



## **9-1-1 Public Emergency Reporting Service (9-1-1 PERS)**

**BID-0013**

**Version 16 – September 2012**

**Terminal-to-Network Interface**

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## TABLE OF CONTENTS

<b>1.0</b>	<b>SERVICE DESCRIPTION .....</b>	<b>7</b>
<b>2.0</b>	<b>FEATURES DESCRIPTION .....</b>	<b>9</b>
2.1	SELECTIVE ROUTING .....	9
2.2	AUTOMATIC NUMBER IDENTIFICATION (ANI) .....	9
2.3	AUTOMATIC LOCATION IDENTIFICATION (ALI) .....	9
2.4	CALL HOLD (CALLED PARTY HOLD) AND BUREAU FORCED DISCONNECT .....	9
2.5	ENHANCED CALLED PARTY HOLD (ALIAN-TATLANTIC ONLY) .....	9
2.6	CALLING PARTY SWITCH HOOK STATUS .....	9
2.7	RINGBACK TO E9-1-1 CALLER.....	9
2.8	FIXED CALL CONFERENCE AND TRANSFER .....	10
2.9	SELECTIVE CALL CONFERENCE AND TRANSFER .....	10
2.10	WIRELESS LOCATION .....	10
2.11	PSAP-INITIATED IN CALL LOCATION UPDATE (ICLU).....	10
2.12	REVERSE ALI .....	10
2.13	MISSED 9-1-1 CALL.....	10
<b>3.0</b>	<b>OVERVIEW OF CALL IN PROGRESS.....</b>	<b>11</b>
<b>4.0</b>	<b>VOICE INTERFACE CHARACTERISTICS .....</b>	<b>12</b>
4.1	PLAIN OLD TELEPHONE SET (POTS) INTERFACE .....	12
4.2	ELECTRONIC BUSINESS SET (EBS) INTERFACE.....	12
<b>5.0</b>	<b>VOICE FEATURE ACTIVATION .....</b>	<b>13</b>
5.1	SELECTIVE CALL CONFERENCE AND TRANSFER (THREE-WAY CONFERENCE) .....	13
5.1.1	POTS Interface .....	13
5.1.2	EBS Interface.....	13
5.2	RINGBACK TO E9-1-1 CALLER.....	13
5.2.1	POTS Interface .....	14
5.2.2	EBS Interface.....	14
<b>6.0</b>	<b>DATA INTERFACE CHARACTERISTICS .....</b>	<b>15</b>
6.1	PHYSICAL DESCRIPTION .....	15
6.2	DATA NETWORK .....	15
6.3	SERVICE DEMARCATION AT THE PSAP .....	15
6.4	COMMUNICATION REQUIREMENTS AT SERVICE DEMARCATION POINT .....	16
6.5	DATA LINK MANAGEMENT .....	16
<b>7.0</b>	<b>DATA APPLICATION PROTOCOL DEFINITION .....</b>	<b>17</b>
7.1	OVERALL COMMUNICATION DIAGRAM .....	17
7.2	XML SCHEMA DEFINITION .....	18
7.3	APPLICATION MESSAGES DESCRIPTION .....	19
7.3.1	SessionOpenRequest.....	19
7.3.2	SessionOpenResponse.....	20
7.3.2.1	Status .....	20
7.3.3	SessionOk.....	20
7.3.4	Advisory .....	21
7.3.4.1	Advisory Types .....	21
7.3.5	Ok.....	22
7.3.6	Request .....	22

7.3.6.1	Query Types .....	23
7.3.7	Response .....	23
7.3.7.1	StatusCode .....	25
7.3.7.2	ALIBody .....	25
7.4	APPLICATION MESSAGE HANDLING.....	32
7.4.1	Session Setup .....	32
7.4.2	Transactions.....	33
7.4.3	Heartbeat.....	33
7.4.4	Session Teardown .....	34
7.4.5	SessionOpenResponse Handling by the AQS Service Provider .....	34
7.4.6	Request Handling by the AQS Service Provider.....	35
7.4.7	OK Handling by the AQS Service Provider .....	35
7.4.8	Advisory Handling by the AQS Service Provider .....	36
7.4.9	Unknown Message Handling by the AQS Service Provider .....	37
7.4.10	Response, SessionOpenRequest and SessionOk Handling by the AQS Service Provider...	38
7.4.11	SessionOpenRequest Handling by the AQS Service Consumer .....	38
7.4.12	Response Handling by the AQS Service Consumer .....	38
7.4.13	SessionOk Handling by the AQS Service Consumer .....	39
7.4.14	Ok Handling by the AQS Service Consumer .....	40
7.4.15	Advisory Handling by the AQS Service Consumer .....	41
7.4.16	Unknown Message Handling by the AQS Service Consumer.....	41
7.4.17	Request and SessionOpenResponse Handling by the AQS Service Consumer.....	41
8.0	DATA FEATURE ACTIVATION .....	42
8.1	WIRELESS LOCATION.....	42
8.2	PSAP-INITIATED IN-CALL LOCATION UPDATE .....	42
8.2.1	Premature ICLU Requests .....	43
8.2.2	Overlapping ICLU Requests.....	43
8.3	REVERSE ALI .....	43
8.4	MISSED 9-1-1 CALLS .....	43
8.5	DEFAULT DISPLAY POSITION .....	44
9.0	COMPUTER-TELEPHONY INTEGRATION .....	45
9.1.1	Private Branch Exchange (PBX).....	45
9.1.2	Key System.....	45
10.0	REFERENCES .....	46

## TABLE OF FIGURES

<b>FIGURE 1</b> : OVERVIEW OF BELL CANADA 9-1-1 PERS (E9-1-1).....	8
<b>FIGURE 2</b> : BELL AQS LAYERED PROTOCOL .....	17
<b>FIGURE 3</b> : BELL AQS OVERALL COMMUNICATIONS DIAGRAM .....	18
<b>FIGURE 4</b> : SESSIONOPENRESPONSE HANDLING BY THE AQS-SP .....	34
<b>FIGURE 5</b> : REQUEST HANDLING BY THE AQS-SP .....	35
<b>FIGURE 6</b> : OK HANDLING BY THE AQS-SP .....	36
<b>FIGURE 7</b> : ADVISORY HANDLING BY THE AQS-SP .....	37
<b>FIGURE 8</b> : UNKNOWN MESSAGE HANDLING BY THE AQS-SP.....	37
<b>FIGURE 9</b> : SESSIONOPENREQUEST HANDLING BY THE AQS-SC .....	38
<b>FIGURE 10</b> : RESPONSE HANDLING BY THE AQS-SC.....	39
<b>FIGURE 11</b> : SESSIONOK HANDLING BY THE AQS-SC .....	39
<b>FIGURE 12</b> : OK HANDLING BY THE AQS-SC.....	40
<b>FIGURE 13</b> : ADVISORY HANDLING BY THE AQS-SC .....	41
<b>FIGURE 14</b> : UNKNOWN MESSAGE HANDLING BY THE AQS-SC.....	41

## TABLE OF TABLES

<b>TABLE 1</b> : SESSIONOPENREQUEST MESSAGE FORMAT .....	20
<b>TABLE 2</b> : SESSIONOPENRESPONSE MESSAGE FORMAT.....	20
<b>TABLE 3</b> : SESSIONOPENRESPONSE STATUS CODE.....	20
<b>TABLE 4</b> : SESSIONOK MESSAGE FORMAT .....	20
<b>TABLE 5</b> : ADVISORY MESSAGE FORMAT .....	21
<b>TABLE 6</b> : ADVISORY TYPES .....	21
<b>TABLE 7</b> : OK MESSAGE FORMAT .....	22
<b>TABLE 8</b> : REQUEST MESSAGE FORMAT .....	23
<b>TABLE 9</b> : QUERY TYPES.....	23
<b>TABLE 10</b> : RESPONSE MESSAGE FORMAT .....	24
<b>TABLE 11</b> : STATUSCODE VALUES .....	25
<b>TABLE 12</b> : ALIBODY MESSAGE FORMAT .....	32

## DOCUMENT HISTORY

Document version	Issue date	Description
15	February 2012	New document superseding BID-13 Version 14 in its entirety. BID-13 Version 14, including all its appendices, is grandfathered.
16	September 2012	Added fields into ALIBody Bell CallInfo Extension : <ul style="list-style-type: none"><li>• PSAPAnswerDateTime</li><li>• NonAnsweredCallDuration</li><li>• TransferringPSAPName</li><li>• TransferringPSAPConferenceDuration</li></ul> Adjusted the response StatusCodes. Added ResultDateTime into ALIBody Bell Geolocation Extension. TrunkId now contains the line or trunk identifier

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

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## FOREWORD

This version of the BID-13 document supersedes all previous versions of BID-13.

It is issued to coincide with the introduction by Bell Canada of a new ALI platform planned for deployment in the third quarter of 2012. This new ALI platform will be IP-based only.

This document does not impact your 9-1-1 voice interface. Only 9-1-1 data is being planned for transition to Internet Protocol (IP) at this time. However, the Line Digital Trunk (LDT) voice interface (associated to the BID-switch<sup>1</sup>) is not compatible with this new ALI platform so PSAPs currently using this technology will require a change to the voice interface when migrating.

This version of the BID-13 introduces a new data interface protocol, natively based on TCP/IP, to support new features and capabilities mandated by the CRTC. This new data interface will be the only one supported on the new ALI platform.

Consequently, the following interfaces will no longer be supported on the new ALI platform and will be grandfathered the date the new ALI platform will be available for service. At that time, new implementations of old interfaces will not be accepted; only augmentations of existing implementations will be considered.

These interfaces will only be supported on the legacy ALI until such time that the legacy ALI platform is decommissioned. This will occur once all PSAPs have migrated to the new 9-1-1 data network in 2013/2014. The grandfathered interfaces listed below will not support any new 9-1-1 enhancements or features.

1. ALI Display Screens and/or Service Printers Link Protocol (formerly Appendix 1 of BID-13, last published as Version 14 – April 2010)
2. Data Transmission Protocol for ALI-CAD Communications using Service Address (formerly Appendix 2 of BID-13, last published as Version 14 – April 2010)
3. Data Transmission Protocol for ALI-PBX Communications (formerly Appendix 3 of BID-13, last published as Version 14 – April 2010)
4. Data Transmission Protocol for ALI-KSI Communications (formerly Appendix 4 of BID-13, last published as Version 14 – April 2010)
5. Data Transmission Protocol for Bid-Switch ALI Links with Service Address (formerly Appendix 5 of BID-13, last published as Version 14 – April 2010)
6. Data Transmission Protocol for ALI-CAD Communications Using Service Address with TCP/IP Interface (formerly Appendix 6 of BID-13, last published as Version 14 – April 2010)

For Bell Aliant – Atlantic region, the following interface document is also superseded by this version of BID-13b:

7. XML Based Data Transmission Protocol for ALI - Generic Customer Premise Equipment Communications Using Service Address (formerly Appendix 7 of BID-13, last published as Version 13 DRAFT – May 2011)

Older versions of BID-13 will be removed from the Bell Canada disclosure site. To request a copy of an older version of the document, please contact the Bell 9-1-1 Product Management contact person.

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<sup>1</sup> As previously communicated in 2010 and 2011, the BID-Switch interface is no longer supported for new implementation and will be discontinued by 2015

## 1.0 SERVICE DESCRIPTION

The **9-1-1 Public Emergency Reporting Service (9-1-1 PERS)** is the provincial-based E9-1-1 service provided by Bell Canada. It supports the carriage of dialled 9-1-1 calls to emergency reporting bureaus and to police, fire and ambulance dispatch centres. The characteristics of the service are:

- Universally recognized 3-digit dialling (9 1 1) for connection to emergency response agencies serving the location of the caller.
- High grade of service (maximum 0.1% probability of call blocking).
- Special features to support the proficiency and effectiveness of E9-1-1 answering attendants.

In a typical operation, the E9-1-1 call is delivered to an answering bureau, also known as a Public Safety Answering Point (PSAP), where the attendant determines the nature of the emergency and forwards the call to the appropriate fire, police or ambulance dispatch centre. The call answering attendant is supported by a number of special features which can facilitate targeted, timely and accurate response.

The E9-1-1 service is associated with all primary exchange services. Local governments are responsible for the answering bureaus and dispatch centres.

The network interfaces described herein conform to those described in Telcordia Technical Reference TR-TSY-000350 [4] and where applicable, to Telcordia Generic Requirements GR-2953-CORE [5].

Implementing E9-1-1 service at any given answering bureau generally involves two (2) network interface types; a voice interface and a data interface.

On the voice side, the E9-1-1 switch is capable of supporting a number of terminal equipment configurations. Agencies can choose to operate with single-line terminal systems, standard key and PBX equipment, or specialized E9-1-1 terminal equipment. Two (2) voice access technologies (see Section 4.0) are available to support these various modes of operation. On the data side, The Bell Canada ALI supports TCP/IP connections to a variety of call taking equipment compliant with the data specifications provided in Section 6.0.



