes:

- recent increases in prospace attitude are much more marked among the most highly educated;
- formerly, "lower" and "working" classes were more antispace than were **"middle" and "upper" classes. Recently, however, the "middle" and "working" have become** more space positive than either "upper" or "lower" class respondents;
- prospace attitudes have increased substantially among whites and only negligibly among blacks; and
- support for space is increasing faster for divorcees than for any other marital class.[10]

There has been a suggestion that the shifts in space-positive attitudes with respect to variables of social class and education "provide a classic example of how social change tends to begin and develop in society. Innovations generally find their beginnings in the ideas and efforts of the more highly educated members of the upper-middle class and, if they survive and grow more prevalent in the upper strata, they then tend to catch on at the lower socioeconomic levels." The same analyst argues that "the resurgence of space-positivism in America since 1975 was spawned by the upper and middle social classes. The trend then began to spread throughout the general public with the classic pattern that has characterized other prominent American social movements such as the feminist and civil rights crusaders.'" [11]

One of the most striking recent developments in the space policy field is the emergence of a number of organized prospace groups. As the quotation just cited suggests, the aggregation of individual opinions into more-or-less broadly based interest groups with middle and working class roots is part of the traditional pattern by

[10]McWilliams, op. cit., pp. 10-15.

[11] Ibid., p. 14.

**which issues are given increased attention on the public agenda. perhaps this is what is happening with respect** to space. The following section describes the recent emergence of a space interest group network.

## Interest Groups and Space Policy

During the 1970's, interest groups organized around one or a few issues and claiming to represent broad sectors of the general population—so-called "public" interest groups—became an increasingly important influence on public policy. In part, the increased influence came at the expense of political parties as vehicles for articulating, influencing, and implementing the public's policy preferences.[12] Thus the rapid increase in space interest groups in recent years may be a development of political significance. A May 1980 survey of space interest groups identified 39 organizations with nationwide activities.[13] In the past 2 years, and particularly with the transition in administrations, there have been a number of one-time efforts organized ad hoc to mobilize opinion on space policy; these groups have provided a base for such mobilization efforts.

There is an active "Coordinating Committee on Space" that attempts to identify areas of agreement and disagreement among the major prospace groups; its membership includes 11 of the most active organizations. There are two general types of prospace groups: 1 ) traditional professional groups, and 2) citizen support groups. Most prominent among the former are:

- ***American Institute of Aeronautics and Astronautics,*** the professional society for people in the aeronautics and astronautics field, with almost 30,000 members.
- ***American Astronautic/ Society,*** a group of individuals with professional interest in space. Current membership is about 1,000.
- ***Aerospace Industries Association,*** a consortium of major aerospace firms that functions as a trade association.
- ***National Space Club,*** a Washington-based group of business and government leaders in the space field.
- ***University Space Research Association,*** a consortium of universities active in space research that operates several facilities under NASA contract.

Among the most active and/or largest of the public interest or citizen support space groups are:

- ***Delta-Vee,*** a citizen-supported, nonprofit corporation that channels public contributions into the support of specific space activities, such as the continued operation of the Viking spacecraft on Mars and a U.S. Halley's Comet Mission.
- ***High Frontier,*** a group formulating a national strategy to make maximum use of space technology to counter the threat of Soviet military power, to replace current nuclear strategy with one based on space defense, and to promote the industrial and commercial potentials of space.
- ***Institute for the Social Science Study of Space,*** which sponsors research and publications related to the social science aspects of space exploration and development.
- ***L-5 Society,*** which emphasizes human settlement in space as a long-term goal. Founded in 1975 by Gerard K. O'Neill, it has broadened its scope to most aspects of space policy. Its membership is between 3,000 and 4,000 individuals.
- ***National Space Institute,*** the largest of the broadly based space groups, with over 10,000 members. Founded in 1975 by Wernher von Braun, its emphasis is on communication with general audiences.
- ***Planetary Society,*** which promotes awareness of and public involvement in planetary exploration and search for extraterrestrial life. Publishes newsletter, supports research, organizes meetings. Has grown to over 100,000 members in just over a year.

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[12] Charles Chafer, "The Role of Public Interest Groups in Space Policy," Jerry Grey and Christine Krop (eds.), *Space Manufacturing III*, Proceedings of the Fourth Princeton/AIAA Conference (New York: American Institute of Aeronautics and Astronautics, 1979), pp. 185-189.

[13] Trudy Bell, "Space Activists on the Rise," *Insight*, August-September 1980, pp. 1, 3, 10, 13-15.

- Space ***Foundation,*** a private foundation for support of space industrialization.
- ***Space Studies Institute,*** a research performing and supporting group with focus on use of nonterrestrial resources.
- ***World Space Foundation,*** a **group supporting research projects to accelerate space exploration (e.g., solar sail).**

**The purposes of these and other space groups fall into three general categories:**

1. **educating and informing the public;**
2. **conducting research themselves; and**
3. **funding external research.**

**Recently added to the list are groups explicitly engaging in political activities. There were attempts to organize prospace Political Action Committees (PACS) for the 1980 election, and at least one prospace PAC remains in existence.**

The influence of these various organizations and groups on space policy is difficult to estimate. Certainly, as the Reagan administration took office **in january 1981 and as the proposed NASA budget was cut several times in the following year, there have been a number of attempts by one or a coalition of these groups to mobilize opinion in support of specific projects (e.g., a** mission to Halley's Comet) or for the civilian space program in general. Whether the reductions in the NASA budget would have been even more severe, had not these groups been active, is a question difficult or impossible to answer.

Finally, note should be taken of the emergence of a Congressional Space Caucus, and a supporting Congressional Staff Space Group. This caucus is initially limited to the House of Representatives; its goal is to increase the awareness of Members and staff of the benefits of the Nation's space effort.

