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GT.8 – Guidelines for the Preparation of Data Technical Specifications (DTS)

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Government Telecommunications Specifications

Canada

GTA
GTG

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1. INTRODUCTION

1.1 Data Technical Specification (DTS)

Under the competitive acquisition process, when there is a requirement for the procurement of data communications services for a relatively large network from the common carriers, a Request for Proposal (RFP) is normally issued. The Data Technical Specification is a section included in or a separate document appended to the RFP describing the technical requirements of the network and services to be acquired. The RFP document itself will contain information for the vendor regarding the response structure, price quotation, evaluation process and time frames. The DTS does not address these issues. The present document deals only with the preparation of the DTS component of the RFP.

1.2 Role of the Government Telecommunications Agency (GTA)

Generally GTA is involved in one of two possible ways in the preparation of RFPs for data networks and services. The first is when GTA is tasked to originate the RFP and evaluate the responses for client departments. The second occurs when a client department produces its own RFP, GTA comments on it, the RFP is released through GTA, and evaluated by GTA and/or the client. The quality of the document, particularly in the latter case, can have a direct impact on the evaluation and also affect implementation schedules.

1.3 Purpose

1.3.1 The purpose of this document is to provide information and guidance to technical personnel concerned with the procurement of data communications networks and services from the common carriers. It is to be used internally by GTA's Directorate of Systems Design and Management (GTA/DST) or could be used externally as a guide for government departments or agencies in the preparation of RFPs for the technical component of data networks and services.

1.3.2 The ultimate goals are to send out consistently high quality RFPs to the industry, to increase efficiency in soliciting high quality responses, and to streamline the proposal evaluation and vendor selection processes.

1.3.3 Although it is concerned primarily with the procurement of wide area networks, individual sections of the DTS may be selected and applied to other types of networks and services.

1.4 Scope

This document provides:

(1) General guidelines for preparing a DTS

(2) Essential paragraphs and typical contents for inclusion in a DTS.

2. PROCEDURES FOR PREPARING A DTS

The procedures outlined in this section are intended for general reference. If existing internal procedures contradict or do not agree with those recommended here, the existing ones should take precedence.

2.1 General Procedures

2.1.1 The first step is to decide whether or not a DTS is needed. Depending on the nature of the acquisition, the details contained in a DTS may or may not be required in a RFP.

Generally, a DTS will be required when:

(1) The data communications (datacom) network and services are large and/or complex

(2) An initial or new network is being established

(3) The existing network is being expanded and the changes justify issuance of a DTS

(4) An existing network or service is being replaced by a new technology or service.

2.1.2 Once it has been decided that a DTS is required, the following steps should be followed:

(1) Determine the format and select contents suitable for the DTS

(2) Estimate the workload and person-year (PY) requirements

(3) Establish a schedule, time frame and target dates

(4) Assemble the project team and assign responsibilities

(5) Collect data and material for each section of the DTS

(6) Write the initial draft, requesting the assistance of the GTA/DST, if required

(7) Send the draft DTS to GTA/DST and other appropriate groups for input and comments

(8) Revise the draft DTS to incorporate the comments submitted

(9) Obtain management approval.

2.2 Preparation of the DTS

2.2.1 In preparing the DTS, the process set out in this document should be followed whenever possible. GTA/DST should be consulted on such matters as technical requirements in the early stages of preparing the document.

2.2.2 Statement of Requirements

Standardized and consistent wording should be used throughout the specification to state requirements. In general, "shall" signifies a mandatory requirement, and "should" signifies a desirable requirement. All essential requirements must be listed using "shall". Any requirements listed using "should" are normally treated as non-essential and are often eliminated during the system optimization and contract negotiation processes.

2.2.3 Standards and Terminology

The "V" and "X" series of CCITT[1] Recommendations for Data Communication should be used and quoted as reference documents. Terminology used should conform to the above standards and other industry standard references such as the *Datapro Reports on Data Communication*, and the *Dictionary of Computer, Data Processing, and Telecommunication*, by J.M. Rosenberg.

2.3 Input by GTA

The draft DTS should be sent to GTA/DST for input and comments shortly after completion. Recommendations made by GTA/DST should form part of the final DTS. Recommended requirements, performance levels or wording should not be altered afterwards.

2.4 Approval of the DTS

The final DTS should be reviewed by GTA/DST before printing.

2.5 Responsibility

The DTS is normally issued under the authority of the project manager with the technical responsibility for the RFP in which the DTS is to be included.

1 International Telephone and Telegraph Consultative Committee.

2.6 Amendments to the DTS

2.6.1 Amendments Made prior to Requisitioning Supply and Services Canada (SSC)

When changes are required in a DTS before SSC is involved, the project manager may either:

(1) Reissue the DTS with the changes; or

(2) Use the original DTS, but include the amendments in the requisition.

2.6.2 Amendments Made after Requisitioning SSC

When changes are required after requisitioning SSC, the project manager must advise SSC in writing. SSC will inform the vendors of the changes. The changes must be reflected in the signed contract.

2.7 Miscellaneous

Procedures for word processing of the document, proofreading, drafting, and printing differ in each department and will not be covered here.

3. FORMAT OF THE DTS

3.1 General

The format of the DTS should follow the general format of specifications prepared by GTA, as described in the following sections.

3.2 Numbering System

Specification numbers are assigned by client departments. An alphanumeric designation consisting of a three-letter departmental code followed by four numbers is recommended, for example: GTA 1529.

3.3 Front Cover

The design of a front cover for the DTS is the client department's responsibility. It may contain the departmental logo and specification number.

