



DAB+ **TRANSMISSION**

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REGIONAL SALES MANAGER

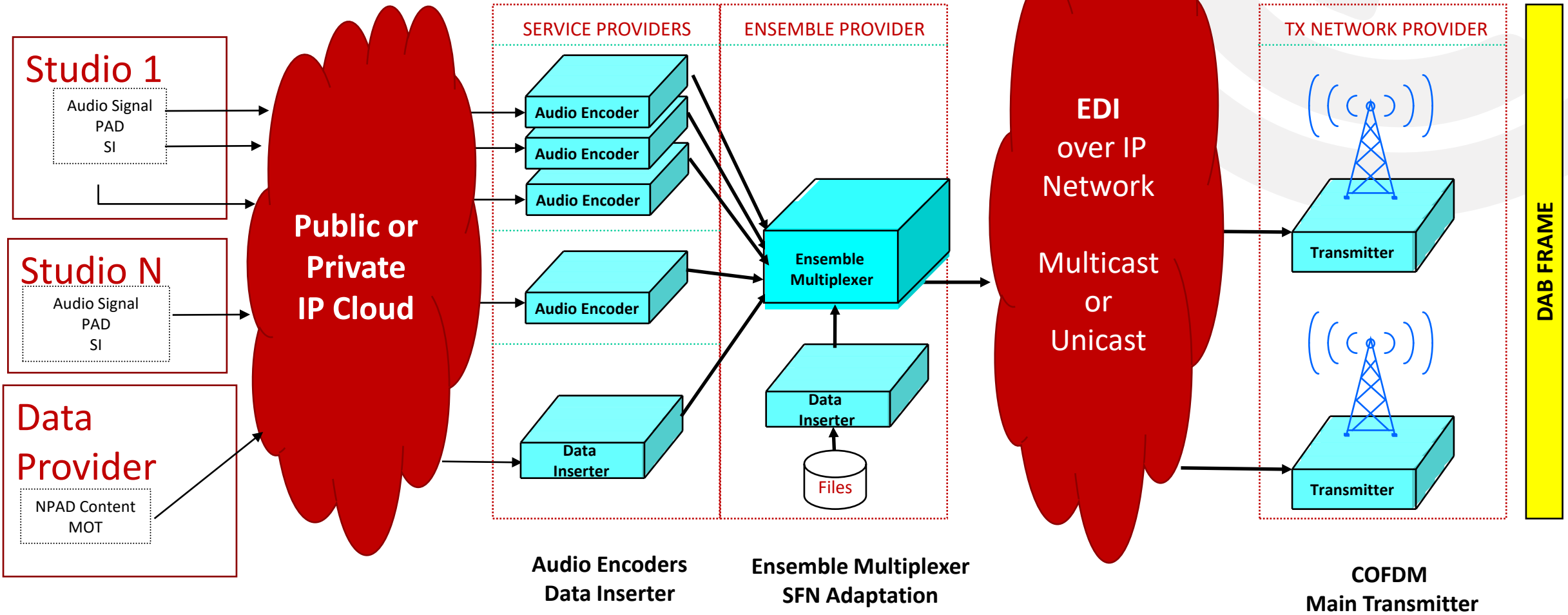
ABU – ASBU – WorldDAB
DAB+ Digital Radio Technical Workshop
18-20 July 2023

OVERVIEW

- DAB/DAB+ uses Band III VHF to provide a suite of audio and multimedia services
- Common transmission infrastructure
- Occupies 1.5 MHz RF bandwidth
- Supports multiple audio and video channels
- Signal delivery via IP (fiber, Sat, μ Wave, public internet)
- No analog simulcast

