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BCN DEMONSTRATION PROGRAM

The Concept in Brief

The USG will provide the stimulus for construction of a small number of advanced technology cable television systems (called BCN, for broadband communications network) and the provision of software or programming via such systems. While the systems will be fully operational and will serve entire communities (e.g., a town, or an urban ghetto), they will serve as a laboratory for testing the feasibility (including marketability) of providing new public and private services via BCN.

The public services will span a wide range of informational and educational activities of local government and federal agencies such as HUD and HEW. The thrust of the public services testing will be to determine those which can be delivered at all or more cost-effectively by BCN than by existing means. These pilot systems will also be capable of testing the commercial viability of a wide range of private services, such as teleshopping, banking, market/opinion research (polling), subscription programming, and library information retrieval.

While USG involvement in such a pilot program is justified by the need to develop new vehicles for the delivery of public services, this program will also have the effect of accelerating the development of advanced BCN equipment (the basic technologies are already available) and its usage in new and expanded commercial applications, and derivatively will help attract private investment capital that will speed the growth of CATV/BCN across the nation.

This proposed initiative has been designed to avoid a number of the pitfalls that plague government intervention in the private sector. Competitively-awarded capital construction grants will be utilized, under the fewest possible restrictions as to commercial applications spin-off, to attempt to stimulate the latent ambitions of the private sector to develop and exploit BCN technology and uses. However, the USG will require that the pilot systems be designed to support on-going evaluation of the results of the demonstration, and this feedback will become public information (even as to commercial services viability).

A key to the success of this initiative is the stimulation of innovative uses of the BCN capability by federal agencies such as HEW and HUD. A special project office will be established to help develop software (programming) proposals, and evaluate the cost-effectiveness or other attributes of delivering governmental services (old or new) via BCN. This project office will also administer a supplemental fund to defray software R&D costs, thereby insuring that bureaucratic inertia is not itself a barrier to the program's objectives.

Some preliminary judgments are noted below about the desirable scope and size of the program and such other major choices as lead to estimates of program costs.

Pilot systems should be constructed in four communities with a total subscriber potential at "maturity" of 120,000 homes. At least one of the systems should serve 50,000 subscribers at maturity. One of the communities should be an entire urban ghetto.

The systems should provide home terminals with two-way interactive capability plus a "frame-grabber" which can display a single still frame to be used in data retrieval.

The program should be of four years duration, counting from January 1974. System construction should be complete by the third year; programming development will begin in year two, but the major demonstration will occur in years three and four.

Given these assumptions, USG program costs would be as follows:

-- Administration: $ 9 million

-- Hardware grants: $92 million

-- Software: $99 million

The software funding represents the necessary project office programming budget, over and above USG mission agency expenditures. It has been assumed that when coupled with agency expenditures, this funding level would generate four hours per day of BCN-delivered public service programming. Lower levels of such programming might not provide the "critical mass" of new public service material which would support a valid demonstration effort.

The timing of USG obligations (not expenditures) would be as follows:

Demonstration Program Costs
($ millions)

FY	73	74	75	76	77
Hardware	--	37	55	--	--
Software	--	30	25	23	21
Administration	1	4	2	2	2
Total	1	71	82	25	23
Total Cumulative	1	72	154	179	202

Program Justification
(including possible services to be delivered)

The justification for USG involvement in the Demonstration Program depends upon three questions: why a pilot program is desirable, regardless of how it comes about or who funds it; why such an experiment would not take place without intervention from an outside source; and finally, why the USG should be the intervenor.

1. A pilot BCN program is desirable for three reasons:

   -- There is a need to ascertain whether BCN can provide a technically viable, cost effective, and otherwise desirable way to deliver public services. Pressures upon government at all levels to provide new, more effective, and more widely disseminated public services have been mounting throughout the last decade, and many "public interest" groups have advocated the exploration of new vehicles, such as BCN, for meeting these needs. The most rapid and effective way to test suitability of BCN in this regard would be to conduct a pilot program where evaluation mechanisms can be built into the technical and management design in order to obtain more reliable information about whether there is as much potential in the BCN medium as has been postulated.

   -- To the extent that it is ever in the future concluded, whether or not on the basis of a pilot program, that BCN is a suitable and desirable medium for the the dissemination of public services, it will be desirable to have proper (including compatible) equipment designed and installed in as much of the country and as soon as is practicable. A pilot program, by leapfrogging the normal evolution of equipment designed and in production, helps insure that necessary compatibility and integration of equipment design will be incorporated in most of the systems in the country. Furthermore, the speed at which CATV/BCN expand to cover most of the country will be accelerated by a pilot program if, as has been hypothesized, commercial BCN applications are identified with greater certainty and therefore attract significantly higher levels of private investment.

   -- Similarly, to the extent that it is ever demonstrated, whether or not on the basis of a pilot program, that commercial BCN applications provide services or products of significant economic value to a large percentage of U. S. consumers, then it will be desirable to have compatible equipment installed throughout the nation as soon as practicable. As stated above, a pilot program can improve the likelihood that this will occur.

2. Why a BCN pilot will not occur without intervention

As desirable as such a pilot appears to be, both from a public interest and private industry point of view, there is strong evidence that it will not occur absent outside intervention. A pilot program adequate to the needs described above represents too large an investment for any single company presently involved in the CATV industry. Industry consortia are not available because of anti-trust restrictions, and there is no indication that institutions (e.g., Ford Foundation) can afford, or will be inclined to support such a project. Furthermore, any privately-funded demonstration would of necessity meet public interest needs only as a fortuitous by-product, if at all.

Some explanation is necessary as to why normal evolution of the CATV industry will not progress rapidly enough to accomplish the pilot program objectives described above. There are three reasons why normal industry development will be too gradual (and, therefore too late) to provide optimal information to both industry and government about the applicability of BCN to the widest possible range of new services.

-- "Chicken and Egg": Which comes first, the new product, or the market for it? Most investors contemplating the introduction of a very new product hesitate to make the plunge for fear a market demand will not materialize, or, if so, only slowly. On the other hand, the market demand cannot be developed until the product exists. This dilemma affects new products to the degree they represent truly new departures from established forms of demand, and to the degree the initial investment necessary to demonstrate market existence is high. In the case of cable television, both these conditions exist to an argueably significant degree.

-- "When to Start": Private CATV/BCN investors are faced with a classic uncertainty regarding when to make a major commitment to a particular hardware configuration at a time when the technology and its applications are evolving so rapidly as to threaten any single configuration with relatively instant obsolescence. There is in CATV today the rather predictable tendency for most investors to wait until someone else has proven that a particular hardware design has wide application and a predictable economic life before large scale production commitments are made.

-- "Critical Mass": If the substantial investment cost of the system must be allocated to at best only one or two commercial services, their economic viability is likely to be very questionable. At the same time, the delivery of one or two demonstration public services may not receive enough attention to be significant or elicit enough commitment from local government to make their support meaningful. Thus, it is unlikely that, absent a major initiative of the sort proposed, such a system would get off the ground soon. Only by using the full capabilities of the system can its total effectiveness be demonstrated. In addition, certain efforts may be measurable only via full implementation (e.g., a reduction in the demand for critically inadequate transportation resources, or a significant change in awareness on the part of citizens).

It should also be noted that the normal evolution of this industry would not only fail to meet the pilot objectives which have been called for, but also make it very difficult for many legitimate public interests to ever be met by CATV. This is so because, whenever the industry reaches maturity, the equipment necessary to meet market needs (as they are ultimately understood) will be possible only through very costly retrofit to meet both home terminal integration and inter-city system compatibility requirements. In fact, at any cost, such retrofit may be impossible once status quo political and bureaucratic patterns are established. Our experience with attempts to boost UHF television at a very late stage in broadcasting development is ample evidence of this possibility.

3. Why the USG should be the intervenor

The justification for USG intervention to effect a BCN pilot program follows directly from the character of the public interest reasons cited in (1) above, as justification for such an experiment however accomplished. Furthermore, it has been pointed out in other discussions above that private industry and institutional groups will not support such a program, and local governments lack the knowledge, initiative, and funding to accomplish such a project alone. In short, if a BCN pilot is desirable, the USG is not only the best intervenor with respect to meeting certain broad program objectives, but also probably the only available source for such a program.

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Possible Services to be Delivered Via BCN

It must be acknowledged that the justifications developed above are based on certain assumptions about the services to be tested in the Demonstration Program. In short, it was assumed that there was adequate evidence to justify a test of certain services (and stimulate the development of as-yet unidentified services which similarly exploit the unique capabilities of BCN). Accordingly, this is an appropriate place to record that evidence, and in so doing give some idea of types of services which are likely to appear over pilot BCN systems. Commercial services are included in the discussion below because they bear significantly on private industry support of pilot systems -- and therefore, under the financing proposal outlined later in these materials, the viability of the entire program.

