


The Radio Club of America, Inc.
Technical Symposium
Fort Worth, TX
**In-Building and DAS
Communications Review**
Presentation by
Jack Daniel, Jack Daniel Co.
November 19, 2011

Distributed Antenna Systems: DAS


**IT'S A
PORTABLE
HANDSET
WORLD**



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Distributed Antenna Systems: Stats

- ★ > 56% of all common carrier handset calls are from inside buildings.
- ★ > 58% of public safety radios are handhelds.
- ★ > 16,000 "High Rise" Buildings in U.S. (> 5 stories)
- ★ < 3% have DAS



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Distributed Antenna Systems: Trends

- ★ Text Messaging grew 65% last 2 years.
- ★ Streaming Music & Video load.
4G LTE: 100 – 150 MBS data rates
- ★ -95 > -85 > -75 dBm delivered signal levels
- ★ MIMO (2+ Antennas)
- ★ Distance to antenna: < 50 ft

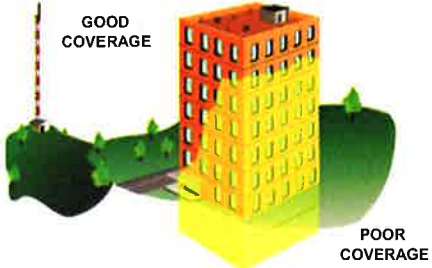
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Distributed Antenna Systems: Owners

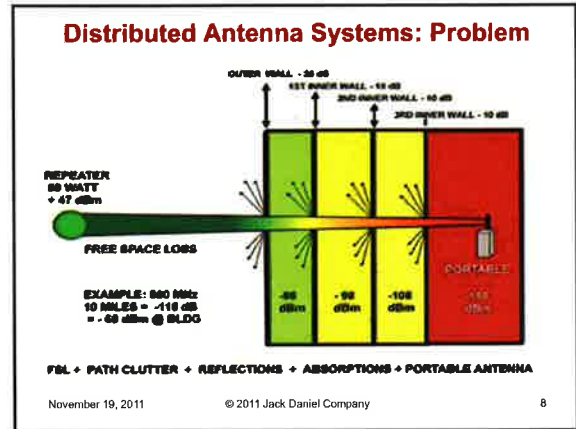
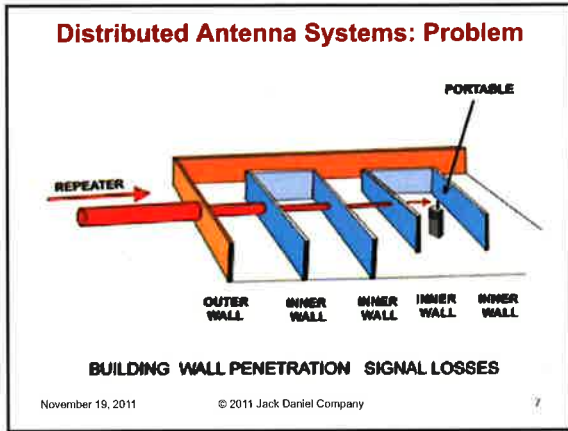
- ★ Carrier Operator Services (Cellular, PCS, etc)
- ★ Public Safety (Fire, Law, EMS)
- ★ Office and Residential Building Owners
- ★ Industrial/Enterprise (Distribution, Factory)
- ★ Hospitals (Security, patient telemetry)
- ★ Hospitality (Ops, security, carrier, WiFi)
- ★ Transportation (Subways)
- ★ Military

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Distributed Antenna Systems: Problem



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Distributed Antenna Systems: LEEDS

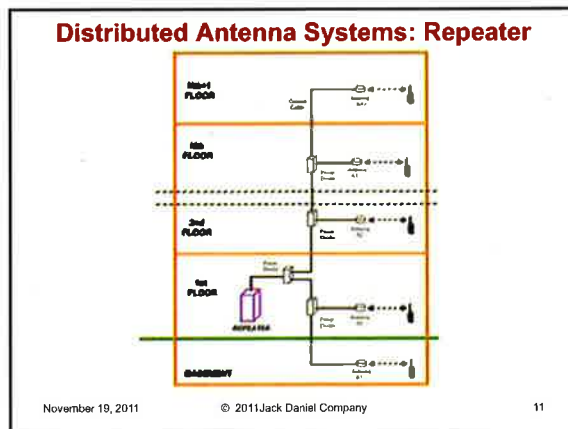
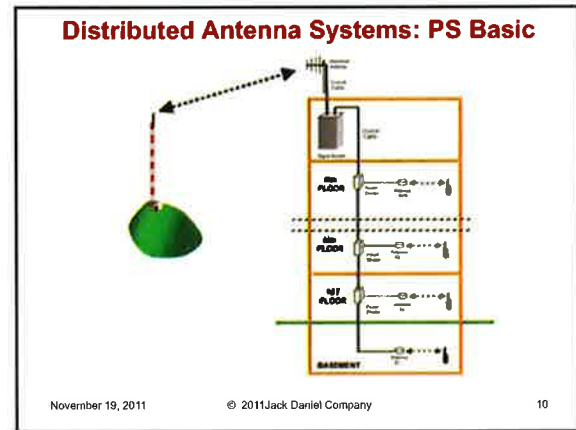
Leadership in Energy and Environmental Design
 U.S. Green Building Council (USGBC)

Glass: PPG Solarban >45 dB attenuation

EMI/RF (walls): TruProtect 40 to 60dB dB attenuation

Bad or Good ?

