# Stutler Users Conference – Austin, TX

Stutler Technologies, Corp.

Airspan


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February 17th, 2011

# Agenda

- The Grid
- Smart Grid Overview
- The Stutler / Airspan Solution

# General Electrical Grid Layout

Generation Station

Transmission Lines

Transmission Substation

Distribution Station

Local Distribution

Direct Customer

Airspan

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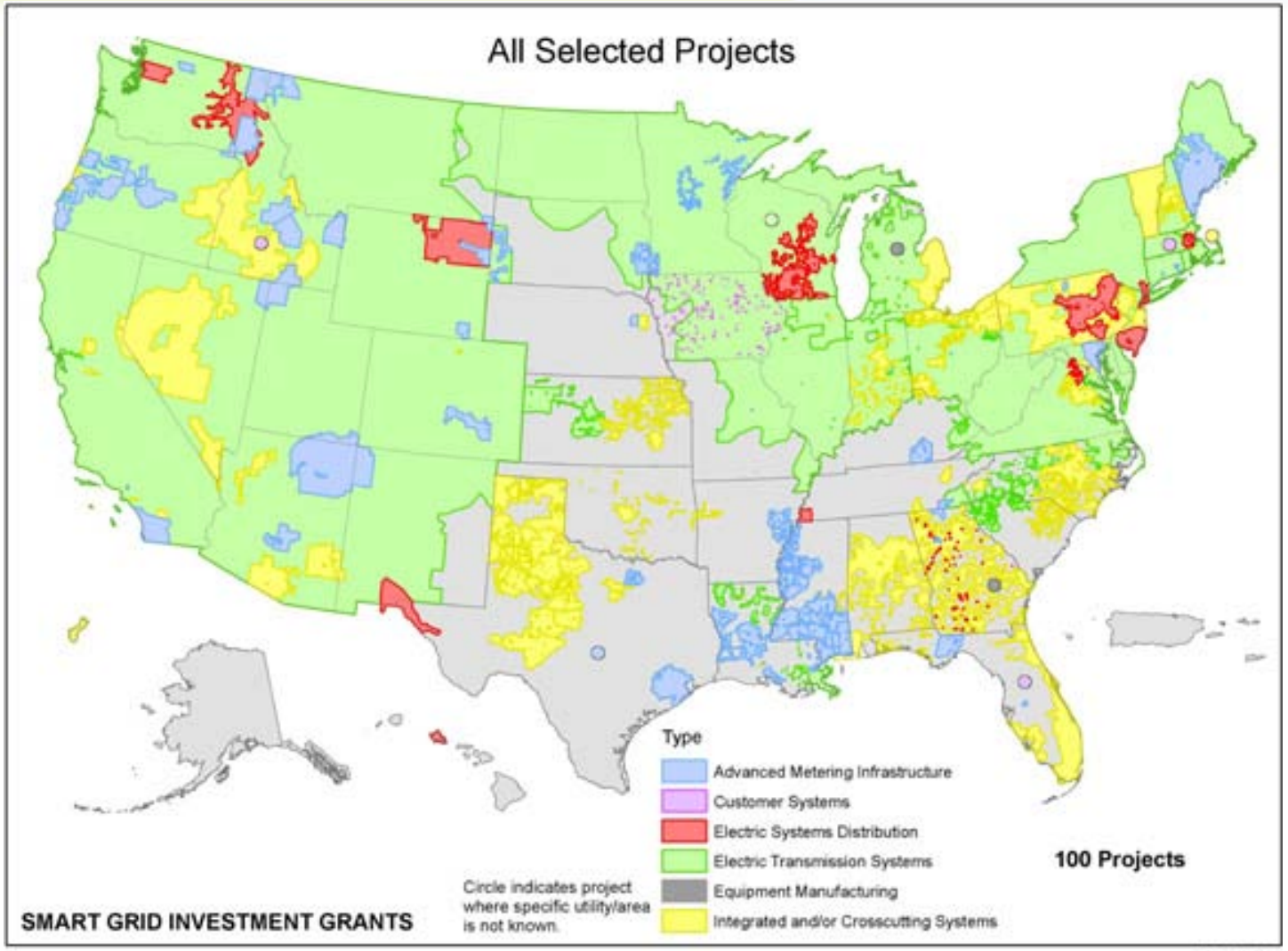
# Making Money Since 2009

- The US Department of Energy recently awarded **$4.5 billion in Smart Grid stimulus funds**. The State of California has published aggressive efficiency and $CO_2$ reduction regulations and mandated the deployment of smart meters. As a result, California utilities have projects underway to deploy millions of smart meters. Various other state mandates have motivated US utilities to launch 31 projects deploying a total of **81 million smart meters**.