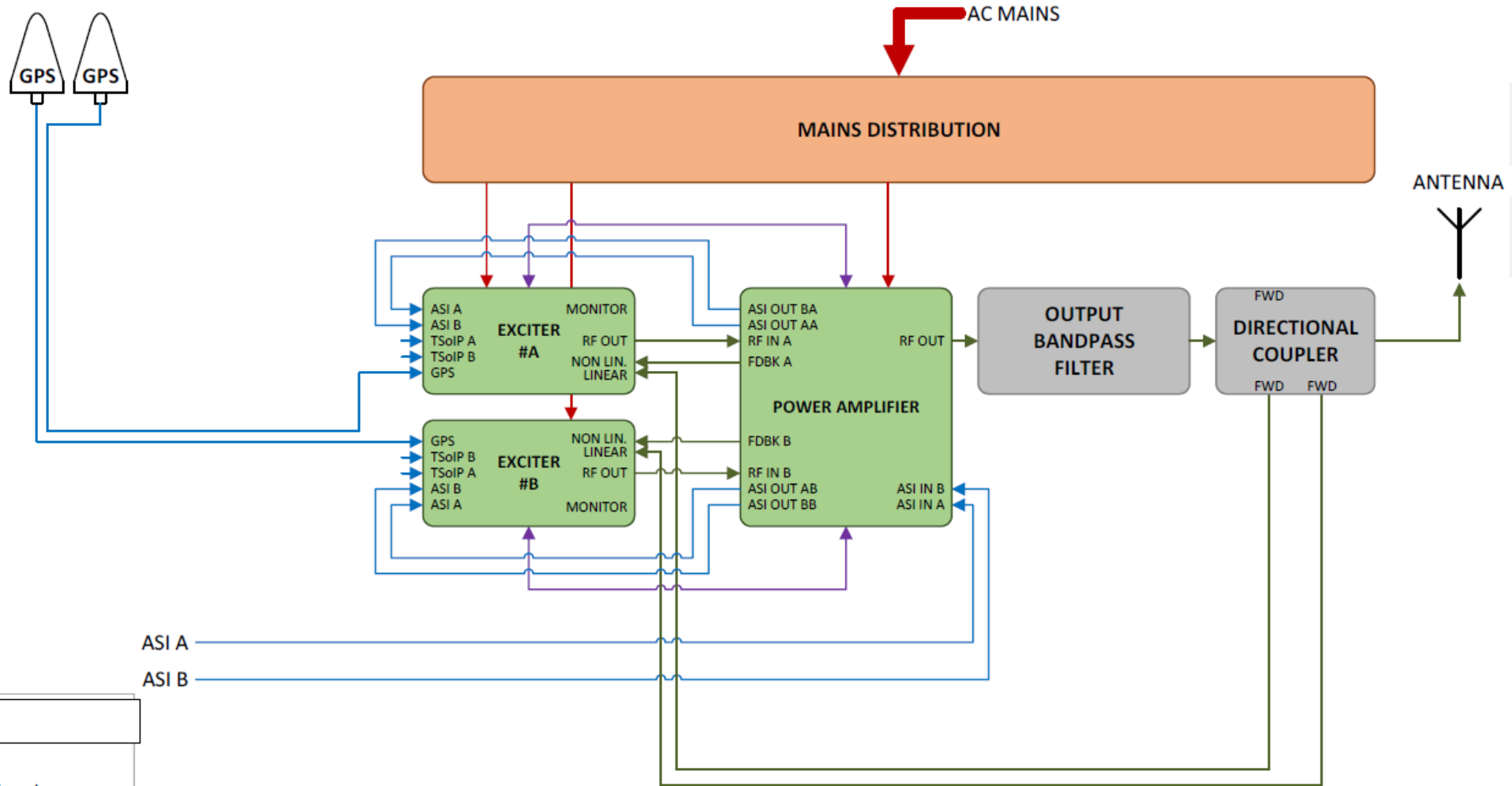


STRUCTURE OF A DAB NETWORK IN PRACTICE

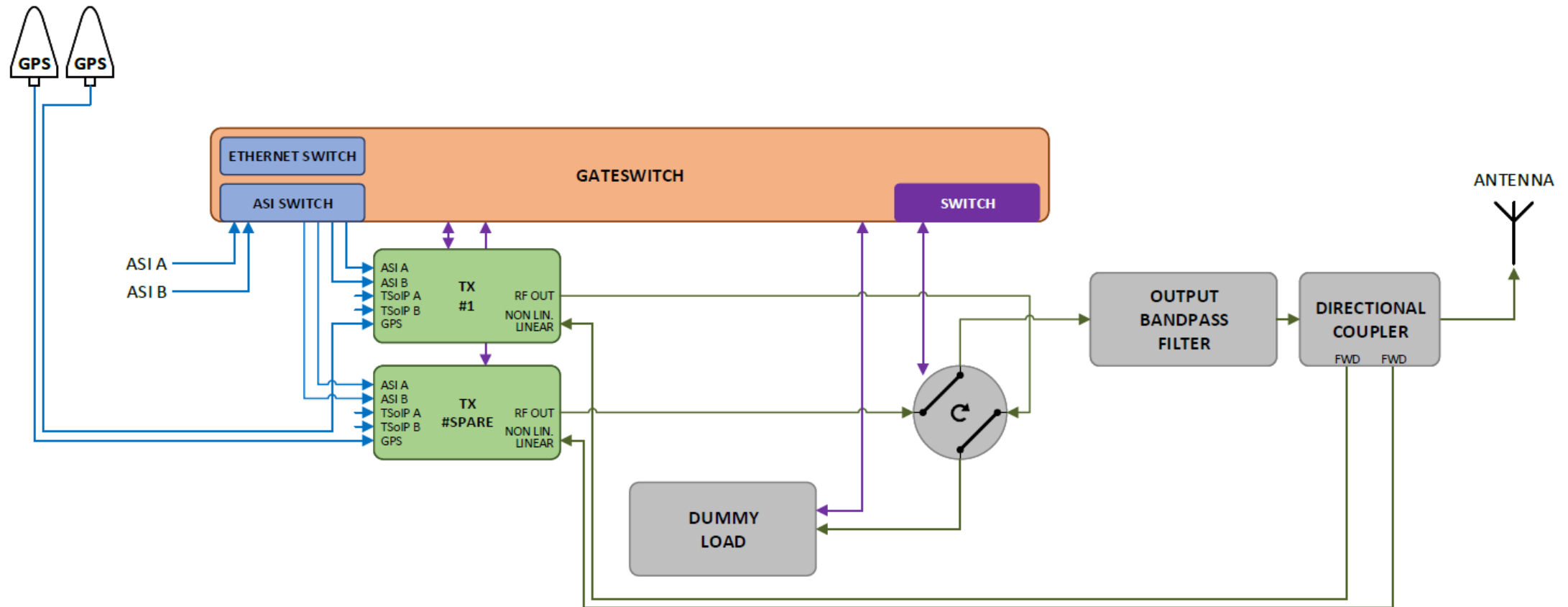




GENERIC DUAL-DRIVE TRANSMITTER SYSTEM



GATESAIR[®] GENERIC 1+1 TRANSMITTER SYSTEM



DAB+: MAXIVA™ PRODUCT FAMILY (LOW POWER)

Maxiva Air-Cooled Ultra-Compact and Multi-Compact

5 - 15W



Maxiva VAXT Multi-Compact

15W - 150W



300W - 450W



550W - 750W



Maxiva VAXT Ultra-Compact

VHF Band III

Maxiva Air-Cooled

1000W



250W



8kW



