Economic Advantages of DAB+

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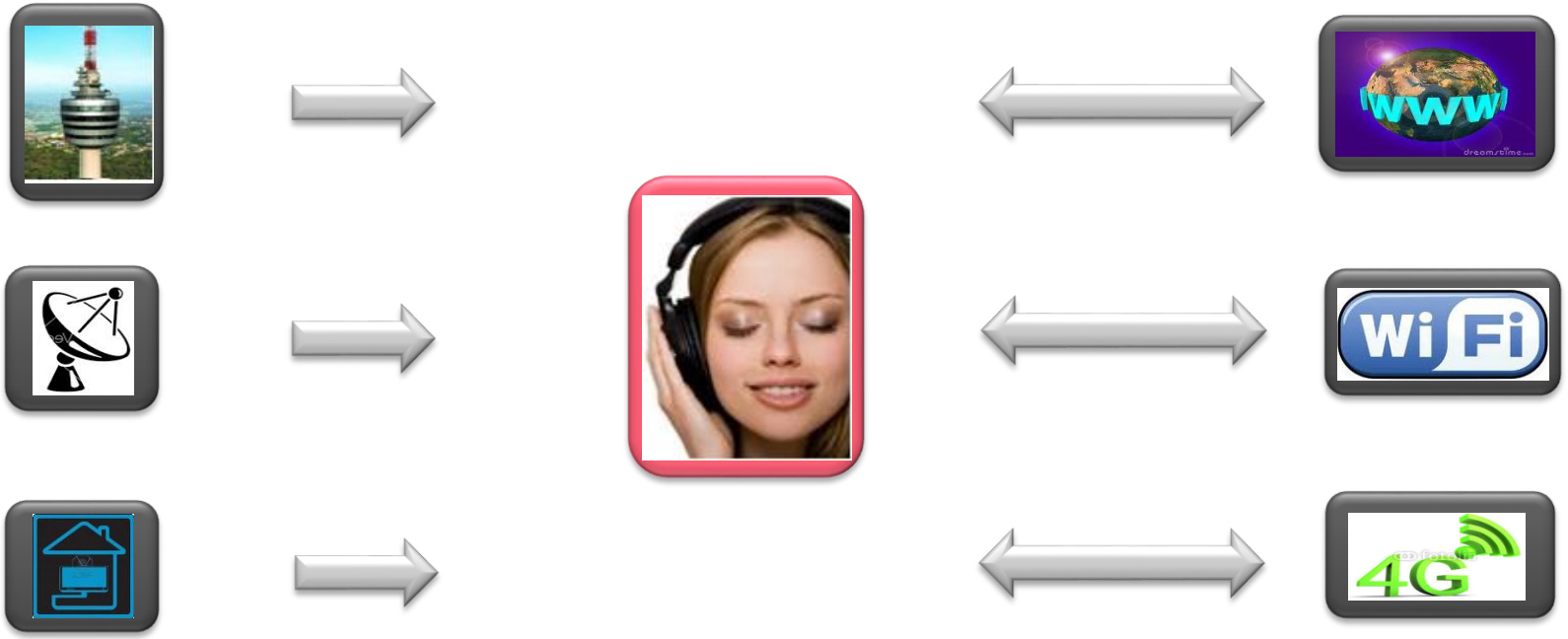
About Gatesair

- GatesAir is former Harris Broadcast
- US based company with unparalleled reliability for nearly 100 years
- provides complete over-the-air radio and television solution
- Word wide active
- Market leader in DAB+ transmitters (most installed Tx base)
- GatesAir's digital and analog turnkey solutions enable broadcasters to expertly and efficiently create, transport and transmit radio and TV content.

The Radio program provider has the choice

- Many ways to deliver Radio to Listeners
- Increasing competition for terrestrial distribution



Why to move to digital terrestrial Radio?

Save costs

for terrestrial Radio distribution

Main cost factors of terrestrial Radio operation

- Equipment — Capital Expenses (CAPEX)

- Distribution
- Energy
- Cooling
- Floor space
- Service & maintenance

} Operational Expenses (OPEX)

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

Main cost factors of terrestrial Radio operation

- More about Total Cost of Ownership

http://www.gatesair.com/solutions/total-cost-of-ownership

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Equipment costs

- Fictive assumption for the following calculation:

  18 Radio Programs high power in Bratislava

Equipment demand DAB+ vs FM

- Example: 18 Radio Programs

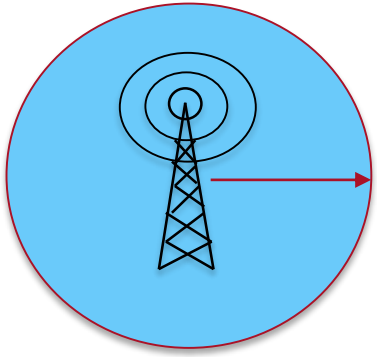
18 x FM Transmitter

1x DAB+ Transmitter

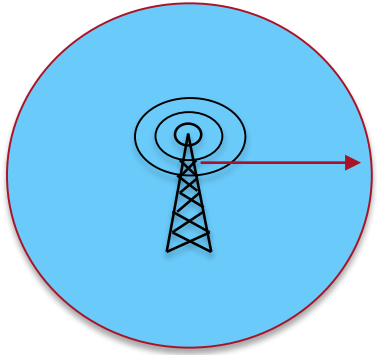
Transmission RF power DAB+ vs FM

- 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 ¼ to FM (conservative)

FM



DAB+



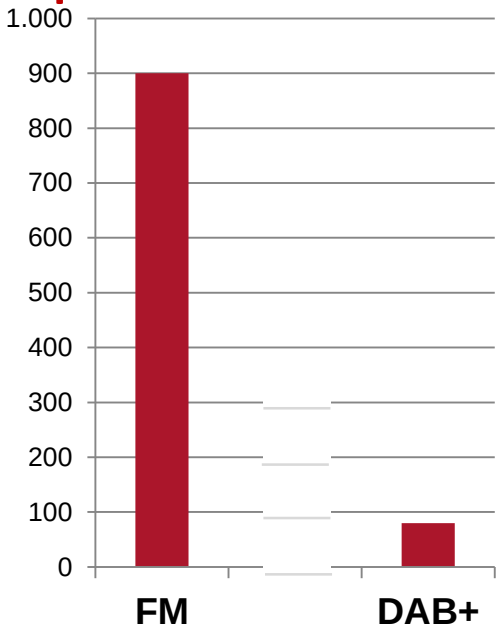
100 kW	**Power on Antenna (ERP)**	**10 kW**
10 kW	**Transmitter Power**	**2,5 kW**

Transmitter investment costs FM and DAB+

Example: 18 Radio Programs same coverage

- **DAB+ Transmitter investment costs 11x lower compared to FM**

Transmitter	FM	DAB+
Power	**10 kW peak**	**2,5 kW rms**
Price per Transmitter	**50.000 USD**	**80.000 USD**
Transmitter	**18**	**1**
Price all Transmitter	**900.000 USD**	**80.000 USD**



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Issues the industry is facing

Rising Cost of Energy

- Electricity prices increased >6 % per year between 2010 & 2014
- Actual slightly decreasing due to oil price
- Projected to continue to rise throughout the world, increasing by as much as 60% by 2030