## Space Achievement and Public Opinion: 1981

With two successful flights of the shuttle Col***umbia*** and the encounter of Voyager 2 with Saturn, **1981 was a year of spectacular space achievement** for the United States. Several public opinion polls have confirmed that the citizens of the United States were quite supportive of these achievements.

- A May 1981 Harris survey, taken less than 1 month after the initial shuttle flight, found **76 percent of Americans calling the shuttle "a major breakthrough for U.S. technology and know-how' and a 63 to 33 percent majority favoring the expenditure of several billions of dollars over the next decade to develop the** full potential of the shuttle. The Harris poll noted that "after the 1969 Moon landing, a 64 to 30 percent majority did not feel it was worthwhile to spend an additional $4 billion on the Apollo space program" and commented that "current support for spending on the space program is even more significant in view of the current overwhelming preference for cutting Federal spending. "
- An August 1981 Associated Press-NBC survey found that 60 percent of U.S. adults thought that the United States was not spending enough or was spending about the right amount on the space program, and 66 percent believed that the shuttle was a good investment for the United States.
- An October 1981 Associated Press-NBC poll confirmed the results of the earlier survey, finding that 60 percent of respondents think the shuttle program is a good investment, 30 percent do not, and 10 percent aren't sure.

A further examination of the results of the May Harris poll suggests both that support for the space program is not evenly distributed across all strata of U.S. society and that the reasons for the support differ substantially among respondents (see tables 15 and 16). The August poll found that 49 percent of respondents believed that the emphasis of the Nation's space program should be primarily on national defense, 32 percent cited scientific exploration, 10 percent cited both, and 9 percent were not sure. By October, these responses had shifted, with 43 percent in support of a defense emphasis and 40 percent favoring an emphasis on scientific exploration. In this latter poll, 46 percent of respondents believed that the United States should keep its space program

**Table 15.—How Would You Rank the Importance of Various Uses of the Space Shuttle?**

| | Very important | Only somewhat important | Not very important at all | Not sure |
|---|---|---|---|---|
| | *Percent* | *Percent* | *Percent* | *Percent* |
| Doing experiments with new pharmaceutical products that can help cure disease | 82 | 11 | 5 | 2 |
| **Developing a military capability in space beyond what the Russians are doing** | **68** | **20** | **10** | **2** |
| **Putting new communications satellites** in space at a much lower cost | 64 | 25 | 9 | 2 |
| Doing scientific research on metals, chemicals, and living cells in space | 55 | 27 | 16 | 2 |
| Picking up other U.S. space satellites and repairing them in space | 47 | 32 | 19 | 2 |

SOURCE: May 1981 Harris Survey.

**Table 16.—"IS the Space Shuttle Program Worth Spending Severai Billion Dollars Over the Next 10 Years to Develop its Full Potential?"**

| | Worth it | Not worth it | Not sure |
|---|---|---|---|
| | *Percent* | *Percent* | *Percent* |
| Total | ***63*** | 33 | **4** |
| College educated | **71** | 26 | **3** |
| Men | 76 | 21 | |
| Women | 52 | 43 | **3** |
| Blacks | 45 | 53 | **2** |
| Republicans | 71 | ***26*** | **3** |
| Democrats | 57 | ***39*** | **4** |
| Conservatives | 66 | **30** | 4 |
| Liberals | 57 | **41** | 2 |

SOURCE: May 1981 Harris Survey.

separate from the programs of other nations, 32 percent favored a joint space program between the United States and the U. S. S. R., and 15 percent favored joint ventures with other countries, but not with the Soviet Union.

Opinion polls, taken singly, do not reveal fundamental views underlying the shifting tides of opinion. Thus, the facts that by 1981 the success of the shuttle and of the Voyager missions spurred public interest in the U.S. space program and that a clear majority of the public was found to favor the program do not in themselves prove that there is deep public support for space. But, viewed in the context of a quarter century of space activities, the recent upswing in opinion in favor of the space program appears significant.

First of all, current support is part of a long-term trend of increasing support. It cannot, therefore, be explained as the result only of shuttle and Voyager successes. Second, the trend of increasing support coincides with the proliferation and growth of citizens' support groups. As public education about space is perhaps the major overall goal of these groups, their efforts have been the effect, if not the cause, of continued rising interest in space. Third, the Space Caucus, arising as a "back bench" movement within Congress, rather than in response to the leadership, is evidence for a genuine space constituency, i.e., one whose real interests, economic, political, or scientific, are at stake. These three conditions suggest that public awareness of space issues is increasing and that official space policy may begin to receive more constant scrutiny among at least the attentive public. This would seem to bode well for those who believe that increased understanding of the benefits of U.S. activity in space will lead to continued and firmer public support for that activity.

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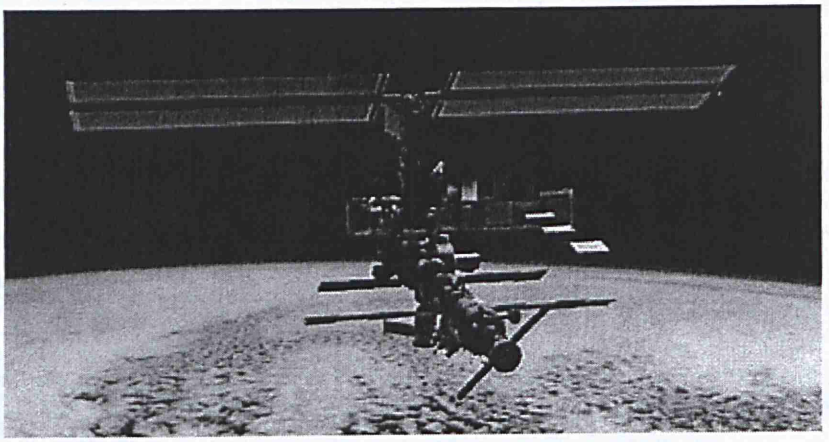

Can the International Space Station be converted into a platform that can be used for future human exploration beyond Earth orbit? (credit: NASA)



# Can NASA go back to the Moon, or anywhere else?

*by Taylor Dinerman*
*Monday, November 10, 2003*

*Editor's Note: Taylor Dinerman's "Monday Analysis" column, previously on SpaceEquity.com, will now be appearing on The Space Review.*

Can NASA be reformed? As an institution, it has been given any number of chances to reform itself and, until recently, it has failed—not through lack of trying. Dan Goldin did everything but transform himself into a Klingon prison guard to try and push the agency into fixing itself. He made some marginal progress with the basic "Faster, Better, Cheaper" (FBC) idea. NASA now sends a wide variety of small and medium-sized spacecraft on missions as different as mapping the Earth's ice fields, or out to the asteroids and Mars. FBC may not have worked perfectly, but it did shake the agency out of the mindset of doing only billion-dollar science missions.

