New Life for AM with Digital Transmission

A Look at the Options

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Why the Erosion of AM?

- Quality of signal
  - Noise
    - Atmospheric static
    - Man made noise
  - Receiver bandwidth reduced to combat noise
    - Results in worse frequency response, now $\leq 4$ kHz
    - Cost reductions in receivers further compromise quality
Man-Made Hindrances

- Failure to implement technology
  - Synchronous detectors
  - Noise blanking
  - Variable bandwidth by reception conditions
  - NRSC-1-B response not adopted in receivers (AMAX)
  - Lack of wide-spread adoption of AM Stereo
    - Even after receivers entered the marketplace
Further Diminution of AM

AM stations being donated to non-profits
- Radio World cites 7 donations including a Detroit AM
- FM simulcasts of large AM news/talk stations
  - WSB Atlanta, WTOP Washington, WFAN NY, WBBM Chicago etc.

Mexico & Canada migrating AM’s to FM wherever possible
- Nautel’s home city Halifax (400,000+) now has no AM services

Many European nations turning off many/all AM
What Can We Do About It?

- Digitalization
  - It’s not just about sound quality (but partly it is)
    - Rich media experience is what consumers demand today
    - Interactivity (Smart Phone is great for this)
  - “Cool” features
    - Graphics displays
    - More information
The Platforms

- Two Major AM Digital Platforms
  - HD Radio™ Technology
    - Developed in US by iBiquity Digital Corp
    - Has ITU recommendation
    - Deployed in US on 250+ AM stations
      - Mostly the largest, high power stations in big cities
    - Licensing of stations by iBiquity required (in US)
The Platforms

- Two Major AM Digital Platforms
  - Digital Radio Mondiale (DRM)
    - Developed primarily in Europe
    - Has ITU recommendation
    - Deployed globally primarily on SW & MW ~ 30 active sites
    - No broadcast station licensing by DRM
More About the Systems

- Both systems have similar tx requirements
  - Tx must be linear or pre-corrected to linear
    - Mask compliance is required or interference results
    - Most modern AM tx capable of either system
More About the Systems

**Simulcast Principles**

- DRM Simulcast using a 18kHz Bandwidth
  - DRM in lower frequencies
  - AM in upper frequencies
  - DRM in upper frequencies
  - AM in lower frequencies

- DRM Simulcast using a 20kHz Bandwidth
  - DRM in lower frequencies
  - AM in upper frequencies
  - DRM in upper frequencies
  - AM in lower frequencies

- DRM Simulcast modes for both 9/10 kHz
- Note that “double channels” required
More About the Systems

iBiquity Conventional AM  MA1

Modified MA1
## Bitrates Available

<table>
<thead>
<tr>
<th>MODE (Total Kb/s)</th>
<th>Kb/s P1</th>
<th>Kb/s P3</th>
<th>Kb/s PIDS</th>
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</thead>
<tbody>
<tr>
<td><strong>MA1 Full Hybrid Mode (36.8)</strong></td>
<td>20.2</td>
<td>16.2</td>
<td>.4</td>
</tr>
<tr>
<td><strong>MA1 Hybrid Reduced Digital b/w Config (20.6)</strong></td>
<td>20.2</td>
<td>N/A</td>
<td>.4</td>
</tr>
<tr>
<td><strong>MA3 Full All-Digital (40.8)</strong></td>
<td>20.2</td>
<td>20.2</td>
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<tr>
<td><strong>MA3 All-Digital Reduced Digital b/w Config (20.6)</strong></td>
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</table>

**Nominal Signal Bandwidth (kHz)**

<table>
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<tr>
<th>Mode</th>
<th>MSC Modulation (nQAM)</th>
<th>Robustness level</th>
<th>4.5</th>
<th>5</th>
<th>9</th>
<th>10</th>
<th>18</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>14.7</td>
<td>16.7</td>
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<tr>
<td>A</td>
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<td>9.4</td>
<td>10.6</td>
<td>19.7</td>
<td>22.1</td>
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<tr>
<td>B</td>
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<td>Max.</td>
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<td>8.8</td>
<td>16.4</td>
<td>18.4</td>
<td>34.1</td>
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<tr>
<td>C</td>
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<td>Min.</td>
<td>6.3</td>
<td>7.1</td>
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<td>14.8</td>
<td>27.3</td>
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<tr>
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<tr>
<td>E</td>
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<td>Min.</td>
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<tr>
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<tr>
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<td></td>
<td></td>
<td>37.2</td>
</tr>
</tbody>
</table>

**Note** – Mode E only for DRM+
Why Hybrid or Simulcast?

- Creates an orderly market transfer to digital
  - Existing receivers continue to operate
  - New receivers add features not available in analog
- The ultimate is to create the all digital mode
  - Improved coverage/lower transmission costs
  - Reduced interference
  - Higher bit rates
What Listeners Want Today

- The speed of now – the audience has become spoiled/demanding
  - Interactivity
  - Not just audio (but rich media)
  - Content relevant to them and tailored to them
  - Small portable devices (transistor radios are out, and desk top and laptop sales are off, smart phones are skyrocketing)
  - Shorter bits, not long form programming – ideal for quick downloading/streaming
Why Broadcasting Then?

- Cell data networks are not keeping up with demand (crippled in places)
- Data is not free, and almost nowhere is it unlimited
- Data coverage is not universal especially in more rural areas
  - Network speeds are also not 3G or 4G LTE in more rural areas
  - Spotty coverage is annoying to listeners
- Broadcasting is free over the air and can cover a wide area with MW and LW and at very low transmission costs (10-20% of analog)
Some Examples

TAG it button to capture purchase token

NewsService Journaline®

HD2/HD3

 DRM Kalundborg
 DRM 243 kHz Easy Listening Music

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Summary

- AM is failing in many parts of the world and needs a boost (digital!)
- Both systems – HD Radio and DRM have technical similarities
- Transmitter requirements are similar, exciters differ
- Both can offer significant wide area digital coverage
- Both offer an array of rich media features desired by consumers
- Both offer an interim hybrid or simulcast mode on path to full digital
- Both offer significantly reduced transmission cost over analog
- Both have demonstrated the core technologies work
Thank you!

For more information:
www.ibiquity.com
www.drm.org

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