3.4 Sections

The DTS should be divided into sections as described in Section 4 of this document. In a large-sized document (40 pages or more), each section should begin on a right-hand page.

3.5 Paragraph Numbering

Each paragraph or sub-paragraph should be numbered as shown in (1), (2), and (3) below:

(1) The first figure of a paragraph number, followed by a decimal point indicates the section; the second figure indicates the paragraph number.

(2) The third figure indicates the sub-paragraph number. No paragraph number will be carried beyond three figures.

(3) Recommended Paragraph Numbering – The Dewey Decimal Classification:

1. **Sections**

If more than three sub-divisions are necessary, use bracketed Arabic numerals and further sub-dividing as shown below.

1.1 **Paragraphs**

1.1.1 **Sub-paragraphs**

(1)

(2)

(a) Lower Case Bracketed Alphabet

(i) Lower Case Bracketed Roman Numerals

3.6 Headings

The headings should be capitalized or be a combination of capitals and lower-case letters to provide an indication of the divisions and sub-divisions of the subject matter. Subjects of equal importance should be given the same type of headings throughout the document.

3.6.1 Section Headings

All section headings should be in bold capital letters and be underlined.

3.6.2 Main Paragraph Headings

Main paragraph headings should be in underlined capital letters. They may stand alone on a single line for emphasis. In every case, main paragraph headings should align with the beginning of the text of the indented heading (as opposed to aligning flush left with the paragraph number).

3.6.3 Sub-paragraph Headings

Sub-paragraph headings may be included as part of the first line of text. The first letter only of each word of the sub-paragraph heading should be capitalized (with the exception of conjunctions or prepositions). Sub-paragraph headings should align with the beginning of the indented text of the sub-paragraph heading.

3.7 Spacing of Paragraphs

Four line spaces should be left above each new paragraph heading and three line spaces should be left below. There should be three line spaces above sub-paragraph headings and two line spaces below. When paragraphs or sub-paragraphs are divided into two or more parts for ease of reading and do not require headings, two line spaces should be left between each part. The last sub-paragraph or last part of the sub-paragraph is regarded as being the end of a paragraph, so four line spaces should be left before the next paragraph heading.

3.8 Page Numbering

Any introductory pages, such as a preface and the table of contents, should be numbered using lower case Roman numerals (except for the title page which does not require page numbering). The pages of the text should be numbered using Arabic numerals. The numbering for the introductory pages and the pages of the text should be centred at the bottom of each page. In accordance with standard printing practices, blank pages should not be numbered. When a section ends on a right-hand page, the next section must begin on the next right-hand page; therefore, the preceding left-hand page will be blank. The specification number and the effective date will appear in the top right-hand corner of each odd-numbered page and the top left-hand corner of each even-numbered page.

3.9 Page Layout

With the exception of tabular material, the text should be typed in a single column (typed single spaced across the page) leaving a 2.5 cm. margin on each side of the page. The typed text width is approximately 16.5 cm. The text should normally be printed back to back, i.e., on both sides of pages.

3.10 Terminology

The terminology should be consistent throughout the text. Clear, concise sentences should be used, and all related information should be grouped in a logical manner.

3.11 Drawings

To avoid show-through, the reverse side of drawings should be left blank when the text is printed. Drawings should be printed so that the specifications do not have to be turned to read them.

3.11.1 Fold-out Pages

Fold-out drawings should have a page-wide margin (21.5 cms.) on the binding side so that the extended drawing is completely visible when the specification is closed. Drawings and charts should meet the following standards:

(1) The finished size of the drawings, charts, etc., for fold-out pages should not be greater than 43 cms. in width, not including the page-wide margin left for binding, and should be 28 cms. in length. Larger drawings, etc., should be reduced to this dimension. All fold-out drawings, etc. to be included in any individual specification should fit in the same dimensions, i.e., all should be 43 cm. x 28 cm., not including the page-wide margin.

(2) When the dimensions of the drawings, etc., are too large to fit on one sheet, the sheets should be marked to indicate this. For example, they could be marked "Sheet 1 of 3", "Sheet 2 of 3", etc.

(3) Fold-out drawings must be folded so that the printed side of the last fold is uppermost, and the name of the drawing, chart, etc. is clearly visible without having to unfold the page.

(4) All fold-out pages should be bound at the back of the specification.

3.11.2 Separately-packaged Drawings

Drawings associated with a specification with dimensions greater than those stated in Paragraph 3.11.1 should not be bound in the specification, but should be supplied as a separate package.

Under no circumstances should part of the drawings of a specification be fold-out pages bound in the specification and part of them be packaged separately, as this would make it too difficult to ensure that all drawings are included. When it is necessary to package one or more drawing(s) separately, all should be packaged separately. Figures may be part of the specification providing they meet the requirements of Paragraph 3.12 irrespective of the above.

3.12 Figures

When sketches, charts, tables, etc. are not assigned standard drawing numbers, they may be inserted throughout the text as figures or bound at the back of the specifications. When illustrations are inserted throughout the text, they must be of a size and quality that can be reduced, if necessary, to print on a 21.5 cm. x 28 cm. page or part of a page. They should be drawn so that the specification does not have to be turned to read them. The margin on the left-hand side should be greater than 2.5 cm. to avoid the possibility of covering part of the figure when the pages are bound.

4. CONTENTS OF THE DTS

4.1 General

The DTS may normally be divided into suitable sections, with each individual section dealing with a particular technical aspect of the acquisition. This should ensure that the requirements are conveyed to the vendors in a logical manner. The following list may be used as a guide in making an outline for a DTS.

