



ATIS Indoor Testing Methodologies

Kelly Springer, AT&T

Director of Regulatory and Location Technology

FCC Workshop on Upcoming Test Bed to Improve Indoor Location Accuracy for Wireless 911 Calls

October 24, 2012

ATIS in Brief

- As a leading ICT organization, ATIS' 200+ member companies define, address and advance technology solutions and standards to support the timely roll-out of new products and services.
 - Thirty years of industry leadership
 - Diverse membership includes wireline and wireless service providers, broadband providers, equipment manufacturers, software developers, consumer electronics companies, internet service providers, cable companies, digital rights management firms, government and public safety agencies, etc.
- ATIS' 55 member C-level Board defines the strategic vision and technology priorities to advance members' business needs.
- Fast-tracked solutions and standards development covers all aspects of the technology development lifecycle —
 - From innovation and solution design, to business use case formulation, to requirements, specifications, standards, interoperability testing, software tool kits, best practices, data collections, user guidelines and more...

ATIS -- Emergency Services

- ATIS has a number of active emergency services-related projects taking place in its committees, including:
 - Next Generation 9-1-1
 - Indoor/Outdoor Location Accuracy
 - Location Acquisition
 - SMS-to-9-1-1
 - Public Safety requirements in LTE networks
 - Next Generation Networks Government Emergency Telecommunications Service (NGN GETS)
 - Commercial Mobile Alert System (CMAS)
- ATIS is a member of the FCC's Emergency Access Advisory Committee (EAAC) and CSRIC, and actively participates on CSRIC Working Groups.

Related ATIS ESIF Publications

CSRIC leverages the defined ATIS Emergency Services Interconnection Forum (ESIF) standards associated with 9-1-1 testing methodologies:

•**ATIS-0500001: *High Level Requirements for Accuracy Testing Methodologies***

- Provides a common frame of reference that individual stakeholders can use to validate the accuracy methodology of 9-1-1 location technologies, and defines requirements and provides a recommendation for verifying the test equipment is meeting the requirements.

•**ATIS-0500011: *Location Technology Performance Data – Define Topologies & Data Collection***

- Defines the topologies in which representative location accuracy data should be aggregated, and the methodology to accomplish this data analysis.

•**ATIS-0500013: *Approaches to Wireless E9-1-1 Indoor Location Performance Testing***

- Establishes the methodologies for assessing location performance of E9-1-1 calls made indoors and defines a clear definition of the term 'Indoors' in this context. It includes recommendations on ground truth determination for indoor test scenarios, evaluates methodologies for assessing location performance of E911 calls made in various indoors scenarios, and determines criteria for test point and result validity.

Staying Current

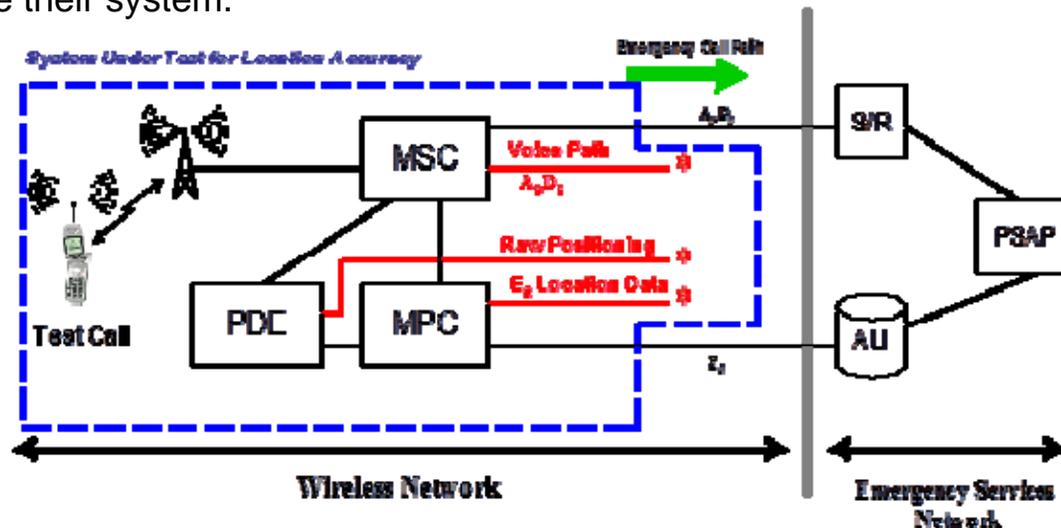
ATIS ESIF monitors and evaluates fundamental changes in evolving wireless technologies and customer uses in how they impact emergency services and promptly responds as necessary to develop the appropriate solutions.