Federal agencies such as HEW and HUD have identified types of services (and in some instances, specific examples) which might be delivered via BCN. There are listed below, followed by a discussion of why these possibilities support the conclusion that experimentation with BCN delivery is warranted. It should be noted that many logical local government services are included in this list for the reason that they will doubtless be undertaken only if software funding is supported by appropriate federal mission agencies.

-- Education:

- Ranging from vocational rehabilitation to college degree courses to adult education (of the general interest, almost recreational variety).

- Serving the general public as well as special interest groups such as unskilled workers, senior citizens, the handicapped, non-English speaking persons, and public school students temporarily confined at home.

- In support of educational institutions through interconnection of school systems to facilitate administration, teacher conferences and seminars, and through greater use of computerized testing and grading.

-- Health: Ranging from preventative information dissemination (essentially a form of health education) to interconnection of medical facilities to provide a wider range and more economical distribution of consultative and diagnostic services to emergency or non-emergency patients.

-- Information: Many federal agencies engage in substantial information dissemination activities which do not merit classification as "educational" in nature. It is possible that more frequently up-dated information can be made available via BCN capabilities on a highly cost-effective basis as a supplement to or replacement for present publishing activities. It is also argued that more timely access by the consumer to such data via BCN (through "library" retrieval capability) will significantly expand the reach (number of users) of informational programs.

-- Social Dynamics: It is possible, due to ease of access to general purpose information as described above -- coupled with access to community affairs information, local political information, rumor hotlines, mock local referenda (and BCN connected "town meetings") -- that essentially social conditions (as contrasted with individual welfare) can be improved. The argument for such a possibility starts with the collective impact of reducing individual sense of alienation from government and society, and culminates with the possible political integration and social adhesion of whole communities (particularly minority groups in urban areas, whether or not there is a geographic definition to the minority community).

Apart from the obvious general-to-specific differences in the above list, there are wide ranges of plausibility involved in the feasibility of these proposals (or their assumptions about utility even if feasible). However, it is only necessary at this time to discuss why this list, taken as a whole, suggests that BCN should be tested as a possibly significant delivery vehicle.

While some of the services proposed are totally new, and others are only a potentially more cost-effective way of providing existing services, and still others merely extend the reach of existing services, they all have one

element in common: they exploit the new and unique capability of BCN with respect to two-way visual communication. Visual distinguishes BCN from the telephone. Communication distinguishes BCN from broadcasting. (By communication we include the act of providing customer-activated access to otherwise passive broadcasting or data dissemination.) It is thus important to understand that BCN offers more than one-way CATV which only increases the volume of passive broadcast material.

In a similar vein, it is clear that low viewing levels on educational TV are not a function of channel availabilities -- there are substantial time slots unfilled in public television despite the existence of massive libraries of public service films from federal agencies and other institutions. While it can be argued that most of such film libraries is of marginal value and interest to even small segments of the population, it is also possible that BCN's capabilities, including customer-activated access, will significantly increase the usage of such materials.

More important perhaps is the possibility that totally new services will spring up to exploit BCN capability. That even so limited a list as above, highlighted by medical and social dynamic services, can be postulated at this time argues strongly for a concentrated effort to stimulate similar software innovations which utilize BCN's capability to expand communications into the visual dimension.

There are additional local services which exploit BCN's communications capabilities, although some of them also rely upon BCN's greater timely downstream (one-way, to the user) capacity, such as disaster and emergency warning systems. Other local public service uses are largely represented in the list above, although BCN also can provide interconnection for many local service facilities (e.g., fire stations) that do not involve the jurisdiction or support of federal agencies. Merely utilizing BCN's capability to provide access to computer-based data and data analysis suggests numerous possibilities to improve the quality and economy of local government services. A related example would be the dissemination of transportation information and the parallel capability to assist in traffic control for all forms of mass transit systems.

Commercial services which might be provided via BCN rely heavily upon its unique capabilities vis-a-vis expanded computer-assisted communications, whether or not of a visual character. That even so limited a list as below can be suggested, when there has been so little previous stimulus to innovation in this area, argues for a concentrated BCN demonstration program:

-- Home security systems

-- Teleshopping (TV catalogues, admittedly only an extension of mail/phone capabilities, plus "impulse buying")

-- Banking services

-- Automated utility meter reading

-- Subscription programming (pay TV)

-- Market and opinion research (polling)

Proposed Program Approach

The approach outlined below is intended to minimize or eliminate many of the criticisms which might be levied at this initiative. The program will be clearly presented to Congress, the industry, and the public as experimental in nature -- a one-shot expedient -- to counter the criticism that the USG is embarking on a permanent subsidization or interference in this industry (or a discriminatory boost to one industry). The "big brother" objections will be minimized by putting system operation under private control to the maximum extent possible. The possibility of imposing financial burdens on a single private industry to accomplish broad public interest goals will be avoided by establishing the precedent that the USG pays for access to private transmission capabilities. Government interference in private sector innovation and investment decisions will be minimized by allowing private BCN operators to select commercial services (and their prices) which will be tested during the program.

There are two major elements to the proposed USG approach to the Demonstration Program. The first is a competitive capital grant fund to subsidize private development and construction of advanced BCN Systems, structured in such a way as to facilitate and maximize private funding of the project and also limit USG involvement in private activities to the minimum necessary level. The second is the stimulation and control of public service "software" to be offered over the systems.

The proposed approach to subsidizing BCN capital construction costs utilizes an essentially categorical grant program, to be awarded on a competitive basis. It is contemplated that the Demonstration Program will operate in 3-5 cities or communities, and that at least 50 communities of the proper size would be interested in participating. It is proposed that all communities (represented by the private BCN franchise) be invited to bid for federal subsidy, as follows:

-- The USG will issue an RFP which specifies only certain technical minimums and schedule constraints. The technical specs would be those which insure the availability of certain transmission capabilities that would support the kinds of public service programming anticipated. While these specs will also insure an advanced commercial applications capability, the USG will not pre-determine what commercial services must be provided. Certain additional specifications will relate to automated usage monitoring procedures which support the USG's interest in getting evaluative information. The USG will indicate that it will pay, at a pre-determined rate, for the channels used to provide federally-funded public services.

-- Each interested bidder will work with hardware suppliers of his choice to develop equipment designs which meet the USG specs as well as other features desired by the bidder. This procedure is expected to produce considerable competition at the hardware manufacturer level, and will probably stimulate considerable

private R&D activity. The bidder will have selected such prime and subcontractors as he wishes before he responds to the RFP, and they will provide the basis for his technical proposal.

-- Each bidder will also design and specify in his proposal the commercial services which, at a minimum, will be provided during the demonstration period, and will work with and secure commitments from such private enterprises as he wishes in his community (e.g., banks, home security companies, department stores, market research companies).

-- Each bidder will also work with and secure commitments from local government and non-commercial institutions as to the services which they wish to provide and the capital and operating costs which they will support. It is expected that local government will be anxious to help secure the USG subsidy for their community, and may accordingly offer to support a significant share of the project's costs.

-- Finally, each bidder will prepare a financial proposal which contains three elements: total cost for the proposed project; the share of the cost to be borne by the bidder and by local government; and derivately, the subsidy requested from the USG. Competition for the USG grant will occur because the bidder will estimate the operating costs and revenues expected from the system, and then calculate the amount of capital he is willing to invest at his desired rate of return. The more interested he is in getting this advanced system, and the more commercial potential he sees (and designs), the better "deal" he will offer the USG.

The USG can wait until bids are in to make final decisions about exactly how many systems, of what size, would be subsidized. If, for example, commercial service proposals were all quite similar, the choice could turn upon demographics (economic and social strata of the populations to be served), political factors (geographic diversity), and such other criteria as might be developed (e.g., hardware to be provided by the widest possible number of different manufacturers).

The key to the success of the Demonstration Program (as contrasted with avoiding its possible jeopardies) lies in the successful stimulation of innovative public service uses of BCN capability. As has been described in earlier sections, USG interest in public service programming reposes largely in mission agencies such as HEW and HUD. However, there is some chance that bureaucratic inertia (and budgetary intransigence) will constrain the enthusiasm with which such agencies might exploit a pilot program's potential. Furthermore, it is likely that knowledgeable staff support will need to be made available to assist mission agencies in understanding the possibilities posed by BCN, and analyzing the cost-effectiveness and other attributes of any particular service application.

Accordingly, it is proposed that a special project office be established within the Executive Branch to coordinate all federal utilization of the pilot BCN capability. An interagency office would also solve the problem of allocating limited channel availability among potential users. That is, such a project office will at minimum provide a brokering and coordination function to select and schedule federal public service programming. However, this office will probably perform a more critical task -- the development of public service programming concepts, the "selling" of such concepts to mission agencies, and the administrative direction to see that programming proposals (regardless of their source) are carried through to implementation on a timely basis.