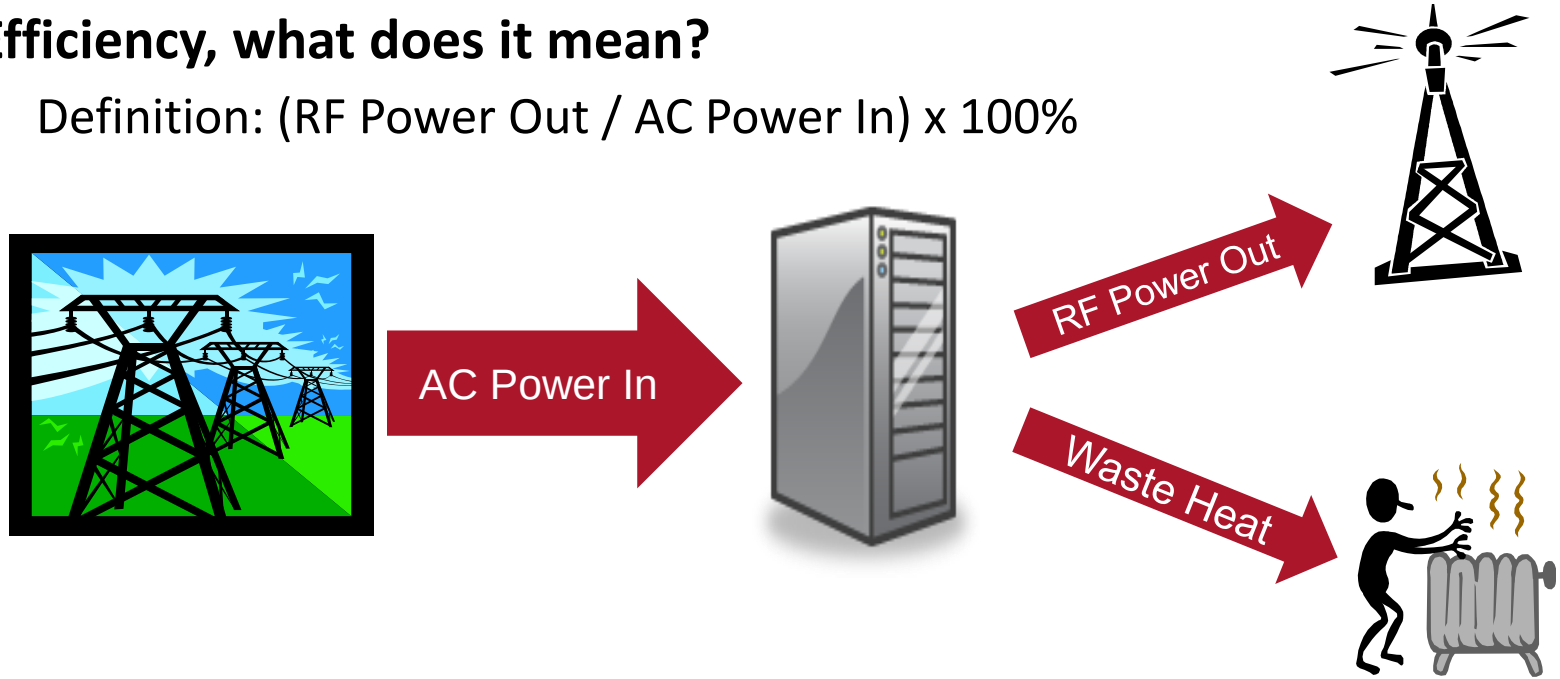
Carbon Taxes

- Some countries have imposed energy taxes based partly on carbon content
- In Australia the carbon tax in 2012 was at $23 per tonne of CO2 emissions
- Broadcast Australia **estimated the first year of the new tax cost them almost $3M**

Proprietary and confidential.

Power efficiency of a transmitter

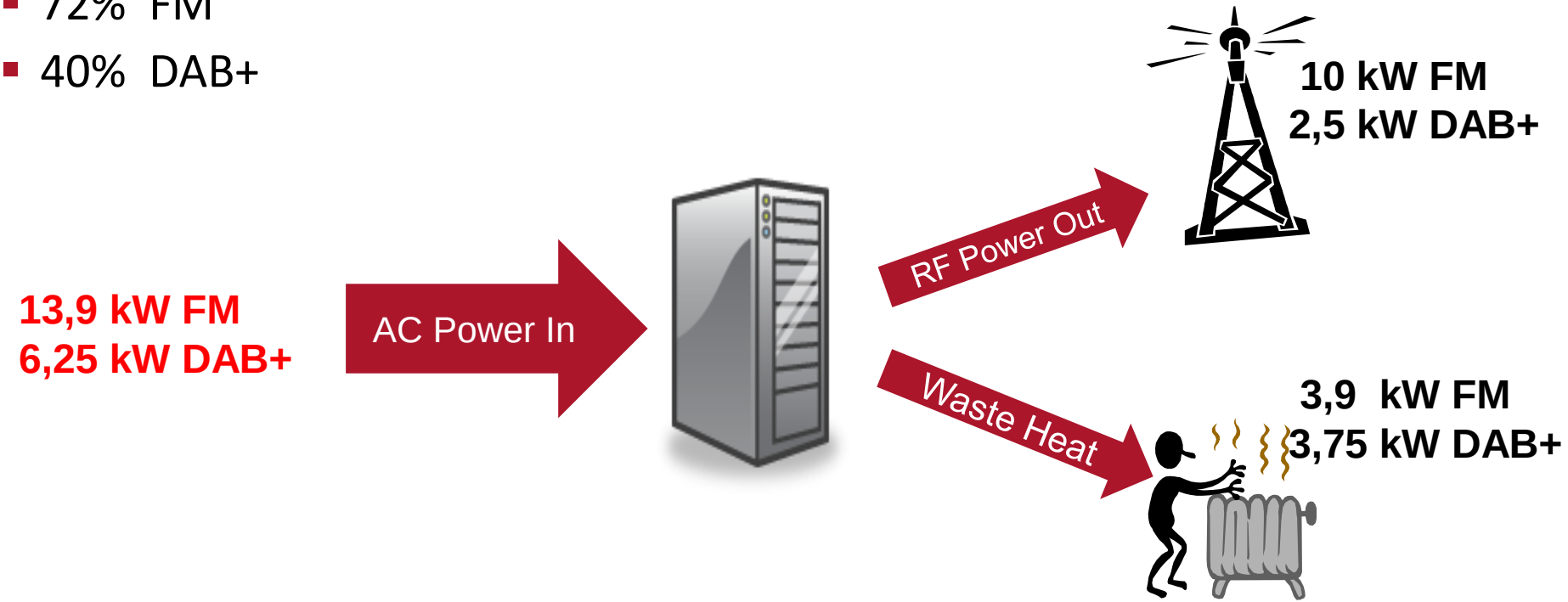
- **Efficiency, what does it mean?**
  - Definition: (RF Power Out / AC Power In) x 100%



