



Communications
Canada



Government Telecommunications Agency Performance Review and Update

February 1990



JL
103
C6
G6886
1990

anadā

Queen
JL
103
C6
G6886
1990

GOVERNMENT TELECOMMUNICATIONS AGENCY
PERFORMANCE REVIEW AND UPDATE

Industry Canada
Library Queen

JUL 08 1998

Industrie Canada
Bibliothèque Queen



February 1990



JW

103

C6

G6886

1990

DD 9699982
DL 9704695

GTA Performance Review and Update

Table of Contents

1.	<u>Executive Summary</u>	1
2.	<u>Introduction</u>	7
3.	<u>The Role of the Government Telecommunications Agency (GTA)</u>	9
3.1	GTA's Responsibilities and Functions	9
3.2	GTA's Service Offerings	9
3.3	Planning and Coordination	9
4.	<u>Strategic Overview: Planning and Development of the Government Common Telecommunications Network and Services</u>	10
4.1	Government Communications Network and Services Planning Strategy ...	10
4.2	Government Telecommunications Physical Network Infrastructure	10
4.2.1	Strategic Planning Approach	10
4.2.2	Intelligent Network Architecture	11
4.2.2.1	Planning Criteria	11
4.2.2.2	Government Telecommunications Network - GTN-2000	12
4.2.3	Integrated Services Digital Network (ISDN) Evaluation	16
4.3	Communications Compatibility for Information Management in a Multi-vendor Environment	19
4.4	Government Telecommunications Architect Function	20
4.4.1	Report Findings of the Advisory Committee on Information Management ..	20
4.4.2	Report Recommendations	21
4.4.3	Recommended Tasks for the Telecommunications Architect	22
4.4.4	Summary	22
5.	<u>GTA Network Services</u>	23
5.1	Current Network Services	23
5.1.1	Development of the Government Telecommunications Network and Services	23
5.1.1.1	Conversion of the Inter-city (IX) Network to Digital Facilities	23
5.1.1.2	Government Telephone Consolidations	24
5.1.1.3	Direct Access Inter-city (DAIX) Service	24
5.1.1.4	U.S.A. Service	25
5.1.1.5	IX Network Authorization Codes	25
5.1.1.6	Network Modelling	25
5.1.2	Government Packet Network (GPN)	26
5.1.3	Government Satellite Network (GSN)	29
5.1.4	Directory Services	30
5.1.5	Government Cellular Service	32
5.1.6	Government Telecommunications Specifications	33
5.2	Planned Network Services	34
5.2.1	Mobile Satellite (MSAT) Service	34

6.	<u>GTA Enhanced Telecommunications Services</u>	36
6.1	Introduction	36
6.2	Current Enhanced Telecommunications Services	36
6.2.1	Government Data Network Service (GDNS)	36
6.2.2	Government Electronic Messaging Service (GEMS) - Envoy 100	37
6.2.3	Government Electronic Messaging Service (GEMS) - Dialcom	37
6.2.4	Government Electronic Messaging and Document Exchange Service (GEMDES)	38
6.2.5	Government Teleconference Service (GTS)	41
6.2.6	Government Voice Messaging Service (GVMS)	42
6.3	Planned Enhanced Telecommunications Services	43
6.3.1	Government Facsimile Communications Service (GFACS)	43
6.3.2	Government Video Teleconference Service (GVTS)	45
6.3.3	Electronic Data Interchange (EDI)	46
7.	<u>Planning and Coordination</u>	47
7.1	Policy Development and Interdepartmental Planning Activities	47
7.2	Information Services	47
8.	<u>Evaluation of Telecommunications Management in the Government of Canada</u>	48
8.1	Introduction	48
8.1.1	GTA Program Evaluation	48
8.1.2	Report of the Auditor General of Canada	50
9.	<u>GTA Performance Measurement</u>	52
9.1	Introduction	52
Graph 1:	Total GTA Revenues	52
Graph 2:	Total Inter-city Calls & Calls Per GTA Person-year	53
Graph 3:	Average Cost Per Call on the Inter-city Shared Network	54
Graph 4:	Customized Services Expenditures	55
Graph 5:	Accounts Receivable Vouchers Processed and Person-years Used	56
Graph 6:	GTA's Share of Total Government Telecommunications Expenditures	57
Table 1:	Examples of GTA Inter-city Prime Time Rates Compared to Direct Distance Dialling Rates	58
Table 2:	Number of Clients Using Specific GTA Services	58
10.	<u>GTA Financial and Personnel Utilization Review and Forecast</u>	59
10.1	GTA Revolving Fund	59
Table 1:	Statement of Net Modified Cash Requirements	59
Table 2:	Financial Performance	60
Table 3:	Constant \$ Revenues per Person-year	61
Table 4:	Allocation of Total Revenues and Person-years by Service	61

10.2	Supplementary Information: Profile of Program Resources	62
Table 5:	Details of Financial Requirements by Object	62
Table 6:	Projected Use of GTA Revolving Fund Authority (\$000)	63
Table 7:	GTA Revolving Fund Statement of Operations (\$000)	63
Table 8:	Statement of Changes in Financial Position (\$000)	64
Table 9:	Person-year Utilization by Headquarters Divisions and Regions	65
Appendix A:	<u>Government Consolidations Switching Systems</u>	66
Appendix B:	<u>GTA Circular Letters</u>	68
Appendix C:	<u>GTA Regional and District Offices</u>	70
Appendix D:	<u>Glossary</u>	72

1. Executive Summary

The Government Telecommunications Agency (GTA) continued to develop common network and enhanced telecommunications services for the Government of Canada during 1988/89 and 1989/90. These years represent a significant period of evolution for GTA: the process of replacing several common services with more efficient ones began; state-of-the-art services, such as the Government Packet Network, continued to be developed to meet user requirements; and new common services such as the Government Voice Messaging Service were launched. These events represent the culmination of several years of planning.

Moreover, the telecommunications planning infrastructure within which GTA fulfils its mandate, experienced significant change, and in turn altered the mandate of GTA.

The following summarizes the changing telecommunications planning and management infrastructure within the Government of Canada, as well as GTA's common network and services developments and plans, the recommendations of two independent evaluations of telecommunications management within the federal government, and GTA's performance during the reporting period.

Government of Canada Telecommunications Planning and Management Infrastructure

The Advisory Committee on Information Management (ACIM) released a report in 1989 entitled *Strategy for the Management of Common Telecommunications Networks and Services for the Federal Government*, in which it was concluded that there would be "a significant advantage in strengthening a government-wide telecommunications architect function and in fostering the optimum use of common telecommunications in the government to achieve cost savings." Opportunities for annual savings of \$40 to \$80 Million were identified.

ACIM recommended "a new collegial management approach for dealing with the telecommunications issues of integration within information technology". It further recommended that the Department of Communications (DOC), through GTA, assume the Telecommunications Architect function of planning and managing the government-wide, integrated telecommunications architecture. The Telecommunications Architect (GTA) was also tasked with producing near-term (3-5 years) and long-term (10-15 years) consolidated, government-wide telecommunications architectures.

In addition, an "executive level Telecommunications Advisory Panel (TAP) will provide on-going guidance to the Telecommunications Architect". It will focus on strategic and operational support matters, such as confirming user requirements, reviewing project proposals, recommending research and development initiatives, and sponsoring pilot projects and field trials.

The new government telecommunications management infrastructure establishes the telecommunications planning function within the broader context of information management.

Government Telecommunications Network - GTN-2000

GTA initiated the GTN-2000 Program in 1988 to address the government's requirement for a new telecommunications network architecture, in response to changing user requirements, new and evolving network technologies, and the restructuring of common carrier tariffs.

The network architecture plan will evolve the existing common government telecommunications network into an intelligent network infrastructure, which will offer new services and features such as high-capacity digital channel network services, intelligent network services using enhanced Common Channel Signalling System Number 7, full Integrated Services Digital Network (ISDN) compatibility, high-capacity Metropolitan Area Networks (MANs), and interoperability of mobile services with the stationary terrestrial network.

GTA distributed a Request for Information (RFI) to the Canadian telecommunications industry in December 1988. The following conclusions were drawn from the responses to the RFI:

- ° The GTN-2000 functional architecture is consistent with industry trends.
- ° Network services defined in the RFI are feasible in the 1990-1995 period.
- ° The initial set of services required for an "embryo" trial network can be implemented by late 1990.

GTA plans to proceed with GTN-2000, by establishing a Government Digital Channel Service pilot network, developing the specifications for a government intelligent digital backbone network service, and planning user applications based on intelligent network services and ISDN access.

ISDN Evaluation

GTA initiated the "ISDN Applications Development and Assessment Project" to assess strategic and technical developments in ISDN. Under this project, GTA is defining the network and service requirements necessary to support government applications. Selected applications will be implemented as common services under GTN-2000.

GTA and Bell Canada collaborated in the "Bell Canada and Federal Government ISDN Technology Trial", which lasted from November 1987 to November 1989. The scope of this trial included user assessments of the technology, the analysis of user problems, evaluations of the technology, as well as operational, administrative and maintenance issues, and the development of recommendations for post-trial activities.

A joint "GTA-Telecom Canada GTN-2000/ISDN Trial Planning Committee" has been formed to develop plans for a national ISDN trial, and to coordinate this activity with the GTN-2000 development network project.

The feasibility plan for the national ISDN trial was completed in January 1990.

Government Telecommunications Network Development

GTA issued a Request for Proposal (RFP) to CNCP, Telecom Canada and Telesat Canada in November 1988, for the procurement of T1 digital facilities for selected cross-sections of the inter-city (IX) network. Proposals were received from all three carriers.

The first trial of T1 facilities was held from August to September 1989, using circuits supplied by CNCP on the Toronto-Ottawa cross-section. Traffic consisted primarily of voice, voice-band data and Group 3 facsimile carried on "compressed" 32 kilobits per second circuits using Adaptive Differential Pulse Code Modulation.

The cost of rerouting compression-sensitive traffic must be further studied. In the meantime, GTA is in the process of offering T1-based dedicated data services between Ottawa and Vancouver, Ottawa and Toronto, and Ottawa and Montréal, at rates substantially lower than those of Telecom Canada's Dataroute and CNCP's Infodat services.

GTA completed the modernization of the Belleville consolidation, and upgraded those in London, Sudbury and Sherbrooke to Centrex III. In addition, Direct Access Inter-city Service, which provides access to the inter-city network from commercial local service, was introduced in several locations in British Columbia.

After several months of marginal telephone service to the U.S.A., the analog Wide Area Telephone Service (WATS) was replaced with digital facilities in 1988/89. Quality of service improved significantly.

Demand for off-net access to the government voice network continued to increase. Authorization code usage now generates approximately 17% of GTA revenues for IX network services.

Government Packet Network (GPN)

The number of GPN circuits increased by 692 in 1988/89, bringing the total to 844 by March 31, 1989; by January 1990, the total had further increased to in excess of 1,200 circuits. This represents a GPN customer base of 51 federal departments and agencies, with an estimated user base in excess of 12,000 federal employees.

Network nodes in Vancouver and Montréal were added to the original nodes in Ottawa, Toronto and Edmonton. A new network node will also be installed in Moncton during the 1st quarter of 1990. In addition, twenty-four serving areas were added across the country. Others will be added as needed.

GTA plans to offer X.32 and Synchronous Data Link Control (SDLC) dial-up services, improve the GPN appointment plan, and increase the speeds of digital trunking facilities between nodes. Virtual networking capabilities continue to be developed which will permit applicable organizations to manage their GPN-based services as if they were private networks.

Government Satellite Network (GSN)

In April 1987, GTA released a Request for Proposal for the procurement of a government thin-route satellite service, which culminated in the signature of a five-year contract with Telesat Canada in February 1989.

Telesat Canada filed the GSN rate and services structure with the CRTC in April 1989. The CRTC's decision is pending. GTA is currently accepting orders for GSN service at standard Telesat Canada tariff rates. It is expected that 40 GSN sites will be installed during 1990, in addition to the 18 sites currently in service.

In 1990, GTA intends to introduce a C-band (6/4 Ghz) service which will extend GSN coverage into the Canadian arctic.

Mobile Satellite (MSAT) Service

MSAT service will provide all areas of Canada with direct links to public and private mobile radio systems, as well as the Public Switched Telephone Network (PSTN). Data and voice services will be provided.

DOC, which conceived MSAT, will begin trials of MSAT voice and data applications in the first quarter of 1990. GTA will be the sole service provider for the federal government, offering discounted, full MSAT service in 1994. An interim service may be available during 1990.

Directories

An analysis of the Government of Canada telephone directories was conducted, resulting in a revised directory format.

Twenty-two departments used GTA's Automated Directory Production System to produce their portions of the May 1989 edition of the National Capital Region (NCR) directory. The system is now used to produce all GTA regional directories.

Shared Messaging Services

GTA shared messaging and text communications services are in the process of being replaced by the Government Electronic Messaging and Document Exchange Service (GEMDES).

GEMS (Government Electronic Messaging Service)-Dialcom ceased to be offered as a shared service on April 1, 1989, but continues to be available through GTA as a customized service for a small group of clients. The Government Data Network Service (GDNS) will be offered as a shared service until March 31, 1990.

The competitive process for the provision of GEMDES to the Government of Canada culminated in the signing of a five-year contract by GTA and Bell Canada in November 1988.

In April 1989 Telecom Canada implemented new Envoy 100 and iNet software, augmenting the standard Envoy 100 features with GEMDES enhancements such as French character support, binary file transfer capability, autodelivery to facsimile, an enhanced directory, and blind courtesy copy.

All 4,068 GEMS-Envoy subscribers were automatically accredited to GEMDES on August 14, 1989, at no additional cost.

Bell Canada received CRTC approval for the new GEMDES rate structures in November 1989.

As of January 15, 1989, the number of GEMDES subscribers had increased to 4,753, representing 65 federal departments and agencies.

The new GEMDES rate structure will be implemented in February 1990, offering reduced rates as well as optional rate structures.

GTA will introduce new features such document conversion, autodelivery to terminals on GPN, upgraded EDI support, and an X.400 gateway.

Government Voice Messaging Service (GVMS)

As a result of an RFP, GTA signed a three-year contract with Time Communications Limited for the provision of GVMS in Vancouver, Toronto, Ottawa, Hull and Montréal. Client commitments for this service exceeded 10,000 voice mailboxes. This service is now available.

Government Facsimile Communications Service (GFACS)

GTA initiated a program in 1988/89 to plan the development of a state-of-the-art, shared facsimile communications service, conforming to Canadian Standards Association (CSA) and CCITT Comité consultatif international télégraphique et téléphonique (CCITT) standards. GFACS will offer more than basic facsimile transmission, providing facsimile store-and-forward and store-and-retrieve functions from user "mailboxes". Moreover, GFACS will provide communication links to other services, such as electronic mail and Telex.

GTA issued an RFI for facsimile communications services, in August 1989. Approximately 60 companies were solicited.

GFACS will initially support a user community consisting of 500 Groups 2 and 3 facsimile terminals in Ottawa and Hull, as well as 500 terminals distributed among Vancouver, Calgary, Edmonton, Winnipeg, Toronto, Montréal, Moncton and Halifax.

Electronic Data Interchange (EDI)

GTA initiated the "Electronic Data Interchange Applications Project" as its portion of a joint project with Supply and Services Canada, to study the potential use of EDI for the procurement by the Government of Canada of telecommunications and other goods and services. GTA is conducting a pilot EDI trial.

GTA plans to offer common EDI services to clients to facilitate the implementation of government-wide and departmental EDI applications. GTA will also be developing EDI applications specifically for the telecommunications procurement function within the federal government.

