ATIS-0700039

ATIS Standard on -

Guidelines for Emergency Call Location Selection and Reporting by Originating Networks

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Guidelines for Emergency Call Location Selection and Reporting by Originating Networks

Alliance for Telecommunications Industry Solutions

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Abstract

A voluntary agreement for improving location accuracy for emergency calls was developed and signed on November 14, 2014, by APCO, NENA, AT&T, Sprint, T-Mobile, and Verizon Wireless. This voluntary agreement included a roadmap for technology changes that was submitted to the FCC in response to an FCC initiative (proceeding 07-114) to provide a number of improvements to emergency location capabilities including providing a dispatchable location for emergency calls to PSAPs. ATIS-0700028 [Ref 1] specifies the requirements, architecture, and interfaces required to support the commitments defined in the roadmap described above as well as the rules as outlined within the FCC CFR [Ref 2].

This standard provides guidelines to acquire location and present it to the PSAP based upon ATIS-0700028.

Foreword

The Alliance for Telecommunication Industry Solutions (ATIS) serves the public through improved understanding between carriers, customers, and manufacturers. The Wireless Technologies and Systems Committee (WTSC) develops and recommends standards and technical reports related to wireless and/or mobile services and systems, including service descriptions and wireless technologies. WTSC develops and recommends positions on related subjects under consideration in other North American, regional, and international standards bodies.

The mandatory requirements are designated by the word *shall* and recommendations by the word *should*. Where both a mandatory requirement and a recommendation are specified for the same criterion, the recommendation represents a goal currently identifiable as having distinct compatibility or performance advantages. The word *may* denotes an optional capability that could augment the standard. The standard is fully functional without the incorporation of this optional capability.

Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, WTSC, 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, WTSC, which was responsible for its development, had the following leadership:

D. Zelmer, WTSC Chair (AT&T)
M. Younge, WTSC Vice-Chair (T-Mobile)
P. Musgrove, ELOC TF Co-Chair (AT&T)
C. Militeau, ELOC TF Co-Chair (West Safety Services)
G. Schumacher, Technical Editor (Sprint)

The Emergency Location (ELOC) Task Force (TF) was responsible for the development of this document.

Table of Contents

Table of Figures

Table of Tables

ATIS Standard on –

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1 Scope and Purpose

1.1 Scope

A voluntary agreement for improving location accuracy for emergency calls was developed and signed on November 14, 2014 by the Association of Public Safety Communications Officials (APCO), National Emergency Number Association (NENA), AT&T, Sprint, T-Mobile, and Verizon Wireless. This voluntary agreement included a roadmap for technology changes that was submitted to the FCC in response to an FCC initiative (proceeding 07-114) to provide a number of improvements to emergency location capabilities including providing a dispatchable location for emergency calls to Public Safety Answering Points (PSAPs) (http://apps.fcc.gov/ecfs/document/view?id=60000988441).

In addition to the roadmap submitted, the FCC created new requirements to address Location Accuracy. These rules are discussed in the FCC 4th Report & Order [Ref 3] and codified within the published Code of Federal Regulations (CFR) [Ref 2].

ATIS-0700028v1.1 specifies the standards needed to support the commitments defined in the roadmap described above as well as the rules as outlined within the FCC CFR.

This standard provides guidelines on the acquisition and derivation of Heightened Accuracy Location Information (HALI) related to an emergency call, as applicable to ATIS-0700028v1.1. As defined in ATIS-0700028v1.1, HALI may include one or more of a Dispatchable Location (DL), a Geodetic Location (GL), details on Source Position Methods (SPM) that were used to obtain a Geodetic Location, and Uncompensated Barometric Pressure (UBP) for a suitably capable User Equipment (UE).