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Distributed Antenna Systems: Repeaters

Portable, No DAS : 5 – 25 Watt typical range
 4 – 5 Floor penetration

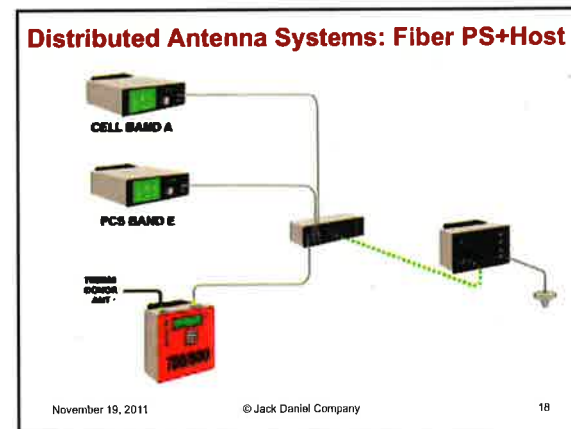
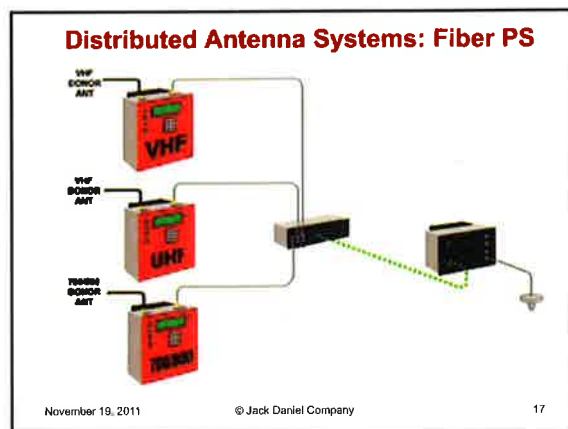
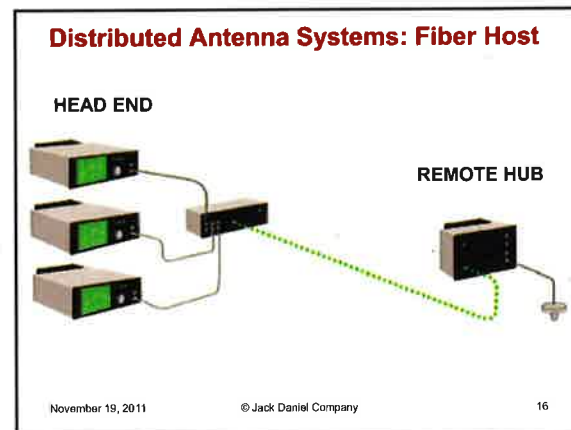
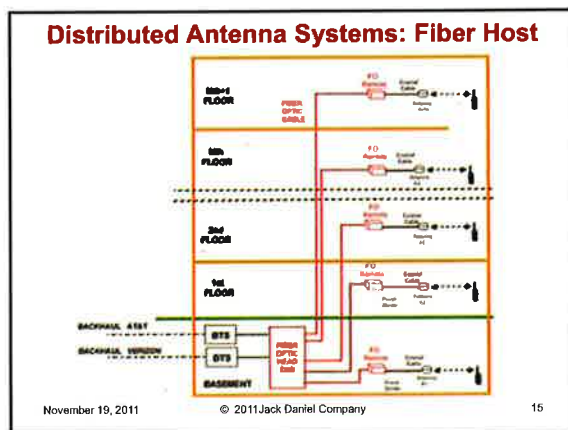
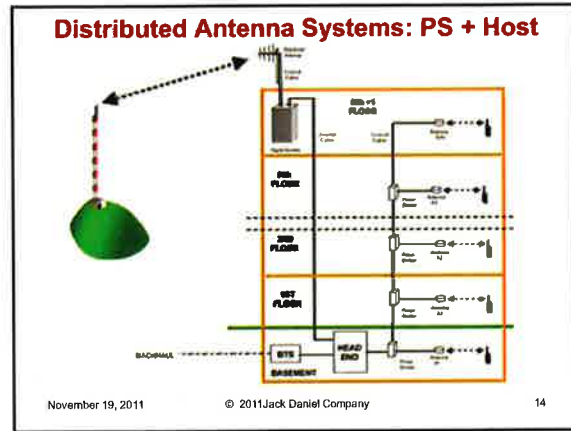
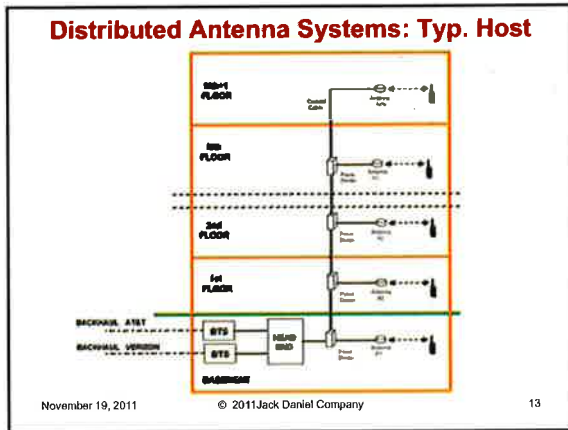
Portable / Permanent, with DAS: Whole Structure

