LTE and Authorized Shared Access
- *Unlocking 3.5GHz Spectrum for Small Cells*

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FCC Workshop 13-March-2013

SMALL CELL AND SPECTRUM SHARING IN 3.5 GHz

Drivers for small cells in 3.5GHz

Coverage

Improve indoor coverage

Fill coverage gaps & holes

Fill new coverage areas

Capacity

Macro not feasible

Dense hotzone capacity

Offload from macro

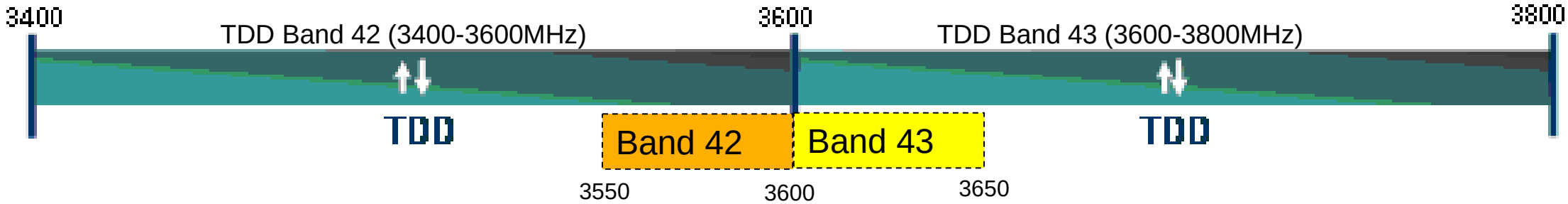
Enterprise solutions

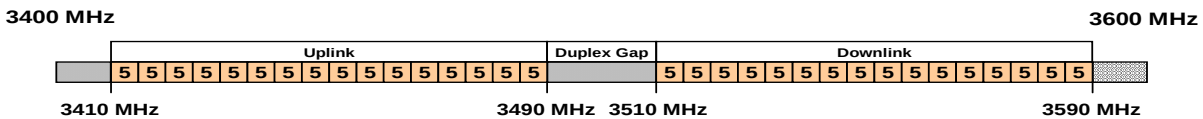
New opportunities

New services

Fixed mobile convergence

Harmonization and Global Standards Drive Economy Of Scale: TD-LTE@3.5GHz





FDD Band 22: 3410-3490/3510-3590 MHz

- Use 3.5GHz TDD Bands 42 and 43.
  - Initial focus on 3400-3600MHz worldwide
- Avoid yet another new 3GPP band.

TD-LTE @ 3.5GHz: “Capacity Boost” to LTE-FDD network

LTE-FDD Network (e.g., 700/850/1700/1900 MHz) provides “Coverage Umbrella” across a region.

NSN Small Cells Trial

Demonstrating small cells in a true Hot Zone Environment

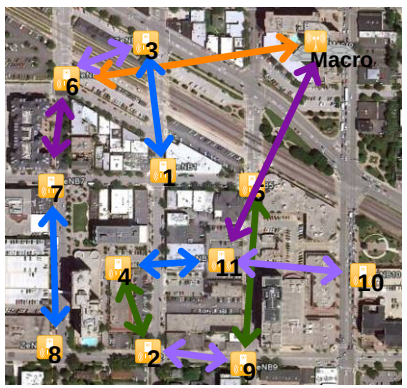
Entertainment
Performing Arts, movie theaters & pubs

Transportation
2,800 residents board daily trains

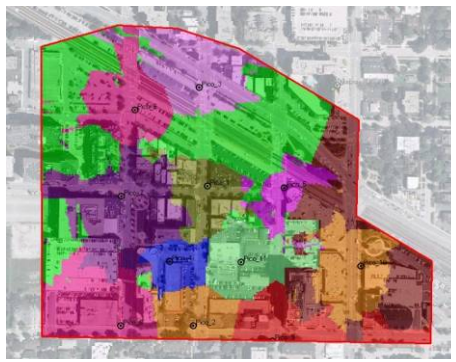
Public Events & Gatherings
Harmony Park

Commerce
Restaurants, coffee shops & unique shops

Deploy-ability | **"Street Dirty"** | **Capacity Uplift**



Street Level Wireless Backhaul
- LOS and NLOS
- Egress Design to Remote Controller



