SPECIAL STUDY

USE OF THE INTERNET BY

TWENTY FEDERAL INSTITUTIONS

DECEMBER 1996

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I   INTRODUCTION

In 1995-96 the Commissioner of Official Languages investigated 16 founded complaints that the Web sites of seven federal institutions[1] did not respect the Official Languages Act (OLA). He followed up with the institutions concerned to ensure that they had taken the necessary corrective measures.

The Commissioner was also aware that federal institutions were increasingly and of necessity adopting the Internet as a new means of communicating with the public. He therefore decided to undertake his first special study of the use of the Internet, through a representative sampling of 20 federal institutions (listed in Appendix A), in order to acquire an overview of the situation from the official languages perspective. Essentially, the special study seeks to identify problems and propose solutions applicable to all federal Web sites with two-language obligations under the OLA.

This study focuses on two basic Internet applications, Web sites and electronic mail (e-mail). In terms of official languages, its primary focus is on service to the public while its secondary one is on language of work. The study also considers the Treasury Board Secretariat's (TBS) official languages policy with regard to the Internet and that of the 20 federal institutions surveyed.

In light of the technical nature of the Internet, the Commissioner retained the services of consultants[2] for certain features of this study. Early in 1996 a number of the Commissioner's officers, trained by Professor Abdel Obaïd, conducted interviews with 100 individuals selected by the 20 federal institutions as being the best able to provide information regarding the official languages aspects of Internet policy and practices, related software, technical support and training. Interviews were conducted with officials at the TBS. The consultants also provided the Commissioner a detailed description of the Internet, focusing on the identification of problems and solutions related to the use of French. In the first months of 1996, under consultant supervision, a team conducted checks of Web sites and of Internet e-mail.

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[1]   For the purposes of this report, the term "federal institutions" refers to all corporate bodies with obligations under the OLA; this includes not only federal departments and agencies but also Crown corporations and certain privatized companies.

[2]   We would like to acknowledge the invaluable contribution of Professor Abdel Obaïd, Ph.D., notably his careful review of all of the technical aspects of this report. Prof. Obaïd has taught in the Department of Computer Science at the Université du Québec à Hull (UQAH) and now teaches at the Université du Québec à Montréal. We also called on the services of Mr. Jean-Marie Comeau, Senior Partner, Flaman Management Partners Ltd. Mr. Comeau is an Associate Professor, Department of Computer Science, UQAH. Useful information related to this study can be found in the following references: **HTML Sourcebook**, by Ian S. Graham and John Wiley; **Internet File Formats** by Tim Kientzle; **Publishing on the Web with HTML**, by Brent Heslop and Larry Budnick.

The final version of the report takes into account the comments made by the TBS, the 20 federal institutions and a key complainant.

We would like to take this opportunity to express our appreciation to all those who participated in this study, which was greatly enriched by their willing co-operation. We would also like to thank the Ambassador of France, Mr. Alfred Siefer-Gaillardin, and the Office de la langue française du Québec for our fruitful exchanges.

While the report necessarily highlights shortcomings, we commend federal institutions for their considerable efforts to serve the public in the language of its choice via the Internet.

In the rapidly evolving Internet field oversights and, at times, even technical problems can be resolved very quickly, so that some of the concerns raised in this report may prove to have had a short lifespan. We could hope for nothing better.[3]

There is no lack of euphoria over the dizzying potential of the Internet. However, in conducting this special study we noted a certain lack of leadership with regard to the related official languages requirements. The 22 recommendations contained in this report are in considerable measure a response to this situation.

The relative newness of the Internet for many readers has led us to append to this report a brief Glossary of Internet Terms and Abbreviations (Appendices B and C respectively).

This report is clearly of interest to the 20 federal institutions which were assessed in this study, as well as to the TBS, which has overall responsibility for the implementation of the OLA in federal institutions. It is also of value to all other federal institutions adopting the Internet; in light of their obligations under the OLA, the recommendations contained herein represent a checklist as essential to them as to the 20 institutions considered in our study.

In 12 to 18 months we will conduct a follow-up on the report's recommendations. For the purposes of the follow-up our sample will include several of the initial 20 institutions and a number of other federal institutions. It also bears noting that we will take into account the recommendations contained in the present report in any investigations into future Internet complaints against federal institutions.

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[3] The Government Telecommunications and Informatics Services Branch (GTIS) in the Department of Public Works and Government Services makes expertise available to federal departments and agencies to resolve technical problems such as the use of French on the Internet.

This report will be posted in both English and French on the Canadian Government primary site: http://canada.gc.ca (Federal institutions, Commissioner of Official Languages). It may be reproduced unaltered without permission by any organization, Canadian or foreign, interested in questions related to the use of Canada's official languages and the Internet.

II   STRUCTURE OF THE REPORT

This report is structured as follows:

• Introduction

• Chapter 1:   discusses the Internet with a focus on difficulties related to the use of French; this chapter has a direct bearing both on service to the public and on language of work;

• Chapter 2:   provides the findings of the assessment of the Web sites of 20 federal institutions;

• Chapter 3:   discusses the e-mail assessment and has a bearing both on service to the public and language of work;

• Chapter 4:   notes our findings with respect to the Internet and several language-of-work considerations;

• Chapter 5:   deals with the TBS and institutional official languages policy pertaining to the Internet.

III   EXECUTIVE SUMMARY

There are a number of language difficulties that confront members of the public and public servants visiting federal Web sites. One of these is that for the French-speaking user browser software packages were initially available in English only. These packages, commonly called Web browsers, enable users to locate information stored on Internet sites. In addition, as a result of different encoding schemes there can be problems retaining diacritical text (for example, accented characters) on the Internet. Moreover, English- and French-speaking users of federal Web sites may question why the services are not always made available in both official languages, given the ease of access the Internet affords. The Commissioner makes six recommendations in these areas.

Generally speaking, the Web allows for the posting of both English and French texts (including accented characters); users with appropriate browser software can display and download information unaltered to their personal computers. However, due to the problems particular to diacritical text, assistance to French-language Internet users is required in the areas of file transfers, using search tools (also called search engines) and e-mail to ensure that these users obtain the same level of service that English-speaking users presently enjoy.

Assessments of a sampling of French-language information pages posted on the 20 federal Web sites we studied revealed that there were occasional errors in French, such as misspellings or the absence of the required accents. Other shortcomings included a greater availability of information in one official language, a lack of a bilingual home page at two sites and local search engines that were unable to conduct French-language inquiries. The Commissioner makes five recommendations on these matters.

In the assessment of the e-mail capacities of the 20 federal institutions we found that a lack of rigour in the application of standards (which provide for the use of French) often resulted in an inability to properly receive the diacritical text of French-language e-mail. The Commissioner makes one recommendation in this regard.

Interviews with 100 public servants in the 20 federal institutions revealed that, with regard to the Internet, the language-of-work rights of employees were not always respected. This was most apparent with regard to Internet user software, which was often unavailable in French.