# Making Money Since 2009



# DOE Definition - A Smart Grid Must...

- Be able to heal itself
- Motivate consumers to actively participate in operations of the grid
- Resist attack
- Provide higher quality power that will save money wasted from outages
- Accommodate all generation and storage options
- Enable electricity markets to flourish
- Run more efficiently
- Enable higher penetration of intermittent power generation sources

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# Smart Grid Core Applications

- DA – Distribution Automation
  - Ability to control distribution controls and react to line conditions
  - Fault management
- SCADA – Supervisory Control and Data Acquisition
  - Substation automation
- DR – Demand Response
  - Providing just the right amount
    - Too much power = wasted resources = wasted money
    - Too little power = brown and black outs
  - To the meter
    - Automatic meter reads
    - Service control
    - HAN
- AMI – Advanced Metering Infrastructure
  - Mesh networks

# Smart Grid Add Ons

- VoIP
- CCTV
- Mobile Workforce

# Smart Grid Applications: Key Requirements

- The DoE surveyed the energy sector and summarized “Smart Grid Functionalities and Communications Needs” as follows;

| Application | Network Requirements | | | | |
|---|---|---|---|---|---|
| | Bandwidth | Latency | Reliability | Security | Backup Power |
| AMI | 10-100 kbps/node, 500 kbps for backhaul | 2-15 sec | 99-99.99% | High | Not necessary |
| Demand Response | 14kbps- 100 kbps per node/device | 500 ms-several minutes | 99-99.99% | High | Not necessary |
| Wide Area Situational Awareness | 600-1500 kbps | 20 ms-200 ms | 99.999-99.9999% | High | 24 hour supply |
| Distribution Energy Resources and Storage | 9.6-56 kbps | 20 ms-15 sec | 99-99.99% | High | 1 hour |
| Electric Transportation | 9.6-56 kbps, 100 kbps is a good target | 2 sec-5 min | 99-99.99% | Relatively high | Not necessary |
| Distribution Grid Management | 9.6-100 kbps | 100 ms-2 sec | 99-99.999% | High | 24-72 hours |

# Smart Grid Applications: Key Requirements

- The DoE surveyed the energy sector and summarized “Smart Grid Functionalities and Communications Needs” as follows;

| Industrial Radio Platform | Interfaces Supported | Data Speeds | Form Factor | Typical Range |
|---|---|---|---|---|
| Serial Application Networks | RS232, RS485 | up to 38.4kbps | OEM card or rugged enclosure | 30 miles terrain permitting |
| IP Communications | 10baseT, RS232, | 115kbps serial 200kbps TCP/IP | OEM card or rugged enclosure | 30 miles terrain permitting |
| QOS Enabled, Converged IP | 10baseT, RS232, | 115kbps serial 1.2 Mbps/800kbps | rugged enclosure | 20+ miles typical (terrain permitting) |

# Tying It All Together


**Monitor, Command & Control**

- DR
- SCADA
- DA
- AMI
- Mobile Workforce

**Reactive Communications**

- Analytical / Agents
- Diagnostic
- Monitor & Report

**Real Time Operational Systems**

- Workforce Management System
- Asset Management System
- Energy Management System

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# Decision Time – Public vs Private

- Public
  - Pros – Network is already built
  - Cons – Coverage and capacity
- Private
  - Pros – Utility controls the network, QoS
  - Cons – Operational responsibility