In fact, the Space Science and the Earth Science enterprises at NASA are in fairly good shape. Sean O'Keefe has been trying equally hard, though without the emotional intensity, to change the way the agency does business. He has made some minor progress in bringing

some of their management practices into the 21st century, but no one doubts that there are still big problems to overcome.

It is the Spaceflight enterprise—essentially the space shuttle and space station programs—that have caused even the best-intentioned NASA supporters to sometimes despair. The CAIB report is particularly damning of the culture that developed inside the agency's human spaceflight program. It was not that safety was ignored, but that it was not made an overwhelming priority.

Even going beyond the CAIB report, one must begin to question all of the bureaucratic impedimenta that a government-run space exploration program must carry with it when it tries to venture off the surface of the Earth. It is difficult to simultaneously convince the US House and Senate that NASA needs more money and more freedom from normal regulations while it has so far failed even to convince the Congress that it has a reasonable plan to replace the shuttle and to begin serious human exploration beyond earth orbit.

**Many of NASA's worst problems can be laid at the feet of those in the Nixon and Clinton administrations who were unwilling to cancel human spaceflight outright but were equally unwilling to put a coherent program together.**

Many of NASA's worst problems can be laid at the feet of those in the Nixon and Clinton administrations who were unwilling to cancel human spaceflight outright but were equally unwilling to spend the time, money, or mental effort needed to put a coherent program together. In the Nixon administration, they ordered the shuttle developed on a shoestring budget. Most of the system's problems can be traced back to its having been starved while still in the womb.

For the ISS, its lack of usefulness as a base for lunar exploration is due to the fact that it is in the wrong orbit. In order to make the station accessible from both Cape Canaveral and Baikonur, it is in a skewed orbit, suitable for doing useful earth observation but not for much else. The Clinton administration saw it as a symbol of US-Russian friendship and for keeping the large aerospace contractors happy, but that was about it.

Luckily, a set of circumstances has developed that might allow the ISS to be moved into an equatorial orbit, thus

allowing it to be used as the departure point for manned lunar missions. First, the European and Russians have agreed to build a Soyuz launch pad in Kourou that will allow them to launch reach the ISS if it were in such an orbit. Second, the technology to move the ISS using an electromagnetic tether is within reach. Third, the US Congress is interested in finding a way to have the US human spaceflight program actually go somewhere, instead of simply going around in circles.

Instead of putting together yet another commission, as Senator Hollings recommends, the President could simply say that we are going to find a way to move the ISS into an orbit from which it can be used to launch missions to the moon. It might take more than three or four years to begin such a move, but by then the new pad in Kourou would be ready and the station itself could begin to be configured as a base for such operations. Also, NASA should come up with either a credible way to get into and out of low earth orbit, frequently and safely, or a way to buy the passenger service from some US entity (commercial or otherwise) that will.

In 1989, on the 20th anniversary of the Apollo 11 moon landing, President George H.W. Bush proposed to go back to the Moon and then to Mars. After a short study, NASA presented both him and the Congress with a price tag of more than 450 billion dollars. The sticker shock alone, leaving aside any questions of technological capacity, killed the idea. Since then, the US has spent about 100 billion dollars on the shuttle and the ISS, and we are only a tiny bit closer to those objectives than we were fourteen years ago.

**By using the ISS as a base, and perhaps also creatively using the existing shuttle infrastructure, the President and NASA can take a meaningful step into interplanetary space.**

By using the ISS as a base, and perhaps also creatively using the existing shuttle infrastructure, the President and NASA can take a meaningful step into interplanetary space. Only a step-by-step process, with clearly defined milestones with the ultimate goal of a permanent human settlement on Mars, will satisfy America's need for a visionary space program and an affordable way to accomplish it.

The alternatives would represent years of more wasted or nearly wasted effort and increasingly bitter political

arguments. There is a embryonic consensus building in the Congress that the US human space program needs an objective. To start a lunar and Martian program from nothing, as some have proposed, would be to waste the huge sums already invested in the Shuttle and the ISS. Making ISS the base from which lunar exploration can depart, and changing the way we use the shuttle's infrastructure, can be one way to move forward without breaking the bank.

Eventually, the shuttle system will have to be replaced, but the current NASA plan, based on the Integrated Space Transportation Plan of November 2002, is being firmly rejected by both houses of Congress. The space agency had better rethink its program or it will be in even deeper trouble than it is now.

