



**Harris
Broadcast**

Deliver the moment.

DAB+: EFFICIENT CONTENT DELIVERY

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June 2013

EVOLVING ECONOMY

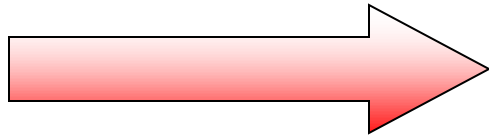
- In analogue broadcast systems of the past, power consumption was rarely considered key to the choice of technology or vendor
 - neither from the perspective of overall, end-to-end efficiency, nor for any single component of the broadcasting chain
- Skyrocketing energy prices impact the economic balance
- 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

TRANSMISSION OVERVIEW

- 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

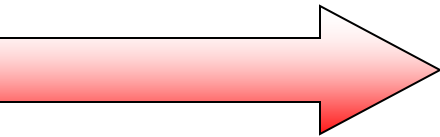
SHIFTING PARADIGM

Analog Radio



One program stream to one transmitter

Digital Radio



Many program streams to one transmitter

Drives increase in content management needs – processors, automation, data management, STL links, monitor & control

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

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 Apex M2X multimedia exciter
- Easy software upgradeability to new standards as they become available

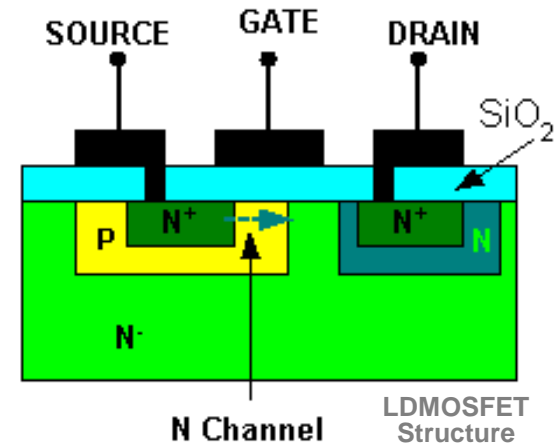


ADVANCE IN DEVICE TECHNOLOGY

Laterally Diffused Metal–Oxide–Semiconductor Field-Effect Transistor (LDMOS-FET)

LDMOS-FETs have significant advantages over VMOS-FETs for RF amplifiers:

- Higher current handling
- Higher breakdown voltage
- Increased power density (2 x VMOS)
- Increased maximum power output
- Improved linearity
- Higher gain (~20dB) (less drive required)
- Improved efficiency
- Lower thermal resistance
- Increased ruggedness – Can tolerate extreme VSWR reflections of up to 65:1 pulsed at full rated power, at all phase angles

