

Evolving 4.9 GHz Technology to provide effective Broadband Communications for Public Safety and Homeland Security

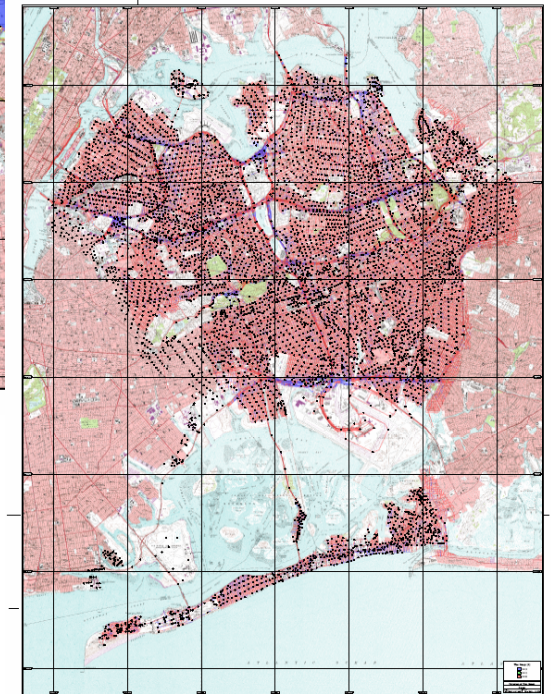
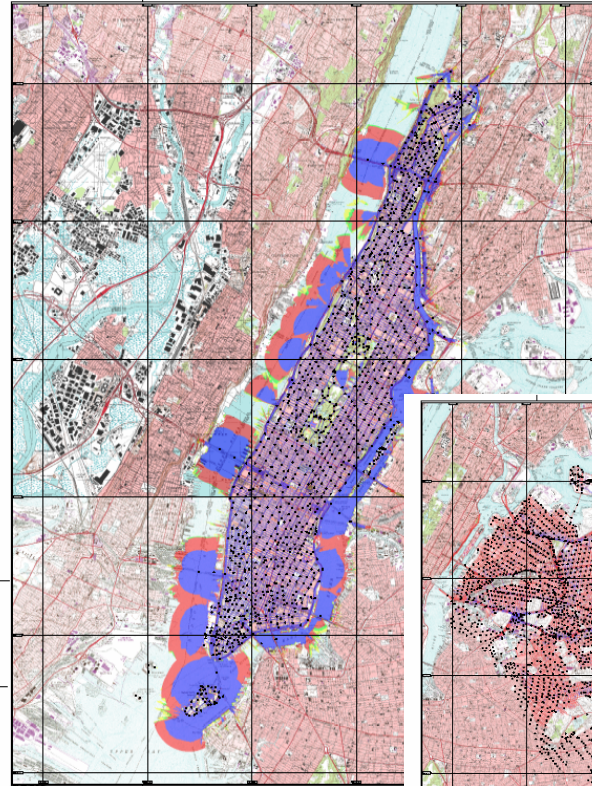
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Development Map

- 4.9 GHz Propagation Measurements in New York, NY and Reston, VA
- Design of a network for New York City
- Understanding Public Safety community requirements (APCO, NPSTC, WCA)
- Characterization of technology benefits and constraints
- Product design to fulfill requirements
- Product field test and fine tuning

Propagation/ Frequency Planning

- Average path loss for LOS
 - 18 to 30 dB/decade
- Large obstruction loss
- Substantial fading
 - 5 to 10 dB
- Recommendations
 - RF Front End
 - RF Heads
 - High gain antennas
 - Antenna diversity
 - Frequency reuse factor
 - 5 or larger
- Requires planning tools that support OFDM, TDD and QOS performance calculations
 - CelPlanner/CelOptima



