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Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

REQUEST FOR INFORMATION
AND
FUNCTIONAL REQUIREMENTS
FOR

INTELLIGENT NETWORKING IN GTN-2000

GOVERNMENT TELECOMMUNICATIONS AGENCY
DEPARTMENT OF COMMUNICATIONS

Government of Canada
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DIVISION OF DEVELOPMENT AND ENGINEERING
GOVERNMENT TELECOMMUNICATIONS AGENCY
DEPARTMENT OF COMMUNICATIONS

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PART I

OVERVIEW

1.0 GENERAL

1.1 Introduction

1.1.1 As a common service organization, the primary mandate of the Government Telecommunications Agency (GTA) is the provision and management of common telecommunications facilities and services for federal government departments and agencies. The Agency provides a full range of voice and data communications through the management of consolidated systems in about 45 locations, encompassing all major Canadian cities. In addition, GTA carries out the Minister of Communications' mandate to plan and co-ordinate telecommunication services for departments and agencies of the Government of Canada (GOC). The planning, provision and management of government telecommunications by GTA is exercised through a headquarters, six regional offices and seven district offices.

1.1.2 The GTN-2000 program is an umbrella program in GTA to address the evolution of the Government Telecommunications Network (GTN) to enhance existing services and provide new network services.

The GTN-2000 network will comprise three major components within an intelligent communication infrastructure:

i) An open, intelligent, integrated digital backbone network based on interconnected Intelligent Communications Nodes (ICN). The ICNs will provide users and user systems new channel services, new switched data and integrated services, better access to common enhanced services and network-wide intelligent features which will enhance existing Centrex services.

ii) Intercity transmission facilities and services linking the ICNs, and other government consolidated systems to these ICNs. The planning and procurement of the intercity transmission facilities and services are being carried out separately from those of the ICN. These transmission facilities and services will be acquired on a competitive basis and optimized for performance and cost. For example, an RFP for Intercity Services between Ottawa and three other cities was issued by GTA in November, 1988.

GTA also envisages the need for broadband transmission facilities within the next few years. The feasibility of a broadband transmission evaluation network is currently being examined by GTA.

iii) Direct Access facilities or Metropolitan Area Network (MAN) providing connectivity within a city and access to the intercity network services.

One of these MAN networks will be planned for the National Capital Region (NCR). The specific requirements for the NCR MAN are still being formulated.

1.1.3 This document provides an overview of the architectural approach and planning principles of the GTN-2000 network (or simply referenced as GTN-2000), and requests information and proposals specifically to meet GTN-2000's intelligent networking requirements. This RFI does not cover intercity transmission and intracity access (direct or via a MAN) requirements.

1.1.4 An embryo network, for which proposals are requested in this RFI, has been identified as the vehicle for the evaluation of the GTN-2000 network services. The embryo network will also be the platform used by GTA in its involvement in future ISDN networking trials.

1.2 Purpose of Document

1.2.1 This Request for Information (RFI) is aimed at achieving the following:

- to inform potential suppliers of systems and services of the Government Telecommunications Network's evolution direction as espoused in the GTN-2000 framework;

- to solicit information on vendor-proposed network architecture options and design alternatives, existing and evolving products and/or services to satisfy the government's requirements and other emerging/future user requirements, as seen by the vendor;

- to better understand the trends of network technology, systems and deployment, and their impact on government telecommunications plans;

- to establish the relative merits of the vendors' proposed network architectures and systems/services with respect to cost/performance, compliance with evolving ISDN and other network standards, and technology maturity and implementation experience;

- to obtain specific proposals to permit GTA to establish the availability, price parameters and implementation options for an embryo network to stage the development of intelligent networking in GTN-2000.

1.2.2 The evaluation of the responses to this RFI should allow GTA to:

- further define the GTN-2000 network architecture, the network services' functional requirements, and development plans;

- establish the approach and plan to provide a cost-effective network infrastructure to support a variety of departmental network architectures and requirements;

- decide on the most advantageous approach to building an embryo network for evaluation and service/cost improvement purposes;

- demonstrate on the embryo network the technical viability and cost-effectiveness of meeting specific departmental and other user requirements (e.g. NRCnet) using digital transmission channel services;

- establish a list of vendors who are interested to participate in the evolution and realization of GTN-2000.

Based on the evaluation, GTA may establish a short list of vendors from which to procure the embryo network for a specific period (i.e., the period required for GTA to plan and acquire the full network). The inter-exchange facilities for this embryo network will be based on existing government intercity circuits and/or new facilities acquired via normal GTA contracting procedures.

1.3 Organization of Document

Part I of the document discusses the objectives, the planning principles as well as the development plan for GTN-2000. The functional architecture requirements of the network and the target set of new telecommunications services are summarized.

Part II specifies the information and proposal requested by GTA, and the process and format of the responses to this document.

Part III presents the functional requirements of the GTN-2000 network services.

Part IV specifies the minimum requirements of the embryo evaluation network.

In the appendices, information pertaining to the existing government telecommunications network and other relevant aspects is provided.

2.0 GTN-2000 OVERVIEW

2.1 Objectives

The GTN-2000 network is designed to:

- Improve the cost and performance of the existing GTN and departmental dedicated networks by:

  ° integrating voice, data, and image communications through common digital backbone transport facilities,
  ° implementing new network technologies and standards,
  ° improving network management capabilities;

- Introduce new common data-oriented network services to satisfy the increasing and new data communication and information management requirements in the government,

- Provide new network-wide enhanced voice communication services in order to improve internal government communications, public access to government services, and network operation efficiency,

- Serve as the flexible network platform to provide access to, and network connectivity for, common enhanced services (e.g. messaging) and departmental operational systems,

- Extend government network coverage to remote and underserved user locations,

- Stage the evolution of existing government networks, services and end-user equipment and applications towards an open, digital intelligent network based on ISDN and enhanced signaling.

2.2 Planning Principles

The principles guiding the evolution of GTN can be summarized as follows:

(i) GTN-2000 should be a stable intelligent network infrastructure providing government users and telecommunications systems:

- access to, and transport of, government enhanced services (e.g. text and voice messaging),

- access to minimum cost transmission (physical transport) facilities, and

- new enhanced network-wide communication intelligence and intercity connectivity for local telephone services.

(ii) Government common enhanced services, local telephone services and the transmission (intercity) facilities referred to in (i) above will be planned and acquired separately using competitive procurement processes, to the extent possible.

(iii) GTN-2000 will have a functional architecture that can be implemented either by systems/services dedicated to the government, a virtual private network in a public shared telecommunications network, or a combination of dedicated and shared systems.

(iv) GTN-2000 will have an "open" network architecture to provide interconnection of multi-vendor equipment and will be in compliance with ISDN and other industry-wide standards adopted by the Government.

2.3 New Common Telecommunication Services

2.3.1 Target Services Portfolio

The network services currently provided in the Government Telecommunications Network are Centrex-based voice communication, analog and digital private lines, and packet-switched data.

The GTN-2000 will build on this base and offer the following new common telecommunciations services.

- Digital channel and switched services for data networks (SNA, LAN-LAN interconnection, virtual dedicated networks, access and transport of common enhanced services such as messaging),

- Enhanced voice networking (network-wide call management, 800-like services, enhanced operator and ACD services, improved access, exit and routing control),

- Broadband services (video conferencing, high-speed computer links).

- ISDN-based integrated services.

For each new service, the appropriate service management capabilities are required in the network to support the deployment of the service.

Figure I.1 depicts the target set of telecommunication services to be provided in GTN-2000. The GTN-2000 services, which are enclosed within the solid bold lines, will support user networks and applications.

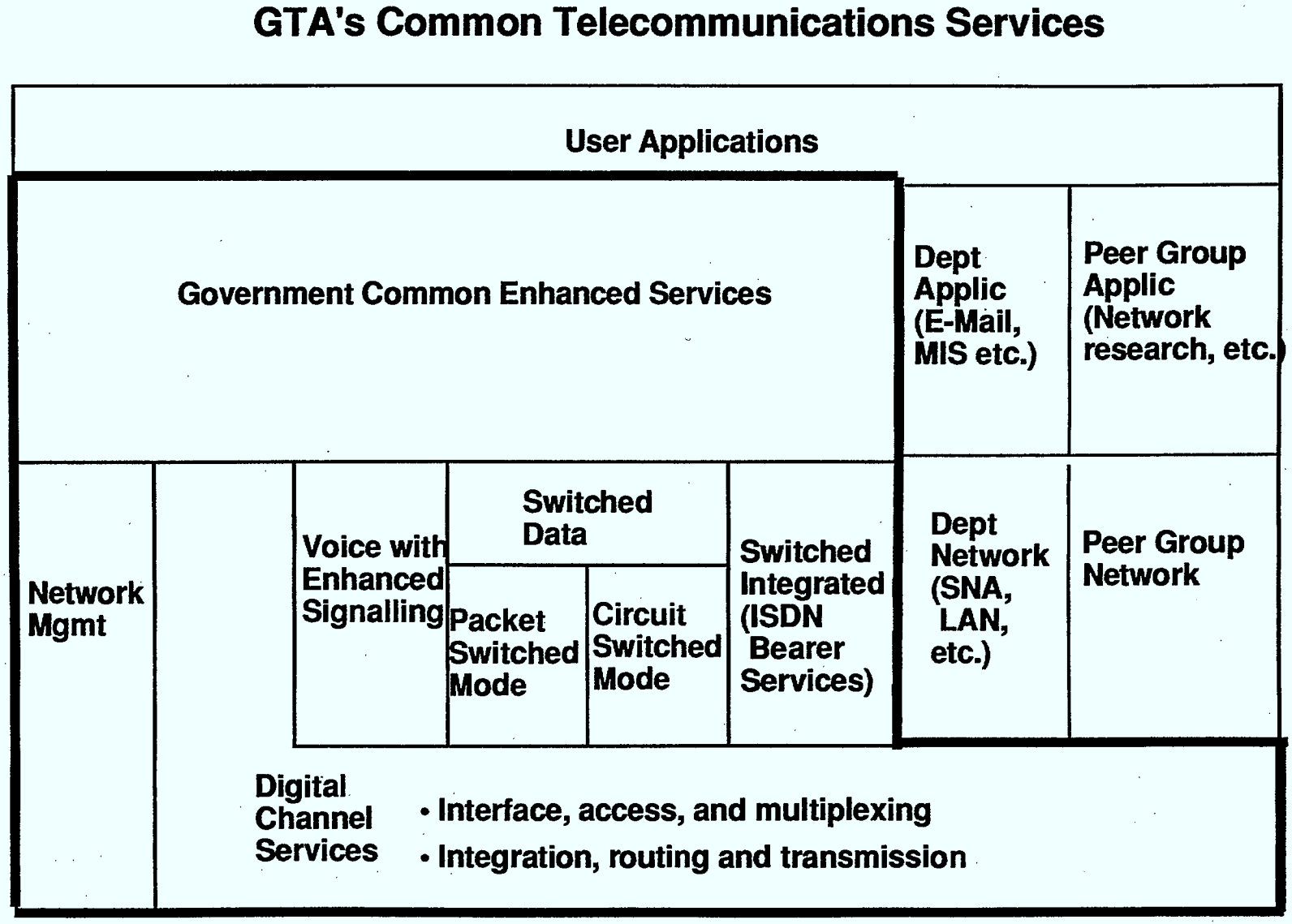


Figure I.1 GTN-2000 TELECOMMUNICATION SERVICES WITHIN GOVERNMENT TELECOMMUNICATIONS ENVIRONMENT

2.3.2 Services in the Embryo Evaluation Network

To evaluate and demonstrate the feasibility of the new network services of GTN-2000, it is GTA's intention to deploy an embryo network incorporating an initial set of the GTN-2000 network services.

The following services are deemed to be those required for this embryo network:

- digital channel services with network management capabilities,

- CCS-7 based network services aimed at improving communications and service efficiency and promoting better network access.

Part IV provides more details on the requirements of the embryo evaluation network.

2.4 GTN-2000 Functional Architecture

2.4.1 Architectural Framework

The GTN-2000 network has a functionally layered architecture. Figure I.2 depicts the three exploded planes of the GTN-2000 architecture.

Plane 1 - represents the Public Switched Telephone Network (PSTN) and government telephone centrex services (CTX). (Currently government Centrex local consolidation nodes are interconnected through dedicated intercity (IX) transmission facilities.)

Plane 2 - represents the nodal level functionalities of GTN-2000. The network nodes, called Intelligent Communications Nodes (ICN), provide connection to stand-alone enhanced government services as well as intelligent network-wide services. Interconnection to enhanced services through Plane 1 is also provided. The implementation of the plane 2 functionalities may be provided either on nodes physically separate from the Centrex nodes, or as an integrated part of the evolving PSTN nodes (e.g. through Virtual Private Networking capabilities, Centrex services, etc).

