



**Harris
Broadcast**

Deliver the moment.

WHY DAB+ IS MORE GREEN & COST EFFECTIVE THAN ANALOGUE

A comparison to FM

Original Author:

Jens Stockmann, Product Marketing Manager Transmission

Presenter:

Alex Ng, Sales Support Manager APAC

ABOUT HARRIS BROADCAST

Harris Broadcast is the largest transmitter manufacturer world wide

**DTV & DAB
Transmitter
VHF, UHF**



**FM, DRM+, HD Radio
Transmitter
VHF**



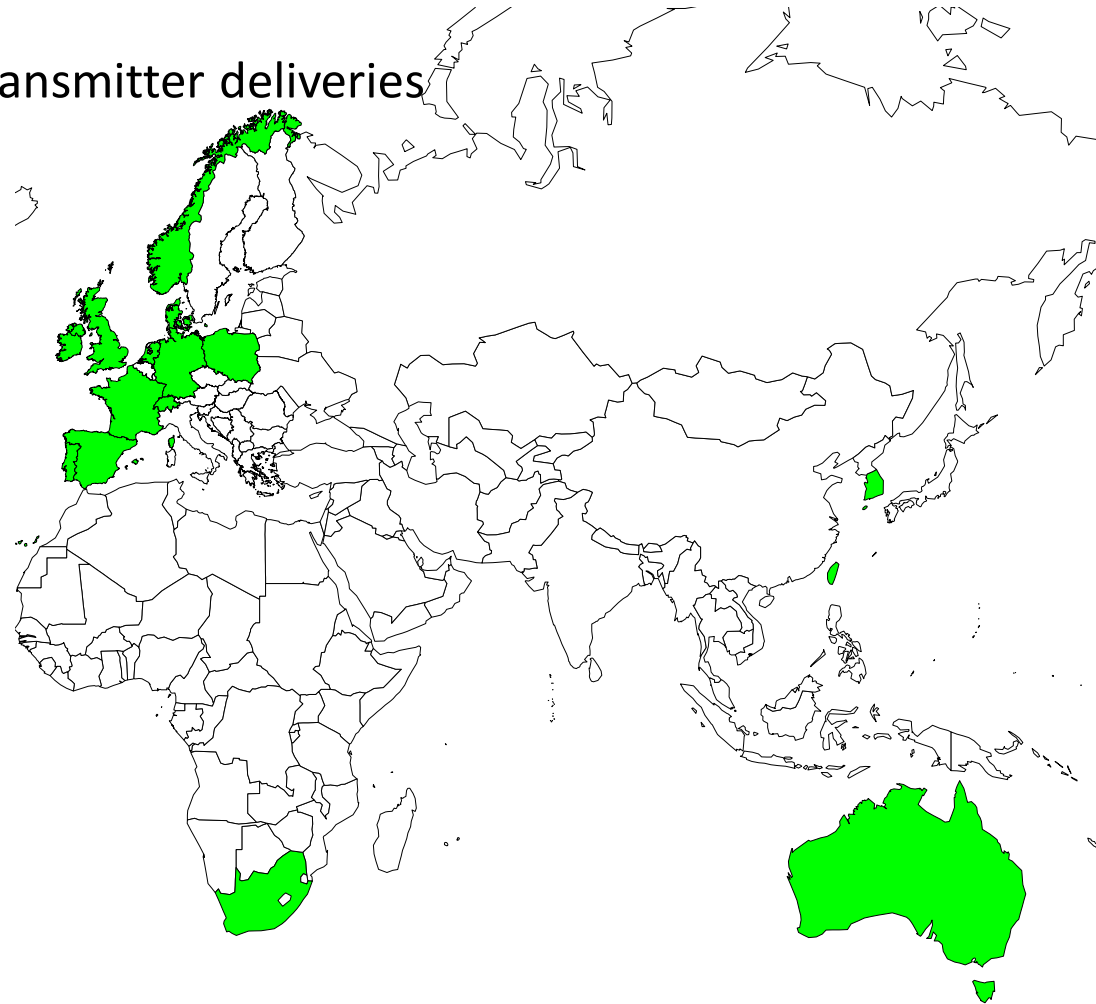
**AM, DRM, HD Radio
Transmitter
Medium Wave**



ABOUT HARRIS

Harris is Market leader in supply of Digital Radio transmitters

- More than 2.000 Harris DAB Transmitter deliveries
- Present in all Markets
- Latest big deals:
2012/13 Norway 750 Tx
2013 Netherlands 35 Tx



INTRODUCTION

Main cost factors of Radio operation

□ Equipment

Capital Expenses (CAPEX)

□ Distribution

□ Energy

□ Cooling

□ Floor space

□ Service & maintenance

□ License fee

Operational Expenses (OPEX)

