



BID-0001

April, 1994

Call Management Service (CMS)

Calling Number Delivery (CND)

Terminal-to-Network Interface

[Multiple Message Format]

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TABLE OF CONTENTS

	<u>Page</u>
Document History	1
Disclaimer	2
MULTIPLE MESSAGE FORMAT - CMS	
1.0 Service Description	3
2.0 Feature Description	5
3.0 Physical Characteristics of the Terminal-to-Network Interface	6
3.1 Data Interface	6
3.2 Timing Information	7
4.0 Timing and Tolerances	8
5.0 Detailed Data Protocol	9
5.1 Characteristics	9
5.2 Message Layout	9
5.3 Parameter Messages	10
a) Time	10
b) Dialable Directory Number (DDN)	11
c) Call Qualifier	12
d) "Reason for Absence of DDN" Parameter	13
5.4 Check Sum Word	13
5.5 Test for Calling Number Delivery (CND) Message	14
6.0 Example	15
7.0 Appendix - Customer-Activated Switch-Resident Features	16
8.0 References	18

DOCUMENT HISTORY

1	September 1989	Initial issue

2	November 1989	Describes service interface for service that has been filed with the CRTC. Approval is not expected until Spring 1990. There are no technical changes from the previous issue, but minor editorial changes are included.

3	November 1993	This is a Stentor document. Both formats (i.e. single message and multiple message) are available on regional basis in Canada wide Stentor network. There are no technical changes from the previous respective issues of the merged documents, but minor editorial changes are included.

4	April 1994	Note of clarification added to Section 11.0. Reissue of Bellcore Document TR-TSY-000030 as TR-NWT-000030 reflected in Reference Section 13.0

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This April 1994 issue of the document BID-0001 describes the protocol which is used by Bell Canada. Namely, the Multiple Message Format is discussed herein.

MULTIPLE MESSAGE FORMAT - CALL MANAGEMENT SERVICE (CMS)

(The Multiple Message Format is used on DMS^(TM) Switches)

1.0 SERVICE DESCRIPTION

The introduction of **Call Management Service (CMS)** marks the beginning of a new phase in the evolution of telephone service. The features available through **CMS** give subscribers more control over incoming calls by identifying the calling line (Call Display). This service may also make it more convenient to return calls (Call Return). The **CMS** service allows individual subscribers to initiate a trace of calls without the need of an operator's involvement (Call Trace) and to reject calls from selected numbers (Call Screen). A subscriber activates Call Return, Call Trace and Call Screen features in the local switch by dialing an assigned number. The Call Display feature is a function of the Terminal-to-Network interface and does not require activation.

The DMS switch retains the originating and terminating station number of the last call. The retention of more than one calling and one called number, if desired by the terminal design, could be made a function of the **CMS** terminal. For details concerning switch resident **CMS** features see Appendix - Page 16.

To provide the Call Display capability the network transmits the following types of information to the called terminal:

- The time and date of the incoming call.
- The actual number to be dialed to return a call.
- An indicator of incoming toll calls.
- An indicator that signifies that the calling line is not identified. This typically means that the originating terminal is located outside of the called terminal **CMS** serving area.

The network also provides the capability for an individual user to test the integrity of the subscriber's loop.

These capabilities are initially targeted to residential and single line business customers.

- The services are available in Ottawa/Hull and Quebec City Metropolitan areas since the first half of 1990.
- The Montreal and Toronto Metropolitan areas are serviced by **CMS** since 1991.
- Other areas with higher density of population are serviced since the year 1992 and beyond.

Initially, about sixty percent of the lines in each area could be served by **CMS**. The rating structure filed with the CRTC on November 7, 1989 provides customers with the ability to subscribe to one or more **CMS** features for a flat monthly fee.

2.0 FEATURE DESCRIPTION

The **CMS** interface provides the capability to transmit data from a DMS switch in a local serving office to an associated **CMS** terminal. It utilizes the voice path of a regular loop-start telephone line when the subscriber's terminal is in the ON-HOOK state. The received data may be used by the terminal for generic applications, such as:

1) Display of data items sent, e.g.:

- Time and Date:

The time and date of the incoming call (military format); see 5.3a, page 10.

- Dialable Directory Number:

The number that the called subscriber can dial to return a call to the calling party; see 5.3b, page 11.

