# Fire Monitoring Technologies International Inc.


## OPEN ACCESS™ Project

### Project Component: XML Interface Communication Specification

Version 1.0

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Document Updates History

| Name | Date | Changes |
|---|---|---|
| HBH | Nov 12/02 | Rough Draft |
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| EAM | May 07/03 | XML revised |
| EAM | Apr 20/05 | XML revised |
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| | | |

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# 1 Objective

The objective of this document is to lay out the framework for the communication interface necessary to interact with a Computer Aided Dispatch System from the OPEN ACCESS™ network. The intent is that this document be easily available and accessible within the public domain. In keeping with our intention to make this a truly open interface, all details are included where possible and questions and comments are welcome. Contact information will be provided at the end of the document in the Appendices section.

# 2 Intended Audience

Anyone who is interested in learning about the interface specification particulars between the OPEN ACCESS™ network and a Computer Aided Dispatch environment will be interested in reading this document. We have attempted to keep the language as straight forward as possible. Any and all acronyms will be explained in a dictionary located in the Appendix section at the end of the document.

Anyone looking for an overview of the OPEN ACCESS™ network layout will also find this document of interest.

This document can be downloaded from http://www.openaccess.ca

This interface document is of interest to parties who wish to implement a more feature rich method of receiving OPEN ACCESS™ information into their CAD system. This solution will also be of interest to departments with multiple dispatch positions.

This interface assumes that the receiving CAD system will create an incoming call record and take care of directing the call to the appropriate workstation for processing.

# 3 Preamble

OPEN ACCESS™ was conceived with the intent of providing a standard solution to the problem of electronically delivering fire alarm signals quickly and reliably to an emergency dispatch centre. FMTI believes that it has achieved this with version 2.0 of OPEN ACCESS™. As the name OPEN ACCESS™ implies, the network will be available to any interested party wishing to participate. For that reason, this standards document will be freely available upon request as described in the previous section.

OPEN ACCESS™ encompasses the network, hardware and software required to deliver a fire alarm signal electronically from a monitoring station directly to the appropriate dispatch centre or PSAP (Public Safety Answering Point)

# 4 Disclaimer

By using this document, the user agrees that FMTI will have no liability for any consequential, incidental, special, or punitive damage that may result

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Many references in this document are made to NENA recommended Technical Standards documents, primarily;

- document 04-001 Generic Standards for E9-1-1 PSAP Equipment (Issue 2) http://www.nena.org/9-1-1TechStandards/Standards_PDF/NENA_04-001.pdf

And

- document 02-010 Recommended Formats & Protocols For ALI Data Exchange, ALI Response & GIS Mapping http://www.nena.org/9-1-1TechStandards/Standards_PDF/NENA%2002-010.PDF

These documents and others can be downloaded at no cost from the following location.
http://www.nena.org/9-1-1TechStandards/nena_recommended_standards.htm

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This document has been prepared solely for the voluntary use of Computer Aided Dispatch system providers wishing to participate in the OPEN ACCESS™ endeavour.

# 5 Introduction

Since the remaining sections of this document assume that the reader has some familiarity with the operation of an ALI-CAD interface link, some very basic descriptions will be covered with suggested links to find out more information.

**What is an ALI-CAD Interface Link?**

ALI stands for Automatic Location Identifier. ALI data is transmitted to a CAD system outfitted with an appropriate interface when someone dials 9-1-1 on a landline or mobile line. ALI information consists of a caller's current location including name, address and phone number.

This is a very simplified explanation of the E9-1-1 purpose. For more detailed information refer to the NENA (National Emergency Number Association) website at www.nena.org.

In the normal course of events there are many pieces of equipment involved in actually delivering the data to the PSAP including;

- the telephone switching equipment servicing the caller's phone,
- telephone equipment at the ANI/ALI database provider's location,
- Telephone equipment at the PSAP.

For the purposes of this document we will concentrate only on the equipment at the PSAP.

When someone calls 9-1-1, the telephone switch routes the call to the PSAP. A notification (phone ringing) alerts the dispatchers and someone answers the phone. At that point, a notification is sent to the PSAP telephone switch which then routes and delivers the ALI data to the dispatch position that answered the telephone, and the data is displayed on that workstation.