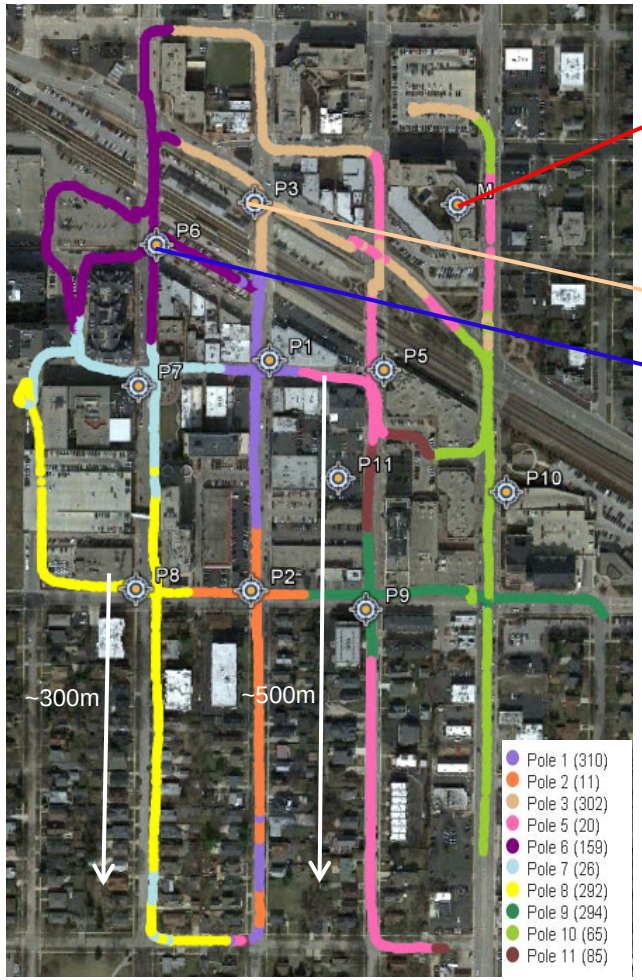
Street Level RF Performance Validation
- F1/F1 Co-Existence w/ Macro
- Capacity uplift & improved user experience
- LTE and WiFi access

Street Pole Deployments
- Stealth designs
- Decorative poles
- Power

Gain Muni-Deployment Experience
- Zoning, Acceptance
- Asset Ownership/Control Model

Dedicated vs. Shared Spectrum for Small Cells

Dedicated: Small cells on F1/Macro on F2

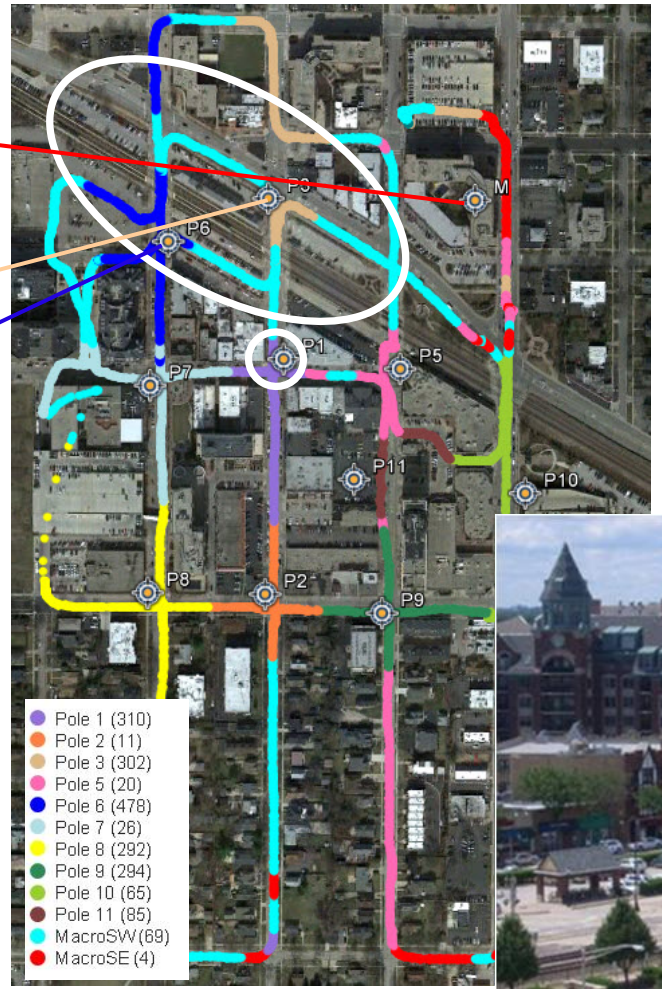


Macro

Pole 3

Pole 6

Shared: Small cells on F1/Macro on F1



Operators may opt to deploy 3.5GHz as a dedicated channel for small cells.