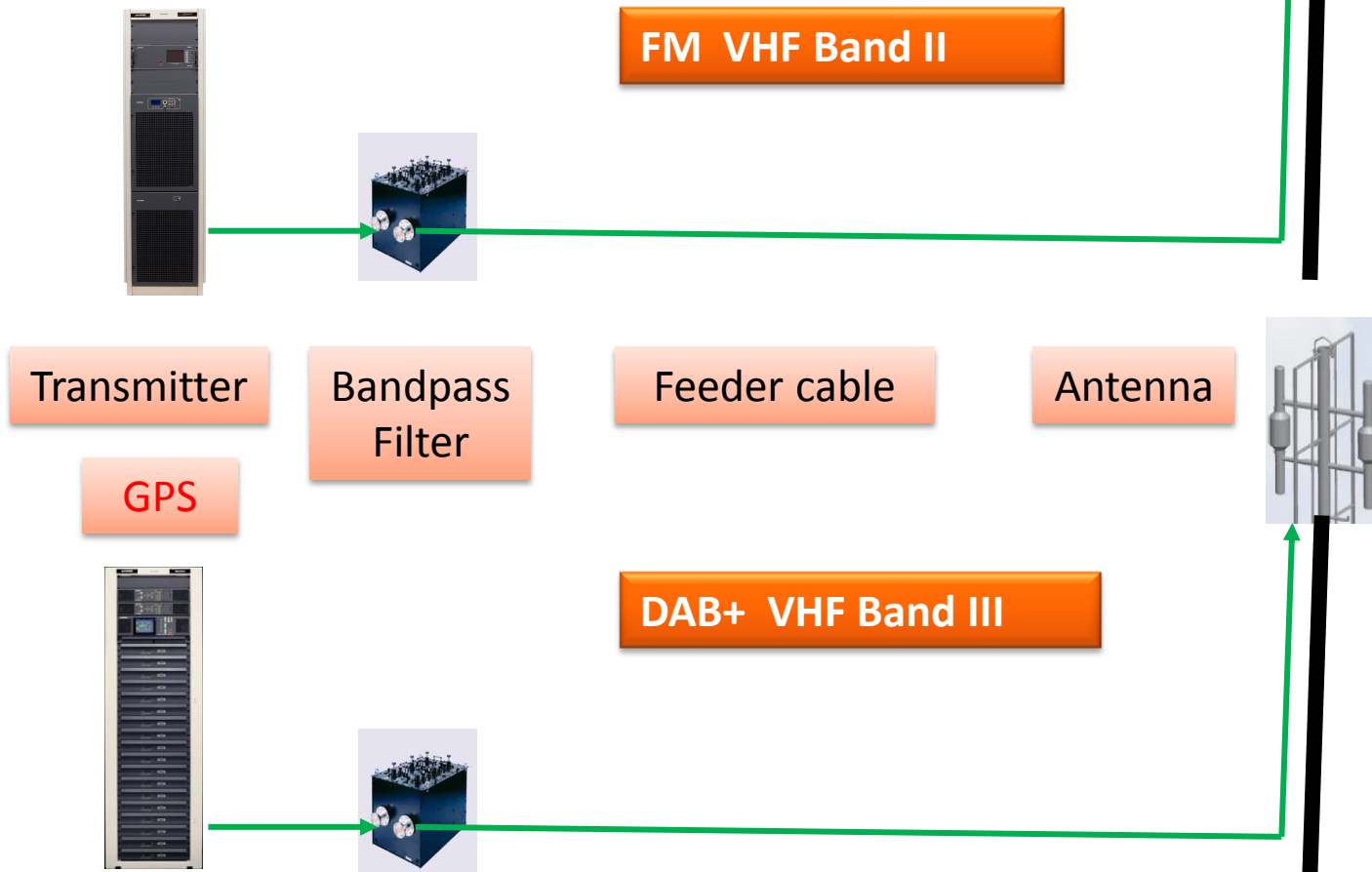
□ Simulcast period, operation of analog and digital Radio in parallel

INTRODUCTION

FM - DAB

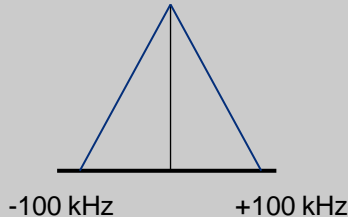
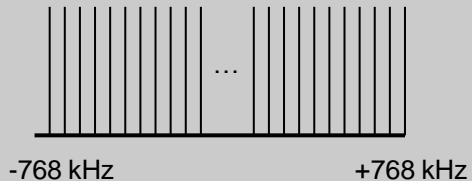
TRANSMISSION SYSTEM - DAB+ VS FM

- Same general system components in FM and DAB+
- Different frequencies & modulation standards
- GPS for SFN synchronization additional in DAB+



DIFFERENCES BETWEEN DAB+ AND FM TRANSMISSION



FM		DAB+
87,5 MHz – 108 MHz	Frequency	174 MHz – 240 MHz
Peak	Tx Power	RMS
200 kHz	Channel	1.5 MHz
1 per channel	Programs	up to 25 per channel
RDS	Data	Part of the Multiplex
Analog L/R, Composite, AES IP (Audio over IP)	Input	Digital ETI 2.048 Mbit/s EDI (ETI over IP)
Single Carrier FM 	Modulation	Multi Carrier (1536) OFDM, type DQPSK 