- Introductory Pages
- Section 1 – General Requirements
- Section 2 – System Definition
- Section 3 – Technical Requirements
- Section 4 – Network Engineering
- Section 5 – In-service Support
- Section 6 – System or Network Implementation

- Section 7 – Project Management
- Section 8 – Documentation
- Section 9 – Training
- Section 10 – Response Format and Content

The following sections give details of typical contents of each component of the DTS.

4.2 Introductory Pages

The introductory pages of the DTS should include the following:

- Front cover with the departmental logo and specification number
- Title page with the revision number and issue date
- Table of contents
- Listing of Appendices, Annexes, Drawings, Charts, etc., if applicable.

4.3 Section 1 – General Requirements

This section should contain items of a general nature. Typically it includes the following:

4.3.1 Scope of the DTS

This is the introduction to the specification. It should include the name of the system or network to be implemented, and the type of equipment or service preferred or required. It should provide a brief description of the size of the project.

4.3.2 Background

This paragraph serves to provide the background of the project. It should include the purpose of the project, locations where the installation will operate, associated equipment to be used with the services to be acquired, and other applicable information that will assist the vendor to understand the project.

4.3.3 Off-the-shelf Products, Features or Services

This paragraph specifies, if applicable, that equipment, features or services may be purchased "off the shelf" in order to minimize the risk entailed in development work. The term "off-the-shelf" should be defined.

An example is given below:

The phrase "off-the-shelf" refers to products, features and services which meet the following conditions:

(1) They have gone through laboratory testing and a field trial or trials

(2) They are in production and have been in service in a normal operational environment for not less than one year prior to the issuance of the DTS

(3) Field operational performance data is available on them to assist the client department to determine the suitability of the product, features, or service, especially in the following areas

   (a) Availability
   (b) Reliability
   (c) Ease of maintenance.

4.3.4 Customization or Special Assembly

In addition to off-the-shelf equipment or standard service offerings, if customization or special assembly is required, the requirements should be summarized here, and the details should be provided in the "Technical Requirements" section.

4.3.5 Turnkey System

A turnkey system is one which will be completely operational when implementation is finished. Requirement for a complete turnkey system must be stated if the "furnish and install" only approach is not desired. All integration work will be carried out by the vendor.

4.3.6 Applicable Documents

This paragraph lists all the documents referred to in the DTS. The following standard paragraph or its equivalent should be included:

"The following specifications, standards, documents and publications of the issue in effect on the date of invitation to tender form a part of this specification."

4.3.7 Precedence of Specifications

The following standard paragraph should be included, if applicable:

"When a conflict occurs between the DTS and any other specification or reference document, the requirement of the DTS shall take precedence. However, where a conflict arises within the DTS itself, clarification shall be obtained from this Department."

4.3.8 Approval of Equipment or Services

Non-standard equipment or service offerings may require approval from the client department. The following paragraph should be included, if applicable:

"The vendor will obtain all necessary prior approvals from this Department and will provide technical information or briefing, carry out testing or provide proof of performance, as required."

4.3.9 Equipment or Services to be Supplied by the Contractor

This paragraph sets out the specific equipment or services to be supplied by the vendor, if this decision has been made, or the requirements can be stated in a general manner.

4.3.10 Equipment, Material or Accommodation to be Supplied by the Client Department

This paragraph should be used only under special circumstances, in which the client department is required to supply equipment, material, or accommodation. It should list the items in sufficient detail so that the contractor will understand the quantity being supplied and the terms under which it will be supplied, including any charges.

4.4 Section 2 – System Definition

4.4.1 This section should describe the system or network, giving details on the existing and/or projected operation. The following is a list of typical contents:

- Current System or Network
- Planned System or Network
- Traffic Profile of the Planned System or Network.

The first two sections should contain a general description of the type of system or network in place or to be acquired, and the nature of the acquisition, such as initial installation, extension, or expansion.

The final section should provide all the technical and traffic information of the planned system or network. The information is, in general, required by the vendors for datacom network design, modelling and optimization.

Typically this will include the following:

(1) Computer Network Architecture and Protocols

This paragraph should provide information on the computer network architecture and protocols used in the system or network in which the acquired datacom services will be placed.

The following items should be included:

(a) Host computer type and applications
(b) Front End Processor (FEP) type, residing software modules and versions and number of ports used or available
(c) Communication networking software details
(d) Terminal and printer types and characteristics
(e) Terminal controller type and data rate capabilities
(f) Protocol – standard or proprietary
(g) Remote Job Entry (RJE) facilities and characteristics
(h) Planned or existing data communications equipment such as a statistical multiplexer (statmux), data switch, Packet Assembler/Disassembler (PAD), modulator/demodulator (modem), etc.
(i) Interface requirements for the equipment mentioned above.

(2) Geographical Coverage

This paragraph should include the following information:

(a) Network map
(b) Location of data input sources, processors and output sources, i.e., terminal, controller, host, etc.
(c) Concentration points – self-provided statmux, data switch, PAD, etc.
(d) Address of each branch or equipment location – NXX[2] and postal code
(e) International access.

(3) Operation

This paragraph should include the following information:

(a) Projected hours of operation per day; days of operation per week
(b) Times zones
(c) Busy and peak hour(s) period
(d) Session lengths (dial-up connections holding time)
(e) Session and calls per day
(f) Preferred mode of operation, such as

- Dedicated or dial up,
- X.25 Permanent Switched Circuit or Switched Virtual Circuit (PVC/SVC).