Increased efficiency: reduces power consumed and reduces energy wasted

Transmitter power consumption

- State of the art transmitter are of high power efficient design
- 72% FM
- 40% DAB+

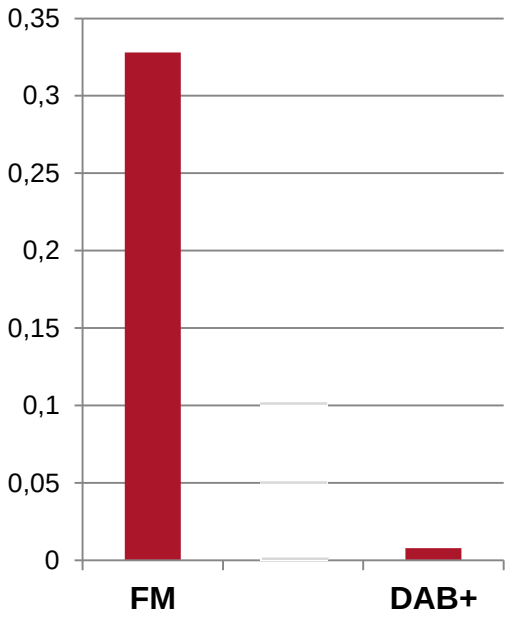


Energy consumption transmitter FM and DAB+

Example: 18 Radio Programs same coverage

- **DAB+ Transmitter energy consumption 41 times less compared to FM**

Transmitter	FM	DAB+
Power	**10 kW**	**2,5 kW rms**
Efficiency	**72%**	**40%**
Energy consumption per Transmitter	**13,9 kW**	**6,25 kW**
Transmitters	**18**	**1**
Energy all Transmitters	**250 kW**	**6,25 kW**
Annual cost of energy	**328.500 USD**	**8.000 USD**