Plane 3 - Intercity transmission facilities provide the "bandwidth" required for the services provided by the Intelligent Communications Nodes. The facilities may be terrestrial links or satellite-based. These facilities will be optimized for performance and minimum cost, and acquired on a competitive basis.

Access to planes 1 and 2 from user premises will be via direct access, or city-wide metropolitan area networks. The customer premises equipment may range from proprietary featured Centrex telephones, LANs, data terminals, FAX machines, PBXs and PCs at present to standard ISDN terminals in the future.

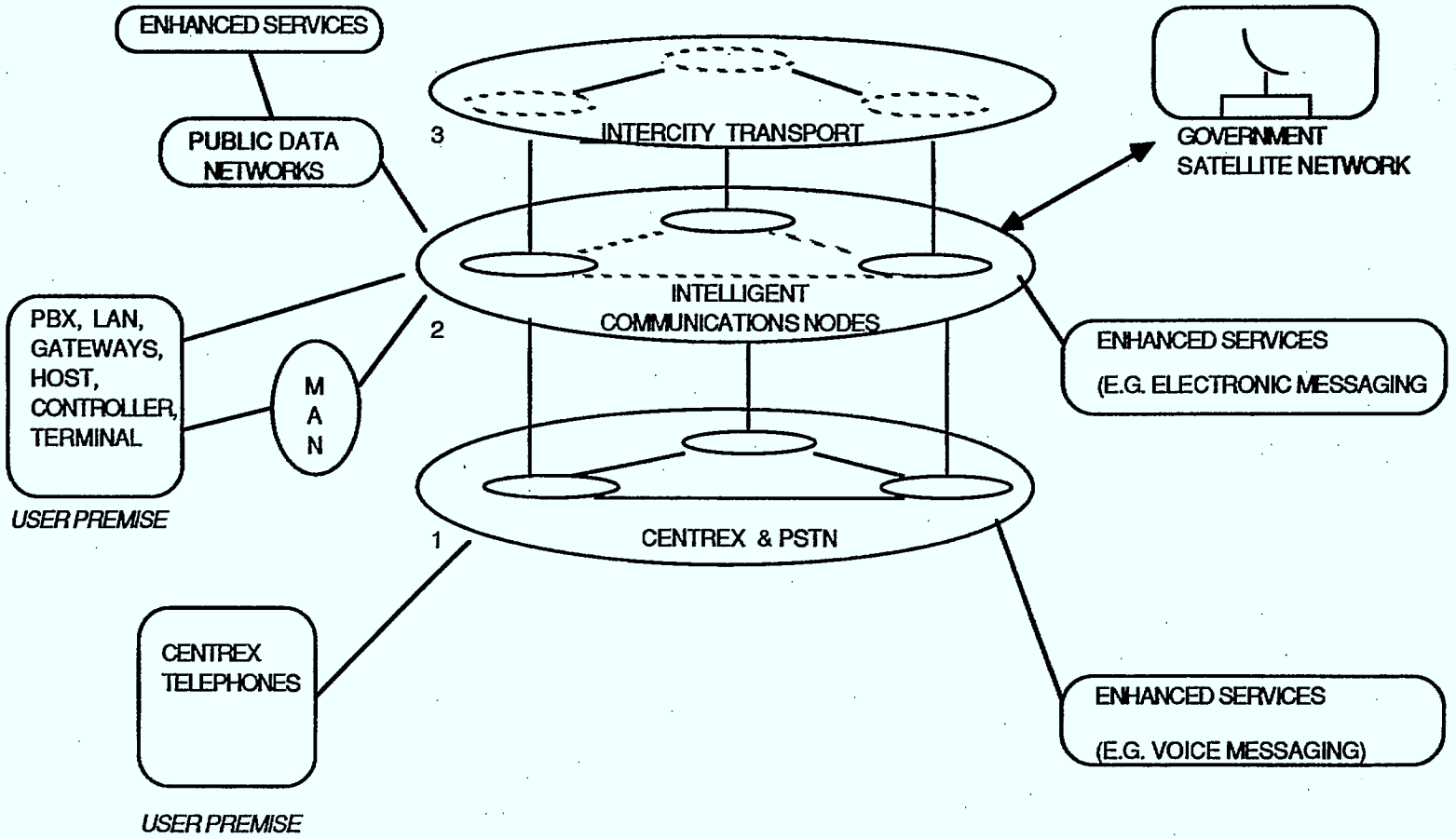


FIGURE I.2 GTN-2000 FUNCTIONAL ARCHITECTURE

2.4.2 Network Attributes

In the functional architecture described in Section 2.4.1, the following overall network attributes should be noted:

- In the network, there is a separation of (local) intracity services from intercity network services. For voice communication, GTN-2000 will provide new network-wide capabilities to enhance and complement existing telephone (Centrex) service. For data communication, there is recognition that intracity requirements may be significantly different from those of intercity circuits.

- The functional requirements are defined in a layered fashion. The transport requirements that are transparent to applications are separated from the specifications of the network intelligence required for call, connection, and overall network management.

- The user/network interfaces as well as interfaces between functional blocks are (to the extent they are feasible and cost-effective) open by adhering to standards for access (e.g. ISDN, X.25), network signaling (CCS7), network management, and other protocols. "Openness" will allow multi-vendor implementation, and provide interconnection of multi-vendor equipment and systems present in government users.

2.4.3 Transport Attributes

The transport functions of GTN-2000 are characterized by:

- end-to-end digital connectivity transparent to user applications,
- common resource for transport of voice, data and image information,
- improved survivability,

- integrated and selectable use of both terrestrial and satellite facilities,
- ability to evolve to support both narrowband and broadband services on the same facilities.

2.4.4 Network Intelligence Attributes

Intelligent networking is a critical part of GTN-2000. Network intelligence is required for:

- more and better user control and network management,
- dynamic call routing and channel reconfiguration,
- flexible addressing and access to information services,
- rapid introduction of new revenue-generating services.

The main attributes of network intelligence are:

- increased intelligence for both switched and channel services,
- conformance to ISDN, CCS7, data network and emerging network management standards,
- use of network servers attached to the network via open interfaces,
- support for the operation of dedicated departmental networks in a shared environment,
- flexibility in distributing the intelligence among network components,
- improved security of information.

2.4.5 Service Access and Network Interconnection

Figure I.3 shows GTN-2000's interfaces for service access and network interconnection.

Requirements for access to network services are defined with reference to a functional demarcation of access called the Service Delivery Point. The actual physical interface will depend on the specific network service required and the terminals accessing the service. GTN-2000 will support standard voice, data, and ISDN access interfaces.

ISDN access will be at the Primary Rate Access (PRA) and Basic Rate Access (BRA) depending on the underlying services and user premises equipment. As GTN-2000 evolves to full implementation, enhanced signalling and control functions will be implemented.

In addition to user access, the GTN-2000 architecture must support interconnection with:

- Canadian public voice and data networks using terrestrial as well as satellite media,
- U.S. public voice and data networks,
- Public enhanced service providers.
- Private government networks,
- Dedicated government enhanced services,
- International networks.

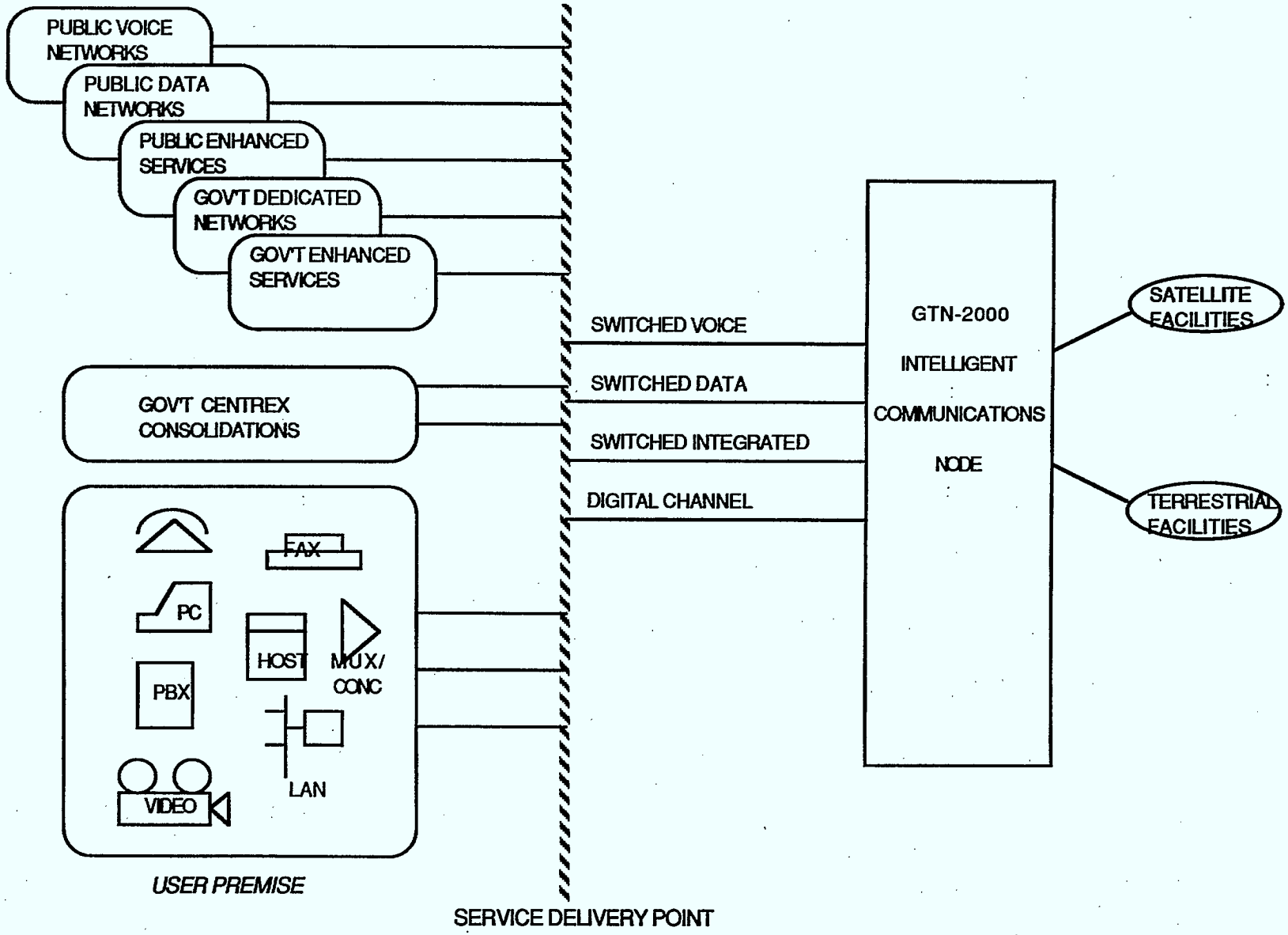


FIGURE I.3 SERVICE ACCESS AND NETWORK INTERCONNECTION

2.4.6 Network Management Attributes

GTN-2000 will have the necessary systems and services for the management, operation and optimization of the network requiring minimum level of GTA staff. The architecture of GTN-2000 will allow GTA to procure such systems and services from the network provider or other vendors. The attributes characterizing the realization of this objective are:

- centralized overall network management by the network operator;
- customized network management by GTA and user departments;
- specifications oriented towards management functions as opposed to specific network products;
- integrated systems for diverse services;
- open, preferably standard, interfaces;
- high level of security and reliability.

2.5 GTN-2000 Development Plan

GTA has translated the GTN-2000 network functional architecture into three planning and development components. As shown in Figure I.4, these components are key to the realization of GTN-2000 within the next five years.

