STENTOR
The Power of Telecommunications

Interface Document
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May 1992

Enhanced Call Management Service (ECMS)

Terminal-to-Network Interface

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DOCUMENT HISTORY

1	February 1992	Initial issue
		Reason for re-issue
2	May 1992	Revised introduction date has been established. There are no technical changes from the previous issue, but minor editorial changes have been included.

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Readers are specially advised that the technical requirements contained herein may change.

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1.0 SERVICE DESCRIPTION

The introduction of **Enhanced Call Management Service (ECMS)** Name Delivery is part of the development of Bell Canada's portfolio of Call Management Service (CMS) offerings. **ECMS** enhances the currently available CMS service. Besides the option of displaying the time, date and the dialable directory number, it also offers the means to obtain, from the network, the name to which the calling directory number is registered. In the case where the calling dialable directory number will not be provided, the network will give an indication to that effect. This service allows the subscribers to accept or reject incoming calls based on the displayed name and directory number.

This **ECMS** feature complements the CMS (Reference 7.1) or it may be used in conjunction with the Visual Message Waiting Indication (VMWI) (Reference 7.2) and Audible Message Waiting Indication (AMWI) (Reference 7.3).

The capability of **ECMS** is targeted to residential and small business customers in areas of high population density.

The current plan is to introduce the tariffed service in the first quarter of 1993. Future deployment will depend upon switch modernization and demand considerations. Although the rate structure for the **ECMS** service has not been finalized at the time of issue of this document, it is expected to be similar to the existing CMS rating structure of today.

2.0 FEATURE DESCRIPTION

Terminals utilizing this interface will receive information from the network identifying the Dialable Directory Number (DDN) from which the incoming call was made and the Name associated with the line.

In cases where the caller requires his identity to remain anonymous, the call can be completed by the telephone operator or per-call, per-line blocking can be pre-arranged by the customer. The delivery of DDN and Name parameter words will be suppressed by the switch and the indicator "P" (Private) will be delivered as the reason for absence of DDN and Name parameter.

In cases where the calling DDN and Name parameters are not made available by the network, as for example in the areas where toll CCS7 is not available, the indicators "O" will be delivered instead.

In cases where the calling DDN and Name parameters are not made available from the toll network the indicator "L" will be delivered instead.

In order to enable directory of Date/Time, DDN, Name, "L", "O" and "P" indicators, the network transmits an in-band coded message to the ON-HOOK receiving terminal.

The **ECMS** feature can be utilized in a variety of ways by the receiving terminal. The message transmitted from the switch can be used for display of alphanumeric characters from the ASCII character set. The DDN and Name parameters are transmitted by the switch in a format that is compatible with: 1 x 16, 2 x 16, 1 x 24, 2 x 24, 1 x 32 and 2 x 32 or other suitable display devices.

2.1 Normal ON-HOOK Operation

The one-time data transmission from the network to the terminal commences after the first complete or incomplete power ring alerting signal. The transmission is completed before the arrival of the second ring signal. If the status of the receiving terminal changes from ON-HOOK to OFF-HOOK state while the transmission is in progress, the transmission will cease at the point of interruption. No re-transmission will be attempted.

2.2 Normal OFF-HOOK Operation

The OFF-HOOK state of the **ECMS** terminal is treated by the switch as that of an ordinary telephone set.

3.0 PHYSICAL CHARACTERISTICS OF THE TERMINAL-TO-NETWORK INTERFACE

3.1 Data Interface

Parameters

Link Type	simplex, two wire
Modulation Type	analog, continuous-phase binary frequency shift-keying
Logical 1 (Mark)	1200 ± 12 Hz
Logical 0 (Space)	2200 ± 22 Hz
Transmission Rate	1200 ± 12 baud
Application of Data	serial, binary, asynchronous
Bit Error Rate	less than 1 out of every 100,000 bits at the switch interface
Phase Continuity	maintained from initial service to end of message
Carrier Level	-13.5 ± 1 dBm at the switch point of data application into standard 900 Ω test termination. The loop loss is typically less than 10 dB.
Carrier Purity	Total power of all extraneous signals in the voice band, including products of nonlinear or quantizing distortion, should be at least 30 dB below the power of the carrier fundamental frequency.
Source Impedance	900 Ω + 2.16 µF nominal, with a return loss satisfying requirements of Reference 7.6.