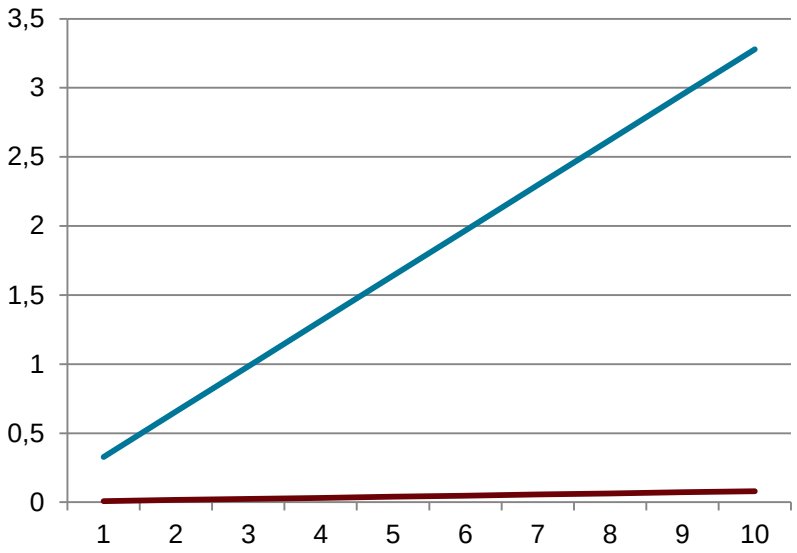


Assumes 0,15 USD per kWh

Energy costs FM and DAB+

Example: 18 Radio Programs same coverage

- **DAB+ energy savings over 10 years 3.207.000 USD compared to FM**



Assumes 0,15 USD / kWh

- Energy costs over 10 years of operation

FM

DAB+

Main cost factors of terrestrial Radio operation

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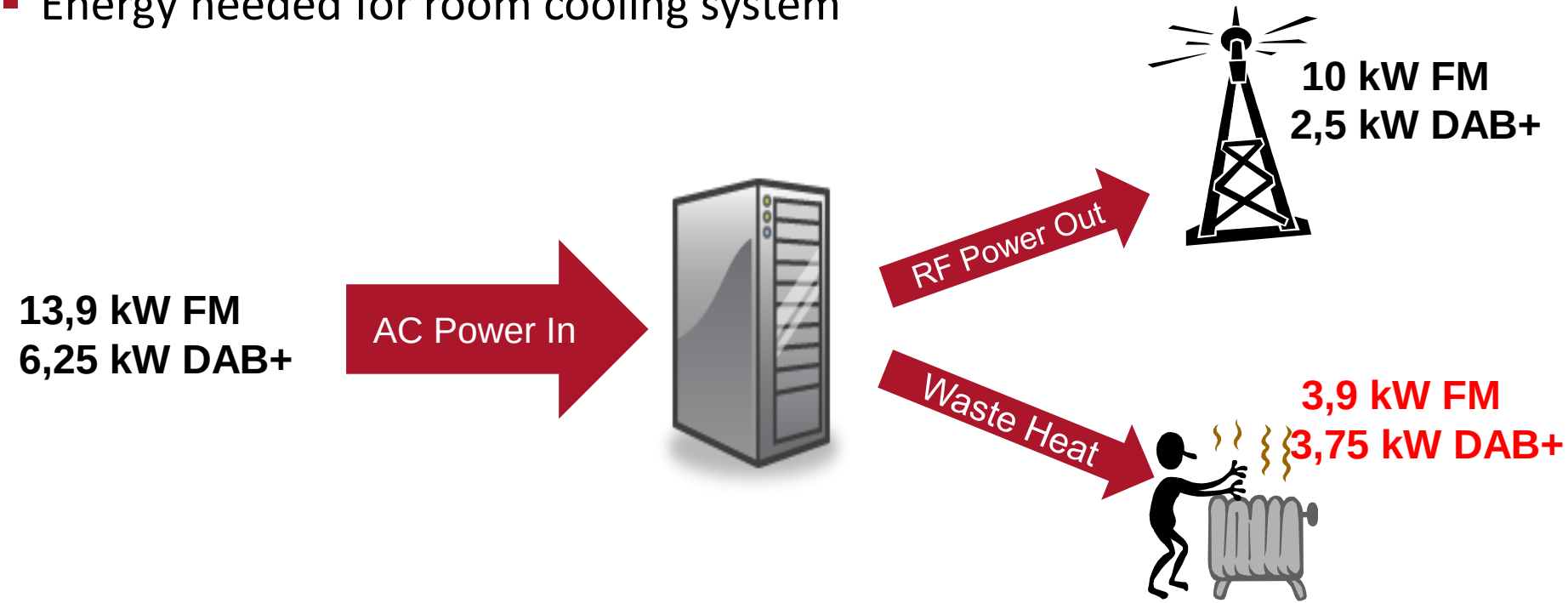
Cooling of the transmitter room

- Wasted heat of the transmitter needs to be removed from room
- Energy needed for room cooling system