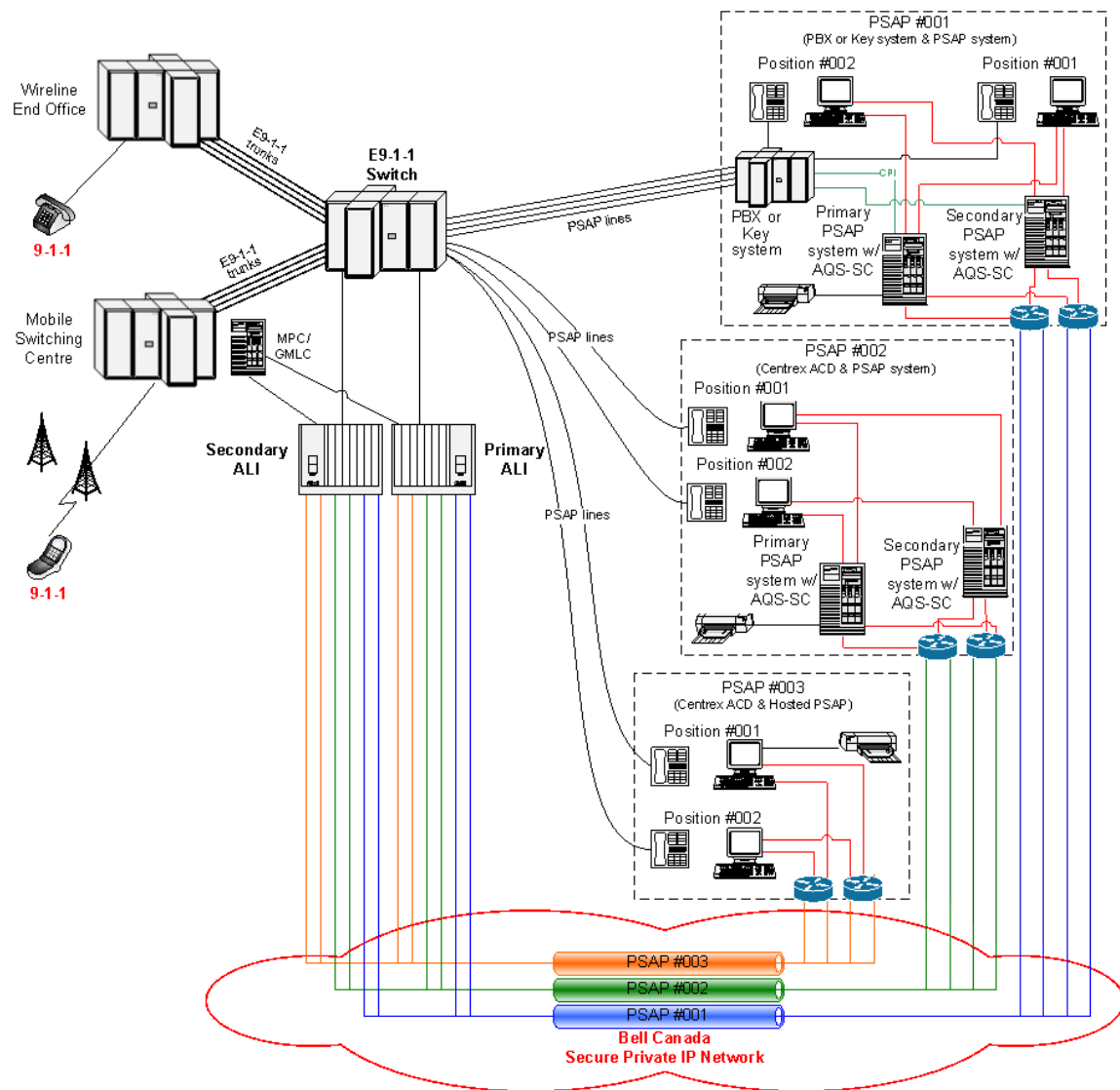


Figure 1 : Overview of Bell Canada 9-1-1 PERS (E9-1-1)

## 2.0 FEATURES DESCRIPTION

The E9-1-1 service, based on Genband's DMS-100™, supports the following network-based features.

### 2.1 Selective Routing

A central network database matches an E9-1-1 caller's address to an Emergency Service Zone (ESZ). The ESZ can represent municipal boundaries, or fire, police, and ambulance serving areas. This feature automatically routes an emergency call to the PSAP serving the E9-1-1 caller.

### 2.2 Automatic Number Identification (ANI)

The E9-1-1 switch receives from the originating switching centre an ANI data record that identifies the telephone number of the 9-1-1 caller. This information is sent to the Automatic Location Information (ALI) System where it is processed to provide ALI and a record of the call.

### 2.3 Automatic Location Identification (ALI)

The network resident ALI feature delivers call and caller related information to a conforming PSAP terminal equipment so it can display on the call attendant's terminal the 9-1-1 caller's name, address and telephone number. The ALI information is delivered from the network to the PSAP terminal equipment in XML format over a TCP/IP connection. This feature can assist in situations where the caller is unable to verbally communicate with the attendant.

### 2.4 Call Hold<sup>2</sup> (Called Party Hold) and Bureau Forced Disconnect

The PSAP has full control of the call. The end-to-end connection is maintained until a valid on-hook signal is sent from the PSAP to the network. This prevents the call originator from inadvertently terminating the call. This network resident feature is inherent to the E9-1-1 network. The E9-1-1 trunk is released only when an on-hook signal is received from the bureau.

### 2.5 Enhanced Called Party Hold<sup>3</sup> (Aliant-Atlantic only)

This network feature, a complement to Called Party Hold, allows the voice circuit to be established even though the PSAP attendant hasn't yet answered when the caller hangs up. Once the attendant picks up, regular connection hold capabilities apply. Therefore, if the caller picks up again, his conversation with the attendant will resume.

### 2.6 Calling Party Switch Hook Status<sup>4</sup>

This network feature automatically provides the PSAP with an audible signal (Switch Hook Status) to indicate when the calling party has gone on-hook. This tone is within the voice band and passed over the established voice path.

### 2.7 Ringback<sup>5</sup> to E9-1-1 Caller

This network feature allows the PSAP to generate ringing to the caller's set that is on-hook or apply Receiver Off-Hook (ROH) tone to an off-hook set. The feature is activated by a hook-flash signal and access code (see Section 5.2).

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<sup>2</sup> This feature is not available for E9-1-1 calls originated from circuit-switched wireless networks and certain types of Voice over IP (VoIP) services.

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

## **2.8 Fixed Call Conference and Transfer**

This network feature gives the PSAP the ability to add on (conference) a secondary agency by activating a transfer code<sup>6</sup> associated with that specific agency. If a secondary agency is defined as an emergency bureau served with direct E9-1-1 access lines, all E9-1-1 features are transferred with the call.

## **2.9 Selective Call Conference and Transfer**

This network feature gives the PSAP the ability to add on (three-way calling) a secondary agency by activating a transfer code associated with the type of agency required (see Section 5.1). The ESZ from the network resident database is used to make the appropriate connection to, for example, the predefined fire dispatch serving the E9-1-1 caller, if a fire department is required.

## **2.10 Wireless location**

This network feature provides the PSAP with the location information for wireless callers. It automatically provides an initial static location based on the cellular tower location (Phase I), followed a few seconds after with geolocation coordinates in the form of a longitude, latitude and radius of uncertainty (Phase II stage 1).

## **2.11 PSAP-initiated In Call Location Update (ICLU)**

This network feature provides the ability for a PSAP call taker to manually request a location update for a wireless E9-1-1 call in progress (Phase II stage 2) that has previously received the initial Wireless Phase II information.

## **2.12 Reverse ALI**

This network feature provides the ability for a PSAP call taker to manually request an ALI record for any given fixed POTS service (wireline, fixed VoIP), irrespective of whether or not a 9-1-1 call is in progress for that service. However it is imperative to note that access to ALI data is only permitted for immediate 9-1-1 calls and emergency situation that constitute an immediate or imminent threat to life and public safety. ALI data cannot be used for investigative and non 9-1-1 or emergency purposes.

## **2.13 Missed 9-1-1 Call**

This network feature provides the ability for a PSAP to receive ANI/ALI advising of missed 9-1-1 calls. These calls may or may not generate a ring-cycle at the PSAP however a 9-1-1 call was placed and abandoned prior to being answered at the PSAP.

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<sup>6</sup> Speed dial codes are defined locally

### 3.0 OVERVIEW OF CALL IN PROGRESS

When the subscriber dials 9-1-1, the call along with the caller's ANI (and pseudo-ANI – pANI for wireless-originated calls), is routed from the originating switching centre over a dedicated E9-1-1 trunk to an E9-1-1 switch. The E9-1-1 switch matches the ANI/pANI to an ESZ and route the call to the appropriate emergency reporting bureau serving the particular geographic location of the caller.

Display of ALI and ANI data to the PSAP attendant is provided as follows. In general, when the PSAP answers the 9-1-1 call, the E9-1-1 switch produces a record containing ANI information plus identification of the agency and line to which the call was routed. This data is forwarded to the ALI System for processing after which the data can be displayed to the call attendant.

If the call is delivered to a key or PBX system, or to specialized E9-1-1 terminal equipment using Call Position Identification (CPI), additional information may be required by the PSAP system to support the ALI feature. This information, not natively available at the ALI, can include the incoming voice line number and the position ID of the agent, typically provided by the voice or CPI equipment. The PSAP system must locally map and aggregate this information with the XML data provided by the ALI, allowing it to route the address and related information for display on the appropriate attendant's data terminal. Please refer to Section 9.0 for additional information.

The role of the primary PSAP (P-PSAP) is to determine the nature of the caller's emergency, and transfer the call to the appropriate agency, usually a fire, police or ambulance service, also known as a secondary PSAP (S-PSAP). The call process described above is repeated as the call is transferred at the E9-1-1 switch to an access line connecting to the S-PSAP.

## **4.0 VOICE INTERFACE CHARACTERISTICS**

The voice terminal at the PSAP is connected directly to the E9-1-1 switch. Standard analog primary exchange service access arrangements are described herein below. The interfaces must comply with the requirements given in Reference [6].

The voice terminal can be a telephone set, a Private Branch Exchange (PBX), a key system or any other voice equipment that complies with the specifications herein.

### **4.1 Plain Old Telephone Set (POTS) Interface**

POTS Tip-and-Ring loop start interface.

In order to activate the network based features the voice terminal must be able to produce a standard hook flash (momentary on-hook condition of  $550 \pm 50\text{ms}$ ) and standard DTMF dialling tones.

### **4.2 Electronic Business Set (EBS) Interface**

The EBS interface is specified in Reference [1].

When specific keys are activated, the terminal equipment generates predefined codes. The E9-1-1 switch interprets these codes and performs the appropriate function. It is critical to discuss 9-1-1 requirements with your vendor/supplier in order to ensure set compatibility with specifications and features.

## 5.0 VOICE FEATURE ACTIVATION

### 5.1 Selective Call Conference and Transfer (Three-Way Conference)

The following is a brief description of steps required to establish a selective three-way conference and transfer.

#### 5.1.1 POTS Interface

When the attendant needs to connect a third party to the call in progress, the terminal shall produce a hook-flash ( $550 \pm 50\text{ms}$  on-hook). The E9-1-1 switch will respond by returning dial tone (350Hz + 440Hz at -13dBm0/frequency at the switch) to the terminal. The terminal then generates three digit DTMF code (\*NN<sup>7</sup>). The call is then automatically bridged to a three-port conference bridge.

**Notes:**

- *If the P-PSAP attendant who has originated the three-way call sends another hook-flash, the S-PSAP, which was added on, will be disconnected by the network.*
- *If the S-PSAP disconnects before the P-PSAP (the original recipient of the call), the network will leave the call with the P-PSAP.*
- *If the conference originator's terminal at the P-PSAP is placed on-hook while on a three-way call, the E9-1-1 call will be automatically transferred to the S-PSAP by the network.*
- *If the E9-1-1 caller goes on-hook after the emergency call has been answered at the P-PSAP, the terminal will receive the dial tone from the switch. The P-PSAP shall be able to originate a Ringback to the caller (see Section 5.2).*

#### 5.1.2 EBS Interface

For lines equipped with an Electronic Business Set (EBS), the voice terminal shall be capable of producing messages to the E9-1-1 switch which corresponds to the conference call command as defined in Reference [1]. The E9-1-1 switch will be programmed to interpret the message and will perform the three-way conference.

**Notes:**

- *If the P-PSAP attendant who has originated the three-way call produces another "conference call" command, the S-PSAP, which was added on, will be disconnected by the network.*
- *If the S-PSAP disconnects before the P-PSAP (the original recipient of the call), the network will leave the call at the P-PSAP.*
- *If the conference originator's terminal at the P-PSAP is placed on-hook while on a three-way call, the E9-1-1 call will be automatically transferred to the S-PSAP by the network.*
- *If the E9-1-1 caller goes on-hook after originating the emergency call, the terminal shall prompt the attendant. The bureau can originate a Ringback to the caller (see Section 5.2).*

### 5.2 Ringback<sup>8</sup> to E9-1-1 Caller

The Ringback feature can be activated by the PSAP during a two-party call. When the set originating the E9-1-1 call is placed on-hook, the call receiving agent shall be able to ring

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<sup>7</sup> The « NN » code is defined locally

<sup>8</sup> This feature is not available for E9-1-1 calls originated from circuit-switched wireless networks and certain types of Voice over IP (VoIP) services.

back the call originating set. If the originating set is off-hook, the agent shall be able to deliver an audible tone (typically Receiver-Off-Hook – ROH) to the originator's receiver.

#### **5.2.1 POTS Interface**

Where applicable, when the Ringback feature is to be activated by the call receiving terminal:

- a) The terminal produces a hook-flash. The E9-1-1 switch returns dial tone to the PSAP attendant's terminal;
- b) The PSAP attendants terminal generates a three-digit DTMF Ringback code (\*NN);
- c) For an originating set in an on-hook state, the E9-1-1 switch then requests the emergency call originating switch to provide the ringing signal which is delivered to the on-hook call originating terminal. When the feature is activated an audible ring will be heard by the PSAP attendant;
- d) For an originating set in an off-hook state, the E9-1-1 switch then requests the emergency call originating switch to provide the audible tone (typically Receiver-Off-Hook – ROH) which is delivered to the on-hook call originating terminal. When the feature is activated an audible ring will be heard by the PSAP attendant.

#### **5.2.2 EBS Interface**

For lines equipped with an EBS, the terminal equipment shall be capable of producing messages to the E9-1-1 switch which corresponds to the Ringback command as defined in Section 5.2.1. The E9-1-1 switch will interpret these messages and perform the Ringback.

## 6.0 DATA INTERFACE CHARACTERISTICS

A data link is required by the ALI to convey customer name and address information to the PSAP. The only data interface supported by the Bell Canada ALI is based on the National Emergency Number Association (NENA) ALI Query Service specification [7], hereinafter referred to as "Bell AQS". This data interface is XML-based and requires an IP connection at the PSAPs.

A number of peripheral systems can be interfaced directly with the ALI platform using this protocol. These systems could facilitate, for example, a visual display of information associated with the emergency call. Systems such as Computer Aided Dispatch (CAD) could be used to enhance the response capability of the PSAP. Systems communicating directly with the ALI must use TCP/IP and be XML-literate and compliant with the technical specifications defined herein.

### 6.1 Physical Description

The Bell Canada ALI platform consists of a pair of geo-redundant systems. The ALI systems operate as primary/secondary and, facing the PSAP, in an active/active mode. As such, each ALI system will attempt to connect to each PSAP system (call-taking equipment, CAD, etc.) on the standard service port 9110. The PSAP system must then be able to accept more than one (1) connection on its service port 9110. For reliability purposes, it is recommended that a minimum of two (2) redundant PSAP systems be deployed at the PSAP. In such implementation, a total of four (4) distinct TCP/IP connections may be established. TCP/IP connections are conveyed over dedicated and secure IP-VPN circuits deployed at the PSAP premise.

In Push mode, for wireline and wireless calls, both ALI systems will send the initial response message to each PSAP system, so a total of four (4) response messages will be sent.

In Pull mode, the request can be made on any or all connections simultaneously. The response will be returned on the same connection(s) where the request came from. If the PSAP elects to have a second systems for redundancy, its second system should also do a display request. Making multiple requests over different connections allows for the response to be still received at the PSAP in the case of a system or network failure.