(4) Traffic Profile

This paragraph provides available traffic data. It may include the following:

(a) Volume
  (i) For each terminal location, provide data transfer type – batch or interactive, file transfer, printing, and percentage of each type
  (ii) Input and output transaction volumes by application per day at each location
  (iii) Transaction lengths (message size) by application – sizes of input and output transactions; mean and 95% values
  (iv) Busy-hour input and output traffic volumes, percentage of daily traffic in the busy hours; busy hour to average hour traffic ratio
  (v) Average connect time per terminal session
  (vi) Anticipated growth, terminals and hosts quantities, traffic volumes
  (vii) Seasonal pattern.

(b) Flow pattern
  (i) Traffic volume between each set of locations, if not already provided in 4(a)(ii)
  (ii) Anticipated growth, if not already provided in 4(a)(vi).

(c) Traffic profile and distribution should be prepared in matrix form using standard software such as

2 A central office code of three digits, usually the first three digits of a seven-digit telephone number.

Lotus 1-2-3 or Symphony. Examples of traffic profile and distribution matrices are included in the Annexes.

(d) An effort should be made to collect as much network traffic information as possible to enable a more precise network design. In the event that meaningful data is not available, or the RFP is for a first-time installation, appropriate assumptions or projections should be made, based on the type of applications that the system will be handling.

4.5 Section 3 – Technical Requirements

4.5.1 General

(1) This section should contain all the details of the technical requirements of the datacom network or services to be acquired.

(2) Typical definitions of some of the parameters are given in Annex A.

4.5.2 Delay

(1) Terminal Response Time (TRT)

This paragraph should define the TRT, and the conditions under which the definition applies. It should specify the required level of performance (mean and 95%).

Relevant information to help the network designer or avoid misleading assumptions used in modelling or simulation should be included, such as:

(a) Terminal and controller type and specifications
(b) For polled networks – specify bid-to-poll time and poll-cycle time (statistical values)
(c) Host or FEP turn-around time (statistical values)
(d) Controller processing time
(e) Preferred average and busy-hour line loadings (if a preference exists)
(f) Average or 95% message sizes
(g) Print volume.

(2) Total Packet Transfer Delay (TPTD) and/or Network Transit Delay (NTD)

TPTD and/or NTD should be specified in addition to TRT, if a packet network is involved.

(3) Batch Transfer Time

The following should be specified:

(a) Average and 95% file lengths
(b) Off-hour transfer.

4.5.3 Availability

This paragraph should define and specify the service and/or network availability parameters. The various components required for calculating the availability, such as failure, down time, Mean Time Between Failures (MTBF), and Mean Service Restoration Time (MSRT) should also be defined or reference should be made to some standard document.

4.5.4 Network Services

This paragraph specifies the services to be offered by the network to its users. These may include the following:

(1) Network Access Protocol(s)

Depending on the type of data network to be established, and the computer network architecture currently in place, it may be necessary to specify certain access protocols, their version and features to be used for accessing the network.

(2) Protocol Conversion

This feature can be a service offered by the network or the user can provide it.

(3) Special Service Features

These may include the CCITT X.2 optional user facilities and other non-CCITT features.

(4) Gateway Service

It may be necessary to interconnect with other data networks.

(5) Value-added Services (VAS)

There may be a requirement for VAS such as electronic messaging, on-line data base, etc.

4.5.5 Security

This paragraph specifies the security requirements of the network, which may include the following.

(1) Dedicated network

(2) Special security features

Mechanisms to be provided by the datacom network in order to restrict or prevent unauthorized access to the network may include:

(a) Calling or called address validation
(b) Privacy list
(c) Data encryption
(d) X.2 features such as Closed User Group or Network User Identification (CUG/NUI)
(e) Operator privilege levels in Network Management and Control (NMC) functions.

4.5.6 Network Management

This paragraph specifies the degree of datacom network control or management required.

Typical features include:

(1) Alarm monitoring

(2) Line or route failure reports

(3) Diagnostics.

(4) Network usage data

(5) Alarm data

(6) Performance and availability of data

(7) Setting of line utilization

(8) PAD parameter or software downloading

(9) Change management for hardware, software or facility.

4.5.7 Special Requirements

This paragraph specifies special requirements and lists special constraints not already mentioned elsewhere.

Typical requirements include:

(1) Special features, customization or special assembly

(2) Extreme reliability

(3) Flexibility for expansion

(4) Other constraints not described above or in the previous sections such as

(a) Special computer or network architecture hardware or software
(b) Existing facilities.

4.6 Section 4 – Network Engineering

This section specifies the minimum engineering analysis to be reported in the RFP responses. It should give an indication of the capability of the vendor, and allow an opportunity to assess the validity of the datacom network design. The following specific items may be requested:

(1) Network design modelling or simulation used

(2) Performance analysis done and the results

(3) Capability for growth and expansion

(4) Communication link sizing procedures

(5) Trade-off analysis performed

(6) Alternatives examined

(7) Design assumptions used and reasons for them.

4.7 Section 5 – In-service Support

4.7.1 This section specifies the support required from the vendor when the network is in service.

4.7.2 It should include the following.

(1) Maintenance service requirements, such as:

(a) Mean failure response time (MFRT)
(b) Mean service restoration time (MSRT)
(c) Trouble reporting and escalation procedures
(d) List of sites staffed 24 hours a day, eight hours a day and on call.

