STENTOR

The Power of Telecommunications

Interface Document
ID-0001
April 1994

Call Management Service (CMS)
Calling Number Delivery (CND)

Terminal-to-Network Interface
[Single and Multiple Message Format]

TABLE OF CONTENTS

TABLE OF CONTENTS

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

DISCLAIMER

Stentor reserves the right to modify the interface described in this document for any reason including, but not limited to, ensuring that it conforms with standards promulgated by various agencies from time to time, utilization of advances in the state of the technical arts, or the reflection of changes in the design of any equipment, techniques or procedures described or referred to herein.

STENTOR SHALL NOT BE LIABLE FOR ANY DAMAGES OR INJURIES INCURRED BY ANY LEGAL PERSON OR PERSONS, INCLUDING BUT NOT LIMITED TO CORPORATIONS, ARISING DIRECTLY OR INDIRECTLY FROM A TERMINAL DESIGN INCOMPATIBILITY WITH THE NETWORK, OR ANY CAUSE WHATSOEVER.

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

If further information is required, please contact:

STENTOR RESOURCE CENTRE INC.
Director - Interface Standards Research
Suite 480
160 Elgin Street
Ottawa, Ontario
K1G 3J4

In Canada:	1-800-265-6608
Worldwide:	613-781-6816
Fax:	613-781-6454
Internet e-mail:	disclosure@stentor.ca
Internet Web-site:	http://www.stentor.ca/disclosure

This April 1994 issue of the document ID-0001 describes both protocols which are used in Canada. Namely, the Multiple Message Format and the Single Message Format are discussed herein.

MULTIPLE MESSAGE FORMAT - CALL MANAGEMENT SERVICE (CMS)

(The Multiple Message Format is used on DMS(™) 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 µsec (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 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.

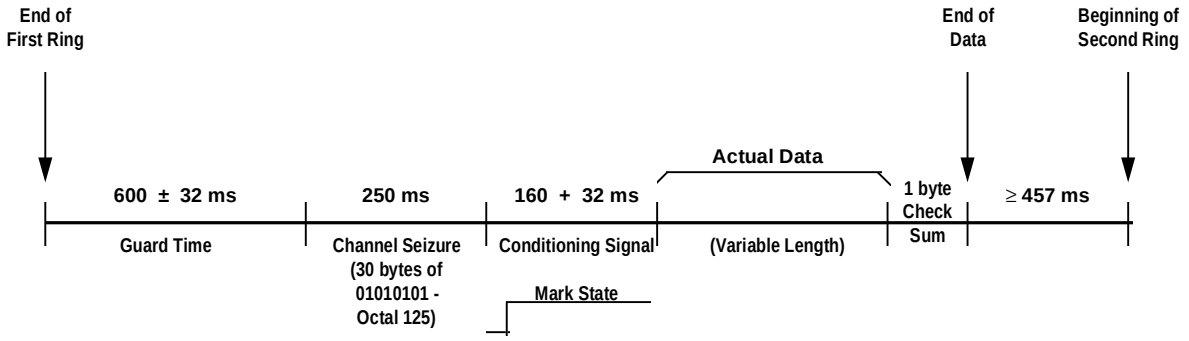


Figure 1: Timing Requirements

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.

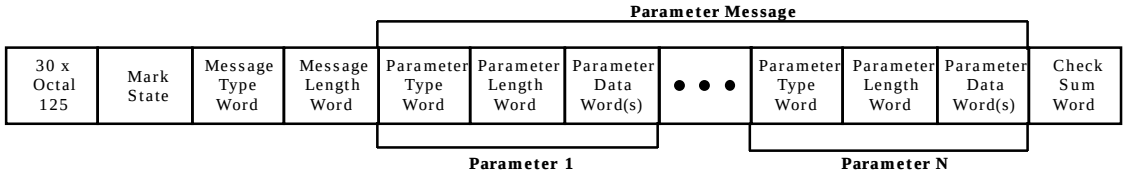


Figure 2: Message Layout

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

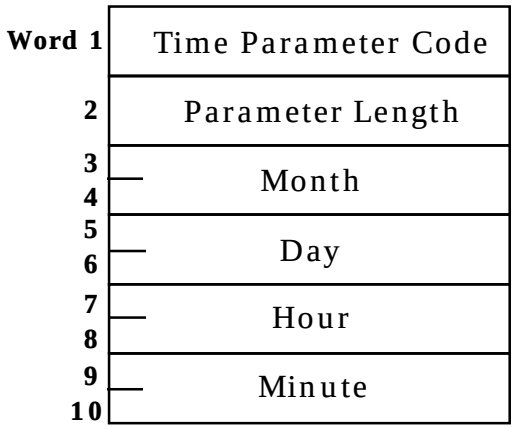
00000001	Time
00000011	Dialable Directory Number (DDN)
00000100	Reason for Absence of DDN
00000110	Call Qualifier

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.