Evaluation of Telecommunications Management within the Government of Canada

An evaluation of the Government Telecommunications Agency was completed during 1988/89. The study, which was requested by Treasury Board, was conducted by the Program Evaluation Division of the Department of Communications (DOC) through an external consulting firm.

The cost effectiveness and range and quality of services offered by GTA were evaluated, as well as the adequacy of GTA's planning activities, and the relationship between GTA and DOC.

The conclusion of the report is that GTA is in general fulfilling its mandate to provide cost-effective services, and that clients are satisfied with the services provided. Although GTA's overall performance is very good, a number of areas require improvement, such as billing, long-term planning of government telecommunications services, and the relationship between GTA and DOC.

The following recommendations were made:

- i. GTA should be provided with the resources necessary to expand and improve specialized services.
- ii. Action to resolve user complaints about certain aspects of GTA's services is being taken. Recommendations are therefore unnecessary.
- iii. Systematic, long-term planning is a problem. It was not clear to what extent GTA should be involved in this process. However, if GTA is given the responsibility for the planning function, more resources should be provided. The planning function would involve the full cooperation of all government departments and agencies, as well as Treasury Board. Achieving the necessary cooperation could be a major task in itself.
- iv. A committee of DOC and GTA representatives had been formed to improve communications. This committee is chaired by the Director General of GTA. Recommendations were therefore unnecessary.

Report of the Auditor General of Canada

The 1989 *Report of the Auditor General of Canada to the House of Commons* included an evaluation of the efficiency of the management and use of telecommunications services by the federal government. In this report, the Auditor General recommended that DOC should review the performance and capabilities of GTA to determine whether it is the appropriate vehicle for all government telecommunications; clarify the mandate of GTA with respect to the administrative policy framework; and re-examine the provision of common services for telecommunications, studying the role of a common service agency as a re-seller of carrier services and negotiator of agreements.

DOC responded that it accepted the conclusions and recommendations of the Auditor General, and added that despite limited resources, GTA had implemented satellite and packet-switched common network services, and was converting the circuit-switched network to digital facilities.

DOC also noted that it did not have any power to enforce a common service agency role, and that such an action was questionable in the environment of Increased Ministerial Authority and Accountability. It further stated that GTA had created a marketing group to publicize the benefits of common services.

Moreover, GTA had developed the GTN-2000 plan which established the direction necessary to achieve greater savings. It would be the blue print by which GTA would evolve a single, universal network for voice, data, image and video.

GTA Performance Measurement

Average growth of GTA revenues between 1984/85 and 1990/91 is projected to be 8.2%. Revenues are projected to increase from \$172 million in 1988/89, to \$212 million by 1990/91.

The Government Telecommunications Network carried 6 million more calls in 1988/89 than the previous year, for a total of approximately 48 million calls, representing growth of 14%. This growth occurred during a period in which the number of government personnel decreased, indicating the increasing importance of the Government Telecommunications Network (GTN) to government program delivery. GTA expects total inter-city calls to increase to 53 million in 1989/90.

The trend in lower average cost per call on the IX network continues, despite a slight increase in 1988/89, due to the 10% federal sales tax and tariff increases. It is expected that the average cost per call will decrease in 1989/90 due to limited cost increases, and increases in facsimile and data traffic volumes.

Increases in customized and coordinated procurement expenditures averaged 6.8% between 1983/84 and 1989/90.

Between 1985/86 and 1988/89, GTA's share of total annual government expenditures for voice and data services averaged 40.8%. It increased to 42.7% in 1988/89, and is expected to increase to 47.2% over the period of 1989/90 to 1990/91.

Between 1984/85 and 1989/90, clients using GTA inter-city voice and local services, shared data services, and customized voice and data services increased from 130 to 142, 57 to 66 and 72 to 100 respectively. GTA's newly-formed Client Services group is continuing to market GTA's services to new clients.

The revenues per GTA person-year have increased from \$492,000 to \$652,000 per year in 1979/80 constant dollars.

2. Introduction

Background

The planning and coordination of government telecommunications is a continuous and evolving process. It is influenced by many factors, including departments' needs, technology development, market conditions, government direction and administrative and regulatory policies.

Recent events such as the review of telecommunications by the Auditor General of Canada, the revision of government policy for information management under the direction of the Treasury Board Secretariat, the study of core systems by the Advisory Committee on Information Management (ACIM), and the identification of GTA as a Special Operating Agency indicate that there is a real and pressing need to develop close working relationships between departments, service organizations and central agencies.

The *GTA Performance Review and Update* examines GTA's performance during the last year, as well as what is planned for the next few years. It contains the essence of GTA's business and development plans, which will be presented formally early in the new fiscal year (1990/91). At that time, departments will have the opportunity to contribute further to the planning process by reviewing and commenting on GTA's direction in light of their own plans.

Through cooperation, and the coordinated planning, management and use of telecommunications, government organizations can achieve a great deal toward making government operations more efficient and effective. It is for this purpose that the *GTA Performance Review and Update* is offered to the government community.

Document Organization

The *GTA Performance Review and Update* provides an overview of GTA's approach to planning and developing the government common telecommunications network and services, under Section 4., *Strategic Overview: Planning and Development of the Government Common Telecommunications Network and Services*. GTA's current plans for the evolution of the network and associated services are discussed, as well as the evolving telecommunications management infrastructure within the Government of Canada.

GTA services are discussed in detail under Sections 5. and 6., *GTA Network Services* and *GTA Enhanced Telecommunications Services*, respectively. Within each of these sections, GTA services are subdivided into "current" and "planned" service categories. Each service summary has been structured to provide the following information, where applicable:

- ° Service description
- ° Service coverage
- ° Rate structure
- ° Developments during the reporting period
- ° Plans for further development of the service

Section 7. is a brief summary of GTA's planning and coordination activities in support of the telecommunications management function within the federal government.

A brief review of major, independent evaluation activities of the telecommunications management function within the federal government is included in Section 8.

Sections 9. and 10. provide a series of graphs and tables which measure GTA's performance and assess GTA's current and projected financial status and resource utilization.

For More Information

For more information about the subjects discussed in this document, please contact your regional or district GTA representative. Please see *Appendix C, GTA Regional and District Offices* for information about the nearest GTA office.

3. The Role of the Government Telecommunications Agency (GTA)

3.1 GTA's Responsibilities and Functions

As mandated by the Department of Communications Act (1969), the Government Telecommunications Agency (GTA) provides telecommunications services and facilities that satisfy the requirements of federal departments and agencies, at the lowest possible cost. GTA also plans and coordinates telecommunications for the federal government.

3.2 GTA's Service Offerings

GTA is a decentralized common services organization, offering a full range of telecommunications facilities and services, including shared voice and data, customized voice and data, and consulting and directory services.

From regional and district offices across Canada, GTA personnel provide client departments with expertise in telecommunications technology, and telecommunications systems and applications development, acquisition, and management.

GTA is able to derive the benefits of economies of scale by sharing, consolidating and optimizing networks and services. In addition, volume discounts are realized from the purchase and lease of services and facilities from common carriers and other service providers.

3.3 Planning and Coordination

In fulfilling its responsibility for planning and coordinating telecommunications for the federal government, GTA develops a framework within which broad strategic objectives, and short- and long-term plans for the government telecommunications infrastructure evolve.

GTA analyses, develops and recommends administrative policies and practices, provides expertise, and disseminates information to assist departments in the effective planning and management of telecommunications. It also conducts surveys and studies on telecommunications resources and inventories, to determine where maximum benefits can be realized by the application of cost-effective, state-of-the-art telecommunications technologies.

GTA supports an interdepartmental committee structure which improves the coordination of telecommunications in the federal government.

4. Strategic Overview: Planning and Development of the Government Common Telecommunications Network and Services

4.1 Government Communications Network and Services Planning Strategy

GTA's three-layered strategy for the evolution of the government telecommunications network and services encompasses the following elements:

- i. provision of an intelligent communications physical network infrastructure to support the transport of a broad range of government services and applications;
- ii. provision of enhanced telecommunications services to carry messages and electronic documents;
- iii. development of means and processes to facilitate the intercommunication of government information systems in a multi-vendor environment.

4.2 Government Telecommunications Physical Network Infrastructure

4.2.1 Strategic Planning Approach

GTA's planning approach is to design a framework for the evolution of the Government Telecommunications Network (GTN) which will achieve the following objectives:

- introduce new network capabilities to address government data communications and information management requirements, in addition to telephony and voice-band data;
- extend network coverage to remote and under-served locations;
- integrate various heterogeneous networks (e.g., voice, data, image, video) on a common digital inter-city backbone network and digital local facilities;
- comply with Integrated Services Digital Network (ISDN) standards and architecture.

4.2.2 Intelligent Network Architecture

4.2.2.1 Planning Criteria

GTA's goal is to achieve a given level of network performance and availability at the lowest possible cost. To achieve this goal, the following network design features will be incorporated:

i. Network Cost Optimization

Network costs will be minimized by employing various optimization techniques, such as the following:

- Combining transmission facilities with different price structures. For example, traffic typically would be routed on fixed-cost (non-usage sensitive) facilities, and dynamically rerouted to usage-sensitive facilities when capacities are exceeded.
- Providing automatic call diversification to public network facilities from government dedicated network facilities.
- Encoding voice signals at bit rates lower than 64 kilobits per second (Kbs) on T1 digital circuits to increase the number of calls which circuits can carry.
- Combining terrestrial and satellite facilities for route diversification.

ii. Digital Network and Transmission Services

An ISDN architecture will significantly reduce costs by providing high-quality voice, data, image and video transmission services on one network.

iii. Intelligent Network Communications Services

Intelligent networking technologies and services associated with common channel signalling and related technologies offer new solutions for improving government program delivery and productivity. The following intelligent network services could be provided:

- Enhanced network management capabilities.
- Private virtual network services to permit departments to manage network resources within a common network architecture.
- Toll-free 1-800 service to a single number for access to the government by the public.
- Electronic directories for both voice and data applications.

4.2.2.2
Government
Telecommunications
Network - GTN-2000

Description

To meet current and emerging communications requirements of the federal government, GTA initiated the GTN-2000 Program in 1988. This program addresses the government's need for a new telecommunications network architecture in response to changing user requirements, new and evolving network technologies, and the restructuring of common carrier tariffs.

Under the GTN-2000 Program, GTA has produced a network architecture plan for the evolution of the existing GTN into a common, intelligent network infrastructure. GTN-2000 was conceived to achieve the following objectives:

- Minimize costs and improve the performance of the evolving GTN as a common physical network platform for *departmental* logical networks; through the following developments:
 - integration of voice, data and image communications on common, high-capacity digital transport facilities
 - implementation of new network technologies and standards
 - enhancement of network management capabilities.
- Introduce new data network services to satisfy the increasing demand for data communications and information management requirements in the government.
- Provide new network-wide enhanced voice communication services to improve internal government communications, public access to government services, and network operational efficiency.
- Serve as the flexible network platform to support common enhanced services (e.g., messaging) and departmental operational systems.
- Extend government network coverage to remote and under-served user locations.
- Plan the evolution of existing government networks, services and end-user equipment and applications toward an open, digital intelligent network based on ISDN and enhanced signalling techniques.

Development Plan

The GTN-2000 architecture for the evolving, inter-city physical network will be implemented in three phases.

Phase I: 1990-1992

Phase I will establish the inter-city digital backbone network and the signalling capabilities required for intelligent networking. In addition to existing circuit-switched and packet-switched services, the network will offer new services:

- High-capacity digital channel network services, permitting the integration of voice and data;
- Intelligent network services using Common Channel Signalling System Number 7 (CCSS7):
 - enhanced 1-800 service
 - network-wide automatic call distribution
 - electronic directory
 - network management services.

Phase II: 1992-1995

The GTN will evolve as follows during Phase II:

- Phase I capabilities will be expanded.
- Full ISDN compatibility will be achieved.
- High-capacity Metropolitan Area Networks (MANs) will be evaluated in conjunction with the GTN.
- Interoperability of mobile services with the stationary terrestrial network will be provided.

Phase III: Beyond 1995

Network development will focus on broadband ISDN and personal communications technologies during Phase III. Trials of broadband applications based on new broadband ISDN standards and technologies will be conducted. Developed applications will then be deployed as network services.

Developments 1988/89

Request for Proposal (RFP) for Digital Trunks

A preparatory step in the development of GTN-2000 was the release in November 1988 of an RFP for the procurement of T-1 digital trunks for selected cross-sections of GTA's inter-city (IX) network. (See 5.1.1.1, *Conversion of the Inter-city (IX) Network to Digital Facilities*, for details.)

**Request for Information (RFI)
for GTN-2000**

GTA distributed an RFI entitled *Request for Information and Functional Requirements for Intelligent Networking in GTN-2000* to the Canadian telecommunications industry in December 1988. This document described the direction in which the GTN should evolve, as well as the functional requirements of the planned new network services.

The following conclusions were drawn from the responses to the RFI:

- i. The GTN-2000 functional architecture is consistent with industry trends.
- ii. Network services defined in the RFI are feasible in the 1990-1995 period.
- iii. The initial set of services required for an "embryo" trial network can be implemented by late 1990.

**Continued Liaison with
Standards and Industry
Groups**

GTA participated in the opening session of CCITT (Comité consultatif international téléphonique et télégraphique) Study Group XI, responsible for telephone switching and signalling standards. This study group deals with ISDN access, CCSS7, and future network signalling protocols.

GTN-2000 Program Plans

The following ongoing activities of the GTN-2000 Program began in 1989/90:

- Establishment of a Government Digital Channel Service (GDCS) pilot network providing high-capacity digital channel services for computer and voice traffic. This network is planned for deployment in the 2nd quarter of 1990 as an embryo network for the GTN-2000. Network management capabilities and intercommunication in a multi-vendor environment will also be evaluated.
- Development of the specifications for the Government Intelligent Digital Backbone Network (GTN-2000 Phase I) for future procurement purposes.
- Planning of user applications based on intelligent network services (using CCSS7) and ISDN access. These applications will be incorporated into a national ISDN trial expected to begin in the fourth quarter of 1990. (See 4.2.3, *Integrated Services Digital Network Evaluation*.)

GTN-2000 Services

Backbone Network Services

The following are some of the digital backbone physical network services which will ultimately be provided:

- switched voice services
- switched data services
- switched integrated services
- packet-switched services
- video communications services
- switched channel services

**Intelligent Network
Communications Services for
Voice, Data and Integrated
Services**

Requirements and plans are being reviewed for voice, data and integrated intelligent network communications services, which could include the following:

- electronic directory
- automatic call distribution (ACD)
- 1-800 + toll free calling
- credit card
- call screening and authorization
- private virtual networking
- call management
- common dialling plan
- charging and alternative billing, etc.
- attendant services

Enhanced Services

The following are some of the enhanced services which will be provided:

- electronic messaging and document exchange
- voice messaging
- store-and-forward facsimile
- multi-media (video) teleconferencing
- electronic data interchange (EDI)
- database networking

**Intra-city and Access
Networks**

GTA initiated the Metropolitan Area Network (MAN) Project in 1989 to study the requirements for digital, intra-city and access networks, initially for the National Capital Region (NCR), and for other metropolitan centres afterward. The MAN Project will identify network connectivity requirements (such as topology, traffic levels, and transmission rates) and produce client communications protocol profiles.

Planning for the MAN Project is scheduled to begin in 1990, with the following:

- Conceptual Service Definition
- Fibre Optics Study
- User Requirements Study
- Service Specification Development

4.2.3 Integrated Services Digital Network Evaluation

Integrated Services Digital Network (ISDN) Applications Development and Assessment Project

ISDN standards and technologies provide the foundation for the integration of voice, data, image and video transmissions on common network facilities.

