NextNav Overview

NextNav is a network services provider deploying a nationwide system to provide reliable, high-precision positioning information in urban and indoor environments.

Nationwide spectrum licenses, significant intellectual property portfolio and wide-area architecture provide consistent store level / floor level precision across entire metropolitan areas.

Experienced team has a long and successful history in network deployment, and is backed by Columbia Capital, Telcom Ventures and Goldman Sachs.
There is no reliable, high-precision solution where mobile devices are used today.

The missing piece....
NextNav Metropolitan Beacon System (MBS)

High Performance
- GPS-like performance indoors and in urban environments
- Accurate vertical position
- Fast time to first fix
- Fully managed network

Limited Application and Core Network Impact
- Designed to leverage existing elements with configuration to support NextNav information
- Similar to “Standalone GPS Mode” call flows

Limited Receiver Impact
- Firmware upgrade to typical GPS digital baseband: standalone solution
- Handset integration largely limited to band support
- On-device computation of location
- Reduced power consumption

Wide Area Broadcast Network
- Highly synchronized beacons, with deployment optimized for location
- Encrypted signal on licensed spectrum, similar to GPS
- Broad coverage from minimal sites

NextNav is deploying a terrestrially-based positioning constellation, featuring significant technical commonality with GPS
Key Principles & Innovations

- Network architecture effectively results in a terrestrial positioning constellation, featuring significant commonality with GPS
  - Timing-based system, using highly synchronized terrestrial transmitters for device-based trilateration
  - Wide-area network architecture, providing consistent indoor service across coverage area
- System designed for minimally-disruptive adoption in mobile handsets and other devices
  - Re-use of GPS digital baseband
- Air interface-agnostic system – allows for evolution of location technology independent of air interface (2G, 3G, 4G etc.)
- Unique height system results in 1 – 3m vertical precision by encoding real-time environmental reference information in positioning data payload
- Unique business model – shared network (similar to GPS) across multiple parties ensures costs are competitive
  - NextNav deploys, manages and runs the network on a nationwide basis

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Indoor Accuracy Performance: Rev 1 System

- Results across suburban/urban environment
  - Offices
  - Hotels
  - Malls
  - Homes
- Indoor results only
- 5,000 measurements
Gold Standard LEED Certified Hotel Building in SF
Day-to-Day Comparison

Elevation (m)


Ground Floor

20th Floor

25th Floor

10th Floor
## Mobile E911 Call Trends

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<tbody>
<tr>
<td>Wireless Subscriber Connections</td>
<td>331.6M</td>
<td>302.9M</td>
<td>233.0M</td>
<td>128.4M</td>
<td>44.0M</td>
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<tr>
<td>Wireless Penetration in US Households</td>
<td>104.60%</td>
<td>~98.5%</td>
<td>76.60%</td>
<td>44.20%</td>
<td>16%</td>
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<tr>
<td>Wireless-Only Households (as % of US households)</td>
<td>31.60%</td>
<td>26.60%</td>
<td>10.50%</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Wireless E-911 Calls (per day)</td>
<td>&gt;400K</td>
<td>&gt;296K</td>
<td>260K</td>
<td>139K</td>
<td>55K</td>
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<tr>
<td>Wireless E-911 Calls (per year)</td>
<td>&gt;146M</td>
<td>108M</td>
<td>~93.6M</td>
<td>~50M</td>
<td>~19.8M</td>
</tr>
</tbody>
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Source: CTIA, NENA

- **Wireless 911 Calls are accelerating (over 145 million annually)**
  - >33% growth in just one year from 2010 to 2011

- **Wireless only households are accelerating as well**
  - Over 36% Households in US do not have a landline [2012, CDC]

- **Vast majority of wireless calls originate from indoors**
  - Over 56% of calls originate indoors [2011, JD Power]
Communications Safety, Reliability and Interoperability Council Trials ("CSRIC")

- In 4Q12 the FCC’s CSRIC advisory group held a comprehensive, independent trial of location technologies for indoor E911 in the San Francisco / Silicon Valley area.
- Joint effort by Public Safety, technology vendors and national wireless carriers. Results released March 2013.
CSRIC Test Protocol Review

- CSRIC 3, Working Group 3 was chartered by the FCC with, among other things, creating an information base from which indoor location accuracy standards for E911 could be established
  - WG3 consists of technology vendors, public safety representatives and the four major U.S. wireless carriers

- Test program was performed by a 3rd party (TechnoCom), and was completely blind to participants
  - Over 13,000 test calls for each participating vendor at 75 indoor test points per building (including deep building core)
  - Test bias towards dense urban / urban (70% of test points)

- Extremely rigorous test process, appropriate for mission-critical applications, resulted in some vendor attrition, with performance for all vendors impacted (7 expressed interest, 4 started and 3 finished)

- Results published in March 2013
2D CSRIC Test Results by Morphology

Dense Urban

Suburban

Urban

Rural
NextNav was the only company to have tested the Vertical in Indoor environments. Average vertical height error was 2m.
Horizontal position fixes that substantially exceed 50 meter accuracy provide only general location information…

- from the conclusions of the CSRIC report
NextNav Rev-1 Network Technology
Currently Deployed, Wide-Area

Compatible with Rev-1

NextNav Rev-2 Network Technology
Improved Accuracy Wide-Area

Compatible with Rev-1 and Rev-2

NextNav Local
5 – 10m Indoor Accuracy, Venue-Based

4Q12

2013

2014

Advanced Dev.

Owned assets provide unique ability to continually improve performance while preserving legacy system support

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Rev 2 NextNav 2D Results

NextNav’s Rev 2 system delivers a consistent 20 - 25% improvement in performance compared to its Rev 1 system.
The following chart depicts the CSRIC Rev 1 and Rev 2 performance data, weighted by US population density in urban and suburban areas. The U.S. Census describes 30% of the population living in urban areas, 50% in suburban areas and 20% in rural areas. Data excludes testing in rural areas, where GPS functions adequately.
In Commerce, Vertical Ambiguity Means Contextual Ambiguity…

Different places. Different people. Different intentions. But all share the same latitude and longitude – altitude is the difference.

NextNav has demonstrated median height accuracy of <1.5m (better than floor level) in 3rd-party testing designed for mission-critical applications like 9-1-1.
NextNav Tracking Performance – Westfield Valley Fair, Rev 1 System

- Walking test result in Valley Fair Mall, ground-truth (red) compared with NextNav measurements (green)
- Beta test – tracking algorithm still being tuned
NextNav Local

- Optimized for campus, mall, warehouse or similar localized areas
- 5 – 10m horizontal accuracy
- *Fully compatible with NextNav Metro deployments – effectively a high-performance underlay of same tech.*
Summary

• NextNav is deploying a revolutionary wide-area positioning system
  – Fully managed network, based on owned assets, brings high-precision, reliable location indoors
  – Underlying technology requires minimal chipset and device integration
  – Encrypted signals allow management of access to technology
  – Shared network allows multiple customers, for different services (e.g., E911, commercial)

• FCC has established a process to bring indoor location standards to wireless E911

• NextNav brings “carrier grade” ubiquity, reliability and accuracy to location