### 6.2 Data Network

To support the Bell AQS data interface, Bell Canada will deploy dedicated and secure IP-VPN to the PSAP premise(s). Each IP-VPN circuit terminates on a Customer Edge (CE) router owned and managed by Bell Canada. By virtue of the network design, the PSAP will only be able to communicate with the Bell Canada ALI systems over these links.

### 6.3 Service Demarcation at the PSAP

The CE router deployed at the customer premise is designated at the service demarcation device. More specifically, the physical demarcation point between Bell Canada and the PSAP is the physical Local Area Network (LAN) interface of the CE router.

It is therefore the responsibility of the PSAP to supply suitable cabling, connectors and interworking components to connect their LAN to Bell Canada's LAN interface of the CE router.



#### 6.4 Communication Requirements at Service Demarcation Point

The LAN interface of the CE router is specified as follows:

- Connector type: RJ-45
- Interface type: Fast Ethernet (100Mbps), full duplex
- Specification: IEEE 802.1Q (VLAN tagging)
- ALI designated VLAN ID: 008

**Note:** VLAN ID 009 and 007 should be reserved on the PSAP LAN for future use.

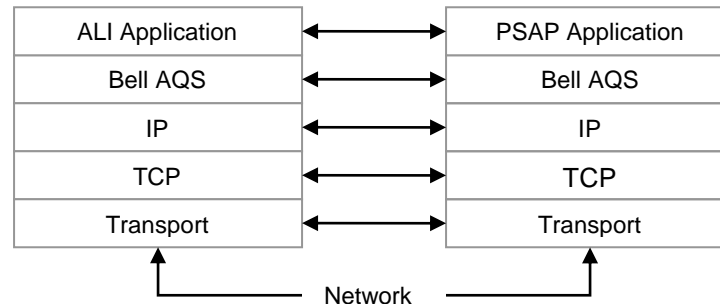
#### 6.5 Data Link Management

Only the ALI can establish a data connection. Both ALI systems, the primary and the secondary, will establish the connections with all of the PSAP systems.

If an ALI gets an error when trying to open a connection, or a connection times out, the ALI will continuously retry every 30 seconds. The number of retries is unlimited.

## 7.0 DATA APPLICATION PROTOCOL DEFINITION

This section outlines the protocol and message format for the exchange of information between the ALI systems and PSAP systems. A PSAP system in this context is commonly referred to an application hosted at the PSAP premise which formats the information provided by the ALI in the proper template before actually displaying it at the call taker position. Consequently, a printer or a dumb terminal cannot be directly interfaced with the ALI using this protocol.



**Figure 2 : BELL AQS layered protocol**

This Bell AQS protocol executes on top of the network transport protocol as shown in Figure 2. It does not deal with the interpretation of the data contents; this task is left to the appropriate application layer at the PSAP end. The underlying protocol between Bell AQS and the ALI system is TCP/IP.

The Bell ALI application functions primarily in Push mode. In this mode, the ALI application receives the display request from the E9-1-1 Switch and pushes the display information to all the PSAP application that are configured for the answering position that answered the 9-1-1 call.

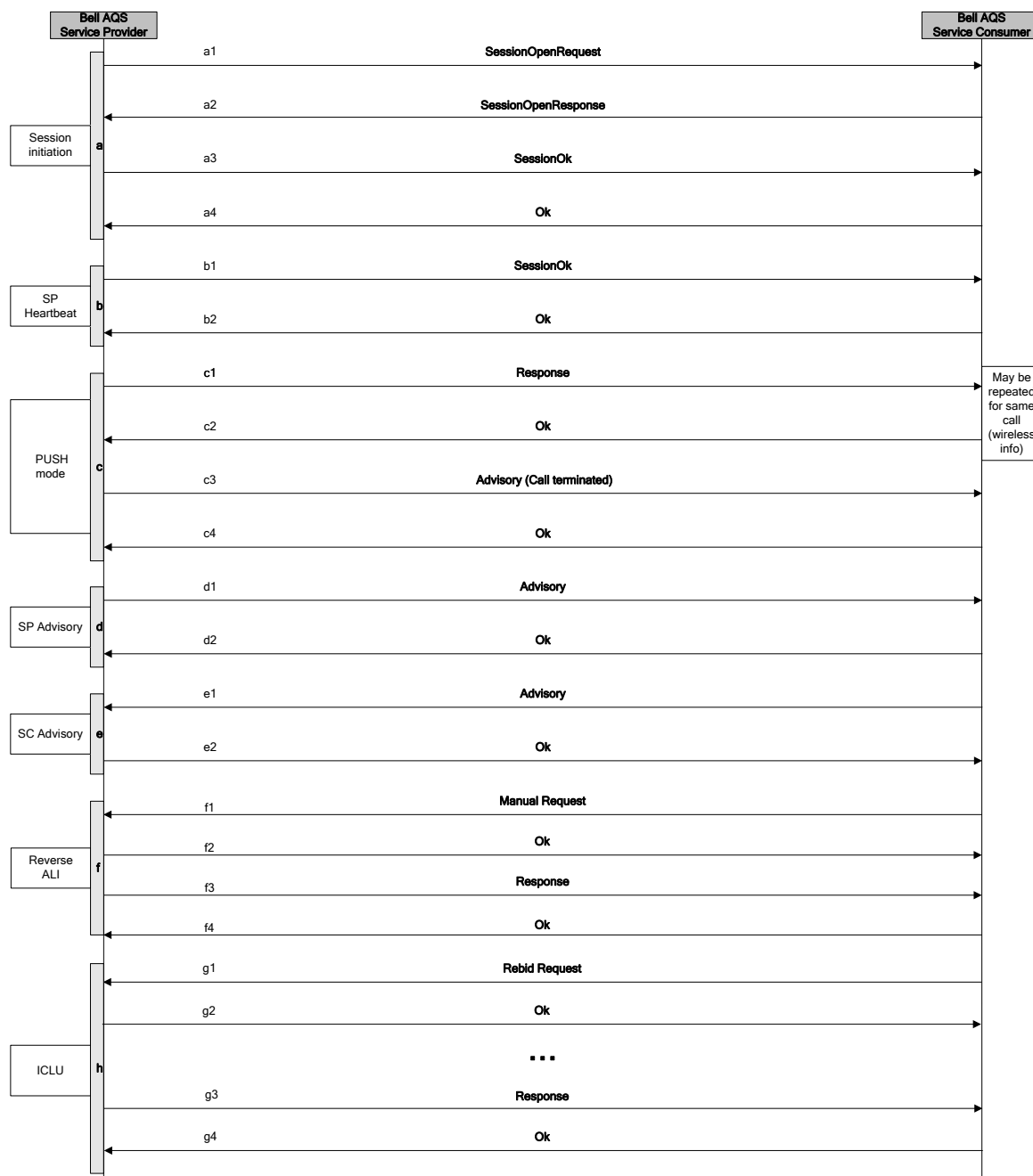
The ALI Pull services, Reverse ALI and In-Call Location Update (ICLU), are also supported. Both features will be available to any PSAP system.

With these Pull mode services, the ALI application receives the display information request from a PSAP application and it responds back to that single PSAP application with the display information.

In the case of an ICLU request received from the PSAP application(s), the ALI sends a request for an updated location to the corresponding Wireless Service Provider (WSP). When the location update response is received, the new display information identifying the answering position that has sent the request is pushed to the PSAP application. ICLU requests are honoured by both the primary and secondary ALI system, and each individual request is typically responded to.

### 7.1 Overall Communication Diagram

The following diagram represents the various communication patterns between the Bell AQS Service Provider client application (the ALI) and the AQS Service Consumer server application (the PSAP system).



**Figure 3** : Bell AQS overall communications diagram

## 7.2 XML Schema Definition

The Bell AQS implementation is based on the NENA XML schema definitions package Version 4.2 [8]. Specifically, Bell Canada has implemented the following:

- ALITypeLib.xsd (version 4.2)
- ALI.xsd (version 4.2)
- AQS.xsd (version 1.0)
- AQS.TCP.xsd (version 0.2)

Bell Canada-specific extension elements have been created where necessary. Those are specified in the following XML schema definitions:

- BellALITypeLib.xsd (version 1.4)
- BellALIBodyExt.xsd (version 1.4)
- BellAdvisoryDetailedExt.xsd (version 1.4)
- BellQueryPropertiesExt.xsd (version 1.4)
- BellAQSExt.xsd (version 1.4)

A Companion XML schemas package containing the Bell AQS specific XSD files and XML examples is available from the disclosure web site. The NENA AQS specific XML schema package is available from the NENA web site [8].

PSAP systems must implement the XML schema definitions (XSD) defined by Bell Canada in their entirety, with proper XSD validation inbound and outbound. Optional elements and attributes in the schemas that are not used by Bell Canada at the moment of this publication could be populated in the future; it is up to the PSAP system implementations to allow for new fields respecting the existing XSD validations to be populated at any point, without impacting the service<sup>9</sup>.

**Notes:**

- *The schema definitions provided by Bell take precedence over this document should discrepancies are found.*
- *Given that all XML elements are nominally specified in the parent NENA XML schemas, this document may not be updated when an already specified optional element is introduced on the Bell AQS Service Provider client application. However, PSAPs will be notified of such through the regular communications channels.*
- *The declared protocol version is 1.4. This version number will be specified in the SessionOpenRequest from the AQS Service Provider and shall be mirrored in the SessionOpenResponse from the AQS Service Consumer, otherwise, the AQS-SP will refuse the connection with a VersionMismatch message.*

### 7.3 Application Messages description

This section describes the application messages of the protocol. When appropriate, variations between the schemas and the Bell AQS application are highlighted herein. Attributes and elements of interest to the application are further explained below

The Bell AQS implementation requires an inter-message boundary (IMB) to facilitate parsing of the XML messages from a TCP stream. The syntax of the boundary is that of a single root XML document with no associated namespace so it can also be recognized by streaming XML parsers.

**<urn.nenaorg.dtc.aqstcp.IMB/>**

The IMB is not an AQS.TCP message and thus is not defined by the AQS.TCP schema.

The IMB is mandatory following each XML message sent from one end point to the other.

#### 7.3.1 SessionOpenRequest

Only the Bell AQS Service Provider client application (AQS-SP) can initiate a session. This message is sent by the AQS-SP to the Bell AQS Service Consumer server application (AQS-SC) to set up a communication session. It provides the AQS-SC with the session parameters to be used for the communication. See the 'Session Setup' section for details on how this message is used.

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<sup>9</sup> It is a common best practice to ignore well-formed XML elements not recognized

Parameter	Application Requirement	Description
version	<b>Mandatory</b> (optional in schema)	The most recent protocol version supported by the AQS-SP.
		<SessionOpenRequest ... version="1.4" ... >
SessionOkInterval	<b>Mandatory</b> (optional in schema)	Duration that a connection will remain quiet until a SessionOk message must be sent. This field is of type <i>xs:duration</i> , a description of this type can be found at <a href="http://www.w3.org/TR/xmlschema-2/#duration">http://www.w3.org/TR/xmlschema-2/#duration</a> . In short, PT10S means 10 seconds.
		<SessionOpenRequest ... > <SessionOkInterval>PT10S</SessionOkInterval>
SessionOkMissedLimit	<b>Mandatory</b> (optional in schema)	Number of SessionOkInterval periods to wait before considering the connection as lost.
		<SessionOpenRequest ... > <SessionOkMissedLimit>3</SessionOkMissedLimit>

**Table 1 : SessionOpenRequest message format**

### 7.3.2 SessionOpenResponse

This message is sent by the AQS-SC in response to a SessionOpenRequest message. It provides the AQS-SC acknowledgement on the communication parameters back to the AQS-SP. See the 'Session Setup' section for details on how this message is used.

Parameter	Application Requirement	Description
status	<b>Mandatory</b>	This is the AQS-SC response to the SessionOpenRequest from the AQS-SP. See Status table below.
		<SessionOpenResponse ... status="urn:nena-org:dtc:aqstcp:status:Ok" ... />
version	Optional	The most recent protocol version supported by the AQS-SC.
		<SessionOpenResponse ... version="1.4" ... />

**Table 2 : SessionOpenResponse message format**

#### 7.3.2.1 Status

Value	Description
urn:nena-org:dtc:aqstcp:status:Ok	This is the positive acknowledgement status. The session opening request and the protocol version are accepted by the AQS-SC.
urn:nena-org:dtc:aqstcp:status:VersionMismatch	The protocol version requested by the AQS-SP is not supported by the AQS-SC. In that case the AQS-SC must provide its protocol version.
urn:nena-org:dtc:aqstcp:status:ServiceNotReady	The AQS-SC is not ready to establish a communication session.
urn:nena-org:dtc:aqstcp:status:RedundantSession	A session is already opened.

**Table 3 : SessionOpenResponse Status Code**

### 7.3.3 SessionOk


The SessionOk message is used in the heartbeat process to keep the connection between the two systems warm. See the Heartbeat section for details on how this message is used.

Parameter	Description
None	<SessionOK/>

**Table 4 : SessionOk message format**

### 7.3.4 Advisory

This message is used by either end-point to provide special event notifications to the other party. The sender is expecting an Ok message back as a reception confirmation to the Advisory message.

Parameter	Description
timestamp	Date/Time the message was sent in datetime format as defined at <a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a> . ex.: "2011-10-14T19:51:10Z". The time zone designator is Z for GMT. <Advisory ... timestamp="2011-10-14T19:51:10Z" ... >
Id	Uniquely identifies a message from any other message from the same end-point. <Advisory> <aqs:Advisory ... Id="BC041" ... >
inRelationTo	It is used to reference the original message the Advisory message is responding to. It must contain the ID field value of the corresponding message. <Advisory > <aqs:Advisory ... inRelationTo="abc123" ...>
AdvisoryType	Type of the advisory. See Advisory Types table below. <Advisory> <aqs:Advisory> <aqs:AdvisoryType> urn:nena-org:dtc:aqs:notif:advisory:Alert </aqs:AdvisoryType>
AdvisoryData	The sub-element Textual provides textual information about the Advisory. <Advisory> <aqs:Advisory> <aqs:AdvisoryData> <aqs:Textual>System error 234985</aqs:Textual>
CallId	 <p>CallId generated by a Service Provider. It is used to correlate multiple responses and CallTerminated advisories. This parameter is specific to Bell. It has been added in BellQueryPropertiesExt.xsd</p> <p>...</p> <p>&lt;aqs:AdvisoryData&gt; &lt;aqs:Detailed&gt; &lt;bcadex:BellAdvisoryDetailedExt&gt; &lt;bcadex:CallId&gt;02418234543200110098&lt;/bcadex:CallId&gt;</p>

**Table 5** : Advisory message format

#### 7.3.4.1 Advisory Types

Value	Description
urn:nena-org:dtc:aqs:notif:advisory:Alert	Generic advisory type for propagating different forms of alerts (ex: Amber Alerts).
urn:nena-org:dtc:aqs:notif:advisory:GoingOutOfService	The end-point is going out of service.
urn:nena-org:dtc:aqs:notif:advisory:CallTerminated	The call ended.
urn:nena-org:dtc:aqs:notif:advisory:appl-x:UnsupportedVersion	Version of AQS-SC is unsupported by the AQS-SP.
urn:nena-org:dtc:aqs:notif:advisory:appl-x:UnreadableMessage	The message received is not in a valid format.