It is consistent with the mandate of the Department of Communications (DOC) that DOC and GTA position Canada to assume a leading role in the development and application of ISDN standards and technology. As well as improving telecommunications services to the federal government, the evolution of the GTN and associated services will be a catalyst for the introduction of ISDN in Canada.

GTA initiated the "ISDN Applications Development and Assessment Project" in 1987 to assess strategic and technical developments in ISDN. The following are the project objectives:

- Assess the development of evolving ISDN narrowband and broadband standards and technologies through participation in standards committees
- Formulate plans to foster the development of ISDN services in the Government of Canada (GOC) by identifying user applications in conjunction with GTA's clients
- Cooperatively evaluate ISDN research and development with the telecommunications industry.

Under this project GTA is defining the network and service requirements necessary to support government applications. Selected applications will be implemented as common services under GTN-2000 (See 4.2.2.2, *GTN-2000*.)

Federal Government ISDN Applications Trial

The GOC and Bell Canada signed a Memorandum of Agreement (MOA) to conduct the "Bell Canada and Federal Government ISDN Technology Trial", which began in November 1987. It was originally scheduled to end one year later, but was extended in order to complete certain planned activities, as well as include new ones. Phase I of the trial lasted from November 1987 through March 1989. Phase II began in April 1989 and continued through November 1989.

GOC ISDN Trial Objectives

The following were the government's objectives in organizing and participating in the ISDN trial:

- Evaluate the features and performance of the ISDN service
- Explore opportunities to use the expanded range of ISDN capabilities as enhancements to existing user applications
- Implement new user applications which were previously not feasible due to limitations of existing telecommunications technologies and services
- Learn more about the operational and administrative impacts of ISDN introduction within the government
- Evaluate the interoperability of ISDN with existing public and private telecommunications networks and services
- Learn more about the economic aspects of ISDN
- Support the Canadian telecommunications industry by providing a testbed for the development of applications of this new technology.

Scope of the ISDN Trial

The scope of the ISDN trial evaluation included the following areas of investigation:

- User assessments of the technological solutions
- Analysis of technology-related problems encountered by users
- Technical evaluations by the GOC and Bell Canada
- Evaluation of operational, administrative and maintenance issues concerning the use of ISDN within the GOC
- Development of recommendations for post-trial initiatives.

Description of the ISDN Trial

The enhanced telephony (based on Centrex business features), and circuit- and packet-switching functions for data were provided by a Bell Canada DMS-100 switch.

Seven distinct customer groups participated in the ISDN trial from DOC, the Department of National Defence (ND) and Industry, Science and Technology Canada (ISTC).

Phase I

The following carrier-provided applications were tested during Phase I of the Bell Canada and Federal Government ISDN Technology Trial:

ISDN Telephony

Features of ISDN Telephony include the following:

- high quality voice
- hands free operation
- programmable hard keys
- context-specific soft keys
- access to Centrex III features
- calling line identification
- interface to PC (personal computer) Call Manager
- headset
- Liquid crystal display (LCD)

Call Manager

The call manager function manages a personal directory of up to 750 names and telephone numbers, logs incoming and outgoing calls and displays information on telephone line status.

Wide Area Networking (WAN)

WAN permits the networking of personal computers (PCs) and file/print servers, the storage of multi-user software, etc. for communications at speeds up to 64 Kbs. Using a shared server(s), files can be read, edited or shared.

Workstations may be located in the same or different buildings. Up to 15 users can simultaneously access one or more servers per packet-switched access.

Shared Screen

"Shared screen" is an application which permits two PC users to share the same screen in either of two modes:

- SHOW mode, where the screen is controlled exclusively by the user who initiates the session
- DUAL mode, where both users control a common screen, for enhanced telephone conversations and remote technical support or training.

ASCII Support

ASCII (American Standard Code for Information Interchange) support allows PCs or asynchronous terminals connected to an ISDN switch to communicate with devices on the network using the ASCII character set. Circuit-switched and packet-switched modes of access are provided.

Phase II

The following applications were added during Phase II:

IBM 3270 Cluster Controller Emulation

The IBM 3270 cluster controller emulation allows PCs to behave like 3278 terminals, without a 3270 cluster controller. The connection is made over standard telephone wiring using ISDN technology.

X.25 Networking

X.25 networking permits hosts, PCs or local area networks (LANs) to communicate with other X.25-based systems.

ISDN Trial Developments

The following activities were completed during Phase II:

- Activation of Station Message Detail Recording, in April 1989
- Live demonstrations of trial ISDN equipment and applications at Teleforum '89 in June 1989
- Issue of *Phase I Completion Report* in July 1989
- Successful implementation of a new nodal software release during July and August 1989, with no disruption to users
- Implementation of 3270 access to an IBM host computer at ISTC, for both high-speed circuit-switched and packet-switched modes of operation.

The *Phase II Completion Report* of the Bell Canada and Federal Government ISDN Technology Trial was issued in January 1990.

A joint GTA-Telecom Canada GTN-2000/ISDN Trial Planning Committee has been formed to develop plans for a national ISDN trial, and to coordinate this activity with the GTN-2000 development network project. The feasibility plan for the national ISDN trial was completed in January 1990.

4.3 Communications Compatibility for Information Management in a Multi-vendor Environment

The role of a common communications service which facilitates communications compatibility in a multi-vendor environment is important and strategic to GTA in serving the government community as a whole.

GTA fully supports the Treasury Board Secretariat (TBS) and ACIM in their endeavours to address this concern, and to establish government standards and administrative policies on information management.

GTA specifies to the extent possible the use of approved standards in government common communications and gateway services for intercommunication with departmental and public communications services (e.g., the application of X.400 and Message Handling Service (MHS) standards in GEMDES).

4.4
Government
Telecommunications Architect
Function

4.4.1
Report Findings of the
Advisory Committee on
Information Management

Following a year-long study, the ACIM Working Group on Core Systems and Supporting Infrastructure issued a report in the fourth quarter of 1989 entitled *Strategy for the Management of Common Telecommunications Networks and Services for the Federal Government*. The working group concluded in the report that there was "a significant advantage in strengthening a government-wide telecommunications architect function and in fostering the optimum use of common telecommunications in the government to achieve cost savings."

The report identified opportunities for savings to the federal government of \$40 to \$80 Million annually, and for "cost containment to meet future growth requirements in the government for data/computer and office communications" through the implementation of a common, integrated telecommunications infrastructure.

It was also noted that the "purpose of managing a common telecommunications architecture is not solely to reduce the telecommunications expenditure in the government, but also to reduce the total operational cost of program delivery, to improve the functionality of common services, to provide sharing of information systems assets, and to provide strategic support to all government operations." The economic, strategic and operational benefits of implementing a common telecommunications architecture were then summarized.

The working group noted that the integration of programs and services can eliminate overlapping costs. This integration is possible when there are common program delivery components. It further noted that the Treasury Board Secretariat (TBS) had developed an Applications Portability Profile which identifies standards for information technology necessary to support application mobility. Integrated telecommunications services were included in the overall architecture.

Reference was also made to the urgency of addressing the architect function because the "government is going through a recapitalization period where information technologies of the seventies are being replaced." It was further postulated that if the government "does not act now, [it] will have to wait for the next cycle of reinvestment in 10-15 years. Incompatible departmental data networks will continue to proliferate, impacting on the efficiency as well as the operability of the government administration."

4.4.2 Report Recommendations

The working group recommended "a new collegial management approach for dealing with the telecommunications issues of integration within information technology.... The main functions [identified] in the infrastructure are:

- a) **Treasury Board Secretariat** to provide broad strategic information technology/information management directions in the context of the telecommunications dimension.
- b) **Telecommunication Architect** to plan and manage the government-wide integrated telecommunications architecture.
- c) **Telecommunications Architecture Planning and Development Unit** to develop approaches to achieve integrated telecommunications architecture and coordinate with Centres of Expertise and Migration Teams.
- d) **Telecommunications Architecture Implementation and Advisory Services Unit** to assist departments in departmental networks planning within the context of government-wide integrated telecommunications architecture and maintain the integrity of the consolidated government-wide telecommunications architecture.
- e) **Telecommunications Common Service Manager** to establish the common telecommunications facilities and provide telecommunications services as formulated by the Telecommunications Architect.
- f) **Centres of Expertise and Migration Teams** to lead migration of dominant telecommunications and computer architectures towards open systems.
- g) **Delivery Agents** to provide one or more telecommunications operational services to departments within the overall context of government-wide telecommunications architecture."

In addition, an "executive level Telecommunications Advisory Panel (TAP) will provide on-going guidance to the Telecommunications Architect and become an enabling agent for the Telecommunications Architect. It would focus on strategic and operational support matters relating to the overall telecommunications architecture. It will confirm user requirements, review project proposals, recommend research and development initiatives to be undertaken by the Telecommunications Architect and Centres of Expertise, sponsor pilot projects and field trials, etc."

The ACIM working group concluded in its report that the new Telecommunications Advisory Panel "will replace the existing Telecommunications Advisory Committee (TAC) ...", which was originally established as an advisory body to assist DOC in the management of telecommunications for the government.

The report urged ACIM to recommend to TBS that a new, integrated telecommunications management infrastructure be implemented, and that DOC, through GTA, assume the Telecommunications Architect function of planning and managing the government-wide integrated telecommunications architecture. This function would be in addition to GTA's current common services provisioning and management functions.

It was recommended that resources for the Telecommunications Architect function be provided by reallocating existing resources within DOC and GTA, and that these resources be reinforced by a small, additional core of personnel distributed between TBS and DOC/GTA.

4.4.3 Recommended Tasks for the Telecommunications Architect

The working group recommended that the Telecommunications Architect undertake immediately the following tasks with respect to planning the government telecommunications architecture:

- a) validate GTA's GTN-2000 initiative as a statement of departmental requirement and the government's telecommunications strategy (see 4.2.2.2, *GTN-2000* for reference);
- b) review of the strategy and responsibility for optimizing the use of local service vehicles;
- c) assess the recommendations of the Telecommunications Occupational Analysis study completed by the Public Service Commission and develop requirements for benchmarking the classification of telecommunications personnel, and human resource development programs;
- d) develop common telecommunications architectures based on current and future departmental network requirements, and Open Systems Interconnection (OSI) profiles;
- e) coordinate the migration teams and Centres of Expertise to achieve the common telecommunications architecture;
- f) assess the interface mechanism between the integrated telecommunications architecture and the TBS Applications Portability Profile.

The Telecommunications Architect was also tasked with producing near-term (3-5 years) and long-term (10-15 years) consolidated government-wide telecommunications architectures.

4.4.4 Summary

The new telecommunications management infrastructure establishes the telecommunications planning function within the broader context of information management. This infrastructure will provide a framework within which the data processing and telecommunications management communities can more effectively collaborate in planning telecommunications, through the coordinated efforts of special operating and common services agencies, departments and TBS.

5. GTA Network Services

5.1 Current Network Services

5.1.1 Development of the Government Telecommunications Network (GTN) and Services

GTA continued to enhance the GTN, which provides telephone services to federal government personnel across Canada. The GTN carried 6 million more calls in 1988/89 than the previous year, for a total of approximately 48 million calls, representing growth of 14%. This growth occurred during a period in which the number of government personnel decreased, indicating the increasing importance of the GTN to government program delivery.

5.1.1.1 Conversion of the Inter-city (IX) Network to Digital Facilities

The conversion of the Government IX Network from analog to digital facilities is fundamental to the evolution of the GTN into an ISDN architecture.

Digital facilities provide superior quality transmission of voice, data, image and video. GTA plans to maximize the cost savings of these higher quality transmission services through the application of "compression" techniques. Compression effectively allows two separate digital channels of 32 Kbs to be derived from each DS-0 (64 Kbs) channel, thereby significantly reducing costs.

RFP for the Procurement of T1 Facilities

GTA issued a Request for Proposal (RFP) to CNCP, Telecom Canada and Telesat Canada on November 1, 1988, for the procurement of T1 digital facilities for selected cross-sections of the IX network. Circuits linking Ottawa, as an intermediary node, to Vancouver, Toronto and Montréal were requested. Proposals were received from all three carriers by March 6, 1989. The evaluation of the proposals was completed in the fourth quarter of 1989.

Respondents were required to propose digital services which would provide not only voice, but also high-speed switched and dedicated data services. Digital local facilities connecting government centrex services to the proposed digital IX service were also required, to ensure high quality end-to-end transmission.

T1 Compressed Facility Trial

The first trial of T1 compressed facilities was held from August 8 to September 1, 1989, using circuits supplied by CNCP on the Toronto-Ottawa cross-section. Traffic consisted primarily of voice, voice-band data and Group 3 facsimile carried on 32 Kbs circuits using the ADPCM (Adaptive Differential Pulse Code Modulation) compression technique. To obtain statistically reliable data, 8 user departments tested the facilities in conjunction with GTA, placing hundreds of calls from various locals.

Government switches in Toronto and Ottawa were programmed to send calls back to the originating city when special dial access codes were used. This allowed GTA to evaluate the effect of using two ADPCM links in tandem for various types of traffic.

Survey of Voice-band Data Applications

GTA issued a survey to departments (GTA Circular Letter 88/07) in May 1988, to determine the number of voice-band data applications carried on the IX network which would not tolerate voice compression. This information was used to calculate the costs of rerouting the traffic which can not adequately be transmitted over compressed facilities to suitable network facilities.

Network Class of Service

New Network Classes of Service (NCOSs) will be developed to address the requirement to route over WATS (Wide Area Telephone Service) or DDD (Direct Distance Dial) facilities those calls which can not be adequately carried over compressed facilities, for those destinations which would normally be reached using compressed facilities. Two classes of service will be available for this purpose.

Moreover, additional classes of service may be developed for data units of 19.2 and 56 Kbs for long duration (emulating dedicated data channels) and short duration inter-city calls.

Authorization codes specifying the appropriate NCOS will accommodate off-network and portable on-network stations which require different routing than voice calls.

Implementation of T1 Facilities

The use of compressed facilities could bring significant savings. However, when the cost of rerouting the facsimile calls over WATS or DDD facilities is taken into account, the net savings under current Canadian Radio-television and Telecommunications Commission (CRTC)-approved rates are small. GTA is currently studying other methods of resolving this problem.

In the meantime, GTA is in the process of offering T1-based dedicated data services between Ottawa and Vancouver, Ottawa and Toronto, and Ottawa and Montréal at rates substantially lower than those of Telecom Canada's Dataroute and CNCP's Infodat services.

**5.1.1.2
Government Telephone Consolidations**

GTA completed the modernization of the Belleville consolidation, and upgraded the consolidations in London, Sudbury and Sherbrooke to Centrex III. GTA continued to analyse government calling from smaller locations to identify opportunities for further consolidation and extension of the government network.

A list of switches used in the government consolidations is attached as *Appendix A, Government Consolidations Switching Systems*.

**5.1.1.3
Direct Access Inter-city (DAIX) Service**

DAIX service provides improved access to the GTN from commercial local service, in non-consolidated locations. Carrier-provided switches are programmed to connect telephone locals in government offices to the IX network. Calls are placed via commercial long distance to locations which are not on the government network.

DAIX is now available in Chilliwack, Kamloops, Kelowna, Vernon, and Prince Albert. GTA is continuing to study the viability of implementing DAIX service at other non-consolidated locations across Canada.

**5.1.1.4
U.S.A. Service**

After several months of marginal telephone service to the U.S.A., the service suppliers (CNCP in Canada and USTS in the U.S.A) replaced the analog WATS service with digital facilities in 1988/89. The problem had been caused by unreliable terrestrial facilities provided to USTS by a local carrier. No additional costs were incurred by the GOC for the service upgrade.