DAB FAMILY OF STANDARDS - NO DIFFERENCE FOR THE TRANSMITTER

DAB

6 – 12 Radio

DAB+

12 – 25 Radio

DMB

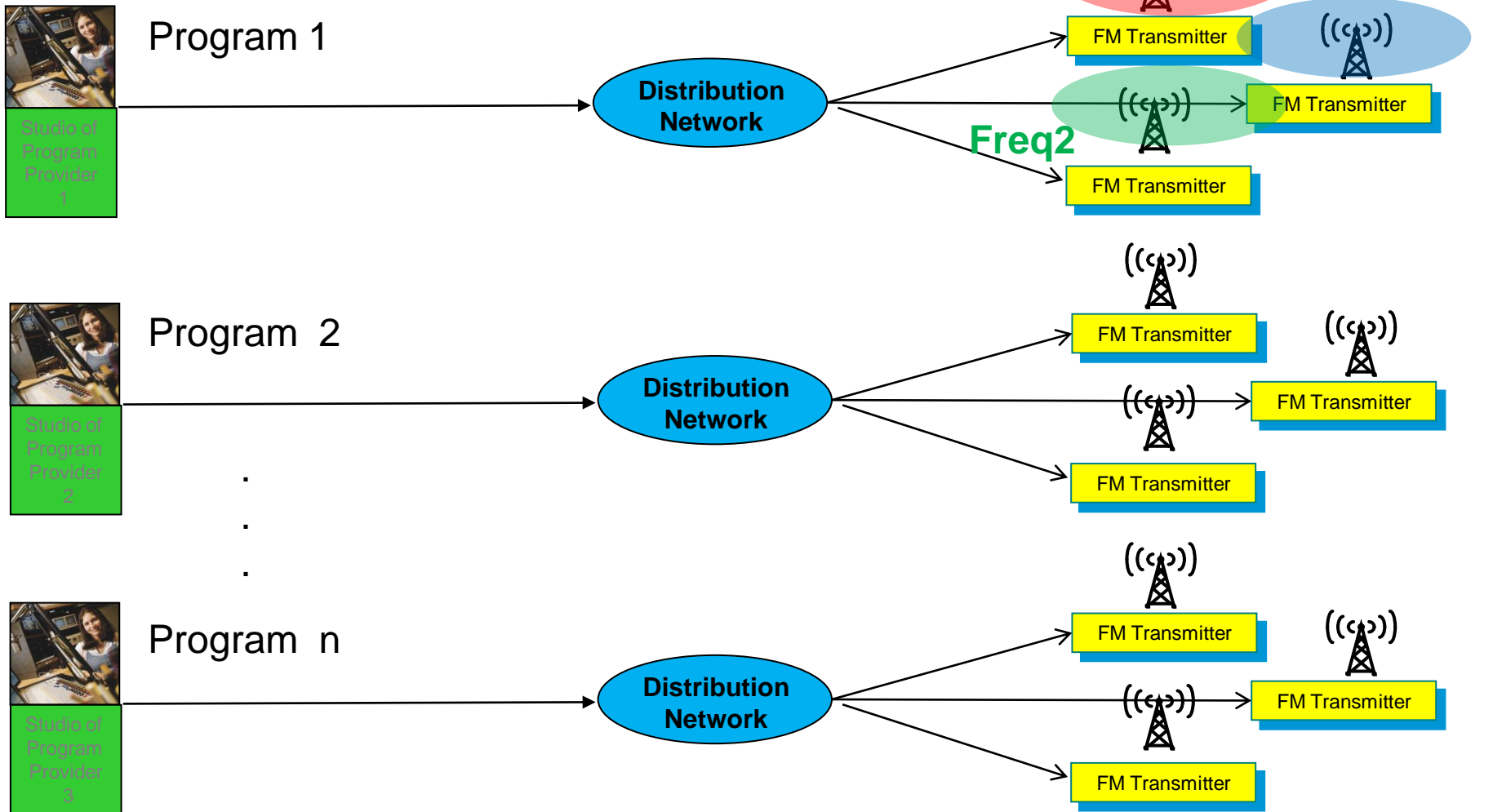
1- 3 Mobile Video + some Radio

- There is **no** difference in Hardware or Software for the transmitter !
- Each DAB transmitter can operate DAB, DAB+, DMB without changes