**Table 6** : Advisory Types

### 7.3.5 Ok

The Ok message is a simple acknowledgment message in answer to Request, Response, Advisory and SessionOk messages.

Parameter	Description
timestamp	Date/Time the message was sent in datetime format as defined at <a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a> . ex.: "2011-10-14T19:51:10.000Z". The time zone designator is Z for GMT. This parameter is specific to Bell. It has been added in BellAQSExt.xsd <Ok ... timestamp="2011-10-14T19:51:10.000Z" ... >
inResponseTo	It is used to reference the original message the Ok message is acknowledging. This attribute should be filled when the Ok message is sent in response to a Response message or to an Advisory message. It should be blank when responding to a SessionOk message. This parameter is specific to Bell. It has been added in BellAQSExt.xsd <Ok ... inResponseTo="999"/>

**Table 7** : Ok message format

### 7.3.6 Request

This message is generated by an AQS-SC to query the AQS-SP for 9-1-1 caller information or updated Wireless 9-1-1 caller Phase II location information. It conveys data the ALI can use to perform the 9-1-1 caller information search.

**Notes:**

- The Reverse ALI request is made with the query type set to *urn:nena-org:dtc:aqs:request:Manual* and is used to retrieve wireline subscriber information only.
- The ICLU request is made with the query type set to *urn:nena-org:dtc:aqs:request:Rebid* and is used to retrieve updated wireless Phase II subscriber information, only when the initial Phase II information has been sent to the AQS-SC.

Parameter	Description
timestamp	Date/Time the message was sent in datetime format as defined at <a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a> . ex.: "2011-10-14T19:51:10.000Z". The time zone designator is Z for GMT. <Request ... timestamp="2011-10-14T19:51:10.000Z" ... >
version	AQS-SC Protocol version. <Request ... > <aqs:QueryRequest ... version="1.3" ... >
ID	Uniquely identifies a message from any other message from the same end-point. <Request ... > <aqs:QueryRequest ... ID="ABC1233" ... >
QueryType	Type of the request. See Query Types table below for details. <Request ... > <aqs:QueryRequest ... > <aqs:QueryType>urn:nena-org:dtc:aqs:request:Manual</aqs:QueryType>
FirstPart	Query key. Phone number of the calling subscriber. <Request ... > <aqs:QueryRequest ... > <aqs:QueryKey> <aqs:NumericKey> <aqs: FirstPart>4186913562</aqs: FirstPart>
SecondPart	Query key. Emergency Service Routing DN (ESRD). Used for wireless subscriber. <Request ... > <aqs:QueryRequest ... > <aqs:QueryKey>

Parameter	Description
	<code>&lt;aqs:NumericKey&gt;</code> <code>&lt;aqs:SecondPart &gt;4185113562&lt;\aqs:SecondPart&gt;</code>
TrunkId	PSAP trunk or line identifier from the PSAP voice equipment. <code>&lt;Request ... &gt;</code> <code>&lt;aqs:QueryRequest ... &gt;</code> <code>&lt;aqs:QueryProperties&gt;</code> <code>&lt;aqs:TrunkID&gt;21&lt;\aqs:TrunkID&gt;</code>
CallTakerPosition	Call taker "position number" from the PSAP system. <code>&lt;Request ... &gt;</code> <code>&lt;aqs:QueryRequest ... &gt;</code> <code>&lt;aqs:QueryProperties&gt;</code> <code>&lt;aqs:CallTakerPosition&gt;17&lt;\aqs:CallTakerPosition&gt;</code>

**Table 8** : Request message format

### 7.3.6.1 Query Types

Value	Description
urn:nena-org:dtc:aqs:request:Manual	A discretionary (not call-associated) ALI query. Use for Reverse ALI service.
urn:nena-org:dtc:aqs:request:Rebid	Request done to display updated location information for a live 9-1-1 call that has previously received Wireless Phase II location information. Used for ICLU service.

**Table 9** : Query Types

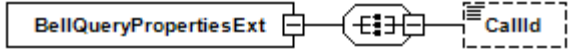
### 7.3.7 Response

This message is generated by the AQS-SP to provide 9-1-1 caller information or updated Wireless 9-1-1 caller Phase II location information. There are 2 cases where a Response is sent without an inResponseTo value:

1. Push Wireline: AQS-SP sends a Response for a wireline customer containing its location info.
2. Push Wireless: AQS-SP sends a Response containing an initial static location based on the cellular tower location (Phase I). A few seconds later, AQS-SP sends a Response containing the geolocation of the wireless customer or a ResultCode and ResultMessage (Phase II).

Parameter	Description
timestamp	Date/Time the message was sent in datetime format as defined at <a href="http://www.w3.org/2001/XMLSchema">http://www.w3.org/2001/XMLSchema</a> . ex.: "2011-10-14T19:51:10.000Z". The time zone designator is Z for GMT. <code>&lt;Response ... timestamp="2011-10-14T19:51:10.000Z" ... &gt;</code>
ID	Uniquely identifies a message from any other message from the same end-point. <code>&lt;Response ... &gt;</code> <code>&lt;aqs:QueryResponse ... ID="2345" ... &gt;</code>
inResponseTo	The ID of the corresponding request message. Will be omitted when there is no corresponding request message such as in ALI Push mode. <code>&lt;Response ... &gt;</code> <code>&lt;aqs:QueryResponse ... inResponseTo="ABC1233" ... &gt;</code>
StatusCode	The status says what kind response the ALI is returning as 9-1-1 caller information. See the StatusCode section below for additional information. <code>&lt;Response ... &gt;</code> <code>&lt;aqs:QueryResponse ... &gt;</code> <code>&lt;aqs:Status&gt;</code> <code>&lt;aqs:StatusCode&gt;urn:nena-org:dtc:aqs:status:Ok&lt;\aqs:StatusCode&gt;</code>
StatusMessage	A textual message that may be part of the status (for display to the call taker). Used to notify of No answer calls with the message 9-1-1 CALL NOT ANSWERED. <code>&lt;Response ... &gt;</code>



Parameter	Description
	<pre>&lt;aqs:QueryResponse ... &gt;   &lt;aqs:Status&gt;     &lt;aqs:StatusMessage&gt;9-1-1 CALL NOT ANSWERED&lt;\aqs: StatusMessage &gt;</pre>
FirstPart	<p>Query key. Phone number of the 9-1-1 caller.</p> <pre>&lt;Response ... &gt;   &lt;aqs:QueryResponse ... &gt;     &lt;aqs:QueryKey&gt;       &lt;aqs:NumericKey&gt;         &lt;aqs:FirstPart&gt;4186913562&lt;\aqs:FirstPart&gt;</pre>
SecondPart	<p>Query key. Optional Emergency Service Routing DN (ESRD) used for wireless subscriber.</p> <pre>&lt;Response ... &gt;   &lt;aqs:QueryResponse ... &gt;     &lt;aqs:QueryKey&gt;       &lt;aqs:NumericKey&gt;         &lt;aqs:SecondPart &gt;4185113562&lt;\aqs:SecondPart &gt;</pre>
TrunkId	<p>PSAP trunk or line identifier from the PSAP voice equipment. In the case of a pushed message (i.e., no request), it is the value received from the E9-1-1 switch that uniquely identifies a PSAP trunk or line where the call has been delivered (the association of TrunkId, ALIBody/NetworkInfo/PSAPID and ALIBody/NetworkInfo/CLLI provides a globally unique identifier); in the case of a response to a request, the field is copied from the request message.</p> <pre>&lt;Response ... &gt;   &lt;aqs:QueryResponse ... &gt;     &lt;aqs:QueryProperties&gt;       &lt;aqs:TrunkID&gt;21&lt;\aqs:TrunkID&gt;</pre>
CallTakerPosition	<p>Call Taker position number. In the case of a pushed message (i.e., no request), it is the value received from the E9-1-1 switch that, for integrated-PSAP (I-PSAP), identifies the call taker position that answered the call, or in the case of PBX/key systems, the PSAP access line identifier provided by the E9-1-1 switch where the call has been delivered. In the case of a response to a request, the field is copied from the request message.</p> <pre>&lt;Response ... &gt;   &lt;aqs:QueryResponse ... &gt;     &lt;aqs:QueryProperties&gt;       &lt;aqs:CallTakerPosition&gt;17&lt;\aqs:CallTakerPosition&gt;</pre>
CallId	<div style="text-align: center;">  </div> <p>CallId generated by a Service Provider. It is used to correlate multiple responses and CallTerminated advisories. This parameter is specific to Bell. It has been added in BellQueryPropertiesExt.xsd</p> <pre>&lt;Response ... &gt;   &lt;aqs:QueryResponse ... &gt;     &lt;aqs:QueryProperties&gt;       &lt;aqs:Extension&gt;         &lt;bcqpex:BellQueryPropertiesExt&gt;           &lt;bcqpex:CallId&gt;02418234543200110098&lt;/bcqpex:CallId&gt;</pre>
ALIBody (See the ALIBody table for element descriptions)	<p>Response message payload. This element carries a Bell AQS ALI data document; it is the root element.</p> <pre>&lt;Request ... &gt;   &lt;aqs:QueryResponse ... &gt;     &lt;aqs:QueryResultData&gt;       &lt;ali:ALIBody&gt; ... &lt;\ali:ALIBody&gt;</pre>

**Table 10 : Response Message format**

### 7.3.7.1 StatusCode

The "StatusCode" field indicates what information is present in the response. The following table lists all the possible StatusCode values along with a short description of their meanings and which fields are present in the response.

Value	Description
urn:nena-org:dtc:aq:status:Ok	Address available
urn:nena-org:dtc:aq:status:OkMore	Indicates to the service consumer that the record includes Phase II location information and can be updated using a subsequent rebid query type request.
urn:nena-org:dtc:aq:status:NotFound	No address available.
urn:nena-org:dtc:aq:status:Responder	Generic status value for service provider faults (Ex: out of resources, ...)
urn:nena-org:dtc:aq:status:Requester	Generic status value for service consumer faults (ex: QueryRequest message not well-formed or invalid).
urn:nena-org:dtc:aq:status:AnonymousCall	Message with ANI "000-911-0000". This situation usually occurs when the PSAP telephone number has been dialled directly instead of the digits 9-1-1. Typically for non 9-1-1 routed calls, 9-1-1 features are not available.
urn:nena-org:dtc:aq:status:ANIFailure911	Message ESCO with an ANI format of NPA-911-XXXX.
urn:nena-org:dtc:aq:status:ANIfailure000	Message with ANI "000-000-0000".
urn:nena-org:dtc:aq:status:RequestRefused	Service provider cannot honour the requested query. No ALIBody is provided.
urn:nena-org:dtc:aq:status:RequestDuplicate	Service provider has discarded the request because it was considered redundant. Used to refuse multiple concurrent requests for the same telephone number.

**Table 11** : StatusCode values

### 7.3.7.2 ALIBody

Parameter	Description
schemaVersion	AQS protocol version. ... <ali:ALIBody ... schemaVersion="1.4" ... >
<b>CallInfo</b>	Call data elements.
CallbackNum	TN that can be dialled to reach a specific calling party (Telephone Number, ELIN). In an ALI response, this number may be different than the CallingPartyNum for Wireless calls. ... <ali:CallInfo> <ali:CallbackNum>4128341234</ali:CallbackNum>
CallingPartyNum	Phone number as a location identifier (Telephone Number, ELIN or ESRD). ... <ali:CallInfo> <ali:CallingPartyNum>4128341235</ali:CallingPartyNum>
<b>LocationInfo</b>	Call location data elements
<b>StreetAddress</b>	
HouseNum	House number ... <ali:LocationInfo ... > <ali:StreetAddress> <ali:HouseNum>142</ali:HouseNum>
HouseNumSuffix	House number extension (i.e. -1/2). ...

Parameter	Description
	<code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:StreetAddress&gt;</code> <code>&lt;ali:HouseNumSuffix&gt;-1/2&lt;/ali:HouseNumSuffix&gt;</code>
StreetSuffix	Valid street abbreviation (e.g. AV). ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:StreetAddress&gt;</code> <code>&lt;ali:StreetSuffix&gt;ST&lt;/ali:StreetSuffix&gt;</code>
MSAGCommunity	Valid service community name as identified by the MSAG. ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:StreetAddress&gt;</code> <code>&lt;ali:MSAGCommunity&gt;MONTREAL&lt;/ali:MSAGCommunity&gt;</code>
StateProvince	Canadian province abbreviation. ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:StreetAddress&gt;</code> <code>&lt;ali:StateProvince&gt;QC&lt;/ali:StateProvince&gt;</code>
PostalZipCode	Postal Code ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:StreetAddress&gt;</code> <code>&lt;ali:PostalZipCode&gt;G6Z1N9&lt;/ali:PostalZipCode&gt;</code>
LocationDescription	Free formatted location information providing more specific or complementary location of the calling party or cell tower. The location should be specific enough to provide a reasonable opportunity for the emergency response team to quickly locate a caller anywhere within it. This information may be displayed at the PSAP. ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:StreetAddress&gt;</code> <code>&lt;ali:LocationDescription&gt;UP THE STAIRWAY AND TURN LEFT&lt;/ali:LocationDescription&gt;</code>
<b>GeoLocation</b>	
Latitude	Latitude coordinates in decimal format. +lat: north of equator; -lat: south of equator. When Phase II location cannot be provided, Phase I information should be reported when available. ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:GeoLocation&gt;</code> <code>&lt;ali:Latitude&gt;123.23456&lt;/ali:Latitude&gt;</code>
Longitude	Longitude coordinates in decimal format. +long: east of Greenwich; -long: west of Greenwich. When Phase II location cannot be provided, Phase I information should be reported when available. ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:GeoLocation&gt;</code> <code>&lt;ali:Longitude&gt;-89.12345&lt;/ali:Longitude&gt;</code>
Uncertainty	Indicates the radius of uncertainty expressed in meters representing the size of the area in which the wireless carrier's network estimates, at the defined confidence level, where the calling party may be located. ... <code>&lt;ali:LocationInfo ... &gt;</code> <code>&lt;ali:GeoLocation&gt;</code> <code>&lt;ali:Uncertainty&gt;18&lt;/ali:Uncertainty&gt;</code>
Confidence	The Confidence level of the wireless carrier's network that the calling party lays within the bounds defined by the radius of uncertainty. Expressed as a percentage value (e.g. 90).