(2) Operational assistance support from the vendor in areas, such as:

(a) Downloading PAD software
(b) Turning up and testing circuits
(c) Collecting statistical data
(d) Executing alternate routing
(e) Changing or updating user profiles.

(3) Network administration or management functions, such as:

(a) Ordering circuits and features
(b) Billing and accounting
(c) Maintaining a directory
(d) Managing network changes.

(4) Engineering support functions, such as:

(a) Modelling or optimizing the network
(b) Redesigning the network based on changes in traffic volume and flow pattern.

4.8 Section 6 – System or Network Implementation

4.8.1 This section specifies the requirements for complete implementation of the system or network.

4.8.2 Implementation Schedule and Plans

For a complex system or a large network, a phased-in approach is generally desirable. This paragraph should provide the vendor with an overall implementation schedule. The vendor is required to submit a detailed schedule.

In addition, the vendor should be required to submit the following items:

(1) Installation plan

(2) Site preparation plan

(3) Turn up cut-over plan

(4) Description of the organization and list of the personnel assigned for implementation of the system.

4.8.3 Installation

This paragraph specifies installation and termination requirements for each site. Items to be installed may include equipment, cabling, software, housings and furniture. The vendor should be requested to provide details.

4.8.4 Acceptance Testing

This paragraph specifies acceptance testing requirements. It may include the verification of the following:

(1) Protocol

(2) Performance

(3) Security

(4) Network management functions

(5) Maintenance procedures.

What constitutes failure should be defined and procedures to be followed when test results fail to meet requirements should be outlined.

4.9 Section 7 – Project Management

This section covers the requirements for a project management program if the size of the network justifies it. Typically it will cover the following:

(1) Prime contractor or subcontractor organizations, and relations

(2) Personnel assigned and interface procedure

(3) Milestones schedule or network chart

(4) Progress review, control and reporting procedures

(5) Financial management

(6) Contractual management.

4.10 Section 8 – Documentation

This section specifies the requirements for documentation and/or reference material to support the operation, management, maintenance and administration of the datacom network.

It should include the following items:

(1) General descriptions of the system and network

(2) Overviews and detailed technical descriptions of the hardware and software

(3) Descriptions of network features and services

(4) Specifications for the system

(5) Manuals for network operation, management, maintenance and administration

(6) Documentation covering the installation, implementation and project management

(7) Network user manual, quick reference guide and trouble-reporting procedures

(8) Documentation update and revision level

(9) Quantity of documents supplied free of charge and cost of additional copies.

At least one copy of each document shall be supplied for the evaluation period.

4.11 Section 9 – Training

4.11.1 This section specifies the requirements for technical and operational training of personnel operating and managing the network.

4.11.2 The courses should typically cover the following areas:

(1) Overview of the system network architecture

(2) Hardware and software

(3) Network operation, management, maintenance and administration

(4) Network planning and engineering.

4.11.3 Other requirements may include:

(1) Training manual

(2) Language

(3) Ongoing training

(4) Training facility.

4.11.4 Contractor responsibilities

The vendor is requested to submit information on the instructor, course syllabus, training plans, and training facilities.

4.12 Section 10 – Response Format and Content

4.12.1 This section specifies the procedures for the vendors to follow in preparing responses to the requirements set out in the DTS. Its purpose is to ensure that all required information for evaluation of the proposal and selection of the vendor is submitted in sufficient detail and in a logical manner in order to simplify the evaluation and selection processes.

4.12.2 In addition to replying point by point to all the specified requirements in the DTS, the vendor should be requested to supply the following information and/or data.

(1) Network diagrams with all relevant data inserted, including:

(a) Site name and route identification
(b) Route capacity
(c) Busy-hour traffic volume
(d) Line utilization.

(2) Network performance matrix with the following data:

(a) Sites, route and capacity
(b) Message size (mean and 95%)
(c) Busy-hour traffic and line utilization
(d) Delay (mean and 95%).

(3) Network design, and performance calculation methodology

(4) Compliancy table – provided as a check-off table itemizing all the mandatory and desirable requirements

(5) Service description

(6) References for existing network or service quality and performance check

(7) Cost matrix – this is normally part of the stand-alone cost proposal of the response to the RFP; due to the valuable network design information contained in the matrix, the vendor should be requested to duplicate it here in the DTS to aid in the evaluation process.

The matrix is to be completed by the vendor and should contain the following:

(a) Site
(b) Installation cost
(c) Usage cost
(d) Communication facility and equipment rental costs
(e) Special feature subscription cost
(f) Maintenance cost.

Other costs that are not site specific should not be included in the matrix. These include:

(a) Training cost
(b) Documentation cost
(c) NMC cost.

(8) Examples of network diagram, performance and costing matrices are included in the Annexes.

4.12.3 The various matrices described in 4.12.2 should be requested in a hard-copy format as well as on a computer-readable medium (e.g., a 5¼" [13.3 cm.] floppy diskette with data stored using spreadsheet software such as Symphony or Lotus).

5. CONCLUSION

The DTS is an essential component of a well-engineered RFP. Together with the terms and conditions and other related procurement requirements, it can ensure that both the evaluation and implementation stages can be conducted in a complete and efficient manner.

Annex A

Examples of Definitions of Parameters

The following definitions are provided as a guide to setting performance parameters. They have been generated for use in a specification designed for a packet switched data network. Appropriate modifications should be made before using them in other types of data network specifications.

1. Delay

   Delay in a packet network is the time required for a data packet to traverse a specified portion of the network. Depending on the extent of the route to be taken into consideration, delay can be defined in different terms as described in the following paragraphs.

