Active Antenna Systems
Leader in active antennas

- CommScope is a world leader in antenna designs
- Pioneering active antennas for over 10 years
- Joint development with Ubidyne since 2007
- CommScope has developed industry-leading technology in remote radioheads, filters, amplifiers, and wideband linearization
- Combined expertise positions CommScope as a global leader in active antennas
Active Antenna Design Challenges

- Filter Design: Size, Insertion Loss
- Amplifier Design: Efficiency, Bandwidth
- Mechanical Design: Interconnects, Thermal
- Antenna Design: Beam Patterns, Active/Passive Combinations, Graceful Degradation

All are CommScope core competencies
Minimizing the hardware footprint is a key benefit to active antenna design.
Extremely Simple, Digital Architecture

- RRH functionality integrated and distributed into the antenna
- Transceiver on each element — redundant architecture
- Digital IF from a central DSP unit, C-Hub
- Future-proof, multi-standard, soft-configurable
- Standard sized antenna — fiber feed from the base band radio
- Improved MTBF and network reliability
  - Redundant radio architecture
  - Distributed low-power transceivers
  - Custom chip integration
  - Passive cooling
- Direct control of signals to each radiator enables digital elevation beam control at baseband — capacity improvements
A Self-Healing Response To A Failure

Unmatched Service Life Due To Built-In Redundancy And Unique Pattern Compensation Capability

Self-Healing!
First upper side lobe suppressed automatically
Tilt adjusted to maintain cell coverage
Dynamic Electronic Pattern Control

Tilt by Carrier - Vertical Sectorization

- Multiple beams per carrier enables vertical sub-sectorization for capacity enhancement

Tx / Rx Tilt Optimization

- Significant capacity improvement
  - Improves handset battery life

Tilt by Standard – Air Interface

- Tilt per standard (GSM/UMTS/LTE)
  - Simplifies RAN sharing

Beam Shape Control

Pattern A

Pattern B

Unique capability to optimize signal patterns of each carrier of each sector for Maximum Network Performance
High-band Active Antenna Currently in Development

- Radio modules are field replaceable
- Antenna array elements identical to current Andrew passive element arrays
- Multi-standard
- 1800, 1900, AWS and 2600 MHz models in the roadmap
Active-Passive Antennas in Development

- Passive and Active antenna arrays in a dual-column arrangement
- Design borrows from CommScope’s industry leading antenna arrays
- Broadband elements to cover low-band or high-band applications
700 MHz Active Antenna General Specifications

- 1.8 m (6 ft) antenna
- 12° elevation beamwidth
- 65° azimuth beamwidth
- 16.5 dBi gain
- 15 W RF output power per array (6 x 2.5 W)
- 30 W RF output power total (2 x 15 W)
- Single 10 MHz LTE carrier
- 6 dual-polarized radiating elements with 12 total Tx/Rx paths
700 MHz Active Antenna Pattern Measurements

- Azimuth and elevation patterns recorded in May, 2011
- Elevation beam down-tilting characterization completed for 0° to 14° range
- Elevation pattern shaping confirmed with excellent agreement to theoretical patterns
- Pattern compensation demonstrated for simulated transceiver failures

700 MHz Active Antenna in Anechoic Chamber
Excellent cross-polarization patterns
700 MHz Active Antenna Elevation Pattern

Excellent elevation patterns and upper side-lobe performance with down tilt
Environmental Verification Testing: Thermal Characterization and Burn-In

48 hour full power burn-in testing

High temperature (50°C) thermal testing
EMC Testing

• Radiated emissions compliance demonstrated for CISPR22 Class B for 10 m (32.8 ft) distance:
  • 30 to 230 MHz (30 dBμV per m)
  • 230 to 1000 MHz (37 dBμV per m)
Field Trial Installation

700 MHz Active Antenna
Active Antenna Product Roadmap

1st Gen
Active Arrays

2nd Gen
Active – Passive

3rd Gen
Active – Active
&
Active-Active-Passive

4th Gen
Multi-column beamforming
Thank You