



JOINT SADIBA /NAB DIGITAL RADIO DAB+ TRIAL



DAB+ (Digital Audio Broadcasting) in South Africa

Digital Radio Showcase

Joint SADIBA/ NAB Digital Radio Working Group

3 May 2018



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Introduction and Definition



- SADIBA - Southern African Digital Broadcasting Association
 - Recently became a member of the WorldDAB (Digital Media Broadcasting) Forum
- NAB - National Association of Broadcasters
 - Representing Radio and TV broadcasters (Public, Commercial and Community) as well as signal distributors and industry associates
- DAB+
 - Second generation Digital Audio Broadcasting



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Why a DAB+ Trial



- Radio Industry saw a need to keep radio relevant in the digital age
- There is “NO” high power FM spectrum available for new entrants or the expansion of existing FM services in SA’s major metropolitan areas – DAB+ will create extra channels and allow for the expansion of services
- DAB+ technology is well established worldwide and growing
- Numerous success stories in the world
- DAB+ receivers are widely available
- Traditional Radio listening is not being replaced by Internet Radio





Advantages of DAB+



Provides the following benefits:

- Efficient use of frequency spectrum, Multiple channel capability (up to 24 Channels)
- Economical - Lower transmitter power per audio service
- Advanced Audio Quality
- Consistent quality of Reception
- All Broadcasters on a mux have exactly the same coverage
- Retains the FM capability of Portable and Mobile Coverage
- Enhanced service offerings, including data (Visual radio with information displayed on screens)



The Purpose of the DAB+ Trial



To test and evaluate DAB+ technology against the following criteria:

- End to end technical functionality (studio to receiver)
- Extent of portable mobile coverage (moving vehicle)
- Signal permeability – building penetration
- Effects of vehicle penetration loss
- Interference and clutter on coverage (high rise buildings)
- Demonstrate value added services, Dynamic Label System (DLS) and Slideshow
- Field testing typical professional and consumer equipment
- Testing Audio quality at different data bit rates



Historical context



- 2012 Joint SADIBA/NAB Digital Radio DAB+ trial WG established
- Trial open to members of SADIBA and NAB
- Currently 77 members participate in the WG
- Sentech SOC was chosen as the signal distributor
- SABC successfully applied for a Trial licence on behalf of the SADIBA/NAB broadcasters
- A Rules of Operation document for the trial was compiled and signed by all participants
- We liaised and involved members of the Automobile Manufacturers in the trial
- Contacted Receiver Manufacturers
- WhatsApp Technical Discussion Group setup for quick liaison between trial participants



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Historical Context (Cont.)



- Original trial licence granted in November 2013 to commence on 1 April 2014
- Start date of licence moved to 3rd November 2014
- Trial on air in Johannesburg on the 3rd November 2014 using “1st Gen” DAB at 2kW TX power with 5 services.
- Start of network verification process to obtain initial readings to show the increased terrestrial coverage to be gained by switching to DAB+
- Reminded participants of the “bubble and squeak” artefacts caused by using the “1st Gen” DAB standard at poor signal strengths
- Network switched to DAB+ on 12 December 2014





Details of South African DAB+ Trial Technical Parameters



- Trial consists of 2 transmitting stations 10kW (100kW ERP) in Johannesburg and Pretoria in Province of Gauteng.
- Operate as (Single Frequency Network) SFN on VHF Channel 13 F 239,200MHz
- The total area covered by the trial is about 21185km² and the total gross population covered is about 11 million (22% of total SA population)
- This is however a closed trial (not for commercial purposes thus limiting public participation)
- 24 stereo channels are available, allowing radio services from the Public, Commercial and Community sectors who are members of either SADIBA or the National Association of Broadcasters to participate.
- Not all the broadcasters will be from the Gauteng province and a third of the mux is reserved for Community Broadcasters.
- Data capabilities to be fully trialled Slideshow, DLS (Dynamic Label Segment), Surround Sound, Service Following and emergency warning system. EWS



Current Status



- 20 services (+1 Pop-Up) in operation on the Mux
- Brixton Tower is transmitting at 5kW
- Pretoria transmitting at 10kW in SFN
- Broadcasters are testing various ways of sending their signals to the tower to get optimal audio quality
- Broadcasters are testing different value adds in terms of Program Associated Data and resolving software issues that become apparent



Current Status(Cont.)



- The Trial consists of 3 phases
 - Phase 1 Network and Coverage Verification
 - Phase 2 Detailed Audio and Data Testing
 - Phase 3 Closed listener group audio and data testing
- Closing off with a “simulated commercial mux” of approx. 4-6 months
- Phase 1 of the trial has been completed.
- 1st Sentech report on Johannesburg network verification published.
- 2nd Sentech report on Pretoria individual coverage and combined SFN ready to be published.