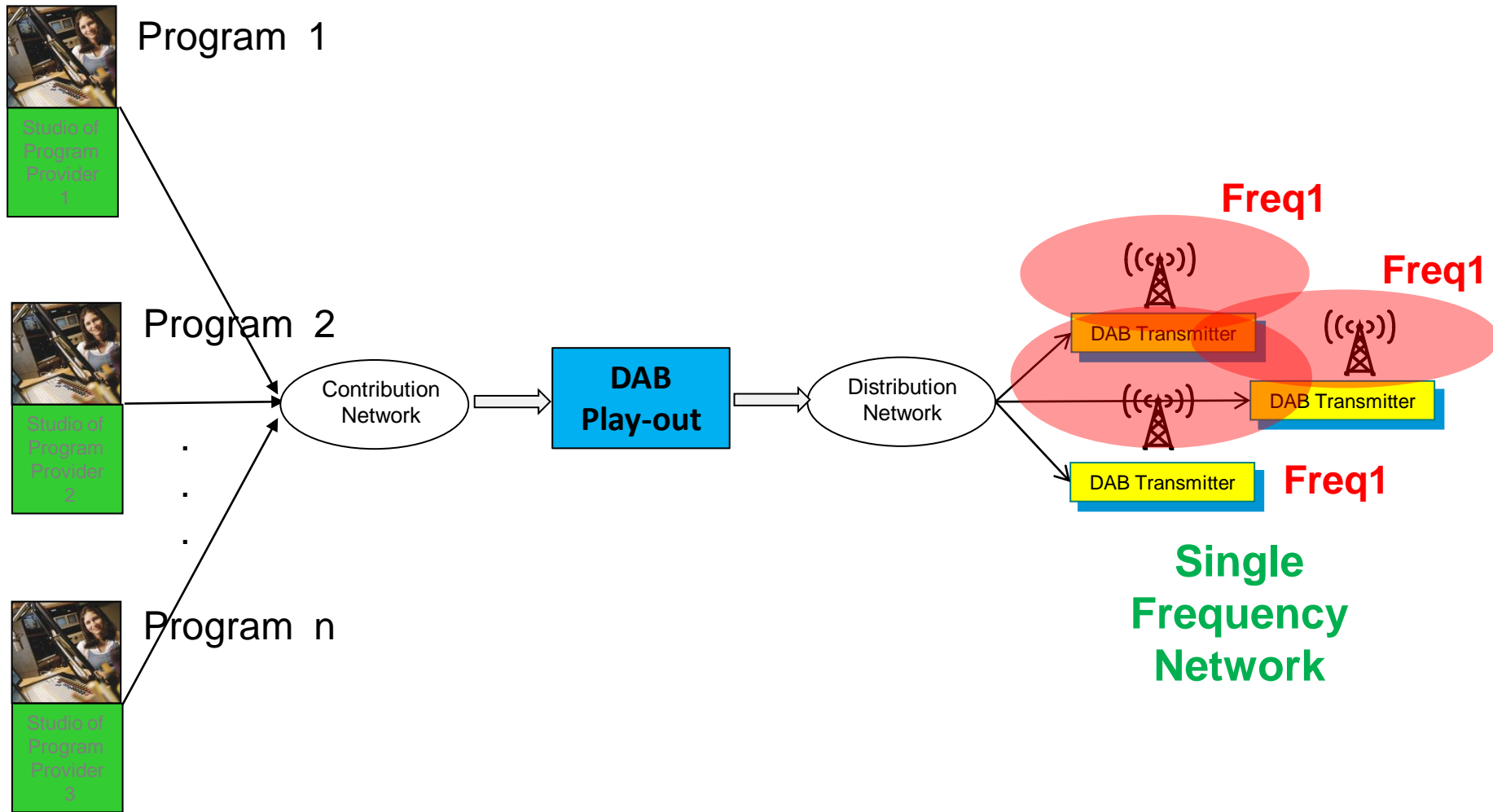
- The differences are managed by the Play-Out equipment
 - audio encoding
 - video encoding (DMB)
 - error protection

DISTRIBUTION COSTS STUDIO- TRANSMITTER

FM - ONE COMPLETE NETWORK PER PROGRAM !



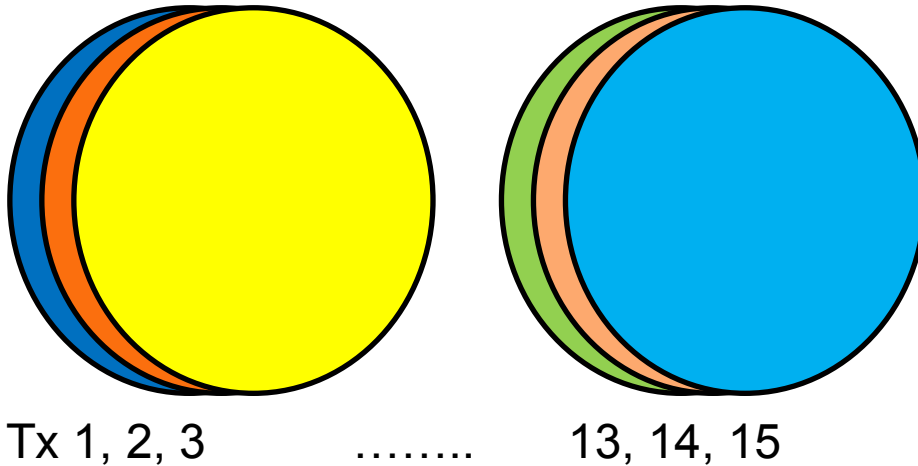
DAB+ ONE NETWORK FOR MANY RADIO PROGRAMS



