

BHI Energy



Outage Communication in a post FCC Auction Environment

**Floyd Harris - Brunswick Nuclear Power Station
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Brunswick Nuclear Plant

- ▶ Duke Energy
- ▶ Boiling Water Reactor
- ▶ Brunswick County, N.C
- ▶ Dual Unit GE ~ 1,870 MW output
- ▶ Approximately 645 employees

Change - Objectives & Benefits

- ▶ The T-Mobile 600 MHz deployment in our area prompted our site to search for a new outage communication system.
- ▶ Our primary objectives:
 - ▶ Provide Reliable Outage Communications
 - ▶ Implement a FCC compliant system.
- ▶ The use of the new system also provided the following secondary benefits:
 - ▶ Significantly reduced outage setup time
 - ▶ Remote HUBs and antennas only equipment deployed in RCA
 - ▶ Minimized equipment damage
 - ▶ Primary equipment mounted outside RCA in controlled environment.

FCC 600 MHz Incentive Auction

- ▶ On March 29, 2016, the FCC commenced the first-ever “incentive auction” designed to repurpose spectrum for new uses - video and broadband services.
- ▶ Bidding in the auction closed on March 30, 2017, repurposing 84 megahertz of spectrum
- ▶ The auction yielded \$19.8 billion in revenue, including \$10.05 billion for winning broadcast bidders
- ▶ More than \$7 billion to be deposited to the U.S. Treasury for deficit reduction.

Federal Communications Commission

DA 17-709 issued July 24th, 2017

- ▶ This Consumer Disclosure informs consumers that wireless microphone users must cease any wireless microphone operations in the 600 MHz service band (617-652 MHz / 663-698 MHz) no later than July 13, 2020.
- ▶ Effective October 13, 2018, no person shall manufacture, import, sell, lease, offer for sale or lease, or ship low power auxiliary stations or wireless video assist devices that are capable of operating in the 600 MHz service band in the USA.
- ▶ In addition, consumers may be required to cease use of these devices earlier if their use has the potential to cause harmful interference to 600 MHz service licensees' wireless operations in the band.

T-Mobile Letter

October 17th, 2017

- ▶ T-Mobile USA Inc., is planning to deploy commercial wireless services in some, or all, of our owned spectrum blocks included in the attached list of counties. We plan to continuously add to this list during the next few years. Broadcasters should review the attached list to make sure affected stations know that T-Mobile's license for spectrum us start being used soon. The list includes an estimated timeframe in which T-Mobile plants to begin using the spectrum in each county.

County	State	T-Mobile Market	T-Mobile Blocks	Commencement
Brunswick	NC	Carolinas, NC	BCDE	Q2 2018

Brunswick County FCC Auction Results

License	Market	Block	Freq Downlink	Freq Uplink	Winning Bidder	Net Price
WT-PEA146-A	Wilmington, NC	A	617-622	663-668	ParkerB.com Wireless L.L.C. [Dish Network]	1,400,000
WT-PEA146-B	Wilmington, NC	B	622-627	668-673	T-Mobile License LLC	1,491,335
WT-PEA146-C	Wilmington, NC	C	627-632	673-678	T-Mobile License LLC	1,491,335
WT-PEA146-D	Wilmington, NC	D	632-637	678-683	T-Mobile License LLC	1,420,319
WT-PEA146-E	Wilmington, NC	E	637-642	683-688	T-Mobile License LLC	1,420,319
WT-PEA146-F	Wilmington, NC	F	642-647	688-693	UNITED STATES CELLULAR	1,470,000
WT-PEA146-G	Wilmington, NC	G	647-652	693-698	UNITED STATES CELLULAR	1,470,000
					TOTAL Brunswick County	\$10,163,308

T-Mobile 2018 Launch

- ▶ T-Mobile will be launching more than a dozen new 600 MHz capable smartphones in 2018. As a result, more operators using wireless gear in the 600 MHz service band will be affected and face considerable fines if they continue to use that range of spectrum.
- ▶ Per 47 U.S. Code § 503, the FCC may impose a fine on anyone who continues to operate in the relevant spectrum of "\$10,000 per violation or per day of a continuing violation and \$75,000 per any single act or failure to act."