Areas which are LOS and near strong Macro can be dominated by Macro.

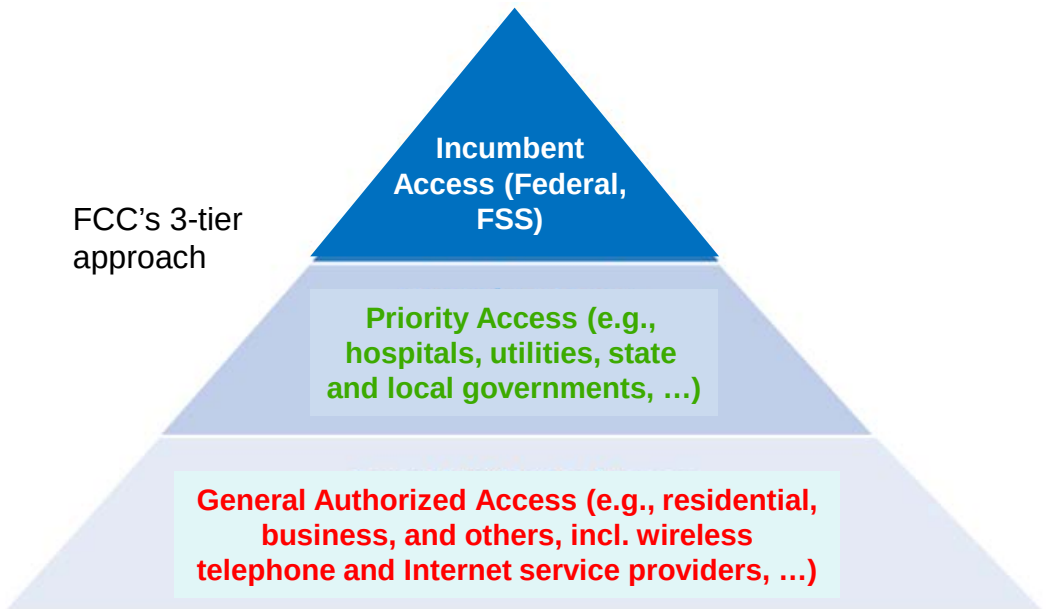
Authorized Shared Access (ASA) in 3.5GHz

•Cleared, exclusively licensed spectrum is strongly preferred for predictable Quality of Service.
•Only when not possible or available in reasonable timeframe/cost, consider Authorized Shared Access.

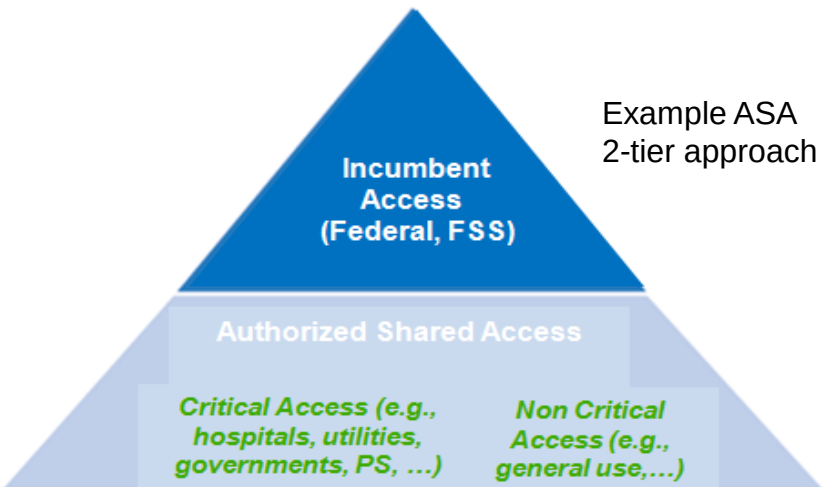
•Licensed Shared Approach.
•Offers the incumbents control over sharing (what, when, where).
•Offers the operator/user predictable QoS on a non-interference basis to incumbents.
•No Priority Access class of users. Instead, common ASA class of users (critical & non critical).

Goal: Provide greater degree of certainty for investment in small cell deployments.

FCC's 3-tier approach



Example ASA 2-tier approach



Joint Nokia Siemens Networks/Qualcomm Small Cells ASA demo @ Mobile World Congress 2013