We also found that not all technical support units had the two-language capability necessary to serve employees in the language of their choice, that employees were not always aware of their language rights and obligations with regard to the Internet and that not all of the federal institutions ensured that the Internet service provider could deal with staff members in the latters' preferred official language. The Commissioner makes seven recommendations on these matters.

It is crucial that the ever-expanding usage of the Internet by federal institutions be guided by clear and comprehensive official languages policies, both central and institutional. The TBS's guide "The Internet: A Guide to Internet Use in the Federal Government" plays a pivotal role in this regard. It is also important that pilot projects - the object of one founded complaint in 1995 - follow the same language rules as permanent Web sites and that in each federal institution, language considerations be at centre stage at every Web site milestone. The Commissioner makes three recommendations on official languages policy and the Internet.

IV   LIST OF RECOMMENDATIONS

The Commissioner makes 22 recommendations in this study.

On ensuring the development of software in both official languages:

1.   that, by March 31, 1997, in accordance with Paragraph 36(1)*b*) of the Official Languages Act, the Treasury Board Secretariat ensure that the procurement policy and practices of federal institutions with regard to Web user software respect official languages requirements;

2.   that the federal government pursue its partnerships with interested parties (provincial, territorial, municipal governments in Canada, the countries of la Francophonie and the informatics industry) to work towards the ongoing development of bilingual Internet user software;

3.   that the federal government continue to stimulate applied research for the creation of French-language software for the Internet.

On federal standards for electronic messaging media:

4.   that, by March 31, 1997, the Treasury Board Secretariat establish a policy requiring that federal Web sites with two-language obligations provide clear user instructions regarding the type of encoding scheme to use to receive diacritical text properly, and that by June 30, 1997, all federal institutions comply with this policy;

5.   that, by March 31, 1997, the Treasury Board Secretariat establish a policy for common encoding standards applicable to all documents to be made available via the Internet or transmitted over any administrative network, and issue an appropriate directive by June 30, 1997, to all federal institutions.

On the Official Languages Act and Federal Web sites:

6.   that the Web sites of those federal offices which do not have an obligation to deal with the public in both official languages carry a standardized initial bilingual advisory on the home pages to the effect that, in accordance with official languages regulations, services are available only in the language of the majority of the geographical area those offices usually serve.

On automated user support:

7.   that, by March 31, 1997, the Treasury Board Secretariat advise federal institutions with two-language Web sites of the necessity of providing appropriate external user support for all site features offered so that the public will be able to receive the services without difficulty.

On quality control:

8.   that, by March 1, 1997, all federal institutions with Web sites that have an obligation to provide services in both official languages put in place quality control measures and, if required, enhance them, to ensure that all information posted is of equal quality;

9.   that, effective January 1, 1997, all federal institutions with Web sites that have an obligation to provide services in both official languages ensure, as a rule, that all information produced by them is posted simultaneously in both official languages;

10.   that, effective January 1, 1997, institutions with Web sites ensure that, in keeping with the Treasury Board Secretariat's policy, the home page of each such site is bilingual.

On search engines:

11.   that all federal institutions with Web sites that have an obligation to provide services in both official languages take the steps necessary to ensure that their local search engines can conduct effective queries in both official languages by June 30, 1997, and that, in the interim, users are informed of the limitations of any local search engines.

On electronic mail:

12.   that, with regard to Internet electronic mail, federal Web sites advise their public of the encoding scheme(s) they have adopted.

On language of work:

13.   that, effective January 1, 1997, all federal institutions procure, where required, client browser software in both official languages and actively make it available to their employees;

14.   that, by March 31, 1997, the Treasury Board Secretariat establish a policy requiring federal institutions to monitor the availability of Internet software in both official languages, and, if necessary, that they take the appropriate measures to ensure conformity with the obligations flowing from Paragraph 36(1)*b*) of the Official Languages Act;

15.   that, by January 1, 1997, Public Works and Government Services Canada establish and maintain an updated list of Internet software available in both official languages and make the list available to all federal institutions;

16.   that, where required, federal institutions conduct ongoing monitoring of the availability of French-language Internet software to keep pace with the latest products and to ensure that the language-of-work rights of French-speaking employees are respected;

17.   that federal institutions ensure that their technical support units have sufficient two-language capability to serve their clients in both official languages where required and that they remind these units of their obligations in this respect;

18.   that, where required, all federal institutions include official languages rights and responsibilities in Internet course material for employees;

19.   that federal institutions ensure that, where required, the Internet service provider selected is able to communicate with users in their preferred official language.

On policy:

20.   that, by March 31, 1997, the Treasury Board Secretariat include the official languages aspects of its Internet guide in the Official Languages Component of the Treasury Board Manual;

21.   that the Treasury Board Secretariat inform all federal institutions without delay that the language obligations which apply to official Web sites apply equally to pilot projects and that it include a provision to that effect in the next edition of the Internet guide;

22.   that the Treasury Board Secretariat advise all federal institutions that they should ensure that their Internet policy includes a comprehensive official languages section to provide language guidance for the planning, creation and implementation of their Web sites and that, in a timely fashion, they disseminate to their staff at large an official languages policy with regard to the Internet.

V FINDINGS AND RECOMMENDATIONS

CHAPTER 1

THE INTERNET: CERTAIN LINGUISTIC DIFFICULTIES

Historically, the Internet was designed to allow users to exchange information in several ways, such as e-mail and file transfer service. More recently, new information exchange services have emerged. Among these is the World Wide Web (WWW). This service allows users, through browsers, to access pages that are stored on Web sites. These browsers permit users to display information in a user-friendly fashion (using graphical user interface or GUI for short). The advent of this type of service did not eliminate the need for e-mail software. As far as the general public is concerned the two most prominent Internet services are Web services and e-mail. This is in part the reason this study concentrates on these two services.

The information first carried by the Internet was in a format most suitable for languages without diacritical characters, such as English. Software for the use of Internet services naturally followed suit and was designed for languages such as English. This was done through the use of a coding known as the American Standard Code for Information Interchange (US-ASCII).

With the increasing world-wide use of the Internet the limits of ASCII became apparent (for example, ASCII had no provision for diacritical text). In response to this, other coding mechanisms were introduced in an effort to make the Internet open to other languages.

Despite these efforts, problems persist:

- the unavailability of encoding mechanisms that support the use of diacritical text on some personal computers;

- the lack of availability of Internet-user software that supports these encoding mechanisms;

- the requirement to encode information properly prior to its transmission via the Internet and the corresponding need, for the receiver, to know which code was used in order to decode the information.

Although there are some international standardization efforts underway many options are nonetheless either left to the users' knowledge and discretion or are simply unavailable to some users.

Most e-mail software programs in the marketplace at present allow users to attach existing files to their messages. There are also problems with regard to attaching files to Internet e-mail which we discuss farther on in this chapter.