Brunswick Next Steps

- ▶ Brunswick evaluated a dual band post auction compliant wireless intercom in the VHF and UHF spectrum with a distributed antenna system (DAS).
- ▶ The combined system allowed us to extend antennas over fiber to multiple areas which significantly increased the coverage area and reduced setup time.
- ▶ We purchased the system at the end of 2017 and successfully deployed for our spring 2018 outage.
 - ▶ Equipment arrived on site in 2017
 - ▶ Vendor and Utility worked together to setup, configure and deploy the new system before outage start

New Brunswick System

- ▶ The new system included the following:
- ▶ Wireless Intercoms
 - ▶ 20 Base Stations with 6 beltpacks per base
 - ▶ Battery Charge Bays & Rechargeable Batteries
 - ▶ Spare Parts
- ▶ Distributed Antenna System
 - ▶ Wireless Intercoms Mounted outside RCA in clean area
 - ▶ Antenna Combiners merged inputs into DAS
 - ▶ Antennas extended into RCA over fiber to up to 14 locations
 - ▶ Wireless belt pack coverage extends to all deployed areas
- ▶ Audio over IP Components

Main Racks Outside RCA



- ▶ Wireless Intercoms
- ▶ Distributed Antenna System
 - ▶ Primary Hub
 - ▶ Optical Modules
 - ▶ Service Modules
- ▶ Battery Charge Bay
- ▶ VCOM AID
 - ▶ Converts Analog communications to Digital for distribution over site Business LAN.
- ▶ Video Encoding
- ▶ Power Conditioning

Wireless Intercom

Radio Active Designs UV-1G Split Band



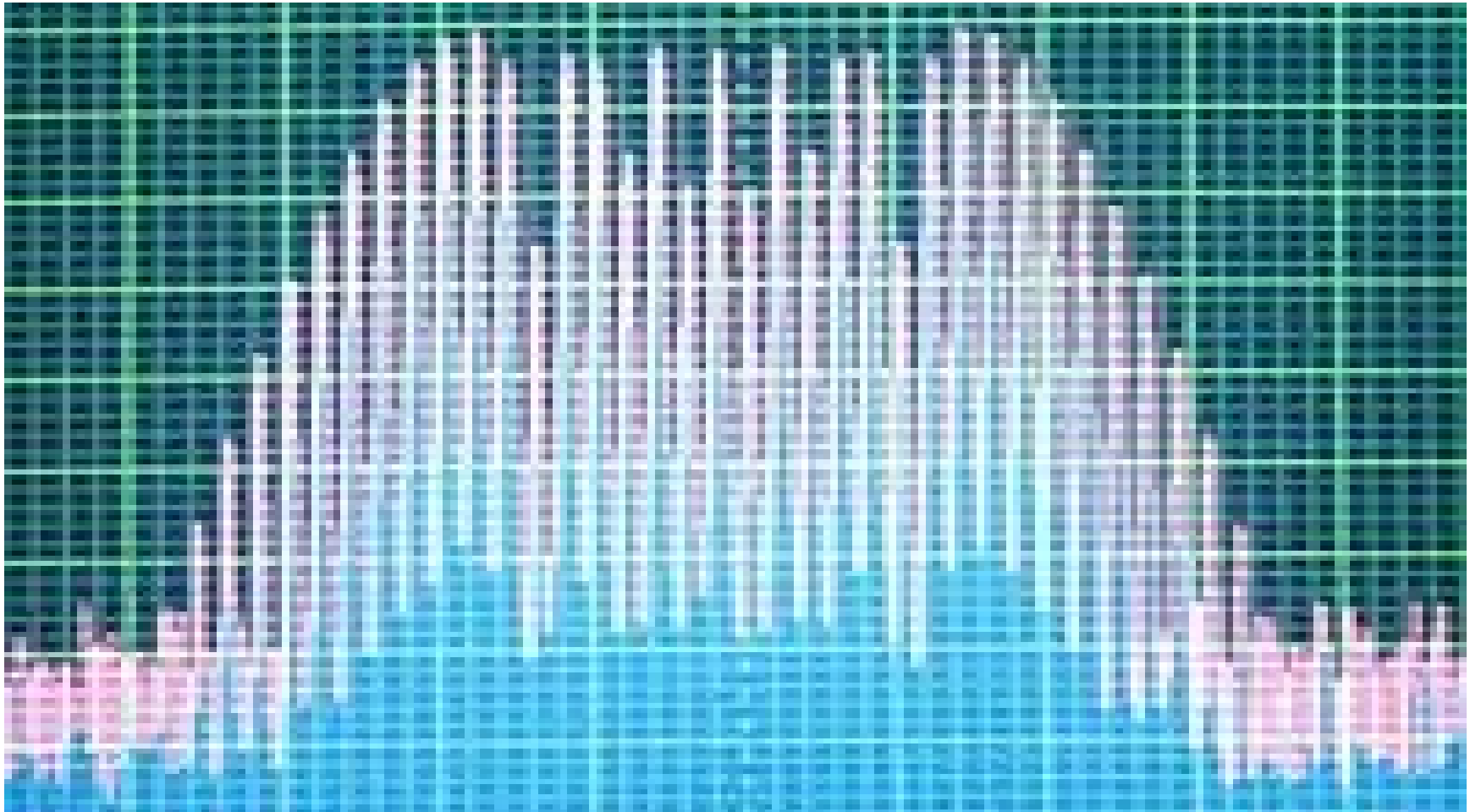
Wireless Intercom System
VHF/UHF AM Narrow Band

