

TechnoCom™

Testing Methodology For CSRIC's Indoor Test Bed

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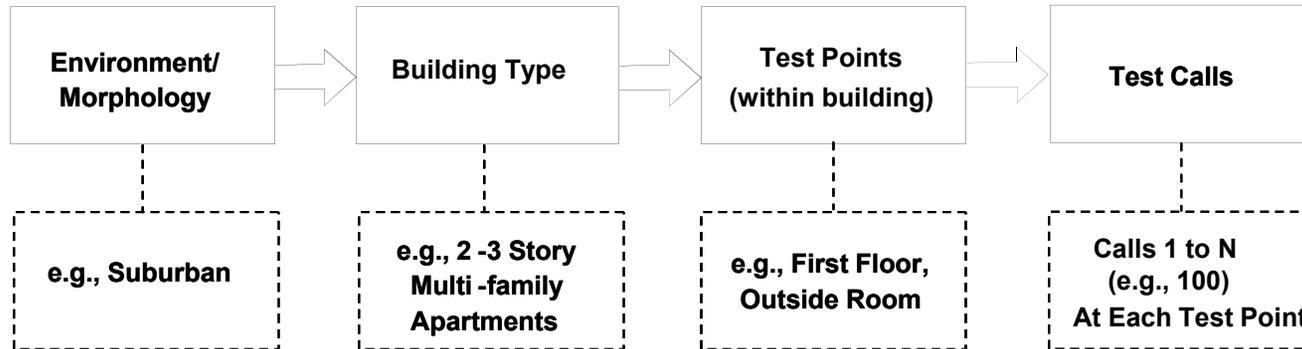
About TechnoCom

- Founded in 1995; 17+ years of wireless location expertise
 - Deeply involved in E911 and LBS since their infancy
- A location technology neutral business model
 - Solutions and services focusing on location performance monitoring and service assurance
 - Deployed in many networks, serving over 300 million subs
 - Strong intellectual property in the area of automated testing
 - Performed testing, analysis, modeling and deployment of a broad range of wireless location systems across all carrier networks
- Key contributor to the development of industry-accepted E911 test methodologies
 - Very active contributor to ATIS ESIF since 2003
 - Leading architect for indoor test methods

Objectives for Indoor Location

- Perform independent comparative testing that provides the FCC with meaningful, objective results on indoor performance for E911
- Use a scientific, statistically sound, broadly accepted methodology for reliable characterization
 - Include a wide range of typical indoor use environments
 - Perform fair side-by-side testing of different technologies over multiple networks
 - Use adequately large test samples for statistical significance
- Have a focused and feasible plan
 - Responsive to very tight time schedule and to cost constraints
 - Structured and extensible approach

Test Methodology



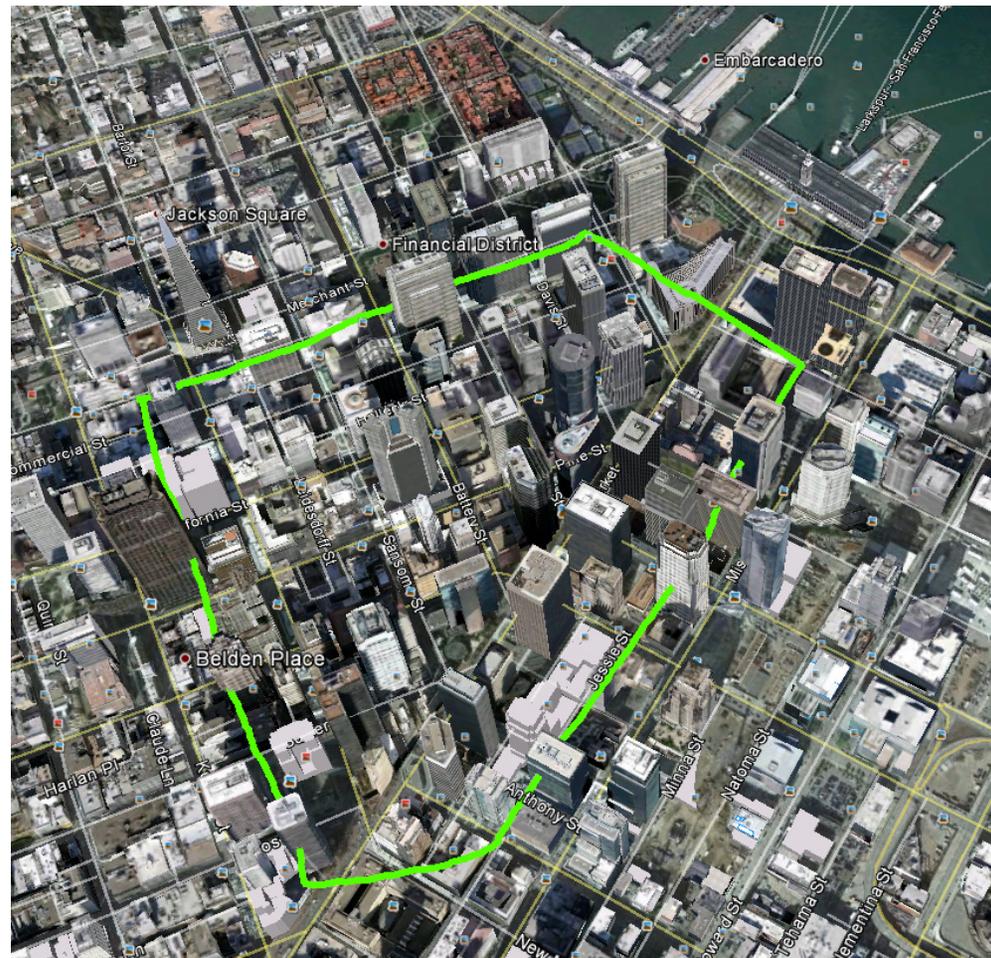
- Based on the statistical test methodology articulated in ATIS-0500013
 - Received wide consensus
- Multiple buildings of different sizes and types across range of morphologies
 - Dense urban, urban, suburban, rural
- Multiple test points in each building
 - Number depending on size and complexity of selected building
- Large enough sample of test calls at each test point
 - 100 test calls per technology per test point
- Indoor ground truth accuracy < 5 m (target < 3 m)

