Computers

OFFICE OF TELECOMMUNICATIONS POLICY

ROUTE SLIP

ACTION	☐
Concurrence	☐
Signature	☐
Comments	☐
For reply	☐
Information	☒
Per conversation	☐
Discuss with me	☐

TO Mr. Joyce

FROM C. H. Culpepper DATE April 5, 1971

REMARKS

cc: Mr. Whitehead
Dr. Mansur
Lt Col Enslow

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF TELECOMMUNICATIONS POLICY
WASHINGTON, D.C. 20504
April 5, 1971

STAFF REPORT -- Government Computer Systems Having Communication Peripherals (As of June 30, 1970)

SCOPE OF STUDY. The General Services Administration maintains a file of data which describes computer systems used by the Federal departments and agencies. This study was an attempt to see if the file could be searched by a computer and made to produce useful statistics about those systems which are in effect computer/communication systems.

APPROACH. System descriptors used in the data file include a category entitled, "Communication Terminals and Related Units." Within this category are found seven discrete types of peripheral equipment, as follows:

50 Card Terminals
51 Magnetic Tape Terminals
52 Paper Tape Terminals
53 Printer Terminals
54 Input Console
55 Multiplexer, Control, Distributor, Buffer, Adapter
56 Other Terminals and Related Units

These devices, in the main, are not communication equipment. There are other descriptor codes, however, than can be used when communication is not involved. It would thus appear that the 50-series codes would be entered in the file when the devices listed are remote from the computer or otherwise require communications. It was decided therefore to retrieve from the file and make a count of all those systems containing any of the foregoing 50-series codes.

It was decided that a separate count would be made for each department and agency having equipment with 50-series codes.

It was further decided to attempt to categorize systems as to cost, in effect to discover if most computer-communication systems are low-cost or high-cost items. Accordingly, system cost categories were arbitrarily established as follows:

(a) Less than $100,000
(b) $100,000 - $199,999
(c) $200,000 - $399,999
(d) $400,000 - $999,999
(e) $1,000,000 - $1,499,999
(f) $1,500,000 or more

In summary, it was decided to count all computer systems in the Government inventory having 50-series codes; to create a separate count for each agency involved; and within each agency, to create a separate count by system cost category outlined above.

RESULTS. It was found that the Government inventory describes 5,521 computer systems. Of this number, 1138 systems (about 20%) have communication peripherals. Equipment in the Federal inventory represents a cost of $2.8 billion. The 1138 communication-oriented systems represent a cost of $998.5 million, or about 35% of the total. Thus, 20% of the total systems in the inventory (which comprise communication-oriented systems) represent 35% of the total cost. (TAB A)

The 1138 communication-oriented data processing systems are used by 30 Federal Government elements. (TAB B)

Five Federal elements use 85% of the total (964 systems). These large user agencies are: AEC (110); Air Force (328); Army (108); NASA (217); and Navy (201). (TAB C)

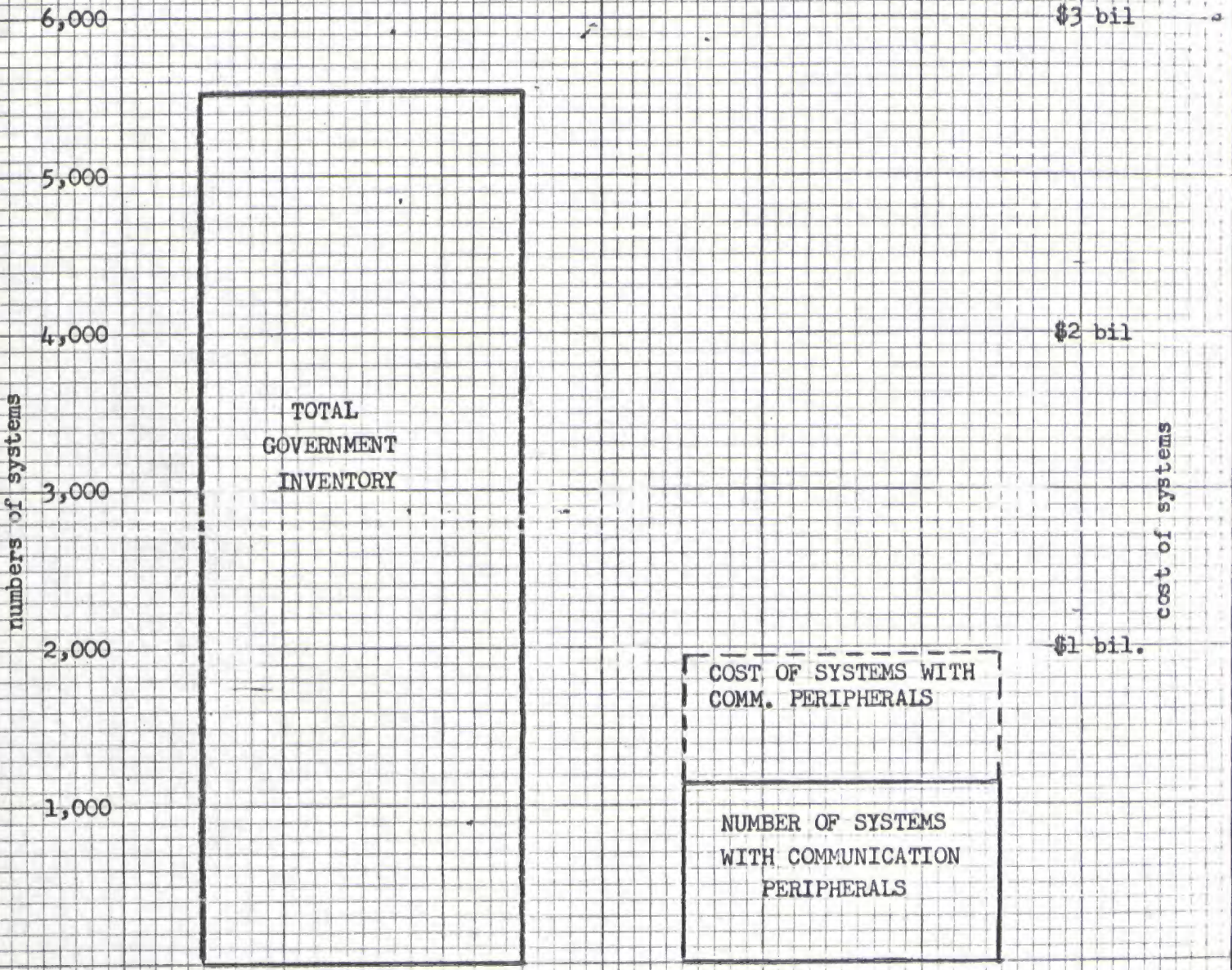
In terms of numbers, communication-oriented systems are distributed across the six arbitrarily-established cost categories, with a slightly larger percentage (24%) in the $200,000 - $400,000 range, and a smaller percentage (7%) in the $1 million - $1.5 million category. In terms of costs, however, an extremely heavy concentration is evidenced in the fact that more than $600 million (65% of the total $998.5 million) is invested in communication-oriented systems costing in excess of $1.5 million each. Thus, 17% of the systems represent 65% of the cost. It can further be said that the 24% of the systems falling in the cost categories of $1 million and above represent 75% of the total spent for communication-oriented data processing systems. (TAB D)

