• 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
• Multiple different radio stations transmit on the same frequency
• Various different radio stations use the same transmitter
• Multiple different radio stations share the cost of the single transmission
• Most cost-effective method to deliver content
An Ensemble will typically carry multiple services from multiple radio networks, for example:

<table>
<thead>
<tr>
<th>Stations (services)</th>
<th>Capacity used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio network 1</td>
<td>2</td>
</tr>
<tr>
<td>Radio network 2</td>
<td>4</td>
</tr>
<tr>
<td>Radio network 3</td>
<td>3</td>
</tr>
<tr>
<td>Radio network 4</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total 18 stations</strong></td>
<td><strong>1152kbps</strong></td>
</tr>
</tbody>
</table>

- Each network can have their own allocated capacity on the ensemble
  - No other network has access to that capacity

- Each network can **reconfigure** their allocated capacity anytime without impacting the other networks’ services
  - **Pop-up services** change their name and sometimes bit rate regularly
**DAB+ AUDIO ENCODING**

**HE AAC+ V2 audio encoding table combinations**

<table>
<thead>
<tr>
<th>Sampling rate (kHz)</th>
<th>SBR on</th>
<th>Sub-channel data rates (kbps)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Stereo</td>
<td>Parametric Stereo</td>
<td>Mono</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>48</td>
<td>no</td>
<td>24</td>
<td>192</td>
<td>-</td>
</tr>
<tr>
<td>24</td>
<td>yes</td>
<td>24</td>
<td>136</td>
<td>24</td>
</tr>
<tr>
<td>32</td>
<td>no</td>
<td>24</td>
<td>192</td>
<td>-</td>
</tr>
<tr>
<td>16</td>
<td>yes</td>
<td>24</td>
<td>136</td>
<td>24</td>
</tr>
</tbody>
</table>

Many combinations to allow the most cost effective delivery of different audio content types

Coding Technologies / Dolby AAC+ implementation
Forward Error Correction (FEC) codes are applied per sub-channel

<table>
<thead>
<tr>
<th>FEC Code</th>
<th>Code Rate</th>
<th>Capacity (kbps)</th>
<th>Number of 64kbps channels</th>
<th>Approximate power required relative to 3A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>1/4</td>
<td>576</td>
<td>9</td>
<td>-3 to -6dB</td>
</tr>
<tr>
<td>2A</td>
<td>3/8</td>
<td>864</td>
<td>13</td>
<td>-2 to -3dB</td>
</tr>
<tr>
<td>3A</td>
<td>1/2</td>
<td>1152</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>3B</td>
<td>2/3</td>
<td>1536</td>
<td>24</td>
<td>+3dB</td>
</tr>
<tr>
<td>4A</td>
<td>3/4</td>
<td>1728</td>
<td>27</td>
<td>+6dB</td>
</tr>
</tbody>
</table>

Payload capacity and transmit power can be traded.
Stronger FEC protection = lower capacity BUT lower power for the same coverage area.
STRUCTURE OF A DAB NETWORK IN PRACTICE

SERVICE PROVIDERS

Audio Encoder
Audio Encoder
Audio Encoder

ENSEMBLE PROVIDER

Ensemble Multiplexer

EDI over IP Network
Multi-cast
or Unicast

TX NETWORK PROVIDER

Transmitter

Data Inserter

DAB FRAME

Public or Private IP Cloud

Studio 1
Audio Signal
PAD SI

Studio N
Audio Signal
PAD SI

Data Provider
NPAD Content
MOT

Audio Signal
PAD SI
MAXIVA VAXT DAB PRODUCT FAMILY
GATESAIR RADIO PRODUCT FAMILY

- **Low Power**
  - VAXT 80/150
    - Ultra Compact

- **Air Cooled**
  - VAX 300/450
  - VAX 550/750
  - VAX 1.2kW - 13.6kW

- **VLX Liquid Cooled**
  - VLX 3.8kW - 45.6kW
MAXIVA VAXT DAB ULTRA COMPACT SERIES
80 watts to 750 watts
## DAB ULTRA-COMPACT VHF MODELS / POWER LEVELS

<table>
<thead>
<tr>
<th>Model</th>
<th>Power Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1RU Models</td>
<td>80 W, 150 W</td>
</tr>
<tr>
<td>2RU Models</td>
<td>300 W, 450 W</td>
</tr>
<tr>
<td>3RU Models</td>
<td>550 W, 750 W</td>
</tr>
</tbody>
</table>
**KEY FEATURES**