Passive DAS

Active DAS (i.e. fiber, inline amps, remotes)

Tap into (share with cell, etc)

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Shared DAS

1. Sooner or later public safety provisions will be required in most high rise structures, parking garages, malls, basements, etc.
2. It is *possible* to share a private DAS system, including installation, with public safety although there can be additional technical and control issues.
3. New DAS systems should have public safety compatibility in the event it is required in the future.

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Shared DAS

DAS Compatibility: Working to integrate systems that aren't technically compatible with one another.

Most technical challenges are result of higher handset power levels and the frequencies used by public safety.

Common cellular/PCS/WiFi Neutral Host systems have limited capability to handle frequencies below 800 MHz cellular.

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Distributed Antenna Systems

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Neutral Host Priorities

Basic Rule:
Use the minimum amount of equipment investment and cover the least amount of area that will provide The maximum income per investment dollar.

- Coverage in low traffic areas
- Back-up power
- Restoration/response priority
- DAS alterations

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Public Safety Priorities

Basic Public Safety Rule: Providing life critical coverage is more important than cost.

- Coverage in emergency traffic areas.
 - Service basements, tunnels
 - Stairwells
 - Critical fire control areas
- Redundancy, High MTBF
- Fire and Electrical code compliant
- Response and Restoration: 24/7

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Compatibility Challenges

The way cellular systems operate is much different than public safety radio systems.

- Cellular; low power handsets.
 - LMR/PS; High power, no FWD PWR control
 - Cellular: Low nearby sites or BTS in building.
 - LMR/PS: Distant high power repeater sites
- Public safety handsets overdrive system designed for cellular. Can generate interference (IM), distortion and loss of data.

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Sharing Conclusions

Most new Neutral Host systems use fiber distribution because of the bandwidth.

When industrial and/or public safety channels are required, it is often best practice to install separate DAS systems at the same time.

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NPRM: Docket 10-4

Wilson is seeking direct sales to consumers, mobile BDAs only.

Service providers, including Sprint Nextel, and consumers have filed over 500 comments before the NPRM.

NPRM Focus has not been on Part 90 users other than Sprint-Nextel.

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NPRM: Docket 10-4

New Part 95 signal booster rules are proposed for "Consumer" signal boosters, operating on 'subscriber based services, focused on mobile use.

Requirements include automatic power reduction near cell site and shut down in the event of oscillation.

All this is in latest Wilson mobile BDAs.

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National Public Safety Codes

Based on may prior local codes: Burbank 1990

Codes, as published in date order:

IFC 2009: Fire Code

NFPA-1 2009: Fire Code

NFPA-5000 2009: Building Code

NFPA-72 2010: Fire Code

IFC 1012: Fire Code

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Latest National Public Safety Codes



IFC 2012
Section 510

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Latest National Public Safety Codes



NFPA5000 2009
Annex G

NFPA72 2010
Chapter 24.5.2

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National Public Safety Codes

Latest codes applies to all new and existing structures; retroactive.

Major modifications that require a new fire inspection and C.O.I.

NFPA: 90% Coverage except Critical Areas, 99% in Critical Areas.

IFC 95% Coverage. (IFC)

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National Code Highlights

- Certified Personnel
- Pre-approved hardware
- Frequency Change Updates Required
- NFPA: 24 hour backup IFC: 12 hours
- Annual Inspections
- Grid coverage validation method

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National Code Highlights

Alarms to LOCAL fire panel:

- Amplifier failure.
- AC power failure.
- DC power failure.
- Battery charger failure.
- 70% of battery capacity remaining.
- Antenna circuit failure.