While the above description would seem to assume that software funding is the responsibility of appropriate mission agencies, it would be very unwise to take the risk that funding limitations at any single agency would ever constrain the innovative exploitation of the pilot BCN systems. Accordingly, it is considered vital that the interagency project office have its own software development budget, which can either be parceled out to mission agencies where budget alone prevents their implementation of an otherwise acceptable concept, or utilized by the project office itself to test a concept which has not been endorsed by a mission agency. (The next section includes a discussion of the necessary size of such a supplemental software budget.)

Program Scope and Cost Estimates

In order to consider even preliminary cost estimates, it is necessary to define the appropriate scope of the Demonstration Program with reference to (i) the number and sizes of the demonstration cities or communities; (ii) the value and extent of programming or software; (iii) the time period during which the program will be conducted; and (iv) the degree of technology to be included (hardware).

The criteria applied to determine the scope should relate to the basic justification for the program as well as critical elements in its implementation -- specifically:

-- It should be an appropriate testbed for the likely services to be demonstrated. This suggests the need for minimum system size criteria, a sufficiently broad range of demographics (e.g., welfare services and sophisticated banking services would relate to opposite ends of the demographic spectrum), and a sufficiently broad technological capability.

-- It should have sufficient scope to permit the "critical mass" to operate.

-- It should have sufficient scope to motivate the "partners" in the program to play a significant role in the venture (viz. equipment manufacturers to invest in application technology, "software houses" to do likewise, local governments to commit their prestige by being willing to attempt to deliver local services via BCN to a significant degree, USG agencies to be willing to view the program as a significant element of their mission).

-- It should provide appropriate geographical balance so that the program will be viewed as being truly national in scope.

-- It should offer an approach designed to confront directly the most significant of the "problems of the cities." This suggests the need to insure that an urban ghetto is included.

-- In order to insure the validity of conclusions with respect to desirable (or undesirable) services, there should be more than one test site for each service.

Application of the above criteria suggest a program with the following ranges in scope:

-- 3-5 demonstration cities.

-- At least one (preferably two) cities to have at least 50,000 subscribers; the others, if any, could be smaller.

-- A program of four years duration (counting from January 1, 1974) to permit adequate time for installing and testing the services.

-- Category III technology with some limited use of Category IV.*

Within the range described above, we would propose the following as being a reasonable mid-point.

Proposed Program Scope

-- Four cities or communities:

  -- Two with 50,000 subscribers each at "maturity" (i.e., 75% penetration), and one of them a ghetto.

  -- Two with 10,000 subscribers each at maturity

  -- Total: 120,000 subscribers.

-- The installation of Category III home terminals for all subscribers. In addition, the installation of compatible Category IV equipment in a limited number of cities (e.g., hospitals, key traffic bottlenecks).

-- A program of four years duration, commencing January, 1974. During the first two full years, systems would be built and subscribers signed on to about 75% penetration. The second year would also see the beginning of testing some services. Years three and four would be devoted to operating experimental services and evaluating their performance.

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*The alternative technical capabilities of a BCN system can be categorized as follows:

Category I -- Conventional one-way broadcasting via cable with 20 or more channels available.

Category II -- Two-way interactive with narrow band return.

Category III -- Category II, plus a "frame-grabber" system which can display a single still frame on the home receiver for an indefinite period and thus can be used for data retrieval.

Category IV -- Category III plus broadband two-way communication.

Category V -- Category III plus a hard-copy facsimile capability.

Program Costs

Program costs are of three major kinds: (i) USG administration; (ii) hardware costs; and (iii) software costs.

The administrative costs would be generated by a USG program office. Its major task would include organizing the program, determining system specifications, issuing RFP's, evaluating competitive proposals, evaluating proposed software demonstrations by government and private organizations, and evaluating the results of the demonstrations.

The administrative costs for program management and evaluation would begin at $1 million for the first FY, peak in the second year at $4 million, and settle back to $2 million per year thereafter.

The hardware costs would be the categorical grants to build the systems. Estimates for these costs were developed, as shown in Exhibit I, on a per-subscriber basis. It was assumed (i) that in their planning, bidders would view only incremental (i.e., relative to Category I) capital and four year operating costs as their new investment, (ii) that bidders would estimate their discounted investment return as embracing 1/4 of the total incremental capital and five year operating costs, and (iii) that inflation of 10% would offset the costs over an average of the two years where the hardware expenditures would be made.

On this basis, USG hardware costs would amount to $763 per subscriber times 120,000 subscribers, or $92 million.

Software costs would consist of those borne by private industry, USG mission agencies, and the interagency project office (called OTP costs). These costs are extremely difficult to estimate at this time because the specific value of the demonstrations has not been defined. A parametric approach is contained in Exhibit II, which indicates OTP software costs of $99 million (out of a total of $394 million). One must realize, however, that most software costs are fixed and become commercially viable only when amortized against a large number of viewers, and that practically unlimited amounts can be expended on software. For example, the U.S. television industry spends about $1.5 billion per year to program about 3½ channels. When amortized over 60 million TV homes, however, this amounts to only $25 per home per year. By contrast, in the proposed demonstration, it is anticipated that $1100 will be spent per home per year, a not totally unreasonable figure, and one which can be reduced substantially if the program is successful and expanded to 10 million or more homes (the approximate size of the cable industry 3 years from today).

On the above bases, the pattern of total program costs would be as indicated below.

Demonstration Program Costs
($ millions)

	FY 73	74	75	76	77
Hardware	--	37	55	--	--
Software	--	30	25	23	21
Administration	1	4	2	2	2
Total	1	71	82	25	23
Total Cumulative	1	72	154	179	202

Exhibit I

USG Hardware Costs per Subscriber

	Technology		
	I	II	III
a. Investment (System + Terminal)	250	500	1,000
b. Op Cost/year	30	45	75
c. Op cost/5 years	150	225	375
d. (a + c)	400	725	1,375
e. Δ cost to USG			
-- Δ	0	325	925
-- factor	0	1/2	3/4
-- factor X Δ	0	163	694
f. Inflation @ 10%		179	763

Exhibit II

Parametric Approach to Software Costs

1. Assume a significant degree of consumer attention to be captured by experimental services. "Significant" is assumed to be 1/3 of average TV viewing time of six hours per household per day, or two hours per day.

2. Assume that since most services will be aimed at selective "audience" segments, the average participant will be interested in viewing 50% of all available programming. This does not include non-viewing due to competing program choices, because it is anticipated that a sufficiently large number of channels will be available, and that frequent "re-runs" will be made.

3. Assume cost of software is equivalent to $90,000 per average viewing hour. This represents 50% more than high-quality non-entertainment film product cost at present, an allowance for the inefficiencies of working in an experimental medium encompassing the novelties of two-way interactive system and frame-grabbers.

4. The above is extended as follows:

   -- 2 hours per day ÷ 50% viewing = 4 hours per day of new program requirements

   -- 4 x 365 days/per year = 1,460 hours per year

   -- @ $90,000 per hour = $131.4 million per year

   -- times 3 years = $394 million

5. Assume relative contributions of private sector to be 25% of total. Thus, the remainder to be picked up by USG would be .75 x $394 million = $296 million. Assume that 2/3 of the above would be derived from the mission agencies, so that OTP would require $99 million.

MEDICAL SERVICES:

Remote Diagnosis, Record Retrieval, Professional Education, and Preventative Information Dissemination

The inadequate availability of health services in central cities has become a major medical issue. To date, some very limited scale experiments have suggested the medical feasibility of utilizing closed circuit TV for diagnostic, consultative and educational purposes. The existence of city-wide two-way broadband cable would facilitate a properly scaled experiment with considerable cost economies.

An initial configuration of point-to-point cable links between major hospitals and several remote health care facilities could provide answers to questions such as: feasibility of remote medical diagnosis and referral on an operational basis; the effectiveness and cost of such an approach; the rate at which patients could be handled by such a system; the acceptability to the public and the medical profession of the techniques used; types of medical personnel needed; the number of patients served; cost per patient; new medical services provided; and savings produced by operating on a preventative rather than a curative basis. As the demonstration warrants, the system could be extended to include clinics and other health facilities throughout the community.

Another concept to be tested by such a system is that of a medical data network which could provide for the storage and retrieval of patient records for emergency and consultative out-patient treatment as well as analysis of these records for medical research.

The need for preventative health services could also be met by, for example, disseminating to all system terminals information concerning self maintenance in cases such as diabetics, cardiac conditions, and the physically handicapped.

Finally, health specialists could provide initial and refresher training for out-patients as well as medical staff.