> **NOTE:** The Third Generation Partnership Project (3GPP) Location Services (LCS) architecture and its associated procedures, which include separate Gateway Mobile Location Center (GMLC), Mobility Management Entity (MME), and Evolved Serving Mobile Location Center (E-SMLC) network functions, is presented in this document. Other standards-based LCS architectures [e.g., Open Mobile Alliance (OMA) Secure User Plane Location (SUPL)] and procedures that support HALI are defined but not described. The underlying recommendations described in this document are generally applicable across alternative emergency architectures and procedures that support HALI.

1.2 Purpose

The purpose of this standard is to assist vendors and Commercial Mobile Radio Service (CMRS) providers in developing and deploying systems to support HALI delivery to PSAPs.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

[Ref 1] ATIS-0700028 v1.1, *Location Accuracy Improvements for Emergency Calls.*[1]

[1] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at < https://www.atis.org/docstore/product.aspx?id=28273 >.

[Ref 2] FCC Code of Federal Regulations (CFR) 47CFR20.18, *911 Service*.[2]

[Ref 3] FCC 4th Report and Order on Location Accuracy.[3]

[Ref 4] ATIS-0500035, *Guidelines for Testing Dispatchable Location*.[4]

[Ref 5] OMA-TS-LPPe–V1_0-20110929-C, *LPP Extensions Specification.*[5]

3 Definitions, Acronyms, & Abbreviations

For a list of common communications terms and definitions, please visit the *ATIS Telecom Glossary*, which is located at < http://www.atis.org/glossary >.

3.1 Definitions

Bluetooth® Public Device Address (BT-PDA) – Forty-eight (48) bit globally unique address used to identify a Bluetooth device.

Dispatchable Location – Appendix D, (i) (1) iii of the FCC Report and Order [Ref 3] (Also see Annex A of ATIS-0700028) defines Dispatchable Location as follows:

> *Dispatchable location: A location delivered to the PSAP by the CMRS provider with a 911 call that consists of the street address of the calling party, plus additional information such as suite, apartment or similar information necessary to adequately identify the location of the calling party. The street address of the calling party must be validated and, to the extent possible, corroborated against other location information prior to delivery of dispatchable location information by the CMRS provider to the PSAP*.

Geocoding Process – The geocoding process is the process that converts a street address to geographic coordinates and may or may not result in an indication of the geocoded location accuracy.

Heightened Location Accuracy – Either a Dispatchable location or a position estimate accurate to within 50 m (horizontal).

Heightened Location Accuracy Technologies – Paragraph 25 of the FCC Report and Order [Ref 3] refers to the definition of Heightened Location Accuracy Technologies presented in the Roadmap:

> *25. As originally proposed, the Roadmap contained the following horizontal location accuracy performance benchmarks:*
>
> *… "Heightened location accuracy technologies" consist of: (1) satellite-based (A-GNSS) location, (2) dispatchable location, or (3) "any other technology or hybrid of technologies capable of location accuracy performance of 50 meters." …*

Indoor Location – Means that the caller's device is within a structure that may be represented by a home, apartment, high-rise, enterprise, etc. Indoor location may be represented as a Dispatchable Location as defined above. Indoor location may also be represented by a geodetic location that includes the latitude and longitude and may potentially include vertical location information (e.g., z-axis).

Media Access Control (MAC) Address – Forty-eight (48) bit globally unique address used to identify a Wi-Fi access point. In the context of this standard, the term MAC address is equivalent to a Wireless MAC address. The wireless MAC address of an Access Point is also known as a Basic Service Set Identifier (BSSID). Other common usages of the term MAC address may exist such as the Ethernet MAC address of the Access Point, but such usages are not applicable within this standard. Note that a single Access Point may have multiple BSSIDs.

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[2] This document is available from the U.S. Government Publishing office at < http://www.ecfr.gov/cgi-bin/text-idx?SID=d111e6a56b3786c1bc935ee861af37d8&mc=true&node=se47.2.20_118&rgn=div8 >

[3] This document is available from the Federal Communications Commission (FCC) at:
< https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A1.pdf >.

