Outdoor Small Cell Market

• Outdoor small cell market to double by 2026 to over 2.2 million radios

• Affordable siting access main concern for operators

• TCO second ranked concern
Small Cell Deployment Strategies for Cable Broadband

Small Cell Deployment Challenges

- Unavailability of utility power or fiber
- Zoning, siting, permitting and regulations
- Logistical issues with local utilities
- Utility power disturbances
- Cost-prohibitive if construction
Small Cell Deployment Strategies for Cable Broadband

Small Cell Deployment Power Options Solutions

Coax / HFC  Remote DC Power  Local Power
Small Cell Deployment Strategies for Cable Broadband

Availability of HFC Networks

- 1M Miles of HFC fiber
- 340K Miles of HFC coax
- 78M Cable broadband customers
- 96% U.S. homes with access to broadband 25/3 Mbps or faster
Coax / HFC Advantages

- Local franchise agreements for simple siting
- HFC infrastructure well maintained
- Battery backup provides hours of runtime during utility outages
- DOCSIS® 3.1 provides high speed, low-latency backhaul for small cells
Small Cell Design Considerations for HFC

Housing size limitations
- Aerial communications space

Physical (outside) connections
- Strand-mount, HFC coax port, ground, antennas

Power
- Quasi-square wave, voltage range, resilience

Backhaul
- DOCSIS® 3.1, outdoor-hardened, firmware

Safety
- Electrical shock, RF exposure

Environmental protection
- Water, salt, UV, wind

Network integrity
- Noise, EMI

Remote management
- Modem, radio, power
Connecting Small Cells to HFC

Integrating HFC Components

- Radio manufacturer designs HFC components into small cell
- Housing must be designed to meet cable broadband industry standards
HFC Demarcations for Small Cells

Separation of HFC and Small Cell

- HFC coax power & DOCSIS® conversion isolated from radio
- Enables off-shelf small cell radios
- Significantly improves time to market by eliminating custom small cell for HFC
- Increased reliability by separating core competency
Local Utility Power for Small Cells

Power Solution Driven by Radio Voltage

AC-powered Radios:
- Utility AC if available (rooftop, building) – quick, low cost, no battery
- Existing cable UPS - quick, low cost, battery backup

DC-powered Radios:
- AC to DC PSU (with or without batteries)
Remote DC Line Power for Small Cells

Another Remote Powering Option
Summary

• Small cell sites do not always coincide with the availability of utility power or backhaul

• Operators have a range of options for leveraging HFC network power and backhaul to support new small cell deployments

• Existing coax (CATV) or twisted pair (telco) infrastructure can power small cells

• In greenfield builds, coax or copper can be run alongside backhaul fiber
Thank You!

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