Energy saving for room cooling FM and DAB+

Example: 18 Radio Programs same coverage

1x DAB+ Transmitter, 3,75 kW

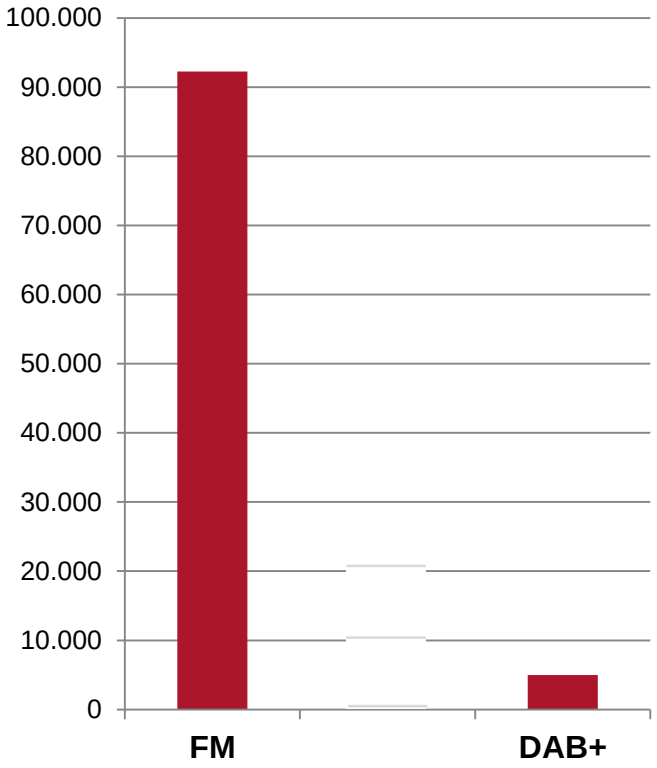
18 x FM Transmitter 70,2 kW

Energy saving for room cooling FM and DAB+

Example: 18 Radio Programs same coverage

- **DAB+ cooling effort 18 times lower than FM**

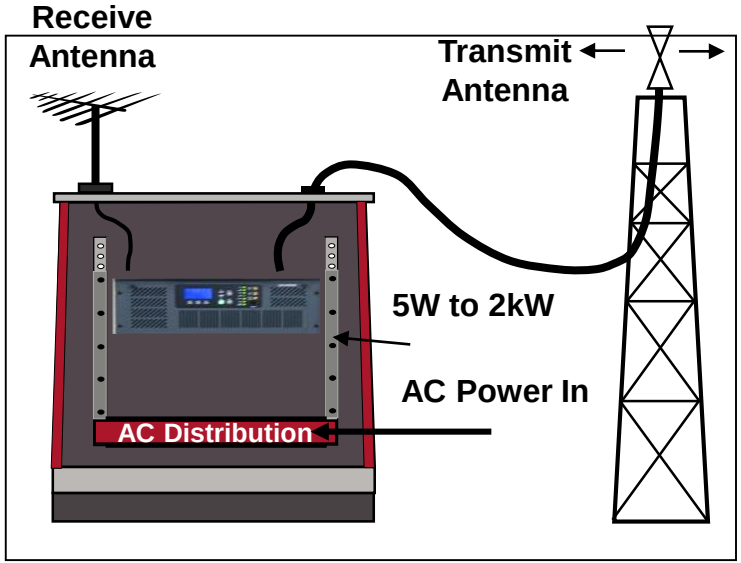
Transmitter	FM	DAB+
Power	**10 kW**	**2,5 kW rms**
Power consumption (rms)	**13,9 kW**	**6,25 kW**
Dissipated Power	**3,9 kW**	**3,75 kW**
Transmitter for 18 Radio programs	**18**	**1**
Dissipated power for 18 programs	**70,2 kW**	**3,75 kW**
Cost per annum	**92.250 USD**	**5.000 USD**



Power Saving cooling installations – air cooled

- Ducted Air racks
- Evacuate the heat from the building
- Reduces Cooling costs

- Outdoor shelter
- Reduces site costs
- Fast deployment

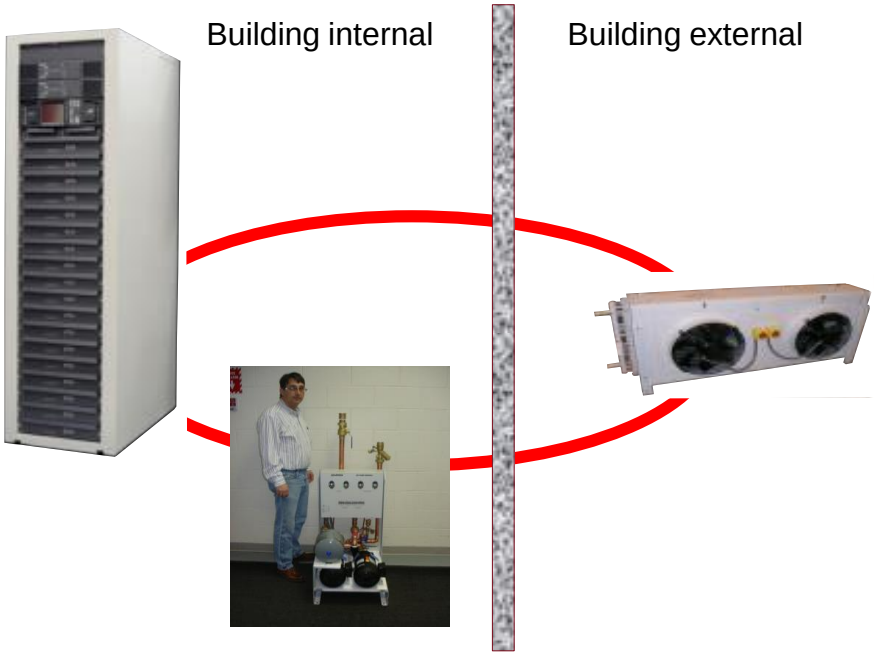


- Both solutions reduce operating costs

Power saving cooling installations - Liquid cooled

Further savings using transmitter with liquid cooling system

- Drastic reduced building cooling costs
- Directly evacuate heat out side of the building
- Reduced space & installation effort
- Variable speed fans and pumps
- to reduce power consumption
- Flexible hose for easy installation
- Redundant system can support multiple transmitters
- Silent, low acoustic noise
- Low maintenance effort



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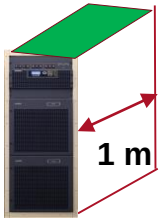
Space savings on transmission site FM and DAB+

Example: 18 Radio Programs same coverage

- In not owned stations the operator need to pay for occupied floor space



0,6 m²

1x DAB+ Transmitter

18 x FM Transmitter

Save tower & antenna space with DAB+

Analoge FM

- Many towers
- Interferences

DAB+

- Single Antenna
- No interference

Cost of space

- Typical cost of floor space in transmitter hall and antenna aperture on the transmission tower can vary significantly :
  - When the facilities are owned by the broadcaster there will always be some component cost to maintain the facility
  - The location of the facility will impact the cost, facilities for major cities often cost significantly more than for rural facilities
  - The amount of space required, particular the antenna aperture

