2013

Copyright © MTS Inc. 2013

All Rights Reserved

Version 1.5

October 2013

[MID-09]

MTS Interface Document-09: 9-1-1 Terminal to Network Interfaces for Enhanced 9-1-1 Service

1. CONTENTS

2. EXECUTIVE SUMMARY

This document describes the interfaces between the 9-1-1 Public Safety Answering Point (PSAP), other emergency response agencies (ERAs), and the MTS 9-1-1 network. These interfaces allow PSAP attendants to answer 9-1-1 calls which pass through MTS's 9-1-1 network, and to transfer those calls to the appropriate emergency response agency. PSAP and ERA attendants also have access to calling number, location information of the 9-1-1 caller, as well as other advanced call control features provided by the network.

3. DOCUMENT HISTORY

Version	Date	Description
1.4	October 2013	Initial public release
1.5	November 2013	Updated contact info

4. DISCLAIMER AND LIMITATION OF LIABILITY

The information contained herein is proprietary to MTS Inc. ("MTS") and, as such, may not be used, reproduced or disclosed to others except as specifically permitted in writing by MTS.   The recipient of this document, by its retention and use, agrees to protect the same and the information contained therein from loss, theft and compromise. MTS reserves the right to make changes, as required, to the information contained in this document.

MTS expressly advises readers that the technical requirements contained herein may change.

MTS SHALL NOT BE LIABLE FOR ANY DAMAGES OR INJURIES INCURRED BY ANYONE, INCLUDING BUT NOT LIMITED TO CORPORATIONS, ARISING DIRECTLY OR INDIRECTLY FROM ANY INCOMPATIBILITY BETWEEN THE NETWORK(S) OF MTS AND ANY TERMINAL DEVICE OR OTHER NETWORK, OR FROM ANY CAUSE WHATSOEVER.

If further information is required, please contact:

MTS E9-1-1 Senior Product Manager
MTS Inc.
Tel: (204) 941-8189

PO Box 6666, 14th Floor
333 Main Street (MP14K)
Winnipeg, MB R3C 3V6

5. SERVICE DESCRIPTION

Provincial 9-1-1 Service provides customers with access to a Public Safety Answering Point (PSAP) via the Public Switched Telephone Network (PSTN), as well as the mechanism for communications between the PSAP and secondary agencies such as police, fire, and ambulance dispatch centres. The primary characteristics of the service are:

- Universally recognized (in 9-1-1 serving areas) 3-digit dialing (9-1-1) for connection to emergency response agencies that service the location of the caller
- High grade of service (P.001, or <= 0.1% probability of call blocking)
- Special features to support the proficiency and effectiveness of 9-1-1 answering attendants

In a typical operation, the 9-1-1 call is delivered to the PSAP where an attendant determines the nature of the emergency, then forwards the call to the appropriate fire, police or ambulance dispatch center. The PSAP attendant is supported by the aforementioned special features which facilitate a targeted, timely, and accurate response.

Provincial 9-1-1 service is associated with all primary exchange services. Local governments are responsible for the answering bureaus and dispatch centres.

6. INTEGRATED FEATURES DESCRIPTION

Provincial 9-1-1 Service is based on Cassidian's ECS-1000[1] Selective Routing and Integrated PSAP attendant platform (Sentinel), and supports the following network based features. These integrated features are primarily offered as a part of the ECS-1000 to PSAP Sentinel Interface described in Section 10.1. These features are only available to PSAPs who use the Sentinel platform.

6.1. CALLED PARTY HOLD

Called Party Hold will ensure that 9-1-1 callers who hang up prior to the call being answered have their line held open for a period of time in order to allow the PSAP operator to answer the call. During this time the 9-1-1 caller cannot dial out to other numbers. This feature is not available on wireless or IP based phone systems.

6.2. CALLING PARTY SWITCH HOOK STATUS

Calling Party Switch Hook Status will automatically inform the PSAP attendant when the calling party has gone ON-HOOK via a visible indicator on the PSAP attendant's Sentinel position.