OPEN ACCESS™ mimics that process by delivering predefined ALI like data (from a separate source) in a similar format and manner to the CAD system. There are some major differences however.

- OPEN ACCESS™ does not in any way interact or communicate with the PSAP's telephone switching equipment.
- OPEN ACCESS™ does not in any way interact with the PSAP's ALI database system

One of the major components in the ANI data stream is the inclusion of a field of data containing a call position identifier. This piece of data is transmitted by the phone switch when a dispatcher answers the telephone. Since OPEN ACCESS™ does not interact with the phone switch, we have no way to identify which position to transmit the information to.

This is where the CAD vendor steps in. The CAD vendor must accept the data feed over a serial link formatted using XML. They must parse the data and create a call record to notify the system that there is an alarm. An audio alert of some form is also necessary, since the ringing phone will be absent unlike in a real 9-1-1 call. A flashing indicator with color is also recommended as a visual cue, but not mandatory.

The header tag included in each message identifies the signal type (IE that the signal is of type OPEN ACCESS™ alarm)

# 6 Why Use the E9-1-1 Model?

The E9-1-1 model has been in use for over a decade. The interface specifications are documented, they are solid, they have been tested and implemented in North America and around the world and they work. In short the idea of global specifications works.

We chose this model because it fits in with what we want to do, and how we want to do it. OPEN ACCESS™ performs a critical function and we wish to portray it with the same level of seriousness and commitment. Our intent is to provide access to any interested party and to do that the interface has to be well documented, widely available and straight forward to implement.

This interface specification is one of two available for interaction with the OPEN ACCESS™ network. The second interface, entitled “OPEN ACCESS™ Basic Communication Interface”, is based on the Bell BID-0013 E9-1-1 interface specification and can be found on the OPEN ACCESS™ web site www.openaccess.ca . Documents pertaining to Bell Canada specifications can be found on Bell Canada’s disclosure website http://bell.cdn-telco.com/.

There are several obvious reasons in addition to those listed above for choosing to build an interface specification based on existing specifications.

1.) The interface has to be straight forward to create and implement in order to encourage participation by a wide variety of dispatch software vendors.
   - The NENA Recommended Technical Standards documents have been drafted, evaluated and revised by industry experts to reflect the current and ongoing needs of the emergency services sector
   - The specification is applicable both in North America and around the world
   - Many developers who have experience within the emergency services area are familiar with the specifications
   - The specifications are widely and freely available on NENA’s website.

2.) The interface has to make sense, be compact and adaptable in a variety of environments
   - The protocol is reasonably compact, making for low overhead in a multitasked environment (elements not containing any data are omitted, not transmitted with blanks or placeholder data)
   - This interface is applicable in map based environments and non map based environments.

3.) A majority of CAD developers are familiar with the concept of XML and how it works. NENA has already spent the time to define the element tags

and what type of data they are to contain. Time is saved in haggling over element definitions and what data to transmit.

- If a CAD system can accept an e9-1-1 data feed and an XML data stream then the system can accept an OPEN ACCESS™ XML Interface Data Feed. This interface can be enabled with minimal development effort on the CAD vendor's part.

# 7 Communication Link Characteristics

The Physical communication link characteristics can be found in the NENA Recommended Generic Standards for E9-1-1 Equipment document 04-001, section 3.4.3 Serial Interface.

Physical characteristics are laid out on page 15 and are as follows;

| | |
|---|---|
| Min Baud Rate: | 1200bps |
| Comm. Link: | Asynchronous Full Duplex |
| Bits per Character: | 7 or 8 |
| Parity: | Odd, Even, None |
| Synchronization: | 1 Start bit, 1 or 2 stop bits |

# 8 OPEN ACCESS™ Message Protocol

The OPEN ACCESS™ Message Protocol will follow NENA 04-001 (Issue 2), Recommended Generic Standards for E9-1-1 PSAP Equipment, Section 3.4.5, 3.4.6 and 3.4.7 on pages 16 and 17. They are described as follows;

### Message Exchange

Positive Acknowledgment (ACK) or negative acknowledgment (NAK) is sent after the reception of the block check character (BCC) of the message by the CAD to accept or reject data. ACK character value is decimal 06 and NAK value is decimal 21.