Parameter	Description
	... <ali:LocationInfo ... > <ali:GeoLocation> <ali:Confidence>90</ali:Confidence>
DateStamp	Date and Time of position determination if available from the WSP, provided in GMT (Zulu Time) by WSP. ... <ali:LocationInfo ... > <ali:GeoLocation> <ali>DateStamp>2001-12-17T09:30:47.000Z</ali>DateStamp>
LocationDescription	Free formatted location information providing more specific or complementary location of the calling party. The location should be specific enough to provide a reasonable opportunity for the emergency response team to quickly locate a caller anywhere within it. This information may be displayed at the PSAP. ... <ali:LocationInfo ... > <ali:GeoLocation> <ali:LocationDescription>LAT: 46 49 50.041N LONG: 71 11 26.753W CONF:90 UNC:100</ali:LocationDescription>
<b>Agencies</b>	Emergency Service Zone (ESZ) related data elements
Name (Police)	Name of Law enforcement Service Responder associated with the ESN of the caller. N/A if not available. ... <ali:Agencies> <ali:Police> <ali:Name>RCMP</ali:Name>
TN (Police)	Telephone number of Law enforcement Service Responder. Set to 0000000000 if not available. ... <ali:Agencies> <ali:Police> <ali:TN>4185552234</ali:TN>
Name (Fire)	Name of the Fire Department Service responder associated with the ESN of the caller. N/A if not available. ... <ali:Agencies> <ali:Fire> <ali:Name>Cresent</ali:Name>
TN (Fire)	Telephone number of Fire Department Service. Set to 0000000000 if not available. ... <ali:Agencies> <ali:Fire> <ali:TN>4185551134</ali:TN>
Name (EMS)	Name of the Emergency Medical Service responder associated with the ESN of the caller. N/A if not available. ... <ali:Agencies> <ali:EMS> <ali:Name>Maguire</ali:Name>
TN (EMS)	Telephone number of Law enforcement Service Responder. Set to 0000000000 if not available. ... <ali:Agencies> <ali:EMS> <ali:TN>4185551224</ali:TN>
Name (Agency 4)	Name of the agency 4. N/A if not available. ...

Parameter	Description
	<code>&lt;ali:Agencies&gt;</code> <code>&lt;ali:OtherAgencies&gt;</code> <code>&lt;ali:Agency&gt;</code> <code>&lt;ali:Name&gt;poison&lt;/ali:Name&gt;</code>
TN (Agency 4)	Telephone number of the agency 4. Set to 0000000000 if not available. ... <code>&lt;ali:Agencies&gt;</code> <code>&lt;ali:OtherAgencies&gt;</code> <code>&lt;ali:Agency&gt;</code> <code>&lt;ali:TN&gt;4185551233&lt;/ali:TN&gt;</code>
Name (Agency 5)	Name of the agency 5. N/A if not available. ... <code>&lt;ali:Agencies&gt;</code> <code>&lt;ali:OtherAgencies&gt;</code> <code>&lt;ali:Agency&gt;</code> <code>&lt;ali:Name&gt;azmat&lt;/ali:Name&gt;</code>
TN (Agency 5)	Telephone number of the agency 5. Set to 0000000000 if not available. ... <code>&lt;ali:Agencies&gt;</code> <code>&lt;ali:OtherAgencies&gt;</code> <code>&lt;ali:Agency&gt;</code> <code>&lt;ali:TN&gt;4185554234&lt;/ali:TN&gt;</code>
Name (Agency 6)	Name of the agency 6. N/A if not available. ... <code>&lt;ali:Agencies&gt;</code> <code>&lt;ali:OtherAgencies&gt;</code> <code>&lt;ali:Agency&gt;</code> <code>&lt;ali:Name&gt;N/A&lt;/ali:Name&gt;</code>
TN (Agency 6)	Telephone number of the agency 6. Set to 0000000000 if not available. ... <code>&lt;ali:Agencies&gt;</code> <code>&lt;ali:OtherAgencies&gt;</code> <code>&lt;ali:Agency&gt;</code> <code>&lt;ali:TN&gt;0000000000&lt;/ali:TN&gt;</code>
ESN	Emergency Service Number associated with the House number, Street name and Community name ... <code>&lt;ali:Agencies&gt;</code> <code>&lt;ali:ESN&gt;12345&lt;/ali:ESN&gt;</code>
<b>SourceInfo</b>	Emergency Service Network primary data elements
DataProviderID	Company ID for Service Provider supplying ALI record source information. ... <code>&lt;ali:SourceInfo&gt;</code> <code>&lt;ali:DataProvider&gt;</code> <code>&lt;ali:DataProviderID&gt;BELL&lt;/ali:DataProviderID&gt;</code>
TN	A unique 24X7 telephone or fax number to be used by the PSAP for trouble reporting or wrong displays. ... <code>&lt;ali:SourceInfo&gt;</code> <code>&lt;ali:DataProvider&gt;</code> <code>&lt;ali:TN&gt;1234567890&lt;/ali:TN&gt;</code>
Name	Full name of the company. ... <code>&lt;ali:SourceInfo&gt;</code> <code>&lt;ali:DataProvider&gt;</code> <code>&lt;ali:Name&gt;BELL CANADA&lt;/ali:Name&gt;</code>
AccessProviderID	Company ID for Service Provider providing wireline, wireless or VoIP service to the customer. Also known as Carrier ID.

Parameter	Description
	<p>...</p> <p>&lt;ali:SourceInfo&gt; &lt;ali:AccessProvider&gt; &lt;ali:AccessProviderID&gt;12345&lt;/ali:AccessProviderID&gt;</p>
TN	<p>24x7 TN for the caller's facility based service provider. To be used for Trap/Trace, emergency line interrupts, etc. Possible values TN number, SPID Errors.</p> <p>...</p> <p>&lt;ali:SourceInfo&gt; &lt;ali:AccessProvider&gt; &lt;ali:TN&gt;1234567890&lt;/ali:TN&gt;</p>
Name	<p>Full name of the company.</p> <p>...</p> <p>&lt;ali:SourceInfo&gt; &lt;ali:AccessProvider&gt; &lt;ali:Name&gt;BELL CANADA&lt;/ali:Name&gt;</p>
ALIUpdateGMT	<p>Date/Time when ALI record last updated</p> <p>...</p> <p>&lt;ali:SourceInfo&gt; &lt;ali:ALIUpdateGMT&gt;2001-12-17T09:30:47.000Z&lt;/ali:ALIUpdateGMT&gt;</p>
ALIRetrievalGMT	<p>Date/Time ALI DB request received or broadcast.</p> <p>...</p> <p>&lt;ali:SourceInfo&gt; &lt;ali:ALIRetrievalGMT&gt;2001-12-17T09:30:47.000Z&lt;/ali:ALIRetrievalGMT&gt;</p>
<b>NetworkInfo</b>	Emergency Service Network components associated with the call
PSAPID	<p>PSAP Number as configured in the E9-1-1 switch processing this call. Fixed at 4 digits, left padded with zeros.</p> <p>...</p> <p>&lt;ali:NetworkInfo&gt; &lt;ali:PSAPID&gt;0012&lt;/ali:PSAPID&gt;</p>
CLLI	<p>CLLI of the E9-1-1 switch processing this call. For Bell, this is represented as an integer.</p> <p>...</p> <p>&lt;ali:NetworkInfo&gt; &lt;ali:CLLI&gt;34&lt;/ali:CLLI&gt;</p>
<b>Extension</b>	<p>Bell Canada ALI extensions NOT ratified by NENA.</p> <p>...</p> <p>&lt;ali:Extension name="Bell ALI Body Extension" source="urn:bell-canada:ali:aq:alibody:ext" version="1.3"&gt;</p>

Parameter	Description
<b>BellAliBodyExt</b>	<p>Bell Canada ALI Body Extension. Specified in BellALIBodyExt.xsd</p> <pre> &lt;ali:Extension name="Bell ALI Body Extension" source="urn:bell- canada:ali:aqs:alibody:ext" version="1.4"&gt;   &lt;bcabex: BellAliBodyExt&gt;     ...   &lt;/bcabex: BellAliBodyExt&gt; &lt;/ali:Extension&gt; </pre>
<b>BellStreetAddress</b>	<p>Bell Canada Specific Street Address data elements</p> <pre> ... &lt;bcabex: BellAliBodyExt&gt;   &lt;bcabex: LocationInfo&gt;     &lt;bcabex: StreetAddress&gt;       ...     &lt;/bcabex: StreetAddress&gt;   &lt;/bcabex: LocationInfo&gt; &lt;/bcabex: BellAliBodyExt&gt; </pre>
StreetName	<p>Bell Canada StreetName (75 chars max). This element will be used instead of the corresponding NENA element</p> <pre> ... &lt;bcabex: LocationInfo&gt;   &lt;bcabex: StreetAddress&gt;     &lt;bcabex: StreetName&gt;Street Name&lt;/bcabex: StreetName&gt;   &lt;/bcabex: StreetAddress&gt; &lt;/bcabex: LocationInfo&gt; </pre>
PostDirectional	<p>Bell Canada PostDirectional (NSEW and O). This element will be used instead of the corresponding NENA element.</p> <pre> ... &lt;bcabex: LocationInfo&gt;   &lt;bcabex: StreetAddress&gt;     &lt;bcabex: PostDirectional&gt;NO&lt;/bcabex: PostDirectional&gt;   &lt;/bcabex: StreetAddress&gt; &lt;/bcabex: LocationInfo&gt; </pre>
PostalCommunity	<p>Bell Canada PostalCommunity (35 chars max). This element will be used</p>

Parameter	Description
	instead of the corresponding NENA element. ... <bcabex:LocationInfo> <bcabex:StreetAddress> <bcabex:PostalCommunity>Postal Community</bcabex:PostalCommunity>
MSAGCommunityCode	3-character code uniquely identifying a MSAG community. ... <bcabex:LocationInfo> <bcabex:StreetAddress> <bcabex:MSAGCommunityCode>AB1</bcabex:MSAGCommunityCode>
LocationType	Type of location within a building or type of building (ex.: apartment, suite, shopping centre). ... <bcabex:LocationInfo> <bcabex:StreetAddress> <bcabex:LocationType>FLOOR</bcabex:LocationType>
LocationNumber	Number of the location identified in the Location Type field, when applicable (ex.: apartment 2, suite 305, floor 11). ... <bcabex:LocationInfo> <bcabex:StreetAddress> <bcabex:LocationNumber>23</bcabex:LocationNumber>
ErrorFlag	Error flag from the 9-1-1 database Management System. ... <bcabex:LocationInfo> <bcabex:StreetAddress> <bcabex>ErrorFlag>Y</bcabex>ErrorFlag>
<b>BellGeolocation</b> Bell Canada Specific GeoLocation elements	
ResultCode	It is the result of the location update process. It can be an error coming from a Wireless Service Provider's location system or from the ALI. May not be populated when the result has no error. ... <bcabex:LocationInfo> <bcabex:GeoLocation> <bcabex:ResultCode>4</bcabex:ResultCode>
ResultMessage	It is the text message associated with the result code. ... <bcabex:LocationInfo> <bcabex:GeoLocation> <bcabex:ResultMessage>UNKNOWN SUBSCRIBER</bcabex:ResultMessage>
ResultDateTime	Date and Time in GMT (Zulu Time) of position determination or error, if available from the WSP. If non-available, the date and time the error was received at the ALI. ... <bcabex:LocationInfo> <bcabex:GeoLocation> <bcabex:ResultDateTime>2012-12-17T09:30:47.000Z </bcabex:ResultDateTime>
<b>BellCallInfo</b> Bell Canada Specific Call Info elements	
CustomerName	Bell Canada CustomerName (75 chars max). This element will be used instead of the corresponding NENA element. ... <bcabex:BellAliBodyExt> <bcabex:CallInfo> <bcabex:CustomerName>Customer Name</bcabex:CustomerName>
ClassOfService	Bell Canada ClassOfService allows 3 characters as retrieved from 9-1-1 database Management System. This element will be used instead of the



Parameter	Description
	corresponding NENA element
	... <bcabex: BellAliBodyExt> <bcabex: CallInfo> <bcabex: ClassOfService> RES </bcabex: ClassOfService>
PSAPAnswerDateTime	Answering date and time of the receiving PSAP. This element changes depending on the receiving PSAP. For example, the first PSAP answering a call will receive its answer date and time and a transferred-to PSAP will receive the transfer answer date and time.
	... <bcabex: BellAliBodyExt> <bcabex: CallInfo> <bcabex: PSAPAnswerDateTime> 2012-06-03T21:16:03.000Z </bcabex: PSAPAnswerDateTime >
NonAnsweredCallDuration	Duration the caller has waited for an answer. This element will only be filled for non-answered calls.
	... <bcabex: BellAliBodyExt> <bcabex: CallInfo> <bcabex: NonAnsweredCallDuration> P0Y0M0DT0H0M23.000S </bcabex: NonAnsweredCallDuration>
TransferringPSAPName	Name of the PSAP that initiated a transfer to the receiving PSAP. This element changes depending on the receiving PSAP. For example, it is empty for the first PSAP answering a call. When a PSAP transfers the call to another PSAP, the response sent to the receiving PSAP will contain the transferring-from PSAP name.
	... <bcabex: BellAliBodyExt> <bcabex: CallInfo> <bcabex: TransferringPSAPName> TransferringPSAP </bcabex: TransferringPSAPName>
TransferringPSAPConferenceDuration	Conference duration at the PSAP that initiated a transfer to the receiving PSAP. This element changes depending on the receiving PSAP. For example, it is empty for the first PSAP answering a call. When a PSAP transfers the call to another PSAP, the response sent to the receiving PSAP will contain the duration between the transferring-from PSAP answering timestamp and the receiving PSAP answering timestamp.
	... <bcabex: BellAliBodyExt> <bcabex: CallInfo> <bcabex: TransferringPSAPConferenceDuration> P0Y0M0DT1H2M31.500S </bcabex: TransferringPSAPConferenceDuration>

**Table 12** : ALIBody message format

## 7.4 Application Message Handling

This section describes the processing of messages by the AQS-SP and AQS-SC. The following handling can only be executed when the TCP session is open between both parties. The AQS-SC message handling contains the expected behaviour and is subject to local policies.