**My take…**

**Rural Telcos can act as a blurring of the two options**

# Decision Time – Ok, so you want a Private Network?

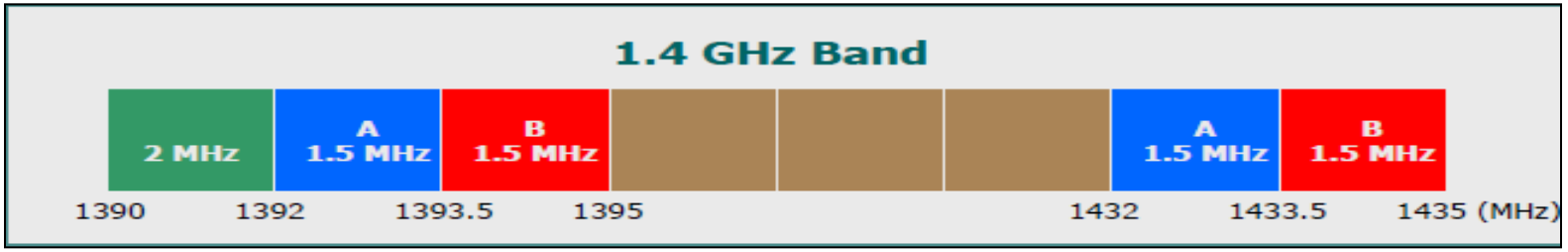
- Spectrum
  - Licensed
    - Pros – Interference free
    - Cons – $$$
  - Unlicensed
    - Pros – Readily available
    - Cons – Operational limits
- Implementation
  - Turn key
  - Managed

# Airspan's Smart Grid Vision

- Delivery of next generation Smart Grid networking solutions using broadband Next Gen radio technology.
- Help Utilities build "***Private and Secure***" wireless networks in ***licensed 1.4 GHz spectrum***, that deliver robust, reliable, resilient communications infrastructure.
- Enable Utilities to ***converge*** their disparate wide-area communications requirements onto a ***single, private, 4G broadband wireless network***
- Provide connectivity between each layer of the grid, from Generation to Transmission to Distribution to System Operations and the Mobile Workforce

# Airspan Networks 1.4 GHz Spectrum

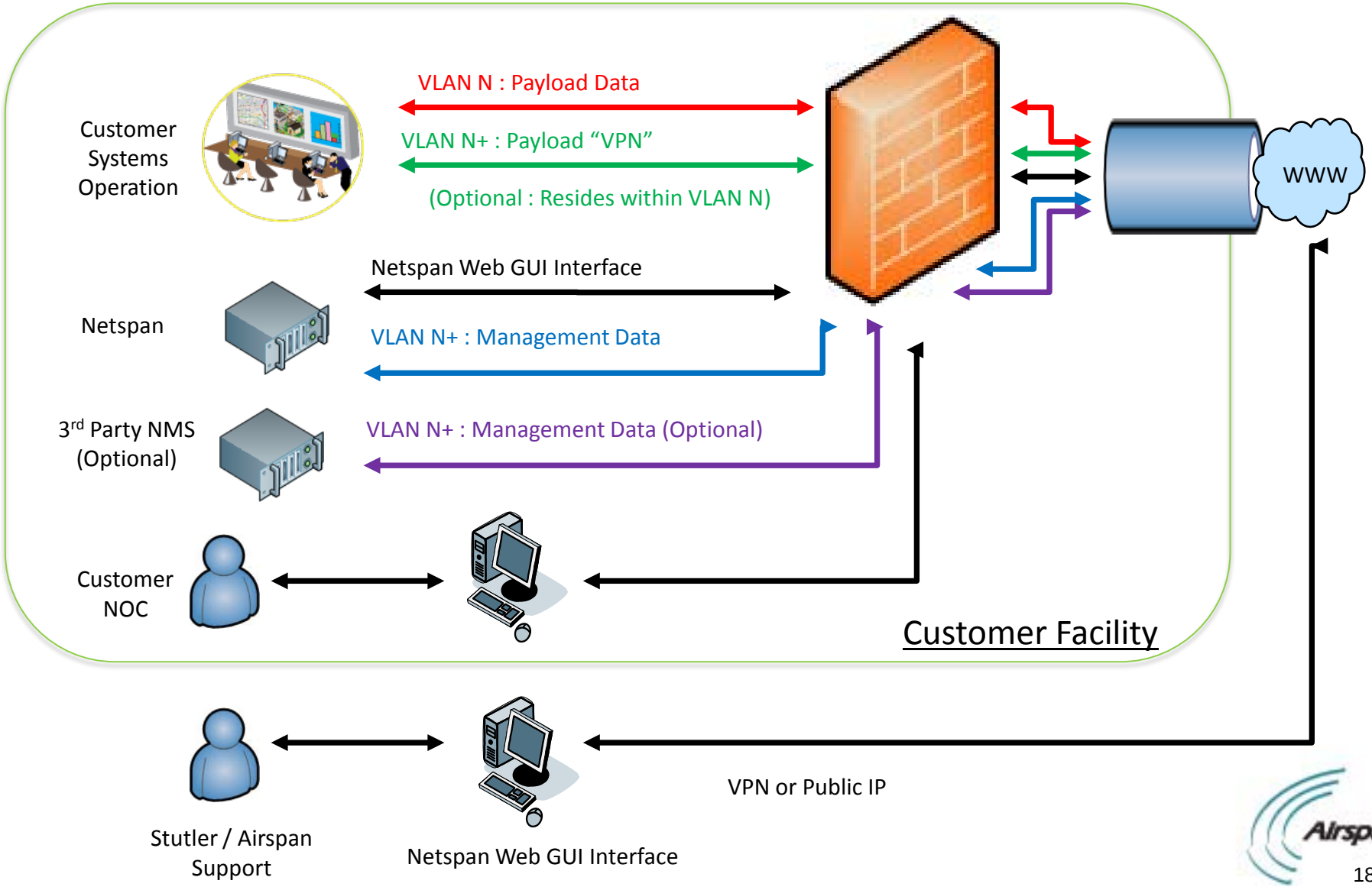
- Airspan Networks has exclusive U.S. distribution rights
- Complete Nationwide Coverage - 8 MHz spectrum bandwidth