MUNICIPAL OPERATIONS SUPPORT:

Traffic Control and Automatic Vehicle Monitoring

Traffic control and automatic vehicle monitoring provide examples of the ways in which municipal governments can utilize city-wide two-way broadband systems to improve essential government functions and services.

A traffic control system is possible because cable will pass literally every corner in the community. Traffic counters imbedded in the pavement can be tied into a computerized control center via the cable and timing of traffic lights can be automatically adjusted to facilitate traffic flow. At very little additional cost, the control center can, on an automated basis, program traffic reports which could be transmitted to any home terminal on either a dedicated channel or as one of the types of information made available on a multiple use channel allocated to single page "frame grabber" retrieval activated by the subscriber.

An automatic vehicle monitoring (AVM) system can report the location of every member of a set of moving vehicles, including police, ambulances, trucks, mass transit, taxis, buses, and other fleet operations. The demand for mobile radio dispatching and communications for such vehicles has already seriously strained radio spectrum availability.

Via cable, mobile units can transmit their identification at low power output on a repetitve basis, with signals received by close-by fixed-site receivers which relay location and vehicle identification via the cable to a central control computer.

Some of the uses of our AVM system are: real time monitoring and dispatching of police and emerging vehicles; dynamic scheduling and routing of transit vehicles; monitoring of conditions on board transit vehicles; tracing of vehicles stolen from an AVM connected fleet (e.g., truck hijack protection).

INTERACTIVE EDUCATIONAL TELEVISION:

Vocational Education

Vocational education programs for high school students and adults are inadequate in many communities. BCS offers the potential to permit local institutions to significantly expand the coverage and quality of vocational education at reasonable cost. (The techniques discussed below are also applicable to improving vocational rehabilitation, an area where the Federal government might take a lead in developing the necessary educational materials for use via BCS.)

The facilities, equipment, and materials in vocational schools are frequently inadequate and out-dated. Another problem is that of extending continuing vocational education to those who have completed a high school or junior college vocational program. A third problem lies in getting into the community and reaching the underemployed and unemployed with appropriate training programs.

The purpose of this demonstration would be to test whether two-way vocational training programs provided for homes, vocational schools, and junior and senior high schools could improve the effectiveness or decrease the cost of providing this type of education. An associated market survey would be used to determine the acceptability of these courses at the prices required for economic viability.

Selected vocational courses would be cablecast from the headend studio into homes and schools.

This demonstration project could use a lecturer who could use teaching aids such as films, filmstrips, a blackboard, etc., in giving his lesson and could query students at any time. He would receive an immediate composite feedback from the students and could modify his lecture to meet their needs during the course of the program. Alternatively, with the use of a frame-grabber terminal, a larger number of lectures using chalk-talk techniques could be sent to a number of classrooms over a single channel of the cable.

The system could use two-way experimental polling terminals and frame-grabbing terminals. The terminals would be placed in the vocational, junior, and senior high schools and in various homes of students enrolled in vocational programs. The vocational programs would be cablecast to the schools and residences via the telecasting network.

LOCAL COMMUNITY PROGRAMMING:

"Neighborhood TV"

One of cable television's many promises is that of becoming the "neighborhood TV network." The increased number of channels that can be provided by a cable distribution system could provide a means of access to the television medium by many individuals and community groups who have up to now been excluded from use of the medium by prohibitive production costs and the necessity for programming with mass appeal. On the other hand, cable has been called the "medium of the people" in that it can be programming by and for small community groups and individuals with localized interests. These local programs can be viewed during prime time or any other time that is convenient to the viewers. Cable is potentially a vehicle for improved personal and community expression and development.

A demonstration project would establish a number of Production Assistance Teams to provide training, as well as technical assistance, to groups and individuals within the city who wished to develop community programming. This should be done on a first-come, first-served basis. Another function would be to inform the community of the public access capabilities of the cable system and how they could be utilized effectively to disseminate community information.

Production assistance for any of the types of groups listed above would range from providing a straightforward service such as facilities for planning, taping and editing of programs, and advice on set design and studio lighting, to more extensive assistance such as program formatting or the use of novel video techniques for presentation of pro gramming ideas. It would not be necessary for a group to use the full assistance team or to use the team at all, if they did not want to do so. However, these capabilities would be available to those who wanted to use the medium effectively but who otherwise would not have the necessary technical skills or familiarity with the range of possibilities for program structure and content. The cost to individuals and groups using Production Assistance Teams might range from no charge, to materials cost only, to costs that would permit the system operator to make a reasonable profit on the services provided.

Funding possibilities for such programming would include cable system sponsorship, as well as grants provided by the Municipal governments or various foundations that are interested in promoting increased community-oriented programming on cable systems. In addition to program publicity that could be provided on the cable, in neighborhood newspapers, community center bulletin boards and the like, these teams should actively seek out community groups to participate in such local programming demonstrations.

SUBSCRIBER-RESPONSE SERVICES:

Polling and Automatic Sensor Interrogation

A number of potential two-way cable services employing interrogation from central computers and digital response from various types of manual and automatic sensors in the home have been suggested for use with wideband two-way cable systems. These include:

- Preference polling
- Shopping-at-home service
- Meter reading systems for utility services (e.g., electricity, gas, water)
- Alarm sensor systems (e.g., intrusion, burglar, fire)
- Various electrical and mechanical output sensor systems for status monitoring operations and maintenance tests and checks (e.g., electronic system components, storage tank level indicators, selective control switches, pollution sensors)

The purpose of this demonstration would be to develop and demonstrate a subscriber polling and automatic sensor interrogation system capability. This capability would be able to provide any or all of the above types of services taking advantage of the rapid sampling rates made possible by computer polling via the cable. Such a system could minimize the cost of transmitting and interpreting the response signals and provide rapid reaction, if required. The cost of the sensor terminals could be reduced to a minimum by performing all counting and other sensor data processing functions at central processing units rather than at each sensor.

It is estimated that the total incremental capital costs of equipping 300,000 utility meters for automatic remote reading in an urban area might be reduced to about $450,000 - $600,000 for systems utilizing two-way cable networks, as compared to an estimated cost of $3.3 to $6.3 million using present designs under development for use with telephone switched-networks.

While the provision of these services is a relatively simple technical concept, the ultimate implementation will have significant institutional effects. For example, automatic alarm systems presently result in very high false alarm rates. Because of this factor, many police

departments will not permit direct response by their department. This may result in the need for private security forces. When the false alarm problem is corrected or reduced to a manageable level, the police departments may be willing to set up their own special squad to respond to automatic alarms. To take the example of automatic meter reading, the replacement of meter readers by an electronic device will not only affect a significant number of people, but it will also eliminate another category of available low skill entry jobs. Such secondary and non-technological effects of these advanced applications will need to be adequately provided for.

A wide band cable system soulc be expected to provide a sampling rate of up to 5000 terminal sites per second per channel, using a 200 microsecond query time per terminal site. For 300,000 terminal sites, therefore, a single central processing unit (CPU) could sequentially query and receive responses from up to 24 different sensor units and the subscriber response terminal in every household, office, business establishment, industrial site, in the city at a maximum rate of about once every 60 seconds. In comparison, a CPU utilizing the switched telephone network would require approximately 60 days to sequentially connect to and read the outputs of the terminals at each of these sites.

BROADBAND COMMUNICATION SYSTEMS

DEMONSTRATION PROGRAM

The Concept in Brief

The USG will provide the stimulus for construction of a small number of advanced technology cable television systems (called BCS, for broadband communication systems) and the provision of software or programming via such systems. While the systems will be fully operational and will serve entire communities (e.g., a town, or an urban ghetto), they will serve as a laboratory for testing the feasibility (including marketability) of providing new public and private services via BCS.

The public services will span a wide range of informational and educational activities of local government and federal agencies such as HUD and HEW. The thrust of the public services testing will be to determine those which can be delivered more cost-effectively through use of BCS than by existing means. These pilot systems will also be capable of testing the commercial viability of a wide range of private services, such as teleshopping, banking, market/opinion research (polling), subscription programming, and library information retrieval.

While USG involvement in such a pilot program is justified by the need to develop new vehicles for the delivery of public services, this program will also have the effect of accelerating the development of advanced BCS equipment (the basic technologies are already available) and its usage in new and expanded commercial applications, and derivatively will help attract private investment capital that will speed the growth of CATV/BCS across the nation.

This proposed initiative has been designed to avoid a number of the pitfalls that plague government intervention in the private sector. Competitively-awarded capital construction grants will be utilized, under the fewest possible restrictions as to commercial applications spin-off, to attempt to stimulate the latent ambitions of the private sector to develop and exploit BCS technology and uses. However, the USG will require that the pilot systems be designed to support on-going evaluation of the results of the demonstration, and this feedback will become public information (even as to commercial services viability).