CONCLUSIONS. The statistics produced in the study can not be said to relate explicity to on-line computer-communication systems. They do demonstrate, however, that communication-oriented data processing systems represent a significant percentage of the total inventory, both in numbers of equipment and in costs. The statistics provide another indicator of the need for a more detailed examination, such as that being undertaken by the OTP, if the convergence of the computer and communication technologies is to be fully understood. And they point out the major user agencies and cost-category of systems that comprise the bulk of the systems to be reviewed.

C. H. Culpepper

Attachments (4)

TAB A



GOVERNMENT COMPUTER SYSTEMS HAVING COMMUNICATION PERIPHERALS
AS OF JUNE 30, 1970

TAB B

NUMBER AND PRICE OF COMPUTER SYSTEMS CONTAINING COMMUNICATION PERIPHERALS AS OF JUNE 30, 1970

AGENCY	LESS THAN $100,000	$100,000 $199,999	$200,000 $399,999	$400,000 $999,999	$1,000,000 $1,499,999	MORE THAN $1,500,000	TOTAL
AEC	31	23	18	15	6	17	110
AF	29	59	121	60	14	45	328
AGRI	1				1	2	4
ARMY	14	17	23	15	14	25	108
COMM	1	2	1	6	2	7	19
CG			1				1
DASA				2	1		3
DCA		2	2	1	4	3	12
DC GOVT				2	1		3
DOT	16		1	5		7	29
DSA	9	2	1	15	3	6	36
FDIC						1	1
FRS						1	1
GPO				1			1
GSA			1	2	2	1	6
HEW	2	2	3	13		6	26
INT	1		2	2		2	7
JUS						1	1
LABOR	1						1
L. CONG					1		1
NASA	41	30	53	53	6	34	217
NAVY	15	58	40	43	19	26	201
OEP						1	1
OSD				2	1	1	4
POD					2	3	5
S. I.				1			1

AGENCY	LESS THAN $100,000	$100,000-$199,999	$200,000-$399,999	$400,000-$999,999	$1,000,000-$1,499,999	MORE THAN $1,500,000	TOTAL
STATE						1	1
TREAS						2	2
TVA					1		1
VA		1	2	4			7
	161	196	269	242	78	192	1138
	(14%)	(17%)	(24%)	(21%)	(7%)	(17%)	
SYST. COST	8,522,800	28,787,500	81,799,400	145,229,500	96,862,900	627,279,200	988,481,000
% of TOTAL	(1%)	(2%)	(8%)	(14%)	(10%)	(65%)	