RAD Addresses Spectral Congestion

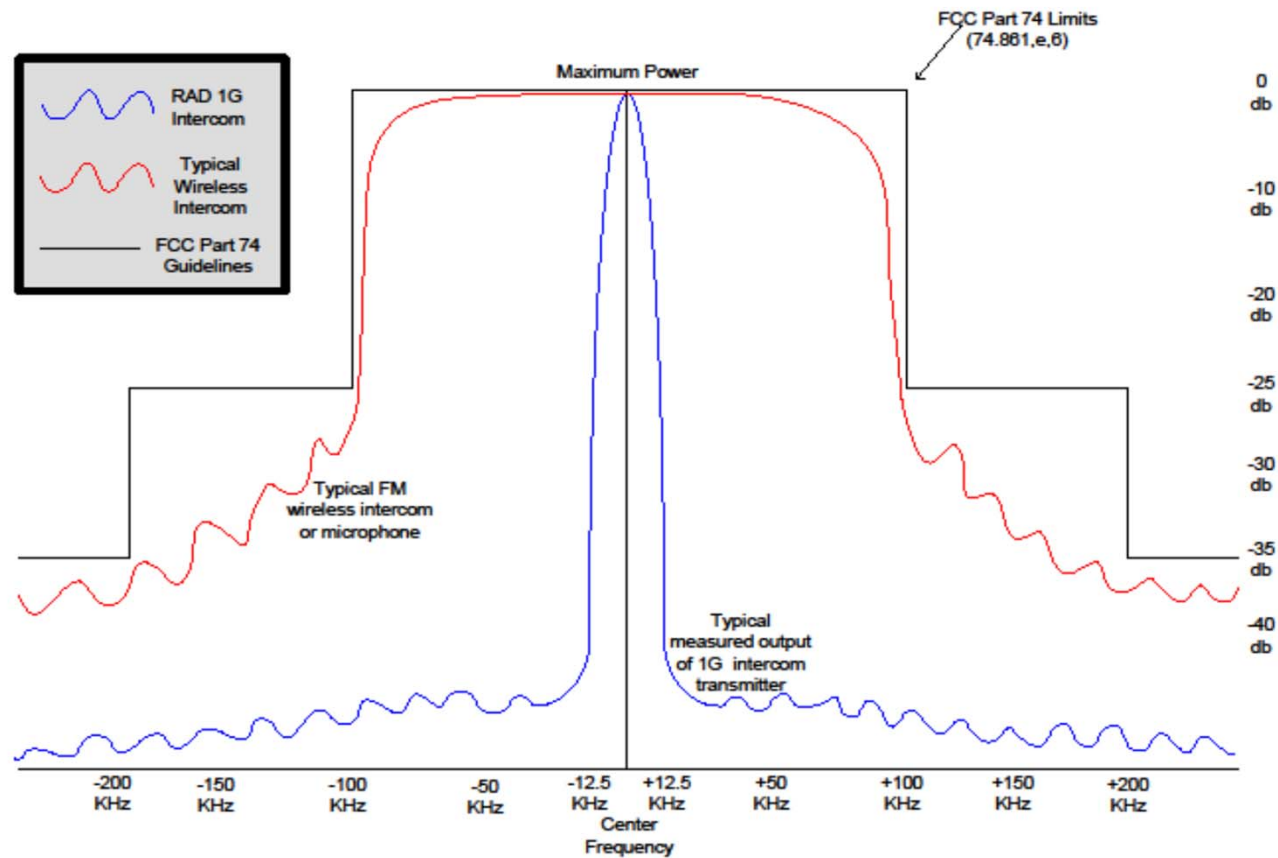
- ▶ All Packs Transmit in VHF from 174-216 MHz
- ▶ All Bases Transmit in UHF 470.025-607.975
Base Tx
- ▶ Modulation Scheme is Enhanced Narrow Band
- ▶ Allows operation of over 120 Beltpacks Within
One 6 MHz TV Band
- ▶ Uses Internal Narrow Band Antennas for
Greater Interference Protection

Frequency Modulation

300 kHz wide band



AM FM Bandwidth Comparison



Proven in the Real World

- ▶ Used at Super Bowls, NBA All Stars, Major League Baseball, Rose Bowl, Latin Grammys and Billboards Awards, Live Broadcast Studios
- ▶ Tested at NASA Cape Canaveral for Space X Mission Control Currently Testing At Vandenberg Air Force Base
- ▶ Installed at Power Plants – Dominion, Duke, Exelon, NextERA, SCANA & XCEL
- ▶ Chosen as Park Wide Wireless Communication System for Disney World Covering Acres of Land RF over Fiber-Optics

Radio Active Designs UV-1G Beltpack



- Dual Audio Channel
- Programmable keys
- Passcode Lockout
- Alkaline or Rechargeable Battery Packs