■

*Taylor Dinerman is editor and publisher of SpaceEquity.com.*

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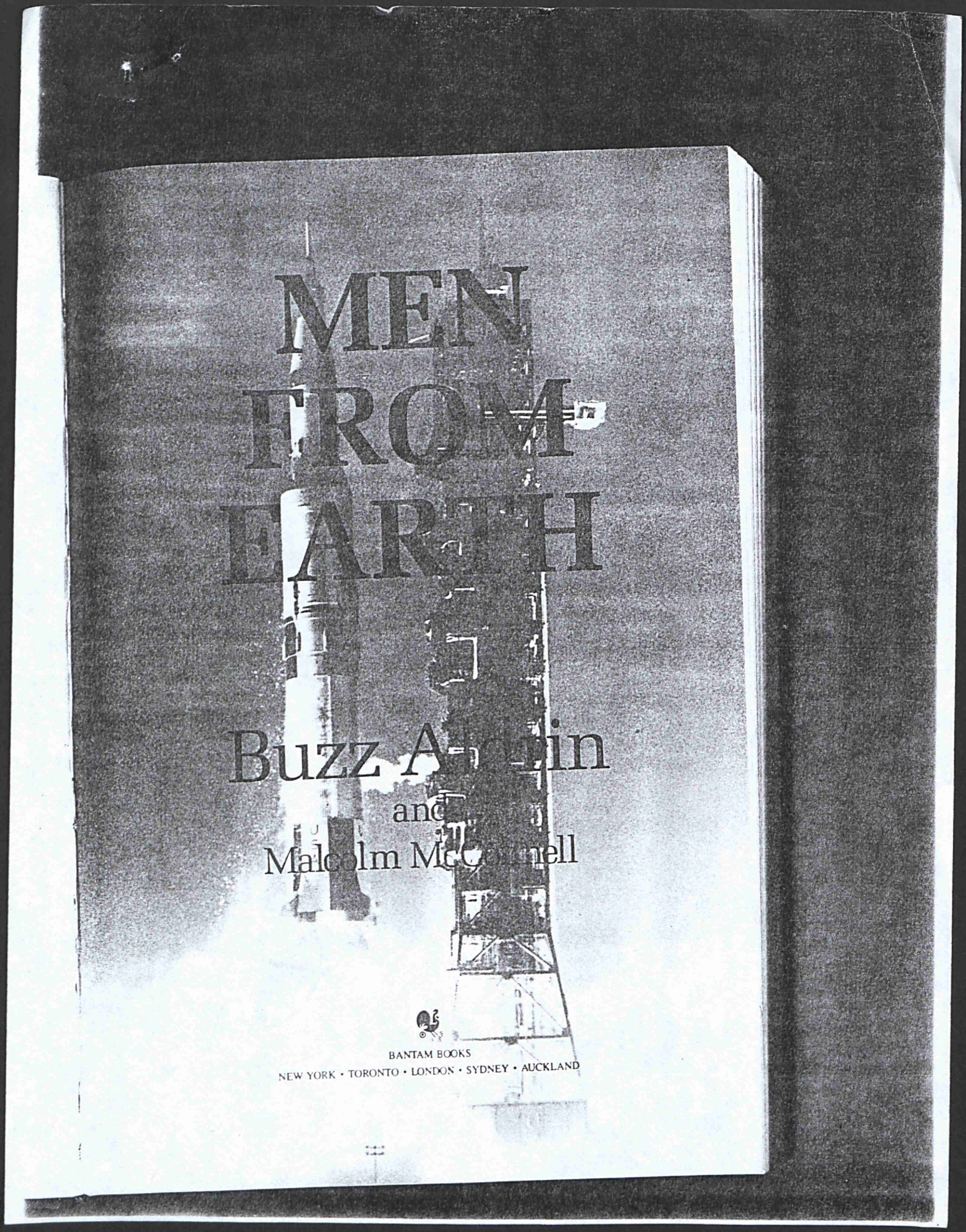
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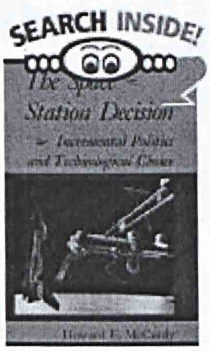


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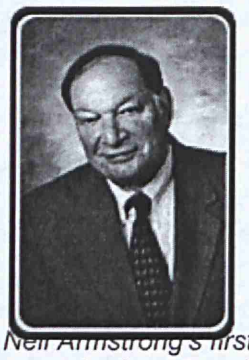

# What President Nixon Didn't Know

**By Julian Scheer**

**Special to space.com**
posted: 01:39 pm ET
16 July 1999



*Neil Armstrong's first words upon stepping onto the moon will never be forgotten. Nor will the words engraved on the plaque fastened to the lunar lander that remains on the surface of the moon. Julian Scheer, who helped guide NASA through those historic years, tells us how those words traveled from Washington to the Moon.*

*--Lou Dobbs*

When I think of the first manned lunar landing, my mind's eye has the image of the lunar lander, moon dust piled against its legs, sitting on the moon's surface. And I see the plaque fastened to it, which reads, "We Came in Peace for All Mankind."

**Images**

The Plaque that hangs on Apollo 11's ladder would have read differently if Nixon had had his way.

It almost did not read that way.

I was sitting in my office one day early in 1969 when NASA Administrator Tom Paine rushed room. "Peter Flanigan called from the White House," he said. "Do you have a plan ready for th

We had done a great deal of work in planning what would occur when the Apollo 11 astronaut lunar surface and some thought of what President Nixon's involvement might be, but the final segment had not been committed to paper.

"We have to be at the White House at 2 p.m.," Paine said.

A secretary rushed to a local stationery store in downtown Washington and purchased three fa bindings and dividers. She had "President Nixon, Apollo 11 Participation" embossed on the co knocked out an index and we began assembling the data needed to fill in the sections: a missio a time-line of events the White House might use, a sample script of a telephone conversation f Office to the crew on the lunar surface, a photo of the plaque we would leave on the lunar surf

Time was short. Typewriters were busy. We quickly filled in the pages but we ran out of time.

NASA's government limousine was a black Checker cab, a boxy un-limo looking vehicle. Pair in, carrying sheets of paper and the newly purchased binders.

As the auto sped down the streets from NASA Headquarters in the Southeast of Washington tc House, Paine and I pushed the taxi's jump seats against the front seat, and collated our noteboc floor of the vehicle as we got closer and closer to the White House.

Not wanting to appear unprepared, we walked into Flanigan's office and almost casually tosse notebooks on his desks. Clearly, we made an impression; NASA had been prepared for this da while. Flanigan, a former New York investment banker, was a hard-nosed guy on Nixon's staf known for his high energy level and efficiency.