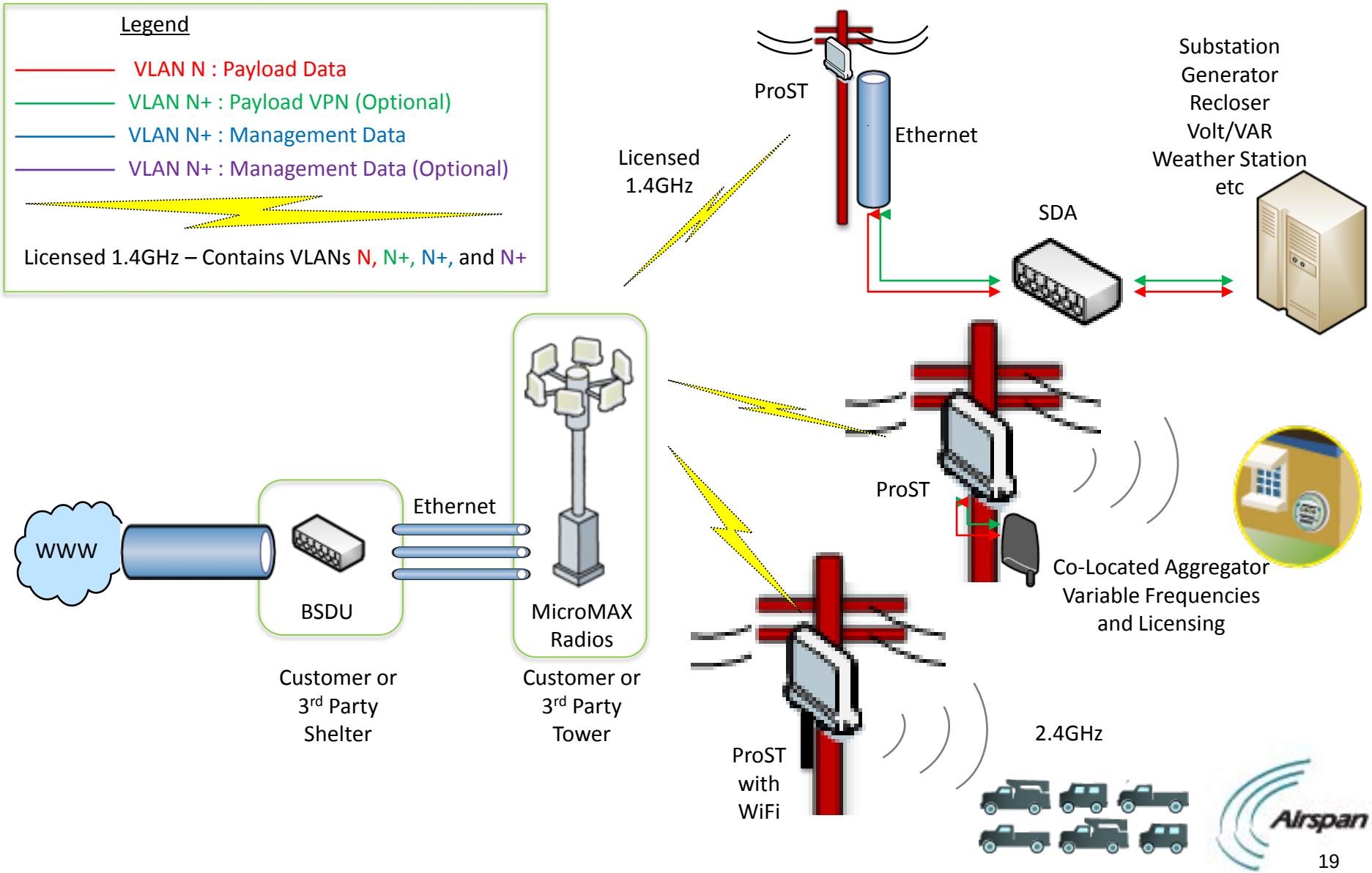

| Block | Frequencies | Bandwidth | Pairing | Geo. Type Area | No. of Licenses |
|---|---|---|---|---|---|
| | 1390-1392 | 2 MHz | Unpaired | MEA | 52 |
| A | 1392-1393.5/1432-1433.5 | 3 MHz | 2 x 1.5 MHz | EAG | 6 |
| B | 1393.5-1395/1433.5-1435 | 3 MHz | 2 x 1.5 MHz | EAG | 6 |

- Private wireless communications network
  - No competing users in service area.
  - 1.5, 1.75, 3.5, and 5 MHz channels possible
  - Nationwide footprint: Airspan Networks oversight of spectrum allocation