The requirements listed above are satisfied by a 202 type of modem transmission (Reference 7.8). The 900 Ω + 2.16 µF source impedance refers to the impedance that the data transmitter presents to the loop facility. The actual impedance at the terminal may vary. The received level may be affected by the terminating impedance. This must be considered in the design of the terminal. The terminal design shall adhere to requirements stated in Reference 7.7.

3.2 Timing Information

This section discusses the timing and tolerance requirements for the interface. These requirements apply only when the terminal is in the ON-HOOK state and the transmission path has been established from the DMS-100™ switch to the terminal.

The timing requirements are summarized in Figure 1.

The channel seizure signal provides a detectable enabling function to the terminal. It consists of 30 continuous bytes of 01010101 (octal 125). This signal is followed by a continuous mark signal.

The maximum interrupt time between any two successive bytes is 16.7 ms. If this interrupt time is exceeded, the message should be considered to contain an error. The message will not be retransmitted and will be lost.

The mark signal (which is transmitted between the parameter data words) should be monitored for continuity. An interrupt of the mark signal of 0.008 sec or less should be ignored by the data receiver. An interrupt that exceeds 0.008 sec should cause the received data to be treated as erroneous. The message will not be retransmitted and will be lost.

3.3 TIMING AND TOLERANCES

The timing and tolerances are explained in the following Figure 1.

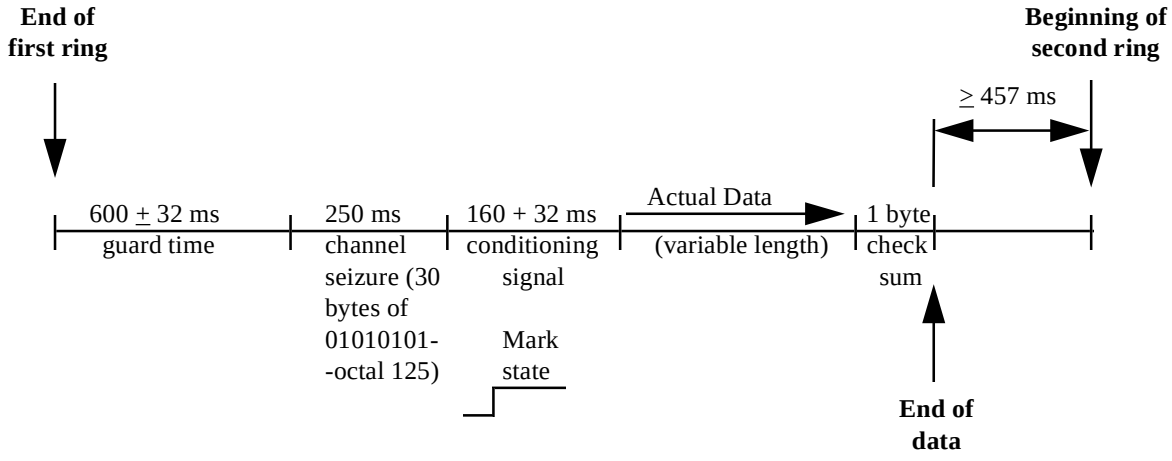


Figure 1: Timing Requirements

4.0 DETAILED DATA PROTOCOL

4.1 Characteristics

- The protocol uses 8-bit data words that are each bounded by a start bit (space) and a stop bit (mark). A combination of bytes is used to transmit a data message consisting of message type, message length, parameter message and error detection words. The message type, message length and error detection words each consist of a one eight bit byte.

- The data is sent with the least significant bit (LSB) transmitted first.

- Data parameters that are not recognized by the terminal should be ignored (i.e., the corresponding data should not be processed).

4.2 Message Layout

The message layout is explained in the following Figure 2.

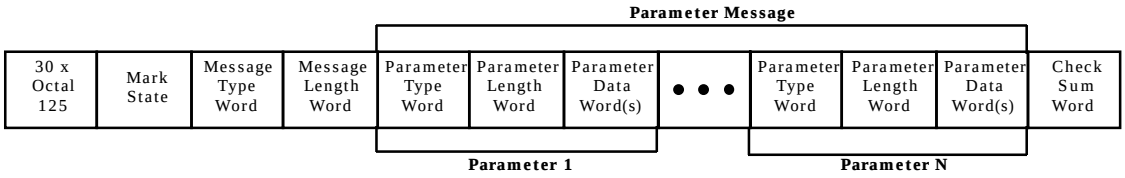


Figure 2: Message Layout

5.0 PARAMETERS

Message Type Word — Call Set-Up Message Type = 10000000

Test Set-Up Message Type = 10000001

Message Length Word - equal to the actual number of parameter data words sent (excluding Message Type, Message Length and Check Sum words).