6.3. RING-BACK TO 9-1-1 CALLER

Ring-Back is a feature that allows the PSAP attendant to make the 9-1-1 caller's set ring if it has been put ON-HOOK.

6.4. FIXED CALL CONFERENCE AND TRANSFER

Fixed Call Conference and Transfer allows the PSAP attendant to add on (conference) a secondary agency by activating a transfer code associated with that specific agency.

6.5. SELECTIVE CALL CONFERENCE AND TRANSFER

---

[1] ECS-1000 ANI/ALI Controller is a registered trademark of Cassidian Communications Inc.

Selective Call Conference and Transfer allows a PSAP attendant to add on a secondary agency (3-way conference) by activating the appropriate transfer code for the desired agency. The network will make use of the ESZ information to contact the appropriate agency for the calling party.

6.6. MISSED 9-1-1 CALL

Missed 9-1-1 Call allows the PSAP attendant to receive ANI/ALI information informing them about 9-1-1 calls that have been missed. These calls will be placed in the abandoned queue prior to being answered.

6.7. MANUAL ALI

Manual ALI allows the PSAP attendant to manually request an ALI record for a fixed POTS service (currently wireline and fixed VoIP).

7. NETWORK PROVIDED FEATURES DESCRIPTION

The Network Provided Features can be provided via the MTS Managed SR to PSAP CPE, as well as a direct interface with specialized PSAP owned and operated customer premises equipment (CPE).

7.1. SELECTIVE ROUTING

A centralized database matches the 9-1-1 caller's address to an Emergency Service Zone (ESZ). The ESZ describes the municipal fire, police, and ambulance serving areas. This feature determines the caller's location from the database using their ANI. It then automatically routes emergency calls to the PSAP responsible for the ESZ based on that location.

7.2. AUTOMATIC NUMBER IDENTIFICATION (ANI)

The Selective Router (SR) will transmit an ANI record that identifies the telephone number (TN) of the 9-1-1 caller. This record is sent to the 9-1-1 ALI which processes the record to provide Automatic Location Identification (ALI).

7.3. AUTOMATIC LOCATION IDENTIFICATION (ALI)

The MTS hosted ALI platform can transmit the caller's name, address, and TN. The ALI information is transmitted from the hosted ALI to the Sentinel position or PSAP hosted switch in ASCII format.

7.4. OUTGOING TRUNK TRANSFER

The outgoing trunk transfer feature allows outgoing trunks from the ECS-1000 to a PSAP controller switch to carry speed calling codes back from the answering call taker via the PSAP controller switch (if supported by the PSAP controller switch). The ECS-1000 will respond to a flash plus a speed calling code sent by the PSAP controller. This feature must be specifically requested and set up on the outgoing trunk to operate properly. Speed calling codes will be pre-configured on the ECS-1000 switch per the PSAPs requirements.

7.5. WIRELESS LOCATION

Wireless Location provides the PSAP attendant with the location of callers who are using a mobile phone. Phase I location information is based on the cellular tower location (physical address), which will be followed a few seconds later by Phase II information which provides the geolocation of the caller in the form of latitude / longitude, and radius of uncertainty (Phase II stage 1).

## 7.6. PSAP INITIATED IN CALL LOCATION UPDATE (ICLU)

In Call Location Update (ICLU) allows the PSAP attendant to manually request a location update from the network for a wireless 9-1-1 call that is currently in progress (Phase II stage 2).

8. SERVICE PROVIDER TO PSAP INTERFACE HIGH LEVEL

The diagram below describes 3 possible methods of deployment for interfacing with the MTS Provincial 9-1-1 service. Each link below describes the specific physical product (eg. CAMA T1), link protocol (eg. RS-232), and communications protocol (e.g. GTE CAD) required to communicate with the elements on the diagram.