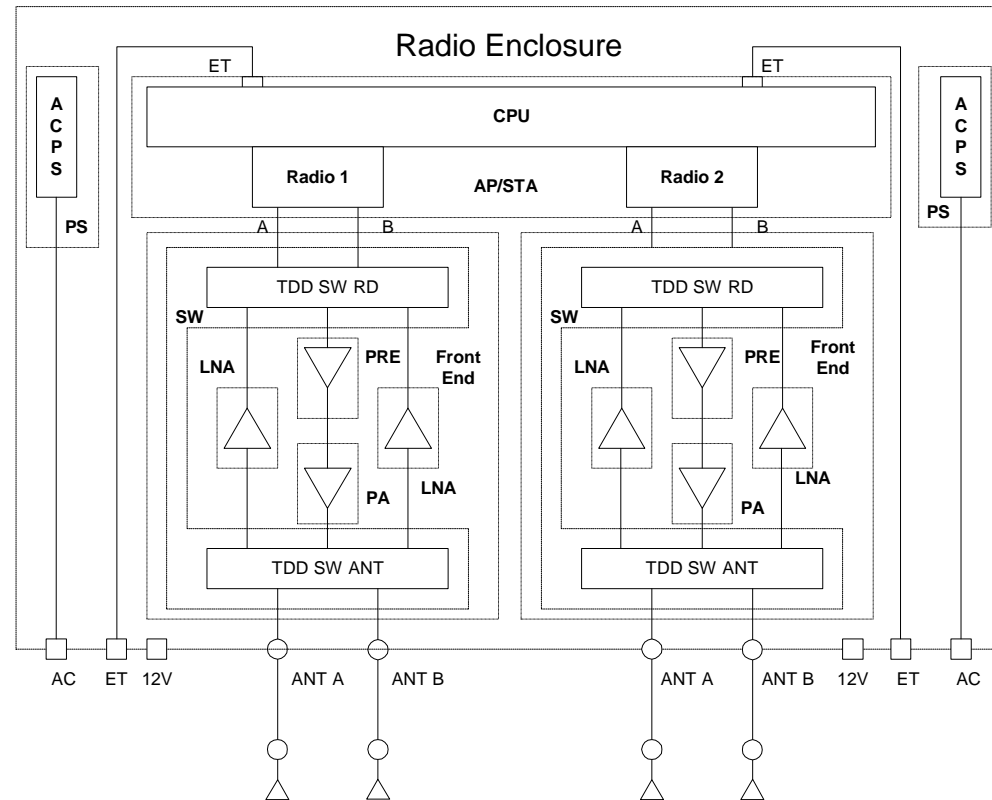
FlexiRadio™

- Multiple integrated radios per enclosure
 - Up to four 802.11 a/ b/ g radios
 - Radios cover any of the bands:
 - 2.4(ISM)
 - 2.5-2.6 (BRS/EBS)
 - 4.9(PS)
 - 5.2-5.3(UNII)
 - 5.4-5.7(UNII-ISM)
 - 5.8-5.9(ITS)
 - 40, 20, 10 and 5 MHz bandwidth
 - Up to two processors
 - Advanced FCC certification process