- The costs below are typical costs for a single installation for both antenna aperture and transmitter hall space:
  - $5k pa if the antenna, transmission tower and building is owned by the broadcaster (contribution to site maintenance and on-costs)
  - $35k USD pa for low cost sites in regional areas
  - $75k USD pa for high cost sites in major cities

The Cost of Space

- Cost comparison for antenna on the transmission tower and transmitter hall space
- **The cost of DAB+ transmitter tower and hall space is 18x lower compared to FM**

Transmitter	**FM**			**DAB+**		
Situation	Owned	Regional site	Metro site	Owned	Regional site	Metro site
Cost per annum ,000s USD	5	35	75	5	35	75
Number of transmitters	18	18	18	1	1	1
Cost per annum ,000 USD	**90**	**630**	**1,350**	**5**	**35**	**75**

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Service & Maintenance

There are a number of options for operations and maintenance including

- Broadcaster provides internal staff to conduct the work, often the case for commercial broadcasters
- A managed service is used, often the case for multiplexes which have multiple broadcasters, e.g. DAB+
- A mixture where the operations aspects are conducted by the broadcaster but maintenance is done by a contract organization, this occurs in large metro transmission sites as well as remote sites

Reduced Service & Maintenance Cost FM and DAB+

1x DAB+ Transmitter

Drastic Service cost reductions using DAB+

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

18 x FM Transmitter

Reduced Service & Maintenance Cost FM and DAB+

Example: 18 Radio Programs same coverage

- **The cost of DAB+ maintenance is 1/2 of FM**

Transmitter	**FM**			**DAB+**		
Situation	Owned	Regional site	Metro site	Owned	Regional site	Metro site
Weeks of effort per annum	2			12		
Cost per annum ,000s USD	5	5	5	50	50	50
Number of transmitters	18			1		
Cost per annum ,000 USD	**90**	**90**	**90**	**50**	**50**	**50**

Summary

Summary economical advantages of DAB+

- The Opex cost of FM in metro cities is dominated by the cost of space on the transmission tower and in the transmitter hall. Regional sites are also highly influenced by the cost of space. In contrast, as DAB+ only requires a single shared site which carries 18 programs the cost of space is much less.
- The cost of energy, cooling and maintenance are less for DAB+ in all situations
- The approximate Opex cost **SAVINGS** of operating 18 services over a 10 year period using DAB+ are:

OPEX Savings	DAB+ vs. FM
Metro site	15.000.000 USD
Regional site	8.000.000 USD
Owned site	3.000.000 USD

Simulcast period

Simulcast period most costly for program provider

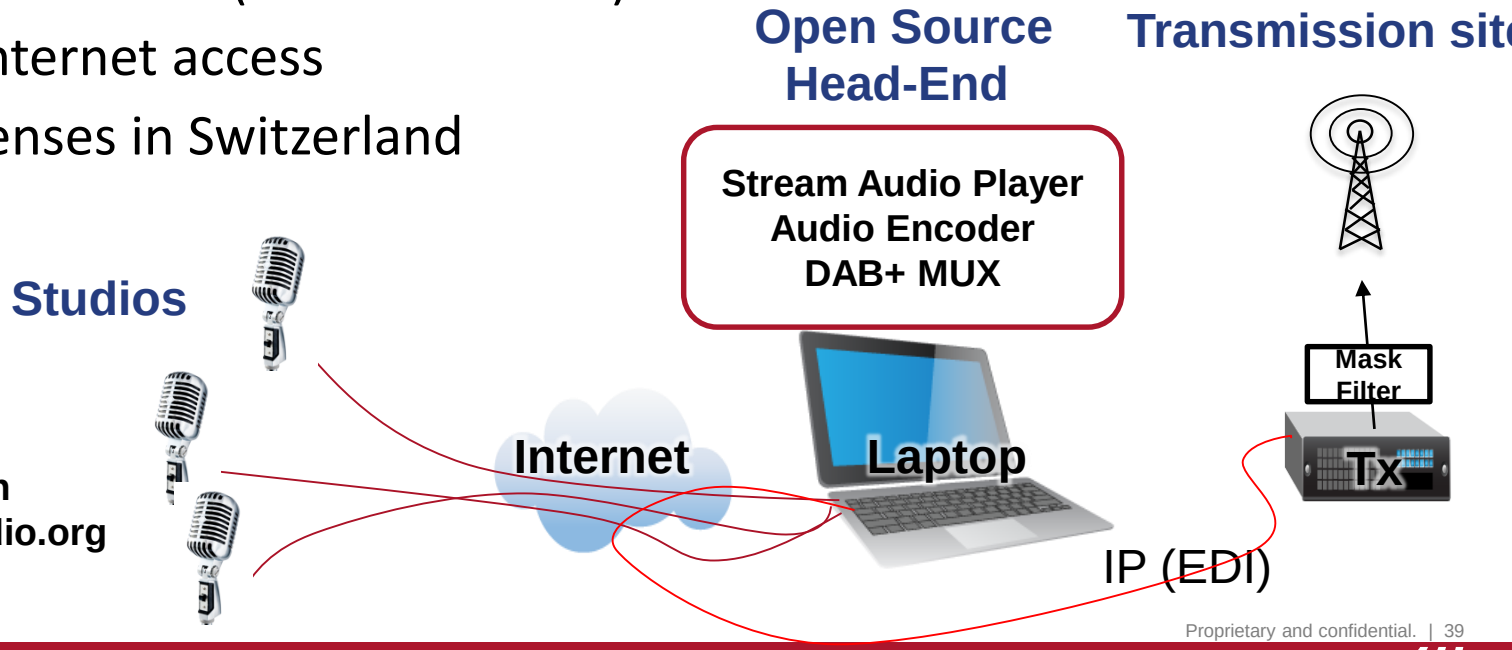
- Transition period from analog to digital for Radio is longer than for TV
- Additional costs of transmission during the simulcast period will be approximately 10% -20% more relative to FM operation for each program provider.
- Broadcaster may not be able to compensate all additional costs of simulcast 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