1.1   Physical and logical components of Web sites

For the purposes of this study we describe a single Web site in the larger context of the Internet.[4]

1.1.1   Web site components

A Web site is a combination of hardware, software and hyperlinked documents.

- The hardware consists of the computer and peripherals (disk drives, etc.) which make up the physical Web site server;

- the documents make up Web pages/information pages (i.e., data files) encoded in the HyperText Mark-up Language (HTML) linked to each other (and possibly to information pages on other Web sites) via hyperlinks. Each hyperlink is actually specified using Universal Resource Locaters (URLs)[5] which specify the server site as well as the document requested by the client;

- the software application is essentially a document manager and communications manager implementing the HyperText Transfer Protocol (HTTP);[6] the application resides on the physical server and receives requests to provide information pages from the Web Browser (e.g., NetScape or Mosaic) which resides on the local workstation.

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[4]   The distinction between the Internet and Web sites is of fundamental importance. The Internet is made up of many interlinked nodes. Web sites are nodes on which Web servers have been installed.

[5]   The URL is said to be "universal" because it provides a standard addressing mechanism to access all classes of resources available on the Internet (Web sites, gopher sites, anonymous FTP sites, Bulletin Boards, etc.).

[6]   A hypertext is a combination of textual data and specific text designed to find other information in other documents.

1.1.2 Ancillary Web site components

A number of database components and other software may also be accessible via a Web site:

- *database components*: non-HTML encoded documents (files) which can be transferred to client sites; any Web site can provide access to such documents using the File Transfer Protocol (FTP) to download documents of interest;

- *other software*: special-purpose applications used to process specific client requests; examples of these applications include search engines, database query engines, etc.

1.2 Difficulties peculiar to the use of diacritical text

The difficulty of dealing with diacritical text on the Internet arises from the requirement for a more capacious encoding scheme to represent diacritical characters than that needed to represent non-diacritical characters.

1.2.1 Character encoding: Seven bit vs eight bit

Simply stated, the source of diacritical text difficulties in using the Internet is that it is an English-language technical universe from the communications point of view. In more technical terms, the difficulty arises because the Internet, and the HTTP, use a seven-bit encoding scheme for character information, known as ASCII. It was originally developed for encoding information to be transmitted between teletype machines.

An eight-bit encoding scheme is necessary to encode diacritical characters. Unfortunately, no standard has been universally agreed on as to the make-up of the eight-bit encoding table. The most common approach to the eight bit encoding scheme has become known as the Extended ASCII code, using eight bits for each character code so as to be able to support languages with accents. In the Extended ASCII code the first 128 positions usually correspond exactly to the ASCII code and the next 128 positions are used to represent the special characters required by other languages. Most encoding schemes used in Office Automation software use variants of the Extended ASCII code.

Moreover, in any Internet information exchange process (including exchange of information via files) the software packages at the server and the client ends must both use the same language setup to be able to fully support diacritical characters.

1.2.2 HTML and ISO Latin1 encoding

HTML tries to overcome some limitations in the use of diacritical texts as they appear on browsers. It is actually possible to specify any type of text using HTML. This is mainly done using two coding techniques:

a) an encoding known as ISO Latin1 (or ISO-8859-1), which was designed to support all Latin-based languages (including those with diacritical text). Unfortunately, not all browser software automatically supports this code. Moreover, there are no keyboards available to use ISO-Latin1 (i.e., no keyboards have single keys that will correspond on a one-to-one basis with all possible letters and symbols of the ISO-Latin1 character set);

b) symbolic representations of diacritical characters. This technique is nearly universal and easy to integrate into any type of Web document.

1.3 Difficulty of E-mail file attachments on the Internet

As we noted when discussing diacritical text, the difficulty with e-mail file attachments comes in encoding them prior to transmission and decoding them prior to display.

1.3.1 Types of files

There are two kinds of files one may wish to attach:

- **text files**: made up of a sequence of characters, usually encoded following some standardized or proprietary encoding schema, such as a variant of extended ASCII;

- **binary files**: made up of strings of bits in a format understandable by the specific software programs (e.g., image files or video files).

1.3.2 Encoding schemes

Binary files need to be encoded to be transmitted and properly received over the Internet. A number of encoding schemes exist, the most common of which are UUENCODE/UUDECODE (UU), Multipurpose Internet Mail Extensions (MIME) and BINHEX (BINary to HEXadecimal). These are discussed in Appendix D.

1.3.3 File reception difficulties

Several problems can occur in the transmission of file attachments over the Internet:

- the sender and receiver mail packages may not have the same encoding mechanism, thus preventing the receiver from viewing the file attachments properly;

- the sender and receiver may have the same encoding mechanism but may not have the same version of the mechanism, thus preventing the receiver from decoding/viewing the file.

1.4 Search engines

Internet search engines are used to find sites with pages containing specific terms. These engines build databases from Web sites and provide search facilities on those databases. There are two types of search engines: local and Internet-wide. Local search engines are built by organizations for searching through their own (local) databases. There are difficulties using both engines when search keywords include diacritical text; we discuss them below.

1.4.1 Using a search engine

Browsing a Web site to find specific information can be tedious and even unsuccessful. Larger Web sites may offer a search capability to their users through a local search engine. To find a page or pages of interest the user specifies a text string of interest or a boolean search string[7] and the search engine will search through the Web pages of the site. The user is then given the number of search "hits" and the location of these hits and may access the text of the hits to examine them.

1.4.2 The difficulty of searching in a database with diacritical text

An extended resource on the Internet called the Common Gateway Interface (CGI) passes messages between the user and the search engine (be it local or Internet wide):

- the client enters a text search string which is converted from ISO-Latin1 to an encoding scheme prior to transmission. This string is then passed on to the search engine through the CGI;

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[7] A boolean search string is a combination of words or phrases using propositional logic operators AND, OR and NOT to specify the search conditions. For example, **fishery AND (industry OR employment)** specifies a search for documents which contain simultaneously either the two words **fishery** and **industry** or the two words **fishery** and **employment**.

- as search engines usually work with an indexing mechanism any confusion in the encoding of diacritical characters will yield no hits on what would otherwise be successful searches.[8]

Rather than attempting to devise "universal translators" for diacritical text, a number of strategies have been used to solve the problem. Efforts continue to construct CGI programs which will allow search engines to handle diacritical text effectively.

1.5   Recommendations

Clearly, the federal government can exercise some influence in certain areas which are problematic from a language standpoint. It could simply, in most cases, refuse to acquire software that is available only in one official language. Moreover, its purchasing power, coupled perhaps with that of other governments (e.g., Quebec or New Brunswick), could undoubtedly accelerate the timely availability and promote the language quality of user software.

The Commissioner therefore recommends:

1.   **that, by March 31, 1997, in accordance with Paragraph 36(1)b) of the Official Languages Act, the Treasury Board Secretariat ensure that the procurement policy and practices of federal institutions with regard to Web user software respect official languages requirements;**

2.   **that the federal government pursue its partnerships with interested parties (provincial, territorial, municipal governments in Canada, the countries of la Francophonie and the informatics industry) to work towards the ongoing development of bilingual Internet user software.**

The Commissioner also encourages the federal government to continue its participation in the activities of international standardization bodies such as the ISO, in order to promote the adoption of international standards that will take diacritical text requirements fully into account.