2.5.1 Intelligent Networking

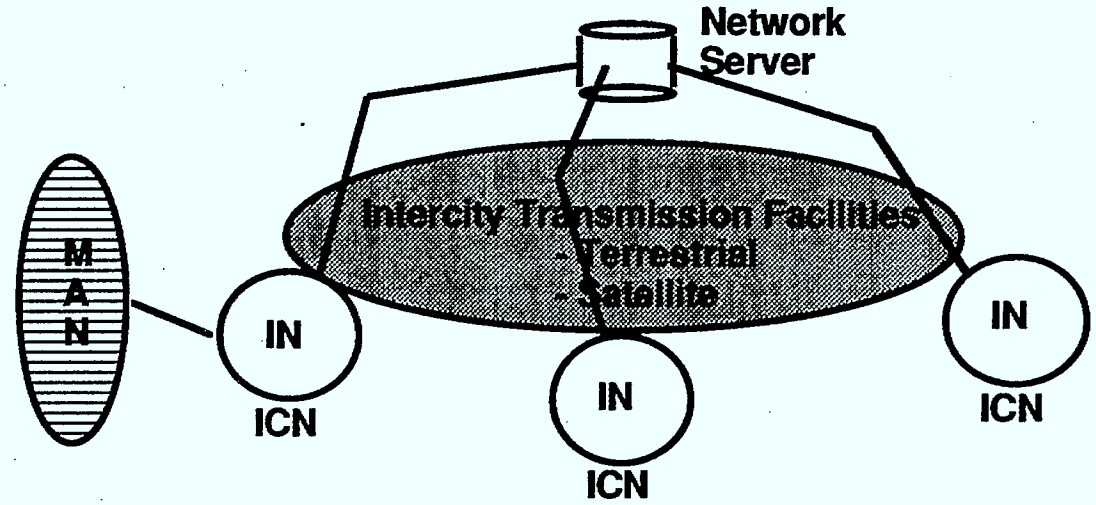
This Request for Information document is one of several parallel activities being undertaken to plan and implement intelligent networking in GTN-2000. The responses to this RFI will lead to further detailed requirements definition of GTN-2000, and the development and deployment of an embryo network in the late 1989/early 1990 time frame. It is expected that the full GTN-2000 network will be established within the five-year planning period.

2.5.2 Intercity Transmission

The following planning and development activities have been initiated for the fiscal year 1988/89:

i) Competitive procurement of digital inter-exchange tariffed transmission facilities (i.e. DS-1 rate) from the common carriers for selected cross-sections of the existing government intercity network.

Major Planning and Development Components



- ° Intelligent Networking
- ° Intercity Digital Transmission Facilities
  - Narrowband (T-1)
  - Broadband
- ° Metropolitan (Intracity) Area Network (MAN)
  - Ottawa/Hull

FIGURE I.4 DEVELOPMENT COMPONENTS OF GTN-2000

ii) Tentative plans are being established by GTA to investigate the feasibility of a pilot broadband (transmission only) network which would support GTN-2000 broadband applications such as video communications and teleconferencing, HDTV broadcasting and high bandwidth communications between computers.

2.5.3 Metropolitan Area Network

A planning study by GTA will identify the requirements for broadband digital access from user premises to the ICNs and for intracity broadband connectivity among user premise systems in selected metropolitan areas (e.g. National Capital Region).

PART II

INFORMATION AND PROPOSAL REQUESTED

1.0 GENERAL

Information and proposals submitted in response to this RFI will assist GTA in the planning and development of the Intelligent Networking capabilities in GTN-2000.

Responses to the RFI should consider the Common Service mandate of GTA to provide shared telecommunication services to federal government department end-users. The responses should also consider the significant impact of information technologies and services on government operations and associated costs in an environment with changing needs and applications.

The responses should assist GTA to plan and acquire future network resources and services in accordance with the objectives, planning principles and architectural directions established for GTN-2000. In this respect, GTA welcomes comments from vendors on the planning direction of GTN-2000, especially from the perspective of technical feasibility, cost effectiveness (comparing costs to current and projected future capabilities), and its relation to the industry direction for ISDN.

The vendors are requested to provide references on evolving ISDN and other network interface standards which are relevant to GTN-2000's objective of being an "Open" network as explained in Section 2.4.2.

Vendors are requested to propose to GTA the availability, options, terms and conditions for the implementation of an embryo evaluation network for a specific time period. This pilot network phase is required to allow GTA to evaluate the various network implications prior to the acquisition of the full network. This evaluation network is intended to demonstrate the cost-effectiveness and flexibility of the basic GTN-2000 services within a relatively short time frame.

Section 2.0 gives the specific technical issues for which information is requested. Section 3.0 outlines the information requested on the embryo evaluation network. Section 4.0 specifies the preferred process and format for the responses from interested vendors.

2.0 SPECIFIC INFORMATION REQUESTED

2.1 Network Services

Vendors are requested to provide information on:

A. the relative merits, from their perspective, of the planned GTN-2000 network services; release of results of relevant application studies, if available, is desirable;

B. other new network services deemed valuable to achieve GTN-2000's objectives;

C. their view on the value and costs of deploying CCS7 in a private network, and on the CCS7-based services with the highest pay-offs;

D. their plan to introduce ISDN as a network service and the applications that will use the service:

E. their views on the value to users, trends in standards, and deployment feasibility of Broadband ISDN and Metropolitan Area Networking;

F. the portfolio of network services the vendor is interested and prepared to supply to implement GTN-2000.

2.2 Product/Service Plans and Implementation Architecture

Vendors are requested to provide information on:

A. their product/service plan to provide the GTN-2000 network services in which the vendor has expressed interest in the response to Section 2.1. The plan should include, but not be limited to, the following: the services and their schedule of introduction, the products delivering the services, and the maturity of the services/products.

B. the architecture of their network implementation and the advantages of this implementation relative to the GTN-2000 objectives, planning principles and functional architecture;

C. the international and North American standards adhered to in the implementation, any interfaces that are proprietary, and, for these proprietary interfaces, the status of their "openness" so that the GTN-2000's objective of being an open network can be met;

D. their design objectives for network survivability, reliablity, and service and transmission performance; a summary of the rationale for the objectives is desirable;

E. how well their implementation plan can accommodate the GTN-2000's network attributes of a) separating transmission functions (and hence resource procurement) from that of intelligent networking, b) separating local switching services from intercity switched network services;

F. their approach to meet the need of user departments to have some autonomy in managing the users' telecommunications resources; demonstration of the approach and its merits via a case example of a dedicated departmental network is desirable.

2.3 Network Management/Operation

GTA expects that the new GTN-2000 network services will be operated by the selected vendor. Vendors are requested to provide information on:

A. their plan for operating the proposed network to implement GTN-2000's planned network services,

B. the network management architecture, functions and features available with the network services they plan to offer,

C. the extent of their network management functions which GTA and GTA's end users can control and execute,

D. the ability of their network management systems to operate in a multi-vendor network environment; specific limitations in this environment as compared with that of Item B should be addressed.

2.4 Support Services

Vendors are requested to inform GTA of the activities and services they are prepared to provide for supporting GTA in:

A. planning and optimizing the topology of the transmission portion of the network,

B. planning specific user applications with selected user departments,

C. training GTA and user staff.

2.5 Technology Barrier and Research & Development Requirements

The vendors are requested to identify and discuss what technology or other barriers would constrain the development and delivery of the necessary systems, technology and services to meet the needs of the GTN-2000.

The vendors may wish to discuss what research and development activities are required and what might be the commercial benefits of these R&D activities in satisfying other market requirements for network products.

3.0 PROPOSAL FOR AN EMBRYO EVALUATION NETWORK

Interested vendors are requested to inform GTA of how they propose to implement the embryo evaluation network to be operational by late 1989/early 1990 and for a specific period of time (e.g. 2 years). Part IV gives the requirements of the embryo network.

3.1 Proposal Contents

The proposal must include at least the following:

A. Description of how the requirements (Part IV of this document) of the embryo network will be met.

B. Location of the Intelligent Communication Nodes (ICN) (i.e. the geographic coverage of the embryo network), the implementation time frame and the operational duration.

C. Additional network services or other capabilities which will be available on the embryo network within the proposed implementation time frame.

D. The relationship of the proposed embryo network approach to the product/service plan given in the response to Section 2 above.

E. The ability to interwork with existing networks and services.

F. Trial activities which are essential to evaluate evolving and non-matured technology, services, and user applications.

G. Terms and conditions including prices for minimum configured network nodes and for tariffed services required (see Part IV of this document).

H. Project management structure.

3.2 Application to User Networks

Vendors are requested to illustrate, in their response, how their proposed embryo network will serve as a common network infrastructure to accommodate specific user network architectures such as SNA and an OSI-based internet (e.g. NCRnet) linking TCP/IP-based regional networks.

4.0 PROCESS AND FORMAT FOR RESPONSE

Vendors may only respond to Section 2.0, or to Sections 2.0 and 3.0. Vendors are requested to submit 3 copies of their response by the closing date stated in the cover letter. Queries on the RFI should be submitted in writing. These enquiries can be forwarded via:

a) Canada Post or courier service to the following address:

GTN-2000 Project
Division of Development and Engineering
GTA, DOC
7th Floor, 300 Slater St.
Ottawa, Ontario
K1A 08C

b) electronic messaging services to the following user IDs:

ENVOY: GTN2000
DIALCOM: GOC458

c) facsimile to (613) 952-1231 addressed to:

GTN-2000 Project
Division of Development and Engineering
GTA
7th Floor
Phone 990-2257

GTA will reply to these queries in writing or through bilateral meetings.

The vendors should identify which information is confidential and proprietary. GTA will safeguard the identified information according to the same standards which GTA would apply to its own confidential material.

The response should be in writing and organized according to the section headings in Sections 2 and 3 above. The information provided shall also reference the section numbers of the functional requirements in Part III.

Vendors are encouraged to provide additional relevant information not specifically requested.

PART III

FUNCTIONAL REQUIREMENTS
FOR
GTN-2000 NETWORK SERVICES

1.0 GENERAL

The purpose of this part of the document is to specify the functional requirements of new network services to be offered by GTA. These services are based on GTA's view of changing applications of major user departments and the technology opportunities in satisfying the applications.

The services will be provided in GTN-2000 by Intelligent Communications Nodes (ICN) interconnected by digital transmission facilities. The key attributes of this network are:

- End-to-end digital connectivity

- Transparent transport service for voice, data and image (multi-media) communications

- The procurement of transmission resources is separated from that of nodal resources.

- The level of integration for multi-media services will be introduced in a phased manner as follows:
    - ° intercity transmission
    - ° local access and
    - ° switching

- Incorporate intelligent network functionalities such as those provided by Signalling Switching Point (SSP), Signalling Transfer Point (STP) and Signalling Control Point (SCP) and integrated network management

- Built-in security and survivability requirements in the network architecture

- Conformance to the evolving ISDN approach, standards and services

Figure III.1 shows the functional demarcation of service access (Service Delivery Point) of GTN-2000 and the required interconnection with public and private networks.

The GTN-2000 services portfolio has two groups: a) new network services complementing existing voice and data services, b) new network-wide intelligent communication services. The functional requirements of these two groups of services are given in Sections 2 and 3 respectively. Section 4 discusses briefly the availability and performance objectives, and Section 5 covers the need for conformance to standards. Section 6 presents the service management and network operation requirements. Sections 7-9 discuss other related requirements for network planning, security, survivability and emergency preparedness.