5.1 Parameter Message

Parameter Type Words

00000001	1 . . .	Time
00000011	3 . . .	Dialable Directory Number (DDN)
00000100	4 . . .	Reason for Absence of DDN Parameter
00000110	6 . . .	Call Qualifier
00000111	7 . . .	Name Parameter
00001000	8 . . .	Reason for Absence of Name Parameter

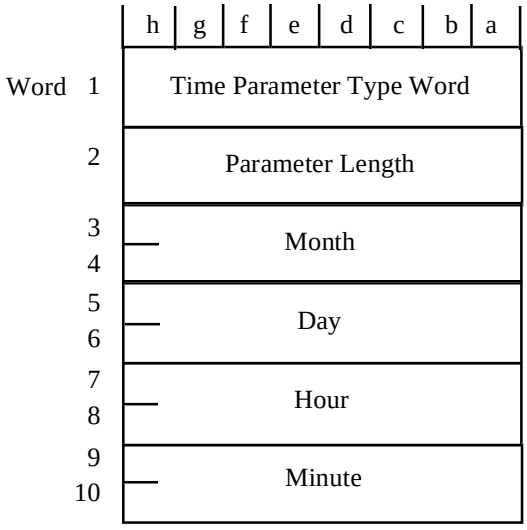
Parameter Length Word - variable, equal to the number of parameter data words contained in the parameter message.

5.2 Parameter Data Words

5.2.1 Time

- The parameter type is 1 (00000001).
- The parameter length is always 8 (00001000).

This parameter contains the time and the date of the incoming call.



5.2.2 Month

Month is coded in ASCII (no parity) as follows:

01	-	January	07	-	July
02	-	February	08	-	August
03	-	March	09	-	September
04	-	April	10	-	October
05	-	May	11	-	November
06	-	June	12	-	December

Where 01 (January) is coded in ASCII (no parity) over two bytes as:

00110000	. . .	0
00110001	. . .	1

and 12 (December) is coded as:

00110001	. . .	1
00110010	. . .	2

5.2.3 Day/Hour/Minute

Days are coded in ASCII (no parity) as:

01 to 31 coded over two bytes			
31 . . .	00110011	. . .	3
	00110001	. . .	1

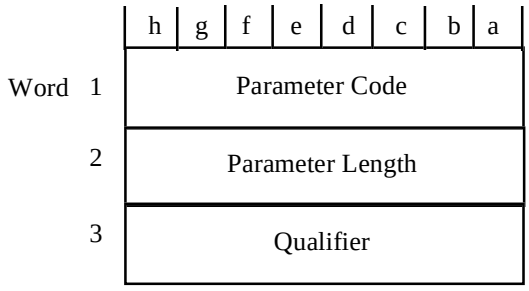
Hour/Minutes are coded over two bytes in ASCII (no parity) in the military, local time format:

00	=	Midnight	00110000	. . .	0
			00110000	. . .	0
01	=	1 A.M.	00110000	. . .	0
			00110001	. . .	1
12	=	Noon	00110001	. . .	1
			00110010	. . .	2
13	=	1 P.M.	00110001	. . .	1
			00110011	. . .	3
23	=	11 P.M.	00110010	. . .	2
			00110011	. . .	3

Minutes are coded similarly over two bytes in ASCII (no parity) as 00 to 59.

5.2.4 Call Qualifier

This parameter provides additional information on a call.



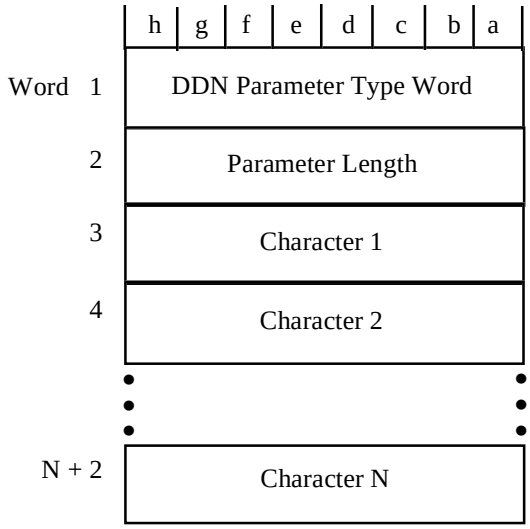
- Bit "a" is the LSB and is to be transmitted first.
- Parameter Code is 6 (00000110).
- Parameter Length is always 1 (00000001).
- Character for "Qualifier" is coded in ASCII (no parity) as:

  "L" . . . Long Distance = 01001100

See also 6.1, Example A.