If a NAK is received by the OPEN ACCESS™ **First Response Electronic Dispatcher (FRED)**, it shall retransmit the message. The message will be lost if this retry is not successful.

If ACK/NAK is not received within 1 second by the FRED, it shall retransmit the message. The message will be lost if this retry is not successful.

### ALARM text message

The FRED shall send the alarm information within a block framed with a start of text character (STX) and an end of text character (ETX). STX character value is decimal 02 and ETX value is decimal 03.

The format of the alarm text message shall be:

<STX><TYPE><POS><ALARM TEXT><ETX><BCC>

Where:

TYPE One ASCII digit (from decimal 49 to 57) reflecting the ALI condition.
POS Two ASCII digits representing the attendant position in decimal
ALARM TEXT
ALI text format shall be negotiated by the data base provider, CPE vendor and their customer prior to the installation. The ALI text shall not include ACK, NAK, STX, or ETX characters. In this case the

| | |
|---|---|
| | Alarm Text shall contain information formatted according to the following section labelled XML Data Definitions and Format. |
| BCC | A block check character shall immediately follow the ETX character. It shall have a value of decimal 0 to decimal 255. It is obtained by taking the continuous Exclusive OR (XOR) of all characters preceding the BCC, but does not include the STX character |

**Heartbeat message**

The FRED shall send a heartbeat message at least once every two minutes during idle conditions.

The format of the heartbeat message shall be:

<STX><H><ETX><BCC>

# 9 XML Data Definitions and Format

The OPEN ACCESS™ XML Data set will support all tags listed in the NENA version 4.0 Element tags definition section of NENA recommended standard 02-010 “Recommended Formats & Protocols for ALI Data Exchange, ALI Response and GIS Mapping”. Some new tags have also been added in order to support the OPEN ACCESS™ initiative; however, we have maintained the schema structure set out in the NENA specification. The new tags have been hi-lighted in yellow.

It is important to note that at present the majority of tags will remain unused, as the OPEN ACCESS™ network is currently only transmitting basic data. It is anticipated that as the thirst for data grows and technology catches up, that more types of data will be added to the OPEN ACCESS™ repertoire.

Another important fact is that normally this information is transmitted through a serial port to the CAD system in the Fire Department, so all messages are sent in the following format:

<STX> **<XML MESSAGE>** <ETX> <BCC>

The <XML MESSAGE> is defined in the following sections.

The flow of the signals (heartbeat, alarms, report messages and acknowledgments) is detailed in the figure number 9-1 in the signals transmission diagram.

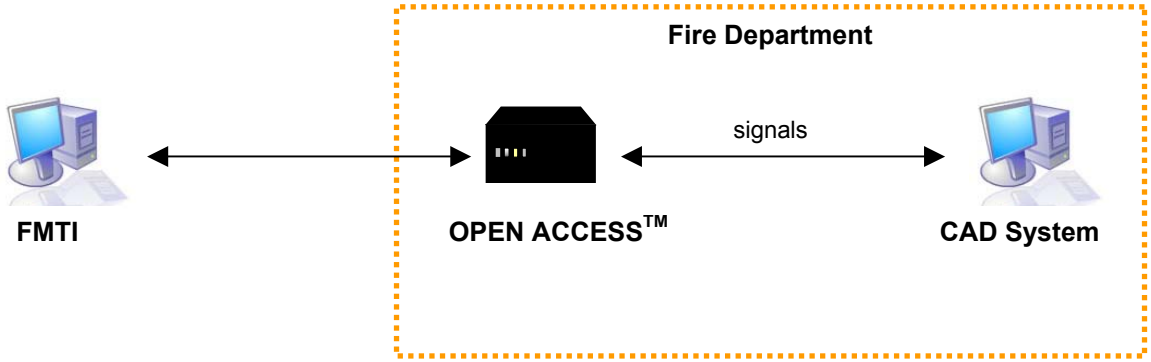


**Figure 1 – Signals transmission diagram**

## 9.1 Root for Alarm signal

| NAME | LABEL | MAX #BYTES | TYPE | DESCRIPTION |
|---|---|---|---|---|
| Root Element | <VER40NENA> | 0 | | Required root element tag. |