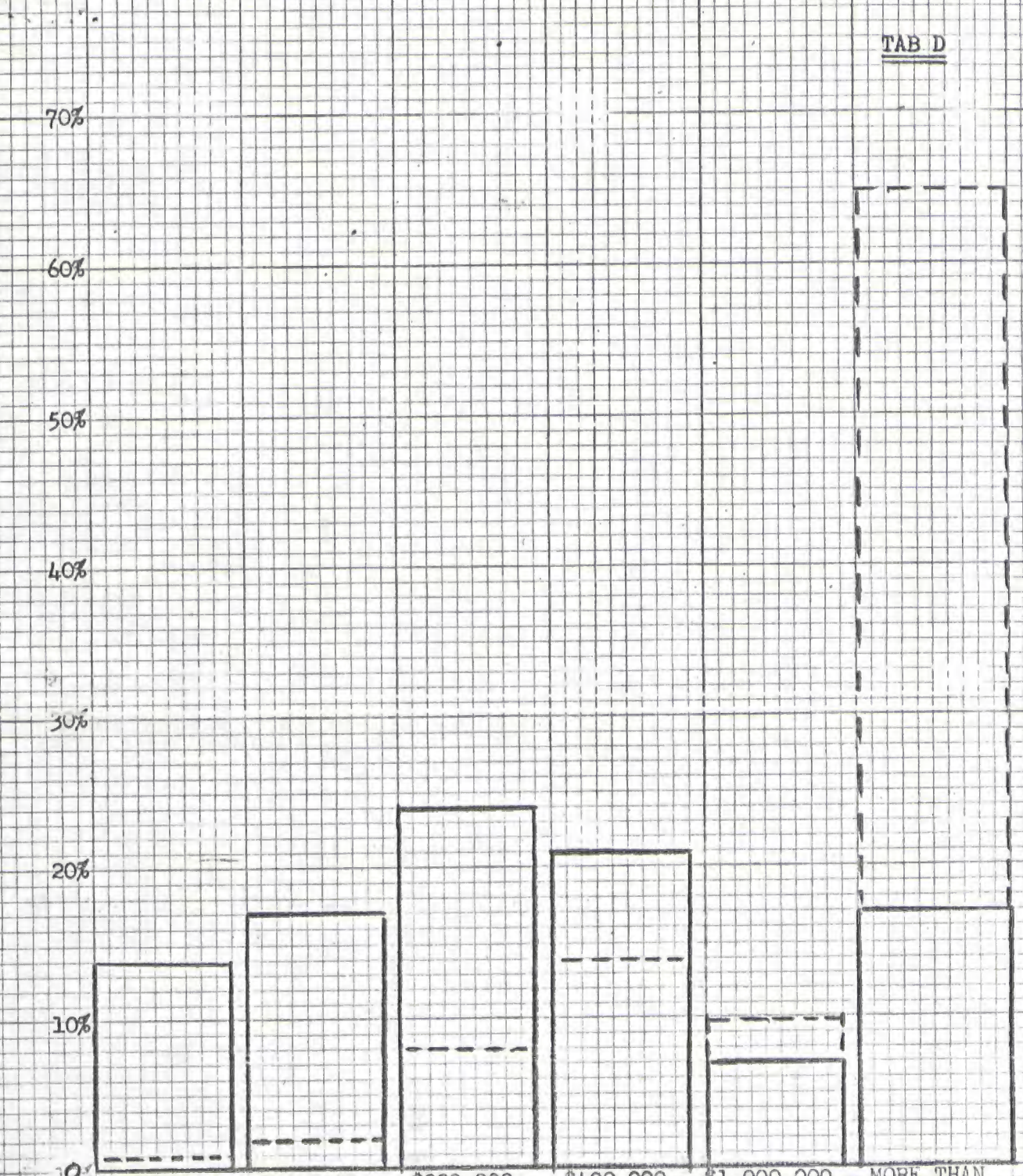
OTP/CHC/4-5-71

TAB C

GOVERNMENT COMPUTER SYSTEMS HAVING COMMUNICATION PERIPHERALS

AS OF JUNE 30, 1970

TAB D



GOVERNMENT COMPUTER SYSTEMS HAVING COMMUNICATION PERIPHERALS
AS OF JUNE 30, 1970

Percentage of total number of computer systems having communication peripherals.

Percentage of total cost of computer systems having communication peripherals

~~Alex Doyle~~
CTW
C Joyce
Computers

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

Date: February 22, 1971

Subject: OTP Use of the OEP Computer

To: Mr. Orcutt Drury
Executive Assistant, Resource Analysis

This will confirm the understandings reached at the meeting in Mr. Gaskill's office some weeks back.

The OTP is exploring the possibility of developing an on-line, computer-based information system to assist in program management. Since the project is still in the vary early stages, discrete applications have not as yet been indentified. It is not yet possible, therefore, to determine the amount of computer time which will be required. It seems safe to assume, however, that the requirements will be small during the coming months during orientation and familiarization, program development, file construction, and pilot test of the system.

It is in the best interest of the Government for the OTP to make use of OEP's UNIVAC 1108, at least during system development, testing, and initial operations. Since the cost of computer time for the OTP will be relatively minor, transfer of funds to pay for it will not be required. However, if and when the OTP requirements begin to exceed the minimal, OEP/OTP discussions will be held to decide upon equitable reimbursements, probably on an annual basis.

C H Culpepper
C. H. Culpepper

computers

1. SRI Draft Report 7379B-1: Policy Issues Presented by Interdependence of Computer and Communications Services by Donald A. Dunn, February 1969
2. SRI Research Report 7379B-2: Analysis of Policy Issues in Responses to FCC Computer Inquiry by L. I. Krause, February 1969
3. 7379B-3: Decision Analysis of FCC Computer Inquiry Responses by A. J. Lipinski, February 1969
4. 7379B-4: Patterns of Technology in Data Processing and Data Communications, February 1969
5. 7379B-5: Digests of Responses to FCC Computer Inquiry by A. J. Lipinski, February 1969
6. 7379B-6: Preface to Theory of Regulation by R. A. Howard and J. E. Matheson, February 1969
7. 7379B-7: Dynamic Financial Model of a Utility, by A. J. Lipinski, February 1969
8. SRI Study of Land Mobile Spectrum Utilization-Interim Report, March 1969
   Part A: Acquisition, Processing and Analysis of Spectrum Occupancy Data
   Part B: Analysis of Spectrum Management Problem
9. SRI Study of Land Mobile Spectrum Utilization-Final Report, July 1969
   Parts A & B: Titles identical with above.
10. SRI Final Report (Phase 2): The Function of a Regional Center in a National/Regional Spectrum Management System, September 1969
11. Communications & Systems, Inc. Draft Report, Vols. I & II: Frequency Assignment Techniques for Microwave Systems, August 1970
12. Texas A&M Research Foundation Report: A Study and Forecast of Electromagnetic Spectrum Technology, Part II, by John P. German