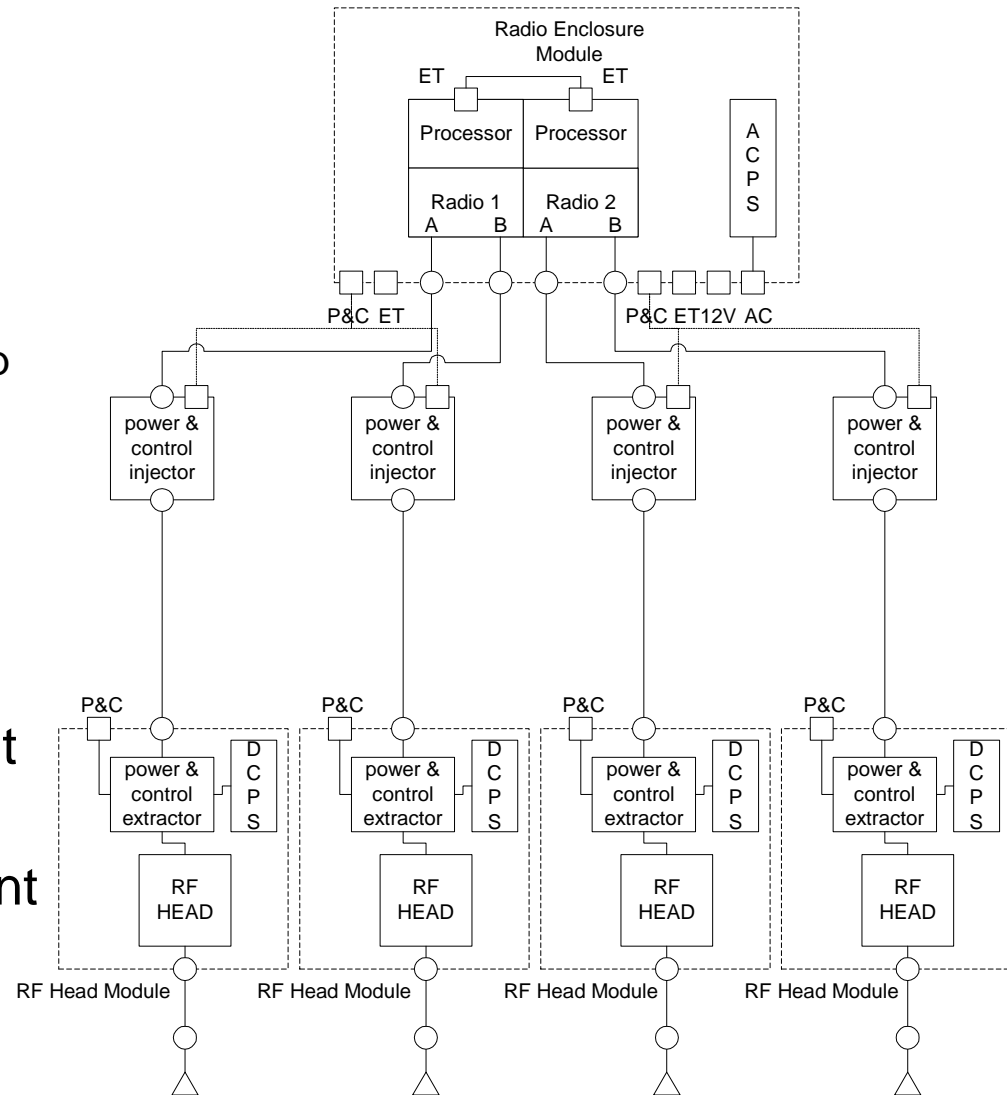
FlexiRadio™

- RF Front End
 - TDD switch
 - Power Amplifier
~36 dBm PA power
(~20 dBm output power)
 - LNA (1.5 dB NF)
 - Mask L
 - MIMO (transmit and receive diversity)
- Integrated Backhaul
 - Mesh/grid connectivity
- Full Mobility Support