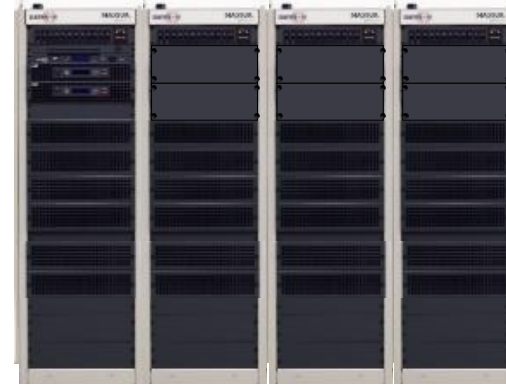
13.6kW



Maxiva VAXTE & VAX-OP

Maxiva Liquid-Cooled

25.6kW



45kW

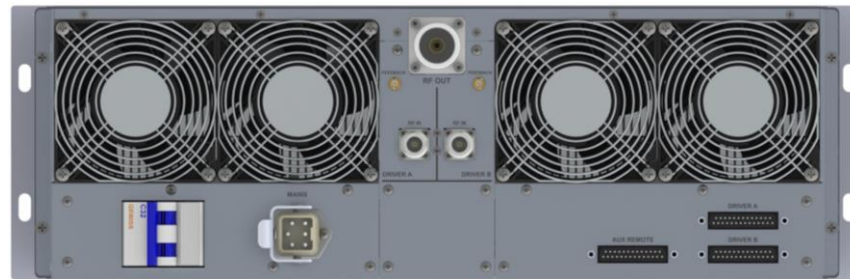


Maxiva OP Series



DAB+: TRANSMITTER CONSIDERATIONS

- Redundancy concept:
 - Single drive (a.k.a. 1+0)
 - Dual drive
 - 1+1 redundancy (with/without switchover unit)
- Output power
- Efficiency – Doherty
 - Dependent on MER with indirect correlation.
- Input options – EDI/ETI/RF/SAT.
- Air cooling vs. Liquid cooling
- Use of TX in full frequency range