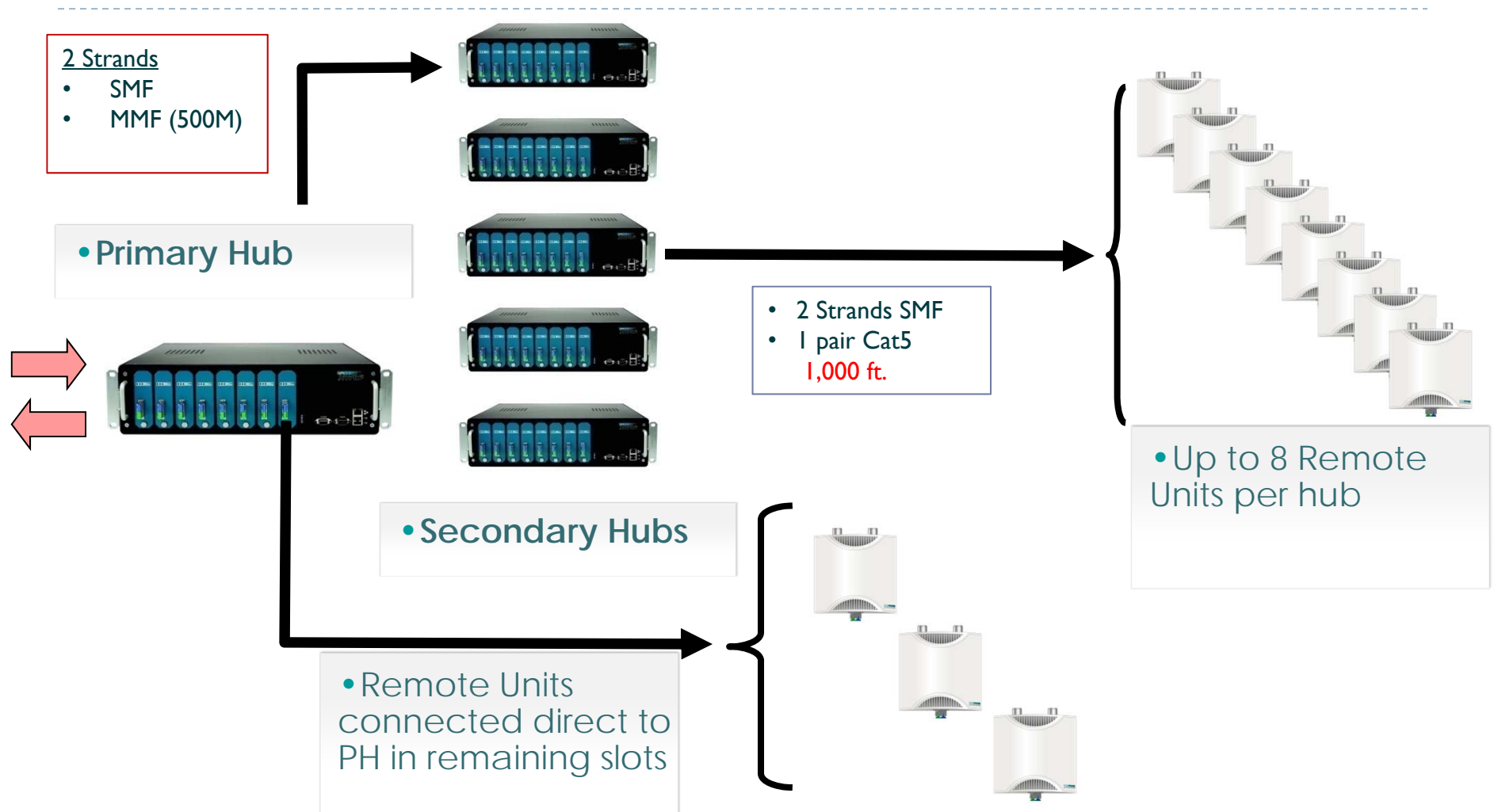
Distributed Antenna System

5 Primary SKUs Cover all Bands & Services



- **Software Defined Hub**
- **Optical Modules in the front slots (up to 8 ea.)**
- **Service Modules in the rear slots (up to 4 ea.)**
- **Draws about 5 amps fully loaded**
- **Each can support multiple services for pre-combining or stand-alone bands.**
- **Hot swappable components**

Mixed System Architecture



BHI Energy Facilities

- ▶ Our product line office is located in Altamonte Springs, Florida which is about 40 minutes north of Orlando International Airport
- ▶ We maintain production and test systems for all software packages in house which allows us to provide the following:
 - ▶ System Administrator Training on every product we sell.
 - ▶ Support for every product we sell.
 - ▶ 24/7 for critical issues
 - ▶ 8-5, M-F for non-critical issues
 - ▶ New Product Testing before we ever approach a customer.
- ▶ Annual User Group Meeting – Training & Benchmarking

Questions?

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