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Q and A

Thank You

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Additional Resources

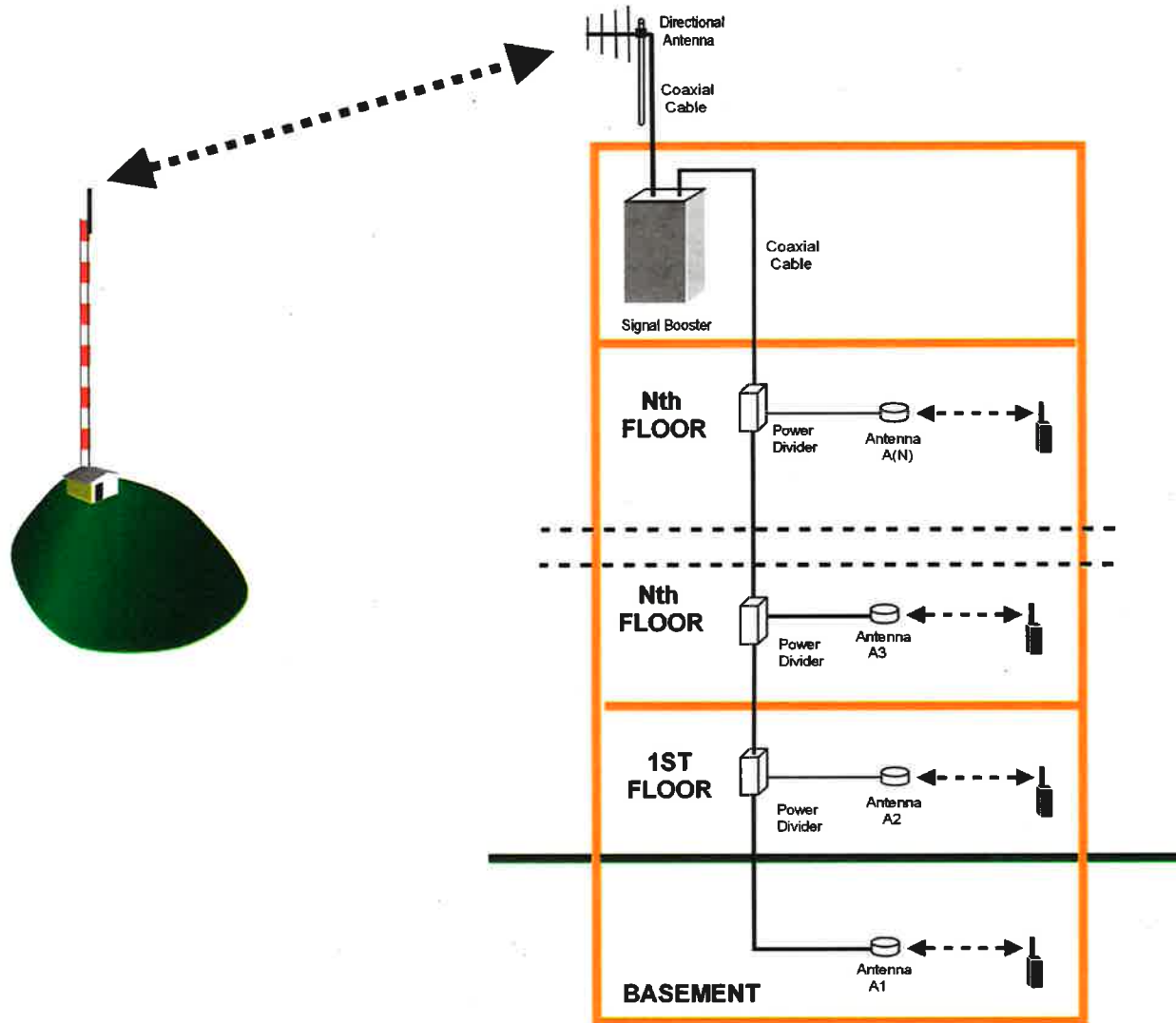
- National Fire Protection Agency (NFPA)
www.NFPA.org
- FCC : www.fcc.gov
- International Code Committee (ICC)
www.ICCsafe.org
- National Public Safety Telecommunications Council
www.NPSTC.org
- Jack Daniel Company web site:
www.RFSolutions.com