A key to the success of this initiative is the stimulation of innovative uses of the BCS capability by federal agencies such as HEW and HUD. A special project office will be established within the Executive Branch to help develop software (programming) proposals, and evaluate the cost-effectiveness or other attributes of delivering governmental services (old or new) via BCS. This project office will also administer a supplemental fund to defray software R&D costs, thereby insuring that bureaucratic inertia is not itself a barrier to the program's objectives.

Some preliminary judgments are noted below about the desirable scope and size of the program and such other major choices as lead to estimates of program costs.

Pilot systems should be constructed in 3-5 cities with a total subscriber potential at "maturity" of 120,000 homes. This seems needed to provide testbeds of a diversity of services to a diversity of populations, with some assurance that conclusions drawn will be valid for other cities across the nation. At least one of the systems should include an entire urban ghetto.

The systems should provide home terminals with two-way interactive capability plus a "frame-grabber" which can display a single still frame to be used in data retrieval.

The program should be of four years duration, counting from January 1974. System construction should be complete by the third year; programming development will begin in year two, but the major demonstration will occur in years three and four.

Given these assumptions, USG program costs would be as follows:

- -- Administration & Evaluation: $ 9 million
- -- Hardware grants: $92 million
- -- Software: $99 million

The software funding represents the necessary project office programming budget, over and above USG mission agency expenditures. It has been assumed that when coupled with agency expenditures, this funding level would permit production of two hours of public service progress per day over a three-year period. (The number of programming hours offered each day would be much higher through used existing progress and reports.) Lower levels of such programming might not provide the "critical mass" of new public service material which would support a valid demonstration effort.

The timing of USG obligations (not expenditures) would be as follows:

Demonstration Program Costs
($ millions)

FY	73	74	75	76	77
Hardware	--	37	55	--	--
Software	--	30	25	23	21
Administration and Evaluation	1	4	2	2	2
Total	1	71	82	25	23
Total Cumulative	1	72	154	179	202

Program Justification
(including possible services to be delivered)

The justification for USG involvement in the Demonstration Program depends upon three questions: why a pilot program is desirable, regardless of how it comes about or who funds it; why such an experiment would not take place without intervention from an outside source; and finally, why the USG should be the intervenor.

1. A pilot BCS program is desirable for three reasons:

-- There is a need to ascertain whether BCS can provide a technically viable, cost effective, and otherwise desirable way to deliver public services. Pressures upon government at all levels to provide new, more effective, and more widely disseminated public services have been mounting throughout the last decade, and many "public interest" groups have advocated the exploration of new vehicles, such as BCS, for meeting these needs. The most rapid and effective way to test suitability of BCS in this regard would be to conduct a pilot program where evaluation mechanisms can be built into the technical and management design in order to obtain more reliable information about whether there is as much potential in the BCS medium as has been postulated.

-- To the extent that it is ever in the future concluded, whether or not on the basis of a pilot program, that BCS is a suitable and desirable medium for the the dissemination of public services, it will be desirable to have proper (including compatible) equipment designed and installed in as much of the country and as soon as is practicable. A pilot program, by leapfrogging the normal evolution of equipment designed and in production, helps insure that necessary compatibility and integration of equipment design will be incorporated in most of the systems in the country.

-- To the extent it is concluded through this program or otherwise that BCS is a significantly effective means for providing public services, CATV/BCS expansion is desirable.

-- The speed at which CATV/BCS expand to cover most of the country will be accelerated by a pilot program if, as has been hypothesized, commercial BCS applications are identified with greater certainty and therefore attract significantly higher levels of private investment.

-- Similarly, to the extent that it is ever demonstrated, whether or not on the basis of a pilot program, that commercial BCS applications provide services or products of significant economic value to a large percentage of U. S. consumers, then it will be desirable to have compatible equipment installed throughout the nation as soon as practicable. As stated above, a pilot program can improve the likelihood that this will occur.

2. Why a BCS pilot will not occur without intervention

As desirable as such a pilot appears to be, both from a public interest and private industry point of view, there is strong evidence that it will not occur absent outside intervention. A pilot program adequate to the needs described above represents too large an investment for any single company presently involved in the CATV industry. Industry consortia are not available because of anti-trust restrictions, and there is no indication that institutions, (e.g., the Ford Foundation) can fully support, or will be inclined to initiate such a project. Furthermore, in a fully privately-funded demonstration, public services might not receive the emphasis and central consideration to be expected in a government supported program.

Some explanation is necessary as to why normal evolution of the CATV industry, typified today as retransmission of local broadcast signals, some imported broadcast signals, and some incipient pay TV operations, will not progress rapidly enough to accomplish the pilot program objectives described above. There are three reasons why normal industry development will be too gradual (and, therefore too late) to provide optimal information to both industry and government about the applica bility of BCS to the widest possible range of new services.

-- "Chicken and Egg": Which comes first, the new product, or the market for it? Most investors contemplating the introduction of a very new product hesitate to make the plunge for fear a market demand will not materialize, or, if so, only slowly. On the other hand, the market demand cannot be developed until the product exists. This dilemma affects new products to the degree they represent truly new departures from established forms of demand, and to the degree the initial investment necessary to demonstrate market existence is high. In the case of cable television, both these conditions exist to an arguably significant degree, and they are prevalent in the high risk software production industry.

-- "When to Start": Private CATV/BCS investors are faced with a classic uncertainty regarding when to make a major commitment to a particular hardware configuration, and the related software that is compatible and defines the possible services, at a time when the technology and its applications are evolving so rapidly. There is in CATV today the rather predictable tendency for most investors to wait until someone else has proven that a particular hardware/software design has wide application and a predictable economic life before large scale production commitments are made.

-- "Critical Mass": If the substantial investment cost of the system must be allocated to at best only one or two commercial services, their economic viability is likely to be very questionable. At the same time, the delivery of one or two demonstration public services may not receive enough attention to be significant or elicit enough commitment from local government to make their support meaningful. Thus, it is unlikely that, absent a major initiative of the sort proposed, such a system would get off the ground soon. Only by using the full capabilities of the system can its total effectiveness be demonstrated. In addition, certain effects

may be convincingly substantiated only via full implementation (e.g., a reduction in the demand for critically inadequate transportation resources, or a significant change in local government participation on the part of citizens). Full implementation will also tend to encourage more enthusiastic and concrete support of the cities and local government segments responsible for public services.

It should also be noted that the normal evolution of this industry would not only fail to meet the pilot objectives which have been called for, but also make it very difficult for many legitimate public interests to ever be met by CATV. This is so because, whenever the industry reaches maturity, the equipment necessary to meet market needs (as they are ultimately understood) will be possible only through very costly retrofit to meet both home terminal integration and inter-city system compatibility requirements. In fact, at any cost, such retrofit may be impossible once status quo political and bureaucratic patterns are established. Our experience with attempts to boost UHF television at a very late stage in broadcasting development is ample evidence of this possibility.

3. Why the USG should be the intervenor

The justification for USG intervention to effect a BCS pilot program follows directly from the character of the public interest reasons cited in (1) above, as justification for such an experiment however accomplished. More effective delivery of public services, and ultimate savings of tax dollars spent on them, makes the Federal government a major potential beneficiary of the program, and hence, the logical program initiator.

Furthermore, it has been pointed out in other discussions above that private industry and institutional groups will not support such a program, and local governments lack the knowledge, initiative, and funding to accomplish such a project alone. In short, if a BCS pilot is desirable, the USG is not only the best intervenor with respect to meeting certain broad program objectives, but also probably the only available source for such a program.

* * * * *

Possible Services to be Delivered Via BCS

It must be acknowledged that the justifications developed above are based on certain assumptions about the services to be tested in the Demonstration Program. In short, it was assumed that there was adequate evidence to justify a test of certain services (and stimulate the development of as-yet unidentified services which similarly exploit the unique capabilities of BCS). Accordingly, this is an appropriate place to record that evidence, and in so doing give some idea of types of services which are likely to appear over pilot BCS systems. Commercial services are included in the discussion below because they bear significantly on private industry support of pilot systems -- and therefore, under the financing proposal outlined later in these materials, the viability of the entire program.

Federal agencies such as HEW and HUD have identified types of services (and in some instances, specific examples) which might be delivered via BCN. There are listed below, followed by a discussion of why these possibilities support the conclusion that experimentation with BCS delivery is warranted. It should be noted that many logical local government services are included in this list for the reason that they will doubtless be undertaken only if software funding is supported by appropriate federal mission agencies.

-- Education:

- Ranging from vocational rehabilitation to college degree courses to adult education of the general interest, almost recreational variety .
- Serving the general public as well as special interest groups such as unskilled workers, senior citizens, the handicapped, non-English speaking persons, and public school students temporarily confined at home.
- In support of educational institutions through interconnection of school systems to facilitate administration, teacher conferences and seminars, more effective use of guest lecturers, and through greater use of computerized testing and grading.