We did not see the President that day but Flanigan called a few days later. The President had n notes, he said, and he would send the margin notes to us. There was one thing the President wa -- the plaque to be left on the lunar surface, which read "We Came in Peace for All Mankind." strange. I was certain the White House had already seen one version of the plaque.

The President wanted "Under God" inserted after the word "Peace".

"Peter," I said, "there is no universal god. We do not want to offend any religion..."

"Julian," he said, "the President was insistent."

I did not want to admit that the plaque had already been made and affixed to the lunar landing had been through a whole series of pre-flight tests at Houston.

We had begun in April to consider what to do on the lunar surface and what might be left behi wording on the plaque had had a lot of attention. Willis Shapely, who headed our study comm conferred with the Librarian of Congress, the Archivist of the United States, the Smithsonian I National Space Council, congressional committee staffs, and others. (The decision to plant an flag, incidentally, came after much discussion because we did not want to create the impressio U.S. claimed the moon. We feared the charge that the United States was attempting to establis sovereignty.)

I protested again.

"Julian, that's what it is going to be."

"Peter..."

"Dammit, Julian, the President wants that change. The president is big on God."

"What?"

"Julian, Billy Graham is here nearly every Sunday. The President wants 'God' on the plaque!"

There was nothing left to do but say "yes."

It occurred to me that in the rush of events, no one would remember. That worked out. The pla
been resting on the Sea of Tranquility for 30 years is the original, without the benefit of Presid
editing.

*Julian Scheer was Assistant Administrator of NASA for Public Affairs from 1962-1971, includ
five lunar landings. This article was written expressly for space.com.*



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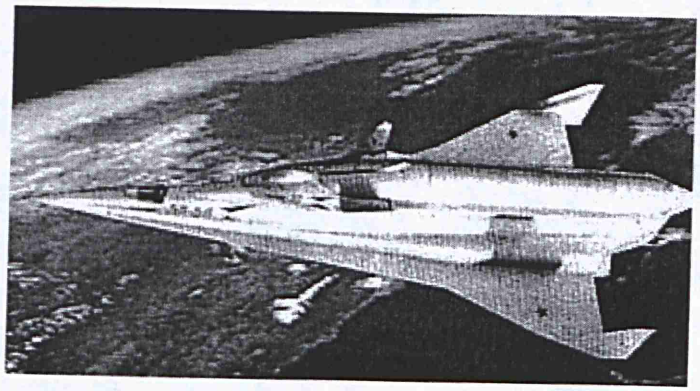

Spiral 50-50
Credit: © Mark Wade

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Winged orbital launch vehicle. *Year*: 1965. Family: Winged. *Country*: Russia. *Status*: Developed 1965-1975. *Other Designations*: EPOS. *Manufacturer*: MiG.

Mikoyan GKAT OKB-155 began work in 1960 on the Spiral combination aerospace system. In 1965 the advanced project was approved, laying out an ambitious work plan leading to operation of a regular earth-orbit-earth reusable transportation system by the mid-1970's. Go-ahead to actually proceed with development of the manned orbital vehicle was given on 26 June 1966 and Lozino-Lozinsky was selected as project manager.

The Spiral system consisted of three main components:

- GSR reusable hypersonic air-breathing launch aircraft
- RB expendable two stage rocket
- OS orbital spaceplane

The project plan for Spiral was as follows:

- 1967 - Subsonic test flight of OS (article 105-11)
- 1968 - Hypersonic test flight of OS (article 105-12)
- 1970 - Unpiloted orbital flight of OS (Soyuz-launched - article 105-13)
- 1970 - Construction of GSR to begin
- 1972 - First rollout of LH2-propelled experimental GSR
- 1977 - First piloted orbital flight of complete system

Interest in the project at higher levels of the Soviet hierarchy was difficult to maintain, due to the massive funding requirements, technical difficulties, and multi-year development program which could not promise quick results. Underfunded from the beginning, the project was finally reoriented to a simple test of the analogue systems without using these as the basis for a flight system. This was now designated EPOS

## Spiral 50-50 Chronology

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**1965 Jan 1 -** Spiral development at MiG bureau authorised. Decree 'On plan of work on Spiral at OKB-155' was issued.

---

**1965 July -** Spiral cosmonaut team formed

In 1965 the advanced project of the Mikoyan Spiral aerospace system was approved. The ambitious work plan indicted operation of a regular earth-orbit-earth reusable transportation system by the mid-1970's. With Gherman Titov as its head, a Spiral cosmonaut training group was formed (Titov, Dobrovolskiy, Filipchenko, Kuklin, Matinchenko) to train to fly the spaceplane.

---

**1965 Sep 2 -** Spiral cosmonaut team changes The was team now consisted of Titov, Beregovoy, Filipchenko, Kuklin, and Shatalov.

---

**1966 Jun 26 -** Development of Spiral spaceplane authorised Lozino-Lozinsky was selected as project manager. The Spiral system consisted of three main components: the GSR reusable hypersonic air-breathing launch aircraft; RB expendable two stage rocket; and the OS orbital spaceplane.

---

**1967 December -** New Spiral cosmonaut team A new cosmonaut training group for the Spiral spaceplane was established: Titov, Kizim, Kozelskiy, Lyakhov, Malyshev, Petrushenko.

---

**1976 Oct 11 -** MiG 105-11 first flight The EPOS spaceplane made its first flight, taking off from an old dirt airstrip near Moscow, flying straight ahead to an altitude of 560 m, and landing at the Zhukovskii flight test center 19 km away. Pilot was A. G. Festovets.

---

**1977 Nov 27 -** MiG 105-11 first air-drop The first air-drop launch from a Tu-95K (used previously for Kh-20 air to surface missile tests) was made from an altitude of 5,000 m, with landing on skids on a beaten earth air strip.