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[8]   For example, *été* would be encoded in MIME (ISO Latin1) as &#233 (for "é") followed by "t" followed by again be &#233 (for "é"). Very few if any non-HTML documents will have this encoding for the word *été*. A WordPerfect file would have *été* as extended ASCII character 130 (for "é"), ASCII character 116 (for "t") and, again, extended ASCII character 130 (for "é") as per its Canadian French (CF) code table. Consequently, the Search Engine will not find any occurrence of the MIME encoded search string it has received in a WordPerfect document using the CF code table.

Until several years ago use of the Internet was fairly restricted and its client software support packages were in English only. However, Canadian federal institutions require user software in both English and French. While we note that French-language user software has recently appeared on the market there nonetheless appears to be an opportunity for meaningful applied research with regard to the continuing creation of Internet software tools.

The Commissioner therefore recommends:

3.   **that the federal government continue to stimulate applied research for the creation of French-language software for the Internet.**

We noted above various software difficulties related to the use of diacritical text on the Internet and, by extension, difficulties having to do with e-mail messaging and the preservation of diacritical text in e-mail file attachments. We also noted the difficulty with regard to French-language search capability on local search engines.

The solution to these problems appears to be straightforward. A variety of encoding schemes and standards already exist (e.g., MIME and ISO Latin1 for text files) and most of the Office Automation packages available already allow for the use of some of these.

Although there are no universally agreed-on encoding standards, part of the solution to the effective use of French on the Internet lies in this direction. However, solutions could be applied in two different contexts: the federal government could require some of these standards in its Intranet (i.e., federal government internal networks) and subsequently encourage their use by its clients.

Moreover, in an Internet environment where different federal Web sites may be using different encoding schemes the public may have difficulty in selecting the appropriate one in order to receive files or documents with diacritical text. The Commissioner therefore recommends:

4.   **that, by March 31, 1997, the Treasury Board Secretariat establish a policy requiring that federal Web sites with two-language obligations provide clear user instructions as to the type of encoding scheme to use to receive diacritical text properly, and that by June 30, 1997, all federal institutions comply with this policy;**

5.   **that, by March 31, 1997, the Treasury Board Secretariat establish a policy of common standards for the encoding of all documents to be made available via the Internet or transmitted over any administrative network, and issue an appropriate directive by June 30, 1997, to all federal institutions.**

1.6 The Official Languages Act and federal Web sites

Many federal offices are obligated only to provide service to their **geographically-defined** clientele in one official language. If these offices establish their own Web sites their language obligations remain the same when they deal with their regular clientele. However, any federal office with a Web site has a potentially **national** clientele made up of English- and French-speakers. This may cause misunderstanding for clients visiting the Web sites of federal offices with one-language service obligations only.

The Commissioner therefore recommends:

6. that the Web sites of those federal offices which do not have an obligation to deal with the public in both official languages carry a standardized initial bilingual advisory on the home pages to the effect that, in accordance with official languages regulations, services are available only in the language of the majority of the geographical area those offices usually serve.

CHAPTER 2

WEB SITE ASSESSMENTS

2.1 Objective of the Web site assessment

The objective of the Web site assessment was to determine, through site visits, the equality of services in both official languages on 20 federal Web sites (See Appendix A) and to make appropriate recommendations. While the central focus of this assessment was on service to the public it also affects language-of-work rights of federal employees, who, under certain circumstances, are entitled to information from federal sites in the official language of their choice.

2.2 Methodology

To perform the Web site assessment we used an *audit protocol* (Appendix E) to ensure that we would consider a representative sample of the information pages on any given site. We based the protocol on the generally hierarchical organization of information pages on a Web site. This protocol also provided for flexibility when performing the site visits. According to the protocol, we first inspected all first-level information pages of a given site and then performed a single exhaustive vertical search, through the first hyperlink leading to more than one level.

2.3 Findings

Our assessment of the 20 Web sites yielded both general and specific findings. The general findings concerned the overall nature and implementation of Web sites in federal institutions whereas the specific findings concerned individual Web sites.

2.3.1 General findings

a)   Equality of service on Web pages

At present, by means of HTML, the Web allows for any Latin-based alphabet to be used to post and display information. Appropriate client software browser packages allow a user to access information and to download it, whatever the Latin-alphabet-based language used. Consequently, the Web poses no significant technical problems[9] when it comes to ensuring the equal status of English and French.

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[9]   It bears noting that the ISO standards for Latin1 have no provision for the diphthong "oe" found in several English and French words.

b) <u>Equality of service in file transfers from the Web sites</u>

We found that equal service in both official languages is provided through the use of the file transfer applications of federal institution Web sites and the file transfer services of the browser client applications.

The Web sites ensure this equality by the encoding of text files (in both official languages) in a number of standardized encoding formats. We had only to select a format usable by the text processing application available on our work station. As the encoding/decoding for transfer purposes is handled by the Web site and the client browser application, we found that there is no incompatibility in the supplementary encoding that takes place between these two applications and consequently that the text files were not altered in transmission.

However, it is in applications, such as search engines and e-mail, that we found structural inequality from the linguistic point of view.

c) <u>Unequal service in terms of user support</u>

The level and quality of the support we encountered varied widely and generally proved inadequate in all but file transfers. We found several instances where automated user support would be helpful.

Although cost could be an obstacle to providing users with access to technical staff, automated support mechanisms[10] can now adequately support most users.

As the number of individuals visiting federal Web sites increases it must be expected that the proportion of lay users will grow substantially. It will therefore become more important to provide these users with support for access to Web site information. This is particularly important for French-language queries, due to the difficulties related to diacritical text.

User support is relevant to the provision of equality of services in some specific instances, including:

- file transfers and the identification and selection of the appropriate format of a file: for the lay user the selection and use of a file format is not obvious and can lead to a situation in which diacritical characters are in fact unreadable by the user's application unless the user appropriately establishes the language setup for the applications on the user's workstation to read/convert the file;

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[10] For example: Automated Help, Electronic Documentation with Automated Text Search and Retrieval, Automatic Messaging (with the Web Master, etc.).

- search engines and their limited capabilities and the use of alternative search strategies;

- automatic messaging and the use of diacritical characters;

- e-mail: the preservation/loss of diacritical characters in the body of a message and the problem of file attachments.

The Commissioner therefore recommends:

7.   **that, by March 31, 1997, the Treasury Board Secretariat advise federal institutions with two-language Web sites of the necessity of providing appropriate external user support for all site features offered so that the public will be able to receive the services without difficulty.**

2.3.2 Specific findings

Our findings on visiting the Web sites in early 1996 do not represent an exhaustive review, but the above-noted protocol allowed for a survey of a representative sample of the sites' information pages.