- Long Distance:

Indicates a call to which long distance charges apply; see 5.3c, page 12.

- Out-of-Area:

Indicates that the calling number has not been obtained from a customer served by an older technology switch, see 5.3d, page 13.

2) Storage, retrieval and management of the data.

The dormant **CMS** terminal is activated by detection of the first complete or partial ringing signal. The one time data transmission is executed before the arrival of the second burst of 20 Hz ringing voltage while the **CMS** terminal is in the ON-HOOK state. If the terminal goes OFF-HOOK before the transfer of data is complete, the data transmission will be interrupted and terminated.

This terminal can be configured either as a stand-alone terminal or as the front end of communications processing equipment.

3.0 PHYSICAL CHARACTERISTICS OF THE TERMINAL-TO-NETWORK INTERFACE

3.1 Data Interface

Parameters

Link Type	simplex, two wire
Transmission Scheme	analog, phase-coherent frequency shift keying
Logical 1 (Mark)	1200 ± 12 Hz
Logical 0 (Space)	2200 ± 22 Hz
Transmission Rate	1200 bits per second
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
Transmission Level	-13.5 ± 1 dBm at the switch point of data application into a resistive load of 900 ohms. The loop loss is typically less than 10 dB.
Bit Duration	833 ± 50 μ sec (start and stop bits have same duration as a standard bit)

The requirements listed above are satisfied by a 202 type of modem transmission (Reference 13.4). The 900 $\frac{1}{2}$ load resistance value is a reference value; the actual resistance of the terminal may vary. The received level may be affected by the terminating impedance. That must, therefore, be considered in the design of the terminal. The terminal design shall adhere to requirements stated in Reference 13.3.

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 switch to the terminal.

The timing requirements are summarized in Figure 1.

Data transmission is interspersed with power ringing, i.e., the **CMS** message will be transmitted during the silent interval between the first and second power ringing signals.

The guard time before the transmission commences permits the line to attain its quiescent state after the end of the power ring. It also assists the terminal to resolve that the silence is not due to a break in the ringing (such as coded ringing patterns used in Ident-A-Call [Teen Service], but is a part of the silent interval between ringing cycles [see Figure 1]).

After this delay, data transmission begins. The message is preceded by a channel seizure and a mark (logical 1). The channel seizure signal provides a detectable enabling function to the terminal. It consists of 30 continuous bytes of 01010101 (octal 125).

The maximum interrupt time between any two successive bytes is equivalent to 20-bit time periods at 1200 bps (i.e., 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 data transmission ends at least 475 ms before the end of the silent interval.

If the called party answers the incoming call before or during the data transmission (e.g., during the first application of power ringing), normal ring trip will occur. The data transmission will be stopped at the point of interruption. The network will not continue to transmit the data message.

4.0 TIMING AND TOLERANCES

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

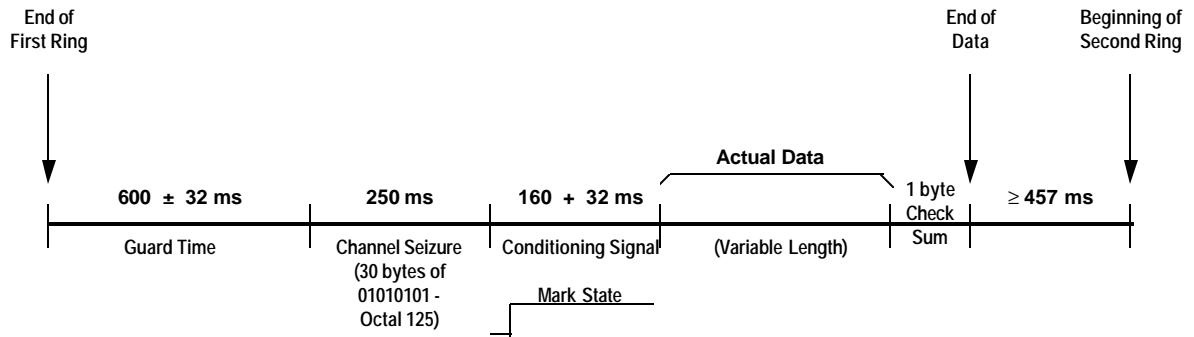


Figure 1: Timing Requirements

5.0 DETAILED DATA PROTOCOL

5.1 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 single eight bit byte. One or more bytes are used to send the parameter message consisting of 1 or more parameters.
- The data is sent with the least significant bit (LSB) transmitted first.
- Data messages that are not recognized by the terminal should be ignored (i.e., the corresponding data should not be processed).