5.2.5 Dialable Directory Number (DDN)

DDN is the number that the called party must dial in order to return a call to the calling party. In the North American Public Dial Plan, the DDN is currently consists of 7, 8, 10 or 11 digits.



N $\leq$ 11 (used by **ECMS**).

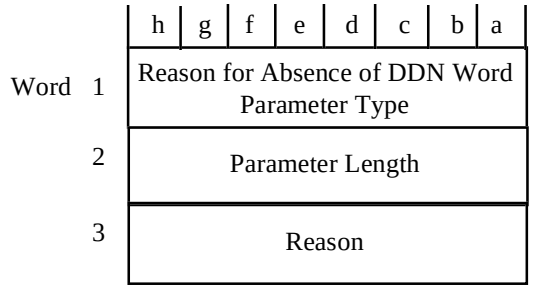
- Bit "a" is the LSB and is to be transmitted first.
- The parameter type is 3 (00000011).
- Parameter length is 7, 8, 10 or 11.
- Digits are coded in ASCII (no parity) as follows:

0	. . .	00110000
1	. . .	00110001
2	. . .	00110010
	. . .	
	. . .	
	. . .	
9	. . .	00111001

See also 6.2, Example B.

5.2.6 Reason for Absence of DDN

This parameter contains the reason why the DDN is not available for delivery to the called party. The delivery of DDN and the Reason for Absence of DDN are mutually exclusive. If more than one of these parameters is found in the data message, then the first one found should be used and the others ignored. When the DDN parameter is suppressed, the Name parameter is also suppressed by the switch.



- Bit "a" is the LSB and is to be transmitted first.
- Parameter Code is 4 (00000100).
- Parameter length is always 1 (00000001).
- Character for "Reason" is coded in ASCII (no parity) as:

  "P" . . . PRIVATE = 01010000
  (when the DDN is available to the network but its delivery from the network to the called party has been suppressed)

  or

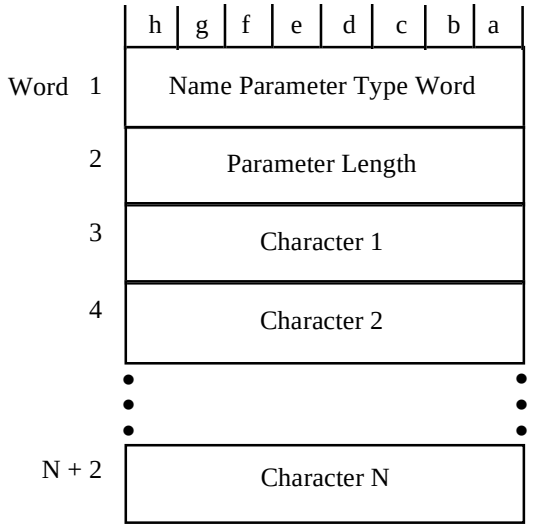
  "O" . . . OUT OF AREA = 01001111
  (when the DDN could not be obtained from the network for other reasons)

See also 6.3, Example C and 6.4, Example D.

Note: It is possible, that initially only "O" may be delivered from the network to the terminal interface and the differentiation between the two possible reasons for absence of the name parameter may not be available. However, as toll CCS7 becomes accessible throughout the network, the indicator "P" will signify that the DDN parameter word was suppressed by the network.

5.2.7 Name Parameter

This parameter provides the Name associated with the calling directory number. The currently assigned number of characters which can be used in this field is 1 - 15. Names containing a higher number of characters will be truncated. The field can contain any displayable ASCII character. The Name field is being delivered to the terminal in a format that is ready for display.

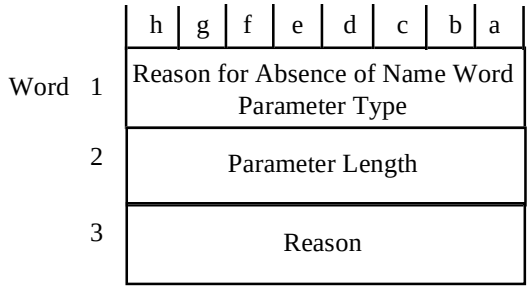


- Bit "a" is the LSB and is to be transmitted first.
- Parameter Code is 7 (00000111).
- Parameter length is currently assigned to $N \leq 15$.
- Character for Name are ASCII (no parity).