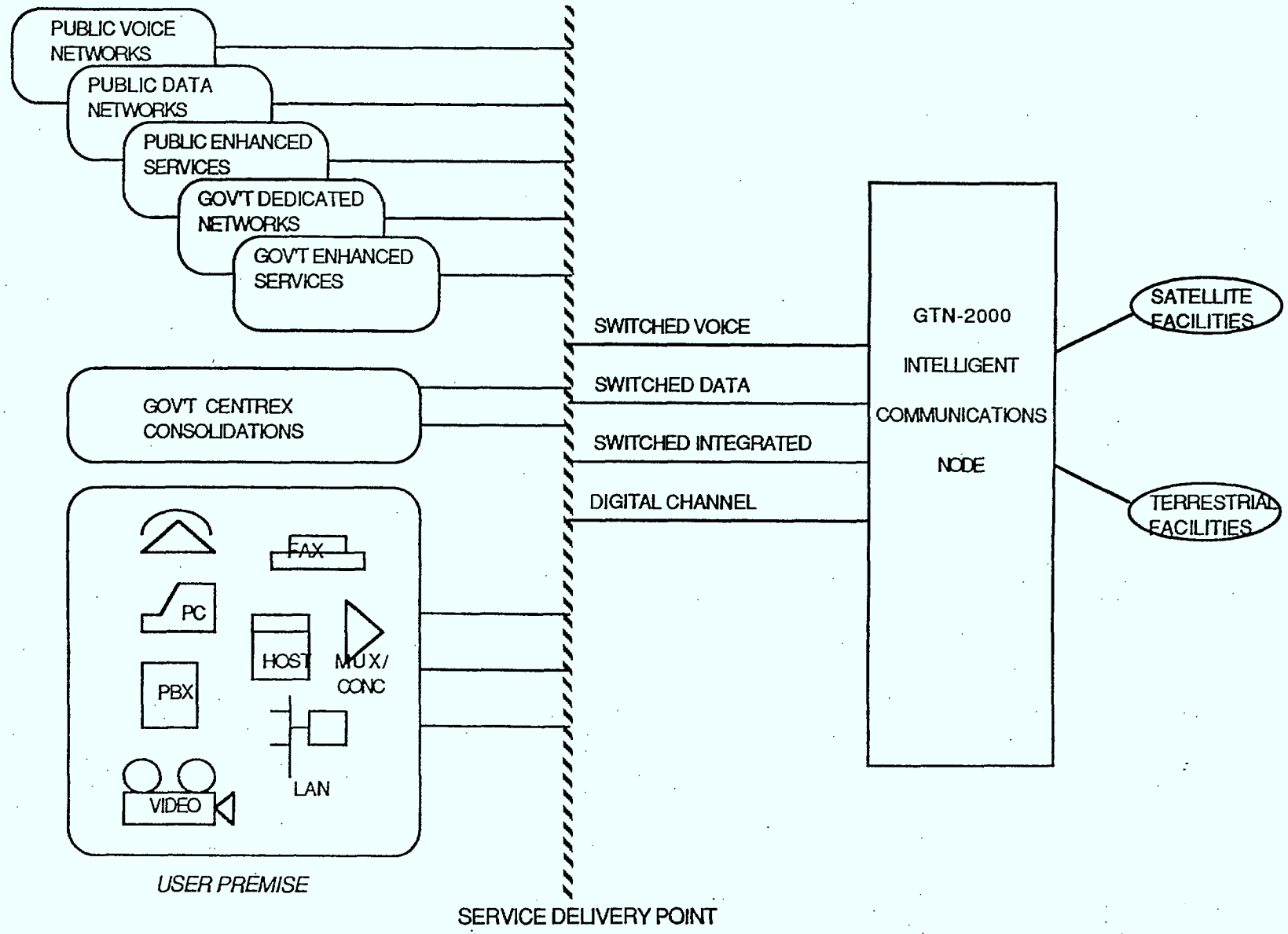


FIGURE III.1 SERVICE ACCESS AND NETWORK INTERCONNECTION

2. NETWORK SERVICES FUNCTIONAL REQUIREMENTS

The network services consist of:

- Channel Services,
- Switched Voice Services,
- Switched Data Services,
- Switched Integrated Services.

Channel services are dedicated digital circuits for the transport of voice, data and image information. These services provide transparent transport from service delivery point to service delivery point using industry standard rates and interfaces. GTA plans to offer two categories of channel services: narrowband (up to DS-1 rate) and broadband (DS-3 rate or higher). The functional requirements of each category are given in the next two sections.

2.1 Narrowband Channel Services

2.1.1 Virtual Private Network (VPN)

VPN is an essential component of narrowband channel services. VPN will allow GTA to:

- optimize the costs of departmental networks through sharing,
- let users maintain departmental control of their network resources

VPN should permit features tailored to the needs of user departments as closed user groups. The features encompass both network service and network management capabilities (e.g., circuit configuration, port assignment, routing, monitoring and reporting, diagnostics).

2.1.2 Interface Requirements

The users' interfaces to these services will support at least the following:

- 2-Wire and 4-Wire analog trunks with E and M signalling,
- compression of individual voice circuit using 32 Kbps encoding of voice using the CCITT ADPCM algorithm,
- Channelized digital trunk with D4 framing format and Extended Superframe Format (ESF), and compatible with B8ZS coding,
- Asynchronous data rates from 300bps to 19.2 Kbps,
- Synchronous data rates from 1.2 Kbps to 1.536 Mbps,
- DTE/DCE interface: RS-232C for 300 bps to 19.2 Kbps, and V.35 for 56 Kbps,
- Compressed video at 384 Kbps, 512 Kbps, 768 Kbps and 1.536 Mbps.

2.1.3 Connectivity Requirements

The service will provide:

- point-to-point and multipoint intracity and intercity connections,
- rerouting of a circuit should be fast enough so that a new call set-up is not required or an SNA session is still maintained,
- connections assigned on a permanent basis or on demand,
- channel reconfiguration on a DS-0 or n x DS-0 basis,
- channel reconfiguration executed on a scheduled basis or within a prescribed response period (i.e., time-variant service options for circuit connection and bandwidth/bit rate assignment).
- internal synchronization to back up external source.

2.2 Broadband Channel Services

Broadband applications are emerging among government departments. These applications are varied in characteristics and include: broadcast-quality video conferencing, high-speed links between computers, LAN-LAN interconnection, and HDTV broadcasts. Initially, GTA will most likely meet the needs of these applications on an overlay basis. However, GTA is considering a future common broadband backbone network that will support most

broadband applications and carry narrowband traffic. The broadband requirements given in this section are preliminary and limited, subject to the completion of ongoing studies. The HDTV application is excluded because of its high-bandwidth requirement and broadcast connectivity requirement.

2.2.1 Interface and Connectivity Requirements

The services will support the following interfaces:

- Channelized and unchannelized DS-1
- Broadcast-quality video conferencing

The broadband channel services provide

- intercity point-to-point, broadcast, and multipoint full duplex interactive connections,
- similar connectivity in an intracity environment.

2.2.2 Video Conferencing Requirements

The video interfaces will be based on industry or de facto standards covering format, input/output levels, and other physical parameters. These interfaces must interwork with government and public video teleconferencing services.

2.3 Switched Voice Services

The main objective of switched voice services in GTN-2000 is to enhance the present networking capabilities of GTN. The key service requirements are to provide:

- the appropriate interfaces to the local Centrex service or to the user's PBX,
- intercity tandem connections,
- network-wide intelligent communication services as detailed in Section 3,
- network audio teleconferencing.

2.3.1 Interface and Tandeming Requirements

The GTN-2000 ICN shall provide and support circuit-switched connections for terminals operating in the voice-band.

Connections shall include all calls initiated from all on-net terminals to all on-net and off-net terminals by direct station-to-station address signalling.

Calls initiated at off-net locations shall also be connectable to all on-net and all off-net locations through direct signalling from the calling location.

On-net and off-net locations are defined here as, respectively, those terminals that terminate on the GTA local consolidations, and those terminals that do not.

The routing plan shall be dependent on the destination code and the numbering plan uniform. Each GTN 2000 Directory Number shall be a unique 7-digit address consistent with the existing numbering plan and shall evolve with standards on numbering plan.

Appropriate recorded bilingual announcements as to why the call cannot be completed shall be provided by the network to the caller when calls cannot be completed.

2.3.2 Network Audio Teleconferencing

The network shall provide the capability to set up audio conferencing for a mix of on-net and off-net stations.

Such conferencing may fall into one of the following categories:

a) Conference-Operator handled teleconference

This would be a conference reserved in advance where the teleconference operator would initiate the calls to the conference participants. The operator would not be connected in the conference during its course, but could be recalled by to aid the chairman of the conference if needed.

A capacity of at least 30 participant-locations per conference should be provided.

b) 'Meet-me' teleconference

Such a conference would be reserved in advance in terms of number of participants and time of conference. The participants would get access to the conference bridge function by dialling the given address at conference time. All participants would be made aware of anyone joining or leaving the conference by means of 'announce' tones. The chairman shall be able to control the bridge function.

A capacity of at least 10 participant-locations per conference should be provided.

Although reservation is initially envisaged as being via a conference booking operator, this service could well evolve to automated reservation via interactions with a centralized network database system using voice response, DTMF secondary signalling or a data terminal.

2.4 Switched Data Services

2.4.1 Voice-band Data

The network shall provide and support circuit-switched connections for voice-band data up to and including a rate of 4.8 kbps.

The terminating equipment for this service may range from dumb or intelligent computer terminals to facsimile terminals of type 1, 2 or 3, and operate either synchronously or asynchronously in a full-duplex or half-duplex mode.

All the service attributes discussed under Sections 2.3 and 3.0 are applicable for this service as appropriate depending on the particular application.

2.4.2 Circuit-Switched Digital Data

This service shall provide synchronous, circuit-switched full duplex digital data connections between service delivery points, at various industry standardized data rates up to 56 kbps as well as clear channel transmission at 64 kbps.

2.4.3 Packet-Switched Data

Packet-switched data service, as defined here, refers to a generic switched data service based on the transmission of information packets over a virtual circuit. In the context of GTN-2000, the service must:

- be compatible with the existing services in GPN (See Appendix A),
- evolve all the existing services based on the latest CCITT standards and new applications,
- expand to include new packet-mode services such as frame relaying after the new standards have been established and cost-effective products/services are available.

2.5 Switched Integrated Services

This service should provide the capability of digital connectivity for integrated voice, data, image and compressed video communication.

Access interfaces for both ISDN and DS-1 will be required.

The ISDN interfaces shall be Basic Rate Access (BRA) and Primary Rate Access (PRA).

DS-1 rate access shall be provided at both the standard channelised 24 channel PCM, and at low bit rate channel coding rate (44 to 48 voice or data channels per DS-1 rate).

The numbering plan shall be consistent with the overall switched service plan with sub-addressing capabilities complying with international standards.

2.6 Service Management

For each of Sections 2.2 to 2.5, the following service management functions shall be provided in the context of each service:

a) Service Provisioning
b) Configuration Management
c) Billing
d) Performance Monitoring and Reporting
e) Testing
f) Trouble Management

The implementation of these functions should satisfy the network management objectives and attributes of GTN-2000, as stated in Section 2.4.6.

3.0 NETWORK-WIDE INTELLIGENT COMMUNICATIONS SERVICES

3.1 General

The features identified in this section are associated with and offered at the ICNs and network servers of GTN 2000. Although some of these requirements might be more relevant to a particular network service (e.g. switched voice), they will be generally required for all multi-media services (voice, data, image).

The objectives for these features are to use end-to-end common channel signalling to achieve full multi-media service interworking and integrated centralized network management.

3.2 Intelligent Routing

a) Network Automatic Route Selection

This feature shall permit routing according to the destination code, both for on-net end-users as well as for off-net end-users i.e. calls originating in any part of the country shall be handled at the location designated to serve the geographical area where the call originated.

The feature shall provide the capability to automatically route calls on least cost paths available at time of call origination. Where the call has to be routed over the DDD as the final overflow option, the user shall be warned by an "expensive route" tone so the user has the option to abandon the call if desired.

For specific government program delivery directory numbers, the feature shall allow the call to be routed to different destinations according to either the time of day and/or geographical area of the caller.

b) Dynamic Controlled Routing

This feature should provide the network with the ability to automatically route calls to circumvent the effects of temporary local high facility demand and/or facility failure.

3.3 Network-wide Calling Features

The network-wide calling features shall include, but not limited to, the following:

- Call Forward
- Network Ring Again
- Call Waiting
- Call Transfer
- Calling Line Identification Delivery
- Calling party call back
- Call queuing
- Customized announcement call prompter (This would allow sorting of calls by type and through call routing, route them to the appropriate destination).

3.4 Network ACD and Attendant Services

3.4.1 Network Automatic Call Distribution

This service shall provide Automatic Call Distribution features on a network-wide basis.

Such a service is envisaged to allow the general public access to government services via published Directory Numbers associated with various government programs and services.

The primary function would be to equitably distribute incoming calls to a set of geographically dispersed ACD agents associated with a given program or service. The subsets of agents serving particular geographical calling areas for a given program or service could be different from those associated with another geographical area. The distribution of agents could also vary according to the Time of Day.

The agents shall have the capability to reroute an incoming call to another Network ACD Directory Number.

There may also be applications where the initial access could be to a voice response system which would respond by offering the caller a menu to which the caller would react using secondary DTMF signalling to further route the call to a specific set of agents.

When a caller experiences an 'all agents busy' condition, a recorded announcement to that effect shall be automatically extended to the the caller.

Queued calls which have waited for more than a GTA specified duration, or calls arriving when the queue length exceeds a GTA-specified length, shall be automatically routed to an overflow ACD.

Calls abandoned while waiting shall be automatically removed from the queue.

Calls arriving during non-service hours shall be automatically redirectable to either a recorded voice announcement or another directory number.

The ACD system should provide a comprehensive Service Operational and Administrative Management capability including but not limited to the following:

- Load Management via supervisory features such as:
  - Agent status monitor
  - Call agent directly
  - Call volume monitor
  - Reassign Agents

- Modification of ACD system parameters
- Ability, with proper authorization, to modify recorded announcements associated with the particular government program delivery.

- Report generation over specified periods such as hourly, daily or weekly on operational statistics such as,

    - Offered, answered, and abandoned calls
    - Offered calls during non-service periods.

3.4.2 Network Attendant Service

This service has two components. The first component is call distribution of incoming calls, and the second component is call processing.