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.

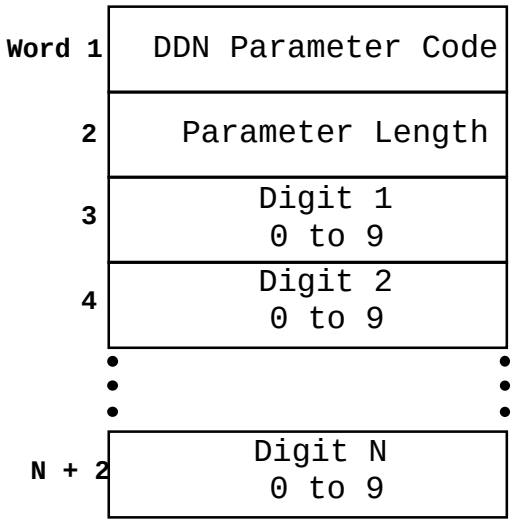
Hour/Minutes are coded in ASCII (no parity) in the military, local time format. Hour is coded as follows:

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.

SINGLE MESSAGE FORMAT - CALLING NUMBER DELIVERY (CND)

(The Single Message Format is used on non-DMS Switches)

8.0 SERVICE DESCRIPTION

Calling Number Delivery (CND) allows the called terminal to receive the Directory Number (DN) of the calling party during the ringing cycle. For an interoffice call, the caller's DN is transmitted from the originating to the terminating switching office via the CCS7 network during the call setup, and is subsequently transmitted from the terminating switching office to the terminal during the first 4-second silent interval of the ringing cycle. For an intra-office call, the caller's DN is retrieved from the memory of the switching office for transmission to the terminal. Then, depending on the option offered by the terminal, the DN could be displayed and/or printed. The terminal could also be arranged to store the DN for later retrieval by the customer.

The **CND** feature provides the called party with information about the caller before the call is answered. A data message is sent from the switching office to the terminal during the 4-second silent interval after the first 20 Hz ringing cycle. The data consists of:

- the date (month and day), time (hour and minutes), and
- the calling party information in one of three forms:
  - a 7 or 10 digit DN,
  - a "privacy" indicator if the calling party is a subscriber of the "**CND** Blocking" feature and has activated that feature, or
  - an "out-of-area" indicator if the calling DN is out of the **CND** serving area or cannot be recovered for display.

Once the **CND** feature is assigned to the customer by a service order procedure, the feature is activated automatically.

9.0 FEATURE DESCRIPTION

The information outlined in this part of the document applies only to the **CND** data that is transmitted from the DSPC to the terminal. Upon receiving the **CND** data, the terminal should be able to present the information to the **CND** subscriber.

The terminal receives **CND** data from the DSPC when it is in an ON-HOOK state and a voice path has been established.

10.0 CHARACTERISTICS OF THE CUSTOMER LOOP

The terminal interface for **CND** has been designed to work on residence and business customer loops having the following characteristics:

Characteristic	Residence	Business
Loop Resistance	1,300 ohms or less	1,300 ohms or less
Insertion Loss at 3 kHz	14 dB or less	10 dB or less
Total Bridge Tap Length	6,000 feet or less	6,000 feet or less

It should be noted that residential lines are inductively loaded at lengths greater than 18,000 feet. Business lines may be loaded at distances as short as 11,000 feet. Therefore, to meet the above loop length and loss requirements, the terminal interface for **CND** should be capable of working on loaded as well as non-loaded loops.

The terminal interface should be able to work on loops served by subscribers carrier systems.

10.1 Transmission Parameter

The parameter to be used for transmitting **CND** data from the switching office to the terminal should conform to the following standards.

Link Type	simplex, two wire
Transmission Scheme	analog, phase-coherent frequency shift keying
Logical 1 (Mark)	1200 Hz ± 12 Hz
Logical 0 (Space)	2200 Hz ± 22 Hz
Transmission Rate	1200 bits per second
Bit Error Rate	less than 1 out of every 100,000 bits
Phase Continuity	maintained from initial service to end of message
Application of Data	serial, binary, asynchronous

Transmission Level	-13.5 ± 1 dBm at point of application into a resistive load of 900 ohms
Bit Duration	833 ± 50 µsec (start and stop bits have same duration as a standard bit)

The transmission level should be constant. The 900 ohm load resistance is a reference value only. The actual resistance of the terminal may vary. The resistance may affect the level of the data transmission. This should be considered in the design of the terminal.