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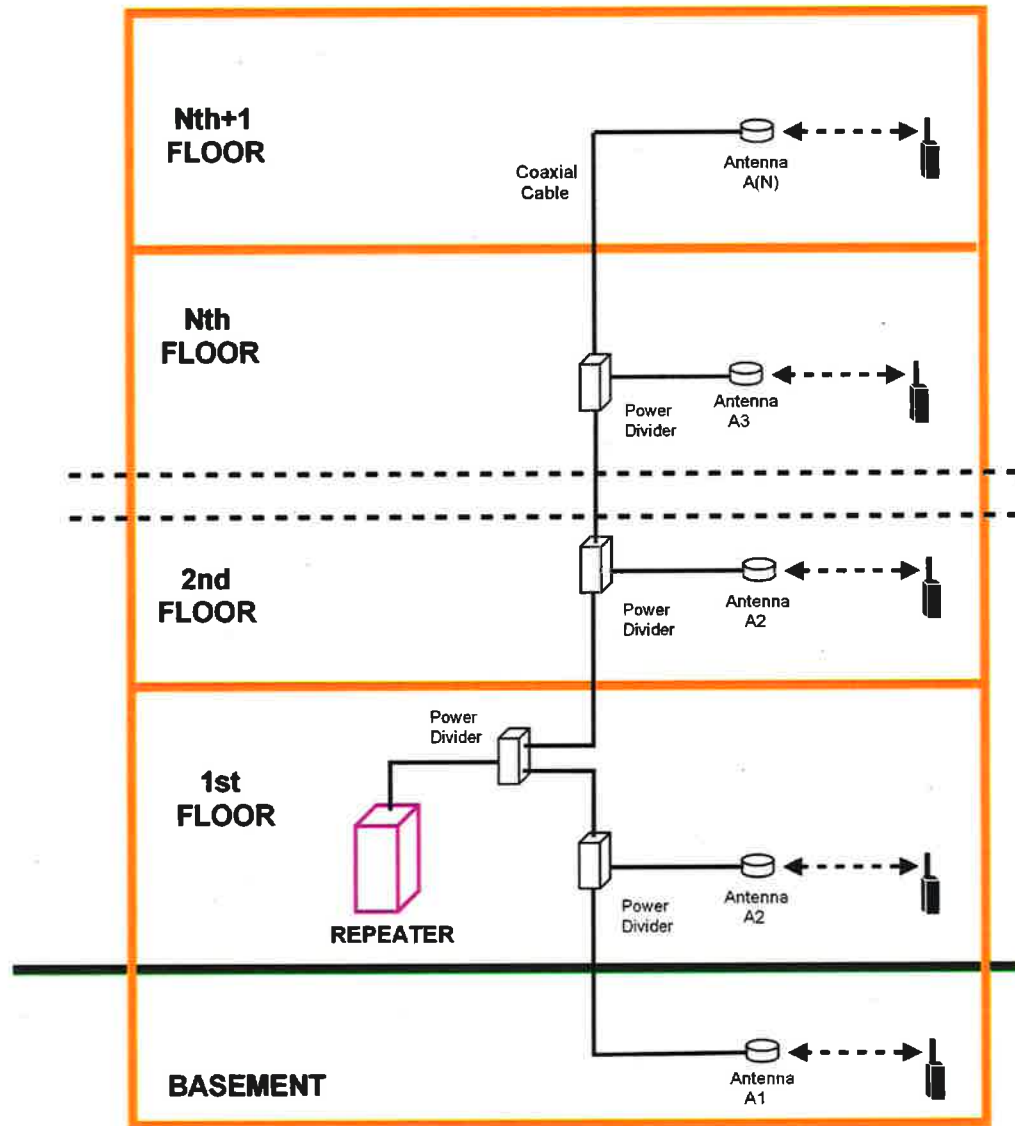
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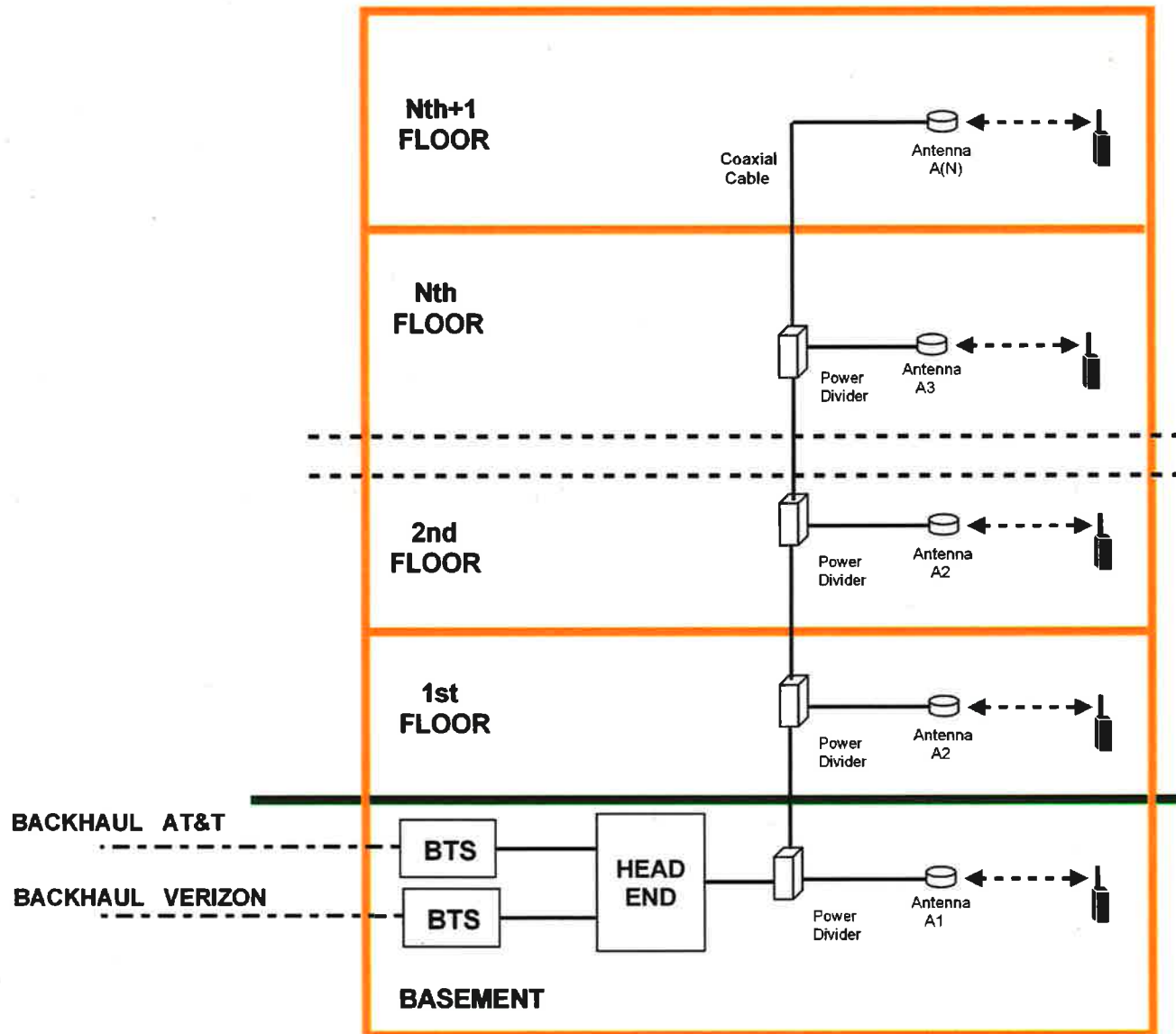
Distributed Antenna Systems: PS Basic