The call distribution function requirements are similar to those identified for the Network ACD above except that the service topology will be less subject to change and essentially independent of government program delivery.

The call processing function will include all the typical operator call processing functions such as call completion, consultation with system databases or third parties while caller on hold, three-way conferencing, setting up general multi-location operator-handled audio teleconferencing, call progress monitoring, and call interception.

In addition, the attendants shall be able to carry out online verification of call authorization codes relayed verbally by off-net users.

The operational and administrative management functions should be similar to those identified for the Network ACD.

3.5 Direct Inward Service Access

Off-net access for government personnel who are not normally terminated on local government consolidations (class 1) or are in a travel status in an off-net environment (class 2) should be afforded via special local access ports providing a Direct Inward Service Access (DISA) capability.

Control of access for class 1 callers should preferably be via an intelligent network interpretation of permissible calling line identification rather than using secondary signalling such as authorization codes.

Access by class 2 callers when not using permissible offnet calling lines, shall be via DTMF secondary signalling for DISA or government operator handled access. Verbal input may be used in the latter case where DTMF is not available.

GTA would also be receptive to proposals using intelligent networking control of access for class 2 callers using user-friendly voice response techniques.

The network shall provide appropriate recorded voice announcement to the caller when access is denied.

3.6 Call Screening

GTN 2000 shall provide the ability to control completion of calls based on the Class Of Service (C.O.S.) assigned to the originating station or originating trunk group. Such control may include for example restricted access to off-net calls, restricted access to certain NPA-NXXs or restricted access to other private or public networks.

The system shall allow the station C.O.S. restrictions to be nullified for the duration of the call when a valid authorization code is used from that station.

3.7 "800" and "900" Services

This service shall provide access to government program services by the public. Access to these program services is via core listings generally published by the GOC in public directories.

The "800" service shall provide the same 1-800-XXX-XXXX number nationwide and have the capability of routing calls to different destinations via GTN-2000 according to at least the following criteria:

a) Time of Day
b) Day of Week
c) Location of caller
d) Statutory holidays
e) Redirection because of emergencies

The routing shall be carried out, as far as possible, on GTN's intercity transport network.

In addition, GTA is interested in "800" and "900" services for internal government use. These services will be strictly for GTN-2000 users to access other government offices, voice-based information and databases.

4.0 AVAILABILITY AND PERFORMANCE

Availability and performance objectives must be service-specific, and must be defined from the perspective of a user and GTA as a common service provider. The vendor must state the objectives for availability and transmission performance, and describe its plan for tracking and reporting how well the services will meet these objectives.

5.0 CONFORMANCE TO STANDARDS

The GTN-2000 network services must be implemented in compliance with the Government's policy of adherence, where it is feasible and cost-effective, to international (CCITT, ISO) and national standards. Vendors must indicate which standards are relevant to, and followed in, the specific services provided. Any proprietary interfaces must be identified and the vendors must indicate the interfaces' status of "openness" in terms of specifications which can be disclosed.

6.0 SERVICE MANAGEMENT AND NETWORK OPERATIONS REQUIREMENTS

6.1 Objectives

Service management is critical to the successful acceptance of GTA's new channel and switched services. GTA's objectives for service management are to:

- Be responsive to user departments' connectivity and bandwidth needs,

- Provide and maintain performance and availability levels required by departmental applications,

- Support the network management architecture of individual departments by providing the required interfaces and service-related information,

- Realize efficiency and responsiveness in network operation through an integrated, centralized management centre using cost-effective computer-based service management systems,

- Support the introduction of new services through user training and application guidelines.

6.2 Service Management Centre

A centralized Service Management Centre (SMC) is key to the responsive delivery of network services to user departments. The centre should have the appropriate staff, procedures and a Service Management System (SMS) to provide dynamic control and management of the network.

The need for SMC and SMS is applicable especially to channel services. For this reason, the functions defined below for SMC and SMS are oriented to channel services, although many functions are equally valid for switched services.

The responsibilities of the SMC are to:

- establish new user accounts,
- respond to user requests to establish and remove circuits,
- monitor and test circuits, transmission facilities and end equipment,
- provide management reports on network performance (transmission quality, availability, utilization, etc.),
- resolve users' trouble reports and network alarms,
- provide information for billing,
- administer the network configuration database and the inventory of network equipment,
- capture information for service evolution and network capacity planning.

6.3 Service Management System

The prime role of the Service Management System (SMS) is to provide, as cost-effectively as possible, the computer-based support required to execute the responsibilities of the SMC.

From a functional viewpoint, the SMS is treated as one logical system. In reality, the implementation may involve a set of physically separate but properly interfaced interworking subsystems. For the purpose of requirements definition, the SMS is viewed as one logical system. The main functions of the SMS are:

- support the design and layout of circuits, download to network equipment the circuit configuration and option setting information, coordinate circuit testing, activate the permanent circuits at the required time, and assign temporary bandwidth as part of the on-demand service;

- coordinate and direct the performance monitoring of all circuits, react to network alarms with alerts appropriate to the severity of the alarms, temporarily restore service according to a preplan, provide testing to help isolate and repair troubles;

- provide on-demand and scheduled management reports summarizing the statistics acquired in monitoring the transmission performance, availability, reliability and utilization of the network resources from the perspective of a) the total GTA network, b) individual user subnetwork;

- administer the whole process of trouble management by tracking and reporting on the reception, resolution and clearance of trouble reports from users;

- act as the interface between the user terminal and the network for mediating those network management functions made available to the users, support Netview applications by compliance with the

appropriate application interface, provide the required information and interface to support the billing and inventory control functions of the SMC;

- support all the above functions with a common database capturing information on: a) all the network equipment and facilities used by GTA to provide the channel services, b) all the users and their contacts, c) a network map, per each user, of all of the user's services (sub-DS-0, n x DS-0, n x DS1) and the access to these services; provide an associated database management system for user-friendly data entry, editing, viewing, printing, and data correlation;

- use a full-screen, graphics-based, menu-driven human/computer interface; supports standard DTE/DCE interfaces (RS-232C, X.25) at 9.6 Kbps as well as dial-up access at 2.4 Kbps; have a network management protocol architecture that facilitates the integrated management of multivendor network and network management equipment by conforming, as closely as possible, to industry standards;

- have full system redundancy, provide access control with different levels of access.

7.0 NETWORK PLANNING REQUIREMENTS

The purpose of network planning is to develop a network implementation plan for a given services introduction schedule, a selection of network products, and a set of end-to-end network objectives (transmission performance, survivability, availability, blocking, response time, throughput etc.). The implementation plan should be phased in steps with minimum disruption of existing services and no degradation in performance as perceived by the users.

The network implementation plan must include:

- a summary of GTN-2000 network services offered, their introduction schedule and geographical coverage,
- the mapping of the network services to the vendors' products and services selected to deliver the network services,
- the demand forecast of the new services within the planning horizon,
- a characterization of the base network,
- the assumed unit costs of the products/services to be procured,
- the performance objectives assumed,
- the key assumptions in the planning algorithms,
- the network topology and capacity (for nodes and links) for each phase, given all the above.

Computer-based decision support tools are expected to be needed to help satisfy the above requirements.

8.0 SECURITY

The GTN-2000 network will be used by the Federal Government primarily for unclassified information. Future applications, however, will likely involve the transmittal of sensitive information requiring an appropriate mode of secure communication. The GTN-2000 implementation must be able to support:

- encryption of information carried by designated network components (such as specific transmission links),

- the use of secure telephones and data terminals,

- authentication of user identity through verification of some form of user signature,

- network-wide capability to manage securely the distribution of encryption keys.

9.0 SURVIVABILITY AND EMERGENCY PREPAREDNESS

9.1 Survivability

The GTN-2000 network must have a high-level of survivability in the event of failures in critical network components. The network survivability is ensured by having:

- a network design with at least two separate physical paths between any pair of major nodes in GTN-2000,
- a network monitoring system (part of SMS) to detect failures and activate emergency service restoral plan,
- network elements to provide the required rerouting capabilities.

In addition, the failure of any node must not disrupt the traffic between other nodes. The failure of the SMS must not affect the existing network configuration or the traffic-handling ability of the network.

9.2 Emergency Preparedness

The GTN-2000 network must be able to operate during emergency situations. Such situations include: a regional natural disaster, a national or international emergency. The network must be able to:

- assure service to critical users by using, for example, priority access, rerouting of circuits, and appropriate traffic overload flow control,
- interwork with other dedicated government networks (e.g. Defence, External Affairs).

Part IV

EMBRYO NETWORK REQUIREMENTS

1.0 GENERAL

As discussed in Parts I and II, GTA plans to implement and evaluate an embryo network with a limited set of Intelligent Networking features. The following are the requirements for this embryo evaluation network. The vendor participating with GTA in this evaluation project is expected to provide end-to-end network service management responsibility, subject to the terms and conditions to be established prior to the commencement of the evaluation. For example, a central management responsibility of the vendor for the embryo network is the system integration of products potentially from several vendors.

2.0 USER ENVIRONMENT AND NETWORK SERVICES

2.1 User Environment

Because of diverse mandates and past decisions, the departments and agencies in the Federal Government have different information networks with overlapping but not identical telecommunications needs. Consequently, it is not possible to have a single description that fits exactly all departments. However, there are typical traits applicable to most departments. Such traits are highlighted here, based on a large GTA user.

A "typical" department has several information networks. They are:

- a nation-wide corporate information network for finance, administration, and office automation applications. The users are primarily the department's employees. The network is likely to be an SNA network. In some departments, however, the corporate network may be based on other architectures (e.g. DECnet). In these cases, however, there is still a need to interwork with SNA since

Supply and Services Canada uses SNA to provide a set of financial and administrative services required by all departments.

- one or more operational networks for delivering specific government programs or services. Most networks are national in coverage; however, there may be some region-specific networks. Depending on the applications, the users may be internal employees, other public servants, or a mix of public and private sector users. These networks have diverse architectures ranging from SNA to X.25-based packet-switched network to a customized network.

- voice networking services that are part of GTN. There is no virtual departmental voice network. There are, however, dedicated networks sharing GTN's transmission facilities.

The information networks usually have separate design authority. Historically, within a department, the telecommunications needs of the department's networks have been identified and satisfied independently. In most departments, the trend is to have a coordinated telecommunications plan in spite of separate network primeships.

2.2 Network Services

For the embryo network, a basic configuration for the network services and their access is depicted in Figure IV.1.

The network services to be provided by the embryo network must include: a) a set of digital channel services b) a set of CCS-7 based network-wide services. More requirements on these services are stated in the next two subsections.