### 7.4.1 Session Setup

The AQS-SP is the end-point that establishes the network connection with the AQS-SC. The first protocol message on the network link is a SessionOpenRequest sent by the AQS-SP to the AQS-SC. Then the AQS-SC responds with a SessionOpenResponse message to accept or deny the session parameters. Finally, the AQS-SP sends a first SessionOk message to complete the handshake on the session parameters which is responded by the AQS-SC with an Ok message.

If the AQS-SP doesn't receive a SessionOpenResponse within 2 seconds, it will:

1. Send an Alert Advisory
2. Send a GoingOutOfService Advisory
3. Disconnect
4. Wait 30 seconds delay
5. Connect

It is up to the AQS-SC to decide which behaviour is appropriate when no answers are received after sending a SessionOpenResponse.

#### 7.4.2 Transactions

A transaction is an exchange in which both the AQS-SP and AQS-SC participate. When the AQS-SP sends a SessionOk, Response or Advisory message, it expects an answer. A transaction is completed when one of these events occur:

1. Receives an Ok with an inResponseTo value equal to the sent message ID.
2. Receives an Advisory with an inRelationTo value equal to the sent message ID.
3. Times out after 2 seconds

In case of a Response transaction that receives an UnreadableMessage Advisory or times out, the SP will resend the Response once. None of the other message types will be resent.

#### 7.4.3 Heartbeat

The heartbeat process is implemented by the SessionOk and the Ok messages. The purpose of these messages is to keep the connection warm between the two systems. Either end-point will then be able to easily and quickly detect when a connection has been lost or if a process is no longer responding. In the event of a lost connection, each system should follow its appropriate recovery procedure.

The underlying rationale behind the SessionOk and the Ok messages is that as long as a valid message is received over a connection, the recipient knows that the remote system is alive and well. Only the AQS-SP sends SessionOk messages when it has determined that no messages have been sent over the connection within SessionOkInterval seconds. By only sending SessionOk message when needed, the protocol will not adversely affect performance during periods of high volume.

There are two variables that control the SessionOk algorithm: SessionOkInterval and SessionOkMissedLimit. The variable SessionOkInterval has been explained above. Its value will typically be 10 seconds. When one end-point does not receive a valid message for SessionOkMissedLimit times SessionOkInterval seconds, it will mark the connection down and follow its corresponding procedure.

##### AQS-SP

1. Send a GoingOutOfService Advisory
2. It does not wait for the Ok and closes the network connection.
3. Continuously retry to establish the network connection and to open the session.

##### AQS-SC

1. Send a GoingOutOfService Advisory
2. It does not wait for the Ok and closes the network connection.

The SessionOkMissedLimit and SessionOkInterval are dictated by the AQS-SP at the communication session establishment. The default values are: SessionOkMissedLimit = 3 and SessionOkInterval = 10.

#### 7.4.4 Session Teardown

The AQS-SP closes the session by doing the following:

1. Send a GoingOutOfService Advisory.
2. It does not wait for the Ok and closes the network connection.

The AQS-SC asks the AQS-SP to close the session by doing the following:

1. Send a GoingOutOfService Advisory and wait for an Ok answer
2. SP sends an Ok
3. SP sends a GoingOutOfService Advisory
4. SP closes the network connection
5. SP will continuously retry to establish the network connection and to open the session.

#### 7.4.5 SessionOpenResponse Handling by the AQS Service Provider

A SessionOpenResponse message will be received by the AQS-SP after sending a SessionOpenRequest. The AQS-SP will only use the Status and Version attributes to determine its behaviour. The SessionOkInterval and SessionOkMissedLimit in the SessionOpenResponse will not be considered.

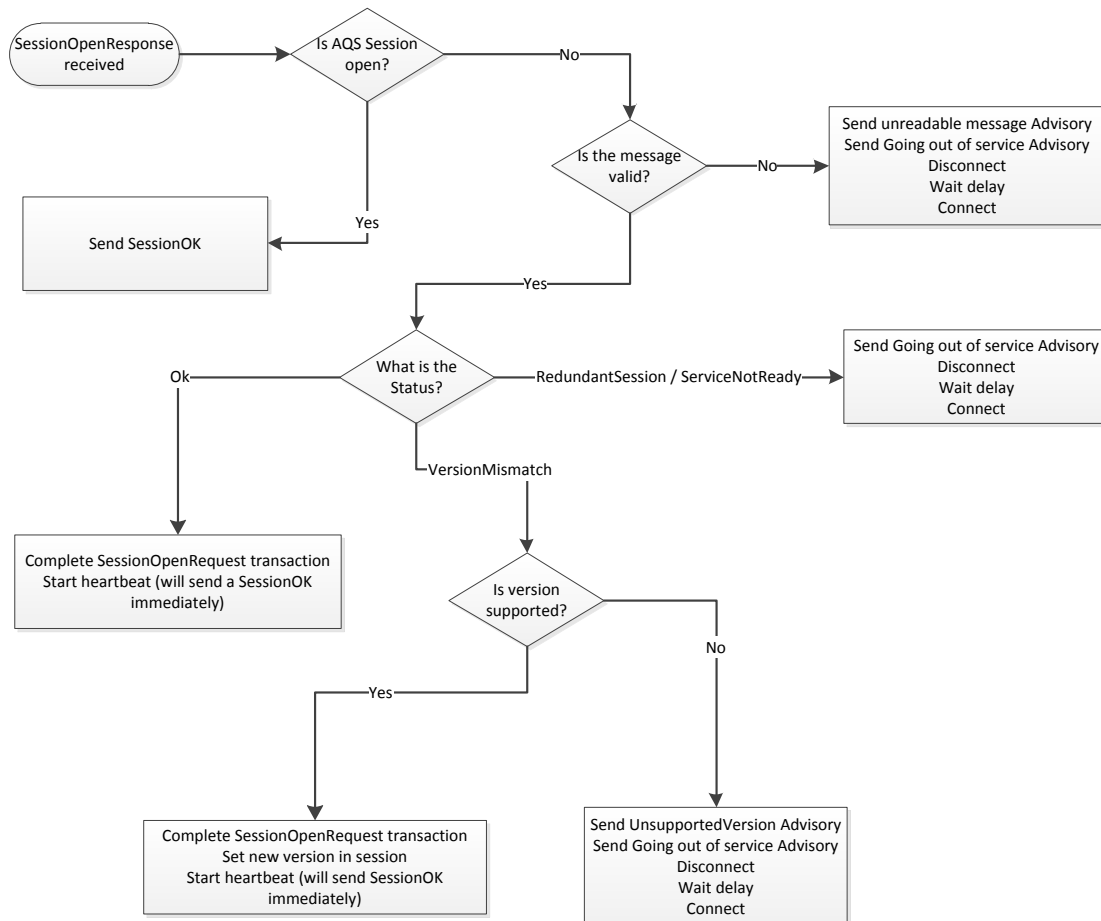
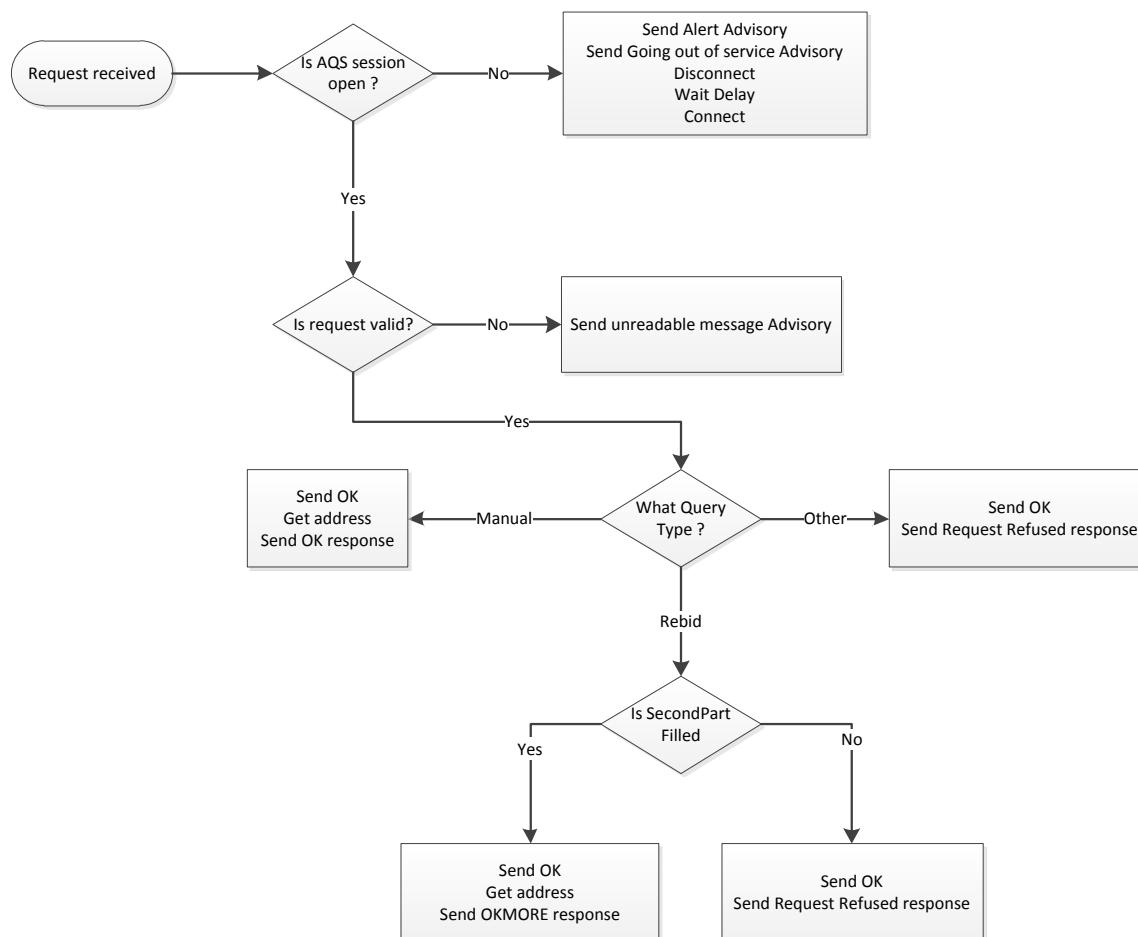


Figure 4 : SessionOpenResponse Handling by the AQS-SP

#### 7.4.6 Request Handling by the AQS Service Provider

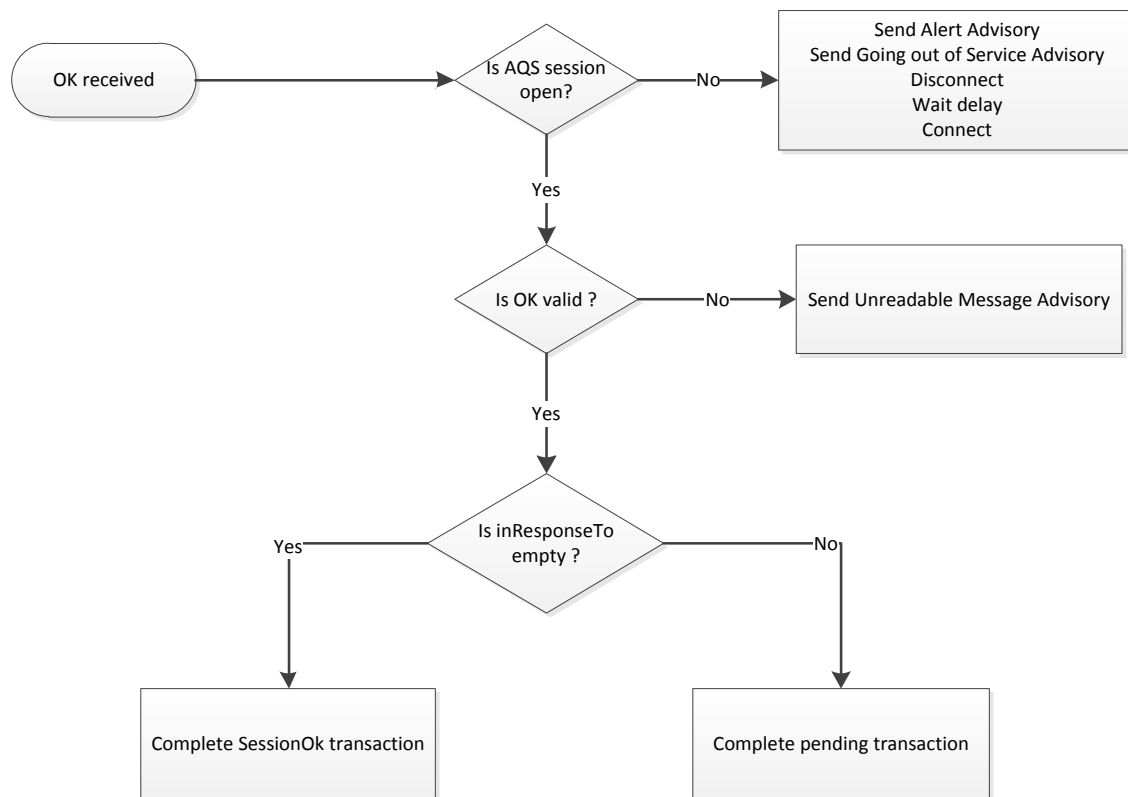
The AQS-SC can send a Request to the AQS-SP anytime. If the Request is valid, the AQS-SP will always respond an Ok message with an inResponseTo attribute equal to the Request ID. A Response with an inResponseTo attribute equal to the Request ID will be sent after getting or failing to get an address.



