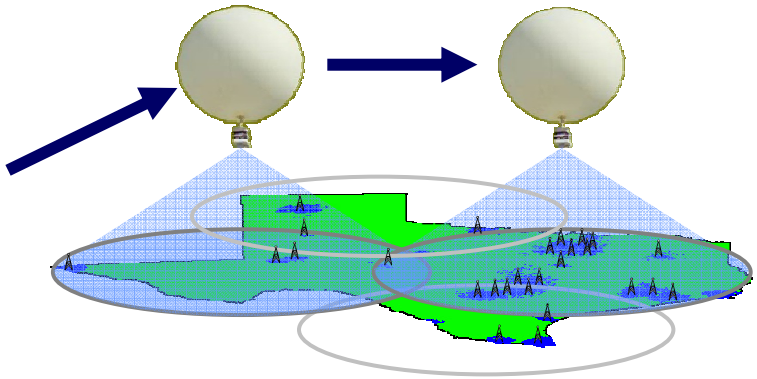
Wide-Area Wireless Technologies Can Bring Ubiquity to 700 MHz D Block & White Space

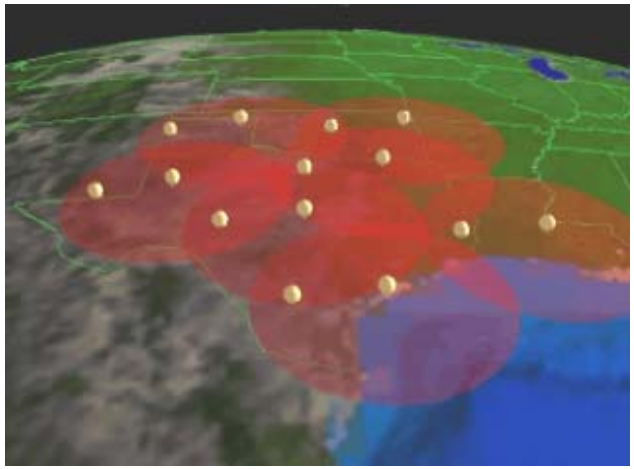
Washington DC Presentation

Spring 2008

Near Space Network

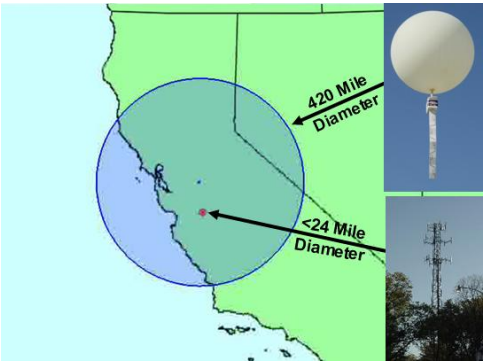
- ***SkySite***® Platforms create a wireless network consisting of transceivers on weather balloons that operate in near space from 60,000 to 100,000 feet
  - One *SkySite* covers a 420 mile diameter, the equivalent of 300 terrestrial towers
  - 41 M2M or 200 Voice or 370 Broadband *SkySites* cover the entire continental U.S.
- Space Data technology uses industry standard protocols:
  - Interoperates with tower based wireless networks
  - Interoperates with existing or new users on same frequency band in same modality
- ***SkySites*** have provided 24 / 7 coverage for over 4 years
  - 200,000+ flight-hours of cumulative near-space operations
  - 15,000+ flights to date providing continuous service
- UHF version is currently deployed by US Air Force