---

**1978 September -** MiG 105-11 final flight

The eighth and final flight resulted in a hard landing and the write-off of the aircraft. First and last flights were made by test pilot A. G. Festovets. The eight flights were considered sufficient to characterize the spaceplane's subsonic aerodynamic characteristics and air breathing systems.

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**Bibliography:**


- Matthews, Henry, *The Secret Story of the Soviet Space Shuttle*, X-Planes Book 1, Beirut, Lebanon, 1994.
- Pesavento, Peter, *Spaceflight*, "Russian Space Shuttle Projects 1957-1994", 1995, Volume 37, page 226.
- Belyakov, R A and Marmain, J, *MiG-Fifty Years of Secret Aircraft Design*, Airlife, England, 1994.
- Butowski, Piotr, *Air Forces Monthly Special, X-Planes*, "Black Reds", February 1998, p. 35.
- Lozinskiy, *Need title - Air space vehicles*,


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December 8, 1973, Saturday

**SECTION:** Page 16, Column 6; (AP)

**LENGTH:** 43 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Scientists at **NASA** rept on Dec 7 that 2 remaining gyroscopes aboard Skylab space station have begun to function erratically but that situation is no cause for alarm; say 3 astronauts could remain aboard space station for 2 wks in event 2d gyroscope fails

WALL STREET JOURNAL

December 5, 1973, Wednesday

**SECTION:** Page 19, Column 4

**LENGTH:** 34 words

**JOURNAL-CODE:** WSJ

**ABSTRACT:**
Space Shuttle prime contractor Rockwell Internatl seeks subcontract bids from Bell Aerospace, TRW Systems and Aerojet Liquid Rocket; Pratt & Whitney gets **NASA** subcontract for work on Space Shuttle orbitor

NEW YORK TIMES

November 30, 1973, Friday

**SECTION:** Page 1, Column 7

**LENGTH:** 609 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
US Pioneer 10 spacecraft hurtles deep into magnetic field of Jupiter on Nov 29 and sends back data indicating that field's reach is greater than expected, strength 40 times that of earth's magnetic field and direction south instead of north; Ames Research Center scientists rept that Jupiter's mass is even greater than estimated, giving planet slightly stronger gravitational pull than had been anticipated; as result, Pioneer 10 is being drawn toward planet faster than planned and is now expected to arrive 2 mins early for closest approach--within 81,000 mi of Jupiter; spacecraft will send back 1st closeup images of Jupiter; Pioneer project deputy mgr Dr R C Nunamaker holds all spacecraft systems are operating normally; Dr S DeForest estimates that Jovian magnetic field stretches to diameter of more than 8-million mi; spacecraft magnetometer, which measures intensity as well as direction of magnetic lines, is transmitting data on field; Dr E J Smith of Jet Propulsion Lab repts that magnetism does not appear to be sufficiently strong to fend off solar wind the way it does; suggests that some sort of thermo plasma, gas consisting of low-energy particles, must be circulating just inside boundary to help magnetism deflect solar wind; scientists say thermo plasma could come from planet's upper atmosphere and from solar wind particles that are able to penetrate bow shock region; also rept that strength of Jupiter's magnetism about 4-million mi from planet seems to rise and fall in regular 10-hr phase; say phenomenon could be related to planet's rotation; Jupiter makes complete spin every 9 hrs and 55 mins; knowledge of strength and shape of Jupiter's magnetic field could give scientists crude model of planet's interior and probably suggest clues as to force that generates planetary magnetism; once scientists know strength of Jupiter's magnetic field they will be able to use ground-based radio telescopes to study dynamics of planet's radiation belts; Dr J H Wolfe comments; Smith explains that reversal of magnetic direction is connected with motions inside planet but declines to make any inferences as to Jupiter's internal structure on basis of preliminary magnetic data; Jupiter is only planet in solar system other than earth known to have intrinsic magnetic field and to have radiation belt particles trapped and accelerated by such a field; **NASA** planetary programs deputy dir Dr S I Rasool says study of planet's magnetism and radiation belts was one of prime mission goals; Dr J A Van Allen, who recommended guidelines for craft's instrumentation, comments; spacecraft was built by TRW Systems Inc under direction of Ames Research Center; contains 65 lbs of remote-sensing instruments, many of which have been operating on and off since spacecraft was launched in '72; spacecraft spins as if flies, giving instruments full-circle scan 5 times every min; uses radioactive decay of plutonium to generate elec power; is equipped with large 9-ft dish antenna to send and receive messages; each signal takes 45 mins to reach earth from Jupiter; imaging system, designed by Ariz Univ, is capable of producing 2-color images of Jupiter from electronic signals; Pioneer 10 has returned 150 pictures of planet; as craft approaches closer to Jupiter, 4 instruments will be focused on learning source, nature and intensity of planet's radiation belts; instruments are charged particle detector, designed by Chicago Univ, cosmic ray telescope, designed by Goddard Space Flight Center, Calif Univ's trapped radiation detector and Iowa Univ's Geiger tube telescope; schematic diagrams of Pioneer 10's scientific instruments and Jupiter

**GRAPHIC:** DIAGRAMS & DRAWINGS

November 25, 1973, Sunday

**SECTION:** Page 80, Column 4; (AP)

**LENGTH:** 79 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Crew members aboard 3d Skylab mission take day off on Nov 24; **NASA** official says astronauts needed day off to get space station in shape for remainder of 84-day mission, and that they have spent several hrs each day searching for misplaced items, such as tools and checklists; crew will attempt to photograph Kohoutek comet and will alter slightly orbit of space station; day off will also allow mission planners to assess effects of failure of 1 of Skylab's 3 gyroscopes

November 24, 1973, Saturday

**SECTION:** Page 62, Column 1; (AP)

**LENGTH:** 71 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Failure of gyroscope aboard Skylab space station on Nov 23 raises fears that 84-day mission may be shortened; **NASA** official says laboratory can function effectively with only 2 of its 3 gyroscopes but that its maneuvers will be more difficult and will require increased use of control gas jets; crew members, Lt Col Pogue, Dr E G Gibson and Lt Col Carr, continue normal flight activities; Col Pogue photographs Kohoutek comet