- Reviewed **ATIS-0500001: *High Level Requirements for Accuracy Testing Methodologies***
 - Reviewed accuracy testing document (warm start, etc.).
 - Reviewed existing requirements to assure that they are still comparable with current technologies and uses.
 - Defined requirements and provided a recommendation for verifying the test equipment is meeting the requirements.
- ESIF drafted and presented its test bed plan recommendations to CSRIC WG3, which have been adopted and incorporated into WG3's deliverable.
- Company testing based upon ESIF's test bed plan will begin in November 2012.

E911 Accuracy

Accuracy Testing (ATIS-050001)

Accuracy testing, whether through empirical and/or predictive test methods, consists of generating location data to gauge the accuracy performance of the system. Location data, typically significant in volume, involves the location infrastructure of the carrier's network. The primary objective is to verify location accuracy and correct any location system errors. Limiting the test to the carrier's location network minimizes impact to the rest of the Phase II network and maximizes the capability of the carriers to optimize their system.



***Possible accuracy test call voice and signaling termination points**

System under Test Boundary for Location Accuracy (ANSI-41 Networks)

E911 Location Accuracy Testing

Two of the most common practices of accuracy testing used in the industry are Empiric and Predictive.

Empiric Testing

An empirical location accuracy test consists of measuring the difference between a location established by typical surveying techniques or by a differential GPS receiver or similar means and the location estimate provided by the wireless carrier. Empiric Testing is the most commonly used by most carriers for Network Accuracy data collecting along with scheduled drive test.

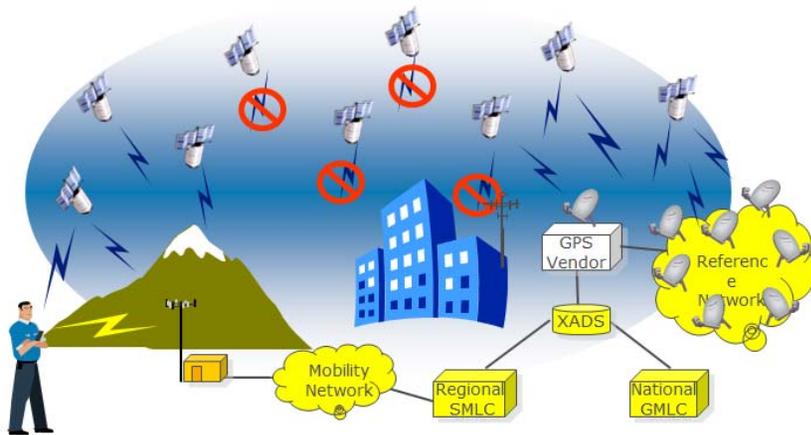
Predictive Testing

A predictive test method consists of utilizing a predictive model to compute the expected accuracy of a location determining technology within a wireless carrier's service area. The predictive model takes into account the physical elements of the location determining system for network or handset based solutions as well as the relevant terrain and RF propagation characteristics.