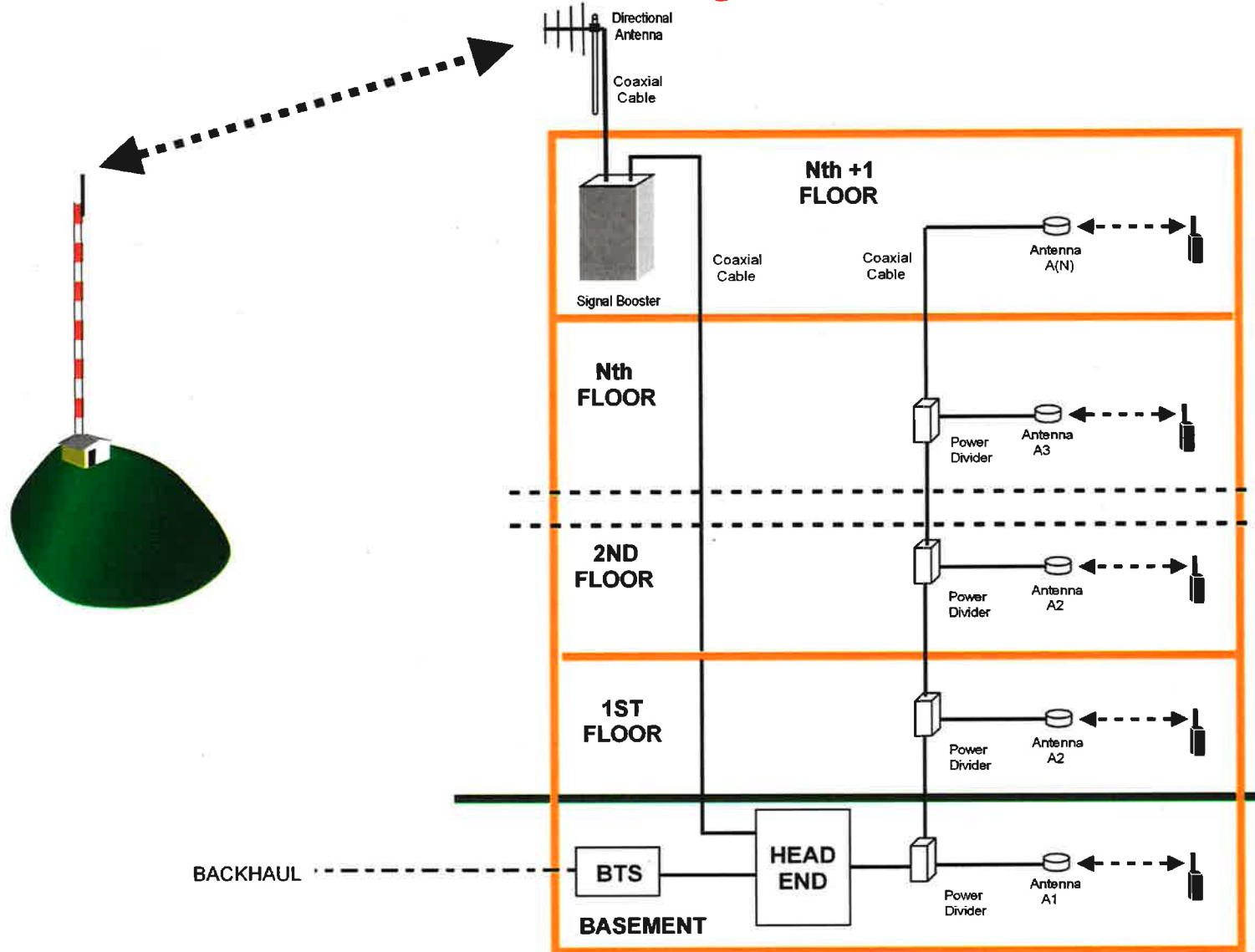
Distributed Antenna Systems: Repeater



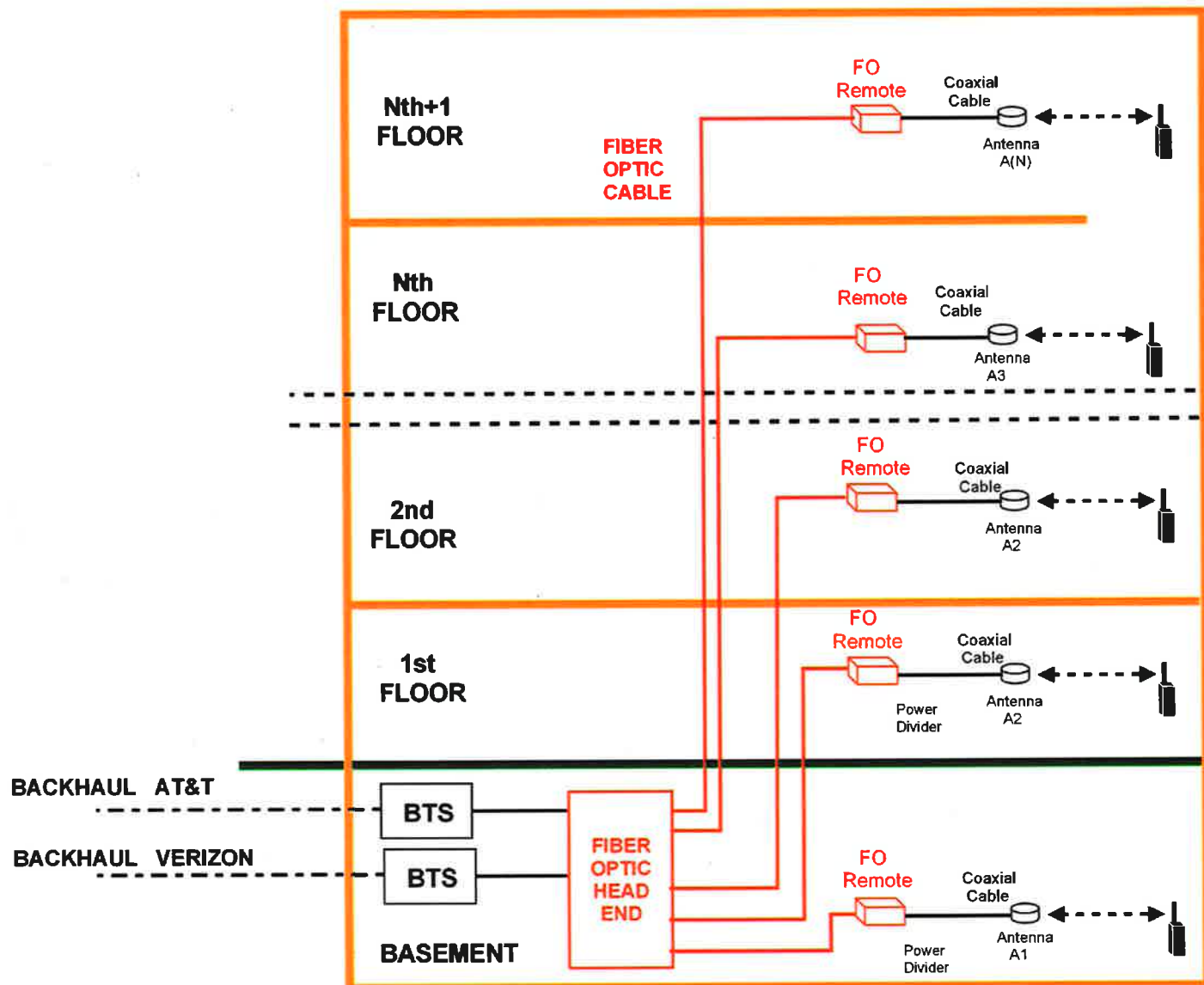
Distributed Antenna Systems: Typ. Host