[4] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS) at
< https://www.atis.org/docstore/product.aspx?id=28346 >.

[5] This document is available from the Open Mobile Alliance (OMA) at
< http://www.openmobilealliance.org/release/LPPe/V1_0-20110929-C/OMA-TS-LPPe-V1_0-20110929-C.pdf >.

National Emergency Address Database (NEAD) – Appendix D, (i) (1) iii of the FCC Report and Order [Ref 3] (also see Annex A of ATIS-0700028) defines the NEAD (pronounced nee-ad) as follows.

> *National Emergency Address Database (NEAD). A database that utilizes MAC address information to identify a dispatchable location for nearby wireless devices within the CMRS provider's coverage footprint.*

This standard also supports the use of BT-PDA to identify the Dispatchable Location for nearby Bluetooth beacons.

Reference Point – A Wi-Fi access point whose MAC address or a Bluetooth device whose Public Device Address (BT-PDA) is detectable by the user's end device during an emergency call. A Reference Point identifier may be associated with a candidate Dispatchable Location in the NEAD. In this standard, Reference Point is also used to indicate a Reference Point identifier.

Serving Flag – The Serving Flag parameter (servingFlag) indicates whether Wireless Local Area Network (WLAN) Access Point (AP) measurements were obtained for a WLAN AP to which the device is connected.

Vertical Location Information – Appendix D, (2) ii of the FCC Report and Order [Ref 3] (also see Annex A of ATIS-0700028) defines vertical location as one of 1) the floor component of a Dispatchable Location, 2) barometric pressure, or 3) z-axis methods to be defined through the evaluation of technologies in the test bed.

3.2 Acronyms & Abbreviations

3GPP	Third Generation Partnership Project
AGPS	Assisted Global Positioning System
ALI	Accuracy Location Information
AP	Access Point
APCO	Association of Public Safety Communications Officials
ATIS	Alliance for Telecommunications Industry Solutions
BSSID	Basic Service Set Identifier
BLE	Bluetooth Low Energy
BT	Bluetooth
BT-PDA	Bluetooth – Public Device Address
CFR	Code of Federal Regulations
CMRS	Commercial Mobile Radio Service
CPE	Customer Premises Equipment
DL	Dispatchable Location
ELOC TF	The Emergency Location TF
E-SMLC	Evolved Serving Mobile Location Center
FCC	Federal Communications Commission
GL	Geodetic Location
GMLC	Gateway Mobile Location Center
HALI	Heightened Accuracy Location Information
LCS	Location Services
LPP	Long Term Evolution Positioning Protocol
LPPe	Long Term Evolution Positioning Protocol Extensions
LS	Location Server
MAC	Media Access Control
LTE	Long Term Evolution

LVF	Location Validation Function
MME	Mobility Management Entity
MSAG	Master Street Address Guide
NEAD	National Emergency Address Database
NEAM	National Emergency Address Manager
NENA	National Emergency Number Association
OMA	Open Mobile Alliance
PIDF-LO	Presence Information Data Format – Location Object
PSAP	Public Safety Answering Point
RSSI	Received Signal Strength Indicator
SPM	Source Position Method(s)
SUPL	Secure User Plane Location
UBP	Uncompensated Barometric Pressure
UE	User Equipment
WLAN	Wireless Local Area Network
WTSC	Wireless Technologies and Systems Committee

4 Principles & Assumptions

The following are assumptions used in this document.

- The Location Server (LS) will send both types of location (Geodetic and Dispatchable) toward PSAPs.
- The Location Server will send the uncertainty data for the geodetic location.
- The Location Server will deliver the best available Dispatchable Location based on its internal logic.
- The PSAP will decide how to utilize the received information.
- A common goal is to have uniformity and consistency in Dispatchable Location results delivered from different carriers to the PSAP under similar call circumstances.