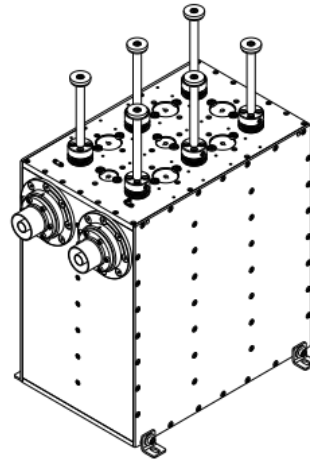
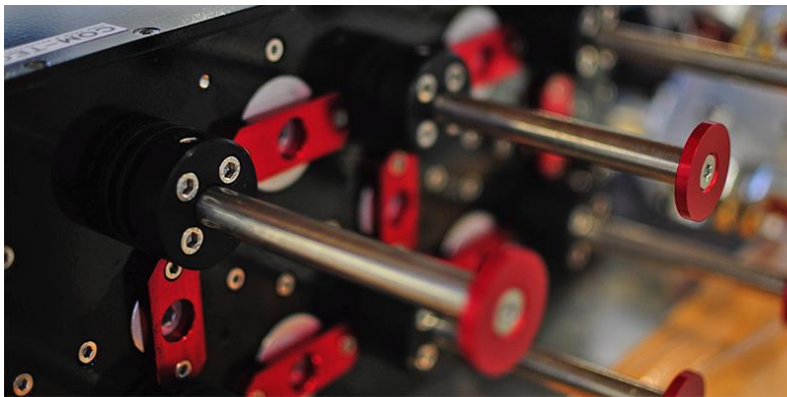
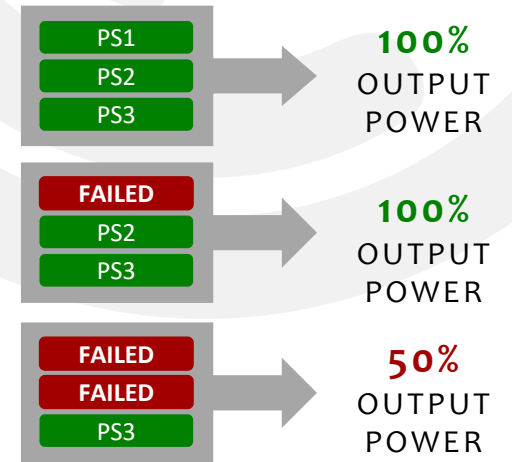


Maxiva VAXTE & VAX-OP

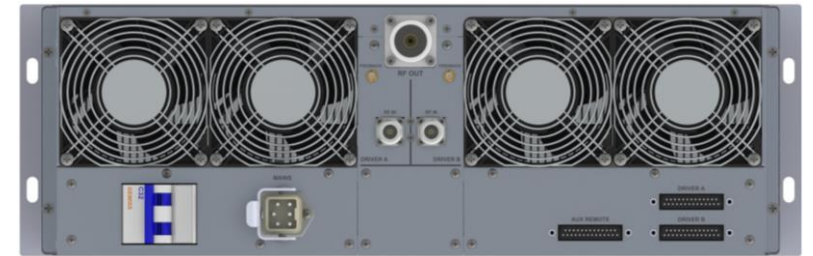


DAB+: TRANSMITTER CONSIDERATIONS (CONTINUED)

- Ease of Use/Service/Maintenance
 - Fail-safe design (e.g. 2-out-of-3 redundancy)
 - Hot-swappable PAs
 - Redundancy of fans
- Low-pass filter (a.k.a. harmonic filter) - internal or external
- Mask filter (a.k.a. band pass filter)
- HTML5/Java/... GUI; SNMP; front panel; dry contacts.
- Internal GPS for SFN & higher stability in MFN operation.