High quality long-distance services to the U.S.A. were expanded. Network accesses to these services are now provided in Toronto, Montréal, Québec City and Sherbrooke. An RFP was issued for an additional network access in Vancouver. The contract will be awarded by the end of 1990.

**5.1.1.5
IX Network Authorization
Codes**

Demand for off-net access to the government voice network continued to increase. Authorization code usage now generates approximately 17% of GTA revenues for IX network services.

Costly cases of fraudulent authorization code usage were eliminated after new administrative procedures were issued in Treasury Board Circular Letter 1987-56.

GTA began offering Direct Inward System Access (DISA) in several locations during 1988. DISA provides authorization-code access to the GTN, without the intervention of government operators. Users enter the relevant authorization code and destination telephone number information via the keypad of touch-tone telephone sets. Service is available in most consolidations.

DISA is also being used to extend GTN access to many smaller, non-consolidated locations. For example, DISA services were implemented in Moose Jaw during 1988 as the exclusive means of access to the GTN. This eliminated the need for operator services in Regina, since the Moose Jaw foreign exchange is now a DISA termination in Regina.

**5.1.1.6
Network Modelling**

GTA introduced the following improvements to its network modelling tools, to improve network provisioning and rating:

- completion of the methodology for determining circuit routing, given Telpak and Inter-Exchange Voice Grade (IXVG) analog circuit tariffs.
- downloading directly from the Government Network Management System (GNMS) to GTA's automated modelling system, traffic statistics on all tie and WATS trunks which terminate on the Ottawa consolidation. The GNMS is a Bell Canada computer system.
- development of a computerized system to produce the per-minute-cost of Numbering Plan Area to Numbering Plan Area (NPA) calls on the GTN. Traffic statistics on 1,600 virtual routes are combined and processed to produce these costs.

5.1.2 Government Packet Network (GPN)

Description

GPN is a shared, digital data network service designed to meet the data communications requirements of the federal government. Based on CNCP's Infoswitch packet-switched network service, GPN conforms to CCITT standards, supporting a broad range of computer and terminal equipment through the following services:

- X.28 - A network interface for asynchronous data terminal equipment (DTE), such as ASCII (American Standard for Information Interchange Code) terminals or personal computers equipped with asynchronous communications software.
- X.25 - A network interface for synchronous DTEs operating in the packet mode such as computers, front-end processors, intelligent controllers/terminals and packet assemblers/disassemblers (PADs).
- X.25 to IBM Synchronous Data Link Control (SDLC) - A network interface for host computers using the X.25 protocol to communicate with SDLC controllers and devices.
- SDLC to SDLC - A network interface for SDLC hosts and controllers, allowing these devices to communicate on GPN as if using dedicated network facilities.

Access to the various network services is provided on dedicated, public-dial or private-dial facilities.

Network Coverage

GPN links computers and terminals in over 125 serving areas across Canada. Off-network locations can be linked to GPN via dedicated digital, analog or satellite facilities. Moreover, serving areas and network switching nodes can be added where traffic volume warrants. Interconnection is provided to more than 70 international networks.

Rate Structure

GTA's rates offer savings of 20% or more over commercially-available packet-switched network services. Discounts apply to access, optional service features and usage charges.

GPN will also reduce electronic messaging costs when used to access the Government Electronic Messaging and Document Exchange Service (GEMDES). (See 6.2.4, *GEMDES* for details.)

Developments - 1988/89

Network Growth

The GPN share of the market continued to expand significantly, as indicated by the following figures:

- The number of GPN circuits increased by 692, bringing the total to 844 by March 31, 1989.
- By January 15, 1990, an additional 374 circuits had been ordered or installed, bringing the total to 1,218 circuits.

This total represents a GPN customer base of 51 federal departments and agencies, with an estimated user base in excess of 12,000 federal employees.

Network nodes in Vancouver and Montréal were added to the original nodes in Ottawa, Toronto and Edmonton.

Twenty-four serving areas were added across the country to facilitate data communications requirements of GTA's clients and ensure low cost.

Service Enhancements

GTA began offering the placement of PADs on customer premises, allowing concentration of data communications at or near customer host devices, reducing costs.

X.28 services were enhanced by the addition of special EEPROMs (electrically erasable programmable read-only memory) on the PADs of those clients requiring 8-bit transparent operations, to accommodate file transfers and unique character sets.

All X.28 service features were upgraded to full CCITT 1984 standards. Those X.25 features of most use to clients were also upgraded to the 1984 standards.

GEMDES Terminations

GTA began testing and conducting trial operations of GPN circuit terminations on the GEMDES computer facilities. (See 6.2.4 *GEMDES*, for an explanation of the benefits.)

Regional Initiatives

GTA regional staff held seminars in Victoria, Vancouver, Edmonton, Winnipeg and Moncton to introduce regional clients to GPN services, discuss potential applications with them, and brief them on service developments. All departments were invited to attend these seminars, which were tailored to the specific requirements of each region.

GTA Applications and Applications Development

GTA began using GPN to link its regional and headquarters local area networks, and to provide GTA regions with access to its corporate databases.

Several LAN-based applications were developed to assist GTA consulting and engineering staff to analyse customer requirements for GPN.

GTA engaged the services of a contractor to develop the GPN integrated order entry, inventory and billing system. This automated system will decrease the billing interval and verify bills, resulting in more efficient, timely billing of GTA clients.

**Supply and Services Canada
(SSC) Applications**

Several SSC applications can now be accessed via GPN. These applications include the Financial Control System (FINCON), Procurement Acquisition Support System (PASS), On-line Pay, Personnel Administration Reporting System (PARS), Payment on Due Date (PODD), and Contribution Systems, as well as other internal SSC applications.

Plans

Network Development

The addition of a fourth network node in Toronto will be completed by the fourth quarter of 1989/90. A new network node will also be installed in Moncton during the 1st quarter of 1990. Capacity of network concentration points will continue to be upgraded and optimized to accommodate the increased demand on the network.

GTA will continue working with CNCP to expand the number of network serving areas, in order to extend economical network services to all parts of Canada.

Service Enhancements

X.32 dial-up service will be introduced, offering low-volume and occasional users the inherent advantages of X.25 network services, such as full error detection and correction, and low cost.

Dial-up SDLC services for IBM and IBM-compatible users will be introduced.

GTA will continue to improve the GPN appointment plan to decrease the time required for service installation and software change intervals.

Speeds of primary and backup digital trunking facilities between nodes will be increased across Canada.

**Virtual Networking
Capabilities**

Enhanced network management capabilities will continue to be developed consistent with virtual private (software-defined) networking. This will permit applicable organizations to manage their portion of GPN dynamically, as if it were a private, dedicated network, while taking advantage of the shared GPN service.

Varying degrees of network management will be offered, assisting applicable clients to orient the service more closely to their requirements.

**Interoperability with
Other Services**

Developmental engineering will continue in order to ensure successful interoperability of GPN with the Government Satellite Network (GSN), and other satellite network service providers.

With the standardization of ISDN and the emergence of ISDN products, development of ISDN interoperability capabilities will continue.

5.1.3

Government Satellite Network (GSN)

Description

GSN provides data, image, video and voice satellite communication services between remote and under-served areas of Canada, and major government centres. Its primary function is to facilitate access to database and electronic messaging systems. Based on Telesat Canada's Anikom 200 Very Small Aperture Terminal (VSAT) service, GSN operates in the Ku Band (14/12 Ghz), providing service coverage from the southern latitudes of Canada to as far north as Yellowknife, North West Territories.

GSN supports System Network Architecture (SNA)/Synchronous Data Link Control (SDLC), X.25, 3270 Binary Synchronous Communications (Bisync) and Burroughs Poll Select protocols. Other protocols such as Asynchronous ASCII and Digital Equipment Corporation's Digital Data Communications Message Protocol (DDCMP) can be supported in a bit-transparent mode.

Coverage

GSN is a national network service. The master earth station control centre (hub) in Toronto is connected via terrestrial facilities to serving offices in Vancouver, Calgary, Edmonton, Winnipeg, Toronto, Ottawa, Montréal and Halifax. The serving offices provide the physical interface to the client's host computer facilities via local loops. Users with host computers located outside serving office locations can be connected to GSN via the Government Packet Network (GPN), dedicated lines or public data networks.

Rates

Planned GSN rates are approximately 15% lower than the standard Anikom 200 rates, due to volume-related discounts negotiated with Telesat Canada. These rates are subject to approval by the CRTC.

Pending CRTC approval, GSN service is available at standard Anikom 200 service rates. When the GSN rates are approved, GTA will automatically apply the new rate structure.

Savings of up to 30% over existing terrestrial services are attainable through the use of GSN service.

Developments

In April 1987 GTA issued an RFP for the procurement of a government thin-route satellite service. The service specifications identified 183 sites, representing the requirements of eight federal departments. This process culminated in the signature of a five-year contract with Telesat Canada, on February 20, 1989.

Telesat Canada filed the GSN rate and services structure with the CRTC on April 14, 1989. The CRTC's decision is pending.

Twenty departments were contacted by GTA during 1988/89 to assess client demand for the GSN service. Detailed network analyses were conducted on behalf of several departments, resulting in the installation of 18 fully-operational GSN sites to-date.

Plans

GTA is currently accepting orders for GSN service. It is expected that 40 GSN sites will be installed during 1990, in addition to the 18 sites currently in service.

In 1990, GTA intends to introduce a C-band (6/4 Ghz) service which will extend GSN coverage into the Canadian arctic.

Opportunities for the application of Business Television (BTV) are being explored as a possible enhancement to GSN service. BTV would provide one-way broadcast video with two-way audio transmission for applications such as seminars, conferences, and departmental briefings where audiences are geographically-dispersed.

5.1.4 Directory Services

An analysis of the layout and organization of the Government of Canada telephone directories was conducted on behalf of GTA by the Directorate of Behavioural Research at DOC's Communications Research Centre. This analysis resulted in a revised directory format, which was introduced in the May 1989 editions of the telephone directories.

Page references in the alphabetical section which list individual names will cross-reference to the department index section, beginning with the January 1990 edition.

GTA continued the following developmental projects aimed at improving directory services to clients. This series of projects was initiated in 1987.

Automated Directory Production System Project

Description

The Automated Directory Production System permits departments to update the *Government of Canada Telephone Directory* using microcomputers equipped with GTA-provided software. Participating departments are able to update their portion of the directory database. Moreover, proprietary departmental information can be added for the production of internal, departmental directories. A "What You See is What You Get" (WYSIWYG) utility allows users to preview their input before publication. A basic file output program is included for formatting and printing departmental directories.

Departmental directory information is currently exchanged with GTA on floppy diskette.

Developments

Five departments participated in an operational trial to produce their portions of the July 1988 edition of the GOC Telephone Directory for the National Capital Region (NCR). As a result of the success of this trial, 22 departments used the system for the May 1989 edition of the NCR directory. The system is now used to produce all GTA regional directories.

GTA held departmental debriefing sessions to obtain user input for improvements to the system. System enhancements based on this input are under development.

Most large departments now use the micro-computer system for the production of the NCR telephone directory.

Plans

GTA will continue the analysis for the development a system which permits direct, on-line updating of the directory database by client departments. GTA plans to issue specifications to prospective bidders in 1990.

On-line Electronic Telephone Directory

Description

The "Minitel" trial in France demonstrated the feasibility of using inexpensive display terminals to access consumer-oriented information services.

GTA initiated the On-line Directory Project to determine the feasibility of making GOC and departmental telephone directories available electronically, for on-line access by government users and members of the public. The resulting value-added telecommunications service will provide access to government directory information, using various search criteria.

Developments

The Department of Communications' Canadian Workplace Automation Research Centre (CWARC) commissioned a study on GTA's behalf to determine whether development of an on-line telephone directory was feasible. The scope of the contract also included recommendations concerning directory database development, should the on-line directory prove feasible.

A consultant surveyed federal departments to determine their requirements, and analysed GTA's current directory operations. The resulting report indicated that substantial savings in operator services could be realized if an on-line database were provided to departments, and that departments could also save money. The report also acknowledged the possibility of providing on-line database update capabilities, but noted a limited financial base to justify such a service offering. Moreover, it was recommended that distribution of an on-line directory begin only after the electronic update process is well established. (See *Automated Directory Production System Project*, above.)

Plans

GTA has formulated a business case for additional person-year support of this project. If the necessary resources are granted, the project will proceed.

The functional specification for the On-line Electronic Telephone Directory will include the following basic requirements:

- Directory photo-typesetting (this function will continue to be performed by contractors)
- On-line directory, initially for government operators
- Full compatibility with the microcomputer-based departmental update system (see *Automated Directory Production System Project*, above)
- Compatibility with and implementation on GTA's facilities for central management of the database.

5.1.5

Government Cellular Service

Description

Federal departments and agencies can order cellular telephone services from CELLNET Canada and CANTEL Inc., under contracts negotiated and managed by GTA. Under the terms of these contracts, all federal users are considered to be one customer group. Significant discounts are therefore offered.

Users order directly from the service supplier of their choice, referencing the "Government Cellular Service". They are billed directly by the supplier.

Service Coverage

Both suppliers offer national coverage.

Rates

Discounts of up to 18% are offered on certain chargeable service components. Several features are offered at no additional cost.

No GTA overhead charges apply.

Developments

New discount rate schedules were introduced during 1988/89.

CANTEL Inc. introduced a new rate structure called the "Million Minute Plan", offering additional cost savings to heavy users of cellular telephone services.

Plans

The contracts with CELLNET Canada and CANTEL Inc. will be renegotiated and renewed by the fourth quarter of 1989/90.

CANTEL's "Million Minute Plan" will be offered in addition to the rate structure of the original contract. This will allow users to select the most cost-effective rate structure.

GTA is exploring with both service providers the feasibility of transferring cellular network long-distance calls to GTN facilities. Long distance services would therefore be billed at the same low rates as regular government inter-city calls.

5.1.6 Government Telecommunications Specifications

GTA develops and maintains the *Government Telecommunications Specifications Manual*, which is a compilation of GTA-approved functional and technical specifications used in the provision of common telecommunications services.

These specifications have been developed to assist GTA personnel in telecommunications systems development and acquisition. The specifications are also available upon request to GTA's clients, to familiarize them with the technical aspects of GTA services and systems.

GT.3 - Government Packet Network (GPN) Interface Specification

The GT.3 specification assists technical staff from client departments to understand the physical link and network requirements of GPN, and assists them in the selection of the appropriate GPN service for their applications. It identifies the physical characteristics and control procedures required for interfaces between Data Terminal Equipment (DTE) and Data Circuit Terminating Equipment (DCE) for various forms of transmission service on GPN.

GPN provides the following types of packet-switched services, and supports the corresponding standard interfaces, which are addressed in GT.3:

- GPN - X.25 CCITT X.25
- GPN - X.28 CCITT X.3/X.28/X.29
- GPN - SDLC IBM SNA/SDLC

GT.3 was distributed in 1989 to departmental GPN network services administrators. It is also available upon request.

GT.5(A) - Subconsolidation Planning Guide

GT.5(A) is a planning guideline for departments considering alternatives to the consolidated telecommunications services provided by GTA.

The GT.5(A) specifications are being updated to provide more information to government clients who are considering the installation of departmental PBXs or subconsolidations. Additional specifications for fire, security, and transmission quality will be incorporated.

The updated Subconsolidation Planning Guide will be released during the fourth quarter of 1989/90.

Guidelines for the Preparation of Data Technical Specifications

Within the Government of Canada, RFPs are normally issued for the procurement of data communications networks and services from common carriers. The Data Technical Specifications (DTS) are that part of the RFP which describes the technical requirements of the network and services to be acquired.