-- Health: Ranging from preventative information dissemination (essentially a form of health education) to interconnection of medical facilities to provide a wider range and more economical distribution of consultative and diagnostic services to emergency or non-emergency patients.

-- Information: Many federal agencies engage in substantial information dissemination activities which do not merit classification as "educational" in nature. It is possible that more frequently up-dated information can be made available via BCS capabilities on a highly cost-effective basis as a supplement to or replacement for present publishing activities. It is also argued that more timely access by the consumer to such data via BCS (through "library" retrieval capability) will significantly expand the reach (number of users) of informational programs.

-- Social Dynamics: It is possible, due to ease of access to general purpose information as described above -- coupled with access to community affairs information, local political information, rumor hotlines, mock local referenda (and BCS connected "town meetings") -- that essentially social conditions (as contrasted with individual welfare) can be improved. The argument for such a possibility starts with the collective impact of reducing individual sense of alienation from government and society, and culminates with the possible political integration and social adhesion of whole communities (particularly minority groups in urban areas, whether or not there is a geographic definition to the minority community).

Apart from the obvious general-to-specific differences in the above list, there are wide ranges of plausibility involved in the feasibility of these proposals (or their assumptions about utility even if feasible). However, it is only necessary at this time to discuss why this list, taken as a whole, suggests that BCS should be tested as a possibly significant delivery vehicle.

While some of the services proposed are totally new, and others are only a potentially more cost-effective way of providing existing services, and still others merely extend the reach of existing services, they all have one element in common: they exploit the new and unique capability of BCS with respect to visual communication (visual in one direction at least, and in both directions for some institutional applications). Visual distinguishes BCS from the telephone. Communication distinguishes BCS from broadcasting. (By communication we include the act of providing customer-activated access to otherwise passive broadcasting or data dissemination.) It is thus important to understand that BCS offers more than one-way CATV which only increases the volume of passive broadcast material.

There is the possibility that totally new services will spring up to exploit BCS capability. That even so limited a list as above, highlighted by medical and social dynamic services, can be postulated at this time argues strongly for a concentrated effort to stimulate similar software innovations which utilize BCS's capability to expand communications into the visual dimension.

There are additional local services which exploit BCS's communications capabilities, although some of them also rely upon BCS's greater timely downstream (one-way, to the user) capacity, such as disaster and emergency warning systems. Other local public service uses are largely represented in the list above, although BCS also can provide interconnection for many local service facilities (e.g., fire stations) that do not involve the jurisdiction or support of federal agencies. Merely utilizing BCS's capability to provide access to computer-based data and data analysis suggests numerous possibilities to improve the quality and economy of local government services. A related example would be the dissemination of transportation information and the parallel capability to assist in traffic control for all forms of mass transit systems.

Commercial services which might be provided via BCS rely heavily upon its unique capabilities vis-a-vis expanded computer-assisted communications, whether or not of a visual character. That even so limited a list as below can be suggested, when there has been so little previous stimulus to innovation in this area, argues for a concentrated BCS demonstration program:

-- Home security systems

-- Teleshopping (TV catalogues, admittedly only an extension of mail/phone capabilities, plus "impulse buying")

-- Banking services

-- Automated utility meter reading

-- Subscription programming (pay TV)

-- Market and opinion research (polling)

Proposed Program Approach

The approach outlined below is intended to minimize or eliminate many of the criticisms which might be levied at this initiative. The program will be clearly presented to Congress, the industry, and the public as experimental in nature -- a one-shot expedient -- to counter the criticism that the USG is embarking on a permanent subsidization or interference in this industry (or a discriminatory boost to one industry). The "big brother" objections will be minimized by putting system operation under private control to the maximum extent possible. The possibility of imposing financial burdens on a single private industry to accomplish broad public interest goals will be avoided by establishing the precedent that the USG pays for access to private transmission capabilities. Government interference in private sector innovation and investment decisions will be minimized by allowing private BCN operators to select commercial services (and their prices) which will be tested during the program.

There are two major elements to the proposed USG approach to the Demonstration Program. The first is a competitive capital grant fund to subsidize private development and construction of advanced BCS Systems, structured in such a way as to facilitate and maximize private funding of the project and also limit USG involvement in private activities to the minimum necessary level. The second is the stimulation, control and evaluation of public service "software" to be offered over the systems.

The proposed approach to subsidizing BCS capital construction costs utilizes an essentially categorical grant program, to be awarded on a competitive basis. It is contemplated that the Demonstration Program will operate in 3-5 cities, and that at least 50 cities of the proper size would be interested in participating. It is proposed that all communities (represented by the private BCN franchise) be invited to bid for federal subsidy, as follows:

-- The USG will issue an RFP which specifies only certain technical minimums and schedule constraints. The technical specs would be those which insure the availability of certain transmission capabilities that would support the kinds of public service programming anticipated. While these specs will also insure an advanced commercial applications capability, the USG will not pre-determine what commercial services must be provided. Certain additional specifications will relate to automated usage monitoring procedures which support the USG's interest in getting evaluative information. The USG will indicate that it will pay, at a pre-determined rate, for the channels used to provide federally-funded public services.

-- Each interested bidder will work with hardware suppliers of his choice to develop equipment designs which meet the USG specs as well as other features desired by the bidder. This procedure is expected to produce considerable competition at the hardware manufacturer level, and will probably stimulate considerable

private R&D activity. The bidder will have selected such prime and subcontractors as he wishes before he responds to the RFP, and they will provide the basis for his technical proposal.

-- Each bidder will also design and specify in his proposal the commercial services which, at a minimum, will be provided during the demonstration period, and will work with and secure commitments from such private enterprises as he wishes in his community (e.g., banks, home security companies, department stores, market research companies).

-- Each bidder will also work with and secure commitments from local government and non-commercial institutions as to the services which they wish to provide and the capital and operating costs which they will support. It is expected that local government will be anxious to help secure the USG subsidy for their community, and may accordingly offer to support a significant share of the project's costs.

-- Finally, each bidder will prepare a financial proposal which contains three elements: total cost for the proposed project; the share of the cost to be borne by the bidder and by local government; and derivately, the subsidy requested from the USG. Competition for the USG grant will occur because the bidder will estimate the operating costs and revenues expected from the system, and then calculate the amount of capital he is willing to invest at his desired rate of return. The more interested he is in getting this advanced system, and the more commercial potential he sees (and designs), the better "deal" he will offer the USG.

The USG can wait until bids are in to make final decisions about exactly how many systems, of what size, would be subsidized. If, for example, commercial service proposals were all quite similar, the choice could turn upon demographics (economic and social strata of the populations to be served), political factors (geographic diversity), and such other criteria as might be developed (e.g., hardware to be provided by the widest possible number of different manufacturers).

The key to the success of the Demonstration Program (as contrasted with avoiding its possible jeopardies) lies in the successful stimulation of innovative public service uses of BCS capability. As has been described in earlier sections, USG interest in public service programming reposes largely in mission agencies such as HEW and HUD. However, there is some chance that bureaucratic inertia (and budgetary intransigence) will constrain the enthusiasm with which such agencies might exploit a pilot program's potential. Furthermore, it is likely that knowledgeable staff support will need to be made available to assist mission agencies in understanding the possibilities posed by BCS, and analyzing the cost-effectiveness and other attributes of any particular service application.

Accordingly, it is proposed that a special project office be established within the Executive Branch to coordinate all federal utilization of the pilot BCN capability. An interagency office would also solve the problem of allocating limited channel availability among potential users. That is, such a project office will at minimum provide a brokering and coordination function to select and schedule federal public service programming. However, this office will probably perform a more critical task -- the development of public service programming concepts, the "selling" of such concepts to mission agencies, and the administrative direction to see that programming proposals (regardless of their source) are carried through to implementation on a timely basis.

While the above description would seem to assume that software funding is the responsibility of appropriate mission agencies, it would be very unwise to take the risk that funding limitations at any single agency would ever constrain the innovative exploitation of the pilot BCN systems. Accordingly, it is considered vital that the interagency project office have its own software development budget, which can either be parceled out to mission agencies where budget alone prevents their implementation of an otherwise acceptable concept, or utilized by the project office itself to test a concept which has not been endorsed by a mission agency. (The next section includes a discussion of the necessary size of such a supplemental software budget.)

Program Scope and Cost Estimates

In order to consider even preliminary cost estimates, it is necessary to define the appropriate scope of the Demonstration Program with reference to (i) the number and sizes of the demonstration cities or communities; (ii) the value and extent of programming or software; (iii) the time period during which the program will be conducted; and (iv) the degree of technology to be included (hardware).