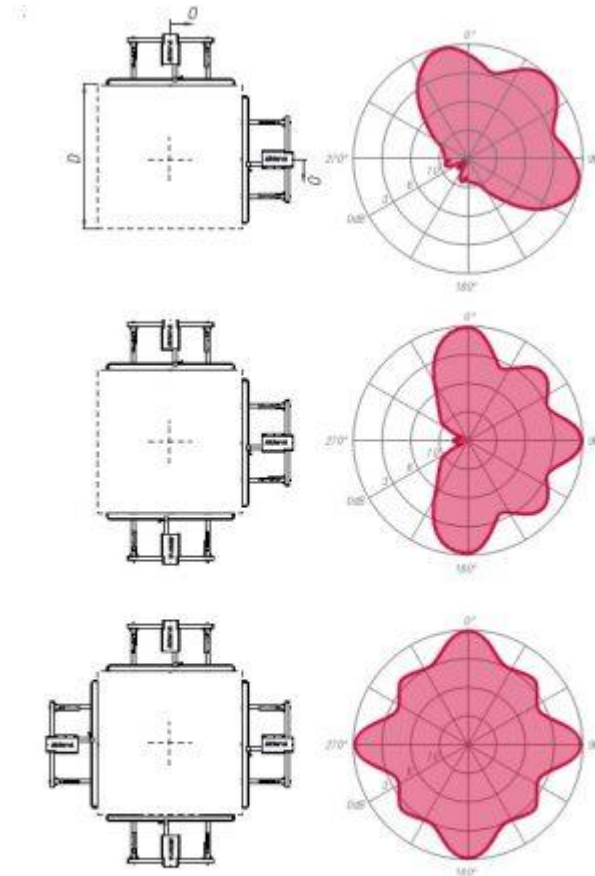
Filter photo & drawing from Com-Tech



ANTENNA



TYPICAL HORIZONTAL PATTERNS



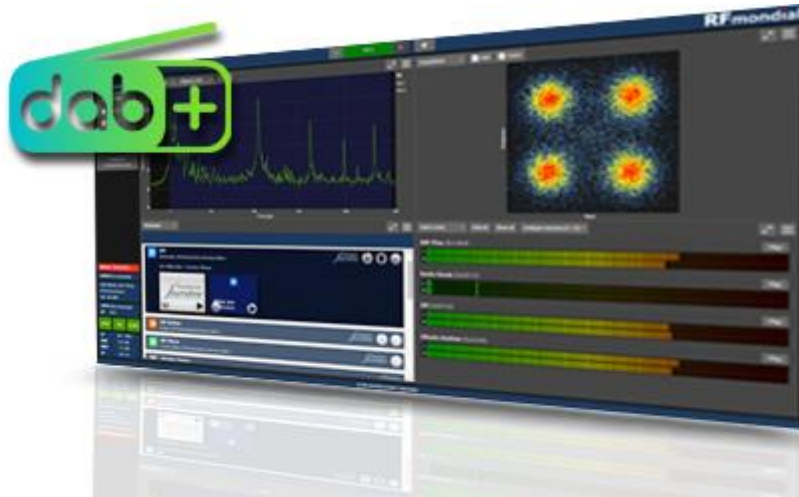
Note:
Antenna Distance (D) and Antenna Offset (C) are subject to change according to requirement.
Custom designed antennas meeting special requirements such as specific azimuth pattern, different gains and custom power input are available upon request.

Antenna photo & graphic from Aldena

Points to consider

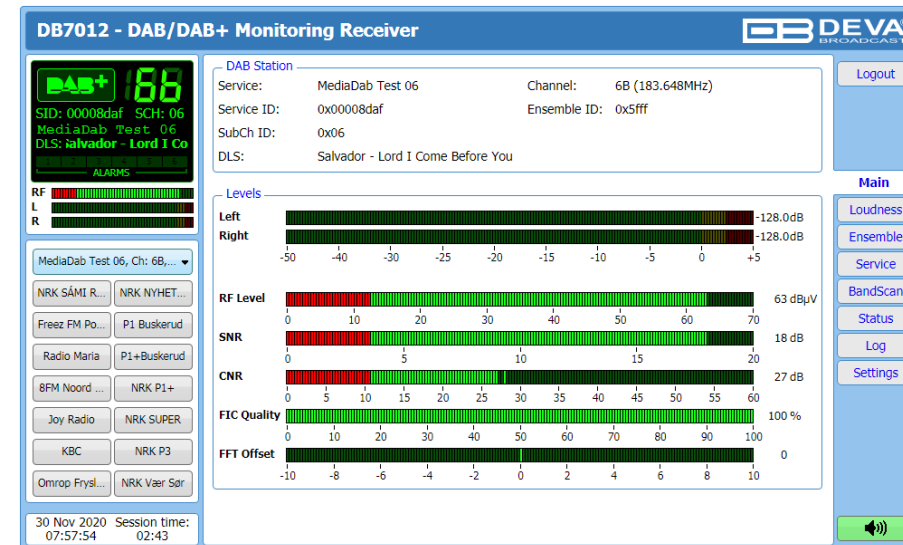
- Frequency range
- Polarisation
- Radiation pattern
- Horizontal Coverage
- Gain
- Number of bays
- Weight
- Wind load
- Tower design
- RF feeder
 - Loss over length

MONITORING



Points to consider

- Transmitter monitoring
- RF measurements and synchronization (SFN) monitoring
- Content verification and monitoring (DAB, DAB+, DMB)
- Listen to DAB over IP
- Field measurements and verification
- Logging and analysis
- Local/Remote access (HTML5)
- SNMP capability





