DRM Tests in Brazil

- Over the last 20 months tests in DRM30, medium wave with TV Cultura and CBN (Radio Globo) in Sao Paulo low and high power
- DRM+ in the FM band with UFMG and Itatiaia in Belo Horizonte low and high power
- DRM+ trial in the FM band with very low power still on in Rio de Janeiro

Call of the Ministry of Communication for a 180 days testing of all digital standards

- AVISO DE CHAMAMENTO PÚBLICO No 1/2011/June

In this context, TDF offered to participate to a series of Short Wave DRM tests in December 2011
Short Wave DRM tests – Transmission Center

Broadcasts were performed from Montsinéry TDF Short Wave site located in French Guiana

Montsinéry (GUF) is ideally located to cover Brazil

Infrastructure used for the test

- 1 transmitter designed for DRM transmission (from 30kW to 150kW)
  - Broadcasts were performed at 125 kW

- Antenna type: AHR 4/3/.5

- Bandwidth: 11.5 – 21.9 MHz

- Azimuth: 167° (rotatable antenna)
Short Wave DRM tests - characteristics

- **Test schedule**
  - 13 days of tests
  - A total of 36 DRM broadcasted hours
    - Audio + data (pictures)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time UTC</th>
<th>Freq (kHz)</th>
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<tbody>
<tr>
<td>05/12 to 08/12</td>
<td>1100-1300</td>
<td>17495</td>
</tr>
<tr>
<td>09/12</td>
<td>1100-1200</td>
<td>17495</td>
</tr>
<tr>
<td></td>
<td>1200-1300</td>
<td>21495</td>
</tr>
<tr>
<td>12/12 to 13/12</td>
<td>1200-1400</td>
<td>21495</td>
</tr>
<tr>
<td></td>
<td>1600-1800</td>
<td>21495</td>
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<tr>
<td>14/12 to 16/12</td>
<td>1200-1400</td>
<td>21495</td>
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<tr>
<td></td>
<td>1600-1800</td>
<td>17495</td>
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<tr>
<td>19/12 to 21/12</td>
<td>1800-2000</td>
<td>17495</td>
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<table>
<thead>
<tr>
<th>Configuration</th>
<th>Config. 1</th>
<th>Config. 2</th>
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<tbody>
<tr>
<td>DRM mode</td>
<td>B</td>
<td></td>
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<tr>
<td>Bandwidth</td>
<td>10 kHz</td>
<td></td>
</tr>
<tr>
<td>MSC</td>
<td>64QAM</td>
<td></td>
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<td>Cor. rate</td>
<td>0.5</td>
<td>0.6</td>
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<tr>
<td>Audio</td>
<td>AAC + SBR</td>
<td>AAC+SBR</td>
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<tr>
<td>Total bit rate</td>
<td>17.46 kbits/s</td>
<td>20.96 kbits/s</td>
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<tr>
<td>Audio bit rate</td>
<td>16.56 kbits/s</td>
<td>17.56 kbits/s</td>
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<tr>
<td>Picture bit rate</td>
<td>0.9 kbit/s</td>
<td>3.40 kbits/s</td>
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</tbody>
</table>

- Technical characteristics
  - 2 configurations tested with pictures embedded
Short Wave DRM tests - results

09/12 – 11.00 UT

09/12 – 12.31 UT

CR : 0.5

Reception at Belo Horizonte

Sound at reception site :

SNR : 26.8 dB, FAC : 100%, Audio : 100.0% DRM mode : B / 16 kHz, interl : 2.0 s, SDC : 64-QAM, MSC : 64-QAM MSC bitrate : 17.45 kbps, protection level H/A/B : 0/3/0 (R=0.50) 1: TDF DRM (por/gf) [ASC111, Portuguese, Varied] 1/2 Audio : AAC+ PS-Stereo (16.56 kbps EEP) 3/1 Data : MOT Slideshow (0.90 kbps EEP)

SNR : 29.1 dB, FAC : 100%, Audio : 100.0% DRM mode : B / 16 kHz, interl : 2.0 s, SDC : 64-QAM, MSC : 64-QAM MSC bitrate : 17.45 kbps, protection level H/A/B : 0/3/0 (R=0.50) 1: TDF DRM (por/gf) [ASC111, Portuguese, Varied] 1/2 Audio : AAC+ PS-Stereo (16.56 kbps EEP) 3/1 Data : MOT Slideshow (0.90 kbps EEP)
Short Wave DRM tests - results

16/12 – 12.02 UT

CR : 0.6

Reception at Belo Horizonte

Sound at reception site:

SNR: 23.6 dB, FAC: 100%, Audio: 100.0% DRM model: B / 10 kHz, Interfy: 2.0 s, SDC: 16-QAM, MSC: 64-QAM MSC bitrate: 23.36 kbps, protection level: H/A/B: 0/0/1 (R=0.50)
1: TDP DRM (por.wav) [235.11, Portuguese, Varied] 1/0
Audio: AAC+P-Blanco (17.55 kbps EEP) 1/1 data: MOT Slideshow (3.40 kbps EEP)

DRM tests over Brazil
Short Wave DRM tests - results

19/12 – 18.02 UT

CR : 0.5

Reception at Belo Horizonte

Sound at reception site :

SNR: 29.8 dB, FAC: 100%, Audio: 100.0% DRM mode: B / 10 kHz, InterlA: 2.0 s, SDC: 16-QAM, MSC: 64-QAM MSC
bitrate: 17.46 kbps, protection level: F/A/F: 0/0/0 [R=0.50]
1: TDF DRM (por/gf) [A35111], Portuguese, [Varied] 1/0
Audio: AAC+ P-Stereo (36.56 kbps EEP) 1/1 Data: MOT
SlideShow (0.90 kbps EEP)

DRM tests over Brazil
Short Wave DRM tests - results

- Picture at reception site (São José)
Thank You!
NEWS from CES in Las Vegas

- NXP Automotive Digital Radio solution to include DRM