October 19, 1973, Friday

**SECTION:** Page 6, Column 1

**LENGTH:** 84 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
**NASA** discloses on Oct 18 plans for intensive scientific observations of Kohoutek Comet during its appearance in heavens in Dec; scientists hope to obtain 3-dimensional image of comet through use of earth-based cameras and equipment aboard Mariner 10 spacecraft, scheduled to be launched toward Venus and Mercury early in Dec; comet will also be observed from ground, from high-altitude aircraft, balloons, sounding rockets, unmanned satellites and other equipment aboard orbiting Skylab space station

September 25, 1973, Tuesday

**SECTION:** Page 22, Column 4

**LENGTH:** 188 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
US Skylab 2 astronauts Capt Bean, Maj Lousma and Dr O K Garriott on Sept 24 make final preparations for splashdown; **NASA** drs say they expect astronauts to be very unsteady when they reach USS New Orleans, recovery ship, and try to flex muscles that have deteriorated somewhat from weightlessness; flight controllers express confidence that astronauts will have no trouble steering Apollo spacecraft, disabled by 2 leaks in maneuvering rockets, to accurate and safe return to earth; modified steering procedures were simulated successfully during ground tests last wk; P C Shaffer, who directed simulations and will be flight dir during return maneuvers, comments; Apollo mgr G S Lunney holds 2 leaks were found to be unrelated; 1st one was traced to stuck valve, probably caused by contamination in fuel line; 2d leak was caused by lose fittings in engine; Dr W R Hawkins, Johnson Space Center life sciences deputy dir, holds crew is in good condition; says astronauts have lost 7 to 8 lbs each; repts their physical condition seemed to stabilize after 39th day of mission; says he does not know why; map shows splashdown target

**GRAPHIC:** MAPS

August 18, 1973, Saturday

**SECTION:** Page 30, Column 3

**LENGTH:** 28 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
**NASA** on Aug 17 selects United Aircraft Corp to build experimental helicopter, Rotor Systems Research Aircraft; co's Sikorsky div estimates cost of project at $25-million

WALL STREET JOURNAL

August 2, 1973, Thursday

**SECTION:** Page 25, Column 4

**LENGTH:** 15 words

**JOURNAL-CODE:** WSJ

**ABSTRACT:**
Eur nations agree to participate in US space shuttle project, but insist on escape clause

July 29, 1973, Sunday

**SECTION:** Page 1, Column 8

**LENGTH:** 182 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Apollo spacecraft with Capt Alan L Bean, Maj Jack R Lousma and Dr Owen K Garriott aboard is launched from Cape Kennedy on July 28 on 2d Skylab mission, during which astronauts will spend 59 days aboard orbiting space laboratory; approximately 100,000 spectators watch launching, smallest crowd ever to observe venture of Amer astronauts into space; Capt Bean steers spacecraft to link-up with space station after 5 orbits of earth; crew enters space station and begins routine inspection; takes medication after reporting that they are suffering slightly from 'stomach awareness'; scientists at Houston Space Center rept thruster on 1 of 4 propulsion units on Apollo service module is leaking nitrogen tetroxide, but that problem will not interfere with rendezvous maneuvers or with spacecraft's ability to return astronauts safely to earth at end of mission; rept failure of another of space station's 9 gyroscopes; launching from Cape Kennedy described; illus; astronauts illus during breakfast at Cape Kennedy prior to launching and on way to launch pad; Dr Kurt Debus, **NASA** official, illus

**GRAPHIC:** PHOTOGRAPHS

WALL STREET JOURNAL

July 5, 1973, Thursday

**SECTION:** Page 5, Column 2

**LENGTH:** 16 words

**JOURNAL-CODE:** WSJ

**ABSTRACT:**
United Aircraft and McDonnell Douglas Corp get US contracts for work on reducing jet-engine noise

June 1, 1973, Friday

**SECTION:** Page 6, Column 4

**LENGTH:** 308 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Skylab space station remains low on electricity on May 31, but crew proceeds with med experiments and operation of solar and stellar telescopes; flight controllers rept they are studying battery failure, 2d in mission, that has further reduced Skylab's electrical capacity; say electrical switch apparently became jammed in open position between solar-power panels and regulator that controls charging of battery; **NASA** repts 16 of vehicle's 18 batteries in Skylab's telescope unit are functioning normally, and that only effect of recent malfunction has been cancellation of planned multispectral photograph of earth and turning off of video tape recorders and a water heater; flight controllers instruct crew to recycle switches in electrical power system in attempt to recharge battery; Comdr Weitz repairs malfunctioning ultraviolet stellar telescope after partly disassembling gear drive on telescope's mirror system and discovering that piece of metal was jamming 1 of gears; redeploys telescope, which will photograph stars and Milky Way in ultraviolet spectrum, on a boom through airlock in wall of space station; Dr Kerwin aims array of telescopes at sun, continuing observations that have already provided scientists with photographs that could explain how particles in solar 'wind' escape sun's atmopshere; astronauts take turns in rotating chair in experiment to test their reactions to spinning in weightlessness; mission officials reaffirm tentative plans to resume earth-survey photography within day, but cameras and remote-sensing instruments will be used for limited periods; temperature inside Skylab is 82 degrees Fahrenheit, 10 degrees above desired level; problems besetting space station stem from loss of micrometeroid and thermal shield during launching from Cape Kennedy and because of failure of solar-power panel to deploy