**Figure 2 - Root Element Format**

### 9.1.1 Children for VER40NENA

| NAME | LABEL | MAX #BYTES | TYPE | DESCRIPTION |
|---|---|---|---|---|
| Header | <HDR EXD= “date”/> | 0 | | Header information<br>*Required Attribute*<br>EXD=Extract date formatted as CCYY-MM-DD *s* |
| Trailer | <TRL> | 0 | | Trailer information |
| Service Order | <SERVICEORDER Num=“x” Type=”y”/> | 0 | | *Required Attributes*<br>Num=Record Number, must be unique<br>Type=Record Type; valid values are<br>DAT = Data sent from the Service Provider to the Data Base Management System Provider<br>RTN = Data returned from the Data Base: Management System Provider to the Service Provider*:* |
| MSAG | <MSAG Num=”x”/> | 0 | | Master Street Address Guide data<br>*Required Attributes:*<br>Num=Record Number, must be unique |

**Figure 3 - Root Element Children Format**

### 9.1.2 Children for HDR

| NAME | LABEL | MAX #BYTES | TYPE | DESCRIPTION |
|---|---|---|---|---|
| Company Name | <CON> | 50 | ANV | Name of Company Forwarding file |
| Cycle Counter | <CYC> | 9 | NV | Sequential number, 1-999999999 |
| Extract Date | <EXD> | 10 | NV | Year, Month, Day the data was processed, Format: CCYY-MM-DD |
| Record | <TST> | 3 | AN | Test Records Only Format: TST |

| | | | | |
|---|---|---|---|---|
| Identifier | | | | |
| General Use | <GEN> | 20 | ANV | Field to be utilized by sender/receiver company's to provide additional information |
| Account ID | <ACC> | 10 | ANV | 10 character account registration code |
| Signal Type | <SGL type="OPEN ACCESS" version="2.0" function="alarm"/> | 0 | | Must be present in order to qualify as an OPEN ACCESS™ signal<br>**Type** = type of protocol<br>**Version** = protocol version<br>**Function** = type of signal, it can be: **alarm, heartbeat** or **test**<br>***Note:** There is one white space between the words OPEN and ACCESS |
| Address complement | <LOC> | 10 | ANV | Apartament or unit number |
| Property Name | <NAM> | 255 | ANV | Name of the property. |

**Figure 4 - Header Element Children Format**

The rest of the valid tag data will be found among the Exhibit 18 Data Dictionary definition. Note that a valid OPEN ACCESS™ signal must include a header tag and include child tags of Account Id and Signal Type. A basic OPEN ACCESS™ tagged data composition would resemble the following diagram.

```
<?xml version="1.0"encoding="UTF-8"?>
<schema targetNamespace=http://www.nena.org/XMLSchema
xmins=http://www.w3.org/2000/10/XMLSchema
xmins:nena4=http://www.nena.org/XMLSchema
xmins:oa20=http://www.fmti.com/XMLSchema>
<VER40NENA>
        <HDR EXD="2000-03-05”>
                <CON>ABC-FTNORMFD</CON>                          Originating Monitoring Station
                <CYC>00012</CYC>                                 Signal Sequence Counter
                <SGL type=”OPEN ACCESS” version=”2.0” function="alarm"/>
                                                                 OPEN ACCESS™ Signal Type
                <ACC>123456</ACC>                                OPEN ACCESS™ Account ID
        </HDR>
        <MSAG num=”1”>
                <CPN>
                        <NPA>555</NPA>
                        <NXX>332</NXX>
                        <LINE>8877</LINE>
                </CPN>
                <PRD>S</PRD>
                <HNO>100</HNO>
                <STN>Keebler</STN>
                <STS>St</STS>
                <POD>N</POD>
                <NAM>ABC Industries Ltd</NAM>
                <CTY>Fort Norman</CTY>
                <PCN>M4P 2R6</PCN>
                <STA>ON</STA>
                <ATY>F</ATY>
                <AID>00001-0001</AID>                                    Fire department id
                <ANA>Fort Norman Fire Department</ANA>                   Agency Name
                <GU1>ADDITIONAL INFO</GU1>
                <ATS>141023</ATS>
        </MSAG>
        <TRL>
                <REC type=”DAT”>1</REC>
        </TRL>
</VER40NENA>
```