COST EFFICIENCY OF DAB+ VS. FM

EXAMPLE: 15 RADIO PROGRAMS, ALL SAME COVERAGE

FM



DAB+



- 15x FM Transmitter
- 15x Frequencies
- 15x Frequency License fee
- 15x Studio-Transmitter Link (STL)
- 15x RDS encoder/ Data
- 1x Large combiner & antenna systems

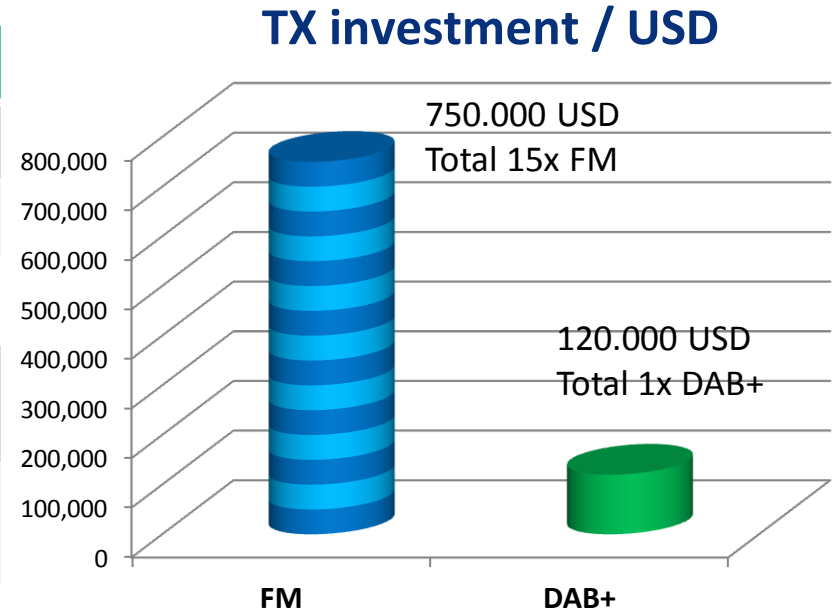
- 1x DAB+ Transmitter
- 1x Frequency
- 1x Frequency License fee
- 1x Studio-Transmitter Link (STL)
- 1x DAB+ Play-out
- 1x Antenna system, no combiner

EQUIPMENT COSTS

TRANSMITTER INVESTMENT COSTS DAB+ VS. FM

EXAMPLE: 15 RADIO PROGRAMS SAME COVERAGE

Transmitter	FM	DAB
Power	10 kW peak	2.5 kW rms
Price per unit	50,00 USD	120,000 USD
for 15 Radio programs	15 transmitter	1 transmitter
Price of 15 Transmitter	750,000 USD	120,000 USD



6x lower transmitter investment costs with DAB+ compared to FM for the example 15 Radio Programs

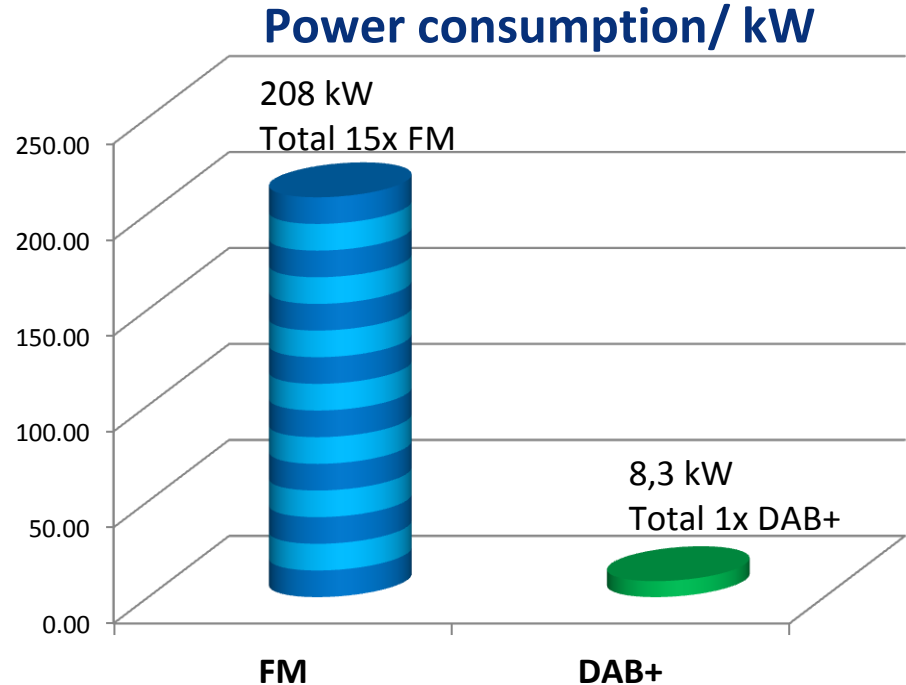
ENERGY COSTS

ENERGY CONSUMPTION TRANSMITTER DAB+ VS. FM

EXAMPLE: 15 RADIO PROGRAMS SAME COVERAGE

	FM	DAB
TX RF Power	10 kW peak	2.5 kW rms
Efficiency <i>*Harris</i>	72%	30%
Energy per transmitter	13.9 kW	8.3 kW