DAB+ for local Broadcaster

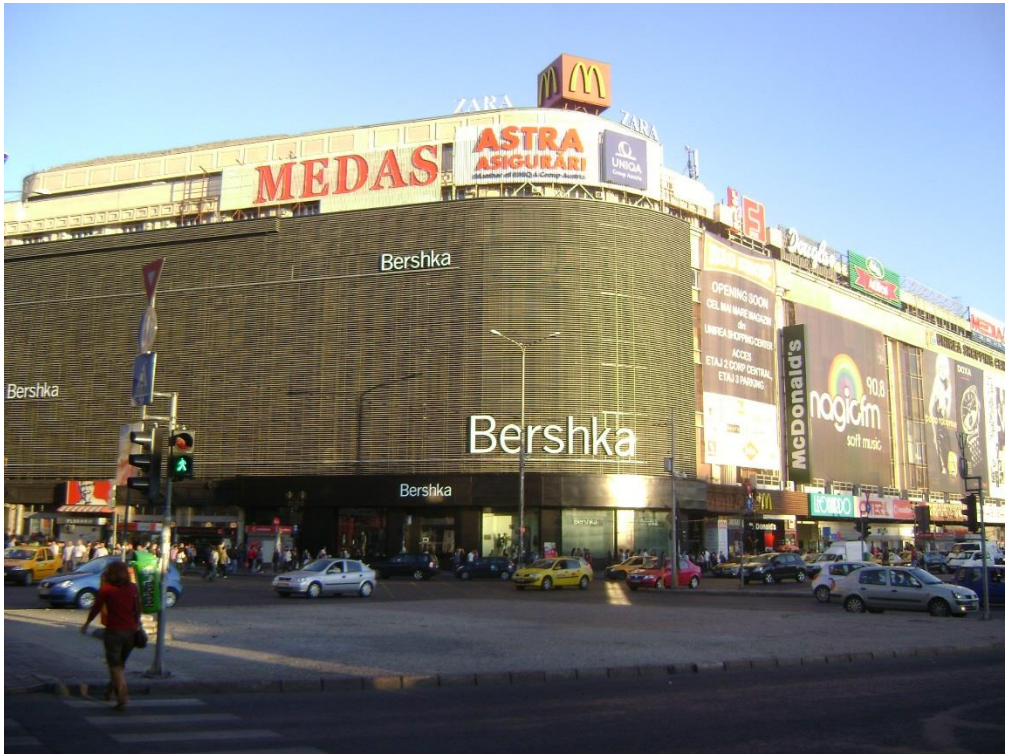
Cost effective Soft Defined DAB+ solution based on Open Code Software

- Standard PC for DAB Head-End (Audio live encoding, Multiplexing)
- Open source software (CRC mmb tools)
- Broadband internet access
- First local licenses in Switzerland



Contact:
coinchon@ebu.
More information on
www.opendigitalradio.org
wiki.digris.ch
mmbtools.crc.ca

How to serve DAB+ Receiver in retailer stores?



- Get a DAB+ signal inside the shopping centers is essential for promotion of new features of DAB+ receiver

DAB+ Promotion Set for Retailer Markets

- On Initiative of Digital Radio Germany
- Cost effective repeater system for indoor coverage of Media Markets
- Special designed for DAB+ retailer promotions
- Used in >100 Centers in Germany

Reception Antenna

Selective Amplifier

Transmission Antenna

Contact:
Michael Richter
Richter@digitalerrundfunk.de

Thank you for your attention!