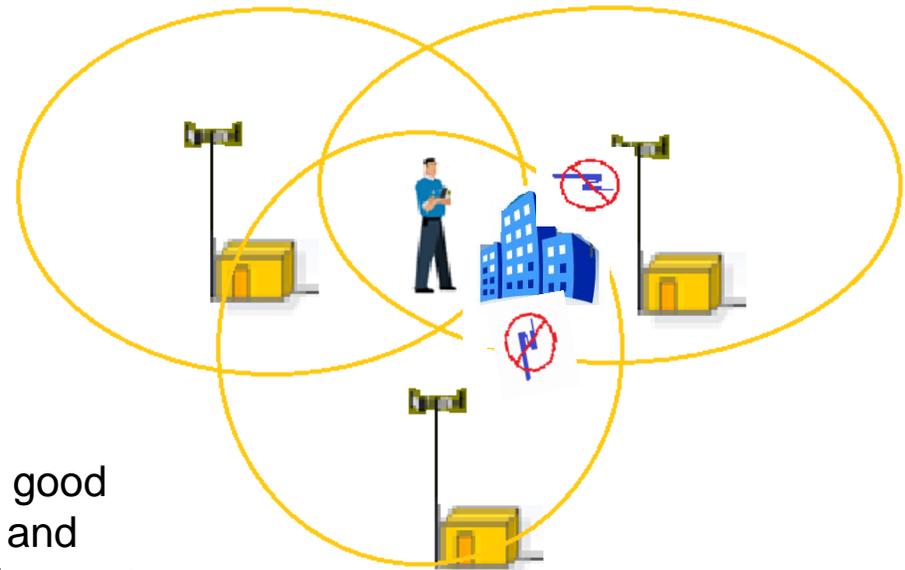
ATIS-0500001: High Level Requirements for Accuracy Testing Methodologies

E911 Accuracy VS Indoors

E911 Location Technologies most commonly used today by US Wireless Carriers are either Handset Based or Network Based. Examples: AGPS, UTDOA, RF Fingerprinting, AFLT, RTT, etc.



A UE device in an unobstructed location with good Network Signal most always will yield a solid and consistent E911 location well within the requirements of the FCC Accuracy Rules.



A UE device used indoors or in an obstructed signal location becomes very inconsistent with location performance and yield. Indoor usage is one of the biggest challenges facing the current location technology used today.

Indoor Accuracy NextGen

ATIS ESIF recognizes there are many new emerging technology solutions which show promise in bridging the gap between solid outdoor location performance and the inconsistency of indoor location.

Challenges facing the deployment of emerging technologies:

- Interoperability between existing technologies
- Large existing UE customer base with early generation chipsets
- Complexities in technology access points
 - WiFi
 - DAS
 - MetroCell
 - FemtoCell

Supplemental Information



TECHNICAL & OPERATIONS COMMITTEES



ATIS -- Emergency Services

- ATIS' Emergency Services Interconnection Forum (ESIF) provides a venue to facilitate the identification and resolution of technical and/or operational issues related to the interconnection of emergency services networks with other networks (e.g., wireline, cable, satellite, Internet, etc.).
 - Participants in ESIF include representatives from communications providers, PSAPs, and equipment manufacturers.

ATIS ESIF Voting Members

- 9-1-1 DataMaster
- Alcatel-Lucent
- APCO
- AT&T
- Bell Canada
- Bexar Metro 9-1-1 Network District
- Cassidian Communications
- CommScope
- Cox Communications
- Denco Area 9-1-1 District
- Ericsson
- Greater Harris County 9-1-1
- INdigital Telecom
- Intrado
- L. Robert Kimball and Associates
- MetroPCS
- MESB
- Motorola Solutions
- NENA
- NeuStar
- Nokia Siemens Networks
- Polaris Wireless
- Qualcomm
- Sprint
- Tarrant County 9-1-1 District
- TechnoCom
- TeleCommunication Systems (TCS)
- Texas 9-1-1 Alliance
- Time Warner Cable
- T-Mobile USA
- TruePosition
- Verizon
- Verizon Wireless