May 16, 1973, Wednesday

**SECTION:** Page 46, Column 2

**LENGTH:** 127 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Ed, commenting on problems besetting Skylab space station, maintains 'a price is being paid for the effort to stage Skylab on a shoestring,' noting that **NASA,** as result of budget cuts, constructed space station 'out of existing bits and pieces of available equipment and eschewed much of the painstaking and expensive testing and retesting that contributed so largely to the brilliant record of accomplishment and safety scored by the Apollo program'; sees problems hinting at great difficulties and substantial expense involved in creation of 'even a small space station, let alone the large manned space laboratories many scientists are looking forward to'; urges coupling of programs by US and USSR into 'a truly internatl effort' which would benefit everyone

April 14, 1973, Saturday

**SECTION:** Page 66, Column 1; (UPI)

**LENGTH:** 38 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Rear Adm H S Ainsworth, comdr of USN's Pacific fleet, on Apr 13 blames human error for aerial collision between USN P-3 research craft and **NASA** Convair-990 near Moffet Naval Air Station, Sunnyvale, Calif, in which 16 were killed

April 13, 1973, Friday

**SECTION:** Page 78, Column 6; (UPI)

**LENGTH:** 62 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
**NASA** twin-engine P-3 Orion turboprop and USN Convair-990 collide during landing approaches to Moffet Naval Air Station, Sunnyvale, Calif, on Apr 12 killing 16, including 11 **NASA** technicians and 4 USN personnel; wreckage of Convair illus on nearby golf course; map of Calif depicts site of crash; victims listed; B N Malibert, crew member aboard Convair, is sole survivor

**GRAPHIC:** COMBINATION (ANY 2 OR MORE)

NEW YORK TIMES

March 3, 1972, Friday

**SECTION:** Page 1, Column 3

**LENGTH:** 95 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
US Pioneer 10 spacecraft launched toward Jupiter after 25-min delay because of unexplained tech problem; illus; upper 3d stage was added to Atlas-Centaur rocket to give spacecraft extra boost to enable it to escape earth's gravitational pull at record velocity of more than 31,000 mph; **NASA** officials say craft should reach Jupiter in 21 mos; craft's 11 scientific instruments expected to provide new data on Jupiter, asteroid belt between Mars and Jupiter and physical properties at boundary where solar system blends into rest of Milky Way; other key mission goals revd

**GRAPHIC:** PHOTOGRAPHS

NEW YORK TIMES

February 25, 1972, Friday

**SECTION:** Page 7, Column 1

**LENGTH:** 91 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
US **NASA** technicians, Cape Kennedy Space Center, conduct final tests on 570-lb Pioneer 10 spacecraft and its Atlas-Centaur rocket, which has augmented power to drive craft away from earth at unprecedented escape velocity of 32,000 mph; if successful, Pioneer 10 will become 1st man-made object to fly beyond Mars, through asteroid belt and to Jupiter; will fly within 100,000 mi of Jupiter in Dec '73; will radio scientific data and take 1st close-up pictures of planet and then, with boost from Jupiter's gravity, will shoot out of solar system

July 7, 1970, Tuesday

**SECTION:** Page 29, Column 7; (UPI)

**LENGTH:** 40 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Sen, 32-28, defeats Sen Mondale amendment to cut **NASA's** fiscal '71 budget $110-million by halting design work on space shuttle; before vote, Sen Allott warned nation's manned space program would end after '74 if shuttle program is scrapped

NEW YORK TIMES

April 8, 1970, Wednesday

**SECTION:** Page 85, Column 6

**LENGTH:** 88 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Sen subcom hearing on F-111; USN civilian expert K E Dental testifies that Gen Dynamics withheld evidence of 'major increases' in craft's expected weight for several mos of original Sen inquiry into program in '63; says it finally supplied data in Dec, 1 mo after inquiry was suspended; E C Polhamus, **NASA** expert, testifies agency warned in early '63 that high drag would seriously degrade craft performance but that Gen Dynamics insisted craft would exceed performance requirements and did little in way of airframe modification

March 24, 1970, Tuesday

**SECTION:** Page 9, Column 1

**LENGTH:** 79 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Sen (McClellan) Permanent Subcom on Investigations to begin hearings on F-111; plans probe of hitherto secret rept that Govt engineers at **NASA** Langley Research Center made many recommendations in '63 and '64 for design changes to help craft meet range, acceleration and other requirements but that Gen Dynamics and USAF rejected virtually all of them; co and USAF officials close to project deny allegations, holding most of the ideas rejected would not have solved problems

February 19, 1970, Thursday

**SECTION:** Page 12, Column 1

**LENGTH:** 81 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
**NASA** asks 6 aerospace cos to submit designs for space shuttle engines; cos listed; shuttle will have booster stage, containing cluster of engines to thrust it through atmosphere, and orbital stage with 2 or 3 engines that will power craft until it docks with space station; both stages will make controlled landings and be refurbished for use on up to 100 missions; **NASA** says preliminary flight testing will begin in '75; Marshall Space Flight Center is in charge of engine development

August 15, 1969, Friday

**SECTION:** Page 14, Column 4; (AP)

**LENGTH:** 33 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
7 astronauts in USAF's canceled Manned Orbiting Lab project named by **NASA** to Civil Astronaut Corps; names listed; 8th astronaut, Lt Col A H Crews, named to **NASA** flight crew operations directorate

NEW YORK TIMES

June 11, 1969, Wednesday

**SECTION:** Page 1, Column 1

**LENGTH:** 113 words

**JOURNAL-CODE:** NYT

**ABSTRACT:**
Deputy Defense Sec D Packard announces Defense Dept has canceled manned orbiting laboratory project because of 'urgency of cutting defense spending'; dept has spent $1.3-billion on project which sought to place 15-ton, 2-man spacecraft into earth orbit for reconnaissance and other mil missions; 6-yr history of project traced; HR, 328-52, approves bill authorizing $3.9-billion **NASA** budget for fiscal '70; earlier, rejected, by voice vote, Repr E I Koch amendment to cut manned space flight budget by $205-million because of pressing domestic needs; Hr approves Repr R L Roudebush amendment to **NASA** appropriations bill, specifying that astronauts place only US flag on moon