Of the 20 Web sites visited, four, including one large site,[11] provided an equal level of services in both official languages.

Three sites had occasional errors (e.g., misspellings, poor grammar) on French-language information pages. Another site had an English-language hyperlink button displayed on a French-language information page. On two other sites we found English-language terminology on a French-language page or the absence of proper accents on French-language information pages.

The Commissioner therefore recommends:

8.   **that, by March 1, 1997, all federal institutions with Web sites that have an obligation to provide services in both official languages put in place quality control measures and, if required, enhance them, to ensure that all information posted is of equal quality.**

Some sites did not provide the same level of service in both languages: two provided more information in French, while several others had more information in English.

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[11] Web site size was not a selection criteria in choosing the federal institutions for the special study. The Web sites visited are classified according to their relative size: Very Large, Large, Medium, Small. Small = approximately 15 different Web Pages; Medium = approximately 30 different Web Pages; Large = about 50 Web pages; Very large = much more than 50 Web pages.

The Commissioner therefore recommends:

9. **that, effective January 1, 1997, all federal institutions with Web sites that have an obligation to provide services in both official languages ensure, as a rule, that all information produced by them is posted simultaneously in both official languages.**

Two institutions had unilingual English home pages, although these had hyperlinks to French-language home pages.

The Commissioner therefore recommends:

10. **that, effective January 1, 1997, federal institutions with Web sites ensure that, in keeping with the Treasury Board Secretariat's policy, the home page of each such site is bilingual.**

As noted earlier in Chapter 1, there are two kinds of search engines, those that are Internet-wide (e.g., Yahoo, Lycos) and local ones that are the creation and responsibility of a given Web site. We focus here only on local search engines on federal sites, as these clearly fall under the OLA. Local search engines were available on three sites but we found that they could only conduct accurate searches of information posted in English, given the nature of the encoding of information concerning diacritical texts on Web pages.

One of these sites did not offer the search engine in French; it presented this application in English only, perhaps because it only works in English. The two other sites presented their search engines in both official languages, although in fact neither offered French-language search capability. In the two latter cases the presentation of search results to a French-language user was either in French or in a bilingual format, but searches with diacritical text strings yielded no results. Moreover, the sites do not explain their search engines' inability to handle diacritical text which can mislead French-language users into thinking that the sites do not have any information corresponding to their queries.

The Commissioner therefore recommends:

11. **that all federal institutions with Web sites that have an obligation to provide services in both official languages take the steps necessary to ensure that their local search engines can conduct effective queries in both official languages by June 30, 1997, and that, in the interim, users are informed of the limitations of any local search engines.**

CHAPTER 3

ELECTRONIC MAIL ASSESSMENTS

We also assessed the capacity of the 20 federal institutions to communicate between each other and with the Canadian public via e-mail on the Internet.[12] As was the case in the Web site assessment, our central focus is on service to the public. Nonetheless, our findings also affect the language-of-work rights of federal employees, who, under certain circumstances, are entitled to communicate with federal sites in the language of their choice.

We first present the objectives, methodology and findings of the assessment. We then discuss the findings in light of the discussion in 1.3 of the first chapter of this report.

3.1 Objective

The objective of the e-mail assessment was to verify the capability of the federal institutions to handle diacritical text in the use of e-mail. We considered two aspects:

- the ability to accurately receive and transmit an e-mail message in French;

- the ability to receive and send French-language files as attachments to an e-mail message.

3.2 Methodology

We chose the Directors General of Communications of the 20 institutions as our e-mail correspondents. Given our understanding of the technology and of the problems both with e-mail and with the use of file attachments, we sent messages to these officials from two sites: one an institutional service provider (to simulate the inter-departmental e-mail capability) and the other a private sector Internet service provider (to simulate the e-mail capability between the Canadian public and a federal institution).

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[12] In the context of our assessment we deal only with Internet electronic mail protocols. Although X400 is a widely used e-mail standard in federal institutions there are two reasons we do not discuss its impact in this study: first, X400 is not as accessible for the general public as the Internet; second, of the six federal institutions that received our e-mail test only two were X400 users: one received our message with the diacritical text while the other did not, which suggests that the effect of using X400 was inconclusive.

Public Works and Government Services Canada informs us that the X400 Internet gateway now supports the transfer of accented characters to and from the Internet.

- We prepared a message and file attachments in both official languages; the message also served as a questionnaire on the successful transmission and reception of the message and the file attachments;

- we then transmitted the message (with attachments) from both the institutional and private sector service providers to all individuals who had provided an e-mail address;

- finally, we analysed the results of the return messages we received at both the institutional site and the private sector site.

3.3   Findings

Of the 20 institutions selected for this study 13 provided us with an e-mail address. Only six recipients received our message and responded to us. One recipient received it but was unable to respond. Six recipients did not respond at all.

The diacritical characters in our message and file attachments were received correctly in three of the seven institutions that we reached. Four federal institutions received a deformed version of the diacritical characters and were unable to decode the file attachments.

Our interview findings corroborated those of our e-mail assessment. Interviewees noted that they had difficulties retaining diacritical text in e-mail correspondence, both to and from federal offices and to and from members of the public. Some recognized that these difficulties were due to incompatible software between sender and receiver of the message.

The results tend to confirm our evaluation of e-mail and the treatment of diacritical text and of file attachments.

3.4   Difficulties and resolution

Given the nature of the technology, the correct transmission of messages over the Internet with respect to diacritical text depends on the set-up of the e-mail packages at both ends of the transmission. If both packages are using the same encoding structure the body of the message should be received correctly.

Given that there is no easy way of verifying that such is the case, some federal institutions tend to use only non-diacritical characters when sending e-mail over the Internet. We do not find this an acceptable approach.

For the transmission of attachments, in all cases one of the three encoding mechanisms described in **Section 1.3** of Chapter 1 of this report comes into play.

It is important to note that encoding will usually not affect the contents of attachments. The e-mail packages automatically handle the encoding and decoding of attachments at either end of the transmission. Problems occur when the encoding and decoding mechanisms are not the same or, if they are the same, if the versions in use at either end are not the same. The attachments then are unreadable unless one can obtain the appropriate decoder and apply it to the attachment received. This is not a language-related issue in itself, since files in any language which are encoded in one way can be decoded only by using the same mechanism.

The Commissioner therefore recommends:

12. that, with regard to Internet electronic mail, federal Web sites advise their public of the encoding scheme(s) they have adopted.

CHAPTER 4

LANGUAGE OF WORK

Under the OLA, employees in bilingual positions in certain designated regions of Canada are entitled to work in the official language of their choice when not dealing with the public or supervising staff. Almost all the employees we interviewed had the right to choose their language of work.

With respect to language of work, we explored two key areas for Internet users: the availability of software and of technical support services in English and in French. As both areas relate to the language of work of users, we note the preferred language of work of the interviewees, we then provide a breakdown of users versus non-users and finally we indicate the preferred official language of Internet users.