5 Heightened Accuracy Location Information (HALI) Flow

This clause discusses points along the data path where decisions are made regarding the selection of HALI and defines what attributes are available to make those decisions. It does not specify algorithms or other methods to make those decisions but provides a reference for doing so.

Figure 5.1 below may be referenced to identify specific decision points.

1. The Np interface through which External Data Sources provide Access Point or Bluetooth beacon address information.
2. The interaction point between the UE and the LS to acquire UE information.
3. The point where the LS may use criteria to filter the number of MAC addresses or Bluetooth identifiers that are passed to the NEAD.
4. The NEAD response with location information.
5. The point where the LS may use criteria to filter the responses from the NEAD to choose a single Dispatchable Location.
6. The point where messaging with location information (HALI) is provided to the GMLC.
7. The E2 interface where the GMLC provides location information to the Accuracy Location Information (ALI).

8. The point where the ALI provides location information to the PSAP Customer Premises Equipment (CPE).

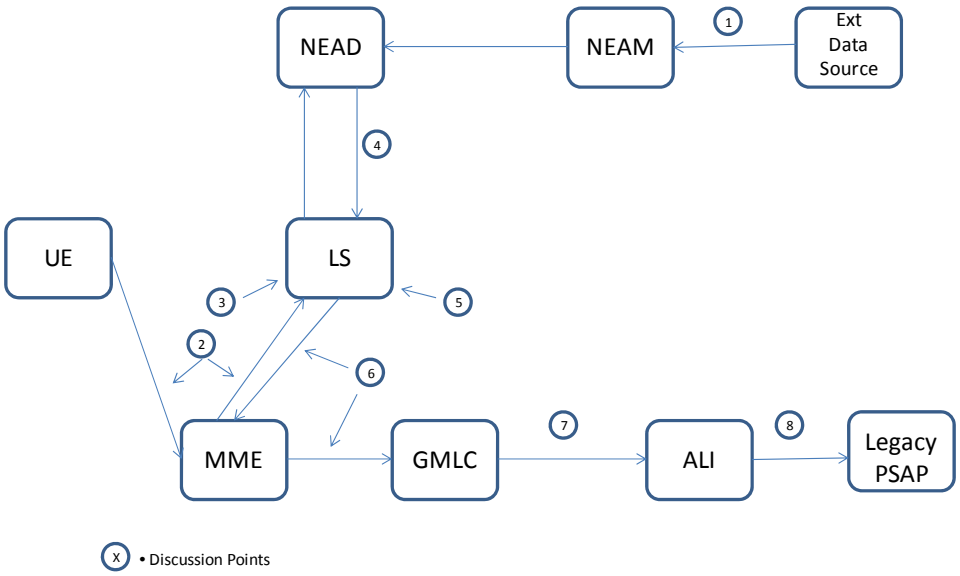

Figure 5.1: Decision Points within the Data Path

5.1.1 National Emergency Address Manager (NEAM) Provisioning Np (Step 1)

Public Safety has requested Place Type designators as shown in Table 5.1 that may provide input into the location services process and is intended to assist the Telecommunicator in dispatching appropriate First Responders.

Table 5.1 – Place Type designators at the Np interface

Code	Description	Examples
RSS	Residential Single Story Single Family	A one story private home, no matter how large in square footage. (NOTE: It may be attached to another dwelling, but they are independent living units.)
RMS	Residential Multi Story Single Family	A multi-story private home, no matter how large in square footage. (NOTE: It may be attached to another dwelling, but they are independent living units.)
MTS	Multi-Tenant Residential – Single story	One building, subdivided into apartments, condos, suites, hotel rooms, or other living spaces on one floor.
MTM	Multi-Tenant Residential – Multi-story	One building, subdivided into apartments, condos, suites, hotel rooms, or other living spaces on two or more floors.