Distributed Antenna Systems: PS + Host

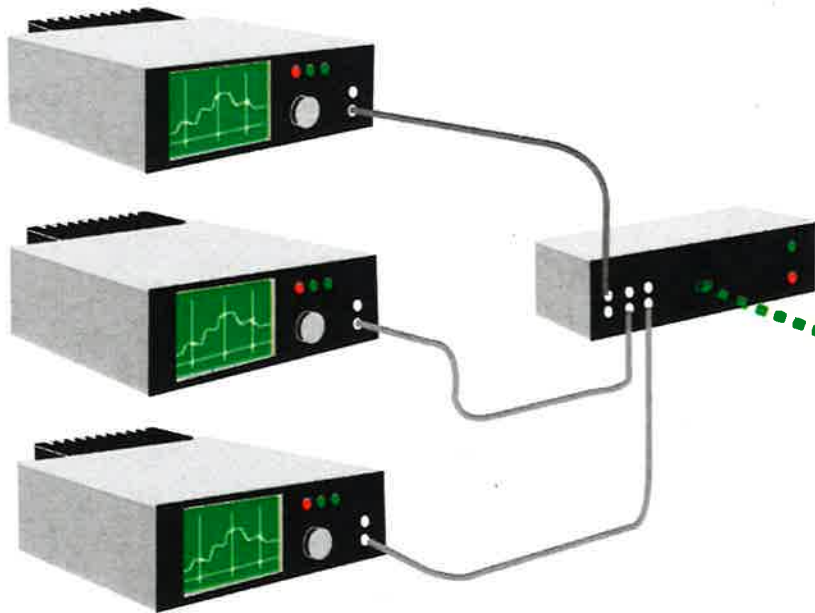


Distributed Antenna Systems: Fiber Host

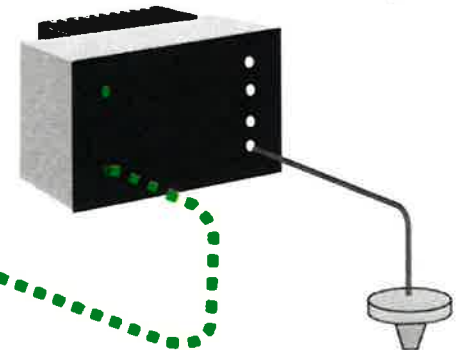