Project Execution Steps

- Define proper test sample to meet project objectives
- WG3 identify candidate test buildings in target areas
- Interface with participating vendors and carriers to finalize detailed test plan and procedures
- Perform final building and test point selection in the field
 - Anonymous to participants
- Send out field teams for surveys and testing
 - Coordinate field activities and building access
- Periodically monitor gathered data at TechnoCom's offices
- Correlate data and analyze
 - Prepare tabular and graphical presentations of results
- Compile summary report & present results to CSRIC WG3

Dense Urban Environment

Downtown San Francisco (Financial District)



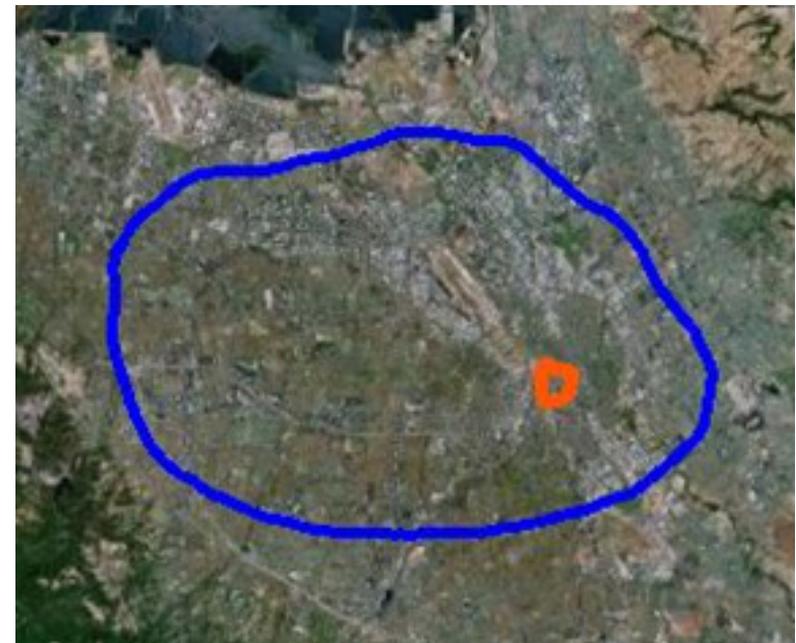
Urban Environment

San Francisco & Downtown San Jose



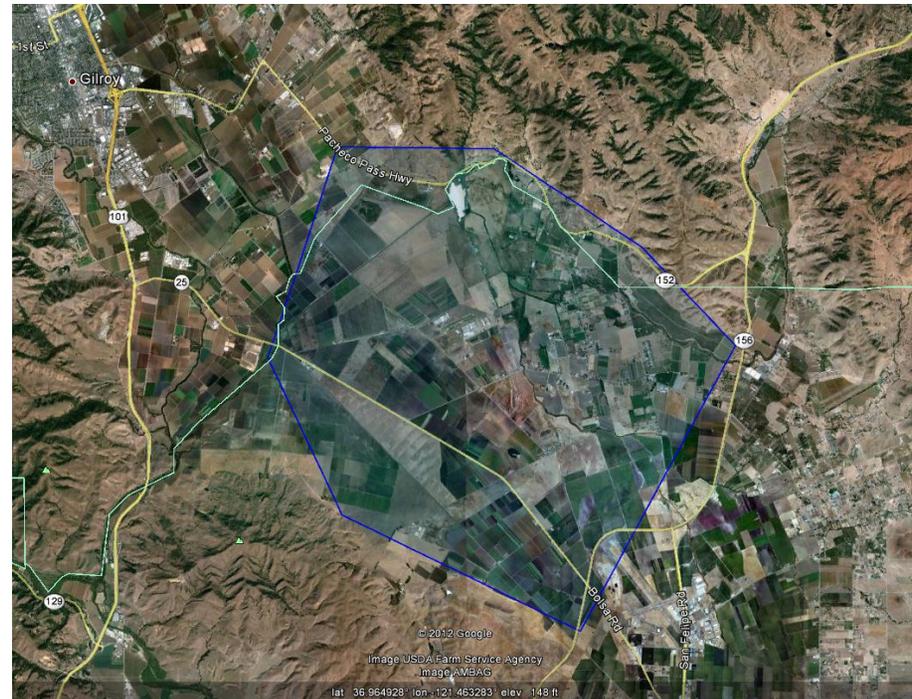
Suburban Environment

Santa Clara County



Rural Environment

Between Gilroy & Hollister, CA



Performance Parameters to Report

- Indoor Summary Performance Report to CSRIC WG3 will include per technology per test point
 - Horizontal location accuracy statistics
 - CDF, average, std. dev., 67th and 90th percentiles of error
 - Vertical accuracy (if available from the location technology)
 - Statistics of reported uncertainty
 - Statistic of time to first fix (TTFF)
 - Yield (ratio of calls with valid fix to overall call attempts)
 - Scatter plots
 - ***Combination of tabular and graphical outputs (for best insight)***
- Results aggregated over each morphology per technology
- CSRIC WG3 to use the results in creating its final report