- High-efficiency Doherty PA’s
  - VHF BIII is a single broadband design 170-240MHz
- ETI and EDI inputs
  - Additional input board options
  - 2 – EDI plus 2-ETI
  - 4 – ETI inputs
- Adaptive pre-correction circuits with MER ≥ 33dB
- Configurable as: Transmitter, On-channel SFN Gap-Filler, or Transposer
- Modular design, PA and Power Supply plug-in and can be replaced in a few minutes.
INPUT CARDS

FRONT PANEL

Note that one or two input cards can be used, for flexibility

Input Slot #1
RF In
(For Transposers, Gap Fillers)

Input Slot #2
2 x EDI + 2 x ETI
Or
4 – ETI
(For Transmitters)

Touch screen LCD
Control Ethernet Port
USB Port
UNDER THE HOOD - WHERE ARE THE CABLES?

“No Cable” Design!

RF Power Amplifier
Modulator Board
Input Card

Power Supply
GPS Receiver Board
Interface Board
Controller Board
• Plug-in PA Module Assembly
• Complete unit is easily removed and replaced in a few minutes
VAX OP SERIES

- Separate Exciter/Driver + PA Module
- Available output power: 300W to 2,000W
- Adaptive pre-correction circuits with MER > 33dB
- Same input interfaces options as 1RU
- Embedded RF Switch Over matrix for Dual Redundant Exciters
- Hot Swappable Power Supplies
Maxiva Air-Cooled VAX-OP VHF Series

- 300W to 1.2kW
- 1.5kW – 1.9kW
- 3kW – 13.6kW

- Same 1RU exciter/driver and same input option cards as Ultra-Compact
- Available with single-drive or dual-drive (option)
- Multiple PA systems include a 36RU rack (single PA systems - rack optional)
- GPS/GLONASS option

2, 3, 4, 6 and 8 PA Systems in 36RU Rack
Maxiva DAB Liquid-Cooled VLX-OP Series

**Key Features**

- High Efficiency (Broadband PA’s)
- Low consumption Pump and Heat Exchanger (pump + heat exchanger + external fans = 535W)
- Dual Redundant Pumps standard
- Coolant reserve tank (8 liters) for automatic liquid refilling, reduces on-site maintenance
- Liquid Cooled Control Unit: level (liquid + refilling), pressure, temperature, pump status, etc.
- Very small external heat exchanger with 24V power, 2 fans or 4 fans
- Heat Exchanger automatic reverse fan rotation feature to remove debris (user settable timing)
Maxiva Liquid-Cooled VLX-OP VHF Series

Single Rack Systems

- **15.2 kW** 8 PA’s
- **11.4 kWz** 6 PA’s
- **9.5 kW** 5 PA’s
- **7.6 kW** 4 PA’s
- **5.7 kW** 3 PA’s
- **3.8 kW** 2 PA’s

Output Power:
- 100% output power
- 100% output power
- 50% output power
VLX-OP LIQUID-COOLING SYSTEM

Automatic Liquid Refilling System (8 litres capacity)

Dual liquid Pumps

Lower portion of liquid-cooled Tx Rack

Refilling System
VLX-OP HEAT EXCHANGERS

Fans 24V DC
Speed-controlled
Programmable auto-reversing to clear debris

61 cm W x 80 cm H x 26 cm D
(24” W x 31.5” H x 10.2” D)

72 cm W x 96 cm H x 27 cm D
(28.3” W x 37.8” H x 10.6” D)
## VLX-OP LIQUID-COOLED (BAND III MODELS)