**Figure 5 -Sample XML OPEN ACCESS™ Message**

This message contains tags that comprise only a sample of the types of tags that can be transmitted via the OPEN ACCESS™ network.

```
<?xml version="1.0"encoding="UTF-8"?>
<schema targetNamespace=http://www.nena.org/XMLSchema
xmins=http://www.w3.org/2000/10/XMLSchema
xmins:nena4=http://www.nena.org/XMLSchema
xmins:oa20=http://www.fmti.com/XMLSchema>
<VER40NENA>
        <HDR EXD="2000-03-05”>
                <CYC>00121</CYC>                                    Signal Sequence Counter
                <ATS>221101</ATS>
                <SGL type=”OPEN ACCESS” version=”2.0” function="heartbeat"/>
        </HDR>
</VER40NENA>
```

**Figure 6 - Sample XML OPEN ACCESS™ Heartbeat Message**

## 9.2 Root Message for the Acknowledgement and Report Message

| NAME | LABEL | MAX #BYTES | TYPE | DESCRIPTION |
|---|---|---|---|---|
| Root Element | <RSP type=”x” version=“NENA4.0”> | 0 | | Required root element tag. There are two supported values:<br>**A** – acknowledgement message<br>**I** – report message message |

**Figure 7 -Root Element Format**

### 9.2.1 Children for RSP

| NAME | LABEL | MAX #BYTES | TYPE | DESCRIPTION |
|---|---|---|---|---|
| Time | <ATS> | 6 | Time | Time the data was sent or processed: format hhmmss (24 hour format) |
| Date | <DAY> | 10 | Date | Year, Month, Day the data was sent or processed, Format: CCYY-MM-DD |
| Fire Dispatch ID | <FIR> | 20 | ANV | Fire dispatch ID, generated by the CAD system for this event. |
| Additional Information | <GU1> | 255 | ANV | Used to identify the signal type, currently it is always **OPEN ACCESS** |
| Additional Information | <GU2> | 255 | ANV | Version of the signal type, currently **2.0** |
| Additional Information | <GU3> | 255 | ANV | Signal type. This can have three values: HEARTBEAT, ALARM and REPORT |
| Additional Information | <GU4> | 255 | ANV | Sequence number, it is the number of the signal sent to the system. |
| Additional Information | <GU5> | 255 | ANV | Originating monitoring station – target Agency. (e.g., ABC-FTNORMFD) |
| Additional Information | <GU6> | 255 | ANV | OPEN ACCESS™ registration ID. |
| Additional Information | <GU7> | 255 | ANV | Action taken, the only value being used now is: dispatched |
| Additional Information | <GU8> | 255 | ANV | Used to return the information that was parsed by the CAD system, and any additional data. It is a free information field, normally it has the following information:<br>**LOC** – complete address<br>**BLDGN** – property name<br>**DSPTC** – dispatcher initials<br>This field format is:<br>*<tag name>* = "*<value>*" *<tag name>* = "*<value>*" …<br>**(the tags are separated by white-spaces)** |

**Figure 8 - Children Element for RSP**

This response message format is used by the heartbeat, the alarm acknowledgement and the alarm report message. However, not all tags are used in all signals. Below is a summary of the currently used children tags in each response signal.