2. Network Transit Delay (NTD) (Figure 1)

   The NTD for data packet, t4, is defined as the time interval that starts when the last bit of the data packet is received by the source Data Switching Equipment (DSE) and ends when the destination DSE places the same packet to the transmit queue of a local link[3]. This delay may include any retransmissions for error correction. In the Government Packet Network (GPN), NTD is the delay contributed by the TESYS[4] packet switches and interconnecting trunks.

3. Total (Data) Packet Transfer Delay (TPTD) (Figure 1)

   The TPTD is defined as the time interval that starts when the data packet is placed at the output queue by the source Data Terminal Equipment (DTE) and ends when the same data packet is received correctly by the destination DTE. This delay may include any retransmissions for error correction.

   In Figure 1, TPTD is the sum total of the delay elements t1 through t7.

4. Terminal Response Time (TRT)

   Terminal Response Time in general can be defined in a number of different ways depending on the type of user response desired. The following are the most common and useful:

   (a) T_{LCFC}[5]

   The elapsed time from when the user depresses the last key stroke, which terminates a service request, to the time when the first character of the response is displayed at the user's terminal.

   (b) T_{LCLC}[6]

   The elapsed time from when the user depresses the last keystroke, which terminates a service request, to the time when the last character of the response is displayed at the user's terminal.

5. Availability

   Availability is defined as the portion of a selected time interval during which the network is capable of performing its assigned data communications functions, expressed as a percentage of the total time.

6. Failure

   The network, or any portion of it, is considered to have failed when it is no longer capable of processing offered traffic and performing its specified functions without the loss of customer data.

   Service interruptions causing Permanent Virtual Circuit or Switched Virtual Circuit

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3 t = time.
4 (Product Name.)
5 Time – Last Character In, First Character Out.
6 Time – Last Character In, Last Character Out.

(PVC/SVC) resets and clearings are failures regardless of the duration of interruption.

7. Network Availability (A_n)

   (a) A_n is expressed in terms of the down time of the major network components, including PAD (network provided), link (PAD-to-DSE), DSE, and trunk (DSE-to-DSE) failures which affect more than one line interface.

   (b) The DSE and PAD line interface failures are included, but all other factors, such as user DTE and its access line, and scheduled maintenance window, are excluded.

   (c) Failure of independent components in a redundant component group is not included unless it results in total failure of the latter.

   (d) "A_n" is defined as:

$$A_n = 1 - \frac{\text{weighted total component down time}}{\text{weighted total time monitored}}$$

   (e) Down time is weighted in terms of the number of lines affected by the failure while total time monitored is weighted by the total number of lines in service.

8. Service Availability (A_s)

   "A_s" is defined as:

$$A_s = 1 - \frac{\text{mean service down time}}{\text{total time monitored}}$$

9. Reliability

   Reliability is defined as the probability that the network is performing its assigned functions without interruption for a continuous period of time.

   It is expressed as the Mean Time Between Failures (MTBF) in units of time.

10. Mean Service Restoration Time (MSRT)

   (a) MSRT is the time taken to restore service after the failure of a network component.

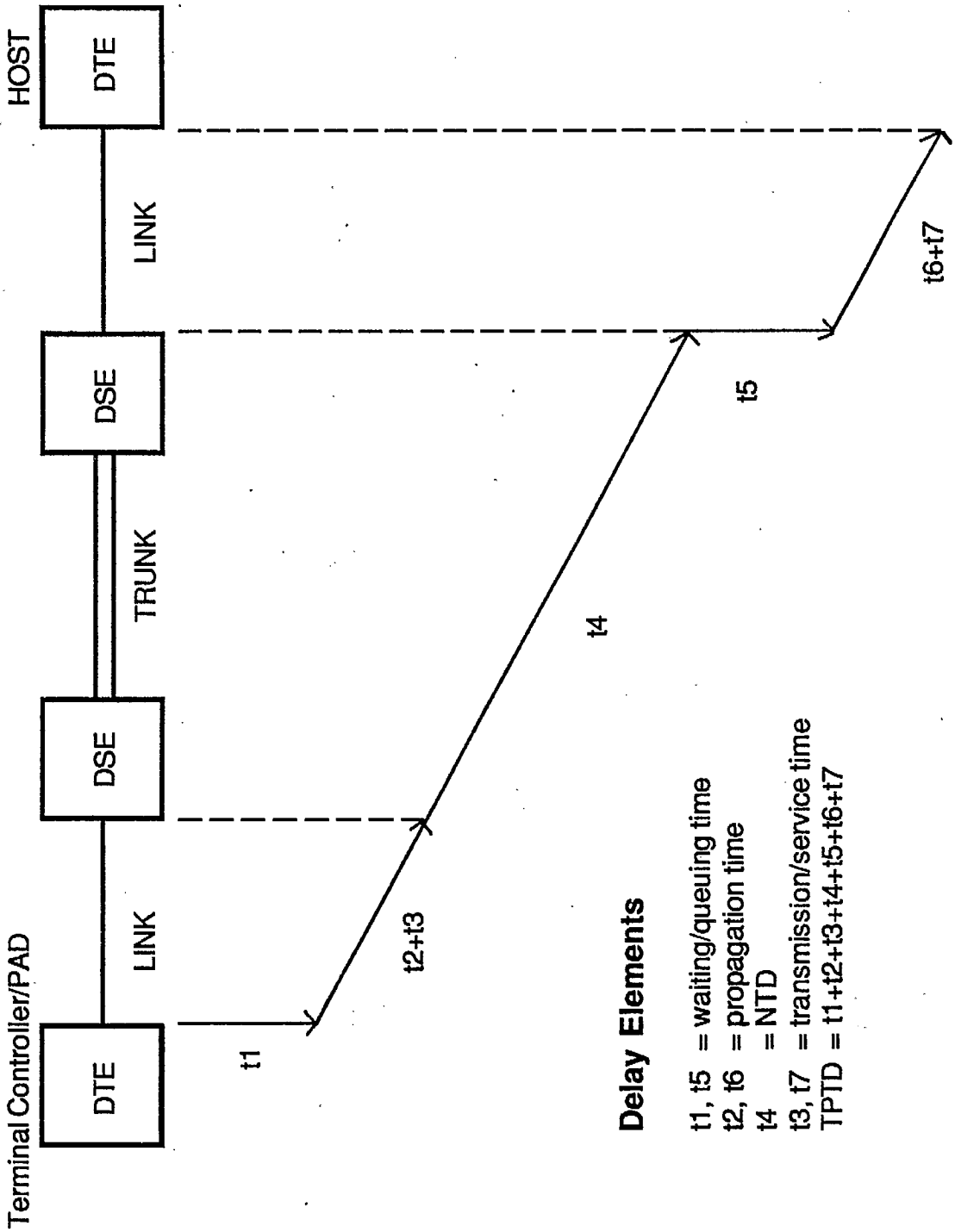
   (b) The formula for it is:

   MSRT = Mean Time To Repair + Mean Failure Response Time

   or, MSRT = MTTR + MFRT.

   (c) In failures that involve major network components, MSRT is normally equal to MTTR because such failures can be responded to by maintenance personnel in a staffed office or wire centre immediately. Service restoration time for some remote sites may be much higher because of the travelling time required to go to these sites.

FIGURE 1


HOST
DTE
LINK
DSE
TRUNK
DSE
LINK
DTE
Terminal Controller/PAD
t1
t2+t3
t4
t5
t6+t7
Delay Elements
t1, t5 = waiting/queuing time
t2, t6 = propagation time
t4 = NTD
t3, t7 = transmission/service time
TPTD = t1+t2+t3+t4+t5+t6+t7

Network Traffic Profile Matrix

Department : _____

Host Location : _____

Terminal Controller Location : _____

Year : _____

Application	Transaction Type	Transaction Sizes (Characters)						% of Daily Traffic in the Busy-Hour	Busy-hour Period	Busy-hour Transaction Volume			Average Session Length	Number of Sessions per Day
		In			Out					In	Out			
		Mean	SD	95%	Mean	SD	95%				VDT	Printer	Minutes	
A	Interactive													
B	Batch													
C	File													
D	Interactive													

SD = Standard Deviation
VDT = Video Display Terminal

Note: If detailed statistics are not available, just provide average values.

Network Traffic Distribution Matrix

Department : _____

Year : _____

Site ID	Site Name	In/Out Transaction Volume by Application										Printer Volumes (Lines/Day)	Number of Controllers
		A		B		C		D		Total			
Mean Transaction Size (characters)	In	50		100		200		300				0	
	Out	200		300		400		500				500	
		In	Out	In	Out	In	Out	In	Out	In	Out		
1	Mirabel												1
2	Montréal												3
3	Dorval												2
4	Toronto												2
5	Winnipeg												1
6	Regina												1
7	Calgary												3
8	Edmonton												2
9	Vancouver												4
10	Prince George												1

Network Analysis Matrix

Department : _____

Year : _____

Facility : _____

Line ID	Line Band Width	Busy-hour Traffic (bps)		Busy-hour Line Utilization		Transaction Sizes (Characters)						Delay Times (Line Only) (Seconds)				Roundtrip Delay (Line + Hardware) (Seconds)	
	(bps)	In	Out	In	Out	In			Out			In		Out			
						Mean	SD	95%	Mean	SD	95%	Mean	95%	Mean	95%	Mean	95%

SD = Standard Deviation

ANNEX E

Network Performance Matrix

Department : _____

Year : _____

Facility : _____

Site ID	Site Name	Line ID	Terminal Response Times	
			Mean	95%

Network Costing Matrix (By Site and Line)

Site ID: _____ Site Name: _____

Line ID/Access Type: _____ Line Speed (bps): _____

Cost Item	Units or Quantity	Year 1			Year 2			Year 3			Three-year Charges $
		Instal-lation $	Monthly KPAC	Monthly $	Instal-lation $	Monthly KPAC	Monthly $	Instal-lation $	Monthly KPAC	Monthly $	
Modem/LDDS											
Local Loop											
IX Mileage											
Channel Terminal											
Access											
Usage											
PAD Charge											
Optional User Facilities											
Equipment											
Special Features											
Maintenance											
Other											
Site Total $											

Notes:
1. Do not include tariff increase.
2. Modem/LDDS (Limited Distance Data Set) monthly rental entry shall be based on one-month contract. The proposal shall include quotations for one-year and three-year contracts.
3. Growth shall be applied on Day 1 of each year.
4. Monthly column entry should include rental, usage, and maintenance.
5. KPAC = KiloPackets.