10-23-70

FEDERAL COMMUNICATIONS COMMISSION

Summary: 1972 Research and Policy Studies Program

Projects included in current request:	Contracts ($K)	In-house Positions	In-house ($K)
I. SPECTRUM MANAGEMENT			
1. Economic & Public Benefit Considerations in Spectrum Allocation	25	2	45
2. Effectiveness of the Enforcement Program	125	2	30
Subtotal, Spectrum Management	(150)	(4)	(75)
II. MASS COMMUNICATIONS			
1. Satellite/Cable Network	100	-	-
2. Future Developments in Television	200	2	40
3. Broadcast Renewal Automation	75	1	16
Subtotal, Mass communications	(375)	(3)	(56)
III. INTERCOMMUNICATIONS			
1. Impact of Pricing upon Service to the public	100	1	25
2. State Commission Information Requirements	75	1	19
3. Educational Communications Requirements	100	1	25
Subtotal, Intercommunications	(275)	(3)	(69)
TOTAL	800	10 (7 m. y.)	200
Alternate projects, dependent upon outcome of present efforts, relative priorities and interagency coordination:			
1. New Land Mobile Services	175	1	25
2. Home/office communications demand	200	3	55
3. Noise measurement/abatement	100	2	40

October 22, 1970

FEDERAL COMMUNICATIONS COMMISSION

Research and Policy Studies Program - Description

This program is designed to identify, clarify, and provide objective information to the Commission on policy issues prior to the times that decisions are required in major issues. Given the lead time required for the budgetary process, contracting, and actual investigation, this generally means that the program is oriented to decisions the Commission will make two or three years from now.

Because of budget constraints, the funds appropriated for research and development for fiscal year 1971 will be used primarily for equipment and contract support to implement the land mobile spectrum center. Very little, if any, funding will be available for other research and policy studies in 1971. However, many of the 1970 contracts were not awarded until late in the fiscal year and the work will actually be going on through most of fiscal year 1971. Vigorous planning and implementation of 1972 projects, now in a very preliminary planning stage, will permit the Commission to get the 1972 projects underway early in the fiscal year and maintain a continuing infusion of objective analyses into the Commission's consideration of policy issues.

Where it appears feasible, the basic orientation of the studies proposed is to look at communications problems from the perspective of the user ard assess the combined impact and regulatory implications of technological developments that will affect him. For example, one project will look at the communications needs of education and assess the effect of technological developments such as video tape playback, cable, satellites, picturephone and other developments as a basis for determining what actions the Commission should take to ensure that educational communications needs are best satisfied.

In scope the program is largely concerned with broad problems induced by the rapid technological change in the communications industries. In most cases these problems involve several industries or industry segments and thus are of interest to several bureaus in the Commission staff. Consequently, several of the projects in the program will require inter-bureau coordination and management by a staff task force or other such arrangement.

The proposed program is a balanced combination of in-house and contractual effort; the contracts are intended to supplement in-house capability, not replace it.

In order to ensure the close coupling of contractor efforts with Commission intent and need, full time participation by one or more Commission staff members is proposed for every project. This will preserve the availability for future use of the expertise developed in the studies. If these investigations are to be of maximum usefulness, it is essential that a significant portion of the research funds be used for additional in-house staff.

A high degree of coordination and cooperative investigation is proposed to take full advantage of studies in other organizations, such as RAND, Brookings, the Sloan Commission, Stanford University, Stanford Research Institute, the National Academy of Science and particularly with other government agencies (OTP, HEW, OED, HUD and Commerce). This approach will give the most useful information at least cost to the FCC even though it may involve more complex management arrangements. Several projects are proposed for joint funding with other agencies, modeled somewhat upon our present participation with HUD and other agencies in the study of the role of communications in urban problems.

The following project descriptions represent the current status of our planning. While individual projects are subject to considerable further refinement and negotiation, they indicate the scope, content and cost of the recommended program.

I. SPECTRUM MANAGEMENT

1. Economic and Public Benefit Consideration in Spectrum Allocation

$25,000 consulting; 2 positions and $45,000 in-house

A long term effort is needed to improve the Commission's spectrum allocation process by the explicit consideration of pertinent economic and public benefit factors.

A preliminary review of previous reports and recommendations (including the Joint Technical Advisory Committee, Stanford Research Institute, GE-TEMPO, National Academy of Engineering, and Computer Sciences Corporation studies) in this field has been completed. These reports have high-lighted the need for basic workable definitions of electro-space for use in decisions involving spectrum trade-offs, as well as the need for additional research in how to include economic and social benefits in those trade-offs.

A review of present FCC spectrum allocation procedures has indicated that in an informal, subjective way, such considerations are usually taken into account. For example, land mobile channels for public safety use have purposely not been as heavily loaded as those for commercial use. However, such standards have not been developed and made explicit in many other cases.

This project will attempt to define and isolate the factors which are actually relevant to spectrum allocation decisions and postulate the weights which should be applied to each factor in the final decision. In effect, it will develop a model of spectrum allocation decision making which takes into account economic and social considerations as well as technical and operational considerations. For example, such a model would consider both the private and public costs of allocating frequencies to one kind of user instead of another, and the cost of moving users from one frequency band to another band.

In scope, the FCC project will be limited to the frequency range (25-1000 MHz) which will be studied and can be monitored by the spectrum management center to be established in Chicago. The existance of this monitoring capability will provide a data base superior to that now available and will permit empirical evaluation and testing of the results of any model developed.

The project will be conducted in-house with individual consultant assistance and in close coordination with similar but broader studies planned by the Office of Telecommunications Policy and the Department of Commerce.

2. Effectiveness of the Enforcement Program
$125,000 contractual; 2 positions and $30,000 in-house

Examine the effectiveness of FCC enforcement activities, review the correlation between the deployment of Commission enforcement resources and the shifts in the problems, analyze the implications of growth patterns in the communications industry for the FCC enforcement program.