5.2 Message Layout

The message layout is explained in the following Figure 2.

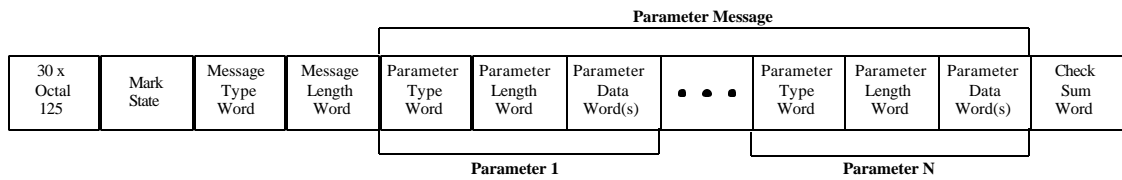


Figure 2: Message Layout

5.3 Parameter Messages

Call Setup Message - (type = 10000000) has currently only one meaning.

Message Length Word - variable, equal to the actual number of parameter message words sent (excluding itself and the checksum word).

Parameter Type Word

00000001	Time
00000011	Dialable Directory Number (DDN)
00000100	Reason for Absence of DDN
00000110	Call Qualifier

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

a) 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.

Word 1	Time Parameter Code
2	Parameter Length
3	Month
4	
5	Day
6	
7	Hour
8	
9	Minute
10	

Month is coded 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 is coded in ASCII (no parity) over two bytes as 00110000 and 00110001, and 12 is coded as 00110001 and 00110010.

Day is coded in ASCII (no parity) as 01 to 31, where 31 is coded over two bytes as 00110011 and 00110001.

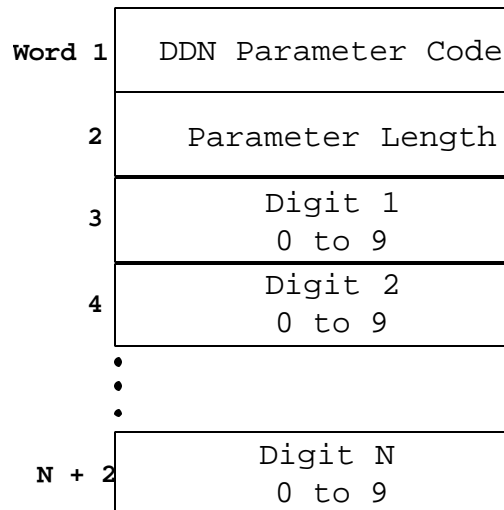
Hour/Minutes are coded in ASCII (no parity) in the military, local time format. Hour is coded as follows:

- 00 = Midnight
- 01 = 1 A.M.
- 12 = Noon
- 13 = 1 P.M.
- 23 = 11 P.M.

Minutes are coded as 00 to 59.

b) DDN (Dialable Directory Number)

This is the number which the Called party must dial in order to set-up a call to the Calling party. In the North American Public Dial plan, the DDN is currently equal to or smaller than 11.



N = 7 (used by **CMS** at the present time).

- The parameter type is 3 (00000011).
- Parameter length ranges from 1 to 11.
- Digits are coded in ASCII (no parity) as follows:

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

c) Call Qualifier

This parameter provides additional information on a call.

Word 1	Parameter Code
2	Parameter Length
3	Qualifier

- Parameter type is 6 (00000110).
- Parameter length is 1 (00000001).
- Qualifier is coded in ASCII (no parity) and currently has only one value assigned:

L: Long Distance Indicator = 01001100

Note:

Before CCS7 is available on the toll network the long distance indicator will be the only indication of incoming long distance call. The calling number will not be delivered from the network to the receiving terminal.

d) "Reason for Absence of DDN" Parameter

This parameter contains the reason why the DDN of the calling party is not available for delivery. "O" indicates that the number has not been obtained from the calling network (i.e., originating switch does not support CMS services).