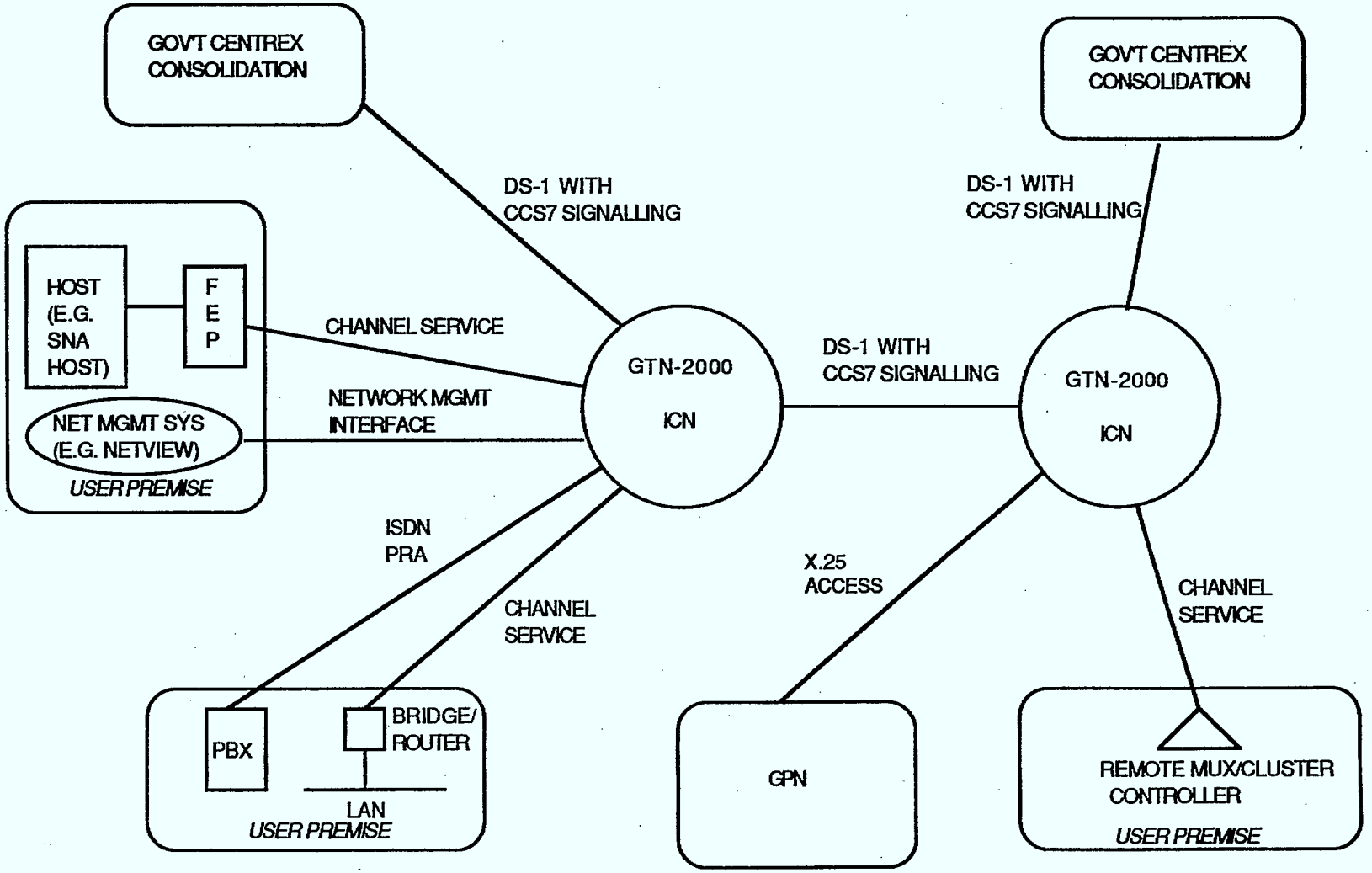


FIGURE IV.1 BASIC SERVICE INTERFACES FOR THE EMBRYO NETWORK

2.2.1 Digital Channel Services

The narrowband channel services proposed by the vendor must be compliant with the specifications in Section 2.1, Part III. The embryo network must demonstrate the capability of virtual private network (VPN) to support one or more departmental (vendor-specific) data network architectures (e.g. SNA) with the associated network management requirements (e.g. Netview interface). Virtual Private Networking capabilities in the embryo network should allow GTA to customize network offerings specific to various departmental needs. This aspect should include service features packaging, transmission network reconfigurations, and user management of circuit, packet and channel services.

The network management features of the digital channel services must comply with the service management objectives and requirements as stated in Section 6.0, Part III.

2.2.2 CCS7 Based Network-wide Services

The CCS-7 based services must comply with the specifications in Section 3.0, Part III. The vendor should identify the expected benefits of the proposed services and how these benefits will be demonstrated and evaluated in the embryo network.

2.2.3 Mode of Operation

The mode of operation must be transparent and nondisruptive to existing users and systems. Rearrangement of existing equipment must be avoided to the extent possible. User training should involve only reasonably limited time.

3.0 NETWORK INTERCONNECTION AND ACCESS

3.1 Network Interconnection

The embryo network must provide basic network-wide feature transparency, and interworking with public networks and other Government of Canada (GOC) networks and services via standard interfaces, including existing:

- consolidations of the government intercity network,
- the Government Packet Network (GPN),
- the Government Electronic Messaging and Document Exchange Service (GEMDES) and
- government local area networks (LAN)

At least one of the user locations will be a PBX service site. The interworking between PBX and Centrex service capabilities will be evaluated and demonstrated.

3.2 Network Access

Access to the embryo network from the government network's user premise systems will be via one of several approaches:

- direct access using standard data rates and interfaces ("Local" means that the user premise is in the serving area of the LCN.),
- ISDN access (BRA and PRA),
- remote access via other common carrier facilities ("Remote" means that the user premise is outside the ICN's serving area.).

3.3 User Terminals

It is desirable to test out on the embryo network the interworking of CPE user terminal equipment from different vendors including ISDN terminals. The vendor is requested to specify the CPE equipment it will support.

4.0 NETWORK TOPOLOGY

The embryo network should comprise of a minimum of three regional locations, one of which must be the National Capital Region (NCR).

The GTA regions are: Pacific (B.C.), Central (Alberta, Saskatchewan, Manitoba), Ontario, NCR, Quebec and Atlantic (New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland).

5.0 INTERCITY TRANSMISSION FACILITIES

Transmission facilities interconnecting the various locations in the embryo network must be digital.

Should the proposed embryo network include transmission links between Ottawa, Vancouver, Toronto or Montreal, the intent is to use digital facilities acquired through the GTA RFP (November, 1988) for these cross-sections. A copy of the relevant section of the RFP is provided in Appendix C.

6.0 NETWORK NODAL CAPACITY

The vendor should specify the system capacity of a minimum configured system for the Intelligent Communications Node (ICN) in the proposed

embryo network, including for example the number and types of network interfaces for access and transmission, a real time service capacity for network-wide services etc.

7.0 NETWORK MANAGEMENT AND SUPPORT CAPABILITIES

7.1 The embryo network should provide, for evaluation and demonstration purposes, end-to-end network management from user premises to user premises including the following aspects:

- customer network management
- station/port moves and changes,
- circuit assignment and reconfiguration
- performance monitoring
- usage monitoring
- billing allocation and administration.

7.2 The vendor should indicate what other network management capabilities as stated in Section 6.0 (Part II) will be provided in the embryo network.

7.3 The vendor is expected to assist GTA in the development and evaluation of end-user or GTA network applications during the evaluation period.

8.0 COSTS

8.1 The development & evaluation of the embryo network by GTA and the vendor should be considered a cooperative venture to advance the development of network services for the benefit of the users in GOC and the clients of the participating vendor.

In the context of a pilot service, it is not expected that the embryo network will be a revenue-generating commercial service for the vendor offering it to GTA.

8.2 The vendor should specify:

- the total cost for providing a dedicated minimum configured embryo evaluation network;
- the total cost for GTA to participate with the vendor to evaluate the embryo network implemented on a shared basis on the vendor's own network;
- all the costs included in the above which are tariffed;
- other costs and all terms and conditions;
- an evaluation period (typical 2 years)

8.3 It is expected that GTA should be able to demonstrate on the embryo network the cost-effectiveness of the GTN-2000. The projected cost of network services on the embryo network should therefore represent minimum investment from the participating user departments and should be less than the cost of equivalent existing alternatives.

APPENDIX A

GTA'S EXISTING NETWORK AND SERVICES

A.1 The Government of Canada Telecommunications Network

The Government of Canada Telecommunications Network (GTN) has several private nation-wide sub-networks which support a variety of voice and data network services. The sub-networks are:

- the government telephone network (consisting of the government inter-city network and local telephone services)
- the government packet data network
- the government store-and-forward telex network, and
- a variety of dedicated point-to-point voice and data transmission facilities.

The government store-and-forward telex network consists of about 1000 stations and has a gateway to the national and international telex network services.

The GTN also has several thousand dedicated point-to-point voice and data facilities for special communications requirements.

A.2 Digitization of Government Consolidations (Switching) Systems

The government consolidation (switches) in the existing government inter-city network provide communications (eg. telephony) at the intra-city level as well as access to the inter-city network facilities for communications to other locations across Canada.

The government telephone network currently consists of 45 government owned or contracted telephone switch consolidations providing advanced telephony services to government offices across the country. These consolidations, besides providing local services, also provide access to the private government inter-city network.

Thirty-eight (38) of these consolidations are digital switches (e.g. Northern Teleom NT DMS). There are approximately 1 million circuit miles and 1000 WATS circuits in the government telephone network. About 200,000 telephone stations are connected to the consolidations.

A.3 The Government Packet Network (GPN)

The GPN is based on CNCP's Infoswitch II service which has been customized to meet the data communications needs of federal government users. GPN has five nodes and provides access to over 100 public packet data network serving areas.

The network supports a broad range of computer and terminal equipment with network access on either a switched or dedicated basis as appropriate.

The primary services supported are:

X.28 Service - supporting asynchronous ASCII terminals as well as a variety of personal computer communications packages.

X.25 Service - supporting users' equipment such as intelligent terminals, Packet Assembly Disassembly (PAD) equipment, computers and front-end processors allowing them direct interface with the X.25 environment.

X.25 to Synchronous Data Link Control (SDLC) Service

- allows computers using the X.25 protocol to communicate with SDLC controllers and devices via the GPN.

SDLC to SDLC Service

- allows hosts and controllers to communicate over GPN as if they were on a dedicated network.

A.4 The Government (Thin Route) Satellite Network (GSN)

This new network to be introduced in early 1989, will provide data, voice and video communications to remote and underserved areas of Canada for the use of government departments operating in those areas. For data communications using VSAT technology, it will provide both the packetized mode for the major standardized communication protocols and clear channels at various data rates up to 56 kbps.

APPENDIX B

GOVERNMENT TELECOMMUNICATIONS SWITCHING

SYSTEMS INVENTORY (1987)

INVENTORY SECTION OF 1987 ITSP
TELECOMMUNICATION SWITCHING SYSTEMS INVENTORY

TABLE 5.4

CONSOLIDATION	SWITCH	TTK/FXS	CAS	DNs	OWNED/LEASE (L)
ATLANTIC					
Bathurst	DMS-100		0	350	L/NB Tel
Charlottetown	SL1-CO		0	1800	L/Island Tel
Corner Brook	SL1-CO		0	250	L/Newfoundland Tel
Fredericton	DMS-100		0	1100	L/NB Tel
Gander	DMS-100		0	300	L/Terra Nova Tel
Halifax	DMS-100		4	8000	L/Maritime T&T
Moncton	DMS-100		0	2200	L/NB Tel
Saint-John	DMS-100		0	900	L/NB Tel
St. John's	DMS-100		0	2900	L/Newfoundland Tel
Sydney	DMS-100		0	1500	L/Maritime T&T
QUEBEC					
Montreal	DMS-100		8	12000	L/Bell
Quebec	DMS-100		0	4500	L/Bell
Rimouski	SL1-CO		0	300	L/Quebec Tel
Sherbrooke	DMS-100		0	500	L/Bell
NCR					
Ottawa/Hull	5 DMS-100s		34 shared 8 dedicated	90700	L/Bell
ONTARIO					
Burlington	SL1-CU		0	560	Owned/BCSI
Cornwall	SL1-CU		0	260	L/Bell
Hamilton	DMS-100		0	1000	L/Bell
Kingston	DMS-100		0	650	L/Bell
London	X-Bar		0	720	L/Bell
Sudbury	SP-1		0	400	L/Bell
Toronto	DMS-100		5	7080	L/Bell
Toronto AES	SL1-CU		0	1000	Owned/TTS
4900 Younge	SL1-CU		0	2060	L/Bell
Malton	DMS-100		0	970	L/Bell
Malton SSC	SL1-CU		0	80	Owned/BCSI

.../ 2

CONSOLIDATION	SWITCH	TTK/FXS	CAS	DNs	OWNED/LEASED
CENTRAL					
Calgary	DMS-100		2	3000	L/Alta Gov't Tel
Edmonton	SL-100		2	4500	L/Edmon Tel
Lethbridge	DMS-100 "DAIX"			250	L/Alta Gov't Tel
Red Deer	DMS-100 "DAIX"			100	L/Alta Gov't Tel
Regina	DMS-100		1	2325	L/Sask Tel
Saskatoon	DMS-100		1	1825	L/Sask Tel
Winnipeg	DMS-100		3	7071	L/Man Tel
PACIFIC					
Abbotsford	SL1-CU		0	220	L/BCT
Campbell River	GTD5 "DAIX"		0		L/BCT
Fairmont	SL1-CU		0	990	L/BCT
Nanaimo	(2)SL1-CU Fed. Bldg		0	370	Owned/BTE
	PB Station				L/BCT
Penticton	SL1-CU		0	230	Owned/TTS
Prince George	SL1-CO		0	340	L/BCT
Prince Rupert	SL1-CO		0	50	L/PRCT
Surrey	SL1-CU		0	290	Owned/BTE
Vancouver	(2)DMS-100		5	6870	L/BCT
Victoria	DMS-100 & SL1-CO		0	2670	L/BCT
	4 SL1 (CU)				

APPENDIX C

RELEVANT SECTION OF
RFP FOR INTERCITY DIGITAL FACILITIES

data and digital data communications between these locations, terminating at Government Centrex type services, and to accommodate intercity and local switched voice, voice band data and digital data, dedicated data and video applications between these locations terminating at user premises.

