NextNav, LLC

High Precision Urban and Indoor Positioning Services

Ganesh Pattabiraman, Founder & President

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Background

- In case of an emergency consumers have a strong expectation that first responders will be able to locate them accurately whether indoors or outdoors – “the public safety – consumer bond”.
- With more than 100% of the population being mobile that “bond” is clearly “frayed”
  - 70% of emergency calls are made from wireless phones
  - Nearly 56% of wireless calls are made from indoors [J D Power, 2011]
- FCC has taken a number of steps to address this public policy issue
  - Since 2010 a number of NPRMs/Comments filed on the subject of Indoor location
  - Creation of the CSRIC committee on Indoor
  - Conducting an unprecedented National Test Bed in 2012
- Appropriate time to consolidate the information to establish policy on a firm ground

Horizontal Accuracy

- Public Safety Foreword in CSRIC III Report
  - "Public Safety desires reliable and consistent caller location information to a specific dispatch-able building (and floor in multi-floor environments). Lacking the specific building and floor, the desire would be for the smallest possible search ring, but still with the underlying requirement for confidence in the reliability and consistency of the data"
  - "Horizontal positional fixes that substantially exceed **50 meters** provide only general location information"
- Number of technologies have demonstrated or claimed in several reports or filings the ability to provide high precision indoor location
  - Nearly a dozen companies have filed on the record the ability to provide indoor location capabilities: Navizon, Skyhook, Cisco, CSR, Qualcomm, Invisitrack, Polaris, Commscope, Trueposition, NextNav
- Extend existing rules of 50m- 67%/150m – 90% to indoors as a first step, eventually getting to public safety's desire of 50m – 80+%

Vertical Accuracy

- In Indoor environments vertical location is clearly required
- Effect of vertical on an area that first responders need to search for can have a 5x – 10x effect on search area (assuming a 50m search radius)
- Various technologies can be used to determine height:
  - DAS systems, Baro sensors, Wi-Fi and Femto Cells
  - Baro sensors are appearing in handsets
- Altitude information can be relayed from the mobile to the call taker's console:
  - Format 04 supports hidden fields incl. elevation
  - J-STD-036 Rev C supports altitude as an optional field
  - Next Gen 911 is future proofed to support altitude
- Display of location information
  - Several providers of indoor maps – Google, Micello etc
  - In some urban areas call taker's have access to maps over the internet
  - Even in the absence of maps relative heights can be used to determine the approximate height/floor of the person in an emergency
- Ultimate goal is floor level information however starting with 3-5m is achievable

Yield

- Defined as “ratio of successful phase 2 locations over the total number of valid location requests” – CSRIC III Report (Indoor and LBS)
- In essence ‘Yield’ is a measure of the technology’s ability to compute a location in various environments. Yield therefore varies significantly by technology – a low yield can present an inaccurate picture of the accuracy that will be delivered to the public safety community
  - Comparing a technology that delivers 50% yield to something that delivers 99% yield would be comparing ‘apples and oranges’
- In RF challenged environments a higher yield could degrade accuracy – balance required
- Any indoor and outdoor rules need to account for Yield
  - Account for 100% of fix attempts
  - Define a threshold that ensures any performance metric comparison is meaningful e.g.:- 95%+

Conclusion

- The issue of location in indoor environments is well understood - as more citizens are going mobile, greater percentage of emergency calls are originating in indoor environments
  - Phase II rules were adopted when wireless penetration was at 44% and 50 million wireless E911 calls were made; today wireless penetration is over 100% and over 150 million wireless E911 calls are made – the public policy gap is clear
- The building blocks for indoor exist
  - Healthy ecosystem of technologies that can support positioning in indoor environments with high accuracy, yield and vertical capabilities
- Challenges in implementation are minor compared to when Phase II rules were rolled out
  - Incorporation of GPS chips in mobile phones
  - Definition of new Network elements - MPC, PDE etc.
- Time to act is Now!