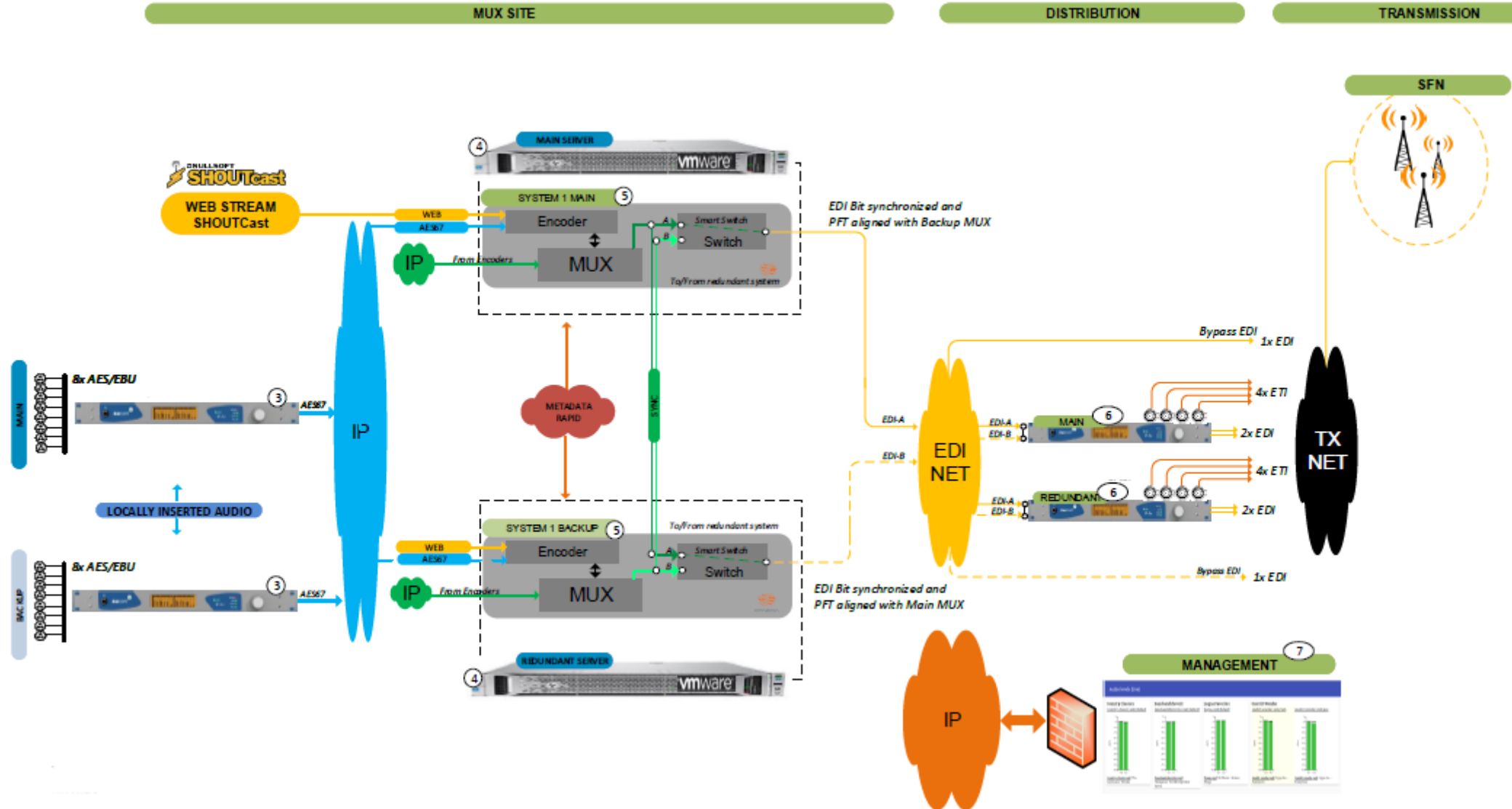
THANK YOU

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Connecting for the Future

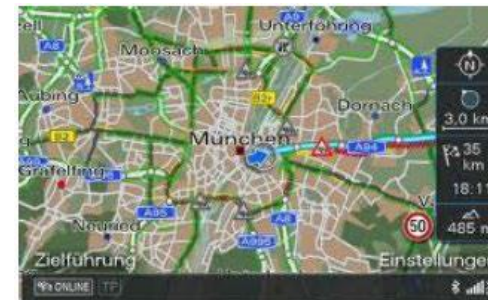
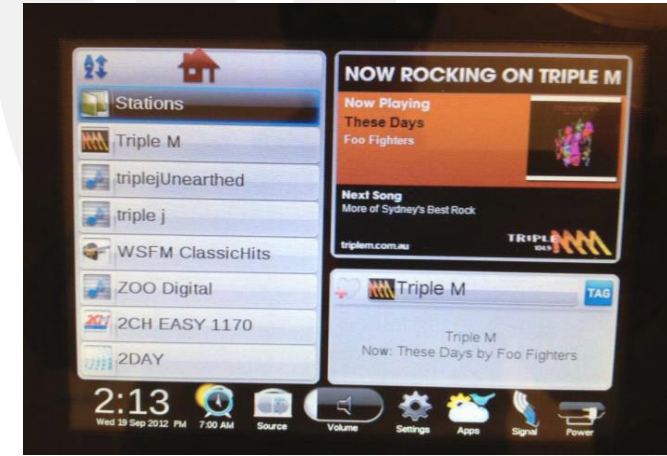
SUPPORTING SLIDES