2.0 Functional Requirements

2.1 General

2.1.1 Wherever the words - capability - or - capable - are used, it shall be understood, unless otherwise stated, in this RFP, that all necessary hardware and/or software must be included in the bidder's proposal to enable activation of the said capability at the time of cutover to the bidder's service.

2.1.2 It is mandatory that the bidder engineer, furnish, install, and maintain all equipment, software and material to provide a fully functional service between the service end points stated in this RFP. Any material, software and/or equipment, not explicitly stated in the proposal but necessary for the provision of the service specified herein, shall be deemed to be included as part of the bidder's proposal.

2.1.3 It is mandatory that only proven equipment be proposed by the bidder.

2.2 Capabilities

2.2.1 It is mandatory that the intercity digital service proposed by the bidder be able to accommodate:

a. switched voice and voice band data at speeds up to and including 2400 bps between Government Centrex type services with access to and from the Public Switched Telephone Network. The quantity of circuits for which prices are needed is indicated in Table 1 and the locations of the Government Centrex type services end points are outlined in Table 2;

b. switched digital data at speeds up to and including 56 Kbps between Government Centrex type services. The quantity of circuits needed to accommodate this requirement is unknown at this time. The bidder shall assume that five 64 Kbps circuits are needed on each of the Ottawa-Vancouver, Ottawa-Toronto and Ottawa-Montreal routes, terminating on the Government Centrex type services. The locations of the Government Centrex type services end points are outlined in Table 2;

and

c. dedicated data services at speeds up to and including 56 Kbps between user premises. The quantity of circuits needed to accommodate this requirement is unknown at this time. The bidder shall assume that one circuit is needed for each speed identified in Table 3 on each of the Ottawa-Vancouver, Ottawa-Toronto and Ottawa-Montreal routes, terminating on one Data Terminal Equipment (DTE) respectively in Vancouver, Toronto and Montreal and three separate DTEs in Ottawa (one for each route). Refer to Table 2 for the locations of the user premises.

2.2.2 It is desirable that the intercity digital service proposed by the bidder be able also to accommodate:

a. switched voice and voice band data at speeds up to and including 2400 bps between stand alone PBXs located on user premises. The quantity of circuits needed to accommodate this requirement is unknown at this time. The bidder shall assume that ten circuits are needed on each of the Ottawa-Vancouver, Ottawa-Toronto and Ottawa-Montreal routes, terminating on one stand alone PBX respectively in Vancouver, Toronto and Montreal and three separate stand alone PBXs in Ottawa (one for each route). Refer to Table 2 for the locations of user premises;

b. switched digital data at speeds up to and including 56 Kbps between stand alone PBXs located on user premises. The quantity of circuits needed to accommodate this requirement is unknown at this time. The bidder shall assume that five 64 Kbps circuits are needed on each of the Ottawa-Vancouver, Ottawa-Toronto and Ottawa-Montreal routes, terminating on the same stand alone PBXs indicated in paragraph 2.2.2 a. (assume that the PBXs have DS-1 interface capabilities);

c. compressed full motion video communications at synchronous speeds of 384 Kbps, 512 Kbps and 768 Kbps between user premises. The quantity of circuits needed to accommodate this requirement is unknown at this time. The bidder shall assume that one circuit is needed for each of the synchronous speeds of 384 Kbps, 512 Kbps and 768 Kbps on each of the Ottawa-Vancouver, Ottawa-Toronto and Ottawa-Montreal routes terminating on one video studio respectively in Vancouver, Toronto, Montreal and three separate studios in Ottawa (one for each route). Refer to Table 2 for

the locations of user premises; and

d. the services indicated in article 2.2.1 c., and 2.2.2 a., b., and c., locally, the two service end points being in the same city.

2.2.3 It is desirable that the intercity digital and voice grade services proposed by the bidder for voice applications be able to accommodate voice band data, including medium and high speed facsimile transmission, at speeds up to and including 9600 bps.

2.2.4 It is desirable that the intercity digital and voice grade services proposed by the bidder for dedicated data applications be able to accommodate multidrop/ multipoint configurations. (For example, a circuit between Vancouver, Ottawa and Montreal used by poll and select terminals located in Vancouver and Ottawa to communicate with a host computer in Montreal; or a circuit between Toronto and Ottawa used by a number of poll and select terminals located in different buildings in metro Toronto to communicate with a host computer in Ottawa).

2.2.5 It is desirable that the intercity digital service proposed by the bidder for full motion video communications be able to accommodate multipoint/multidrop configurations (video conferencing).

2.2.6 It is desirable that the intercity digital service proposed by the bidder provide portable full motion video studios, with video conferencing capability, which can be rapidly deployed on user premises and put in operation.

2.2.7 It is desirable that the intercity digital service proposed by the bidder provide additional bandwidth ranging from one DS-0 to multiple DS-1s, for an indeterminate period on a:

a. channelized, and
b. unchannelized basis (to accommodate for example video conferencing)

2.2.8 It is desirable that the intercity digital service proposed by the bidder provide additional bandwidth ranging from one DS-0 to multiple DS-1s, on demand, on a:

a. channelized, and
b. unchannelized basis (to accommodate for example video conferencing)

2.2.9 It is desirable that the bidder offer the option to locate the DS-1 multiplexers, which are used to connect the intercity digital service to equipment located on user premises, on either the bidder's premises or the user premises at the choice of the user. Examples of user's equipment which are located on user premises are stand alone PBXs, Data or Video terminals, etc...

2.2.10 It is mandatory that the intercity voice grade service proposed by the bidder be able to accommodate:

a. the capabilities outlined in article 2.2.1 a, and
b. the capabilities outlined in article 2.2.1.c at speeds up to and including 2400 bps.

2.2.11 It is desirable that the intercity voice grade service proposed by the bidder be able to accomodate:

a. the capabilities outlined in article 2.2.2 a, and
b. the capabilities outlined in article 2.2.2 a locally, the two service end points being in the same city.

2.3 Availability

2.3.1 It is mandatory that the bidder provide a detailed explanation on how he intends to meet the availability requirements stated below and address in the proposal the relevant factors such as the MTBF of the various subsystems making up the service, the manning hours and days on sites (24 hours? 7 days a week?), the equipment redundancy and automatic service recovery, the quantity of equipment spares, the quantity of facility spares, and any agreement he may have with other carriers to immediately restore services in cases of catastrophic failures.

2.3.2 It is mandatory that the service availability of each intercity DS-1 stream be higher than 99.7% in any consecutive 12 month period. Note that a DS-1 stream shall be considered unavailable when more than 300 errored seconds occur in any 15 minute interval or when the Bit Error Rate is worse than 1 X 10 Exponent (-3) for 10 consecutive one-second periods.

2.3.3 It is mandatory that the availability of each local DS-1 stream be higher than 99.7% in any consecutive 3 month period. Note that a DS-1 stream shall be considered unavailable when more than 300 errored seconds occur in any 15 minute interval or when the Bit Error Rate is worse than 1 X 10 Exponent (-3) for 10 consecutive one-second periods.

2.3.4 It is desirable that the service availability of each DS-1 stream and each DS-0 channel and sub-channel, used between the service end points be higher than 99.7% in any consecutive 3 month period.

2.3.5 It is desirable that the service availability of each intercity voice grade trunk be higher than 99.7% in any consecutive 12 month period. Note that a voice grade trunk shall be considered unavailable when it does not meet the transmission quality requirement indicated in article 2.6.5.

2.3.6 It is desirable that the service availability of each local voice grade trunk be higher than 99.7% in any consecutive 3 month period. Note that a voice grade trunk shall be considered unavailable when it does not meet the transmission quality requirement indicated in article 2.6.5.

2.3.7 It is desirable that the service availability of each dedicated data circuit from the user originating point to the user destination point be higher than 99.7% in any consecutive 3 month period.

2.4 **Restoral Time**

2.4.1 It is desirable that service interruptions be restored before the following periods of time:

a. the service interruption of one to five trunks used for switched voice or data applications, and of one dedicated data circuit: 2 hours; and

b. the service interruption of more than five trunks used for switched voice or data applications on the same route, and of more than one dedicated data circuit terminating at the same user premises: 15 minutes for the intercity portion of the service and 2 hours for local portion of the service.

2.5 **Route Diversity**

2.5.1 It is desirable that the routing of local and intercity facility services providing more than 48 voice circuits be diversified in order that a failure of a facility

does not affect more than 60% of the service in operation.

2.6 Transmission Quality

2.6.1 It is mandatory that the Percent Error Free Seconds of each local and intercity DS-1 streams that are 1000 Km or less in length, be better than 99.0% averaged over one day for 90% of the days in an assessment period of 30 consecutive days during the time the service is available.

2.6.2 It is mandatory that the Percent Error Free Seconds of each intercity DS-1 streams that are greater than 1000 Km, be better than 98.0% averaged over one day for 90% of the days in an assessment period of 30 consecutive days during the time the service is available.

2.6.3 It is desirable that the Percent Error Free Seconds of each DS-1 stream and each DS-0 channel and sub-channel used between the service end points be higher than 98.0% averaged over one day over one day for 90% of the days in an assessment period of 30 consecutive days during the time the service is available.

2.6.4 It is desirable that the Percent Error Free Seconds and the Bit Error Rate of each dedicated data circuit from the user originating point to the user destination point be respectively better than 98.0% averaged over one day for 90% of the days in an assessment period of 30 consecutive days and better than 1 X 10 Exponent (-6) during the time when the service is available.

2.6.5 It is mandatory that the service provide a quality of voice transmission equivalent or better than that experienced on the Public Switched Telephone Network (PSTN) including but not limited to an adequate control of echo. This necessitates that the bidder provide echo control equipment at least on the OTTAWA-VANCOUVER route and on any satellite facility. Near toll quality is not acceptable.

2.6.6 It is mandatory that the echo control equipment be automatically disabled for voice band data calls, if such disabling is needed to ensure a proper data transmission quality for both direct and tandemed calls.

2.6.7 It is mandatory that the echo control equipment be automatically disabled for digital data calls, if such disabling is needed to ensure a proper data transmission quality for both direct and tandemed calls, in cases where the Government chooses to carry both voice and digital data calls over the same

facilities, and if the digital data sets (data units or other types) can send to the echo control equipment the proper signal for their disabling.

2.7 **Facility Transmission Medium**

2.7.1 It is mandatory that the facility transmission medium used for each service option proposed by the bidder be as specified in Table 1. This requirement does not mean that the services must always be routed over the same facility without substitution. For instance, where terrestrial facilities are mandatory, the bidder can substitute Fiber or Microwave Digital Radio for Digital Coax anytime during the service period at his discretion. He may also choose to route some circuits over one type of facility for example Digital Coax and some others on Fiber at his discretion.

2.8 **Interconnection to Telephone Companies Equipment and Services**

2.8.1 It is mandatory that the local facilities connecting the Government CESS, Centrex and EEWD services to the bidder's intercity digital service be fully digital or if more cost effective, be a mixture of digital and analog facilities.

2.8.2 It is mandatory that the interface used by intercity facilities proposed by the bidder to connect to Telephone companies' facilities and equipment be compatible with that used by the Telephone company in question. The technical interfaces used by the Telephone companies shall be considered the standard.

2.8.3 It is desirable that the intercity service proposed by the bidder interface the Centrex, CESS and EEWD services and stand alone PBXs using standard ISDN interfaces compatible with those utilized by Telephone companies when those interfaces become available.

2.9 **Tandeming Restrictions**

2.9.1 The intercity service to be procured will in certain cases accommodate tandemed connections. For example, a call between Halifax and Victoria is currently tandemed through the Ottawa and Vancouver switches and routed over the Ottawa-Vancouver intercity facility. The portions of the tandemed call paths which are not part of this RFP, for example the Halifax-Ottawa and the Vancouver-Victoria portions of an Halifax-Victoria call, can consist of analog or digital facilities and switches. They may also use, in the future, 32 Kbps ADPCM compression. In addition, the telephone sets are for the most part, analog sets requiring in the case of

digital switches a digital/analog conversion. Given the above and the requirement to obtain a transmission quality equivalent or better than that of the PSTN, it is mandatory that the bidder indicate any limitations or restrictions the service he proposes may have on the tandeming of calls.

2.10 Channel Routing and Assignment

2.10.1 It is desirable that the intercity digital service proposed by the bidder be capable of routing tie trunk groups used for voice, which may have to be compressed or not by the DS-1 multiplexer, and used for switched digital data, over the same DS-1 facility (ies) between the CESS, Centrex and EEWD services, and the bidder's intercity digital service hubs. (The bidder may assume that he can obtain information about which DS-0 channels and DS-1 streams connected to telephone switches are used for each tie trunk group. With this requirement, the Government wants to prevent the routing of voice trunks and high speed digital data trunks, over separate DS-1 facilities between Centrex type services and the intercity digital service hubs.)