<u>Preferred language of work of interviewees and Internet users</u>

The language-of-work preferences of the 100 interviewees was:

English	57 (57%);
French	42 (42%);
Not specified	1 (1%)
Total	100 (100%)

Out of the 100 interviewees, 73 (73%) were Internet users; they came from all 20 federal institutions. The preferred language of work of these users was:

English	47 (64.4%)
French	26 (35.6%)
Total	73 (100%)

<u>Language of work for Internet use: The impact of software</u>

Interviewees noted that the client browser software first acquired by their employers was in English only. Some were aware that French packages are now available and a few had the French package either provided by their employer or had acquired it themselves.

We found that the interviewees who preferred French as their language of work did not always maintain that choice for Internet usage. In fact, of the 26 Internet users who chose French as their language of work only six (23%) chose French as their language of work for Internet usage. They did so despite the fact that they had to work with English-language browser software. The other 20 (77%) chose English as their language

of work for Internet use. In this latter group, eight (40%) cited the non-availability of French-language Internet software packages as having an impact on their choice of English for this work instrument.

As French-language user browser software is now available, the Commissioner recommends:

13. that, effective January 1, 1997, all federal institutions procure, where required, client browser software in both official languages and actively make it available to their employees.

Technical support from Information Technology services

a)   Monitoring for French-language software

Interviewees noted that they were not provided a choice with respect to the language of the browser software. The standard explanation - when one was given - was that browser software was not available in French at the time the browser was purchased. One interviewee noted that the French-language software lagged behind the English by two generations. Unfortunately, we found that the practice of monitoring for the availability of French-language software was not widespread.

The Commissioner therefore recommends:

14. that, by March 31, 1997, the Treasury Board Secretariat establish a policy requiring federal institutions to monitor the availability of Internet software in both official languages, and, if necessary, that they take the appropriate measures to ensure conformity with the obligations flowing from Paragraph 36(1)b) of the Official Languages Act;

15. that, by January 1, 1997, Public Works and Government Services Canada establish and maintain an updated list of Internet software available in both official languages and make the list available to all federal institutions;

16. that, where required, federal institutions conduct ongoing monitoring of the availability of French-language Internet software to keep pace with the latest products and to ensure that the language-of-work rights of French-speaking employees are respected.

b)   Dealings with the technical support units

We found that, as a rule, communication from the technical support units respected the preferred official language of their clients. However, there were exceptions. For example, e-mail messages to all Internet users were sometimes not in both official languages or the French version followed some time after the English.

The Commissioner therefore recommends:

17.   that federal institutions ensure that their technical support units have sufficient two-language capability to serve their clients in both official languages where required and that they remind these units of their obligations in this respect.

c)   Official languages and Internet training

Internet training was usually provided in the preferred official language of employees. However, this training often did not touch on official languages matters. When it did, it tended to deal solely with obligations regarding service to the public and to leave out the language-of-work rights of employees. In light of the fact that interviewees had questions about their language rights and obligations with respect to the Internet we consider that an official languages component should be included in the course material; this is all the more important when the training is sometimes given by an external firm which may have little awareness, if any, of official languages concerns. Moreover, the 14 complaints we received in 1995-96 which involved six federal departments, highlighted the need for federal institutions to be clear with employees about their obligations when providing service to the public.

The Commissioner therefore recommends:

18.   that, where required, federal institutions include official languages rights and responsibilities in Internet course material for employees.

d)   Internet service provider

For their Internet connection federal institutions call upon either Government Telecommunications and Informatics Services (GTIS) or a commercial Internet service provider. We found that GTIS was able to serve users in their preferred official language. The same was not always true when users dealt with an Internet service provider. Moreover, users did not always know whether or not they could receive service in French. We also found that the selection criteria for choosing a service provider did not necessarily include the latter's capacity to ensure service in both official languages.

The Commissioner therefore recommends:

19.   that federal institutions ensure that, where required, the Internet service provider selected is able to communicate with users in their preferred official language.

CHAPTER 5

CENTRAL AND INSTITUTIONAL POLICY

TBS's "The Internet: A Guide to Internet Use in the Federal Government"

In the summer of 1995 the TBS posted the first edition of "The Internet : A Guide to Internet Use in the Federal Government" on the Internet. It subsequently ensured that all federal institutions were made aware of the guide's official languages sections. We commend the Secretariat for this welcome guide and in particular for its official languages components, which are timely and incisive. We understand that the guide is evolving; its second edition is posted on the Government of Canada's primary site under "What's New". We consider that the guide's official languages sections should be integrated into the *Treasury Board Manual, Official Languages Component* as soon as possible, given the rapidly growing importance of this mode of communication.

The Commissioner therefore recommends:

20.   that, by March 31, 1997, the Treasury Board Secretariat include the official languages aspects of its Internet guide in the Official Languages Component of the Treasury Board Manual.

Pilot projects

The first edition of the guide does not cover pilot projects involving new federal Web sites. In our view, a pilot project involves the same official languages obligations as an official site and this should be made clear in the guide. It bears noting that we received a complaint in 1995 involving a federal Web site pilot project. While the federal institution involved clearly had an obligation to post federal information on its official site in both official languages it was posting information in only one language at the pilot project stage.

The Commissioner therefore recommends:

21.   that the Treasury Board Secretariat inform all federal institutions without delay that the language obligations which apply to official Web sites apply equally to pilot projects and that it include a provision to that effect in the next edition of the Internet guide.[13]

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[13] The TBS agrees that pilot projects involve the same language obligations as official sites; it will stipulate in both its revised Internet guide and Internet policy (Spring 1997) that all uses of the Internet are subject to the legal requirements of the OLA, its regulations and related Treasury Board policies. It does not, however, wish to immediately issue a special directive on pilot projects. It notes that three official languages advisory committees are good forums to communicate this requirement.

We believe that the TBS should take action without delay.

Review of institutional Internet guidelines

1. GENERAL OBSERVATIONS

a) Web sites

On average, federal institutions have had their own Web sites for one or two years at the most. Certain institutions with a scientific bent, however, have been "hooked up" to the Internet for a number of years.

b) TBS guidelines

Interviewees in all but two of the 20 institutions were aware of having received the TBS Internet guidelines. However, in every institution visited, not all of the interviewees had received or were aware of them, despite the fact that the TBS has both posted its guide on the Web and had mailed the official languages component thereof to all federal institutions with obligations under the OLA.

2. INSTITUTIONAL GUIDELINES

Of the 20 institutions surveyed, five provided us with a copy of their internal guidelines. In some cases these formed part of the institution's "acceptable use" policies or standards, which apply to all means of communication.

Most of these internal guidelines include official languages considerations in varying degrees. Some refer to the OLA and official languages policies; others reiterate the July 1995 TBS guidelines. Still others exceed the guidelines to the extent that they attempt to consider general official languages policies as they apply to the Internet, and include such considerations as posting documents of a scientific or technical nature, switching languages beyond the home page, providing access instructions, including screen menus in both official languages, and ensuring an appropriate English/French balance in selecting unilingual documents from an exterior source to be posted on the Internet.

