

Economics of delivering radio via DAB+ vs FM vs IP

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- In analogue broadcast systems of the past, power consumption was rarely considered key to the choice of technology or vendor
 - neither from the perspective of overall, end-to-end efficiency, nor for any single component of the broadcasting chain
- Skyrocketing energy prices impact the economic balance
- Many broadcasters find they are in the top energy consumers in a country and face possible “carbon taxes” in the future
- Sharing infrastructure become more desirable
- Green becomes more than a statement in social responsibility - it impacts the bottom line



- Digitisation brought significant power advantages by enabling far higher channel density over similar spectrum/transmitters
- DAB/DAB+ digital terrestrial transmission standard, offers robust modulation scheme enabling reliable delivery of multiple programs
- DAB/DAB+ transmitter consumes approximately 35% less power than an analogue transmitter for the same coverage area
- Power consumption drops
 - Up to 28 analogue transmitters can be replaced with one DAB+ system; with a single transmitter, you can now encompass the same coverage area with 28 digital audio programs
- Infrastructure requirements are reduced



- Broadcasting
 - Intrinsic Point to Multipoint
 - Broadcaster assumes most of the cost (transmitter and energy)
 - Consumer doesn't incur in recurring expenses (receiver cost)
 - Robust system for emergency communications
- Webcasting
 - Multiple Point to Point
 - Cost shared between Broadcaster and Consumer (internet access)
 - Consumer has recurring costs related to internet access (fixed and mobile)
 - Lot of points of failure in case of emergency (power, internet and cellular access)



Typical Scenario Costs



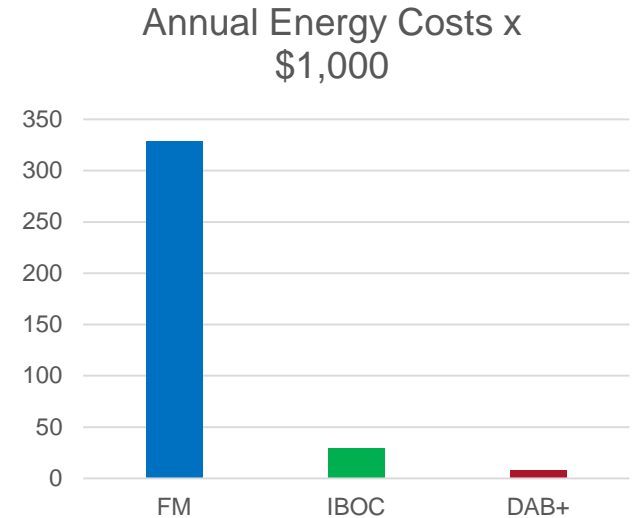
Capex	Analog FM	DAB+	DRM+
Main system components			
Antenna	\$27,579	\$18,725	\$27,579
Feeder	\$5,650	\$5,650	\$5,650
Mask Filter & cable	\$0	\$10,087	\$10,087
Transmitter inc Exciter	\$53,500	\$70,000	\$48,137
Head End - Mux / Enc etc	\$0	\$76,235	\$19,682
Total - Main	\$86,729	\$180,697	\$111,135
Ancillary equipment and services			
Racks	\$0	\$1,445	\$3,200
Power Conditioning	\$4,000	\$3,000	\$3,000
Monitoring	\$4,000	\$16,000	\$8,000
Transmitter Installation	\$15,151	\$15,152	\$15,153
Antenna & Other Instal Costs	\$17,250	\$17,250	\$17,250
Total - Ancillary	\$40,401	\$52,847	\$46,603
Total Costs	\$127,130	\$233,544	\$157,738
Number of Services	1	18	2
Cost per service	\$127,130	\$12,975	\$78,869
Ratio to DAB+	9.8		6.1



Cost efficiency of FM vs. IBOC and DAB+

Example: 18 Radio Programs same coverage

Transmitter	FM	IBOC – HDR/DRM/CDR	DAB+
Power	10 kW	2.5 kW	2.5 kW
Efficiency	72%	50%	40%
Energy consumption Per TX	13.9 kW	5 kW	6.25 kW
Transmitters	18	4.5	1
Energy all Transmitters	250 kW	22.5 kW	6,25 kW
Annual cost of energy	\$328,500	\$29,565	8.000 USD