Code	Description	Examples
CMS[6]	Commercial – Single story	A Single-story building with no residential use. Includes government buildings, churches, libraries, stores, malls, museums, aquariums, factories, stadiums, warehouses, shipping terminals, public transportation buildings, or other similar facilities.
CMM[6]	Commercial – Multi-story	A multi-story building with no residential use. Includes government buildings, churches, libraries, stores, malls, museums, aquariums, parking structures, factories, stadiums, warehouses, shipping terminals, public transportation buildings, or other similar facilities.
MUM	Multi-Use – Multi-story (building with both commercial & residential occupants)	A multi-story, multi-use building featuring residential and commercial uses.
MUS	Multi-Use – Single story (building with both commercial & residential occupants)	A Single-story, multi-use building featuring residential and commercial uses.
OBS[7]	Office Building – Single Story	A Single-story office building with no residential use.
OBM[7]	Office Building – Multi Story	A Multi-story office building with no residential use.
SCH[7]	School Campus (Admin, Dorm, Classroom)	A single or multi-story, multi-use building featuring education uses to include on campus housing, classrooms, administrative facilities, plus commercial and office buildings on campus.

Examples of using Place Type are shown in Table 5.2. An Access Point or Bluetooth beacon address is submitted that includes the Place Type.

Table 5.2 – Np Access Point or Bluetooth Beacon Location Information Examples

#	Address	Place Type
1	123 West Admiral Anytown WI	RSS
2	826 Monument Ave Anytown WI	RMS
3	356 Crescent Drive Anytown WI	MTS
4	896 North Main Floor 5 Room 501 Anytown WI	MTM
6	3657 Apple Street Room 122 Anytown WI	CMS
8	6364 Lawndale Ave Building A Floor 8 Room 823 Anytown WI	CMM
9	6983 Mountain Parkway Floor 3 Anytown WI	MUM
10	5983 Huron Street Room A Anytown WI	MUS

[6] In this context, Commercial refers to non-residential.

[7] This value is not supported in ATIS-0700028.v1.1 [Ref 1]. It is intended to be supported in a future version.

5.1.2 UE to LS Interactions (Step 2)

The UE and LS will interact (via the MME) using either Long Term Evolution Positioning Protocol (LPP) or Long Term Evolution Positioning Protocol Extensions (LPPe) protocols to obtain Access Point and Bluetooth identifiers. Additional information may be obtained as shown below.

Attributes passed:

1. Wi-Fi Access Point.
    a. MAC Address.
        - servingFlag.
        - Received Signal Strength Indication (RSSI).
        - Round trip delay
        - Channel number.
2. Bluetooth beacon.
    a. BT-PDA.
        - RSSI.
3. UBP.

5.1.3 LS Query Filter (Step 3)

The LS queries the NEAD with the Access Point MAC Addresses or Bluetooth identifiers it received from the UE. LS may select a subset of those MAC Addresses and Bluetooth identifiers based upon filtering.

Attributes that may be used for filtering:

1. Wi-Fi Access Point.
    a. MAC Address.
        i. servingFlag.
            - RSSI.
            - Round trip delay.
            - Channel number.
2. Bluetooth beacon.
    a. BT-PDA.
        - RSSI.

5.1.4 NEAD Response (Step 4)

Assuming that the Access Point or Bluetooth beacon information is provisioned in the NEAD, it responds to the Location Server with location information. The NEAD returns the civic address, including subaddress elements, Place Type, and a geocoded location of the Access Point or Bluetooth beacon.

Attributes returned in Presence Information Data Format – Location Object (PIDF-LO):

a. Civic address including subaddress elements.
b. Place Type.
c. Geocoded location.
d. Method of either NEAD-WiFi or NEAD-Bluetooth Low Energy (BLE).

5.1.5 LS Filtering (Step 5)

Once the LS obtains the Access Point and Bluetooth information from the NEAD and the geodetic location from the location determination equipment, it may choose a Dispatchable Location from those candidates it obtained from the NEAD. The LS will perform specific algorithms to choose the appropriate location estimate.