GATESAIR CENTRALISED DAB HEADEND



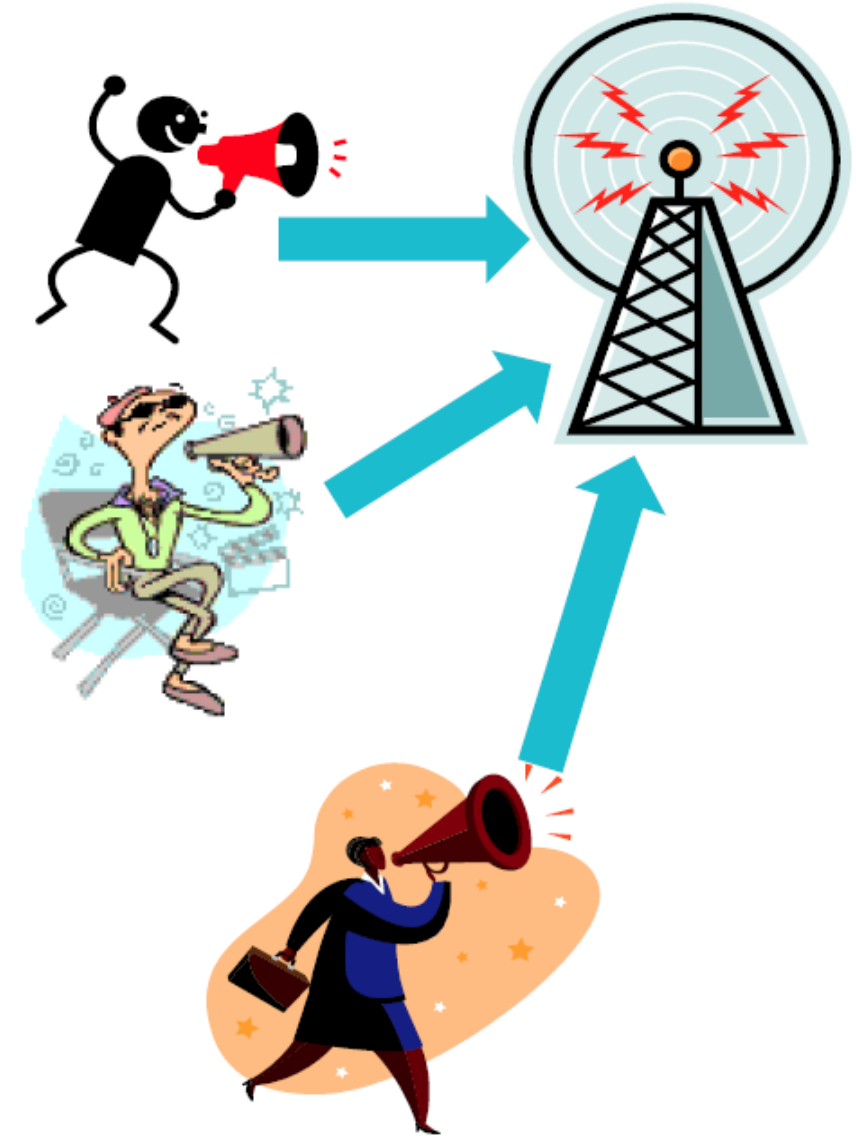
WHY DAB?

- The DAB system provides spectrum and power efficiencies
 - Provides for many services
 - Reduces Energy consumption
- Superior audio quality
- Data Services for mobile, portable and fixed receivers
 - Expand brand portfolios
 - Station logo and brand recognition
 - Program Associated Data
 - Traffic information



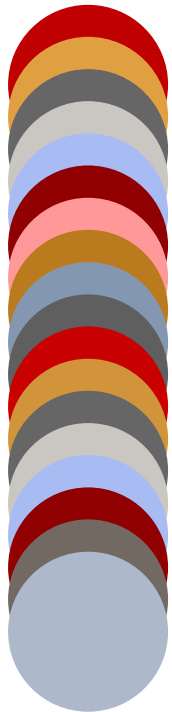
DAB DEPLOYMENT STRUCTURE

- Multiple radio stations transmit on the same frequency
- Multiple radio stations use the same transmitter
- Multiple radio stations share the cost of the single transmission
- Most cost-effective method to deliver content



COMPARISON: FM VERSUS DAB+

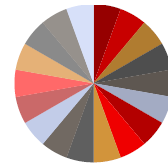
Equipment example: 18 radio programs; same coverage



FM

Tx1, 2, 3 16, 17, 18

- 18x FM Transmitter
- 18x Frequencies
- 18x Frequency License fee
- 18x Studio-Transmitter Link (STL)
- 18x RDS encoder/ Data
- 18x Large antenna



DAB+

Tx1 handles all 18 programs

- 1x DAB+ Transmitter
- 1x Frequency
- 1x Frequency License fee
- 1x Studio-Transmitter Link (STL)
- 1x DAB+ Play-out
- 1x Medium antenna system