Some guidelines include statements to the effect that the official languages policies that apply to the print medium apply equally to the Internet. Surprisingly, only two institutions include language of work considerations in their guidelines. Worse still, some of the guidelines we reviewed do not include official languages considerations at all.

Of those institutions which did not provide copies of their internal guidelines we were pleased to note that most indicated that guidelines which will include official languages requirements are being developed. However, we were perplexed by one official languages manager's stance: that guidelines would be prepared only when the Internet is a commonly used work instrument. Another official languages manager left us equally perplexed when he informed us that he had no involvement with his institution's Web site. In our view, when it comes to Web sites official languages policy must be established at the outset and must involve the appropriate specialists.

The Commissioner therefore recommends:

22.   that the Treasury Board Secretariat advise all federal institutions that they should ensure that their Internet policy includes a comprehensive official languages section to provide language guidance for the planning, creation and implementation of their Web sites and that, in a timely fashion, they disseminate to their staff at large an official languages policy with regard to the Internet.

Web sites visited

Agriculture and Agri-Food Canada

Canadian Heritage

Environment Canada

Finance Canada

Fisheries and Oceans Canada

Foreign Affairs and International Trade

Health Canada

Human Resources Development Canada

Industry Canada

National Defence

National Library of Canada

Natural Resources Canada

Public Works and Government Services Canada

Revenue Canada

Statistics Canada

Atlantic Canada Opportunities Agency

Atomic Energy of Canada Limited

Canada Post Corporation

Canadian Space Agency

Via Rail

Glossary of Internet terms

ANONYMOUS FTP SITE
> See *FTP Site*.

ARCHIE
> A program that allows the user to find publicly accessible files that can be transferred (*downloaded*) to the user's PC. Archie automatically generates and maintains a contents database for *anonymous FTP servers*. An archie *server* accesses information from *FTP servers* and archives the directory listings. With a *client* archie the user can obtain a list of the locations of the files of interest and may transfer them using *FTP*.
>
> **Archie** programs are usually found on publicly accessible **archie** sites accessed using *telnet*.

ASCII
> American Standard Code for Information Interchange (**ASCII**): a standard for encoding character-type information such as letters, punctuation, decimal digits, arithmetic symbols, etc. It is a seven-bit code capable of representing 128 characters (many of these are special control characters used in communications control, and are not printable). **Extended ASCII** uses the eighth *bit* of a *byte* to allow for the representation of another 128 characters (allowing for the representation of diacritical characters, etc.).
>
> See also *ISO Latin1*.

BINARY FILES
> See *Files (Binary)*

BIT
> <u>B</u>inary dig<u>IT</u>. One of the two symbols of the binary system: 0, 1. Most computers use the binary numbering system for calculations.

BYTE
> A sequence of eight *bits* considered as a unit. The **byte** is the fundamental unit of memory organization in a computer. It is also the unit for most coding systems for alphanumeric data. See also *ASCII* and *ISO Latin1*.

BROWSER
> A program that allows the user to access information on the *Internet* through the *World Wide Web (WWW)*. *Mosaic*, **MacWeb**, **Lynx** and **NetScape** are examples of browser programs. Browsers interpret *HTML* and can use several *Internet protocols*, such as *HTTP*, *FTP*, and *Gopher* to display information according to the specifications provided.

CLIENT

A program used to extract information from a *server*. For example, a *browser* is a **client** that can access data from *HTTP* (and other) *servers*.

DOWNLOAD

To transfer a file from a *remote computer* to a *local computer* (user's computer). The user can **download** files using the *FTP (File Transfer Protocol)*.

See also *upload*.

ELECTRONIC MAIL (E-MAIL)

A method used to send and receive messages over a network. The user uses an e-mail program to compose and send a message. The message is sent to a remote mail box, whence it can be retrieved and read by the addressee.

FILE

A collection of data stored in the memory of the computer (disks, magnetic tapes, etc.).

FILE (BINARY)

A *file* containing binary data (i.e., sequences of binary symbols 0 & 1). Binary data can be a compiled program, or scientific data, images, etc. They can be read only by a program which recognizes their format in the *file*.

FILE (TEXT)

A *file* containing text data (i.e., words, phrases, paragraphs). In a **text file** data are stored as characters encoded in *bytes* according to a pre-set code (such as *ASCII*).

FREEWARE

Free software distributed by its author. The author retains all copyrights to **freeware**.

FTP

File Transfer Protocol is an *Internet client-server protocol* used to transfer *text files* and *binary files* between computers. With **FTP** a user can copy files from a *remote computer* to a *local computer* (user's computer) and copy files from the *local computer* to the *remote computer*, if the *remote computer* permits it.

FTP SITE/SERVER

A computer on which are stored files that can be *downloaded* using *FTP*. FTP sites which allow anyone to *download* (without requiring individuals accessing the site to have an account number) are known as anonymous **FTP sites**.

GIF

Graphics Interchange Format (GIF) is a graphics file format used throughout the *Internet*. *WWW servers* use GIF graphics, among others, to display graphical information. *JPEG* is also a common graphics format.

GOPHER

A *protocol* for distributed information delivery commonly used in distributed information systems. **Gopher** is a menu-based delivery system and does not have *hypertext* capability.

By extension, **Gopher** is used to describe some *Internet* information servers. **Gopher servers** contain a wide variety of information and resources (such as programs and images) organized in menus to make it easier to find information. **Gopher server** information documents are essentially character-based.

HOME PAGE

The introductory page of a *WWW* information server/site. A **home page** usually provides an introduction to the site and hyperlinks to other *WWW* documents/resources on the same information server or on other *WWW* servers.

All *Internet WWW* information servers have a **home page**, first displayed to users accessing the server to provide them with an entry point or a guide to the information available on the server. Institutional, public sector, private sector and personal *WWW* information servers have **home pages**.

HTML (HyperText Mark-up Language)

A document-formating language used to design and govern the display of the information documents/pages found on *WWW* information servers. To a document writer HTML is a collection of tags used to mark blocks of text, to assign special characteristics to them (for example, format, font, paragraph) and to define links to other sites.

HTTP (HyperText Transfer Protocol)

The *protocol* used to transfer *WWW* documents/pages through or over the *Internet*. It is used to transfer *HTML* documents.

HYPERMEDIA

Information that contains hyperlinks to other related information. Similar to hypertext, hypermedia includes several other types of data, such as images, graphics, sound, video and animation. The *WWW* is a hypermedia-based system that allows users to point and click on hyperlinks to directly access the selected information.

HYPERTEXT

Textual information that is hyperlinked to other related textual information. In hypertext words/phrases/character strings are highlighted in some fashion (underline, bold, colour, blink) to indicate the existence of a hyperlink to related information. The user can point and click to select the highlighted text and access via the hyperlink the related textual information. For example, most automated Help facilities which accompany certain software packages are hypertext-based.