The criteria applied to determine the scope should relate to the basic justification for the program as well as critical elements in its implementation -- specifically:

-- It should be an appropriate testbed for the likely services to be demonstrated. This suggests the need for minimum system size criteria, a sufficiently broad range of demographics (e.g., welfare services and sophisticated banking services would relate to opposite ends of the demographic spectrum), and a sufficiently broad technological capability.

-- It should have sufficient scope to permit the "critical mass" to operate.

-- It should have sufficient scope to motivate the "partners" in the program to play a significant role in the venture (viz. equipment manufacturers to invest in application technology, "software houses" to do likewise, local governments to commit their prestige by being willing to attempt to deliver local services via BCS to a significant degree, USG agencies to be willing to view the program as a significant element of their mission).

-- It should provide appropriate geographical balance so that the program will be viewed as being truly national in scope.

-- It should offer an approach designed to confront directly the most significant of the "problems of the cities." This suggests the need to insure that an urban ghetto is included.

-- In order to insure the validity of conclusions with respect to desirable (or undesirable) services, there should be more than one test site for each service.

Application of the above criteria suggest a program with the following ranges in scope:

-- 3-5 demonstration cities.

-- At least one (preferably two) cities to have at least 50,000 subscribers; the others, if any, could be smaller.

-- A program of four years duration (counting from January 1, 1974) to permit adequate time for installing and testing the services.

-- Category III technology with some limited use of Category IV.* in small point-to-point nets, e.g., clinics to a general hospital.

Within the range described above, we would propose the following as being a reasonable mid-point.

Proposed Program Scope

-- Four cities or communities:

  -- Two with 50,000 subscribers each at "maturity" (i.e., 75% penetration), and one of them a ghetto.

  -- Two with 10,000 subscribers each at maturity

  -- Total: 120,000 subscribers.

-- The installation of Category III home terminals for all subscribers. In addition, the installation of compatible Category IV equipment in a limited number of cities (e.g., hospitals, key traffic bottlenecks).

-- A program of four years duration, commencing January, 1974. During the first two full years, systems would be built and subscribers signed on to about 75% penetration. The second year would also see the beginning of testing some services. Years three and four would be devoted to operating experimental services and evaluating their performance.

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*The alternative technical capabilities of a BCS system can be categorized as follows:

Category I -- Conventional one-way broadcasting via cable with 20 or more channels available.

Category II -- Two-way interactive with narrow band (digital signal) return.

Category III -- Category II, plus a "frame-grabber" system which can display a single still frame on the receiver for an indefinite period and thus can be used for data retrieval.

Category IV -- Category III plus broadband two-way communication (for use between clinics and hospitals, or between schools).

Category V -- Category III plus a hard-copy facsimile capability.

Program Costs

Program costs are of three major kinds: (i) USG administration; (ii) hardware costs; and (iii) software costs.

The administrative costs would be generated by a USG program office. Its major task would include organizing the program, determining system specifications, issuing RFP's, evaluating competitive proposals, evaluating proposed software demonstrations by government and private organizations, and evaluating the results of the demonstrations.

The administrative costs for program management and evaluation would begin at $1 million for the first FY, peak in the second year at $4 million, and settle back to $2 million per year thereafter.

The hardware costs would be the categorical grants to build the systems. Estimates for these costs were developed, as shown in Exhibit I, on a per-subscriber basis. It was assumed (i) that in their planning, bidders would view only incremental (i.e., relative to Category I) capital and four year operating costs as their new investment, (ii) that bidders would estimate their discounted investment return as embracing 1/4 of the total incremental capital and five year operating costs, and (iii) that inflation of 10% would offset the costs over an average of the two years where the hardware expenditures would be made.

On this basis, USG hardware costs would amount to $763 per subscriber times 120,000 subscribers, or $92 million.

Software costs would consist of those borne by private industry, USG mission agencies, and the interagency project office (called OTP costs). These costs are extremely difficult to estimate at this time because the specific value of the demonstrations has not been defined. A parametric approach is contained in Exhibit II, which indicates OTP software costs of $99 million (out of a total of $394 million). One must realize, however, that most software costs are fixed and become commercially viable only when amortized against a large number of viewers, and that practically unlimited amounts can be expended on software. For example, the U.S. television industry spends about $1.5 billion per year to program about 3½ channels. When amortized over 60 million TV homes, however, this amounts to only $25 per home per year. By contrast, in the proposed demonstration, it is anticipated that $1100 will be spent per home per year, a not <u>totally</u> unreasonable figure, and one which can be reduced substantially if the program is successful and expanded to 10 million or more homes (the approximate size of the cable industry 3 years from today).

On the above bases, the pattern of total program costs would be as indicated below.

Demonstration Program Costs
($ millions)

	FY 73	74	75	76	77
Hardware	--	37	55	--	--
Software	--	30	25	23	21
Administration	1	4	2	2	2
Total	1	71	82	25	23
Total Cumulative	1	72	154	179	202

Exhibit I

USG Hardware Costs per Subscriber

	Technology		
	I	II	III
a. Investment (System + Terminal)	250	500	1,000
b. Op Cost/year	30	45	75
c. Op cost/5 years	150	225	375
d. (a + c)	400	725	1,375
e. Δ cost to USG			
-- Δ	0	325	925
-- factor	0	1/2	3/4
-- factor X Δ	0	163	694
f. Inflation @ 10%		179	763

Exhibit II

Parametric Approach to Software Costs

1. Assume a significant degree of consumer attention to be captured by experimental services. "Significant" is assumed to be 1/3 of average TV viewing time of six hours per household per day, or two hours per day.

2. Assume that since most services will be aimed at selective "audience" segments, the average participant will be interested in viewing 50% of all available programming. This does not include non-viewing due to competing program choices, because it is anticipated that a sufficiently large number of channels will be available, and that frequent "re-runs" will be made.

3. Assume cost of software is equivalent to $60,000 per average viewing hour. This represents approximately 50% more than high-quality non-entertainment film product cost at present, an allowance for the inefficiencies of working in an experimental medium encompassing the novelties of two-way interactive system and frame-grabbers.

4. The above is extended as follows:

   -- 2 hours per day ÷ 50% viewing = 4 hours per day of new program requirements

   -- 2 x 365 days/per year = 730 hours per year

   -- @ $60,000 per hour = 43.8 million per year

   -- times 3 years = 131.4 million

5. Assume relative contributions of private sector to be 25% of total. Thus, the remainder to be picked up by USG would be .75 x $131.4 million = $99 million. This is the figure that the project office would have under its direct control. It is realistic to expect that additional programming funds, totalling approximately an equal amount will be derived from the Departments engaged in the demonstration -- principally HUD and HEW -- and will budget for the accomplishment of their missions. Thus, total new programming produced for the demonstrations may total 4 hours per day.

Log No. _____

OFFICE OF TELECOMMUNICATIONS POLICY

INFORMATION MEMORANDUM

August 1, 1973

SUBJECT: Meeting with John Wells

TO: Tom Whitehead

FROM: Walter Sutter

BRIEF SUMMARY:

WHY IT IS WORTHWHILE TO READ:

FYI

GPO 931-271

OFFICE OF TELECOMMUNICATIONS POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20504

ASSISTANT DIRECTOR

August 1, 1973

To: Tom Whitehead

From: Walter Sutter

John Wells called yesterday indicating an important legal conference which he had to attend prevented him from completing the demonstration paper. He will deliver it to us this morning since it was agreed in the conversation that it would probably be better anyway for us to review it prior to meeting with him. I have agreed to accept the paper today, review it, and then schedule a meeting for the three of us early Thursday.

Walter Sutter

OTP FORM 6
December 1971

DOCUMENT CONTROL

SEC. CL.	ORIGIN	CONTROL NO.

DATE OF DOC	DATE REC'D	DATE OUT	SUSPENSE DATE	CROSS REFERENCE OR POINT OF FILING
—	2-13-73	2-13		

TO Director
FROM John D. Wells - TBS
SUBJ. Copy of this please for Approaching the "CATV Demonstration Project"

ROUTING	DATE SENT
HOL	2-13
Dir.	
Tuttle	

COURIER NO.	ANSWERED	NO REPLY
		✓

3

SEC. CL.	ORIGIN	CONTROL NO.

DATE OF DOC	DATE REC'D	DATE OUT	SUSPENSE DATE	CROSS REFERENCE OR POINT OF FILING
—	7-13-73	7-13		

TO Director
FROM John D. Ulle - TBS
SUBJ. —

Copy of the plan for Spraying the "CATV Demonstration Project" —

ROUTING	DATE SENT
WSH	7-13
Dir	
Cutler	

COURIER NO.	ANSWERED	NO REPLY ✓

4

TBS

MEMO from ... JOHN D. WELLS

Tom -

I provided the attached to Walt as a rough indication of how we would approach the Demonstration project. I've marked a few paragraphs where my attempt to raise management and policy issues of particular concern to this particular Administration is most evident.