- PSAP Example Site 1 is an example of a single PSAP hosted switch and CAD connecting to the MTS Provincial 9-1-1 Service
- PSAP Example Site 2 is an example of a geo-diverse PSAP hosted switch and CAD connecting to the MTS Provincial 9-1-1 Service; Example Site 2 includes Example Site 1 for the diverse location
- PSAP Example Site 3 is an example of a PSAP being hosted off of the MTS Sentinel platform. Specific link and communications protocols are proprietary; the platform is an end-to-end MTS provided platform

8.1. HIGH LEVEL DIAGRAM
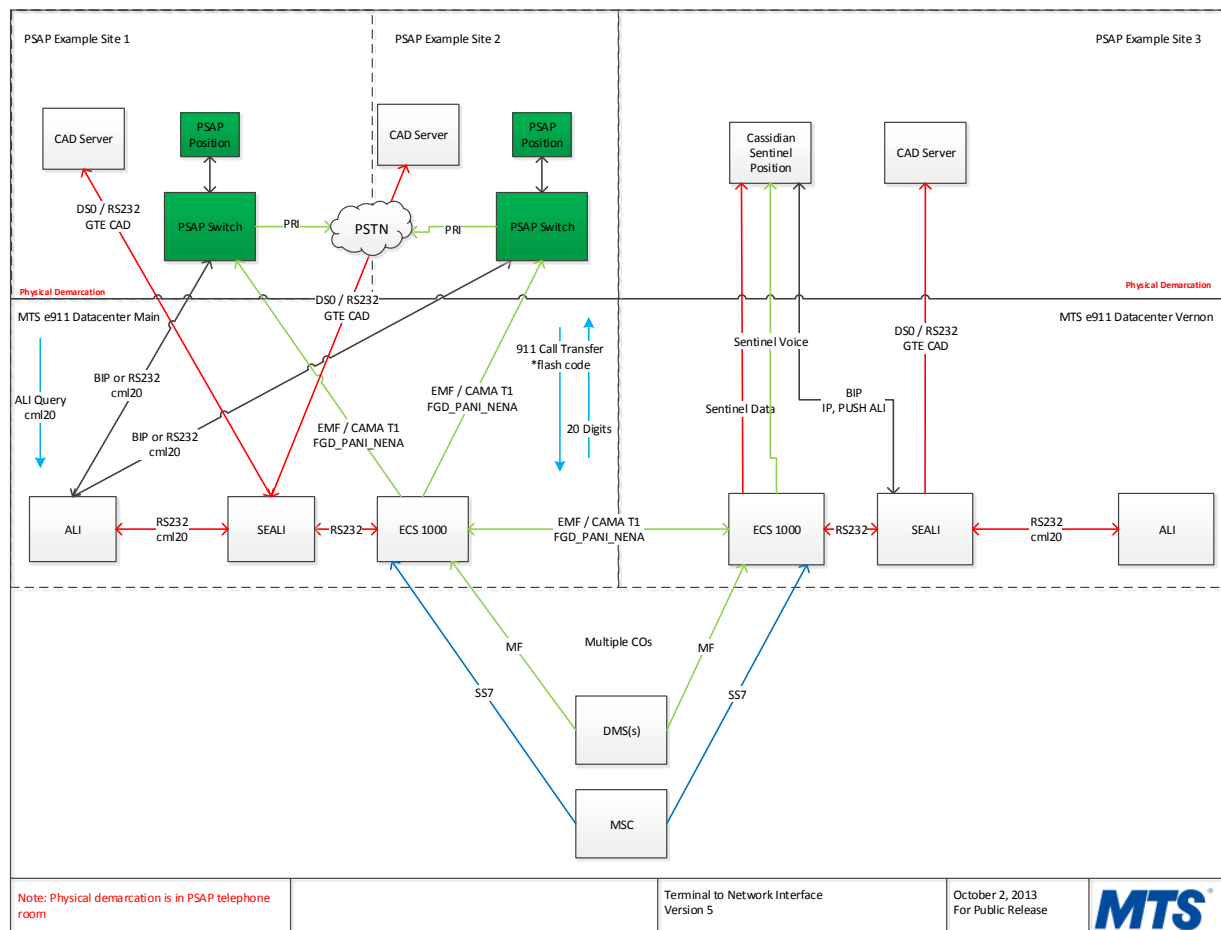
9. OVERVIEW OF CALL IN PROGRESS

After dialing 9-1-1 the call and the caller's ANI (along with the pseudo-ANI (pANI) for wireless-originated calls) is transmitted from the originating switching center via a dedicated 9-1-1 trunk to the ECS-1000 switch. The ECS-1000 looks up the ESZ using the ANI/pANI, and routes the call to the appropriate PSAP.