The following is a non-exhaustive list of inputs that may be used to determine the most appropriate location information to forward to the GMLC, if available:

a. Geocoded location (in PIDF-LO from NEAD).
b. Method of either NEAD-WiFi or NEAD-BLE (in PIDF-LO from NEAD).
c. Serving Flag.

   The use of the servingFlag parameter is an inherent part of the LS filtering process. This parameter indicates whether WLAN AP measurements were obtained for a serving WLAN AP (TRUE) or a non-serving WLAN AP (FALSE). A target device with multiple radio support may indicate more than one type of serving access for the same time instant. [Ref 5]. Table 5.3 provides examples of use cases in which a serving flag may be present.

Table 5.3 – Use Cases

Use Case	Device Associated
1	Single BLE
2	Single AP
3	Single BLE and AP
4	AP with servingFlag
5	Multiple AP(s) with serving flag
6	Multiple AP(s) and BLE(s)
7	Multiple AP(s)
8	Multiple BLE(s)

d. Place Type (in PIDF-LO from NEAD; see Table 5.1). It is likely that in use case 4 (see Table 5.3) a building or place type of RSS or RMS will correspond to a Class of Service value of WDL2, whereas a building or place type of OBM will correspond to a Class of Service value of WDL1 (see Clause 5.1.8). Dispatchable Location Test Bed testing will further clarify these relationships.

   NOTE: The use of serviceFlag is an inherent part of the LS filtering process. It is likely that in use case 4 with building or place type RSS or RMS will correspond to WDL2. In use case 4 with a building or place type of OBM will correspond to WDL1. Dispatchable Location Test Bed testing will further clarify these relationships.

   NOTE: Any Use Case could be found within any Place Type.

e. Geodetic location obtained from the location determination equipment.
f. Serving cell geo coordinates from the cellular network.
g. Wi-Fi Access Point.
    a. MAC Address.
        i. servingFlag.
        ii. RSSI.
        iii. Round trip delay.
        iv. Channel number.
h. Bluetooth beacon (BT-PDA).
    a. RSSI.

5.1.6 LS Messaging toward the GMLC (Step 6)

Once the LS has obtained the geodetic location and potentially determined a Dispatchable Location, it forwards that information to the GMLC through the MME.

Attributes forwarded to the GMLC:

a. Dispatchable Location (in PIDF-LO from NEAD).
b. Method of NEAD-CVC, NEAD-DL1 or NEAD-DL2 (generated by the LS).
c. Place Type (in PIDF-LO from NEAD).
d. Geodetic location obtained from the location determination equipment.
e. Positioning Method of obtaining geodetic location [e.g., Assisted Global Positioning System (AGPS)].

5.1.7 E2 Response to the Legacy ALI (Step 7)

Once the GMLC receives the location information from the LS, it must map the geodetic location and Dispatchable Location into the E2 format. It then must determine a Position Source depending upon the information it obtained.

The following shows an example of the Location Description parameter populated in the E2 response using example 4 in Table 5.2.

<HNO>896</HNO>
<PRD>N</PRD>
<STN>Main</STN>
<MCN>ANYTOWN</MCN>
<LOC>FLOOR 5 ROOM 501</LOC>

If the XML elements associated with the Dispatchable Location exceed the associated E2 element length, the GMLC truncates the string from right to left (left justified). The GMLC populates the Position Source based on a mapping from the location method token value provided in the PIDF-LO from the LS. The GMLC maps a method token value of NEAD-CVC to Position Source 55, a location method token value of NEAD-DL1 to Position Source 56, and a location method token value of NEAD-DL2 to Position Source 57.