This document will guide technical personnel in determining the scope of information required to develop comprehensive technical specifications. It will be used internally by GTA's Directorate of Telecommunications Systems Management, and could be used by government departments or agencies in the preparation of the technical components of RFPs for data networks and services.

GTA will distribute these guidelines to departmental telecommunications coordinators and known network administrators during the fourth quarter of 1989/90. These guidelines will be available upon request.

**5.2
Planned Network Services**

**5.2.1
Mobile Satellite (MSAT)
Services**

Description

MSAT was conceived by the Department of Communications (DOC) to satisfy national requirements for improved public and government mobile communications, particularly in rural and remote areas. It is a satellite communications system for the provision of wide-area mobile voice and data communications to terrestrial, marine and aeronautical mobile stations.

MSAT will provide all areas of Canada with direct links to public and private mobile radio systems, as well as the public switched telephone network (PSTN).

GTA will manage MSAT services for the GOC as the sole service provider for federal departments. GTA will offer a 5% discount over the commercial service offering. The MSAT service provider will be Telesat Mobile Incorporated (TMI).

Treasury Board has allocated a total of \$176.5 Million funding to support MSAT. Of this amount, \$126.5 Million is reserved for the bulk lease of MSAT services over a five-year period to satisfy urgent government needs. These costs will be recovered from departments who subscribe to the service. Treasury Board has reserved \$50 Million for technology development, pilot trials and management.

Potential Applications

MSAT will be able to collect data transmitted from remote monitoring and alarm devices and send commands to automated control stations. It could also transmit broadcast weather forecasts and agricultural information to any location in Canada.

Transport operations could be enhanced by an auto-locating feature, providing continuous, automatic update to dispatch centres.

In addition, MSAT will carry voice traffic, and could provide nation-wide paging.

Types of Service

MSAT will provide data and voice communications services.

Data Communications

Subscribers with mobile data units will be able to exchange and process information with remote computers from portable video terminals. Data communications services such as two-way messaging, facsimile communications, position reporting and text communications will be available.

Voice Communications

Interconnected and non-interconnected mobile radio voice communications services will be available. The voice function could also be used in conjunction with data as a service enhancement.

Plans

DOC will begin MSAT trials of voice and data applications in the fourth quarter of 1989/90. GTA is participating in the data trials, and is a member of an advisory committee which focuses on market development.

In 1990, GTA will be able to offer interim MSAT data services to government clients. The full MSAT service is expected to be operational in 1994.

6. GTA Enhanced Telecommunications Services

6.1 Introduction

Enhanced telecommunications services provide capabilities beyond those of basic transmission. Typically, they involve the storage and processing of information in electronic form as required, and as part of the communication process. The following section provides the status of existent and planned GTA enhanced services.

6.2 Current Enhanced Telecommunications Services

6.2.1 Government Data Network Service (GDNS)

Description

GDNS is a shared, computer-controlled store-and-forward message switching service, based on CNCP's Telenet service. Access is provided by dedicated data facilities and equipment, or the Telex network, using standard Telex equipment.

Coverage

Service is available throughout Canada.

Rates

GTA offers a 5% discount on CNCP's standard Telenet rate for usage and equipment.

Developments

Total GDNS subscriptions exceeded 1,400 when the service was at its peak. This total had decreased to 746 by March 31, 1989.

As of January 15, 1990, further cancellations reduced the total to 242 stations, distributed among 19 federal departments and agencies.

During 1988/89, GTA began systematically approaching departments to formulate plans for migration to the Government Electronic Messaging and Document Exchange Service (GEMDES), or, in special cases, Dialcom. (See sections 6.2.4 and 6.2.3 respectively, for information about these services.)

Plans

GDNS will be offered as a shared service until March 31, 1990. GTA will continue to assist departments to plan their migration to more efficient and effective shared messaging services before this date.

Departments which require Telenet service after March 31, 1990 should procure it directly from CNCP as a departmental service. GTA will assist any client continuing to require Telenet service to make the necessary arrangements.

**6.2.2
Government Electronic
Messaging Service (GEMS) -
Envoy 100**

GEMS-Envoy 100, a shared, electronic messaging service based on Telecom Canada's Envoy 100 service, was replaced by the Government Electronic Messaging and Document Exchange Service (GEMDES) in 1989.

All GEMS-Envoy 100 subscribers were automatically accredited to GEMDES on August 14, 1989. (See 6.2.4, *GEMDES* for details.)

**6.2.3
Government Electronic
Messaging Service (GEMS) -
Dialcom**

Description

Dialcom is a customized, electronic messaging service, provided by CNCP.

Coverage

The service can be accessed anywhere in Canada from public dial, private dial, or dedicated GPN, Infoswitch (CNCP) or Datapac (Telecom Canada) facilities, as well as through 1-800 service, and the Telex network.

Rates

Standard Dialcom usage and storage costs apply, plus a 5% GTA overhead charge.

Developments

GEMS-Dialcom ceased to be offered as a shared service as of April 1, 1989. Dialcom is now available through GTA as a customized service, to those departments who have specific requirements for it. GEMDES is now offered as the GOC shared messaging service, as the result of a competitive process. (See 6.2.4, *GEMDES* for details.)

The number of GEMS-Dialcom subscribers totalled 383 by March 31, 1989. As of January 15, 1990, the number of subscribers had decreased to 346.

Plans

GTA will continue to assist Dialcom subscribers to migrate to GEMDES. Dialcom subscribers who do migrate to GEMDES will benefit from its enhanced service features and rate structures. (See 6.2.4, *GEMDES* for details.)

GTA will continue to offer Dialcom as a customized service, to accommodate clients who have specific requirements for it.

6.2.4
Government Electronic
Messaging and Document
Exchange Service (GEMDES)

Description

GEMDES is a shared, electronic messaging service, designed to replace GTA's GDNS, GEMS-Envoy 100 and GEMS-Dialcom messaging services, as well as the Government Text Communications Service (GTCS) for format conversion of word processor documents. By combining GTA's messaging and document exchange services into one enhanced service, service integration is achieved, and greater cost savings associated with higher usage thresholds are possible, resulting in significant savings to the GOC.

GEMDES is the result of a competitive process to develop a shared messaging service for the Government of Canada. Based on Telecom Canada's Envoy 100 and iNet 2000 services, it incorporates all standard Envoy 100 features, including enhancements which were required to meet GTA's specifications. GEMDES Phase I (implemented in August 1989) incorporates the majority of the GEMDES specification. Phase II will incorporate all of the GEMDES specifications, as well as a revised rate structure. (See *Developments* and *Plans* below, for details.)

Service Coverage

Phase I

GEMDES can be accessed from anywhere in Canada by accredited subscribers using public dial, private dial, or dedicated Datapac (Telecom Canada) facilities, as well as from a 1-800 service.

Phase II

In addition to access provided under Phase I, users will be able to access GEMDES from public dial, private dial and dedicated GPN facilities, as well as as departmental networks via an X.25 access.

Rate Structure

Phase I

Users receive a 10% discount on standard Envoy 100 usage and storage rates.

Phase II

GEMDES rates will be significantly reduced (February 1990). Users will be able to select either a kilocharacter-based or a time-based rate structure, which would further vary according to the network used by the subscriber to access GEMDES.

The standard rate structure for GEMDES is "bundled". Messaging rates incorporate both network and messaging system (computer) costs. This rate structure applies to subscribers who access GEMDES from public-dial network facilities via GPN or Datapac special access ports on the GEMDES computer system. Users who access GEMDES from GPN public-dial facilities will be charged less than those who use Datapac public-dial facilities.

Users who supply their own dedicated GPN or Datapac network access will be able to take advantage of an optional, "unbundled" rate structure, in which network and messaging system charges are separate. The messaging rates are considerably lower than any of the public-dial access rates, since the network costs are eliminated from the GEMDES rate structure. The GPN charges are then billed separately, at very cost-effective rates. This combination of GTA network and enhanced services offers considerable potential savings and flexibility to customers. If Datapac is used as the network access under this option, network charges are billed separately as well, but are more expensive than GPN.

GTA will assist clients to determine the configuration which is most cost-effective for them.

Developments

The competitive process for the provision of GEMDES to the Government of Canada culminated in the signing of a five-year contract with Bell Canada (as the contracting body for Telecom Canada) on November 10, 1988.

Telecom Canada filed the proposed GEMDES rate and services structure with the CRTC on December 22, 1988.

On April 30, 1989, Telecom Canada implemented Envoy 100 Software Release 12.0, and iNet Software Releases 7.0 and 8.0, augmenting the standard Envoy 100 features with the following GEMDES enhancements:

- French character support
- binary file transfer
- autodelivery to facsimile
- enhanced directory
- blind courtesy copy
- recipient aliases

All 4,068 GEMS-Envoy subscribers were automatically accredited to GEMDES on August 14, 1989, at no additional cost. No user software or hardware changes were necessary to use GEMDES or take advantage of the majority of new features, nor were access procedures changed. In order to take advantage of the accented French character capability, however, users had to enhance their personal computers or terminals.

As of January 15, 1990, there were 4,753 subscribers, representing 65 federal departments and agencies.

On June 12, 1989, the CRTC rendered its decision: the proposed GEMDES service was reasonable in terms of function, but the CRTC required more information on the method used by Bell Canada to set the proposed rates, as well as on the application of the proposed GEMDES discounts. Bell Canada re-filed on July 31, 1989, and received CRTC approval on November 23, 1989.

Plans

GTA will implement GEMDES Phase II on February 26, 1990. All GEMDES subscribers will automatically receive this upgraded service.

The following features will be introduced under GEMDES Phase II to comply with all of the GEMDES specifications.

Telex Interface

An enhanced Telex interface will be provided to meet the GOC requirements. The standard Envoy 100 Telex interface is currently available to GEMDES users.

Document Conversion

This feature will provide on-line format conversion of documents created using personal computer word processing programs, as well as dedicated word processing systems. Users will be able to convert documents to a variety of dissimilar word processor formats, in revisable form. The conversion utility is based on Keyword Technologies software, and will be available in the second quarter of 1990.

Autodelivery to Terminals on GPN

GEMDES messages can be autodelivered to accredited terminals connected to the service via dedicated GPN accesses.

GTA plans to develop the following service enhancements, over and above those features specified in the GEMDES specifications.

Standing Offer for Personal Computer Communications Software

GTA has issued an RFP for personal computer communications software compatible with popular operating systems used within the GOC. A standing offer will be established through SSC.

GTA's specifications require that the communications software support all GEMDES features, including Canadian Standards Association Z243.4 standard 8-bit code with Latin Alphabet No. 1 and extended 7-bit code, which includes all accented French characters.

Electronic Data Interchange (EDI) Support

Traderoute (based on Envoy 100) currently provides an interface for the transmission of EDI documents in accordance with American National Standards Institute (ANSI) X.12 Standards. During 1990, it will be upgraded to conform to the international United Nations EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) standards for EDI. GTA will work with Telecom Canada to offer EDI services via GEMDES.

X.400 Gateway

The current X.400 gateway for interaction with compatible public and private messaging systems now conforms to CCITT 1984 standards. The 1988 standards will be implemented during 1991.

GTA plans to introduce the binary file transfer capability for the X.400 Gateway in the second quarter of 1990.

GEMDES to Facsimile

GEMDES currently supports autodelivery to Group 3 facsimile terminals.

GTA also plans to offer complete inter-service compatibility with its planned shared store-and-forward facsimile service which is currently under development. (See 6.3.1, *Government Facsimile Communications Service*.) Fully bi-directional communications capabilities with the facsimile network are planned. Users will be able to send messages from their GEMDES mailboxes to facsimile terminals, as well as receive messages from the facsimile network.

Interface to CNCP's Dialcom Service

Pending resolution of interconnection issues, GEMDES users will be able to exchange messages with Dialcom users.

Access to Government Service Providers

Specialized access to several government and private sector service providers is currently provided via GEMDES. GTA will continue to work with other departments to develop additional applications which can be used by GEMDES users.

**6.2.5
Government Teleconference Service (GTS)**

Description

GTS is an audio conferencing service which permits up to 30 participants in different locations to hold scheduled meetings. Conference participants are connected via a "bridge", to which conference participants call.

GTA offers two basic forms of teleconferencing, in a variety of configurations:

- Operator-assisted, providing conference services for up to 30 parties, depending on location.
- Station (user)-controlled, providing conference services for up to 10 parties, depending on location.

Specific configurations differ from region to region. GTA regional personnel can be contacted for more details.

Service Coverage

Bridging arrangements are available in several major centres across Canada. GTA regional personnel should be contacted for details.

Rates

Teleconference Cost Components:

- Teleconference Booking Fee
- Teleconference Set-up Charge
- Long Distance (IX and/or DDD) Charges - These charges are based on prevailing rates for each "leg" of the teleconference, and therefore are location-dependent.

GTS is up to 50% cheaper than equivalent commercial service, where available.

Developments

GTS usage continued to grow. In the National Capital Region, for example, the number of teleconferences held during 1988/89 grew to 5,425, an increase of 734 teleconferences or 16% over the previous year.

The following administrative practices were introduced:

- Scheduling of multiple teleconferences is limited to a maximum of six per teleconference booking.
- Bookings are accepted up to three months in advance of the teleconference.

Plans

GTS will continue to be offered in its current forms and configurations.

6.2.6

Government Voice Messaging Service (GVMS)

Description

GVMS will enhance the ability of users of GTA local shared telephone services to send and receive telephone messages. GVMS will be fully-integrated with the government telephone system, and thus will provide the following basic functions:

Automatic Telephone Answering

Automatic telephone answering permits incoming, unanswered and/or busy-line calls to be forwarded to the subscriber's voice mailbox. Callers hear a personal greeting and can then leave full-content messages. Subscribers are notified of messages by flashing lights on their telephone sets, or modified dial tones when they next use their telephones. Mailboxes are accessed using exclusive passwords.

Messages can be played, replayed, stored, and/or annotated and forwarded to other subscribers; replies can be recorded and automatically sent to other subscribers; callers can optionally speak to an operator or receptionist, should they not wish to leave a GVMS message.

Voice Mail

The voice mail function permits subscribers to record, edit and send messages to other subscribers, either individually or in groups. Received messages can be forwarded, stored or deleted.

Information Dissemination and Collection

The "bulletin board" function allows callers to access a series of prerecorded messages which answer often-asked questions, or disseminate information such as hours of operation, fee schedules, timetables, etc. Callers can also record responses to prerecorded questions, place orders or request assistance.

All voice messaging functions are activated by touch-tone telephones using one- or two-digit commands. Voice prompts guide users through each operation. These prompts are available in English or French, and are selected by the subscriber. They can optionally be deactivated by users. GVMS provides a 24-hour-per-day, 7-day-per-week service.

Service Coverage

Initial GVMS sites will be Ottawa, Hull, Toronto, Montréal, and Vancouver. (See *Plans* below, for details.)

Rates

Subscribers pay a one-time set-up charge of \$40.00, and a recurring charge of \$9.95 per month.

Developments

Based on the success of two GTA voice messaging service trials as well as the response to an RFI for voice messaging services, an RFP for the procurement of GVMS was issued by SSC on behalf of GTA, in April 1988.

Four proposals were received in July 1988. Contract negotiations began in March 1989, culminating in the signing of a three-year contract with Time Communications Limited in May 1989.

Marketing GVMS concurrently with the contracting process resulted in departmental commitments of over 10,000 mailboxes.

Plans

GVMS is initially offered in Ottawa, Hull, Toronto, Montréal, and Vancouver. It will be introduced in other regional centres across Canada, based on demand.

New and expanded service features will continue to be developed.