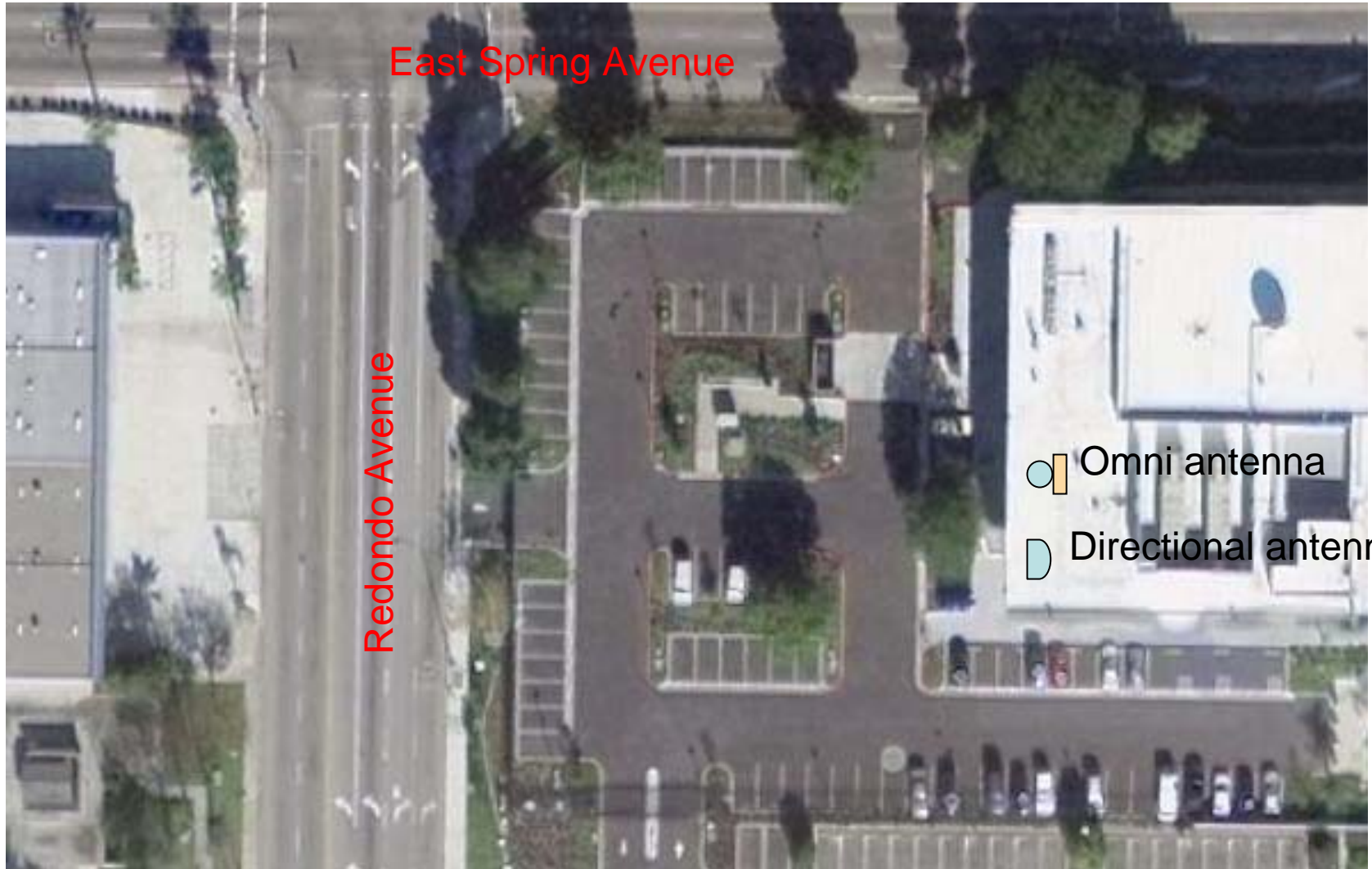
FlexiRadio™

- RF Head per antenna
 - Multiple Antennas per radio provide high gain omni like coverage
 - Compensates cable loss (up to 3 dB per meter)
 - Available September 2005
- COTS
- Compatibility
 - CelPlan AP to Proxim Client (PCMCIA)
 - CelPlan AP to LinkSys Client (PCMCIA)