(over)

TEMPLE, BARKER & SLOANE, INC.
MANAGEMENT AND ECONOMIC COUNSEL
36 WASHINGTON STREET
WELLESLEY HILLS · MASS. 02181

It is this sort of sensitivity, as well as guiding the project through WH and agency bureaucracies, that would represent the most important contribution to your in-house capabilities.

Walt seems amenable to writing an adequate Phase I contract taking us through WH/OMB approval.

John

cable demonstration

CATV Demonstration Project

The following materials are not in detail or organization intended to serve as a project or management plan, but rather represent TBS' preliminary thinking about the range of tasks that should be undertaken over the next 3-6 months, as well as more general projections of planning/study requirements in the succeeding months (which would presumably lead to "permanent" staffing of a project office in a federal agency by summer, 1974).

Most of the tasks that seem called for can be roughly identified on a time-sequence at least to the extent that OTP has adopted certain benchmarks relating to discussion/disclosure of elements of the project plan to outside parties.

You have indicated, for example, that within a month you would like to have the project sufficiently defined to receive White House/OMB review (and presumably, approval). There would appear to be two principal elements in this phase of the work.

First, the project's purposes and rationale should be documented in such a form as to receive the highest necessary levels of White House review (presumably, certain White House officials whose concurrence is required will not be available for an oral presentation). While this step may seem straightforward, there are certain aspects of project planning which will have to be sufficiently fleshed out so as to resolve some rather predictable White House policy/political concerns about this endeavor. For example, there is sure to be considerable question about whether the project can be designed, packaged and presented so as to mollify critical reactions by various interest groups (ranging from broadcasters and other industry groups with a stake in current industry structure and form, to many groups/persons who are concerned about the "big brother" dangers which argueably are posed by the project). While final resolution of these "packaging" problems cannot be proposed within a month, enough consideration must be given to such matters as will persuade White House officials that the problems are subject to <u>some</u> reasonable range of solutions. At an even more basic level, such descriptive documents will have to persuade the White House of the project's advantages -- features which we suspect will not be totally self-evident to some Administration officials and which will occasionally require delicate but nonetheless cogent treatment in written form.

The second element of this one-month phase is the preparation of adequate funding estimates for review by OMB. This should include necessary study funds for the remainder of this fiscal year, plus full project costs through 1976-7, preferably broken down by agency. Ideally, we would be able to indicate the extent to which participating agencies could fund the project without new authorizations, as well as where additional appropriations may not even be necessary because of the opportunity to apply existing general or categorical grant funding levels to this project. One question which will bear on the figures submitted to OMB is the likely extent of industry funding to be obtained. We will not be able to give firm figures in this regard, but ideally should have

considered various funding mechanisms and sources to thepoint where we can give OMB a range of federal dollars required under alternative assumptions, in addition to total capital requirement information. The process by which the funding estimates are prepared will essentially be an iteration between the cost parameters for certain classes/types of hardware and the set of services which are possible/desireable to provide through the BCN medium. We understand that hardware cost parameters are being developed independent of the efforts which we might undertake. However, a major job remains in defining a probable range of services to provide through BCN. Federal agency suggestions will have to be reviewed critically, and in some cases we might need to provide direct input to the original agency submission. The definition of OTP or "other" services will require considerable effort, particularly in the local government services area, although we understand you have arranged some outside assistance for this task. Once the "shopping list" of services is complete, they will have to be grouped according to broad technical requirements (e.g., passive two-way vs. iterative capability; random access retrieval, and so forth). The shopping list should then undergo a preliminary screening, we would suggest, in order to eleminate those services where the value of the function performed clearly has no potential of being reasonably matched by the cost of applying BCN technology. Other screening criteria will have to be developed if the services list exceeds technological limits or single-system BCN limits (although we might recommend different systems that test different service packages). In final submission to OMB, a range of service/hardware/cost options should be presented, with OTP's recommended first choice (and reasons) indicated. You have also suggested that OMB may wish to see a management plan at the time budget figures are presented, but much of such work for the later years of the project is, we understand, being provided on a preliminary basis by OTP personnel and outside contractors.

Assuming White House/OMB approval is received, the next project benchmark is an announcement to the Congress and public that the Administration is definitely undertaking such a project. You expect this disclosure will take place in late September. As alluded to earlier, such an announcement, in addition to presenting a reasonably definitive concept and operational plan, will have to mollify a diverse group of potential critics. We believe that a saleable project will require much more than adroit packaging; basic project design will in all likelihood need to respond to some of the most serious potential criticisms.

During this second phase, project definition will have to achieve increasing levels of detail and certainty. Such tasks will of course extend well beyond the first public announcement, and accordingly we have discussed further work below in two time periods -- August thru December, and January thru June.

In the August-December period, we envision the need to begin tasks such as, but not limited to, the following:

--Refining services packages according to criteria such as technical requirements, cost effectiveness in light of value of service, federal/state/local government/commercial services overlap, and so forth.

--Updating OTP's understanding of technological limits and hardware cost factors.

--Matching final service packages with technical requirements to produce refined budget estimates and overall project schedules and plans.

--Securing agency cooperation in and commitment to an increasingly intense project effort, including the preparation of budget requests for the January submission of the President's budget to Congress.

--Finalizing financing plans (securing industry investment commitments, designing financing/ownership/management programs for the demonstration systems, etc.).

--Selling industry and the public (including Congress) on the merits of the project.

In general terms, this August-December phase will focus on continued data collection and project definition with respect to political, service, technological, and financial considerations. Many key decisions will be made in this period, some of which aren't obvious from the above list of tasks.

For example, questions such as these will have to be resolved:

--The role of local government control over project design and implementation.

--The extent to which requirements for project evaluation should influence project/hardware/service package plans and design.

--The effect of project financing arrangements on post-demonstration ownership and control of the BCN systems.

--The effect of all aspects of project design on the likelihood of institutionalizing federal subsidization and regulation of telecommunications.

Tom - This one scares me. The project must not be allowed to set back your de-regulation efforts.

We would also note that during this period, it is critical that project design be approached with a proper balance between the objectives of testing technology and testing the marketability of services. In our view, previous studies have shown a (predictable) bias toward testing technology that is somewhat inappropriate.

The critical long-term commercial question, we submit, is marketability, not technology. Furthermore, the rationale for government intervention must be closely tied to the marketability of government/public services. This "approach" philosophy affects the focus of much of the technological investigation that would take place in the August-December period. Two examples come to mind.

--As desireable as it may seem to use the project to advance, and test advanced technology, it is vital to the project that the hardware perform. That is, it is impossible to test marketability if the box doesn't work. This viewpoint will inevitably result, as we feel it must in this project, in less technical risk-taking than many CATV industry constituents might wish to see.

--Similarly, the potential for eventual economies in hardware production must be a critical guide in writing technical specifications and selecting service packages. Gold-plated boxes which provide marginal services and offer little prospect of long-term production economies should have no place in the project.

Harsh as it may seem, this is the pragmatic approach we would prefer to bring to the management of this project. In short, strong management/policy views must be brought to bear on a high-technology area which, left to certain interest groups, could wait years before finding practical application. The federal government should be hesitant to direct this project in a way which leaves much room for a technical boondoggle and consequent practical failure. We are also suggesting that in the August-December period, a critical output would be the drafting of management guidelines for the later preparation of technical specifications.

In the January thru June period, many of the above tasks would continue. However, generally the work during this period should be focused on the following:

--Site selection for the demonstration.

--Drafting technical specifications, and possibly conducting brief hardware testing/demonstration projects to insure workability of advanced concepts.

--Making concrete arrangements for non-federal financing.

--Designing, creating and "programming" a permanent project staff so that implementation is as goof-proof as possible. All key policy/management issues should be anticipated and resolved before the project is handed over to an agency staff.

We have not attempted to provide further definition of this phase, since it is somewhat speculative at this time. Like all of the thoughts herein, what we have discussed is representative of the approach we would try to bring to the project.

In closing, we should note that the above material overlooks a critical element of task definition: the "process" involved, apart from the subject matter, and what that process suggests about required staffing capability. Much of the work requires a project management capability in the context of an inter-agency effort. Substantial direct contact with agency personnel will be necessary to elicit and refine initial services proposals, prepare budget estimates and comparative cost-effectiveness data, and generally achieve cooperation and a commitment to the timely execution of this project. In addition to an understanding of bureaucratic realities, it is necessary that the project staff appreciate many of the political vagaries -- within the Administration, on the Hill, and in various public and industry groups -- which will have bearing on the project's success. Finally, the project requires the substantive expertise to address management and policy issues with respect to an industry/service that has unique technological and financial characteristics.

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