**Figure 5 :** Request Handling by the AQS-SP

#### 7.4.7 OK Handling by the AQS Service Provider

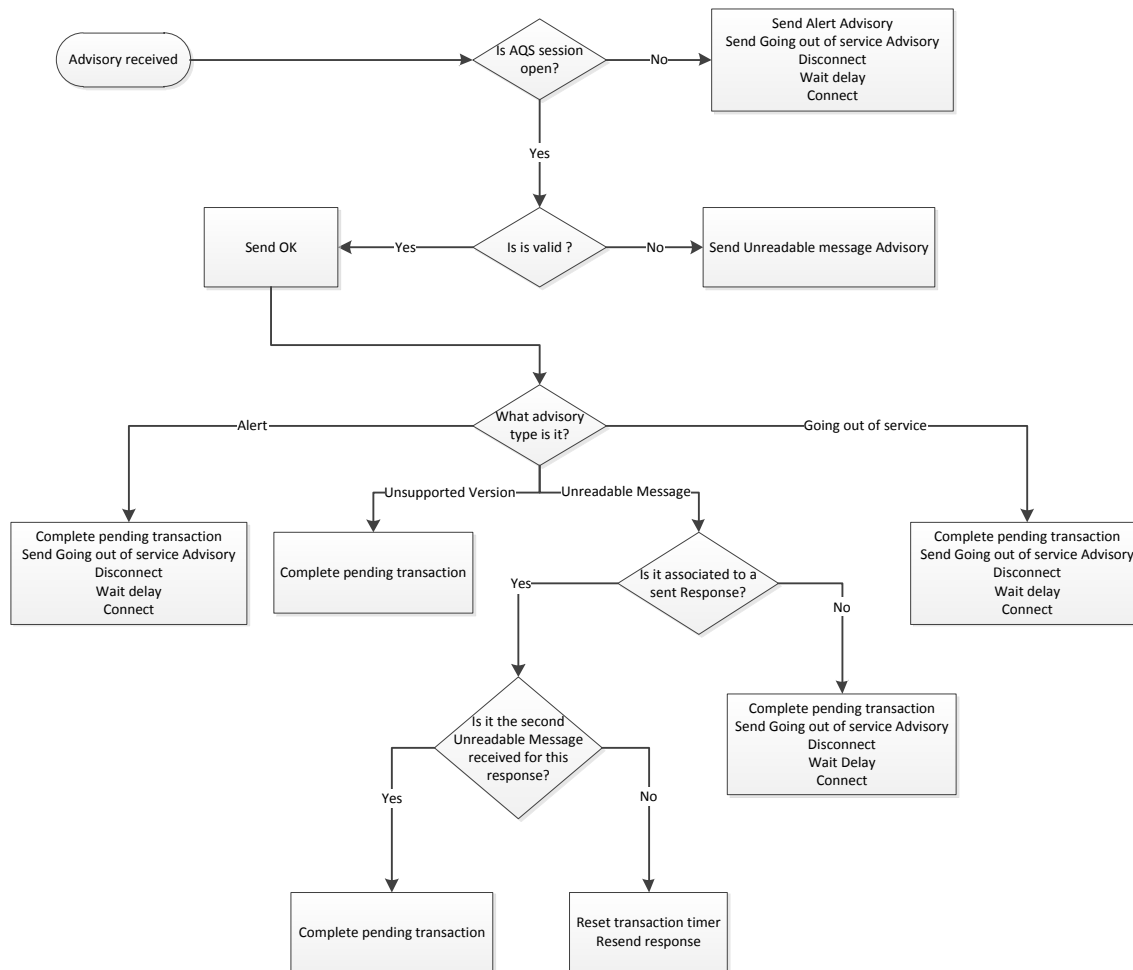
Ok messages received by the AQS-SP are acknowledgements of SessionOk, Advisory and Response messages sent.



**Figure 6 : Ok Handling by the AQS-SP**

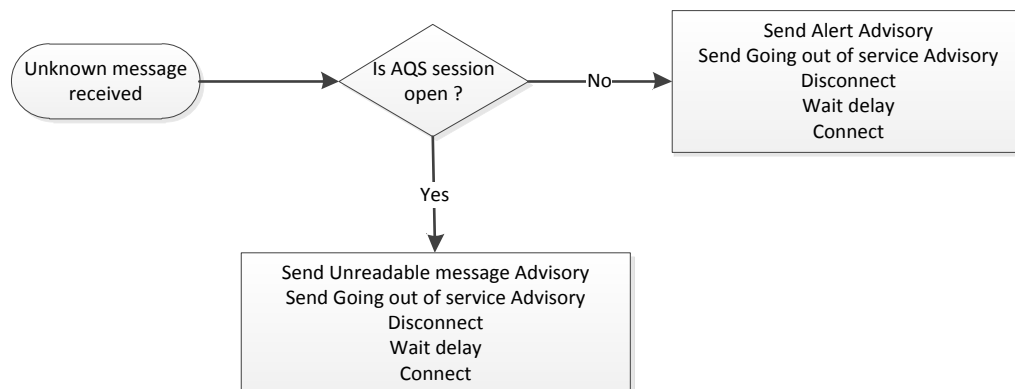
#### **7.4.8 Advisory Handling by the AQS Service Provider**

An Advisory message can be a response to any message sent by the AQS-SP. It notifies that an error has occurred or the AQS-SC is going out of service. It can be sent instead of an Ok message. Its inRelationTo attribute will contain the ID of the message associated to it.



**Figure 7 : Advisory Handling by the AQS-SP**

#### 7.4.9 Unknown Message Handling by the AQS Service Provider



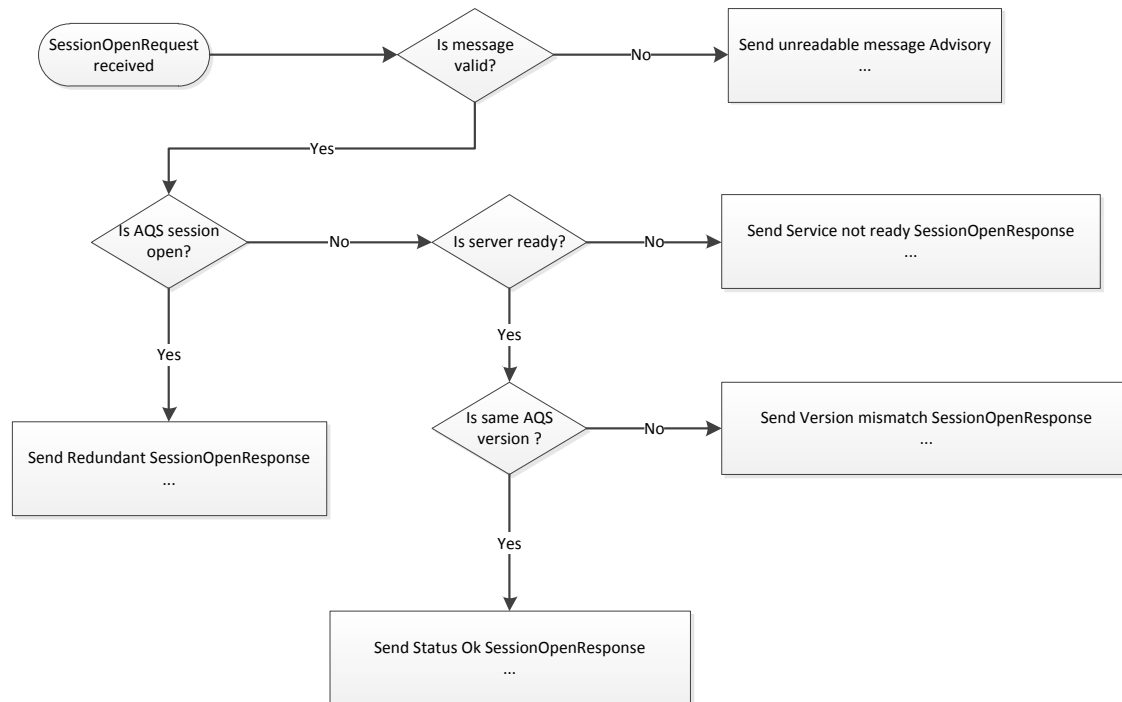
**Figure 8 : Unknown Message Handling by the AQS-SP**

#### 7.4.10 Response, SessionOpenRequest and SessionOk Handling by the AQS Service Provider

The AQS-SP should not receive any of these messages. It will do nothing when receiving them.

#### 7.4.11 SessionOpenRequest Handling by the AQS Service Consumer

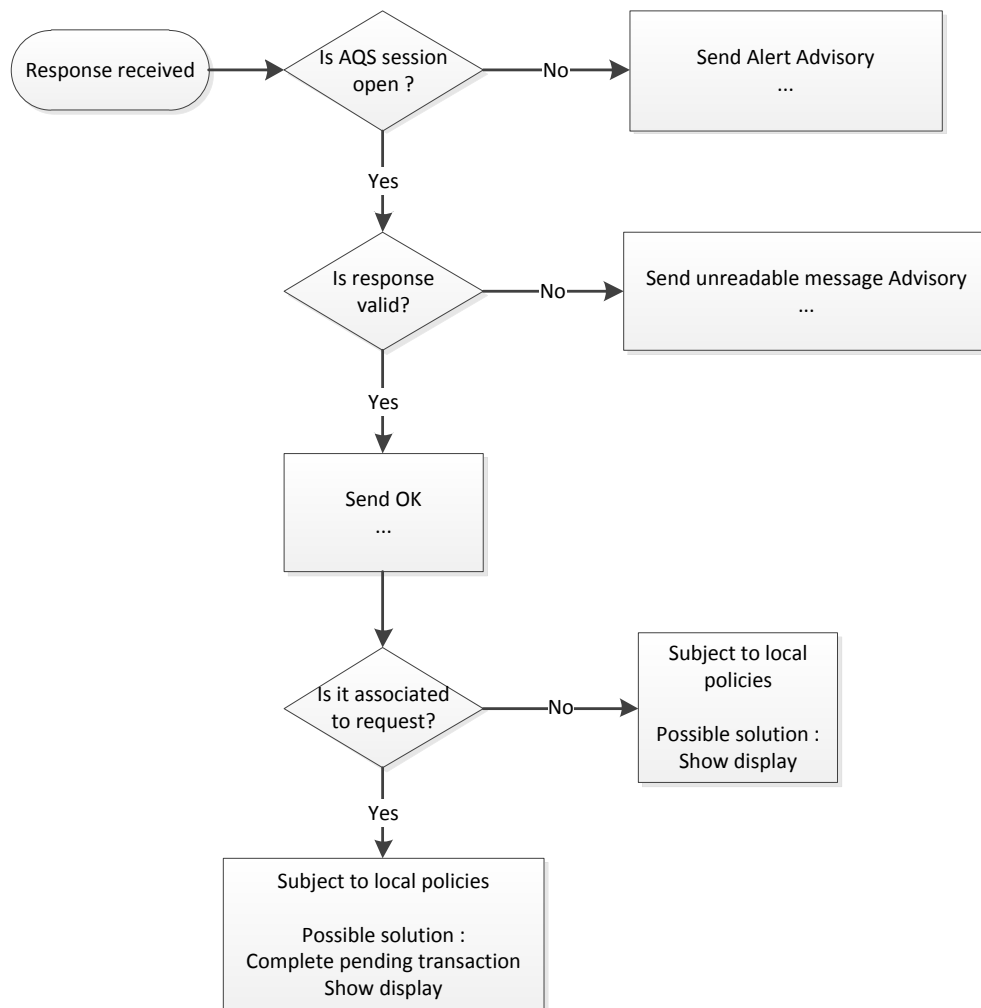
A SessionOpenRequest is sent by the AQS-SP to initiate an AQS session.



**Figure 9** : SessionOpenRequest Handling by the AQS-SC

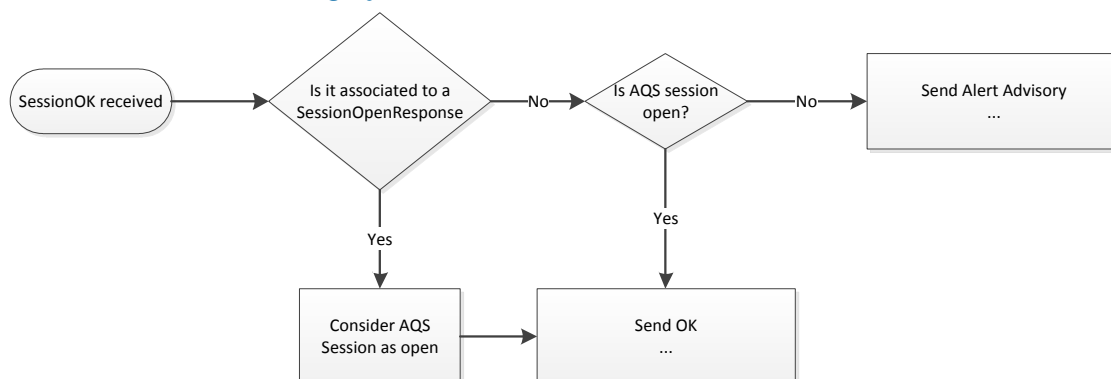
#### 7.4.12 Response Handling by the AQS Service Consumer

A Response can be sent by the AQS-SP any time. It will contain an inResponseTo value only when it is associated to a Request.