The task of enforcing the Commission's Rules and Regulations increases in both size and complexity as (a) the total number of licensed stations increases, (b) the volume of message traffic increases, (c) more stringent technical standards and operating procedures designed to improve spectrum utilization are implemented, (d) new uses of radio come into being and (e) new communications channels are opened up.

This study will investigate the impact of predicted future growth in the use of radio on the overall FCC enforcement program. Some of the specific factors to be analyzed are: (1) Role of licensing procedures and administrative or criminal sanctions (by whomever imposed) in facilitating the Commission's total enforcement objectives; (2) The nature and causes of noncompliance; (3) The potential contribution of automation and new modern equipment to increase the productivity of field enforcement activities; and (4) Whether the field office locations are optimum, relative to the location of major elements of enforcement workloads such as citizens band violations.

This project will build upon the results forthcoming from our on-going "PEP" study of the effectiveness of intensive enforcement in the citizens band and the analysis shortly to be completed of a survey of the degree and kind of utilization of the citizens class D service.

II. MASS COMMUNICATIONS

1. Satellite/Cable Network

$100,000 contract; existing staff

Anticipating further development of cable systems in major markets, the Commission expects proposals for interconnection of cable systems via satellite, creating one or more nationwide cable television networks.

We propose to explore the potential impact of such a network upon other sectors of mass communications media and upon the public. For alternative levels of interconnection and development of programming, expected impact would be forecast for the existing broadcast networks, local station affiliates, independent stations, local cable origination, public broadcasting, and the viewing public.

A related question, the potential for satellite-to-home broadcasting would b deferred, pending completion of the current Commerce Department study of satellite communications for Alaska and further development of proposals for satellite use in Hawaii.

2. Future Developments in Television
$200,000 contract; 2 positions and $40,000 in-house

This study would supplement the broad inquiry into future needs of television, proposed by the Broadcast Bureau in connection with docket 18262 (the allocation of UHF channels 71-83 for land mobile services). A number of technological developments are in prospect which can be expected to change the mix of means by which television reaches the viewer. These include cable, satellite/cable interconnection into a national network, satellite to home broadcast, video cartridge playback equipment (with and without cable distribution from libraries of tapes), and high-resolution television via cable or over the air.

In particular, the potential benefits of high-resolution television by cable, and possibly over the air, must be weighed against the corresponding socio-economic impact. It has been a quarter century since the present line spacing standards for television were established. Advances in electronics have made feasible the introduction of high-resolution service via cable and perhaps over-the-air. The availability of excess channel capacity on cable systems will greatly facilitate the conversion process since cable systems could broadcast both high and low resolution pictures on separate channels. A competitive response by UHF to offer high-resolution broadcast would have an obviously large spectrum requirement which must be weighed against the importance of preserving free over-the-air local services.

These developments have serious implications for spectrum allocation and other regulatory policies. Because of the inter-related nature of the developments, it will be most fruitful to examine the problem from the standpoint of viewer demands for television services.

While the impact of conventional cable television systems and commercial substitution are now being explored in docket 18397, the proposed study would integrate the findings in that inquiry with those of the satellite/cable network study. It would draw also upon the findings of the educational needs study with regard to the technical and economic status of the various technological developments in order to produce a composite analysis of the mixture of techniques expected to be used for television.

3. Broadcast Renewal Automation
$75,000 contract; 1 position $16,000

A preliminary in-house study is underway to determine whether quantitative information on broadcast renewal applications can be extracted, compared with data for stations in similar markets on a nationwide basis and utilized for automatic screening of applications with regard to programming. The present study is limited to some 200 television stations in the top 50 markets.

If the results of this study appear promising, a feasibility study is proposed to examine aspects of automating the preliminary screening of renewal applications and evaluate the proposal in terms of its potential costs and savings, if extended to more than 7000 station renewals.

As a by-product, the data bank which would be generated by putting renewal data in machine usable form would facilitate future statistical analyses for publication and for further refinement of renewal standards.

If the results of present efforts should not appear to be useful, consideration would be given to utilizing these funds for improvements in the present methods of processing renewal applications.

III. INTERCOMMUNICATIONS

1. Impact of Pricing upon service to the public
$100,000 contract; 1 position, $25,000

In view of the expected increase in competitive overlap in services which can be provided by either common carriers or cable systems, a comparative analysis is proposed of the role of pricing practices upon the introduction and growth of new services.

Particular attention would be given to the use of pricing as a tool by the Bell System to expand or discourage the growth of new services. In its comments to the Rostow Task Force, the Bell System claimed that it has been vigorous in making new technological developments available and argued that its vertical integration expedites the innovation process. However, it is apparent that in some cases demand-based pricing has been used to slow the growth of some services, while elsewhere cost-based pricing has been used, typically where a competitive service was available.

As cable systems expand into two way and broadband services, they may utilize incremental cost pricing for new services or even cross subsidize entertainment services from subscriber fees. Potentially, this could lead to cable systems providing services which, from the public benefit standpoint, might better be provided by the telephone system; meter reading and fire and burglar alarms are possible examples.

While the proposed analysis would serve as additional input into the vertical integration investigation, its principle use would be in the development of policies which would specify the conditions under which different pricing policies should be encouraged in the public interest. Possible application of the findings might lead to encouraging carriers to offer some services on an incremental cost basis (as is being done for public television interconnection) or the application of price regulation to cable systems, now being considered under Part V of docket 18397.