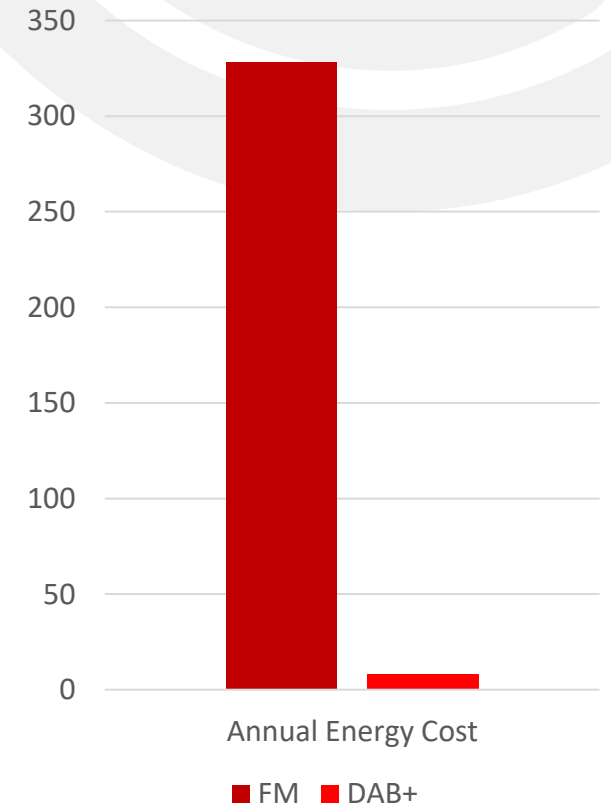
NOTE: Antenna system aperture for DAB+ around 200MHz is approximately 1/2 that of FM; around 100MHz for the same gain.

COMPARISON: FM VERSUS DAB+

Cost efficiency example: 18 radio programs; same coverage

Transmission Type	FM	DAB+
Power	10 kW	2.5 kW
AC-to-RF Efficiency	72%	40%
Energy consumption per Tx	13.9 kW	6.25 kW
# of Tx	18	1
Total energy consumption	250 kW	6.25 kW
Annual energy cost*	\$328,500 USD	\$8,000 USD

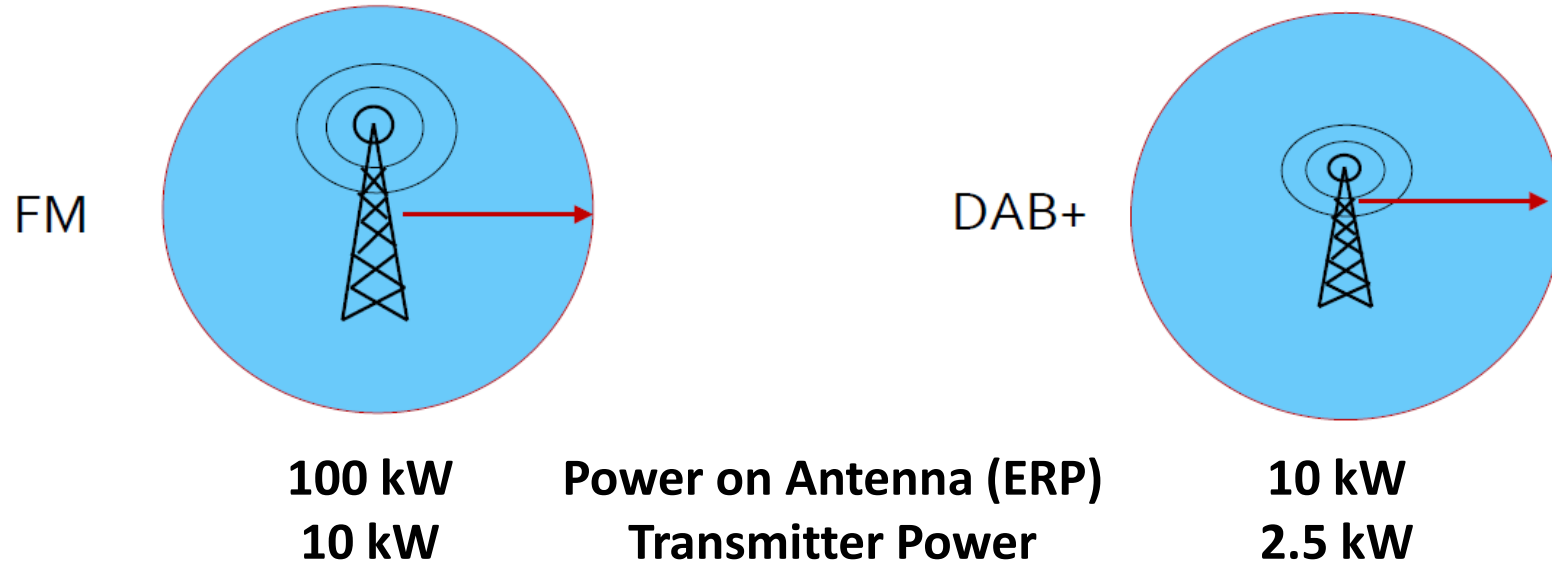
*Assumes \$0.15 USD per kWh



COMPARISON: FM VERSUS DAB+

Transmission power example: Same programs; same coverage

- 10 times less RF power in DAB+ for same coverage as FM
- Due to higher losses in Band III (Filter, RF line) the effective transmitter power of DAB+ is $\frac{1}{4}$ to FM (conservative)





THANK YOU

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