Generally, once a 9-1-1 call is answered in the PSAP, the ANI information and identification of the agency and line which the call was routed to is forwarded to the ALI for processing. If the PSAP is using the MTS Sentinel solution, the ALI information is then sent to the attendant's Sentinel position. If the PSAP is using another PBX system or other specialized 9-1-1 terminal equipment, additional information may be required to support the ALI feature and route it to the correct terminal. This information could include the incoming voice line number or position ID of the agent.

10. INTERFACE DESCRIPTIONS

10.1. ECS-1000 TO PSAP SENTINEL INTERFACE

As in PSAP Example Site 3, in Section 8, the recommended interface for a PSAP to receive 9-1-1 calls, ANI/ALI information on the MTS Provincial 9-1-1 Service is to use the fully integrated, Sentinel solution. In this model the ECS-1000 not only acts as a Selective Router, but also as a Controller. Specialized hardware used by the PSAP is tightly integrated with the Selective Router, and communicates with it using proprietary Cassidian Communications Inc. protocols. This tight integration allows for additional functionality; the PSAP attendant is provided with a Microsoft Windows-based GUI to manage all the aforementioned service features. Rather than relying on Electronic Business Sets (EBS) sets and customized PSTN features, the PSAP attendant can use a system that has full integration with the host 9-1-1 switch (ECS-1000).

10.2. ECS-1000 TO PSAP CPE INTERFACE

As an alternative to the ECS-1000 to PSAP Sentinel Interface, the ECS-1000 can also interface with PSAP customer premises equipment (CPE). This section will provide guidelines for such an implementation, and the PSAP customer should expect that there would be development (professional services) and rigorous integration testing to certify the platform for accepting 9-1-1 calls.

10.2.1. PHYSICAL

The ECS-1000 accepts 4 wire physical copper circuit.

10.2.2. DATA LINK

The Data Link layer currently supports Enhanced MF for FGD and Analog CAMA Trunks

10.2.3. COMMUNICATIONS PROTOCOL

The ECS-1000 currently supports NENA Standard (Feature Group D) for the Implementation of Enhanced MF Signaling E9-1-1 Tandem to PSAP (FGD_PANI_NENA). See Reference (National Emergency Numbers Association, 2007). The purpose of Enhanced MF is to facilitate the delivery of one or two ten-digit ANI transmissions to the PSAP.

10.3.   CAD INTERFACE

10.3.1. PHYSCIAL

The physical CAD interface utilizes a 2 wire, dedicated DS-0 data circuit which requires no dialing.

10.3.2. DATA LINK

The data link conforms to RS-232, and is transmitted via modems operating at 8 bits, No Parity, 1 Stop bit (8N1).

10.3.3. COMMUNICATIONS PROTOCOL

The CAD interface can make use of any of 4 different protocols, as outlined in Reference (Cassidian Communications Inc. (formerly CML Technologies), 2013). This document is available from MTS under NDA. Please see contact information in Section 4 to request the document. The four protocols are:

- GTE CAD
- CAD with ESN
- CAD with Complete Information (CML)
- CAD AT&T

10.4.   ALI INTERFACE

10.4.1. PHYSCIAL

The ALI physical interface has 3 options, depending on the desired Data Link layer. If using RS-232 the standard 2 wire, dedicated DS-0 data circuit is required. However, if IP is desired, either Ethernet (CAT5), DS-1/T1, Fiber, or other IP compatible physical link can be used, depending on a number of factors such as location.