2. State Commission Information Requirements
$75,000 contract; 1 position, $19,000

Since 1967, Senator Lee Metcalf, several other senators, as well as certain members of the House of Representatives have been interested in, and actively urging, the greater use of electronic data processing facilities in order to provide useful information on a timely basis to State Commissioners, customers and other interested parties concerned with the regulation of gas, electric, telephone and telegraph services. Having been made aware of Senator Metcalf's interest in this matter, the Office of Management and Budget, the National Science Foundation, the Federal Power Commission and the Federal Communications Commission have become involved in one way or another with seeking ways and means to ascertain the nature of the need for the computerized information system and its implementation.

The FCC staff, in cooperation with the FPC and NARUC, has conducted a survey of the State regulatory Commissions and found that although there are few such commissions which presently utilize electronic data processing in carrying out their regulatory functions, a significant number of them are interested in making use of such techniques. Twenty-nine out of forty-nine responding commissions favored participation in a nation-wide computerized information system providing for the interchange of accounting, economic, statistical and other data between State agencies, Federal agencies and the regulated companies; eleven did not favor participation, and nine had no opinion on the matter.

The next logical step, it would seem, would be a feasibility study concerning the computerized information system. It is proposed, therefore, that á research project be undertaken to inquire into the following matters, among others:

1. The kinds and quantities of information thought desirable for interchange among those participating in the system.
2. Information flows: Intra-federal, State-to-State, Companies to Commissions, Commission to the public, etc.
3. The kinds of processing to be undertaken and the kinds of data and information to be made available to the public.
4. The types of equipment that should be utilized, including central processors, peripheral units, communications facilities, interfaces, etc.
5. Standards for media, codes, formats, etc.
6. The costs of such alternative systems as may be feasible.
7. Administrative and operational responsibilities in any feasible system.

3. Educational Communications Requirements
$100,000 contract; 1 position, $25,000

An analysis is proposed of the instruction, education and cultural communications requirements in terms of the quantity of information to be transferred (voice channel, video, etc.), the locations involved, the distribution pattern required, and the time delays that are acceptable. This is expected to provide a better perspective for policy decisions affecting these services than the present reliance upon case-by-case handling.

The project would benefit from a similar current project in the Office of Telecommunications Policy to specify governmental user requirements in terms of functional needs, as a tool for the review of agency requests for spectrum assignments.

It is apparent that the present trend in educational communications toward intermixed combinations of transfer and storage technology will continue. As the systems become more inter-related it becomes more difficult to assess the suitability of a requested action as the optimum solution to a communications problem.

Heretofore, most research studies in communications needs have been oriented around a particular type of service. For example, a study of cable systems would include material on the uses that would be made by education of CATV. The use of one service by education may greatly affect the use or, more accurately, the need for use of another service. Studying the services separately would not provide a comprehensive picture of the inter-affectiveness of services.

Thus, the orientation of this research study will be around the user needs -- in oversimplified terms, around the concept of "what does the customer need?" It might be found, in this manner, that the increased use of CATV and cartridge tape records for closed-circuit distribution may require reservation of CATV facilities in each community while materially decreasing the need for ITFS channels. Or it may be found that the multi-media use now authorized for ITFS may result in that service becoming the primary medium for instruction, and that the need for in-school programs on broadcast frequencies will be virtually eliminated.

The study will include the present and future communications needs of education, including those not regulated by the FCC. The media to be considered include VHF and UHF broadcast stations, common carrier services, safety and special frequencies, ITFS, satellite, cable including CATV, closed-circuit systems, VTR adaptations

including cartridge recorder and playback units, film and tape libraries, international exchange, possible laser and holograph developments, and others.

Results of the study should include:

A. The technical and engineering identification of communications needs technology most likely to provide the needed information transfer;
B. The sources of "software";
C. The allocations and licensing implications;
D. The federal regulatory and administrative implications; and
E. The methods, public and private, appropriate to financing such a system.

The expected results of such a study should indicate which communications services will be needed by education in the future and to what extent. Accurate results will better enable the FCC to make some decisions now on reserving (and unreserving) bands, frequencies and services for education. Without such a study, the FCC will have no choice but to make ad hoc decisions on educational needs, hopefully considering the primary role education plays in the growth of our society and reserving spectrum accordingly, but increasingly faced with demands and needs for other segments of society for the scarce frequency space.

It is desirable that this proposed study be undertaken in cooperation with the Bureau of Libraries and Educational Technology of the Office of Education of HEW. That Bureau has a vital interest in educational communications needs and services and has expressed its interest in conducting such a study in cooperation with the FCC.

Alternate projects, dependent upon outcome of present efforts, relative priorities and interagency coordination:

1. New Land Mobile Services
$175,000 contract; 1 position, $25,000

Land mobile is an extremely active and growing service, competing for more space in an already crowded spectrum. Satisfaction of the demand foreseen by some parties will require far more relief than that recently provided in dockets 18262 and 18261.

A two phase comprehensive study is proposed to determine the demand for mobile services from the standpoint of the user, given various alternative levels of cost and characteristics of service. Additionally, the public benefits of such services would be evaluated. The work of the Land Mobile Committee and the filings of docket 18262 would be valuable inputs to this phase of the study. The previous study and data of the Stanford Research Institute and the experience of the Commission's Spectrum Management Task Force will provide a substantial base for the review of present and planned use of land mobile.

The second phase would be to assess the feasibility of new land mobile communications systems from technical design and operational aspects. Present systems and proposed new concepts will be compared and evaluated in terms of technical efficiency, economic feasibility, compatibility, and effectiveness in meeting user requirements. A comprehensive survey of the field would be made, including investigation of:

- suitability of microwave frequencies for land mobile
- cellular systems
- spread spectrum systems
- multiplexing

The end result would be a comprehensive analysis of land mobile communications possibilities in relation to user needs and public benefits.