See also 6.2, Example B.

5.2.8 Reason for Absence of Name Parameter

This parameter contains the reason why the Name parameter is not available for delivery to the called party. The delivery of Name parameter and the Reason for Absence of Name parameter are mutually exclusive. If more than one of these parameters is found in the data message, then the first one found should be used and the others ignored. If the DDN is delivered but the Name parameter is not available from the network, the reason for absence of Name parameter will always be "O". If the delivery of the Name parameter has been suppressed by the switch then "P" will be delivered in place of the Name parameter.



- Bit "a" is the LSB and is to be transmitted first.
- Parameter Code is 8 (00001000).
- Parameter length is always 1 (00000001).
- Character for "Reason" is coded in ASCII (no parity) as:

  "O" . . . OUT OF AREA = 01001111

  or

  "P" . . . PRIVATE = 01010000

See also 6.4, Example D.

5.2.9 Check Sum Word

The error detection Check Sum Word, included as the last word of the multiple data message, consists of two's complement of the modulo 256 sum of all the other words in the data message. Namely, the Message Type, Message Length, Parameter Type, Parameter Length and Parameter Data Word(s) of the complete message, excluding the Check Sum itself.

The Check Sum applies to both the recognized and unrecognized words. The addition of the received Check Sum Word with the modulo 256 sum of all words received by the terminal in the message should equal to zero. If the result of this addition is other than zero it should be assumed that an error in transmission has occurred. If an error is detected by the terminal, none of the received data should be processed. The message will not be retransmitted.

5.2.10 Test for Message Delivery

The test for message delivery can be activated by the subscriber. Upon dialing a locally assigned number and hanging up, the network will simulate a call of a known origin to the **ECMS** terminal hence testing the integrity of the transmission path.

The test message is preset to:

Test Set-Up Message Type	10000001	. . .	129
Message Length	00001100	. . .	12
Parameter Type	00000010	. . .	2
Parameter Length	00001010	. . .	10
The Calling Number is preset to:	00110000	. . .	0
	00110001	. . .	1
	00110010	. . .	2
	00110011	. . .	3
	00110100	. . .	4
	00110101	. . .	5
	00110110	. . .	6
	00110111	. . .	7
	00111000	. . .	8
	00111001	. . .	9

These are followed by the transmission of the Check Sum Word.

6.0 EXAMPLES

6.1 Example A

The date and time is May 21, 11:56 P.M.

This parameter provides additional information on a call.

L . . . Long Distance = 01001100

Field Name	Actual Data	Transaction
Message Type	10000000	Call Setup Message
Message Length	00001101	13 Words
Parameter Type	00000001	1 . . . Time Parameter
Parameter Length	00001000	8
Data	00110000 00110101	05 . . . May
	00110010 00110001	21 . . . Day
	00110010 00110011	23 . . . 11 P.M.
	00110101 00110110	56 . . . minutes
Parameter Type	00000110	6 . . . Call Qualifier
Parameter Length	00000001	1
Data	01001100	"L" . . . Long Distance
Sum MOD 256	10000001	
Check Sum	01111111	2's complement MOD 256

6.2 Example B

The date and time is August 15, 1:36 P.M.
The calling number is (808) 567-1234.
The name the calling line is registered to is James Bond.

Field Name	Actual Data	Transaction
Message Type	10000000	Call Setup Message
Message Length	00100011	35 Words
Parameter Type	00000001	1 . . . Time Parameter
Parameter Length	00001000	8
Data	00110000	08 . . . August
	00111000	
	00110001	15 . . . Day
	00110101	
	00110001	13 . . . 1 P.M.
	00110011	
	00110011	36 . . . minutes
	00110110	
Parameter Type	00000011	3 . . . DDN
Parameter Length	00001011	11
Data	00110001	1
	00111000	8
	00110000	0
	00111000	8
	00110101	5
	00110110	6
	00110111	7
	00110001	1
	00110010	2
	00110011	3
	00110100	4
Parameter Type	00000111	7 . . . Name
Parameter Length	00001010	10
Data	01001010	J
	01000001	A
	01001101	M
	01000101	E
	01010011	S
	00100000	32 . . . space
	01000010	B
	01001111	O
	01001110	N
	01000100	D
Sum MOD 256	01010110	
Check Sum Word	10101010	2's complement MOD 256

6.3 Example C

The date and time is May 21, 11:56 P.M.