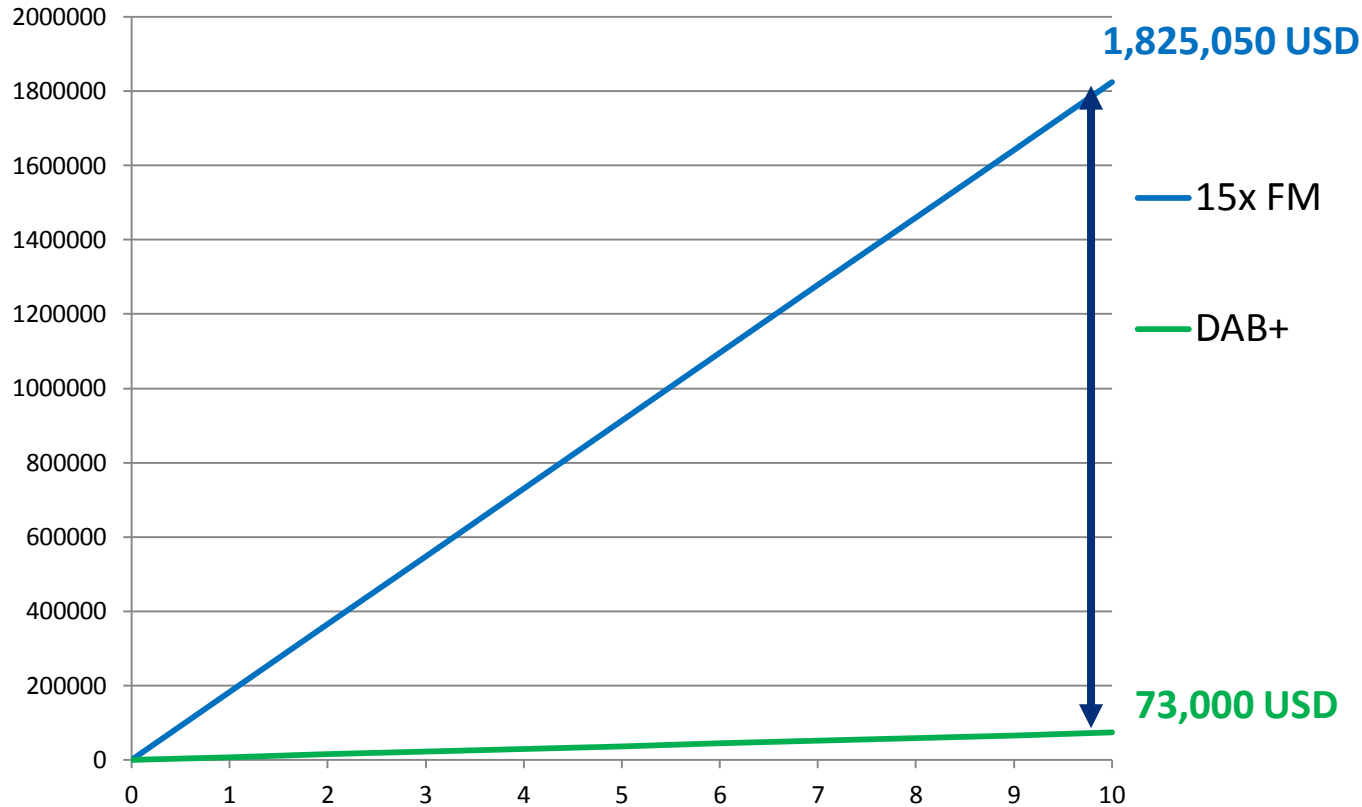
Transmitter for 15 programs	15	1
Energy for 15 Programs	208.3 kW	8.3 kW



**Drastic lower energy consumption with DAB+
25x lower in the example for 15 programs compared
to 10kW FM**

ENERGY COSTS DAB+ VS. FM

EXAMPLE: ENERGY BILL TRANSMITTER FOR 15 RADIO PROGRAMS



1.52M USD savings with DAB+ over 10 years operation

COOLING REQUIREMENTS

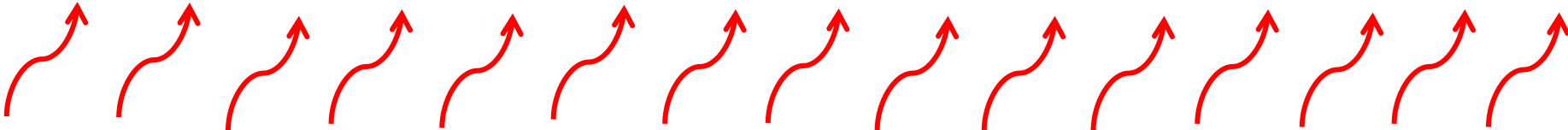
ENERGY SAVING FOR ROOM COOLING DAB+ VS. FM