**Figure 10 : Response Handling by the AQS-SC**

#### 7.4.13 SessionOk Handling by the AQS Service Consumer

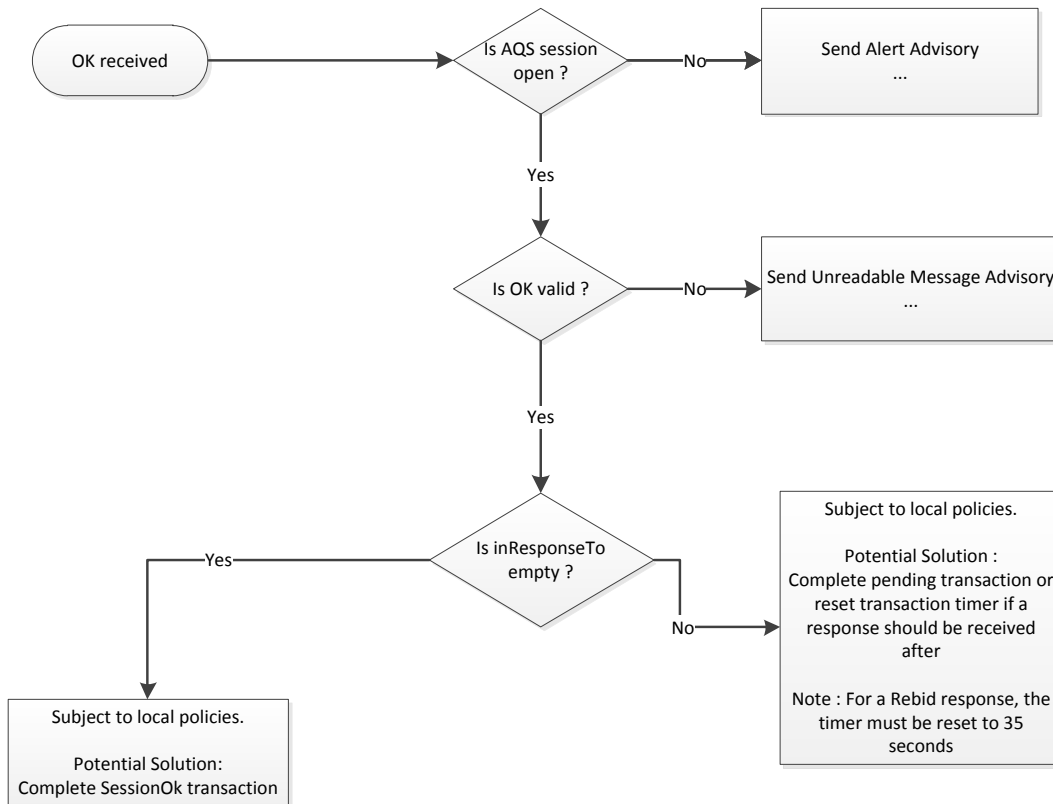


**Figure 11 : SessionOk Handling by the AQS-SC**



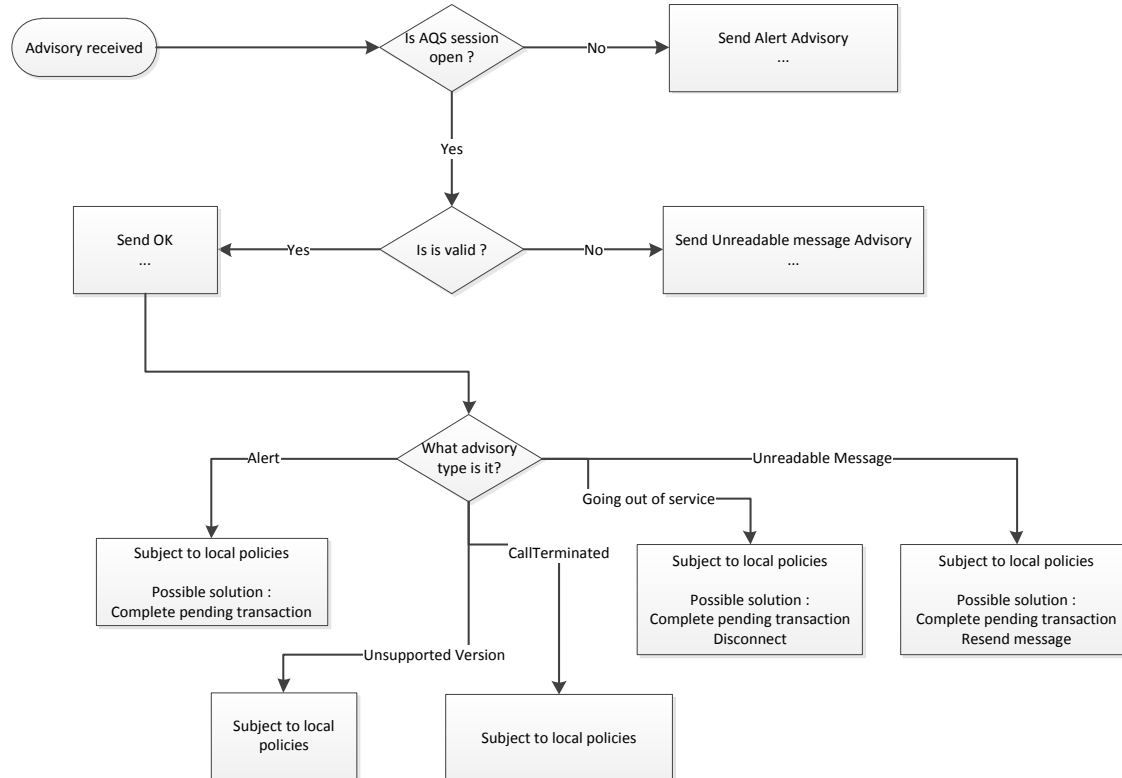
#### 7.4.14 Ok Handling by the AQS Service Consumer

Ok messages received by the AQS-SC are acknowledgements of Advisory and Request messages sent.



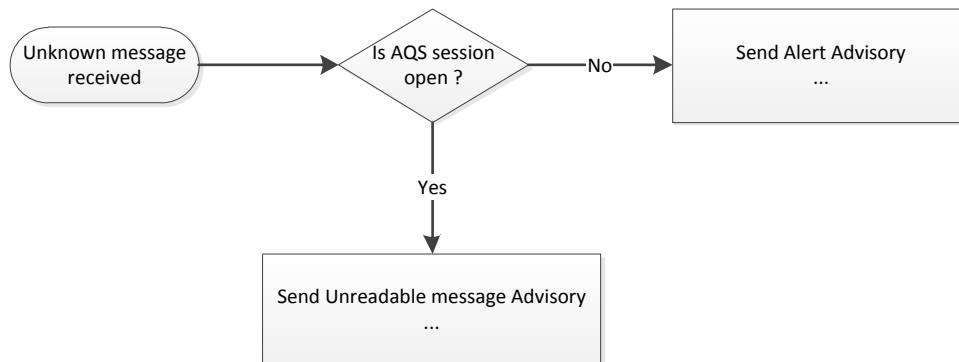
**Figure 12 : Ok Handling by the AQS-SC**

#### 7.4.15 Advisory Handling by the AQS Service Consumer



**Figure 13 :** Advisory Handling by the AQS-SC

#### 7.4.16 Unknown Message Handling by the AQS Service Consumer



**Figure 14 :** Unknown Message Handling by the AQS-SC

#### 7.4.17 Request and SessionOpenResponse Handling by the AQS Service Consumer

The AQS-SC should not receive any of these messages. The handling of these messages is subject to local policies.

## 8.0 DATA FEATURE ACTIVATION

### 8.1 Wireless Location

When a 9-1-1 call is presented to the E9-1-1 infrastructure, the ALI automatically pushes the Phase I information to the PSAP system. With the introduction of Wireless E9-1-1 Phase II Stage 1 (see CRTC Telecom Regulatory Policy 2009-40<sup>10</sup>) and contingent upon wireless networks being Phase II enabled, the ALI automatically pushes an update of the location information to the PSAP system when received from a wireless carrier. The refreshed location and associated information are populated in a Response message that includes the ali:GeoLocation element for a successful location fix, or an error status in the bcabex:ResultCode and bcabex:ResultMessage elements, in case of failure.

The ali:GeoLocation element contains the location information: Latitude, Longitude, Uncertainty, Confidence, DateStamp and LocationDescription, all of which are provided by the wireless carrier. For the Response element descriptions, see Section 7.3.7.

Given that wireless location for Phase I and Phase II Stage 1 are automatically pushed without a prior request from the AQS-SC, the Responses do not have an InResponseTo element.

If a 9-1-1 call is hot-transferred (3-way call) to an S-PSAP before the initial Phase II location is available at the ALI, both PSAPs will receive a first message with Phase I only. If the Phase II location is received at the ALI while both PSAPs are still in a 3-way call, the AQS-SP will signal both PSAPs with the Phase II Response. If a 9-1-1 call is hot-transferred to an S-PSAP after the P-PSAP got the initial Phase II Response, the S-PSAP will receive the first message with the initial Phase II location; no second message will be delivered.

### 8.2 PSAP-initiated In-Call Location Update

As part of the E9-1-1 Phase II Stage 2 service, the In-Call Location Updates (ICLU) feature allows PSAP call takers to manually query the ALI for updated Wireless Phase II information. The ALI acts as a proxy between the PSAP and the wireless carrier's location platform.

The AQS-SC may send a Request to the AQS-SP for an In-Call location update using the QueryType set to REBID. This Request must only be sent by the AQS-SC for an active wireless 9-1-1 call, when a pushed Response containing wireless Phase II information (lat/long or error code) has already been received for the current call. To be compliant with the standards already implemented for Phase II Stage 1, the query type "rebid" requires the ANI (MSID) in the FirstPart element and the pANI (ESRD) in the SecondPart element. A properly formatted ICLU request would require both fields to be present and non-empty. Missing these elements in the query would result in a RequestRefused Response. The Request must also contain a unique message identifier in the ID element and the call taker position number initiating the Request in the CallTakerPosition element; those will be mirrored in the InResponseTo and CallTakerPosition elements of the Response.

When a well-formed ICLU request is received, the AQS-SP will respond right away with an Ok Response message, acknowledging that the request is being processed. Another Response message will be sent to the AQS-SC when the actual location update is received from the WSP, be it an actual geolocation update or an error.

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<sup>10</sup> <http://www.crtc.gc.ca/eng/archive/2009/2009-40.htm>

The Responses containing the updated wireless Phase II location information will follow the same behaviour as Phase II Stage 1 for pushed Responses. In a nutshell, the Response to a 'Rebid' request will:

- Always have an `inResponseTo` element filled with the value received in the ID field of the request;
- Always have an `ali:GeoLocation` element if the WSP returned a valid Phase II location, and/or the `bcabex:ResultCode` and `bcabex:ResultMessage` elements filled with location status information.

Wireless Location platforms and devices cannot sustain overlapping location fixes for the same ESRD/MSID. To mitigate the risks, the Bell ALI has implemented safeguards to protect the network resources while maximizing the chances for successful location updates. Those safeguards are described below.

### 8.2.1 Premature ICLU Requests

ICLU requests for an ESRD/MSID received by the AQS-SP before the initial Phase II geolocation, or error, has been received will automatically be responded to by a `RequestRefused` `StatusCode`. It should be noted that this `StatusCode` is generic and could be used in other contexts.

### 8.2.2 Overlapping ICLU Requests

Overlapping ICLU requests for the same ESRD/MSID could be initiated by the same or different call takers within a PSAP, or by call takers in different PSAPs. Overlapping ICLU requests for the same ESRD/MSID received by the AQS-SP, irrespective of the point of origination, will be automatically responded to by a `RequestDuplicate` `StatusCode`. It should be noted that this `StatusCode` is generic and could be used in other contexts.

## 8.3 Reverse ALI

The Reverse ALI feature allows a call taker to manually query the ALI for a wireline customer record. The AQS-SC initiates a Reverse ALI request by issuing a Request with a `QueryType` set to `MANUAL`, the `FirstPart` element filled with the 10-digit telephone number (the `SecondPart` element is not required), the `ID` element filled with a unique message identifier and the `CallTakerPosition` element filled with the position number of the call taker initiating the request. The Reverse ALI feature can only be invoked for fixed POTS services (wireline, fixed VoIP). Upon reception of the request, the AQS-SP will respond with an `Ok` Response immediately followed by a Response comprising the ALI record in the `ALIBody` element and the ID value in the `InResponseTo` element.

## 8.4 Missed 9-1-1 calls

9-1-1 calls that have been presented by the E9-1-1 switch to the PSAP voice equipment but did not receive answer supervision prior for the 9-1-1 caller to hang-up are flagged to the AQS-SC as a Response with the following characteristics:

- No `InResponseTo` element
- No `CallTakerPosition` element
- No `TrunkID` element
- An `ALIBody` filled with the ALI record providing the wireline information associated with the calling party number or, in the case of a wireless call, the information associated with the ESRD (cell tower)
- A `StatusMessage` element set to "9-1-1 CALL NOT ANSWERED"
- A filled `NonAnsweredCallDuration` element

## **8.5 Default Display Position**

A PSAP default display position can be configured for the rare cases where the E9-1-1 switch does not provide the PSAP line number associated with an answered 9-1-1 call. In such case, the assigned default position will be provided in the CallTakerPosition element of the Response. The AQS-SC can then determine proper treatment for this display.

## 9.0 COMPUTER-TELEPHONY INTEGRATION

Many 9-1-1 deployments involve Private Branch Exchange (PBX) switches or Key systems using a Call Position Identification (CPI) solution at the PSAP premise. Since the agent lines sit behind this local voice equipment, the actual position number is not visible to the E9-1-1 switch. To overcome this, the PBXs and Key Systems' CPI needs to be linked locally to the PSAP system. This allows the PSAP system to learn from the voice equipment the actual call taker position to which a 9-1-1 call was routed by the voice equipment so that the display information delivered by the ALI can be forwarded to the appropriate call taker position's screen display.

Once the PSAP system receives the display pushed by the ALI, it will match the display with the messages received from the CPI using a static configuration pre-established between Bell and the PSAP, based on the PSAP line attributes.

The PSAP line attributes associated with a given 9-1-1 call will be passed by the ALI to the PSAP system.

A local mapping of the PSAP lines configured on the E9-1-1 switch versus the PSAP lines configured on the PSAP voice equipment will be necessary. This will allow the PSAP system to properly map the information provided in the Response with the information provided by the voice equipment to determine where to send the display.

PSAP personnel should contact their voice equipment vendor to determine how computer-telephony integration can be achieved with their PSAP system.

### 9.1.1 Private Branch Exchange (PBX)

A PBX can be used at a PSAP to receive and switch the incoming E9-1-1 voice call to an available answering attendant. The PBX is connected to the E9-1-1 switch using a number of PSAP lines (external side). The PBX uses a number of call taker lines terminating at each call taker position (internal side). Upon reception of an incoming call on a PSAP line, the PBX determines to which call taker line the call will be routed to and switches the call there. The PBX transmits Call Detail Messages (CDM) associated with the beginning of the call, when the call is transferred and at the end of the call. A two port modem configuration is required on the PBX to transmit data locally to the PSAP System to support ALI display to the call attendant.

The AQS-SP will provide the PSAP line identifier of the E9-1-1 switch filled in the CLLI, PSAPID and CallTakerPosition elements of the Response. Taken together, those three values represent a unique call leg between the E9-1-1 switch and the PSAP voice equipment. The AQS-SC will use this information to compare with the information received from the PBX CDMs to determine to which call taker position to send the display.

For ICLU and Reverse ALI requests, the AQS-SC will populate the CallTakerPosition element with the position number of the call taker position initiating the request.

### 9.1.2 Key System

A Key System Interface (KSI) can be used by a PSAP to provide the same functionality as described in Section 9.1.1. The KSI must be interfaced with the PSAP System to allow the E9-1-1 agent to receive the caller's address on the data terminal associated with the telephone set answering the call.

## 10.0 REFERENCES

- [1] Northern Telecom, *Electronic Business Service -Network Access Interface Specification: Switched Network Compatibility Specification for Two Wire Connection to a DMS-100 Family Northern Telecom Switch*  
[NIS S106-1, Issue 2.0, December 1990](#)
- [2] Canadian Standards Association, *Functional and Compatibility Requirements for Private Branch Exchanges (PBX) Switching Equipment for Voice Applications*  
CAN/CSA - T512.1-M91
- [3] Canadian Standards Association, *Functional and Compatibility Requirements for Digital PBX's, and Analogue PBX's with Digital Interface*  
CAN/CSA - T512.2-M87
- [4] Telcordia, *E9-1-1 Public Safety Answering Point: Interface between a 1/1A ESS™ Switch and Customer Premises Equipment*  
TR-TSY-000350, Issue 1, November 1987
- [5] Telcordia, *Enhanced MF Signaling: Tandem to PSAP Interface* (Intended to be used in conjunction with TR-TSY-000350)  
GR-2953-CORE, Issue 1, March 1997
- [6] Industry Canada, Department of Communications, *Terminal Equipment Certification Standard, Standard for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility*  
[CS-03, Current Issue](#)
- [7] National Emergency Number Association, *NENA ALI Query Service Standard*  
[NENA 04-005, Issue 1, November 2006](#)
- [8] National Emergency Number Association, *NENA XML Schemas*  
[NENA XML Schemas, Version 4.2](#)



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