10.4.2. DATA LINK

Either RS-232, transmitted via modems operating at 8N1, or IP via the MTS Business IP (BIP) MPLS service.

10.4.3. COMMUNICATIONS PROTOCOL

The ALI interface currently supports one protocol, cml20, as outlined in Reference (PlantCML, 2009).

10.5.   TEXT WITH 9-1-1 INTERFACE

The Text with 9-1-1 interface that MTS provides is based on the Agent511 TextBlue SMS T9-1-1 (TEXTBLUE) application. TEXTBLUE is designed to integrate with 3rd party applications, and also supports bidirectional messaging. Additionally, TEXTBLUE provides a web interface which can be used directly by a PSAP attendant.

10.5.1. PHYSICAL

Either Ethernet (CAT5), DS-1/T1, Fiber, or other IP compatible physical link can be used, depending on a number of factors such as location.

10.5.2. DATA LINK

The Text with 9-1-1 Interface is only available via IP, over the private MTS BIP MPLS Service.

10.5.3. TEXT WITH 9-1-1 COMMUNICATIONS PROTOCOL WEB INTERFACE OPTION

The interaction with the TEXTBLUE web interface is described in Reference Document (AGENT511, 2013)

10.5.4. TEXT WITH 9-1-1 COMMUNICATIONS PROTOCOL API FOR CAD INTEGRATION OPTION

The interaction with the TEXTBLUE API for CAD integration is described in Reference Document (AGENT511, 2013)

11. ACRONYMS

Acronym	Definition
ALI	Automatic Location Identification
ANI	Automatic Number Identification
ASCII	American Standard Code for Information Interchange
BIP	Business Internet Protocol (MTS MPLS Product Name)
CAD	Computer Aided Dispatch
CAMA	Centralized Automatic Message Accounting (refers to Enhanced MF trunks for 911)
CAT5	Category 5 Ethernet cable
CPE	Customer Premise Equipment
DS-0	Digital Signal 0 (refers to a single 2 wire phone circuit)
EBS	Electronic Business Sets
ERA	Emergency Response Agency
ESZ	Emergency Services Zone
FGD	Feature Group D (a tariffed set of features governing long distance selection)
ICLU	In Call Location Update
IP	Internet Protocol
MPLS	Multi-Protocol Label Switching
MF	Multi-Frequency
NENA	National Emergency Numbers Association
pANI	Pseudo-Automatic Number Identification (for use with cellular calls)
POTS	Plain Old Telephone System
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
RS-232	Radio Sector 232 (serial communications protocol for 3 or 5 wire connections)
SMS	Short Message Service (Text messaging for cellular phones)
SR	Selective Router
T1	Or DS1, refers to a 4 wire trunk which can carry up to 24 voice channels
TN	Telephone Number
VoIP	Voice over IP

12. REFERENCES

Cassidian Communications Inc. (formerly CML Technologies), 2013. *Communication Protocol with CAD Interfaces,* s.l.: Martin Boucher *

Cassidian Communications Inc. (formerly PlantCML), 2009. *20 digits ALI protocol,* s.l.: Denis Larviere*

*MTS will make this available to third parties who sign an applicable Non-Disclosure Agreement. For further information please contact the person listed in Section 4 of this document.

AGENT511, 2013. *TEXTBLUE multimedia chat API,* Northbrook, Illinois: Good Egg Media LLC**

AGENT511, 2013. *TEXTBLUE SMS T9-1-1 User's Guide,* Northbrook, Illinois: Good Egg Media LLC**

**MTS will make available to readers upon request. To make the request please contact MTS at the address in Seciton 4 of this document.

National Emergency Numbers Association, 2007. *NENA Standard for the Implementation of Enhanced MF Signaling, E9-1-1 Tandem to PSAP.* [Online]
Available at: http://www.nena.org/resource/collection/1F053CE7-3DCD-4DD4-9939-58F86BA03EF7/NENA_03-002-v2_Implementation_Enhanced_MF_Signaling_E9-1-1_Tandem_PSAP.pdf