Reason for Absence of DDN and Name parameters:

P . . . PRIVATE = 01010000

Field Name	Actual Data	Transaction
Message Type	10000000	Call Setup Message
Message Length	00010000	16 Words
Parameter Type	00000001	1 . . . Time Parameter
Parameter Length	00001000	8
Data	00110000 00110101	05 . . . May
	00110010 00110001	21 . . . Day
	00110010 00110011	23 . . . 11 P.M.
	00110101 00110110	56 . . . minutes
Parameter Type	00000100	4 . . . Reason for DDN Absence
Parameter Length	00000001	1
Data	01010000	"P" . . . Private
Parameter Type	00001000	8 . . . Reason for Name Absence
Parameter Length	00000001	1
Data	01001111	"O" . . . Out of Area
Sum MOD 256	11011110	
Check Sum	00100010	2's complement MOD 256

6.4 Example D

The date and time is November 29, 8:21 A.M.

Reason for absence of DDN and Name parameters:

O . . . Out of Area = 01001111

Field Name	Actual Data	Transaction
Message Type	10000000	Call Setup Message
Message Length	00010000	16 Words
Parameter Type	00000001	1 . . . Time Parameter
Parameter Length	00001000	8
Data	00110001 00111000	11 . . . November
	00110010 00111001	29 . . . Day
	00110000 00111000	08 . . . 8 A.M.
	00110010 00110001	21 . . . minutes
Parameter Type	00000100	4 . . . Reason for DDN Absence
Parameter Length	00000001	1
Data	01001111	"O" . . . Out of Area
Parameter Type	00001000	8 . . . Reason for Name Absence
Parameter Length	00000001	1
Data	01001111	"O" . . . Out of Area
Sum MOD 256	11100100	
Check Sum	00001100	2's complement MOD 256

6.5 Example E

The date and time is May 21, 11:56 P.M.

Reason for absence of Name parameters:

O . . . Out of Area = 01001111

Note: This condition may occur when the receiving switch had received the calling number but the name parameter was lost by the network.

Field Name	Actual Data	Transaction
Message Type	10000000	Call Setup Message
Message Length	00011010	26 Words
Parameter Type	00000001	1 . . . Time Parameter
Parameter Length	00001000	8
Data	00110000	05 . . . May
	00110101	
	00110010	21 . . . Day
	00110001	
	00110010	23 . . . 11 P.M.
	00110011	
	00110101	56 . . . minutes
	00110110	
Parameter Type	00000011	3 . . . DDN
Parameter Length	00001011	11
Data	00110001	1
	00111000	8
	00110000	0
	00111000	8
	00110101	5
	00110110	6
	00110111	7
	00110001	1
	00110010	2
	00110011	3
	00110100	4
Parameter Type	00001000	8 . . . Reason for Name Absence
Parameter Length	00000001	1
Data	01001111	"O" . . . Out of Area
Sum MOD 256	11011110	
Check Sum	00100010	2's complement MOD 256

7.0 REFERENCES

7.1 Bell Canada: Interface Document ID-0001, November 1989, "Call Management Service (CMS) Terminal-to-Network Interface".

7.2 Bell Canada: Interface Document ID-0008, March 1991, "Visual Message Waiting Indication (VMWI) Terminal-to-Network Interface".

7.3 Bell Canada: Interface Document ID-0009, March 1991, "Audible Message Waiting Indication (AMWI) Terminal-to-Network Interface".

7.4 Bellcore: TR-TSY-000030, Issue 1, November 1988, "SPCS Customer Premises Equipment Data Interface".

7.5 Bellcore: TR-TSY-000031, Issue 3, January 1990, "CLASS Feature: Calling Number Delivery".

7.6 Bellcore: TR-TSY-000507, Issue 2, July 1987, LATA Switching System Generic Requirements (LSSGR): Transmission (Section 7)

7.7 Canada, Department of Communications:
CS-03, "Terminal Equipment Certification Standard, Standard for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility", Current Issue.

7.8 Data Set 202T Interface Specification:
Bell System Data Communications Technical Reference, Current Issue.