Word 1	Parameter Code
2	Parameter Length
3	Reason

- Parameter type is 4 (00000100).
- Parameter length is 1 (00000001).
- Reason is coded in ASCII (no parity) as:

O: Out of Area = 01001111

Note:

This indicator could be replaced by the actual number when toll CCS7 is deployed.

5.4 Check Sum Word

The error detection Check Sum Word, included as the last word of the multiple data message, consists of the **two's complement of the modulo 256 sum of 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 Word itself. The Check Sum Word 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 an error is detected by the terminal, none of the received data should be displayed. The switch will not retransmit the message.

5.5 Test for Calling Number Delivery (CND) Message

(type = 10000001)

Message length = 10 + 12 = 22

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

The data items consist of two parameters:

- a) Time parameter as per 5.3.a.
- b) Calling Line Number as per 5.3.b where the calling number is preset to:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

6.0 EXAMPLE

The local calling number is 789-4321

The time and date is August 15, 1:36 P.M.

Message Type Word	10000000	Call Setup
Message Length Word	00010011	19
Parameter Type Word	00000001	Time
Parameter Length Word	00001000	8
	00110000 00111000	08 . . . August
	00110001 00110101	15 . . . Day
	00110001 00110011	13 . . . 1 P.M.
	00110011 00110110	36 . . . minutes
Parameter Type Word	00000011	DDN - Dialable Directory Number
Parameter Length Word	00000111	7 digits (789-4321)
	00110111	7
	00111000	8
	00111001	9
	00110100	4
	00110011	3
	00110010	2
	00110001	1
Check Sum Word	01001101	2's complement modulo 256

7.0 APPENDIX - Customer-Activated Switch-Resident Features

The customer-activated switch-resident features, available at the time of issue of this document are:

Call Return - consists of two independent features:

- Auto Call-Back (ACB)

This is an outgoing call management feature that enables subscribers to set-up a call to the last number dialed, whether the original call was answered, unanswered or busy. It can be activated by the calling subscriber dialing "*66". The call will be set-up automatically. In case of encountering a busy signal, a voice announcement will be made to that effect. The caller may hang-up. When the called terminal becomes idle a coded ringing will signal to the caller that the call may be completed now. The originator can simply take his terminal OFF-HOOK and the call set-up will be performed automatically.

Should the originating caller become unavailable before the call set-up is completed, the code "*86" will cancel the ACB to the last called number.

- Auto Recall (AR)

This is an incoming call management feature that enables subscribers to automatically return the last incoming call. To perform AR the subscriber dials "*69". A voice message prompts the user for two currently available options, either to hang-up and abort the process or dial "1" to automatically call the last incoming caller and complete the call. In case of encountering a busy signal while Auto Recall(ing), a voice message will make an announcement to that effect. The caller may hang-up. When the called line becomes idle the call set-up will be performed automatically. The availability of the connection will be announced by a distinct ringing to the originator's terminal. The originator can complete the call by taking his terminal OFF-HOOK.

Should the party returning the call become unavailable after issuing the AR code "*69", the code "*89" will cancel the AR to the last called number.

Call Trace (CT)

This customer originated feature allows customers to record the directory number of the last incoming call. Call Trace can be activated at any time after the call has been disconnected as long as no other calls have been received. The trace information will be sent to Bell security for the use by the police or other designated agency. The activating code is "*57".

Call Screen (CS)

This selective call rejection feature allows customers to reject calls from a pre-programmed list of up to 12 numbers. Calls from numbers not on the list will be completed normally, while calls from numbers on the list will be routed to an announcement indicating that the call cannot be completed. To activate this feature the subscriber will dial "*60" and then the number to be included on the list. To deactivate, the subscriber will dial "*80" and then the number to be taken off the list.

8.0 REFERENCES**8.1 Bellcore:**

TR-NWT-000030, Issue 2, October, 1992, "Voiceband Data Transmission Interface - Generic Requirements".

8.2 Bellcore:

TR-TSY-000031, Issue 2, June 1988, "CLASS Feature: Calling Number Delivery".

8.3 Department of Communications:

CS-03, "Terminal Equipment Certification Standard", current issue.

8.4 Data Set 202S and 202T Interface Specification:

Bell System Data Communications Technical Reference, current issue.