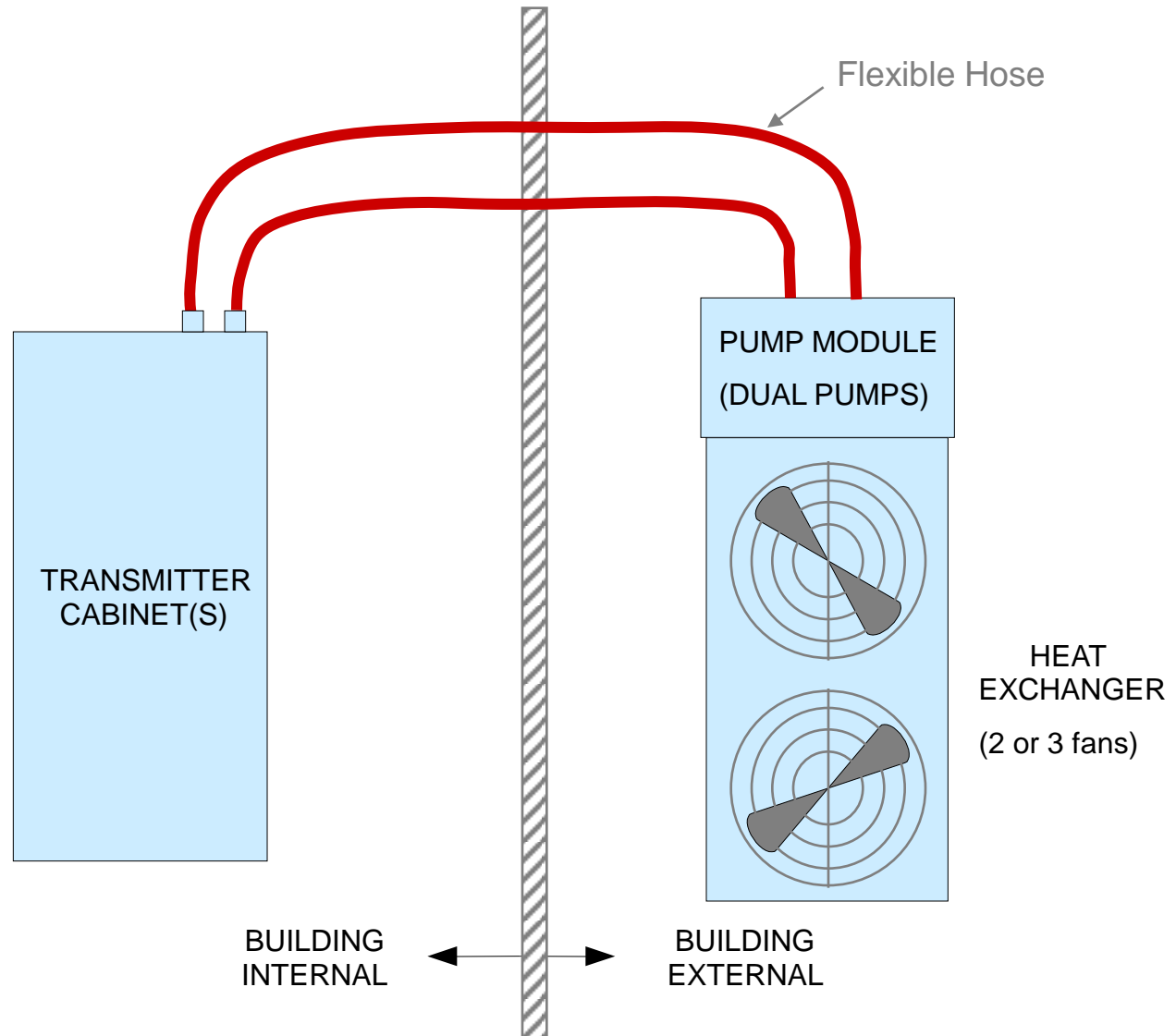


The LDMOS-FET is an asymmetric MOSFET designed for low on-resistance, higher blocking voltage and current handling capability than their VMOS counterpart.

Combined with a short channel length superior thermal performance and high breakdown voltage, these characteristics make them very attractive for high power RF amplifiers in many applications.

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

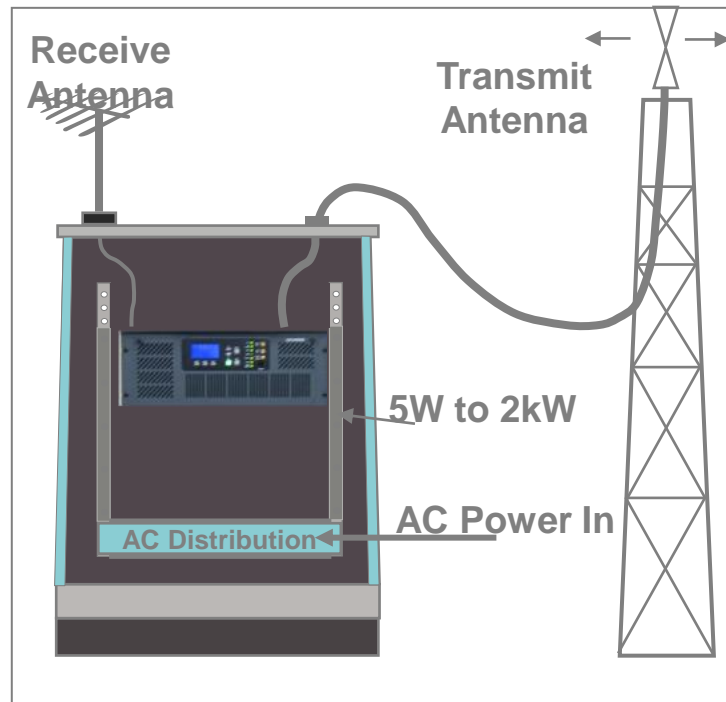


POWER SAVINGS INSTALLATIONS


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

- Outdoor shelter
- Reduces site costs
- Fast deployment

- Both solutions reduce operating costs



SUMMARY

- 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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