EXAMPLE: 15 RADIO PROGRAMS SAME COVERAGE



1x DAB+ transmitter

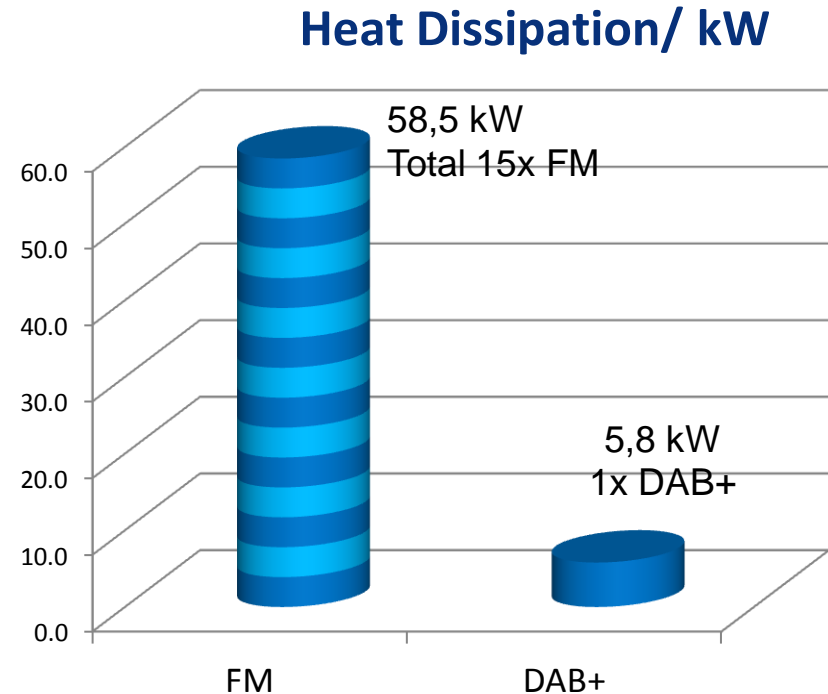
15 x FM transmitter



ENERGY SAVING FOR ROOM COOLING DAB+ VS. FM

EXAMPLE: 15 RADIO PROGRAMS SAME COVERAGE

	FM	DAB
TX RF Power	10 kW peak	2.5 kW rms
Power consumption	13.9 kW	8.3 kW
Dissipated Power	3.9 kW	5.8 kW
Transmitter for 15 programs	15	1
Dissipated Power for 15 Programs	58.5 kW	5.8 kW

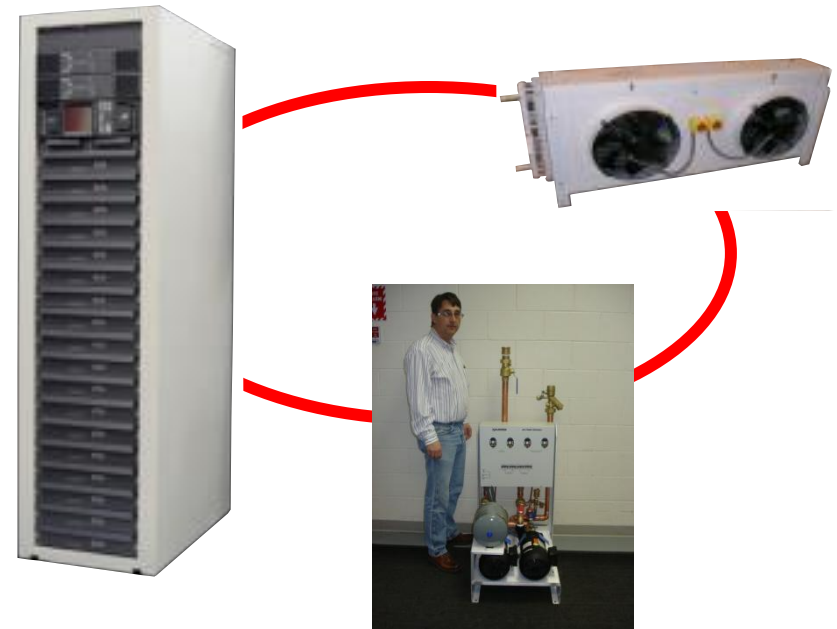


10x less heat dissipation with DAB+ compared to FM in example of 15 Radio programs !