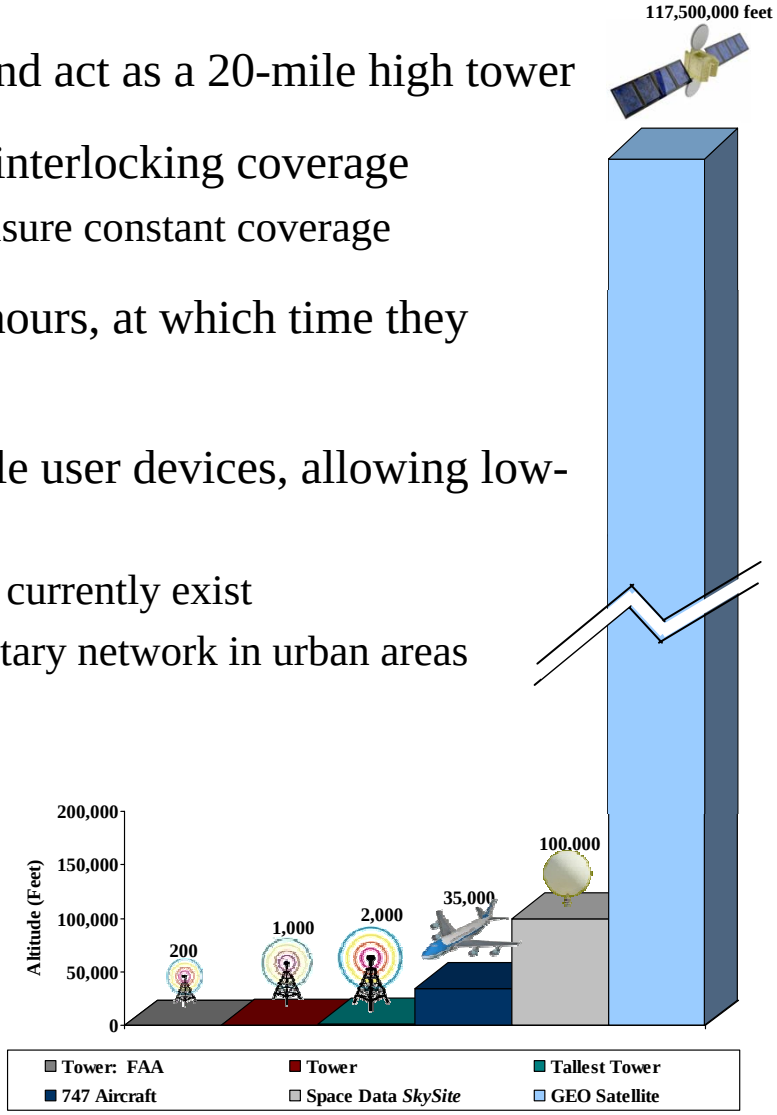




SkySite Platform

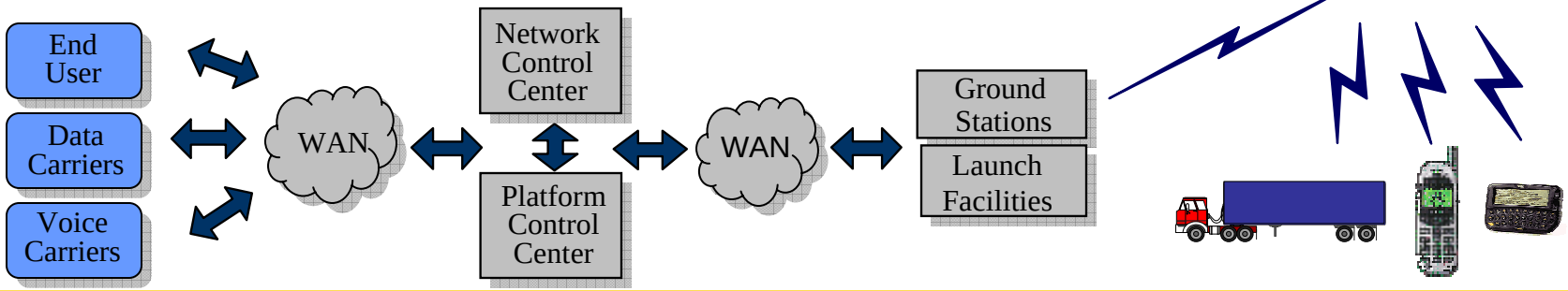
- ***SkySites*** rise to 100,000 feet then level off, and act as a 20-mile high tower
- ***SkySites*** float in unison to form a blanket of interlocking coverage
  - *SkySites* are launched every 12-24 hours to ensure constant coverage
- ***SkySites*** stay in flight for approximately 24 hours, at which time they descend, are recovered and reused
- ***SkySites*** are compatible with fixed and mobile user devices, allowing low-cost network services to:
  - Rural areas where wireless coverage does not currently exist
  - Existing tower coverage provides complementary network in urban areas





SkySite Technology

- Large coverage area – 420 mile M2M diameter , 170 mi. Voice, 120 mi. Broadband
- No geographic constraints
- Overlay existing networks – transparent to consumer
  - Compatible with consumer devices
  - Compatible with asset tracking systems
  - Users seamlessly roam on / off *SkySite* network
- Low-cost components
- Proven hardware – wireless technology agnostic
- Works just like tower-based networks
  - Longer radio frequency link but same path loss as terrestrial systems



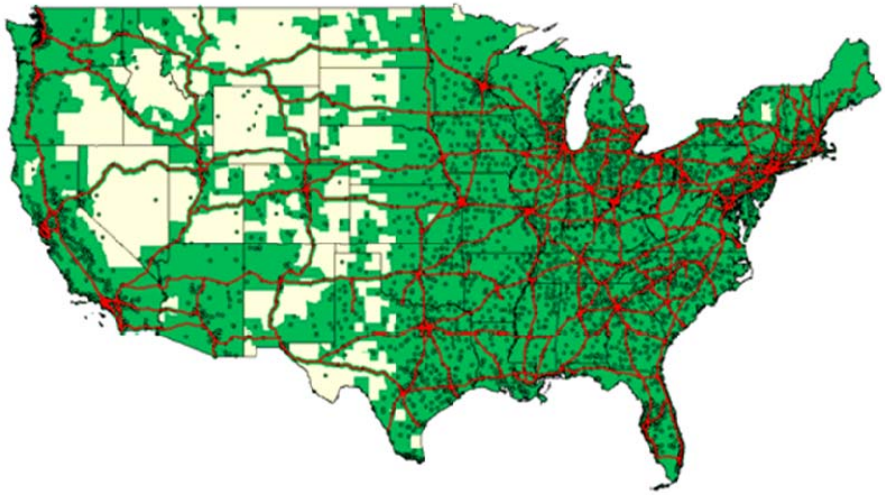
700 MHz Public Safety Challenges

- The 700 MHz interoperable nationwide public safety network faces two significant problems:

  1. Cost of build out and equipment.
     - Estimates in the record regarding constructing a terrestrial network range from $6-7 billion and higher.
     - Maintenance and equipment costs increase price of public safety network.
  2. Scope of build out.
     - Existing FCC coverage requirements: (a) at least 75% of the population by the end of the fourth year, (b) at least 95% of the population by the end of the seventh year, and (c) at least 99.3% percent of the population by the end of the tenth year.
     - Even by reaching 99.3% of the population, 26.5% of the land mass of the continental U.S. and 37% of the land mass of the entire U.S. (including Alaska, Hawaii) still would be without coverage, presenting a significant public safety issue.

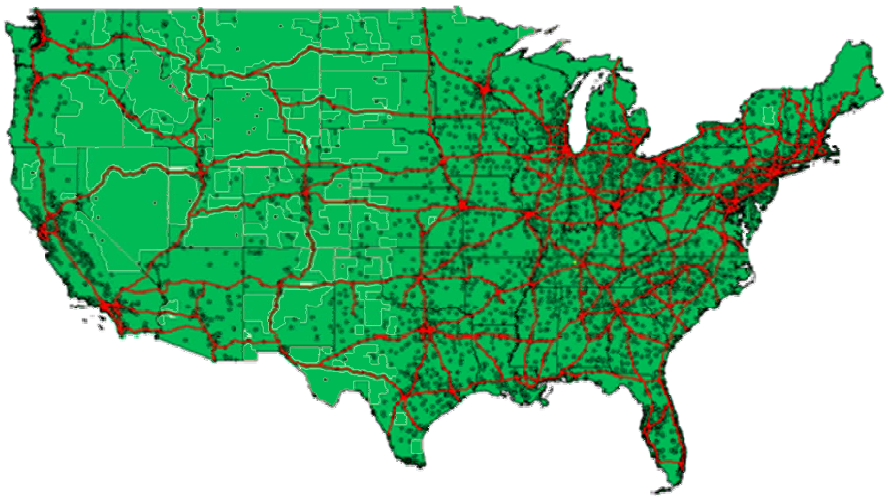
- Proven, non-traditional technologies, such as Skysites or other wide area technologies, can address these problems and should be considered as means to meet the FCC's build out requirements.

Alternative Delivery Offers 100% Public Safety Coverage



Terrestrial Coverage*
at 99.3% Pop Build Out for
Public Safety Network in 2019

Significant gaps remain in coverage of rural areas



Coverage Using Wide Area
Technologies Such as SkySites for
Public Safety Network in 2010

Covers 100% pops & land mass

Coverage for single-mode terrestrial-only radio

** Map coverage is approximate, source: PSST presentation at International Wireless Communications Exposition February 27, 2008.*

Wide Area Technologies Can Achieve Cost Effective D Block Ubiquity

- Improves rollout strategy without compromising public safety's build out needs
  - Ubiquity provided by SkySite overlay from beginning
    - Transparent to user (no special devices needed, thus reduces reliance on dual mode handsets)
    - Users can seamlessly roam on and off the SkySite network
  - Fill in areas with towers as demand increases
- Cost effective method to meet and exceed the FCC build out requirements
  - Some estimate that it will cost $1-2 billion to cover 75% of the U.S. population, but another $5 billion to reach 99.3% coverage, using approximately 32,000 terrestrial towers.
  - Using Skysites rather than towers for early bird service and for most all rural areas could bring in $5 billion more revenue and save $2+ billion costs.
- Wireless technology agnostic – CDMA / WCDMA / WiMAX
- Wide area technologies are well suited for both regional economic area and nationwide spectrum allocations.

TV White Space Control Channel

- Nationwide, single frequency control / supervisory channel
  - Over 2 MHz of Narrowband PCS spectrum is held by nationwide licensees
    - Same frequency everywhere makes for least cost device
    - Same frequency as 900 GSM elsewhere in the world makes for very low cost RF components due to high volume market
  - Ability to transmit at 3500 watts ERP from towers makes for coverage with fewer towers + good building penetration margins
    - Towers already exist and have excess capacity (SkyTel/ USA Mobility)
  - SkySite overlay provides ubiquity to network
  - Ability to intelligently direct devices in each city to White Space
  - Ability to download new firmware to White Space Devices to correct any "misbehavior" discovered after large scale deployment

Space Data®

Summary

- Developments in Wide Area Technologies during the past 5 years offer alternatives to solving the 700 MHz Public Safety coverage and build-out cost challenges
  - 100% coverage with low-cost, terrestrial-only user equipment
  - Potential to save billions in build out costs
  - Coverage available much earlier than with a tower-only build
- Proven combination of existing NPCS towers and the SkySite Network offer a robust, inexpensive, licensed channel for controlling access to TV White Space
- Future discussions must fully explore all proven technologies with potential to address today's vexing problems
- Future Rule Makings should allow flexibility in deployment technology to accommodate both today's options and all foreseen future technical options