5.1.8 ALI to PSAP Location Conveyance (Step 8)

Once the ALI receives the geodetic location and Dispatchable Location in the E2 response, it returns those along with Class of Service to the PSAP in response to an ALI query. It will convert the Position Source it received in the E2 response into the corresponding Class of Service. If elements received in the E2 response are longer than can be utilized by the PSAP CPE, the ALI truncates the string from right to left (left justified).

6 Location Selection

It is expected that wherever possible, the caller's estimated geodetic (latitude and longitude), with confidence and uncertainty, will be provided to the ALI servers. Any other location capabilities (i.e., device-based hybrid) should also be considered in the determination of best latitude and longitude, including z-axis when available.

In addition, where available from NEAD data, a chosen AP or BT associated civic address and sub-address location data set will be provided through the E2 and ALI server process to the PSAP[8]. Where the NEAD does not provide sufficient coverage, such data may not be available for a given 9-1-1 call, or verification actions may indicate that populated data is not appropriate for use.

[8] Note that truncation of the location data may be necessary due to limitations in legacy location delivery protocols and PSAP CPE.

Additional evaluation in specific carrier location services processing will determine which NEAD AP or BT address and location data that is available should be utilized.

Present considerations of concern to Public Safety are listed below and are not meant to be all inclusive. It is expected that additional considerations will be derived over the course of the NEAD multi-year development and deployment life cycle and may result in future revisions.

1. All geodetic locations, including handset derived locations, should be evaluated based on available information for quality, timing, and dependability in relation to other location choices for a given 9-1-1 call. Factors to enter into such evaluation include calculated uncertainty and technology type. For example, a small uncertainty device-based hybrid geodetic fix can be used as a distinguishing factor between two candidate Dispatchable Locations returned by the NEAD to the LS. High quality geodetic fixes should be used in aiding the correct selection of DL.
2. When available, the presence of a servingFlag that ties a given user device to a related AP should be utilized to differentiate between surrounding multiple AP instances. This will tend to make the chosen address more relevant to determining the likely user location than if the servingFlag is not utilized.

   When servingFlag is present it may be more definitive than RSSI based on the assumption that the Wi-Fi access point that the device is attached to is the most representative of the user's device location. Therefore, higher weighting should be given to the serving access point, especially in consideration of certain building types. For example, in residential environments (e.g., RMS), it may be assumed the caller is connected to the access point in their own home even if a neighbor's Wi-Fi beacon signal is stronger.
3. PlaceType is an important parameter and should be provisioned in the NEAD whenever possible. If PlaceType is available, it is expected to influence the selection of the NEAD-based location and may be used in the determination of CVC, DL1, or DL2 labels. The PlaceType should be sent toward the PSAP (e.g., MPC-E2-ALI interfaces).
4. In conjunction with all other parameters, AP signal strength should be considered in the selection of Dispatchable Location. Received Wi-Fi AP signal strength, particularly for APs whose civic addresses are provisioned in the NEAD, is very useful information, which can be used to augment decision making regarding DL or the class of DL. Even in the presence of a serving flag for an AP, signal strength can help differentiate between DL2 and DL1 in a multi-floor, multi-unit building. Furthermore, in the absence of a serving flag, AP signal strength can help distinguish between CVC and a likely DL1. This is because the received Wi-Fi signal level at the handset correlates well with the number of walls or floors that the signal penetrates to arrive at the handset. Empirical testing can provide guidance for signal level thresholds that can be used, either in the presence or absence of other factors, to aid in making decisions, including DL2 versus DL1, DL1 versus CVC, and CVC versus a situation where the Wi-Fi signal is likely to be from a neighboring building.
5. Loading of NEAD data must involve an address validation action [i.e., Master Street Address Guide (MSAG) or Location Validation Function (LVF)], in order to verify the content and format of the data for each AP or BT Reference Point.
6. When the APs or BT Reference Points recognized by the user device are passed to the NEAD database, the returned result is cross-checked at the Location Server with other available location information to determine whether the AP/BT data may be appropriate to use. This check indicates appropriate proximity with the cell tower and sector data. For example, the geocoded information associated with the civic address of the AP/BT should be in the vicinity of the cell site serving the caller. The exact relationship should be defined and tested during NEAD location accuracy testing in the national Test Bed process.
7. A goal of the location services process is to have consistent Dispatchable Location results delivered from different carriers to the PSAP under similar call circumstances.
8. There should be testing of the location determination system as a whole, which arises from the interactive and interdependent elements of the location determination process, including location services logic, NEAD, MPC/GMLC actions, and the ALI server.
9. The NEAD test bed and any other efforts to define how the NEAD related results should be evaluated to help refine the location services processes among carriers to improve the quality and consistency of the results delivered to the PSAPs.