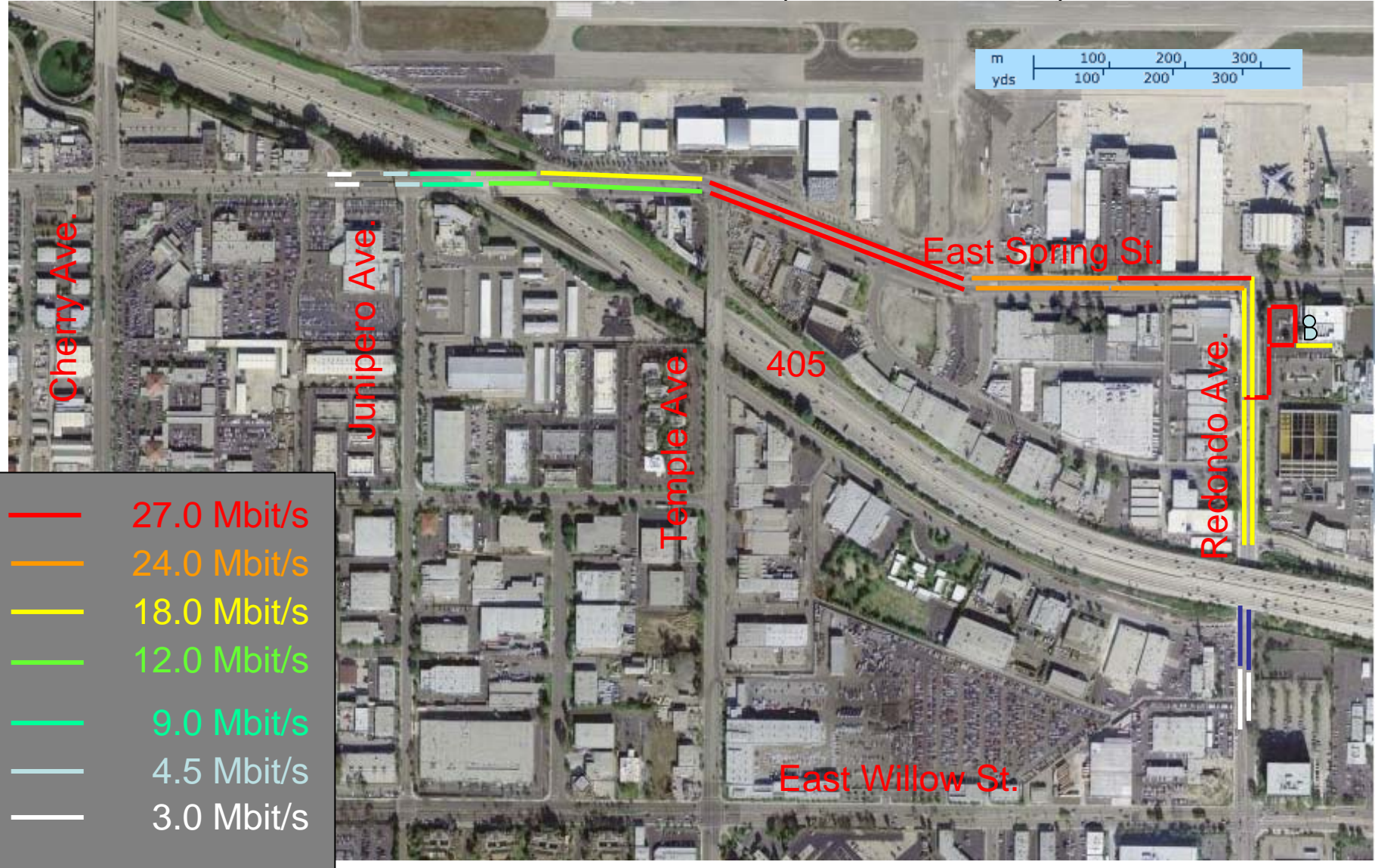
Long Beach Tests

10 MHz Bandwidth (4.955 to 4.965 GHz)