Furthermore, Electronics Industries Association (EIA) specifications 470-A (revision of EIA-470), dated July 1987, indicates the allowable DC resistance and AC impedance (for a range of frequencies) for an ON-HOOK terminal. These specifications should be adhered to when designing terminals for use with the **CND** features.

11.0 TIMING AND TOLERANCES

The **CND** data is transmitted to the terminal in the 4-second silent interval after the first 20 Hz, 2-second signal phase while the customer's line is in an ON-HOOK state. If the called party answers the incoming call before or during the transmission, normal ring trip occurs. The data transmission, if interrupted by answer, will be stopped at the point of interruption. The switch will not attempt to transmit or retransmit the data message while the called party is in an OFF-HOOK state.

The switching office waits 500 ± 25 milliseconds (ms) after the 20 Hz signal before starting transmission of the data, and completes transmission of the data no later than 500 ms prior to the next 20 Hz ringing signal. A sequence of data messages is transmitted within this silent interval. (See Note) This 500 ms delay in the start of signaling enables the terminal to determine that the silence is not due to momentary break in ringing (such as coded ringing patterns used in Distinctive Ringing/Call Waiting, ACB or ARC, etc.), but is a part of the silent interval between ringing cycles. After this delay, data transmission can begin. Each message is preceded by channel seizure and mark (logical 1). The channel seizure signal is 250 ms long and is composed of 30 continuous bytes of octal 125 (i.e., 01010101). Following the channel seizure signal, 150 ± 25 ms of mark (logical 1) is sent to help "condition" the terminal to receive the data.

The maximum interrupt time between any two successive bytes is equivalent to 20-bit time period 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 by the switch and will be lost.

Furthermore, the mark signal should be monitored for continuity, while an interrupt of the mark signal of 8 ms or less should be ignored by the terminal, an interrupt that exceeds 8 ms would cause the terminal to treat the received data as erroneous.

NOTE: *The term 'silence' refers to absence of ringing - not absence of ringing transients or FSK signals. The 500 ± 25 ms waiting period is a guard time interval similar to the 600 ± 32 ms period defined in Section 4.0 for the Multiple Message Format. Terminal devices should ignore any signals, other than ringing, during this waiting period.*

12.0 CND PROTOCOL

The terminal for the **CND** feature should be capable of supporting both digit and alphanumeric character transmission.

The **CND** protocol is a "single data message" which consists of a message type word, a message length word, the data word(s) and a check sum word. The data is sent as ASCII characters (8 bit data words bounded by a "space" start bit and a "mark" stop bit) without parity and is always sent in conjunction with ringing to the terminal in the 4-second silent interval after the first 20 Hz, 2-second ringing phase. Every **CND** message is preceded by 250 milliseconds of channel seizure signal (30 bytes of "01010101") and 150 milliseconds of carrier signal (1200 Hz tone). Figure 3 illustrates the **CND** message format.

CND is defined to be message type 4 (00000100) and have a message length word value of 9 through 18. The first eight words of data contain the date (month and day) and local time (hour and minutes), each comprised of two characters. Word nine begins the calling party information, a 7 to 10 digit DN (a 10-digit directory number is sent for an inter-NPA call while a 7-digit number is sent for an intra-NPA call), or an ASCII alpha character "P" for privacy or character "O" for out-of-area. See Figure 4 for the **CND** data word content.

For error detection, a check sum is included as the last word of the data message. The check sum consists of the two's complement of the modulo "256" sum of the other words in the data message (e.g., message type, message length, data words). To use this sum, the receiving terminal should be capable of obtaining the modulo "256" sum of all other words received in the data message and of adding this sum to the check sum. Zero usually indicates that the message was correctly received. However, this checking approach cannot detect all transmission errors. Specifically, it cannot detect offsetting bit errors occurring in the same bit positions in two, four or six (or any multiple of two) bytes of the data message.

If the terminal detects an error, the received data should not be displayed. No messages should be sent to the DSPC indicating that an error was detected, and the DSPC will not attempt to retransmit the data.

Examples of **CND** messages are provided in Figure 5 through Figure 8.