<table>
<thead>
<tr>
<th>Model</th>
<th>Digital</th>
<th>Power DAB</th>
<th># PA’s</th>
<th># Internal Pumps</th>
<th># Heat Exchangers</th>
<th>Rack Info</th>
<th>RF Output Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLX-OP-1900-R36</td>
<td>1,900W</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1 x 36RU</td>
<td>7/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-3800-R36</td>
<td>3,800W</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1 x 36RU</td>
<td>1-5/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-5750-R36</td>
<td>5,700W</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1 x 36RU</td>
<td>1-5/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-7600-R36</td>
<td>7,600W</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1 x 36RU</td>
<td>1-5/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-9500-R42</td>
<td>9,500W</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1 x 42RU</td>
<td>3-1/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-11400-R42</td>
<td>11,400W</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1 x 42RU</td>
<td>3-1/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-15200-R42</td>
<td>15,200W</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>1 x 42RU</td>
<td>3-1/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-19000-R42</td>
<td>19,000W</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>2 x 42RU</td>
<td>3-1/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-22800-R42</td>
<td>22,800W</td>
<td>12</td>
<td>2</td>
<td>2</td>
<td>2 x 42RU</td>
<td>3-1/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-30400-R42</td>
<td>30,400W</td>
<td>16</td>
<td>2 x 2</td>
<td>4</td>
<td>2 x 42RU</td>
<td>3-1/8&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-38000-R42</td>
<td>38,000W</td>
<td>20</td>
<td>2 x 2</td>
<td>4</td>
<td>4 x 42RU</td>
<td>4-1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>VLX-OP-45600-R42</td>
<td>45,600W</td>
<td>24</td>
<td>2 x 2</td>
<td>4</td>
<td>4 x 42RU</td>
<td>4-1/2&quot;</td>
<td></td>
</tr>
</tbody>
</table>
MULTICARRIER DAB+ 240W TOTAL POWER

- Touch screen LCD
- Control Ethernet Port
- USB Port
- ETI In #1
- ETI In #2
- ETI In #3
- 240W TOTAL POWER
MultiCarrier DAB Transmitter:

- Allows up to 3 DAB+ Carriers to be generated or re-transmitted through a single amplifier
- Advanced pre-correction and linear broadband amplification
- Unique solution ONLY available from GatesAir
- More economic than standard solutions
- More compact
- Less expensive to operate, lower power consumption
 Compact 1U rack 19 "chassis.
 Output power up to 240W rms total
 Common RF amplification.
 Wide Band VHF BIII Doherty Amplifier technology with high efficiency.
 Supported Modulations: DAB / DAB + / T-DMB.
 Multi-carrier modulation (3 channels), for adjacent and non-adjacent frequencies.
 Adaptive pre-correction circuits.
 Built-in high-stability GPS / GLONASS receiver (Optional).
 Hot swappable amplifier and power supply.
 Input interface: 3 ETI inputs.
 SNMP, Web interface and Touch Screen display.
 USB service interface for up-grade / download.
N+1 SYSTEMS GateSwitch
GateSwitch for N+1 Applications

GateSwitch line of N+1 redundancy controller

3 Models Available:

• **GateSwitch 2E/2U/3U Series**
  Control for larger systems up to 7+1 units

• **GateSwitch 4000 Series**
  Control for medium-sized systems up to 4+1 units

• **GateSwitch 2000 Series**
  Control for smaller 1+1 and 2+1 systems
2/3 Series:

- **GATESWITCH 2E** - 7+1 External RF switches
  - RF output power switching based on external relays
- **GATESWITCH 2U** - 7+1 Internal 80W switches
  - Internal switches
- **GATESWITCH 3U** - 4+1 Internal 350W switches
  - Internal switches
GATESAIR 4000 SERIES

4000 Series:

- GATESWITCH 4000 - 4+1 External RF switches
  - RF output power switching based on external relays

- GATESWITCH 4080 - 4+1 Internal 80W switches
  - 80W internal switches

- GATESWITCH 4130 - 4+1 Internal 130W switches
  - 130W internal switches

- GATESWITCH 4350 – 4+1 Internal 350W switches
  - 350W internal switches
2000 Series:

- GATESWITCH 2350 - 1+1 Internal RF switches
  - 350W internal switches

- GATESWITCH 2130 - 2+1 Internal RF switches
  - 130W internal switches

- GATESWITCH 2000 – 2+1 External switches
  - RF output power switching based on external relays
Front Panel Status on 4000 series

- RF/TS Signal Flow
- TX Status LEDS
- RF Signal Flow
- TX On Air
- LOCAL/AUTO/Load Control
- Maximum # of swithovers
- Manual/Remote Control
- RF In System
- RF In Presence TX
Illustration of +1 redundancy
TX 3 is off-line, Transport stream (RED) is rerouted for TX3 to +1 spare
RF coax switch relay (BLUE) positions to put +1 TX to air
TRANSPORT STREAM

IP Connect
• IPConnect provides “Hitless” protection using Intraplex® Dynamic Stream Splicing technology for EDI streams
• IPConnect intercepts the streams from the Headend and reliably tunnels it to one or more exciters
• IPConnect works with unicast, multi-unicast and multicast topologies
• IPConnect also monitors and provides automatic failover between Main and Backup Headend at the Studio side