**6.3
Planned Enhanced
Telecommunications Services**

**6.3.1
Government Facsimile
Communications Service
(GFACS)**

Description

GTA initiated a program in 1988/89 to plan the development of a state-of-the-art, shared facsimile communications service, conforming to Canadian Standards Association (CSA) and CCITT standards. This service will be fully compatible with existing and future facsimile terminals which conform to CSA and CCITT standards.

GFACS will offer capabilities beyond those of basic facsimile transmission. It will provide facsimile store-and-forward and store-and-retrieve functions from user "mailboxes". Moreover, GFACS will provide communication links to other services, such as electronic mail and Telex.

Extensive traffic routing and network management capabilities will provide efficient, cost-effective facsimile communications. GFACS will provide optional autodelivery on a time-of-day basis, reducing costs by using idle network capacity available during off-peak and non-business hours.

GFACS Program Objectives

The GFACS Program was established to achieve the following objectives:

- ° Maximize economies of scale by combining federal government facsimile systems and services on one network.
- ° Provide more cost-effective, better-managed facsimile communications services to GTA's clients.

- More efficiently use government common network facilities and services to minimize transmission costs of all types of government traffic.
- Standardize basic facsimile terminal features, and facilitate ease of terminal procurement via Standing Offers.

Access Arrangements

To ensure universal availability, users will be able to access GFACS via the following access arrangements:

- Circuit-switched GOC IX Network; this arrangement will conform to CCITT-approved service definition recommendations for store-and-forward facsimile communications services.
- Packet-switched Government Packet Network (GPN); access will be provided from 9.6 Kbs dedicated nodes.
- Government Electronic Messaging and Document Exchange Service (GEMDES); store-and-retrieve and store-and-forward capabilities, in addition to multiple addressing will be provided. The GEMDES message handling service will also transmit and store image information in binary format.

Possible Functional Requirements

Some of the possible functional specifications which are being fully explored by GTA include the following.

Network-wide Communications Capabilities

Functions related to network-wide communications include the following:

- Store-and-forward service based on the user mailbox concept, with transmission to single or multiple destinations.
- Autodelivery on a time-of-day basis, with automatic re-dial of busy numbers.
- Network-wide polling of user facsimile terminals in unattended mode, with or without passwords.

Service Access and Transmission Network

Service access and transmission network requirements include the following:

- Local access via dedicated and/or circuit-switched access arrangements.
- Distribution via existing and evolving government networks equipped with standard PSTN and X.25 interfaces.

Service Interconnection

The service interconnection specifications will require standardized interfaces for interconnection to existing and evolving public and departmental facsimile network services.

**Service/Network Node
Capability and Capacity**

Requirements relating to the service/network nodes include the following:

- Government shared or dedicated facsimile nodes will be located in service centres across Canada.
- Network nodes will store facsimile images, packetize (if using the packet network) and transmit them via the government network to destination nodes. The images will be stored in the recipient's mailbox or forwarded immediately to the remote recipient via a telephone link.

Service-User Interaction

A user interface which allows subscribers to use service functions easily will be required. Prompts and error corrections will simplify system use.

Developments

GTA issued an RFI for facsimile communications services in August 1989. Approximately 60 companies were solicited.

The closing date for response was September 1, 1989.

Plans

GTA will conduct a trial service evaluation during the first quarter of 1990 to determine the operational capabilities and performance of a representative, commercially-available facsimile network.

A draft RFP for the acquisition of the full service offering will be completed by March 1990.

GFACS will initially support a user community consisting of 500 CCITT Groups 2 and 3 facsimile terminals in Ottawa and Hull, as well as 500 terminals distributed among Vancouver, Calgary, Edmonton, Winnipeg, Toronto, Montréal, Moncton and Halifax.

**6.3.2
Government Video
Teleconference Service
(GVTS)**

As a result of developments in compressed video technology and services, video teleconferencing in the government is becoming cost-efficient for certain applications. The introduction of digital broadband facilities on the GTN will further reduce the costs of the high-capacity facilities required for video-teleconferencing. (See 5.1.1.1, *Conversion of the Inter-city (IX) Network to Digital Facilities*.)

GTA is developing a plan to introduce an evaluation video teleconferencing service in selected government centres during 1990. This interim service will permit GTA to evaluate user demand and acceptance of video teleconferencing, its cost-efficiency, and the appropriate network facilities required for the GTN, prior to development of a full service offering.

6.3.3 Electronic Data Interchange (EDI)

Description

EDI is the electronic exchange of business transaction information in a standard form. Business transaction processes such as ordering, billing, payment, and inventory and asset management can be further automated through the application of EDI, resulting in greater efficiency in the procurement process.

Electronic Document Interchange Applications Project

The Department of Communications/Supply and Services Canada (DOC/SSC) Information Technology Steering Committee initiated a joint project in 1988 to study the potential use of EDI for government procurement of telecommunications and other goods and services. Both departments are examining how they can improve the procurement process through the application of EDI.

The "Electronic Document Interchange (EDI) Applications Project" was established within GTA to carry out DOC's portion of the project. GTA engaged the services of an external consultant to support the first phase of this project, which was to identify opportunities for the application of EDI within both GTA and SSC.

The *EDI Definition Study* was completed in June 1989, concluding the first phase of the project. Its recommendations are being pursued by GTA and SSC, who are planning EDI pilot trials as the second phase of this project.

The objective of the GTA pilot trial will be to develop the necessary processes and procedures for the implementation of an EDI approach for conducting business transactions between GTA and client departments, other common service agencies (e.g., SSC) and regional telephone companies. This trial will begin in March 1990.

Project developments are being reported to the EDI Federal Users Group, which was established by the Treasury Board Government EDI Steering Committee to promote the effective deployment of EDI in the GOC.

GTA's Role in the Development of EDI for the GOC

As a common service provider, GTA will provide common communications services to facilitate the implementation of government-wide and departmental EDI applications. GEMDES is being evaluated as a vehicle for government EDI applications. (See 6.2.4, *GEMDES* for details.)

GTA will also be developing EDI applications specifically for the telecommunications procurement function within the GOC.

7. Planning and Coordination

7.1 Policy Development and Interdepartmental Planning Activities

On behalf of the government community, GTA continued to support the following activities related to policy development and interdepartmental planning of telecommunications:

- Occupational analysis of the telecommunications management function in the federal government.

This project included surveying the federal government telecommunications community, and analysing and reporting the results.
- Teleforum '88 and Teleforum '89.

The fourth and fifth annual government telecommunications study sessions were organized. Their themes were "Sharing the Future" and "Making Connections" respectively.
- Review and revision of economic objects for telecommunications and the development of model line objects.

The resulting *Report on Economic and Line Object Coding for Telecommunications in the Federal Government* was submitted to Treasury Board Secretariat for use in the development of the Comptroller General's Master List of Objects.

7.2 Information Services

GTA provided the following information in various media on telecommunications management:

- Textual, audio and video materials from Teleforum '88 and Teleforum '89 were provided to the information management community.
- The *1988 Edition of the Telecommunications Training Catalogue* was published. This catalogue lists telecommunications courses offered by a variety of institutions across Canada.
- Several "Communiqués" were issued, which announced various planned events, new and proposed GTA common services, and the availability of information packages.

8. Evaluation of Telecommunications Management in the Government of Canada

8.1 Introduction

As previously discussed in Section 4.4, *Government Telecommunications Architect Function*, the ACIM Working Group on Core Systems and Supporting Infrastructure concluded in its report entitled *Strategy for the Management of Common Telecommunications Networks and Services for the Federal Government* that there would be significant benefits for the GOC in strengthening the government-wide telecommunications architect function, and promoting the use of common telecommunications services. It recommended "a new collegial management approach" to developing an integrated telecommunications management infrastructure. It further recommended that GTA assume the telecommunications architect function for the government-wide, integrated telecommunications architecture.

The above-referenced ACIM report, the DOC Program Evaluation Report entitled *Summary Evaluation Report: Government Telecommunications Agency*, and the *Report of the Auditor General of Canada to the House of Commons*, were all issued in 1989. Discussions of all three reports have been included in the *GTA Performance Review and Update* because these reports are mutually reinforcing and constructively critical of telecommunications management within the federal government.

The Program Evaluation and Auditor General's reports are briefly discussed in this section.

8.1.1 GTA Program Evaluation

Introduction

An evaluation of the Government Telecommunications Agency was completed during 1988/89. The study, which was requested by Treasury Board, was conducted by the Program Evaluation Division of the Department of Communications (DOC) through an external consulting firm.

Evaluation Issues

Four issues were individually examined:

- Cost effectiveness of GTA's services
- Range and quality of services offered by GTA
- Adequacy of GTA's planning activities
- Relationship between GTA and DOC

General Findings

GTA is generally fulfilling its mandate to provide cost-effective services, and clients are satisfied with the services provided.

The overall performance of GTA is very good; however, a number of areas require improvement, such as billing, long-term planning of government telecommunications services, and the relationship between GTA and DOC.

Cost Effectiveness

A sample survey of GTA's clients revealed that the inter-city services reduce costs and are effective. This conclusion applies, to a lesser extent, to equipment and specialized services. Administration, billing and consulting services are considered too costly and are seen as less effective.

Clients find that important economies are realized through common services, but at the expense of a certain degree of flexibility in the range and choice of services and equipment offered.

Industry trends indicate that local services, equipment, sales, leasing and consultant services are growing faster, in most cases, than inter-city toll services. Therefore, GTA may find increased business in these areas. This would require improved planning and responsiveness to client needs.

Range and Quality of Services

Service users and telecommunications managers from three departments were surveyed. They indicated that GTA has performed its functions well and that its services are evolving at more or less the right pace.

Availability of voice and data services, assistance from government operators, courtesy and helpfulness of GTA personnel, quality of training materials, directory layout and the quality of sound of local calls were rated highest.

In the fields of consulting services and planning, the quality of services and expertise provided by GTA were rated lower than those in the private sector.

Interviewees also indicated that there were some areas that need improvement. Both users and managers expressed dissatisfaction with the quality of sound of U.S. calls, technical difficulties associated with conference calls, the slow billing process, and inaccuracies in regional directories and the cumbersome method of updating them.

It was noted in the evaluation that GTA has taken steps to alleviate or eliminate each of these problems.

GTA Planning Activities

The evaluation of planning was based on a document review and interviews with GTA and DOC representatives, and addressed two important aspects of GTA long-range planning:

- i. Service - The study indicated that GTA expended considerable effort in planning common services.
- ii. Long-range planning - This area encompasses all government telecommunications services, including those provided by GTA and those originated by individual departments or agencies. The study indicated that there is virtually no systematic, all-encompassing, long-term planning in this area.

Because GTA is operations-oriented, its primary concern is to plan for common services. Its organizational structure does not facilitate long-term planning, nor does it encourage the full cooperation and participation of all departments and agencies, and of Treasury Board.

Relationship between GTA and DOC

The study of the relationship between GTA and DOC was based on a document review with selected DOC personnel. It was concluded that GTA and DOC have a limited relationship. Information exchange is usually informal and is considered one-sided in favour of GTA. Those surveyed felt that overall, the relationship could be improved.

Conclusions

The conclusions of the program evaluation study were the following:

- i. GTA should be provided with all necessary resources to expand and improve specialized services.
- ii. Action to resolve user complaints about certain aspects of GTA's services is being taken. Recommendations are therefore unnecessary.
- iii. It is not clear to what extent GTA should be involved in long-term planning. If GTA is to be assigned the responsibility for the planning function, more resources should be provided. The planning exercise would involve the full cooperation of all government departments and agencies as well as Treasury Board. Securing this cooperation could be a major task in itself.
- iv. A committee of DOC and GTA representatives has been formed to improve communications. This committee is chaired by the Director General of GTA. Recommendations are therefore unnecessary.

Readers are directed to sections 4. *Strategic Overview*, 5. *GTA Network Services*, and 6. *GTA Enhanced Telecommunications Services* for information about the measures which GTA has instituted to address the noted deficiencies.

**8.1.2
Report of the Auditor General
of Canada**

In the 1989 *Report of the Auditor General of Canada to the House of Commons*, the evaluation of how efficiently the federal government uses telecommunications services was reported under Section 7. "Efficiency - The Management and Use of Telecommunications in the Federal Government".

The following excerpts are limited to the Auditor General's recommendations to the Department of Communications, and the department's response. For more details about the Auditor General's audit of telecommunications management within the GOC, readers are directed to the above-referenced report.

**Auditor General's
Recommendations to DOC**

The Auditor General recommended that the "Department of Communications should:

- review the past performance and current capabilities of GTA to determine whether it is the appropriate vehicle for a common service agency for all government telecommunications;
- take action to clarify the mandate of GTA with respect to the intent of the Treasury Board's administrative policy framework; and
- re-examine the provision of common services for telecommunications, with a view to studying the role of a common service agency as re-seller of carrier services and negotiator of agreements similar to 'master standing-offers' for services."

DOC's Response

DOC's response, as published in the Auditor General's report, was the following:

"The Department accepts the conclusions and recommendations of the audit and makes the following additional comments. Despite the very limited resources available, GTA has managed to implement common services for data communication in the forms of a VSAT network, a packet switched network and conversion of the circuit switched network [to] digital facilities, all of which have brought and will bring further economies to the government in the data communications area.

It should be recognized that DOC does not have any power to enforce a common service agency role (implied mandatory) and, in the IMAA [(Increased Ministerial Authority and Accountability)] environment, such an action would be questionable. Short of the mandatory inference, the Department and GTA have vigorously pursued a common service role even to the extent of creating a marketing group to ensure the benefits of the common service approach are widely publicized throughout government.

The Agency has developed a plan (GTN 2000) [sic] which clearly shows the direction to achieve the greater savings which will become available in the future.

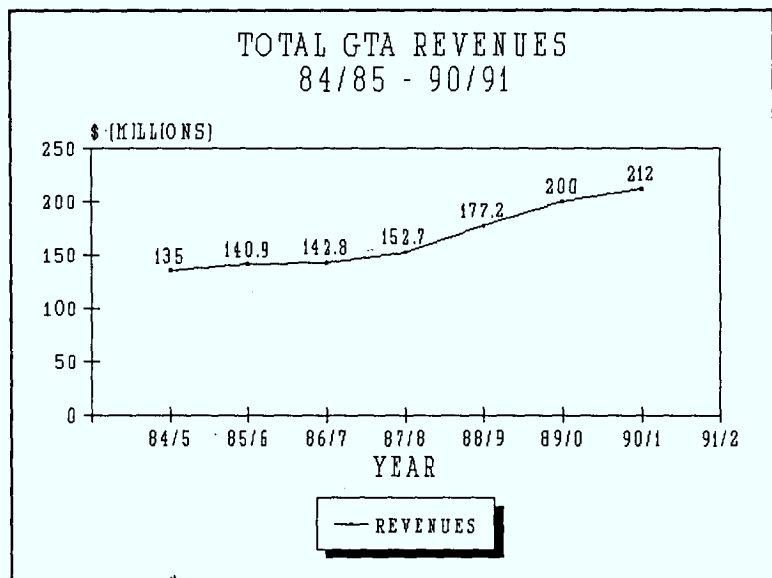
GTN 2000 [sic] examines the major changes in technology and regulation now unfolding and provides the blue print by which GTA will evolve a single universally accessible network to carry voice, data, image and video in the future. The baseline for this network is the existing circuit switched network which is being converted to a universal digital technology network as permitted by economy, technology and regulation. A Request for Information issued to industry in 1988 indicates that it will be feasible to establish a pilot digital channel network service by 1990."

9. GTA Performance Measurement

9.1 Introduction

The following graphs and tables contain some of GTA's operational statistics used for performance measurement. They are provided for reference purposes.