**HEARTBEAT** - <ATS>, <DAY>, <GU1>, <GU2>, <GU3> and <GU4>

**ALARM ACKNOWLEDGEMENT** - <ATS>, <DAY>, <GU1>, <GU2>, <GU3>, <GU4>, <GU5> and <GU6>

**ALARM REPORT MESSAGE** - <ATS>, <DAY>, <FIR>, <GU1>, <GU2>, <GU3>, <GU4>, <GU5>, <GU6>, <GU7> and <GU8>

The acknowledgements for heartbeat, alarm and the report message for the signal shown above are shown in the following figures, 9-5, 9-6 and 9-7 respectively.

```
<?xml version="1.0" standalone="yes" ?>
<RSP type="A" version="NENA4.0">
        <ATS>221024</ATS>
        <DAY>2000-03-05</DAY>
        <GU1>OPEN ACESS</GU1>
        <GU2>2.0</GU2>
        <GU3>HEARTBEAT</GU3>
        <GU4>00121</GU4>
</RSP>
```

**Figure 9 - Sample XML OPEN ACCESS™ Heartbeat Acknowledgement**

```
<?xml version="1.0" standalone="yes" ?>
<RSP type="A" version="NENA4.0">
        <ATS>141024</ATS>
        <DAY>2000-03-05</DAY>
        <GU1>OPEN ACESS</GU1>
        <GU2>2.0</GU2>
        <GU3>ALARM</GU3>
        <GU4>00012</GU4>
        <GU5>ABC-FTNORMFD</GU5>
        <GU6>123456</GU6>
</RSP>
```

**Figure 10 - Sample XML OPEN ACCESS™ Alarm Acknowledgement**

```
<?xml version="1.0" standalone="yes" ?>
<RSP type="I" version="NENA4.0">
      <ATS>141034</ATS>
      <DAY>2000-03-05</DAY>
      <FIR>234567890</FIR>
      <GU1>OPEN ACCESS</GU1>
      <GU2>2.0</GU2>
      <GU3>REPORT</GU3>
      <GU4>00012</GU4>
      <GU5>ABC-FTNORMFD</GU5>
      <GU6>123456</GU6>
      <GU7>dispatched</GU7>
      <GU8>LOC="100 S KEEBLER ST N" BLDGN="ABC INDUSTRIES LTD"
DSPTC="ABC"</GU8>
</RSP>
```

**Figure 11 - Sample XML OPEN ACCESS™ Report Message**

# 10 Appendices

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## Appendix 1 Glossary of Terms

ACK
Communication terminology indicating that a transmission was received successfully

ALI-CAD INTERFACE
Computer to computer interface between telephone company equipment and Computer Aided Dispatch equipment

ALI
Automatic Location Identifier

ANI
Automatic Number Identifier

Asynchronous
Communication term used to specify that traffic need not be at specific timed intervals

BCC
Block Check Character. Used to determine the accuracy of a transmission

Baud Rate
Speed at which data flows over a communications link

CAD
Computer Aided Dispatch

Child Elements
XML term referring to particular tags required by to convey additional information about a particular parent piece of data

E9-1-1
Enhanced 9-1-1. Delivery of specific electronic location data to a dispatch centre for the purpose of dispatching emergency help

Element
XML term referring to a piece of data

Element tags
Names given to identify a particular piece of data. Like fields in a database

ETX
Communication term referring to end of transmission

FRED
First Response Electronic Dispatcher

Full Duplex
Communication term referring to the ability to transfer data in two directions at the same time.

Heartbeat
Communication term referring to a periodic transmission between systems used to monitor the hardware link status

NAK
Communication term used to indicate unsuccessful data transmission

OPEN ACCESS™
Term used to describe the network and equipment required to deliver an alarm signal to a Fire Department

OPEN ACCESS™ Basic Communication Interface
Communication interface based on Bell BID-0013 interface specification to deliver alarm data to a Fire Dept electronically

Parity
Method used to determine data validity and correctness

PSAP
Public Safety Answering Point

ROOT
Element at the top of a tree structure. All subsequent elements fall below this point

Start Bit
A change in bit status to indicate that data is beginning to flow over a data link

Stop Bit
A change in bit status to indicate that data flow is ending

STX
Character indicating the beginning of a data message

VER40NENA
Version 4.0 NENA recommended standard

XML
Extensible Mark-up Language

## Appendix 2 Contact Information

OPEN ACCESS™ web site: www.openaccess.ca

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