2. Home/office communications demand
$200,000 contract; 3 positions, $55,000 annually

A broad inquiry is proposed into the regulatory questions arising from the forthcoming introduction of broadband, two way services into the home and office, via one or a combination of cable, picturephone, radio, and associated recording and playback equipment.

Numerous proposals have been made that small businesses and individual homes have wide band facilities to provide not only TV but such things as library readouts, display of all sorts of data, two-way video and other services.

Two-way communication between the CATV subscriber and the system may become available to subscribers of existing CATV systems within the next year -- providing optional services such as video shopping, burglar alarm protection, hotel reservations, meter reading, and facsmilie for hard-copy documents.

The Bell System is developing picturephone services, including a variety of computer routines to offer computational shopping and information query services, conference hook-ups, high resolution display and hard copy print out.

The study proposed would be a two sided analysis; looking at user requirements in terms of services needed, and on the other side, looking at what technology has to offer. Economic, political and social values will be applied to arrive at a measure of the value of broadband services to users and to assess the public benefits of such services. In doing so, it would draw upon other studies in process and recently completed (HUD/NAE, Sloan Commission, SRI, A.D. Little). The technical and economic viability of the various proposed services would be evaluated to determine the possible demand upon the spectrum and the regulatory implications involved, particularly for those services which may have a relatively large public benefit as well as value to users. These might include, for example:

- newspaper distribution: what is its potential for providing increased diversity of opinion? what impact would it have upon the solid waste disposal problem?

- postal services: what is the potential benefit of cable distribution of second and/or third class mail, for local advertising, for community affairs information?

- fire and intruder alarm services: what are the public benefits of such systems, what are the relative merits of different types of systems?

The overall purpose of the study would be to put the Commission in a better position to identify the benefits inherent in future broadband proposals

3. Noise Measurement/Abatement
$100,000 contractual first year, $200,000 second year; 2 positions and $40,000 year in-house

The overall objectiveof this study is to achieve a reduction of man-made rad noise to acceptable levels. The present lack of knowledge and agreement on the present level, expected levels of noise and how to measure noise, leads to reduced ranges of radio transmissions, inefficient use of the spectrum, and communications systems designed for greater radiated power to mask noise background.

Noise is not an isolated area of study, but a factor to be considered in any communications research. A list compiled by JTAC (Joint Technical Advisory Committee), entitled "Available Information of Recent Man-Made Noise Measurements" shows that data have not been collected in a standardized pattern and is usually intended for a specific purpose. Comparison of results is most often not possible.

Examination of various residential, industrial, and commercial sites reveal that the automotive ignition system is the predominant source of man-made noise affecting the Land Mobile Service. Man-made noise affecting VHF and UHF transmission (TV and FM) would involve not only automobile traffic, but a number of other sources as well.

The effect of noise on the Land Mobile Service formed part of the background upon which the Advisory Committee for the Land Mobile Radio Service (ACLMRS) was asked to sponsor a man-made noise study in March 1964. This in itself is a subject of extremely wide scope, but it was felt that at least a beginning could be made in the limited time available. A survey of man-made noise calls for techniques that are not standardized and knowledge that is not available in any one organization. A report to the Technical Committee of ACLMRS, entitled "Man-Made Noise", was published June 30, 1966.

New sources of man-made noise can be expected in this decade. Electric-powered cars could provide one source. Solid state devices used for variable control of electric ovens, stoves, and furnaces can become noise generators during some portion of their working cycles. The possible use of non-metallic bodies on vehicles can present new shielding problems. Accordingly, a study in depth of man-made noise is urgently needed now to better understand and deal with this problem in the future.

Corrective action will most probably involve development of an accurate and uniform method of noise measurement and standards as to maximum allowable noise radiation.

A joint ad hoc committee of experts from Government and industry is planned to define parameters and determine priorities for the study. Joint funding with OTP or DOD would be appropriate.

Computer Inquiry

In November 1966, the Commission issued a Notice of Inquiry in the matter of "Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services & Facilities". The Inquiry was intended to provide a public forum for the discussion, examination and resolution of a number of regulatory and policy questions. These included: present and future computer uses of communications facilities and services; the adequacy of existing facilities and services of common carriers; the need for new and improved common carrier offerings; whether and under what circumstances the rendition by common carriers or others of data processing and other computer services involving the use of communications facilities should be free from or subject to governmental regulation; whether and under what conditions the entry into such services by common carriers and others should be controlled; and what measures, if any, are required to be taken by the computer industry, communications common carriers, or government to protect the privacy of data stored in computers or transmitted over communications facilities.

In March 1969, the Stanford Research Institute, under contract to FCC, completed an evaluation of the responses to the Inquiry which in contained in a series of published reports. The Commission then issued a Report and Further Notice of Inquiry on May 1, 1969 in which it requested written comments to the SRI report.

On April 4, 1970, the Commission issued a Tentative Decision in which non-common carriers providing data processing services would not come under government regulation and regulated common carriers would be permitted to provide data processing only through separate corporations. In addition, a Notice of Proposed Rule Making was also issued asking for comments on the Tentative Decision and on rules to implement the proposed policy. Oral agreements were held on September 3, 1970 and a final decision is due shortly.

Broadband Technology Study

The purpose of this study was to identify, to the maximum feasible extent, the major technological developments which will have an impact on utilization of the radio spectrum in the 1970-1980 time frame. This included both developments which require or make possible extension of spectrum use into the millimeter-wave (e.g. >15 GHz) region and those which require or make possible more intensive use of presently useful spectrum bands. Some of the devices studied included radiating, limited radiation and non-radiating telecommunication and signal processing devices.

The study assessed the technical and technological feasibility of each device or design concept, its potential operational application, and the economic viability of this approach as contrasted with alternative, potentially competitive devices or systems.