Assumes 0,15 USD per kWh



PowerSmart® – Green Technology

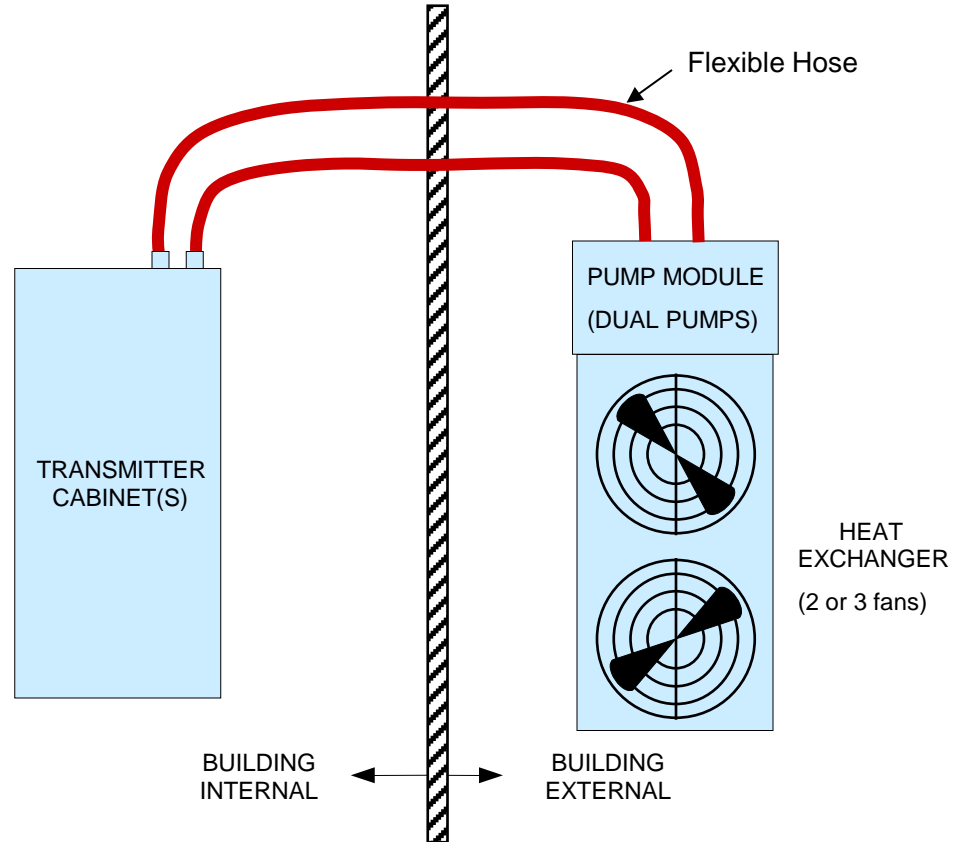


- First available 50 Volt LDMOS Power Devices
- Best in Class Power Density
- Higher Efficiency up to ~66% improvement
- Lower Power Consumption
- Less Complexity - Higher reliability
- Smaller and lighter for ease of handling
- Field serviceable design with sub-assembly repair
- RoHS & CE compliant
- All digital **Real Time Adaptive Correction (RTAC)**
- Incorporates new XTE multimedia exciter
- Easy software upgradeability to new standards as they become available



Liquid Cooling Solutions

- Directly evacuate heat out side of the building
- Drastically reduced building cooling costs
- Variable speed fans and pumps to reduce power consumption
- Closed-loop system
- Flexible hose for easy install
- Redundant systems can support multiple transmitters

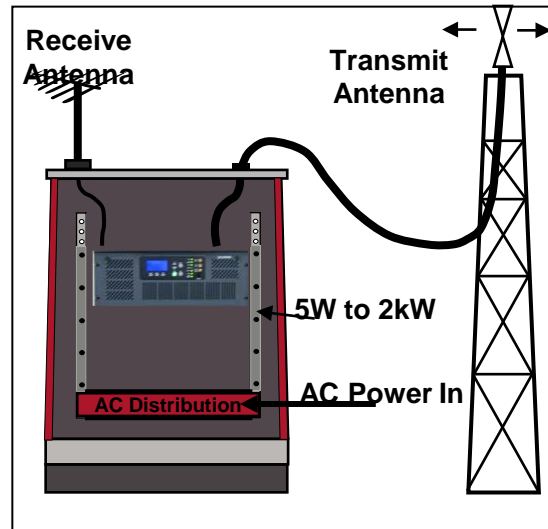



Power Savings installations

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

- Outdoor shelter
- Reduces site costs
- Fast deployment

- Both solutions reduce operating costs



- Economic factors impact technology selection
- DAB/DAB+ standard enables green operation and new revenue opportunities
- Multiple Channel per transmitter drives lower cost per channel
- Key technologies deliver superior green footprint
 - **PowerSmart**  DAB/DAB+ transmitters
- Additional savings are realized from facility space, cooling, construction and maintenance costs
- Unicast wireless data does not scale
- Digital Radio is a cost effective mobile content delivery platform

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Thank you !

DAB+: Efficient Content Delivery

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