# Airspan Smart Grid Fixed Network Architecture

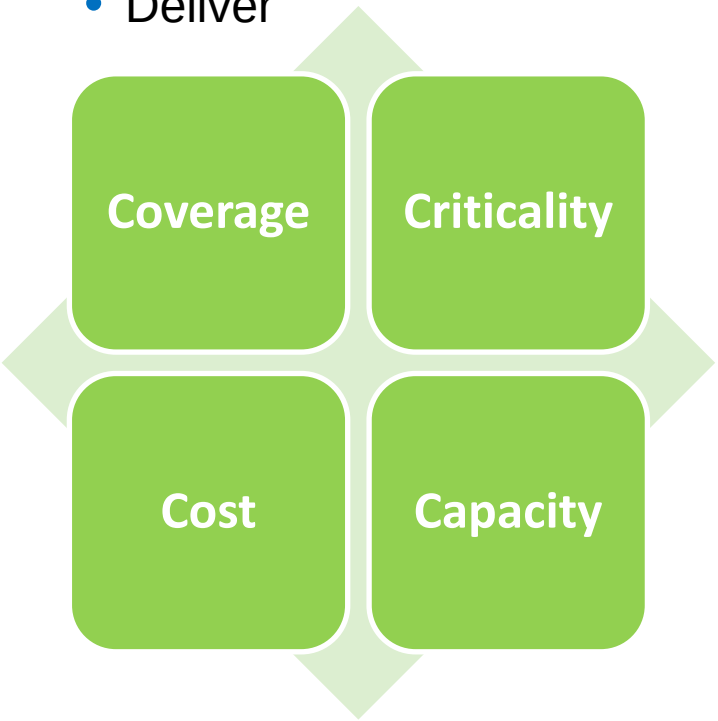


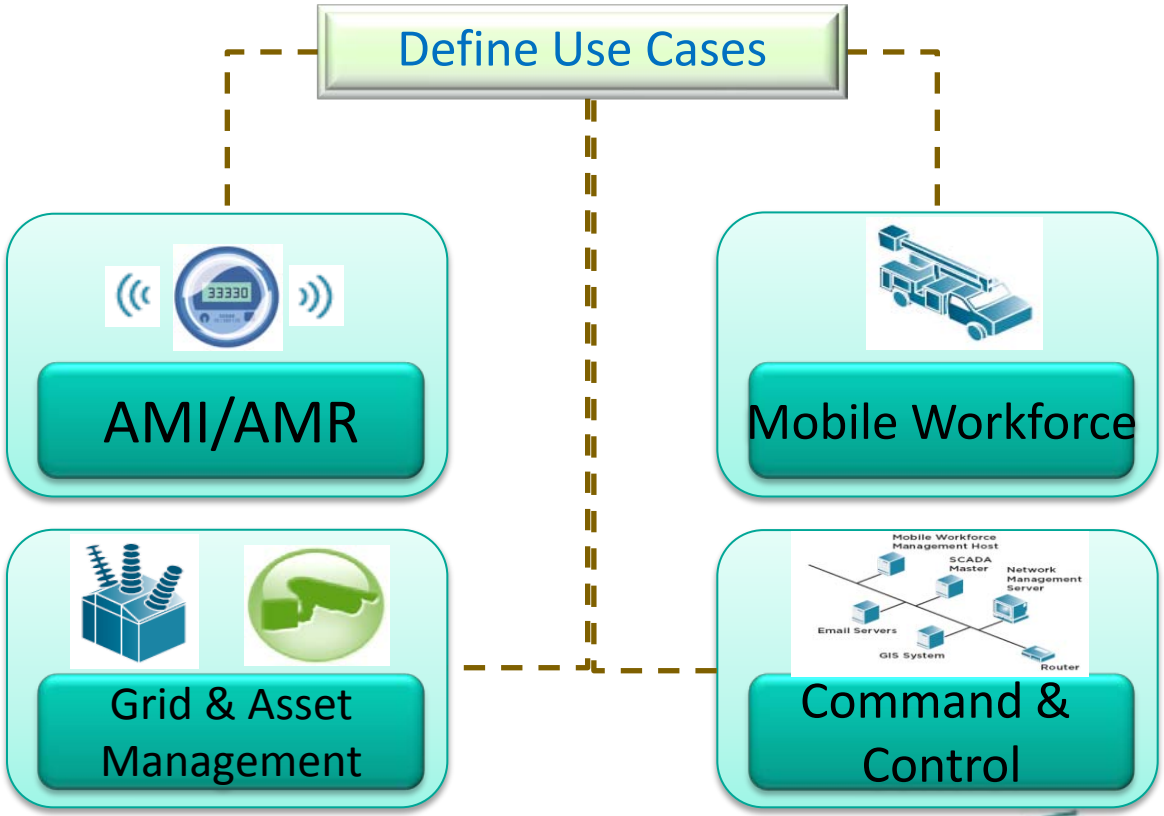
# Airspan Smart Grid Fixed Network Architecture



# Smart Network Methodology

- Characterize requirements
- Inventory current assets (towers, spectrum, backhaul)
- Leverage assets
- Craft plan/strategy
- Deliver



# SOW Sample Menu Options

- Design
- Installation / Integration
- Acceptance Testing
- Training
- Support / Managed Services
- SLA

# Typical Deployment Timeline

| Week | Design | Installation | Acceptance | Training |
|---|---|---|---|---|
| Pre Contract | Pre Sales Design | | | |
| 1 | Customer Internals Discovery | | | |
| 2 | | | | |
| 3 | Requirements Finalization | | | |
| 4 | | | | |
| 5 | Initial Design | | Acceptance Test Drafting | |
| 6 | Initial Design Review | | | |
| 7 | Model Tuning / BTS Site Surveys | Site Acquisition | | |
| 8 | | | | |
| 9 | Final Design | BTS RF and IP Installation | BTS RF Acceptance | Side by Side in the Field |
| 10 | | | | |
| 11 | Final Design Review | | | |
| 12 | | CPE RF and IP Installation | System IP Acceptance / CPE RF Acceptance | Session #1 |
| 13 | | | | Session #2 |
| 14 | | | | Session #3 |
| 15 | | | | Session #4 |
| 16 | | | | Session #5 |
| 17 | | | | |

- Red circles indicate the main drivers of possible project delay

# Revolutionizing Wireless Communications