A major part of the study, aside from internal studies and analyses by the Institute for Telecommunication Sciences, who is the prime contractor, was to determine to the various government, industrial, and university laboratories which could reasonably be expected to impact on spectrum use.

This project was performed by ITS under a contract dated 30 June 1969. Dr. Hartman of ITS subcontracted portions of the research to the University of Minnesota (Professor Park) and to Texas A&M (Professor German).

The subcontracted portions are complete. Professor German's report is attached. Professor Park's report is being sent to the Commission.

The final portion (draft), now being prepared by ITS, is expected within approximately two weeks.

Frequency Assignment Techniques for Microwave Radio Systems

The growing problems in assigning frequencies for microwave systems has been under study for some time. The objective of the frequency management effort in this area is to satisfy expanding frequency requirements in the best public interest without degrading the service of existing users. The effort involved represents a complex area interacting with technical, operational, economic, social, and legal aspects. The statutory rights of the user and the economic implications of his needs must be considered in the evolution of effective regulatory measures which can best serve the public interest. The regulatory process must be performed through a complex interaction of updating technical variables, options, and performance demands involving terminal equipment, modulation, propagation, antennas, and terrain effects. In addition, social and economic developments preclude the possibility of arriving at any permanent solutions to this problem; i.e., population distribution, social requirements, work and leisure interests, and environmental changes.

The present microwave frequency assignment system is handicapped by the scope of technical influence and the variations possible under different conditions and interactions. In view of the present growth rates, new technology, new type requirements for transmission and economic implication, the existing approach of frequency management is inadequate for the future. The data base of information essential to achieve the degree of engineering required is insufficient in depth and parameters. The proposed methodology for spectrum management will be armed with technical criteria which are pertinent to effective assignment practices for both environmental sciences and technical performance of radiators, transmitters, and receivers. It will have the requirements expressed in realistic terms of critical transmission characteristics, including performance criteria essential to operation and the possible tradeoff relations among the parameters. In short, the managerial method will be conducted as a systems engineering approach oriented to the optimum use of the radio spectrum involved. Its tools will be a complete data base including confirmed performance and technical criteria, computer assistance to the frequency engineer, and procedural steps to keep the program viable with the constantly changing situation.

In FY-69, a contract was awarded to Communications & Systems, Inc. to study and develop frequency assignment techniques for microwave systems.

The study is divided into two phases:

A. Phase I

1. Review of present FCC policies and procedures.

2. Study of user requirements.

3. Analysis of frequency sharing.

4. System engineering (spectrum management) recommendations for frequency assignments techniques for microwave radio services.

B. Phase II

Phase II is to contain the methodology for implementing sub-task four of Phase I. It will also include such items as: data requirements, data reporting format and forms, data analysis techniques and data processing requirements for implementation.

Although the report expected by Computer Sciences Corporation will not be submitted until July 1971, sufficient information and data has been accumulated to date indicating many of the probable findings and recommendations. It is expected that the frequency management approach recommended by the contractor will permit more effective and efficient use of the point-to-point microwave spectrum . It will also provide the Commission with a more accurate user data base and with the capability for automatic data processing of applications. The draft final report of Phase I just recently has been submitted to the FCC and is being analyzed.

Land Mobile Regional Center

The Land Mobile Regional Center arose from a study on intensive sharing of the land mobile frequencies. The Stanford Research Institute was amended by the Study Contract in 1968.

The Interim and Final Reports of the Stanford Research Institute, under Contract RC-10056, outlined a combined national and regional spectrum engineering and management approach with objectives of the Regional Center as follows:

1. Constitute the regional spectrum management authority as defined by the Joint Committee (National Center) and other Commission policies.

2. Implement an equal channel occupancy policy in appropriate radio services.

3. Implement standards for user requirements and priorities.

4. Implement station coverage criteria where appropriate.

5. Conduct regional measurements of spectrum utilization.

6. Collect and maintain a regional data base.

This approach was approved by the Commission and subsequently by Congress in their approval and recommendations in the FY-71 budget. The Commission established a Spectrum Management Task Force (SMTF), in February 1970, to develop and carry out this approach of a decentralized frequency management program. The activities that have been completed or will be completed by the end of FY-71 are as follows:

1. Organization of the SMTF including the functional organization, assignment of necessary working groups, functional statement, position description and selection of personnel for the Task Force.

2. Procurement of a mobile spectrum monitoring van to be delivered in July 1971.

3. Award of a contract to SRI for assistance in the development of the first Regional Center.

4. Complete the initial phases of the various models required for the Regional Center. This will include models for: propagation (short and long range) man-made noise, intermodulation frequency selection.

5. Define the requirements and prepare the specification for the regional computer.

6. Prepare the buy vs. lease study required for a computer.

7. Lease the required space in Chicago, through GSA, for the Regional Center.

The activities listed are not all inclusive but are considered the major objectives for FY-71 for the implementation of the Regional Center.

The proposed activities for 1972 under this program would open a regional office in Chicago for the private land mobile services. The organization and functions of the Center are to be essentially in accordance with the recommendations of the Stanford Research Institute in their reports to the Commission under Study Contract No. RC-10056.

The initial operation of the Center will be primarily concerned with the accumulation of data on present usage of the land mobile portion of the spectrum, the development of channel loading statistics, criteria, development and implementation of frequency assignment procedures for more efficient and effective utilization of the spectrum. The experience gained and the assignment system developed will be indispensable to the proper utilization of the additional spectrum space which may be made available to the land mobile services. Further, the Center will be flexible enough and equipped to handle services other than land mobile, including cooperative ventures with the Federal Government, should such operations become desirable.