Graph 1: Total GTA Revenues



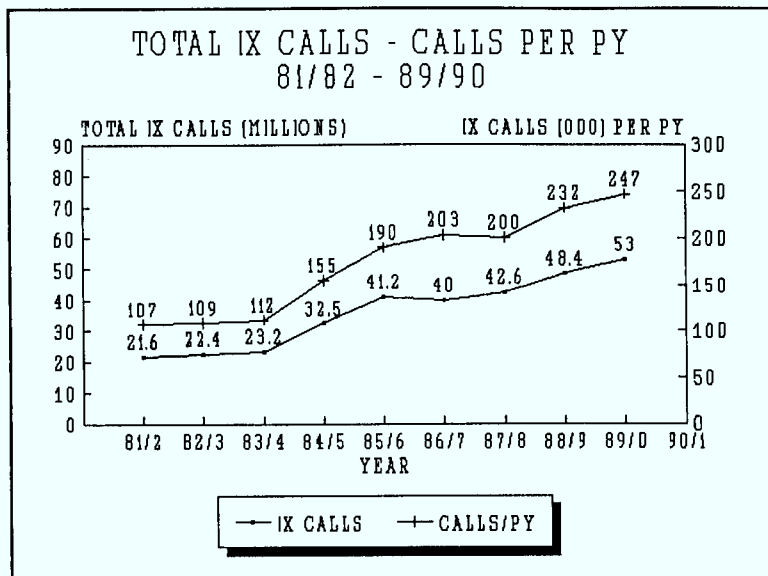
Graph 1: Total GTA Revenues

This graph shows the growth in total annual revenues generated through GTA cost recovery operations from all sources.

The average growth of revenues for the years identified measures 8.2%.

The significant increase of 11.3% for 1988/89 is primarily due to the introduction of the 10% federal sales tax on telecommunications and growth of the Government Packet Network. The forecasted growth of \$22.8 million in 1989/90 is primarily due to the 1% increase in the federal tax, the first full year of coordinated acquisition of CNCP circuits, and an increase in IX and GPN usage. For 1990/91 revenues are projected to grow by 6% to \$212 million.

Graph 2: Total IX Calls - Calls per GTA Person-year (PY)



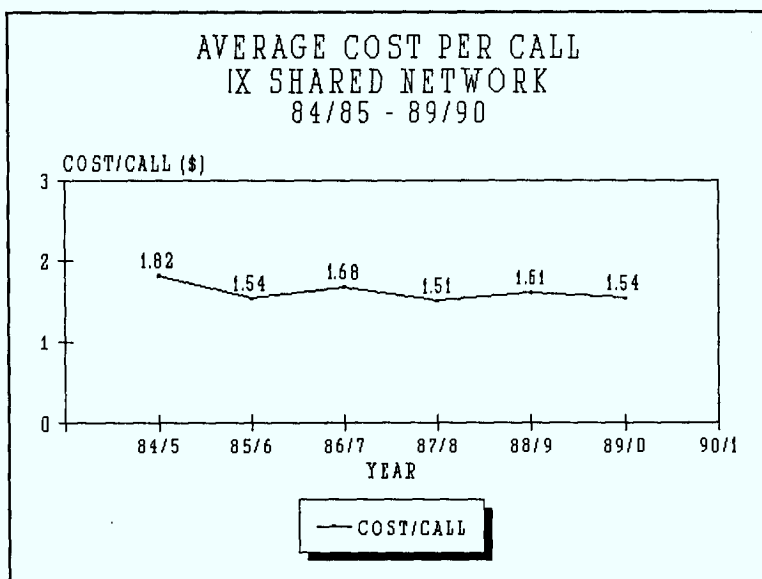
Graph 2: Total IX Calls - Calls per GTA PY

The growth in the total number of long distance calls placed over the inter-city network and the relationship of these calls to total GTA person-years are illustrated. Changes in number of calls are paralleled by similar changes in the number of calls per person-year.

Call levels were stable over the 1986/87 to 1987/88 period. This was a direct result of GTA's efforts to curtail abuse of the network by providing accurate and timely SMDR (Station Message Detail Recording) information to departments and by making TBS-endorsed changes to the control and administration of authorization codes.

The increase in calls per person-year in 1988/89 is primarily due to a decrease in GTA person-years, while the forecasted increase for 1989/90 is based on an anticipated growth in the number of IX calls due to higher facsimile and data usage.

Graph 3: Average Cost per Call - IX Shared Network

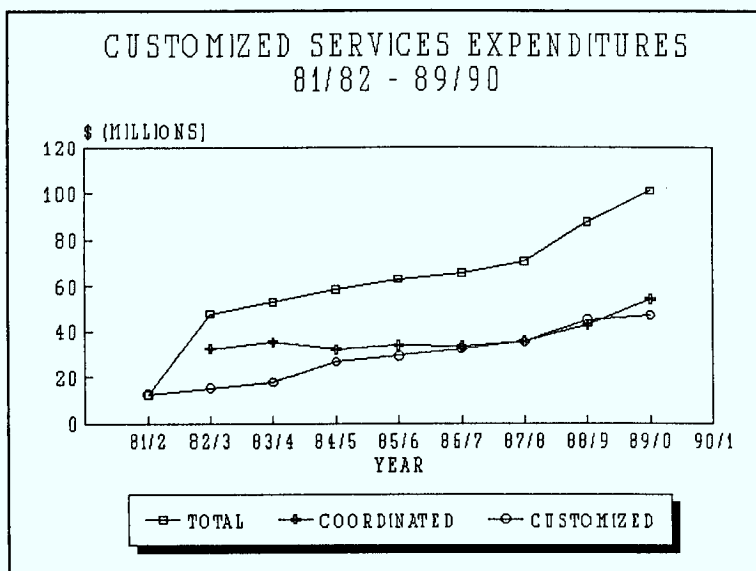


Graph 3: Cost per Call - Inter-city Shared Network

This graph shows the average cost per call transmitted over the inter-city shared network.

The trend in lowered cost per call beginning in 1985/86 is the result of efficiencies from the modernization of the network (e.g., Automatic Route Selection). Rate restructuring, the introduction of a 10% federal sales tax, and tariff increases account for the increase during 1988/89. The projected lower cost per call for 1989/90 is due to limited cost increases and expected growth in facsimile and data traffic volumes.

Graph 4: Customized Services Expenditures

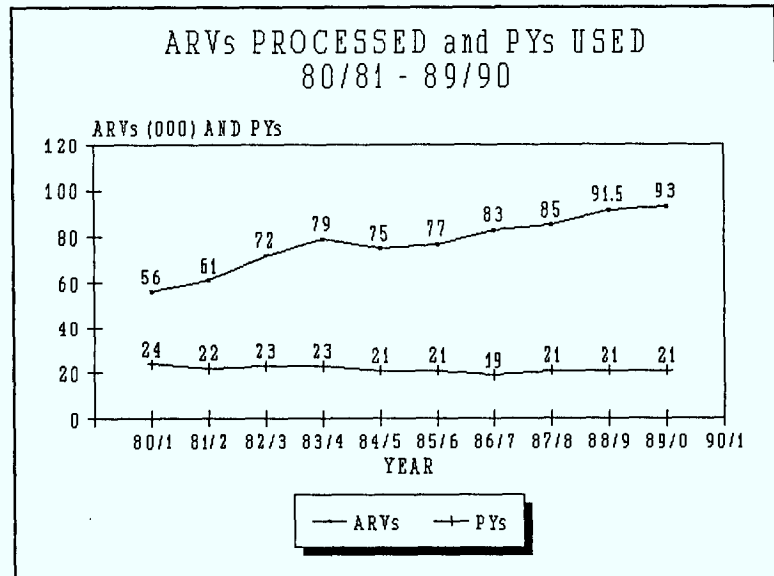


Graph 4: Customized Services Expenditures

The growth in annual GTA expenditures for customized telecommunications services and the coordinated procurement of bulk services for major users (e.g., ND, TC) are shown.

Coordinated procurement began in 1982/83 when GTA was designated by Treasury Board to act on behalf of the federal government for the consolidated acquisition of bulk services. This resulted in estimated annual savings of \$1.8 M. Continued increases in coordinated procurement operations have resulted in the inclusion of the majority of CNCP private line circuitry, resulting in additional annual savings of \$125 K. Higher expenditures in 1988/89 and 1989/90 are the result of the coordinated procurement of additional ND circuits by GTA, and the accounting of GDNS and DIALCOM expenditures as customized services expenditures. Increases in customized and coordinated procurement expenditures averaged 6.8% over the 1983/84 to 1989/90 period.

Graph 5: Accounts Receivable Vouchers (ARVs) Processed and PYs Used

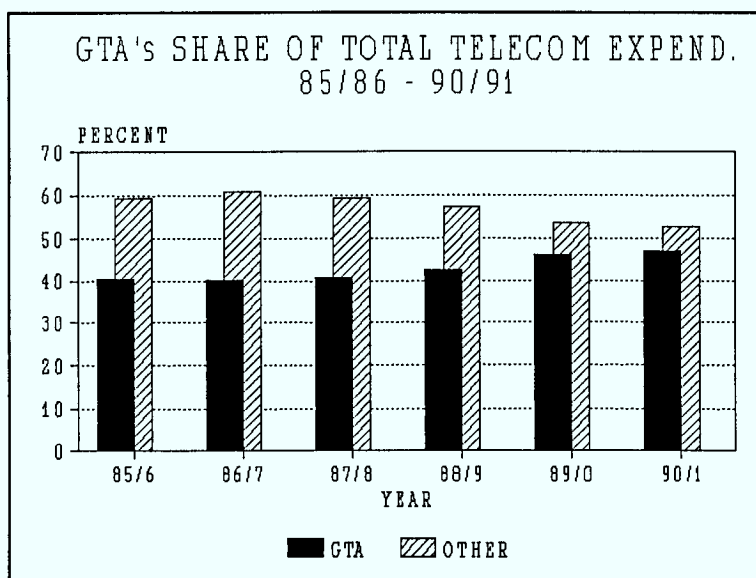


Graph 5: ARVs Processed and PYs Used

The annual number of bills (ARVs) issued by GTA for telecommunications services in relation to the number of GTA person-years directly involved in the billing process is shown.

The billing function is currently being streamlined due to improvements to GTA's financial information system. It is anticipated that summary billing techniques will reduce the total number of bills issued in future years.

Graph 6: GTA's Share of Total Government Telecommunications Expenditures



Graph 6: GTA's Share of Total Government Telecommunications Expenditures

GTA's share of total annual government expenditures for voice and data services is illustrated.

Between 1985/86 and 1988/89, GTA's share averaged 40.8%. It increased to 42.7% in 1988/89. Over the 1989/90 to 1990/91 period, GTA's share of total telecommunications services expenditures is projected to increase to 47.2%

Table 1 compares the cost of GTA inter-city voice services to the DDD rates of commercial carriers, for calls between Ottawa and ten Canadian cities.

Table 1.: Examples of GTA Inter-city Prime Time Rates Compared to Direct Distance Dialling (DDD) Rates			
To or from Ottawa	DDD Rate per Minute	GTA Rate per Minute	% Savings per Minute
Halifax, N.S.	0.73	0.49	33%
St. John's, Nfld.	0.75	0.57	24%
Saint John, N.B.	0.71	0.45	37%
Charlottetown, P.E.I.	0.73	0.49	33%
Montréal, Que.	0.42	0.23	45%
Toronto, Ont.	0.44	0.26	41%
Winnipeg, Man.	0.75	0.48	36%
Regina, Sask.	0.75	0.57	24%
Edmonton, Alta.	0.75	0.54	28%
Vancouver, B.C.	0.75	0.55	27%

Another measure of GTA's performance is the expansion of its client base. Table 2 lists the number of departments and agencies using specific GTA services.

Table 2: Number of Clients Using Specific GTA Services						
Services	84/85	85/86	86/87	87/88	88/89	89/90
Intercity Voice and Local	130	131	135	133	135	142
Shared Data	57	63	65	67	65	66
Customized Voice and Data	72	87	85	92	102	100

10. GTA Financial and Personnel Utilization Review and Forecast

10.1 GTA Revolving Fund

Resource Summaries

Table 1 shows total estimated revenues and expenditures that will result in a nil surplus in 1990/91.

Table 1: Statement of Net Modified Cash Requirements			
	Estimates 1990/91 (\$000)	Forecast 1989/90 (\$000)	Actual 1988/89 (\$000)
Revenue	212,000	200,000	177,162
Expenses			
GTA Service Offerings	209,186	197,774	173,007
Planning and Coordination	2,814	2,226	1,754
	212,000	200,000	174,761
Deficit (Surplus) for the Year	0	0	(2,401)
Resources Required (Provided from)			
Loss (Surplus) for the Year	0	0	(2,401)
Depreciation	(659)	(578)	(673)
Provision for Employee Termination Benefits	(201)	(245)	(147)
Working Capital Changes	466	829	(1,103)
Other Items	0		(1,735)
Capital Expenditures	750	350	694
Net Modified Cash Requirements	356	356	(5,365)
Person-years	207	210	209

The telecommunications costs incurred in the provision of shared and customized voice and data services account for approximately 91% of GTA's operating budget for 1990/91. Personnel costs are limited to approximately 5% of the total operating budget for 1989/90.

Mode of Financing

GTA is financed by a revolving fund for all administrative, operational and capital expenditures. It is managed on a full-cost, revenue-dependent basis. Under this system, the activity is financed by charging federal government departments and agencies for telecommunications services and facilities provided in accordance with approved rates. Rates should be fair, equitable and stand the test of comparison with similar services available directly from commercial carriers.

Table 2 summarizes the major changes in financial requirements that occurred in 1988/89.

Table 2: Financial Performance			
	Actual 1988/89 (\$000)	Main Estimates 1988/89 (\$000)	Change (\$000)
Revenue	177,162	170,000	7,162
Expenses			
GTA Service Offerings	173,007	167,552	5,455
Planning and Coordination	1,754	2,448	(694)
	174,761	170,000	4,761
Deficit (Surplus) for the Year	(2,401)	0	(2,401)
Resources Required (Provided)			
Loss (Surplus) for the Year	(2,401)	0	(2,401)
Depreciation	(673)	(585)	(88)
Provision for Employee Termination Benefits	(147)	(126)	(21)
Working Capital Changes	(1,103)	723	(1,826)
Other Items	(1,735)	0	(1,735)
Capital Expenditure	694	350	344
Net Modified Cash Requirements	(5,365)	362	(5,727)
Person-years	209	216	(7)

The variance between actual and estimated revenues and expenditures was primarily due to increased calling on the IX network, greater than anticipated growth in new shared services, and an increase in the telecommunications tax. The variance in the net modified cash requirements was primarily due to increased cash receipts resulting from greater revenues, as well as early billing for some services at year-end. Other items include changes in the Balance Sheet not reported elsewhere, as well as the difference between current and previous year's transactions affecting the appropriation account after March 31.

One measure of the GTA's efficiency is the ratio of the revenues it recovers for the provision of telecommunications services and facilities, to the person-years authorized to carry out GTA's mandate. The revenues in Table 3 are expressed in 1979/80 constant dollars.

Table 3: 1979/80 Constant \$ Revenues per Person-year					
Year	GTA Revenues (\$000)	Deflator	Deflated Revenues (\$000)	Person-Years	Revenues \$ Constant Per PY (\$000)
86/87	143,692	137.00	104,885	213	492
87/88	151,000	142.00	106,338	213	499
88/89	177,159	147.00	120,516	209	577
89/90	200,000	152.00	131,579	210	627
90/91	212,000	157.00	135,032	207	652

Table 4 summarizes the distribution of revenues generated and person-years allocated by GTA service category.