Network Costing Matrix (Total Network Cost)

Site Name	Site ID	Line ID	Year 1			Year 2			Year 3			Three-year Charges $
			Instal-lation $	Monthly KPAC	Monthly $	Instal-lation $	Monthly KPAC	Monthly $	Instal-lation $	Monthly KPAC	Monthly $	
Total Network Cost $												

ANNEX F(c)

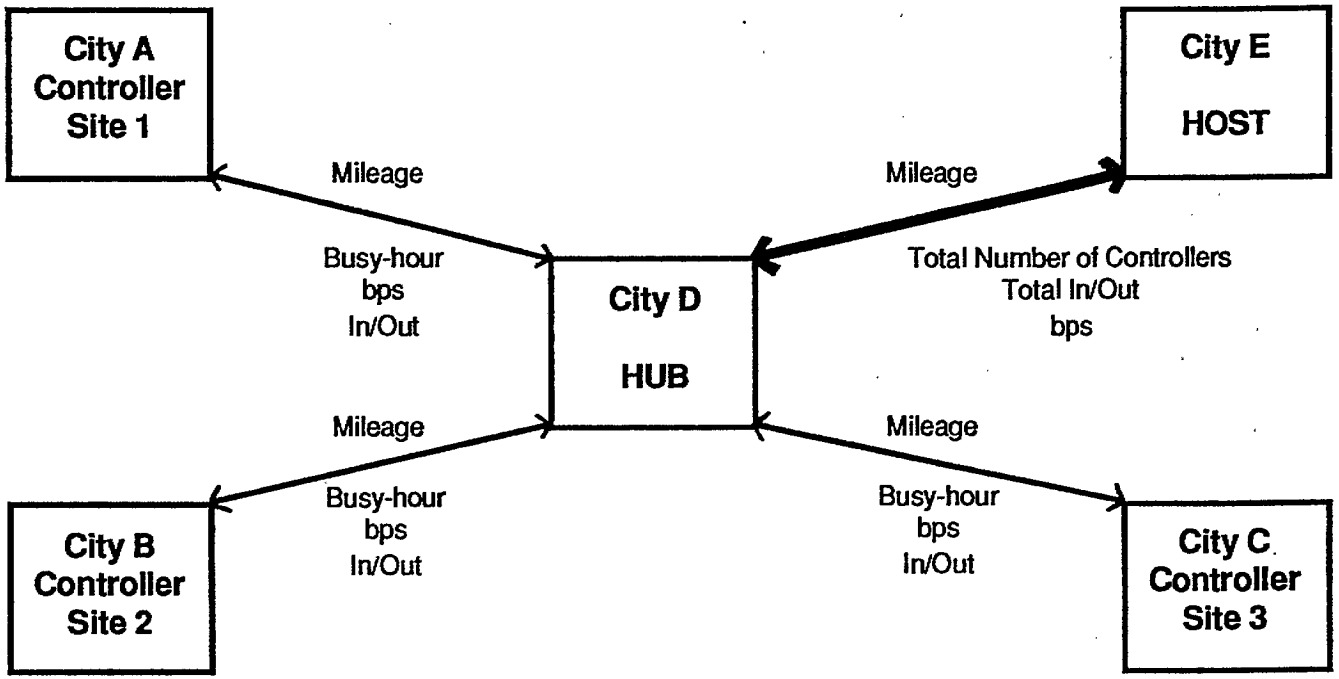
Network Costing Matrix (By Year)

Year	Cost Items	Cost $	
		Non-recurring	Recurring
Year 1	Modem/LDDS Local Loop IX Mileage Channel Terminal Access Usage PAD Charge Optional User Facilities Equipment Special Feature Maintenance Other		
	Year Total $		
Year 2	Modem/LDDS Local Loop IX Mileage Channel Terminal Access Usage PAD Charge Optional User Facilities Equipment Special Features Maintenance Other		
	Year Total $		
Year 3	Modem/LDDS Local Loop IX Mileage Channel Terminal Access Usage PAD Charge Optional User Facilities Equipment Special Features Maintenance Other		
	Year Total $		
Three-year Cash Flow			

Note: Do not include tariff increases, just indicate how they apply, and the forecast rates.

Network Diagram Example

Line Number: _____



ANNEX H

List of Acronyms and Abbreviations

A_n	Network Availability
A_s	Service Availability
bps	Bits per second
CCITT	International Telegraph and Telephone Consultative Committee (Comité consultatif international télégraphique et téléphonique)
CUG	Closed User Group
Datacom	Data communications
DSE	Data Switching Equipment
DTE	Data Terminal Equipment
DTS	Data Technical Specification
FEP	Front End Processor
GPN	Government Packet Network
GTA	Government Telecommunications Agency
GTA/DST	Government Telecommunications Agency's Directorate of Systems Design and Management
ID	Identification
KPAC	KiloPackets
LDDS	Limited Distance Data Set
MFRT	Mean Failure Response Time
Modem	Modulator/Demodulator
MSRT	Mean Service Restoration Time
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NMC	Network Management and Control
NXX	A central office code of three digits, usually the first three digits of a seven-digit telephone number
NTD	Network Transit Delay
NUI	Network User Identification
PAD	Packet Assembler/Disassembler
PVC	Permanent Virtual Circuit
PVC/SVC	Permanent Virtual Circuit/Switched Virtual Circuit
PY	Person-year
RFP	Request for Proposal
RJE	Remote Job Entry
SD	Standard Deviation
SSC	Supply and Services Canada
Statmux	Statistical multiplexer
SVC	Switched Virtual Circuit
t	Time
TESYS	(Product Name)
T_{LCFC}	Time – Last Character In, First Character Out
T_{LCLC}	Time – Last Character In, Last Character Out
TPTD	Total Packet Transfer Delay
TRT	Terminal Response Time
VAS	Value-added Services
VDT	Video Display Terminal