Distributed Antenna Systems: Fiber Host

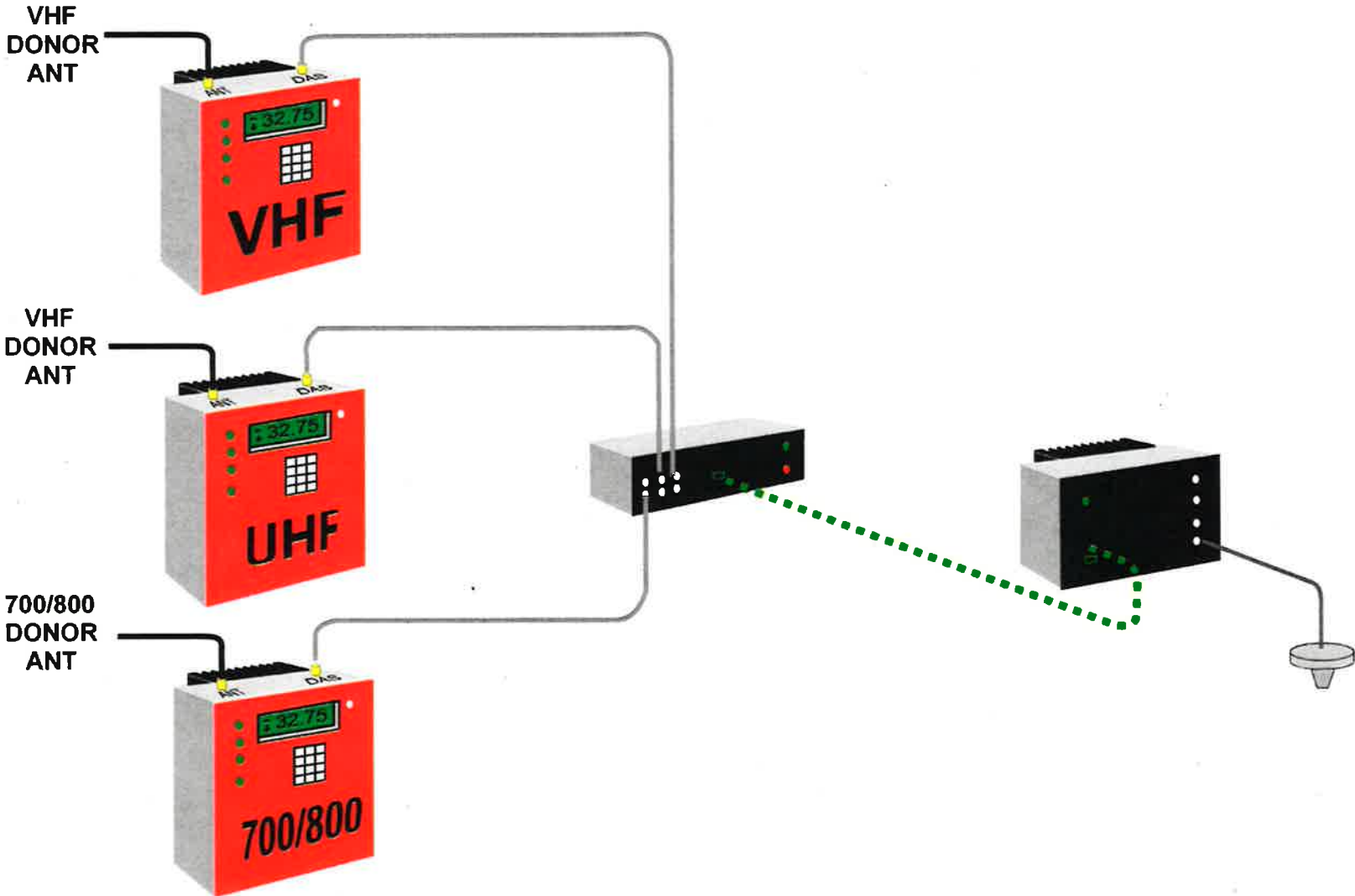
HEAD END



REMOTE HUB



Distributed Antenna Systems: Fiber PS



Distributed Antenna Systems: Fiber PS+Host