2.10.2 It is desirable, should the bidder propose compressed voice facilities, that during Government non-working hours, compressed voice channels assigned to shared voice applications automatically become uncompressed and that the voice channels for which there is no intercity bandwidth left, be automatically busied out or put in an "unavailable state". This capability will enable the routing during non prime time of high speed digital data calls as well as voice calls over the digital facilities used by voice during prime time.

2.10.3 It is desirable that the required number of channels used for shared voice applications be automatically busied out or put in an "unavailable state" when they become idle, when they are needed immediately or at scheduled date/time for other applications and be automatically assigned to these other applications. This capability should also include the removal of echo control equipment when necessary. It could be used for example, to route dedicated data applications during non prime-time over facilities used by voice during prime time.

2.11 Clock Synchronization and Buffer Space

2.11.1 The services requested in this RFP could be connected to equipment, facilities and networks provided by various suppliers. It is mandatory that:

a. the bidder resolve any clock synchronization issues that are necessary to meet the availability and transmission quality performance levels contracted by GTA as a result of this RFP, with the supplier of the end equipment services (Centrex, CESS, EEWD, stand alone PBXs, data and image terminals etc...);

b. buffers with sufficient space be provided to accommodate transmission slippages and accurate alternate clocks be used in case of failure of the primary clock, if these are necessary to meet the availability and transmission quality performance levels contracted by GTA as a result of this RFP.

2.12 Preventive Maintenance and Monitoring

2.12.1 It is mandatory that the bidder indicate what preventive maintenance and performance monitoring he will perform on the services he proposes.

2.12.2 It is mandatory that the bidder indicate what monitoring capability can be made available to GTA to monitor on an ongoing basis the end to end performance of the various services (voice, voice band data, switched digital data, dedicated data and video) routed over the intercity services proposed by the bidder.

2.13 Equipment location

2.13.1 It is mandatory that the bidder indicate the complete address for the location of the DS-1 Digital Cross Connect (DCC)/Multiplexer (Mux) equipment needed to accommodate the Government voice requirements indicated in this RFP between the Government Centrex type services.

2.14 Management

2.14.1 Traffic Statistics

2.14.1.1 The Government specifications presently require that the suppliers of the telephone switches provide the traffic statistics indicated below. However, their offering by the bidder of the intercity service in addition to the suppliers of the telephone switches may be beneficial and GTA would like to have the possibility of obtaining these statistics, if needed, on an optional basis anytime during the life of the service.

2.14.1.2 It is desirable that the bidder provide each month, a traffic study covering a full five-day (Monday to Friday) working period containing the following:

a. study dates;

b. CCS usage by hour averaged over the five-day period;

c. the studied hours each day to be from 0800 to 1700 hours (local);

d. directional flow of calls carried (2-way group only);

e. average (time consistent) busy hour CCS;

f. grade of service for busy hour (use Erlang B for circuit groups which overflow and Poisson theory for circuit groups which do not overflow);

g. quantity of circuits installed at the time of study.

h. peg count by hour averaged over the five day period for each end (peg count is a count of all calls offered but not necessarily carried by the service); and

i. overflow by hour averaged over the five day period for each end.

2.14.1.3 It is desirable that the bidder provide upon request in addition to 2.14.1.2:

a. a report of directional flow in CCS (2-way group only);

b. a report by individual circuit of prime time traffic by hour of each business day; and

c. a report by individual circuit of total traffic each day in CCS;

2.14.2 **Service Availability and Restoral Times Report**

2.14.2.1 It is mandatory that the bidder provide a monthly report of service availability and restoral times.

2.14.3 **Trouble Reporting Procedure and Responsibility to Restore**

2.14.3.1 It is desirable that the following procedure to report troubles and restore the service be adopted by the

bidder. Government users experiencing transmission problems will report them to the supplier of the local services (Centrex, CESS, EEWD, PBX, Digital Channel Service, Limited distance data set loops, Data Units, etc...). This supplier will then quickly resolve the problem with, if necessary, the supplier of the intercity facility and of the local service at the distant end and report back to the user who originated the trouble report once it is resolved. Note that local services leased from Telephone companies by the bidder to provide the service between the service end points indicated in Table 2 are considered to be supplied by the bidder and not by the Telephone company in question. The bidder is requested to elaborate on any other procedure he proposes should he not intend to meet the procedure above.

2.14.4 **Billing**

2.14.4.1 It is mandatory that all parts of the service proposed by the bidder be billed to GTA with the bidder providing detailed and summary bills.

2.14.4.2 It is desirable that itemized invoices be prepared and delivered in an electronic format that is amenable to further processing by GTA. Methods using Electronic Data Interexchange (EDI), magnetic tape and direct down loading into a GTA mainframe computer would be considered suitable.

2.14.4.3 It is mandatory that the bidder agree to cease billing for services deleted, 2 working days after the Government issues to the bidder a written notice for the service deletions (by Telecom Canada Envoy 100 or CNCP Dialcom service at the choice of the bidder).

2.14.5 Information Support

2.14.5.1 It is mandatory that the bidder provide to GTA during the life of the service, all the tariff, feature, technical, and other related information needed to ensure an adequate implementation, operation, marketing and enhancement of service(s) procured.

2.14.6 **Network Management Terminal Capability**

2.14.6.1 It is desirable that the bidder indicate what management information could be made available to GTA and/or users in real time and in batch and the method and equipment needed to obtain this data.

2.14.6.2 It is desirable that the bidder provide all the information GTA needs to read and process the real time

and batch information available electronically from the bidder.

2.14.6.3 It is desirable that the bidder provide with his proposed intercity digital service, network management terminal capability to be located on GTA HQ, GTA regional and user premises.

2.14.6.4 It is desirable that the network management terminal capability provided by the bidder on GTA HQ, GTA regional and user premises:

a. be able to work simultaneously;

b. access the proposed service with adequate security; and

c. provide file transfer of circuit and facilities information.

2.14.6.5 It is desirable that the network management terminal capability provided by the bidder to GTA HQ have the following capabilities:

a. View and print maps showing all the DS-0 and DS-1 facilities between Digital Cross Connects and DS-0/DS-1 Multiplexing equipment composing any Government Regional network (Pacific, Central, Ontario, National Capital Region, Quebec and Atlantic) and the Government Continental (Canada and US) network with unique identifier for each group of facilities;

b. view and print maps showing all the DS-0 sub-channels, DS-0s, DS-1s, Digital Channel loops, Limited Distance Data sets loops, analog E&M trunks, etc. between PBXs, data terminal equipment, and video equipment located on user premises, Government Centrex type services, and digital Cross Connects and DS-0/DS-1 multiplexing equipment in each city with a unique identifier for each group of facilities;

c. view and print tables listing the identifier of each facility composing any service and group of services, end to end, from origin to destination;

d. highlight on the maps and tables requested in 2.14.6.5 a., b., and c. above, the facilities which have at least one facility member or channel inoperative. The highlighting should be different depending on whether the outage affects only one subrate DS-0 channels, one DS-1 channel or a group of DS-1 channels;

e. view and print when requested the identification of any inoperative DS-1, DS-0 and DS-0 sub-rate channels;

f. view and print the current and last 15 minutes and the current and last day Percent Error Free Seconds of any local and intercity facility and any end to end circuit (from originating service end point to destination service end point);

g. view and print the Percent Availability of the last week, three month and twelve month period of any local and intercity facility and any end to end circuit;

h. view and print the Percent Error Free Seconds and the Percent Availability of any local and intercity facility and any end to end circuit (from originating service end point to destination service end point) for each calendar day of any window period requested and the average Percentage Availability over the window period requested;

i. obtain the latest status and expected restored time of each facility and end to end circuit in outage;

j. prepare and store many different network configurations from the local and intercity facilities subscribed to. This includes the re-assignment of DS-0s, the reconfiguration of DS-0 bandwidth, and the reconfiguration of DS-0 sub-rates;

k. make active any configuration identified in j. above immediately or automatically at scheduled date/time and for a specific time period;

l. automatically find out and busy out or put in an "unavailable state" channels used for shared switched voice applications when they become idle, when they are needed (immediately or at scheduled date/time) for other applications and assign the bandwidth requested to these other applications. These other applications could be for example, dedicated data applications, compressed full motion video communications, etc.;

m. add and delete bandwidth on demand, previously subscribed to;

n. view and print a log of all changes over any time period; and

o. file transfer of any accessible information.

2.14.6.6 It is desirable that the network management terminal capability provided by the bidder to GTA regions have the capabilities identified in articles 2.14.6.5 a. to i. and o. above.

2.14.6.7 It is desirable that the network management terminal capability provided by the bidder to users have the capabilities identified in articles 2.14.6.5 a. to i. and o. above, only for the circuits each individual user is subscribing to.

2.14.6.8 It is desirable that the bidder provide training for up to six GTA staff on how to use the network management consoles.

2.15 **Testing and Implementation**

2.15.1 It is mandatory that the service be implemented progressively, only after it has been fully and successfully tested by the bidder and authorized GTA personnel and that adequate back up facilities be immediately put in service in case of major failures during the implementation.

2.15.2 It is mandatory that the bidder submit upon contract award, a detailed test and implementation plan including a test and implementation schedule, the equipment configuration, the test and implementation procedures and GTA's participation for the implementation of both the initial number of circuits ordered and the ones ordered from time to time during the service period. It is mandatory that an outline of the test and implementation plan be included in the bidder's proposal.

2.15.3 It is mandatory that the bidder obtain approval from GTA before actioning the proposed testing and implementation plan.

2.15.4 It is mandatory that the bidder indicate the lead time in working days necessary after an order is received from GTA for the services proposed to be implemented. It is the Government's intention to have them implemented as soon as possible.

2.16 **Lead Time to Provide Additional Service**

2.16.1 It is mandatory that the bidder indicate the lead time in working days necessary after an order is received from GTA for additional services of the same type as those requested in this RFP to be installed.

TABLE 1

SERVICE OPTIONS AND QUANTITY OF INTERCITY VOICE CIRCUITS

SERVICE OPTION	MANDATORY GUARANTEED FACILITY TRANSMISSION MEDIUM	OTTAWA - VANCOUVER	OTTAWA - TORONTO	OTTAWA - MONTREAL
A	DIGITAL, SAT*	45 to 100		
B	DIGITAL, SAT	45 to 100	80 to 150	80 to 150
C	DIGITAL, TER*	45 to 100		
D	DIGITAL, TER	45 to 100	80 to 150	80 to 150
E	DIGITAL, TER	90 to 200		
F	DIGITAL, TER		160 to 300	
G	DIGITAL, TER			160 to 300
H	DIGITAL, TER	90 to 200	160 to 300	160 to 300
I	Voice grade, SAT	45 to 100		
J	Voice grade, SAT	45 to 100	80 to 150	80 to 150
K	Voice grade, TER	45 to 100		
L	Voice grade, TER	45 to 100	80 to 150	80 to 150
M	Voice grade, TER	90 to 200		
N	Voice grade, TER		160 to 300	
O	Voice grade, TER			160 to 300
P	Voice grade, TER	90 to 200	160 to 300	160 to 300

* SAT: SATELLITE
TER: TERRESTRIAL

TABLE 2

LOCATION OF SERVICES END POINTS

1. GOVERNMENT CENTREX TYPE APPLICATIONS

The service end points for Centrex type applications are the locations of the Government Centrex, CESS and EEWD intercity hub switches. Their address is:

VANCOUVER:	768 Seymour Street, V6B 3K9
TORONTO:	15 Asquith M4W 1J7
OTTAWA:	78 O'Connor K1P 6E7
MONTREAL:	87 Ontario ouest H2X 1X8

Note that the Vancouver and Ottawa intercity hub switches are located in wire centers which are the rate centers whereas the Toronto and Montreal intercity hub switches are located in wire centers which are different than the rate centers.

2. APPLICATIONS TERMINATING ON USER PREMISES

The locations of user premises are unknown at this time. For pricing refer to article 6.5 of this RFP.

3. DEDICATED DATA APPLICATIONS

The service end points for these applications are the user premises except for the access methods described in articles 5.3 f. and g. where they are the locations of the Government Centrex type intercity hub switches indicated in paragraph one above.

TABLE 3

DEDICATED DATA SERVICES CHARACTERISTICS

SPEED (BPS)	ASYNC	SYNC	RS - 232 - C	V35
300	X		X	
1200	X	X	X	
2400	X	X	X	
4800	X	X	X	
9600	X	X	X	
19200	X	X	X	
56000		X		X

X: APPLICABLE

CACC / CCAC
95810

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