LIQUID COOLED DAB+ TRANSMITTER FOR REDUCED COOLING EFFORT

Further savings using transmitter with liquid cooling system

- ✓ No energy bill for room air condition
- ✓ Reduced energy consumption by speed controlled pump & heat exchanger
- ✓ Silent, low acoustic noise
- ✓ Low maintenance effort
- ✓ Reduced space & installation effort



FLOOR SPACE

SPACE SAVINGS ON TRANSMISSION SITE DAB+ VS. FM

EXAMPLE: 15 RADIO PROGRAMS SAME COVERAGE

DAB = 0.6 Meter



	FM	DAB
Occupied floor space 1 program	0.6 m ²	0.6 m ²
Occupied floor space 15 programs	9.0 m ²	0.6 m ²

FM = 9 meter



15x less occupied floor space with DAB+ compared to FM in example of 15 Radio programs !

SAVE TOWER & ANTENNA SPACE WITH DAB+

Analog FM

- Many towers
- Possible Interferences

DAB+

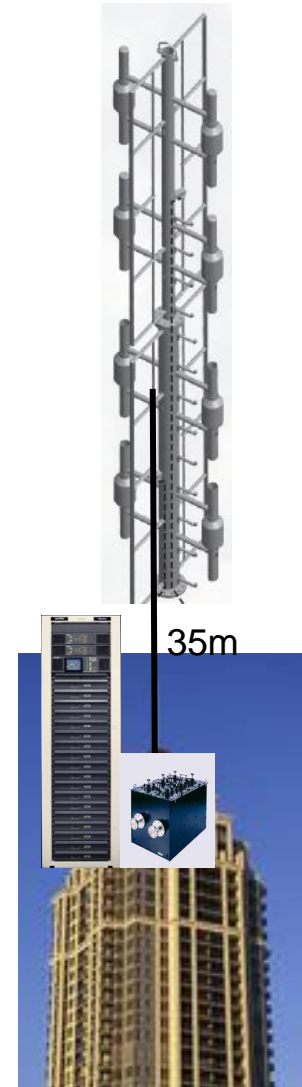
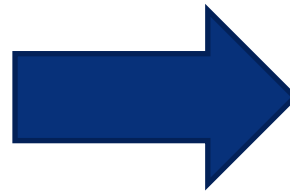
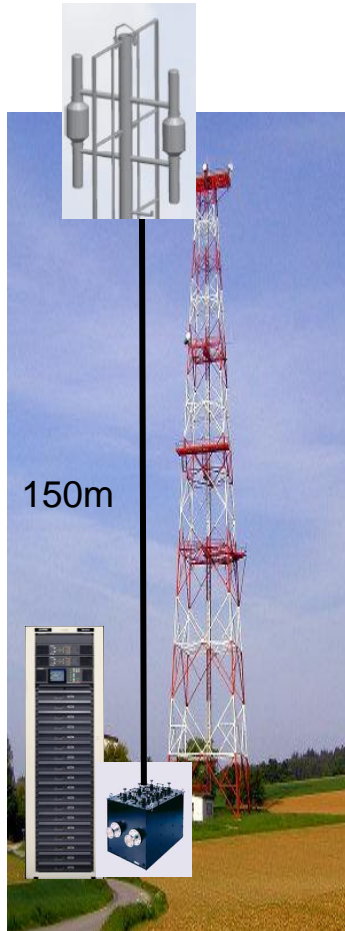
- Single Antenna
- No interferences



COST SENSITIVE DESIGN & PLANNING OF TRANSMITTER SYSTEM

High gain antenna systems (8-12 dB)

Short antenna feeder distance



SERVICE & MAINTENANCE

REDUCED SERVICE & MAINTENANCE COST DAB+ VS. FM

EXAMPLE: 15 RADIO PROGRAMS



1x DAB Transmitter



Drastic Service cost reductions using DAB+

- reduced spare part stock
- reduced part diversity
- reduced maintenance effort

15x FM Transmitter



SERVICE & REPAIR OF DAB+ TRANSMITTER

LIGHT & UNIVERSAL PARTS FOR COST EFFECTIVE REPAIR & LOGISTIC

RF Pallet

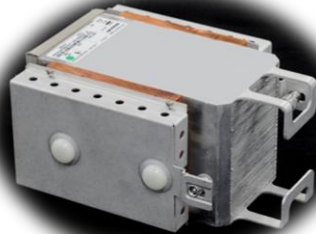
identical for
Air cooled and
Liquid cooled



500 g

Power Amplifier

Air cooled



2 kg

Power Supply

Air cooled
Liquid cooled



1 kg



250 g

- Low spare part costs
- Low shipment costs
- Low import fee
- Easy to carry and replace

SUMMARY ECONOMICAL ADVANTAGES OF DAB+

Drastic cost reductions using DAB+ compared to FM for:

1. Equipment
2. Distribution
3. Energy
4. Cooling
5. Space
6. Service & Maintenance
7. License fee



SIMULCAST PERIOD

Simulcast period most costly for program provider

- Transition period from analog to digital for Radio longer than for TV
 - Broadcaster cannot compensate all additional costs of simulcast operation by more revenue
1. Simulcast costs are critical for acceptance & motivation of broadcaster
 2. Clear road map of analog to digital transition helps to secure planning
 3. Cost compensations for broadcaster during simulcast period

Thank you for your attention!

It's time for DAB+ !