Channel Seizure Signal	Carrier Signal	Message Type Word	Message Length Word	Data Words	Check Sum Word
30 bytes of (01010101) 250 ms	150 ms of 1200 Hz	(00000100) "4"	9 - 18	Month - 2 Characters Day - 2 Digits Hour - 2 Digits Minutes - 2 Digits DN - 7-10 Digits Privacy - "P" Out-of-Area - "O"	

Figure 3: CND Message Format (DSPC to Terminal)

Month	Day	Hour	Minutes	Calling DN
01 - January 02 - February 03 - March 04 - April 05 - May 06 - June 07 - July 08 - August 09 - September 10 - October 11 - November 12 - December	01 - 31 Day of Month	Military Local Time 01 = 1 AM 12 = Noon 13 = 1 PM	00 - 59 Within the Hour	Directory Number 7 - 10 digits Value: 0 - 9 or Privacy - "P" or Out-of-Area - "O"

Figure 4: CND Data Word Content (DSPC to Terminal)

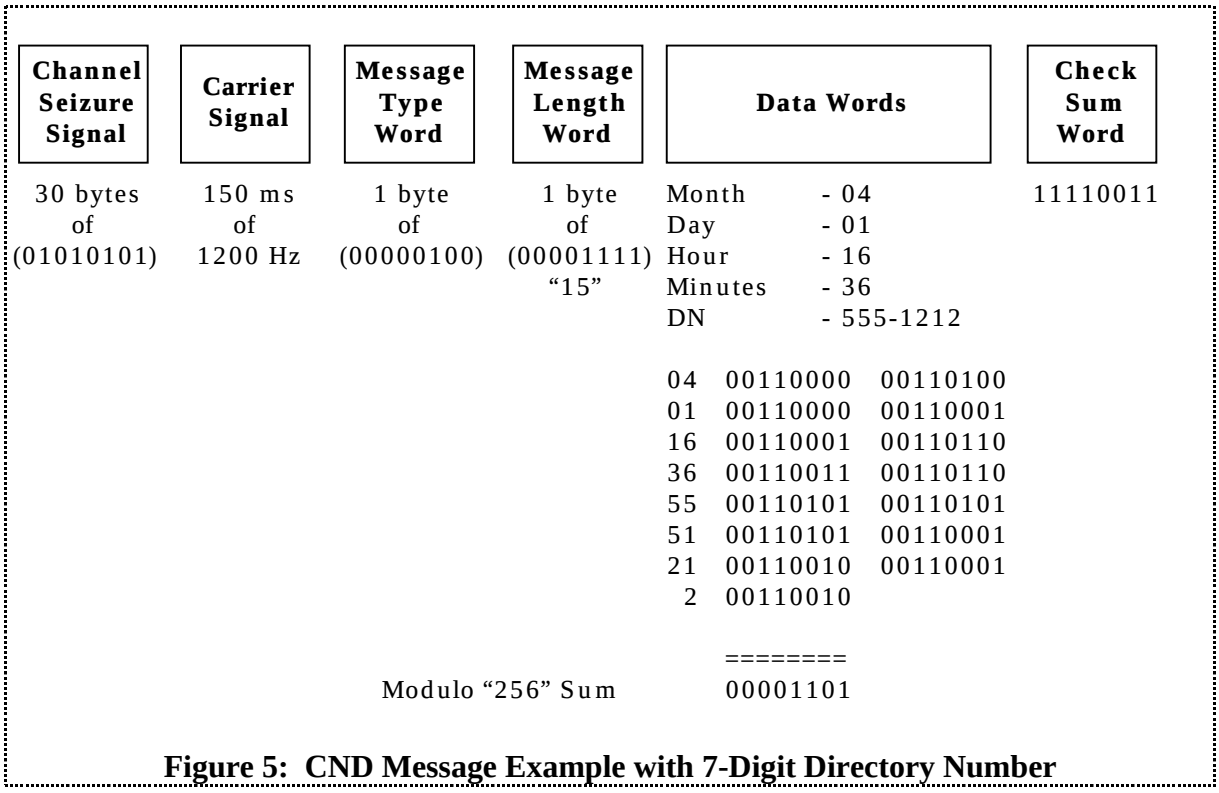


Figure 5: CND Message Example with 7-Digit Directory Number

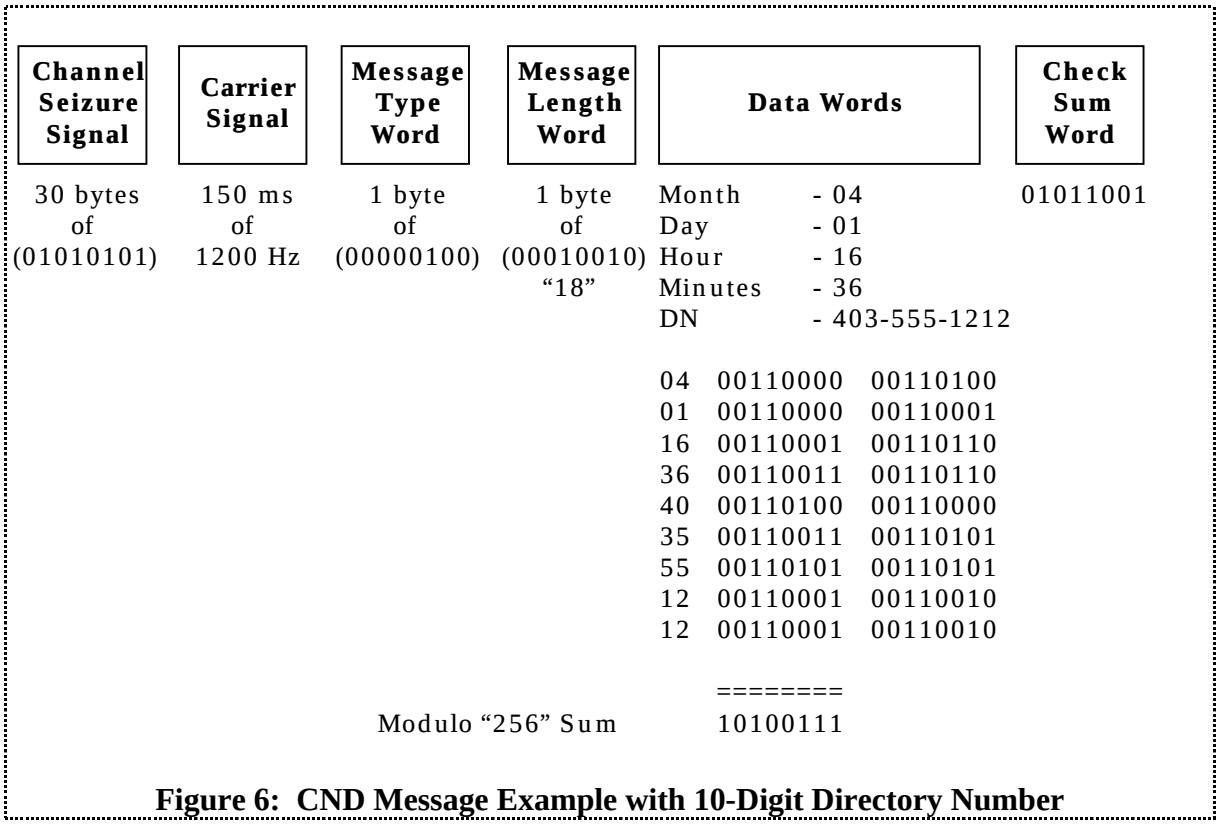


Figure 6: CND Message Example with 10-Digit Directory Number

Channel Seizure Signal	Carrier Signal	Message Type Word	Message Length Word	Data Words	Check Sum Word
30 bytes of (01010101)	150 ms of 1200 Hz	1 byte of (00000100)	1 byte of (00001001) "9"	Month - 04 Day - 01 Hour - 21 Minutes - 56 Privacy - "P" 04 00110000 00110100 01 00110000 00110001 21 00110010 00110001 56 00110101 00110110 "P" 01010000 ======== Modulo "256" Sum 11110000	00010000

Figure 7: CND Message Example with Privacy

Channel Seizure Signal	Carrier Signal	Message Type Word	Message Length Word	Data Words	Check Sum Word
30 bytes of (01010101)	150 ms of 1200 Hz	1 byte of (00000100)	1 byte of (00001001) "9"	Month - 04 Day - 01 Hour - 09 Minutes - 50 Out-of-Area - "O" 04 00110000 00110100 01 00110000 00110001 09 00110000 00111001 50 00110101 00110000 "O" 01001111 ======== Modulo "256" Sum 11101111	00010000

Figure 8: CND Message Example with Out-of-Area

13.0 REFERENCES

13.1 Bellcore:

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

13.2 Bellcore:

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

13.3 Department of Communications:

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

13.4 Data Set 202S and 202T Interface Specification:

Bell System Data Communications Technical Reference, current issue.