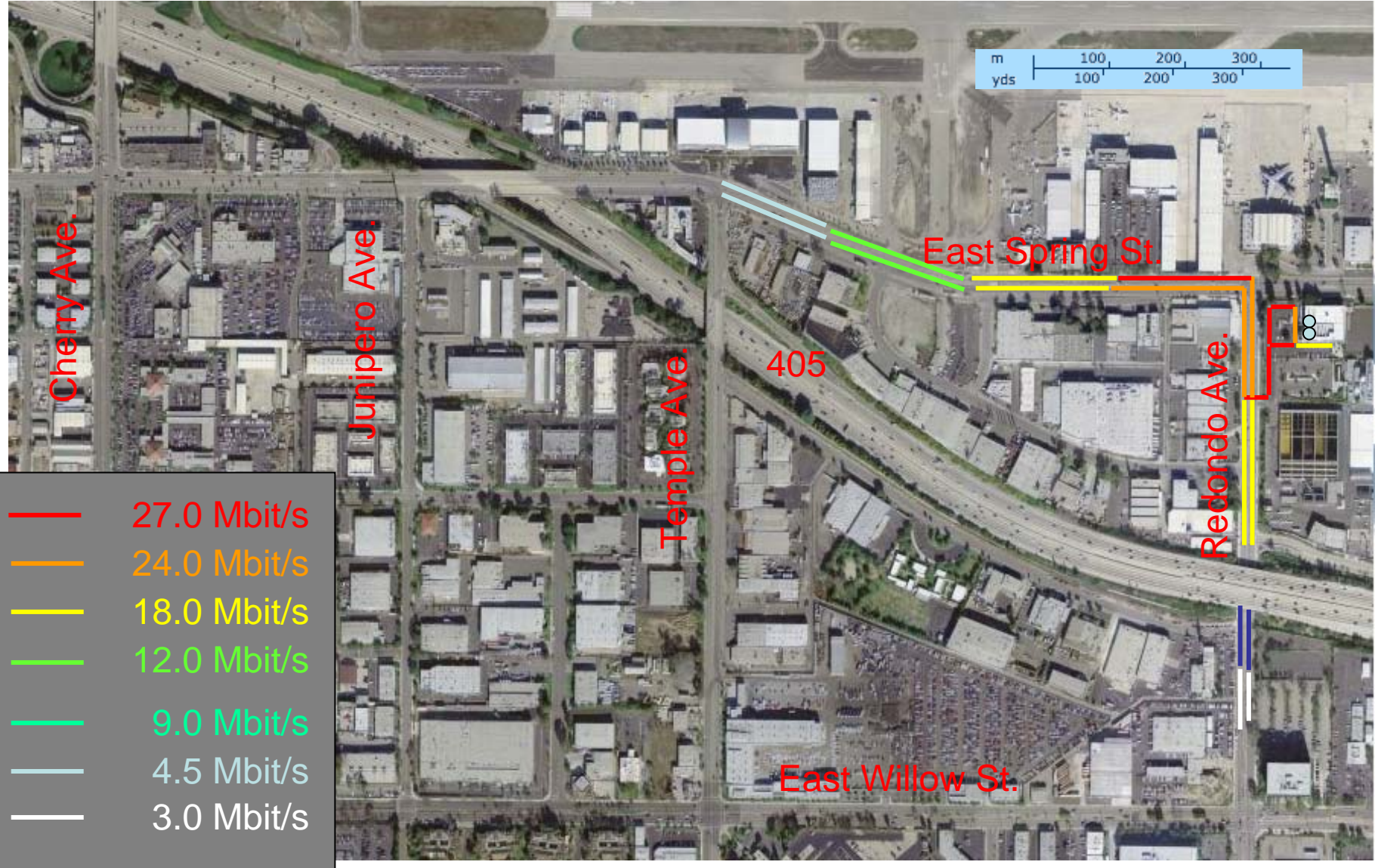
FR-3000 Average Air Throughput

6 dBi omni – 26 dBi directional (10 dB cable loss)