HTML documents use the **hypertext** concept.

INTERNET

A world-wide network of networks (i.e., a world-wide collection of inter-connected networks) that includes university, corporate, government, institutional and research networks. Many millions of individuals and computers are connected to the **Internet** through these networks. Individual users can connect to the **Internet** through *Internet Service Providers (ISP)*.

IP (Internet Protocol)

The Internet Protocol is the *protocol* used to route information through the *Internet* via *IP addresses*.

IP ADDRESS

The address of an information *server* or a *server* on the Internet. The **IP address** refers to a numeric **IP address** (for example, *165.323.3.138)* but it is also used by extension to refer to a Fully Qualified Domain Name.

ISO (International Standards Organization)

The **ISO** is an international organization whose aim is to standardize products and services in a variety of fields, including information technology.

ISO LATIN1

An eight-*bit* character code developed by the *International Standards Organization*. It encodes 256 characters. In the **ISO Latin1** code the first 128 characters are equivalent to the 128 characters of the US-*ASCII* character set (also called the ISO 646 character set). The remaining 128 characters consist of control characters plus a large collection of accented and other characters commonly used in European languages.

ISP (Internet Service Provider)

A company that provides individuals with access to the *Internet*. This means of access enables the user's computer to be connected to the *Internet* through a modem linked to a telephone line. Typically, a user pays a monthly subscription fee to obtain a fixed number of hours of access to the *Internet*. If the user exceeds this number of hours an extra fee is charged for each additional hour.

This type of connection commonly uses a communication protocol via modem for the Internet - *PPP* or *SLIP*.

JPEG

Joint Photographic Experts Group (JPEG) is a standardized image compression mechanism. JPEG was the original name of the committee of experts that produced the standard. By extension, it has come to be used to refer to the corresponding type of image format used on the *Internet*. Many *WWW* servers contain **JPEG** images. *GIF* is another common image/graphic format. In general, **JPEG** allows for higher quality images than *GIF*.

LOCAL SYSTEM/COMPUTER

The name given to the user's system or computer; interactions between the user's computer and another computer on the *Internet* are sometimes described using the terms **local system** and *remote system*, where the remote system is the other computer.

MIME

Multipurpose Internet Mail Extensions (MIME) is a scheme for incorporating several types of data (sound, video, image, graphic and text) into a document (for example, into *e-mail*). The *WWW* uses the MIME content type to specify the type of data contained in a *file* or being sent from an *HTTP server* to a *client*.

In particular, MIME is used to encode the contents of file attachments to *e-mail* messages.

MODEM

A communications device that converts data between the digital format used on a computer and the analog format used for transmission on telephone lines. **MODEM** stands for *mod*ulation/*dem*odulation. **Modems** are used to connect computers via telephone lines for data transmission.

MOSAIC

A type of *WWW browser*, originally developed by the NCSA (National Centre for Supercomputing Applications).

MPEG

Moving Picture Experts Group is a standard (produced by the group) used for digital video (movie) type compression. By extension, MPEG has come to refer to movie files commonly found on the *Internet*. The user must have an MPEG player (software package) to view MPEG files.

MULTIMEDIA

The concept wherein information is presented by combining different types of data such as text, graphics, sound and video images.

NAVIGATE

To manoeuvre, travel, move through the various sites on the *Internet*. The user can navigate through *Gopher* menus by selecting menu entries or through *Web pages* by clicking on hyperlinks. The user can also navigate directly by specifying the location (address) of the site the user wishes to visit.

PPP (Point-to-Point Protocol)

Software that allows the user to turn a dial-up telephone connection into a point-to-point *Internet* connection. It is commonly used to run *WWW browsers* over a phone line.

PROTOCOL

A **protocol** is a set of rules for intercomputer communications.

For example, the *TCP/IP* **protocol** defines how messages are passed on the *Internet* while the *FTP* **protocol**, which is built using the *TCP/IP* **protocol**, defines how *FTP* messages should be sent and received.

REMOTE SYSTEM/COMPUTER

A computer on the *Internet* to which the user connects. See *local system/computer*.

SERVER

A program running on a networked computer that provides services to *client* programs running on other networked computers. For example, an *FTP server* allows an *FTP client* program to access files on that **server**; a Web server allows a Web *client* to view pages/documents and *download* information from that **server**.

By extension, the computer on which the server program resides and is executed can be called the network **server** computer. Also, by extension, the computers on which the client programs reside and are executed can be called *client* computers.

SHAREWARE

Freely distributed software that users may try/test before paying. If the users keep/use the software, they are then expected to send payment to the shareware author.

SLIP (Serial Line Interface Protocol)

A communications *protocol* that allows the user to access the *Internet* over a telephone line. The user can utilize a variety of applications over a **SLIP** connection. In contrast, other types of dial-up accounts allow the user to access the *Internet* but often require the user to utilize an application provided by the *ISP*.

SLIP is less stable than a *PPP* connection.

TCP/IP

Transmission Control Protocol/Internet Protocol (TCP/IP) is the basic communication *protocol* that is the foundation of the *Internet*. All other protocols, such as *HTTP*, *FTP* and *Gopher*, are built on top of **TCP/IP**.

TELNET

A terminal emulation *protocol* that allows users to connect to a *remote system* as if they were directly on that system. **Telnet** passes keystrokes typed on the *local system* directly to the *remote system*. With **telnet** the user can access files and run programs/applications on the *remote system*.

A **telnet** *client* on the *local computer* and a **telnet** *server* on the *remote computer* are required.

TEXT FILES

See **FILE (TEXT)**.

UPLOAD

To transfer a file from a *local computer* (user's computer) to a *remote computer*. The user can **upload** files using the *FTP*.

See also *DOWNLOAD*.

WEB PAGE

An *HTML* document found on the *World Wide Web (WWW)*.

WWW (WORLD WIDE WEB)

A *Hypermedia*-based system that makes it easier to browse for information on the *Internet*. Information available on the *WWW* is provided on *Web pages* which can contain text, graphics, sound and video linked to other *Web pages*. These links (hyperlinks) allow the user to *navigate* through the available information non-sequentially.

It is also known as W^3.

Abbreviations

ASCII	American Standard Code for Information Interchange
BBS	Bulletin Board System (Electronic Bulletin Board)
CD-ROM	Compact Disk - Read-only-Memory
CPU	Central Processor Unit
EBCDIC	Extended Binary Coded Decimal Interchange Code
FTP	File Transfer Protocol
CGI	Common Gateway Interface
HTML	HyperText Mark-up Language
HTTP	HyperText Transfer Protocol
IHAC	Information Highway Advisory Council
ISO	International Standards Organization
MIME	Multi-purpose Internet Mail Extensions
URL	Universal Resource Locator
UU	UNIX to UNIX
WWW	World Wide Web