Table 4: Allocation of Total Revenues and Person-years by Service						
Services	Forecast 1990/91		Forecast 1989/90		Actual 1988/89	
	(\$000)	PY	(\$000)	PY	(\$000)	PY
Intercity Shared	88,200	87	85,500	87	77,133	88
Local Shared	8,000	43	7,600	43	7,517	39
Data Shared	11,970	28	8,500	27	7,128	23
Customized	103,000	38	97,700	42	85,083	49
Directory	780	10	650	10	283	9
Other Network	50	1	50	1	15	1
Total	212,000	207	200,000	210	177,159	209

10.2 Supplementary Information: Profile of Program Resources

Table 5: Details of Financial Requirements by Object			
Expenditures	Revolving Fund		
	Estimates 1990/91 (\$000)	Forecast 1989/90 (\$000)	Actual 1988/89 (\$000)
Personnel			
Salaries and Wages	9,110	8,630	7,900
Contributions to Employee Benefit Plans	1,412	1,338	1,465
Other Personnel Costs	415	299	257
	10,937	10,267	9,622
Goods and Services			
Transportation and Communications	191,508	180,773	155,456
Information	850	832	576
Professional and Special Services	3,780	3,300	3,114
Rentals	2,485	2,449	1,436
Purchased Repairs and Upkeeps	500	480	448
Utilities, Materials and Supplies	230	227	187
All Other Expenditures	850	849	740
	200,203	188,910	161,957
Total Operating	211,140	199,177	171,579
Capital	750	350	693
Grants, Contributions and Other Transfer Payments			
Gross Expenditures	211,890	199,527	172,272
Less:			
Receipts Credited to the Revolving Fund	211,534	199,171	177,637
Net Expenditures	356	356	(5,365)

Table 6: Projected Use of GTA Revolving Fund Authority (\$000)

Authority - April 1, 1990		30,000
Drawdown:		
Projected Balance April 1, 1990	2,453	
Net Expenditure Charged to Appropriation Authority for 1990/91	356	2,809
Projected Balance March 31, 1991		27,191

Table 7: GTA Revolving Fund Statement of Operations

	Estimates 1990/91 (\$000)	Forecast 1989/90 (\$000)	Actual 1988/89 (\$000)
Revenue	212,000	200,000	177,162
Telecommunications Expenditures			
Inter-city Services	72,261	71,239	63,575
Local Services	4,774*	4,750	5,067
Data Services	11,359	7,387	6,648
Customized Services	101,614	96,348	83,760
Directory Services	780	650	429
Other Network Services	42	42	8
Total Telecommunications	190,830	180,416	159,487
Management and Administration	18,356	17,358	13,520
Planning and Coordination	2,814	2,226	1,754
Total Expenditures	212,000	200,000	174,761
(Surplus) Deficit	0	0	(2,401)

Table 8: Statement of Changes in Financial Position (\$000)			
	Estimates 1990/91 (\$000)	Forecast 1989/90 (\$000)	Actual 1988/89 (\$000)
Working Capital Required (Provided)			
Operations			
Net (Income) or Loss for the Year	-	-	(2,401)
Add: Depreciation and Other Items not Requiring Use of Funds	(860)	(823)	(675)
	(860)	(823)	(3,076)
Working Capital Requirements	466	829	(2,983)
Capital Requirements	750	350	694
Net Expenditure Charged to Appropriation Authority	356	356	(5,365)

Table 9: Person-year Utilization by Headquarters Divisions and Regions			
Headquarters (HQ) Divisions/ Regions	(1) Authorized PYs 88/89	(2) Utilized PYs 88/89	(3) Variance (1-2)
Director General - Government Telecommunications	3.0	3.0	0.0
Director - Systems Design and Management	65.0	65.5	(0.5)
Director - Development and Engineering	17.5	15.8	1.7
Director - Planning and Coordination	9.5	8.3	1.2
Director - Finance and Administration	26.0	25.3	0.7
Director - Client Services	23.0	24.2	(1.2)
Total HQ	144.0	142.1	1.9
Atlantic	16.0	15.2	0.8
Québec	11.0	9.0	2.0
Ontario	18.0	17.9	0.1
Central	12.0	11.9	0.1
Pacific	12.0	12.6	(0.6)
Total Region	69.0	66.6	2.4
Total GTA	213.0	208.7	4.3

Appendix A

Government Consolidations Switching Systems

Consolidation	Switch	Central Attendant Services	Directory Numbers	Leased(L)/ Owned(O)
<u>Atlantic</u>				
Bathurst	DMS-100	0	496	L/NB Tel
Charlottetown	SL1 CO	0	2090	L/Island Tel
Corner Brook	SL1 CO	0	250	L/Nfld Tel
Fredericton	DMS-100	0	1311	L/NB Tel
Gander	DMS-100	0	290	L/Terra Nova Tel
Halifax	DMS-100	4	8721	L/MT&T
Moncton	DMS-100	0	2527	L/NB Tel
Saint-John	DMS-100	0	1197	L/NB Tel
St. John's	DMS-100	0	3240	L/Nfld Tel
Sydney	DMS-100	0	1500	L/MT&T
<u>Quebec</u>				
Montréal	DMS-100	6	11593	L/Bell
Quebec	DMS-100	0	3781	L/Bell
Rimouski	SL1 CO	0	360	L/Quebec Tel
Sherbrooke	DMS-100	0	554	L/Bell
<u>National Capital Region</u>				
Ottawa/Hull	DMS-100 (5)	15 Shared 4 Dedicated	100376	L/Bell
<u>Ontario</u>				
Belleville	DMS-100	0	355	L/Bell
Burlington	SL1 CU	0	612	O/BCSI
Cooksville	DMS-100	0	699	L/Bell
Cornwall	SL1 CU	0	273	L/Bell
Hamilton	DMS-100	0	1363	L/Bell
Kingston	DMS-100	0	650	L/Bell
London	DMS-100	0	950	L/Bell
Sudbury	DMS-100	0	575	L/Bell
Toronto	DMS-100	5	7717	L/Bell
AES	SL1 CU	0	1000	O/TTS
4900 Yonge St.	SL1 CU	0	2260	L/Bell
Malton	DMS-100	0	1286	L/Bell
Malton SSC	SL1 CU	0	80	O/BCSI
<u>Central</u>				
Brandon	DMS-100	0	135	L/MTS
Calgary	DMS-100	1	3400	L/AGT

Consolidation	Switch	Central Attendant Service	Directory Numbers	Leased(L)/ Owned(O)
<u>Central - Cont'd.</u>				
Edmonton	SL-100	1	3500	L/Edmonton Tel
Lethbridge	DMS-100 DAIX	0	135	L/AGT
Prince Albert	DMS-100 DAIX	0	190	L/Sask Tel
Red Deer	DMS-100 DAIX	0	150	L/AGT
Regina	DMS-100	0	2500	L/Sask Tel
Saskatoon	DMS-100	0	2000	L/Sask Tel
Winnipeg	DMS-100	2	7265	L/MTS
<u>Pacific</u>				
Abbotsford	SL1 CU	0	177	O
Campbell River	GTD5 DAIX	0	40	L/BCT
Chilliwack	GTD5 DAIX	0	40	L/BCT
Fairmont	SL1 CU	0	1300	L/BCT
Kamloops	GTD5 DAIX	0	375	L/BCT
Kelowna	GTD5 DAIX	0	125	L/BCT
Nanaimo	SL1 CU (2)	0	420	O/BTE
Penticton	SL1 CU	0	330	O/TTS
Prince George	SL1 CO	0	425	L/BCT
Prince Rupert	SL1 CO	0	280	L/PRCT
Surrey	SL1 CU	0	340	O/BTE
Vancouver	DMS-100 CO	2 (Attendant) 3 (Console)	7122	L/BCT
Vernon	GTD5 DAIX	0	55	L/BCT
Victoria	DMS-100 CO	0	1530	L/BCT
Dockyard	SL-1 CU	0	1450	L/BCT
Naden	SL-1 CU	0	550	L/BCT
Work Point	SL-1 CU	0	150	L/BCT
Royal Roads	SL-1 CU	0	200	L/BCT

Appendix B

GTA Circular Letters

GTA periodically issues Circular Letters to subscribers of the *Telecommunications Management Manual*. These letters deal with the day-to-day administration of telecommunications within the Government of Canada.

GTA issued the following Circular Letters during 1988/89 and 1989/90. They are presented in chronological order.

Subject	Circular Letter Identification
Government Packet Network	88.01*
Government Inter-city Calling Guide - Update	88.02*
Government Information Technology Standards Policy	88.03
Authorization Codes	88.04*
Data Telecommunications - Trouble Reporting	88.05
Authorization Code Call Detail Report	88.06*
Digitalization of the Government Shared Inter-city Network	88.07
GTA Rates 1988/89	88.08*
Government Inter-city Calling Guide Update - Ontario Region	88.09*
Government Inter-city Calling Guide Update - Ontario Region	88.10*
Cellular Telephone Service	88.11
GTA Rates - 1988/89 Update	88.12*
GTA Rates - 1988/89 Update	88.13*
Commercial Telecommunications Publications	89.01
GTA Accounts Receivable	89.02
Government Inter-city Calling Guide Update - Washington D.C.	89.03*
Government of Canada Listings - Public Telephone Directories	89.04
Change of Telephone Number - Prince Albert, Sask.	89.05*
Government Secure Telephone Network	89.06
Federal Sales Tax on Telecommunications Services	89.07
GTA Rates 1989/90	89.08
Government Inter-city Calling Guide	89.09
Multiple Bookings - Government Shared Teleconference Services	89.10
Government Voice Messaging Service (GVMS)	89.11
Government Electronic Messaging and Document Exchange Service (GEMDES)	89.12
GTA Rates - 1989/90 Update	89.13

* Indicates Circular Letters that were no longer current at the time of publication of this document.

Subject	Circular Letter Identification
Government Electronic Messaging and Document Exchange Service (GEMDES)	89.14
Calling Card Amendment - Buckingham	89.15
800 Service Directory Listings	89.16
GTA Accounts Receivable	90.01
GPN X.28 Dial-up Service	90.02

Appendix C

GTA Regional and District Offices

Building 302
2nd Floor
Pleasantville
P.O. Box 9277, Station "B"

St. John's *
Nfld./T.-N.
A1A 2X9
709-772-4900

Immeuble 302
2^e étage
Pleasantville
C.P. 9277, Succursale "B"

Willow Tree Tower
8th Floor
6009 Quinpool Rd.

Halifax *
N.S./N.-É.
B3K 5J7
902-426-9898

Immeuble Willow Tree
8^e étage
6009, chemin Quinpool

Terminal Plaza Bldg.
6th Floor
1222 Main St.
P.O. Box 5090

Moncton **
N.B./N.-B.
E1C 8R2
506-857-6900

Immeuble Terminal Plaza
6^e étage
1222, rue Main
C.P. 5090

East Tower, Room 216
200 René Lévesque
Blvd. W.
Guy Favreau Complex

Montréal ***
Que./Qc
H2Z 1X4
514-283-5700

Tour Est, pièce 216
200 ouest, boul. René-
Lévesque
Complexe Guy Favreau

14th Floor
300 Slater St.

Ottawa ***
Ont.
K1A 0C8
613-990-4444

14^e étage
300, rue Slater

9th Floor
55 St. Clair Ave. E.
416-973-8215

Toronto ***
Ont.
M4T 1M2

9^e étage
55 est, avenue St. Clair
416-973-6179

200 - 386 Broadway

Winnipeg **
Man.
R3C 3Y9
204-983-4321

200 - 386, Broadway

1020 - 2002 Victoria Ave.

Regina *
Sask.
S4P 0R7
306-780-5550

1020 - 2002, avenue
Victoria

* - District Office/bureau de district

** - Regional and District Offices co-located/bureaux régional et de district à la même adresse

*** - Regional Office/bureau régional

1610 - 9700 Jasper Ave.

Edmonton *
Alta/Alb.
T5J 4C3
403-495-2462

1610 - 9700, avenue Jasper

Suite 1700
800 Burrard St.

Vancouver **
B.C./C.-B.
V6Z 2J7
604-666-5439

Suite 1700
800, rue Burrard

Room 205
816 Government St.

Victoria *
B.C./C.-B.
V8W 1W9
604-388-3656

Pièce 205
816, rue Government

* - District Office/bureau de district

** - Regional and District Offices co-located/bureaux régional et de district à la même adresse

*** - Regional Office/bureau régional

Appendix D

Glossary

ACD	Automatic Call Distribution
ACIM	Advisory Committee on Information Management
ADPCM	Adaptive Differential Pulse Code Modulation
ANSI	American National Standards Institute
ARV	Accounts Receivable Voucher
ASCII	American Standard Code for Information Interchange
Bisync	Binary Synchronous Communications
BTV	Business Television
CCITT	Comité consultatif international télégraphique et téléphonique
CCSS7	Common Channel Signalling System Number 7
CRTC	Canadian Radio-television and Telecommunications Commission
CSA	Canadian Standards Association
CWARC	Canadian Workplace Automation Research Centre
DAIX	Direct Access Inter-city
DCE	Data Circuit Terminating Equipment
DDD	Direct Distance Dialling
DDCMP	Digital Data Communications Message Protocol
DISA	Direct Inward System Access
DOC	Department of Communications
DTE	Data Terminal Equipment
DTS	Data Technical Specification
EDI	Electronic Data Interchange
EDIFACT	Electronic Data Interchange for Administration, Commerce and Transport
EEPROM	Electrically Erasable Programmable Read-only Memory
FINCON	Financial Control System
GDNS	Government Data Network Service
GEMDES	Government Electronic Messaging and Document Exchange Service
GEMS	Government Electronic Messaging Service
GFACS	Government Facsimile Communications Service
GNMS	Government Network Management System
GOC	Government of Canada
GPN	Government Packet Network
GSN	Government Satellite Network
GTA	Government Telecommunications Agency
GTCS	Government Text Communications Service
GTN	Government Telecommunications Network
GTN-2000	Government Telecommunications Network - 2000
GTS	Government Teleconferencing Service
GVMS	Government Voice Messaging Service
GVTS	Government Video Teleconferencing Service
HQ	Headquarters
IBM	International Business Machines
IMAA	Increased Ministerial Authority and Accountability
ISDN	Integrated Services Digital Network
ISTC	Industry Science and Technology Canada
IX	Inter-city (Inter-exchange)
IXVG	Inter Exchange Voice Grade
Kbs	Kilobits per second
LAN	Local Area Network

LCD	Liquid Crystal Display
MAN	Metropolitan Area Network
MHS	Message Handling System
MOA	Memorandum of Agreement
MSAT	Mobile Satellite
NCOS	Network Class of Service
NCR	National Capital Region
ND	National Defence
NPA	Network Planning Area
OSI	Open Systems Interconnection
PAD	Packet Assembler/Disassembler
PARS	Personnel Administration Reporting System
PASS	Procurement Acquisition Support System
PBX	Private Branch Exchange
PC	Personal Computer
PODD	Payment on Due Date System
PSTN	Public Switched Telephone Network
PY	Person-year
RFI	Request for Information
RFP	Request for Proposal
SDLC	Synchronous Data Link Control
SMDR	Station Message Detail Recording
SNA	System Network Architecture
SSC	Supply and Services Canada
TAC	Telecommunications Advisory Committee
TAP	Telecommunications Advisory Panel
TBS	Treasury Board Secretariat
TC	Transport Canada
TMI	Telesat Mobile Incorporated
VSAT	Very Small Aperture Terminal
WAN	Wide Area Network
WATS	Wide Area Telephone Service
WYSIWYG	What You See is What You Get

GOVERNMENT TELECOMMUNICATIONS
AGENCY : PERFORMANCE REVIEW
AND UPDATE

JL
103
C6
G6886
1990

DATE DUE[illegible]