6.1 Specific Position Methods

For further study.

6.2 Multiple Position Methods

For further study.

7 Position Reporting for PSAPs

Clauses 5.1.7 and 5.1.8 discuss the interactions between a GMLC and the ALI, and between the ALI and the PSAP, respectively. Specifically, Clause 5.1.7 discusses how the GMLC will receive the geodetic location and civic location and convert them into an E2 response. The geodetic location will be populated in a Wireless Phase II format. The civic address will be formatted into XML elements and sub address elements and will be populated in the LOC field of the E2 response. The LOC field is limited to 60 characters and if the total number of characters exceeds 60 characters, the lower-priority sub-elements will be truncated. The priority of converting XML elements into the LOC field in the E2 Location Description parameter is as follows (highest on left to lowest on right):

BLD**|**FLR**|**UNIT**|**ROOM**|**SEAT**|**MP**|**LOC**|**LMK (or LMKP) **|**PLC|UBP

The method token value in the PIDF-LO received from the Location Server is converted by the GMLC into Position Source values. The GMLC converts the method token value of NEAD-CVC to Position Source 55 (CVC), a method token value of NEAD-DL1 to Position Source 56 (DL1), and a method token value of NEAD-DL2 to Position Source 57 (DL2).

As discussed in Clause 5.1.8, the ALI server will convert the information it receives in the E2 response into a format that can be transmitted to the PSAP. The geodetic location will be presented in the same manner as for a Wireless Phase II call. The civic address will be presented in the manner that has been agreed upon by the ALI provider and the PSAP administrator, unless the PSAP CPE provides a modification of the format. In order to display the sub address elements, the PSAP must have the capability to display them on the Telecommunicator screen. If the display has restrictions on the size of the location field, then some information may be truncated and therefore not displayed. For example, some PSAPs have a limit of 20 characters that can be displayed on the screen. If the GMLC returns 60 characters and the PSAP has a limitation of 20 characters, some important information regarding location may not be displayed. PSAP administrators should evaluate their display formats to assess the impact of receiving sub addressing information.

The ALI will convert the Position Source values it received into Class of Service enumerations. It is recommended that PSAPs use these new Class of Service designations and display them on the Telecommunicator display screen. The ALI server will convert Position Source 55 (CVC) to Class of Service WCVC, Position Source 56 (DL1) into Class of Service WDL1, and Position Source 57 (DL2) into Class of Service WDL2.

8 Conclusions

The guidelines and recommendations presented in this document are based on a combination of conceptual definitions and very limited functional testing of the interactions between locations servers in wireless networks and the NEAD. As such, the guidelines are initial and broad in nature. As stated under Clause 6, various details pertaining to these guidelines may be refined or expanded as more comprehensive Dispatchable Location testing takes place according to the guidelines in ATIS-0500035. With every test program and analysis of the resulting data, it will be possible to gain a deeper understanding of the interactions between different location servers and the NEAD, the decision-making processes leading to Dispatchable Location determination, and the desired versus achievable Dispatchable Location outcomes under a wide range of conditions. This will lead to more refined guidelines to achieve enhanced Dispatchable Location performance and to promote consistent Dispatchable Location outcomes across networks under similar conditions.