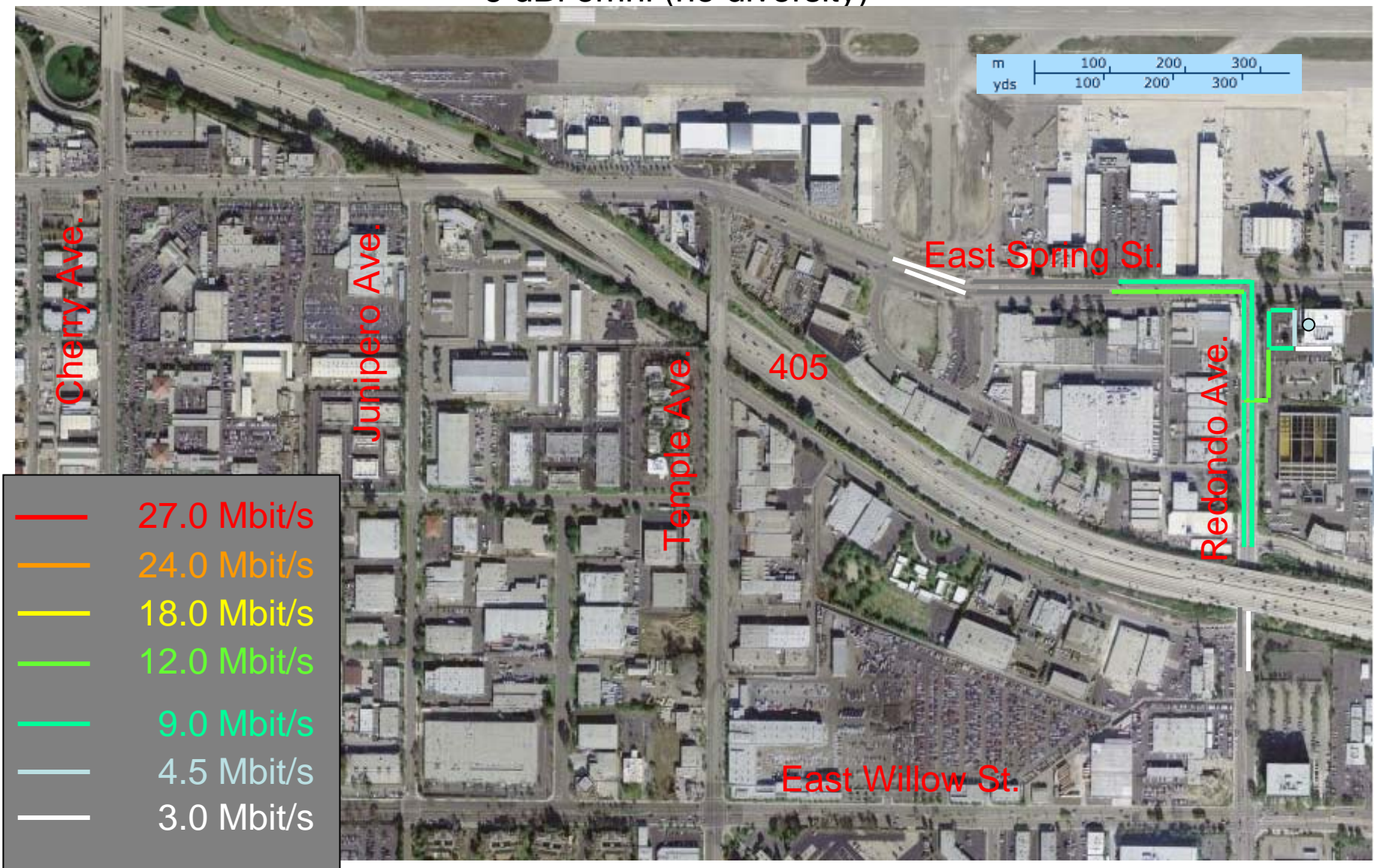
FR-3000 Average Air Throughput

6 dBi omni – 6 dBi omni

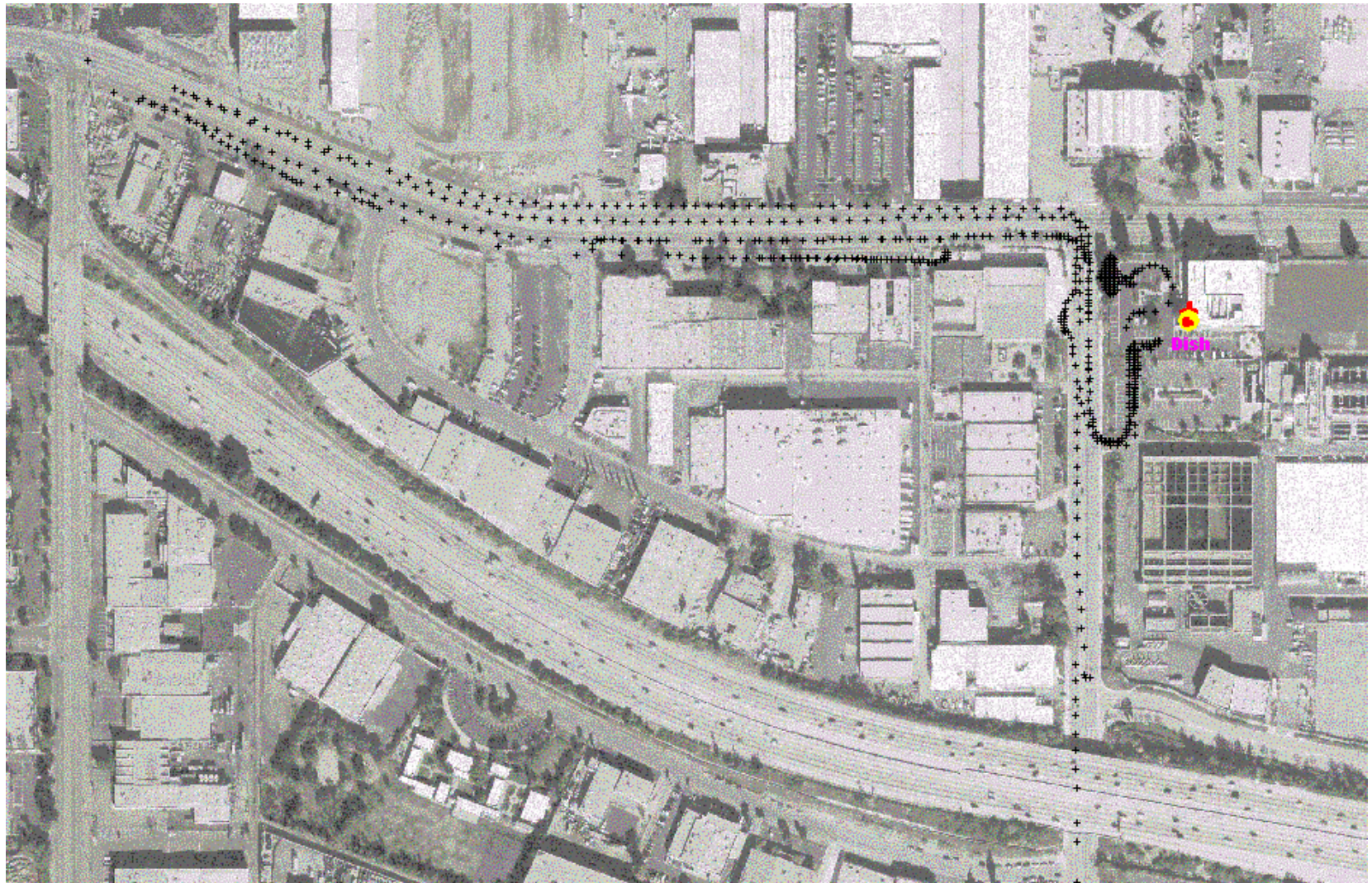


FR-3000 Average Air Throughput

6 dBi omni (no diversity)



GPS and Bi-directional Video Transmission (1 Mbit/s)



Conclusions

- 4.9 GHz can deliver broadband communications in urban areas
- NLOS coverage demonstrated in Long Beach
- Coverage radius of 1.2 km per cell
- Interoperability between vendors demonstrated
- Further improvements are still possible

Invitation

- WCA 2005
- Wireless Communication Association
- June 28, July 1- Washington DC
- CelPlan Demonstration
 - The Car of the Future
 - 4.9 / 5.9 GHz coverage of an office park
 - High speed Internet, Video and Voice