Findings of the Johannesburg Verification Report



- End to end technical functionality achievable
- Performance evaluation of domestic receivers and professional measurement equipment in coverage area proved satisfactory
- Portable /mobile coverage was evaluated with the use of domestic receivers and a professional receiver proved satisfactory
- DAB+ domestic receivers with the functionality to display value added services (slideshow) demonstrate the correct functionality as well as the advantages of this functionality
- Overall performance of the domestic receivers and professional measuring tool exceeded expectations



Findings of the Johannesburg verification Report (Cont.)



- 2kW TX Power Line of Site (LOS) or near line of site (NoLOS) propagation paths are required to ensure sufficient coverage and good quality of service . Insufficient coverage and bad service quality was experienced in NoLOS areas.
- 5kW TX power coverage and service quality in NoLOS areas were greatly improved as well as in surface clutter conditions and penetration into vehicles. Building penetration was still a problem.
- 10kW TX power –a much denser coverage was provided with sufficient signal to penetrate through most of the buildings evaluated

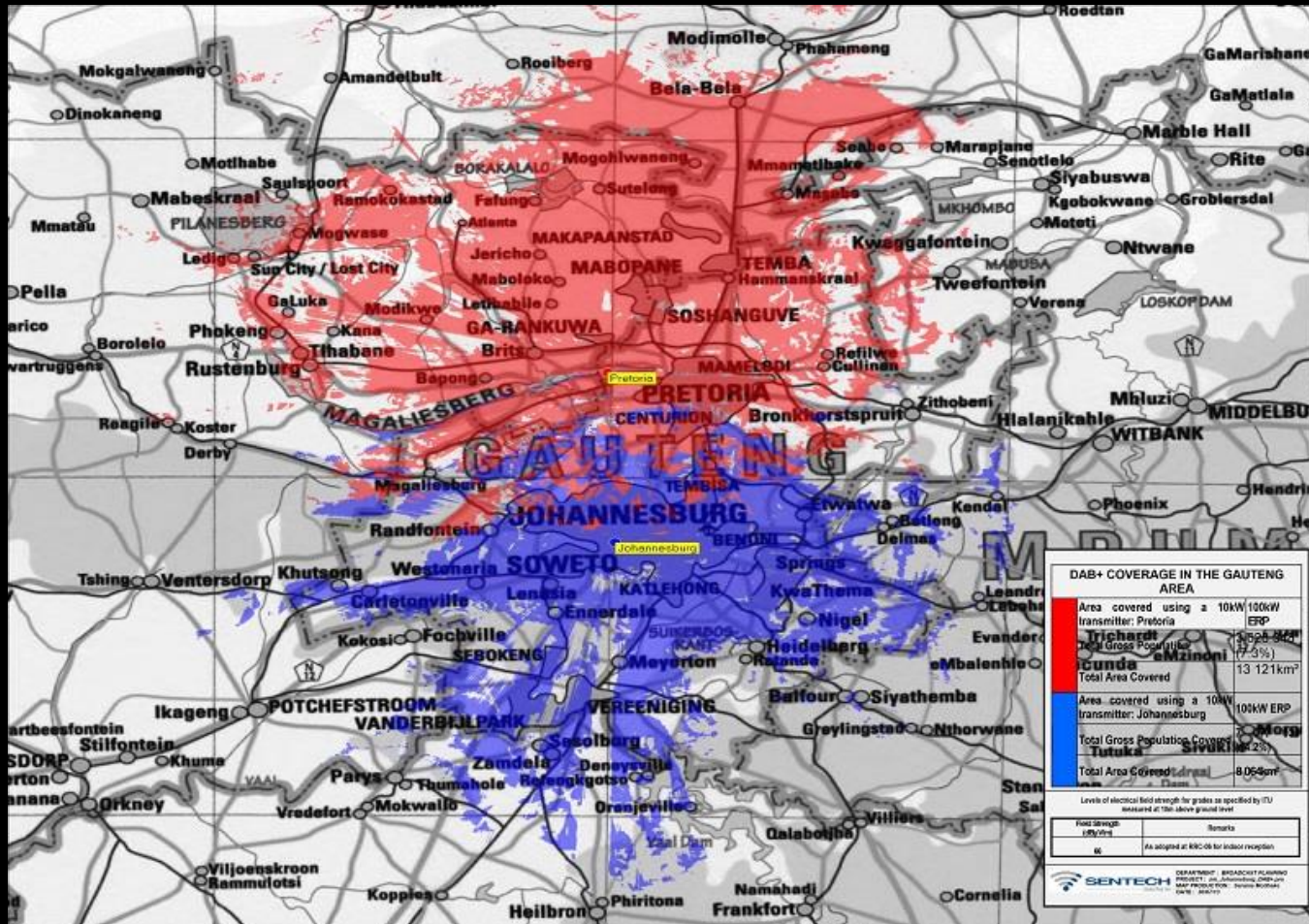


Findings of the Johannesburg verification Report (Cont.)



- Measured coverage results were correlated with the predictions and the following findings were made.
- 2kW coverage predictions +/- 1db higher than predicted
- 5kW coverage predictions +/- 2db higher than predicted
- 10kW coverage predictions +/- 2db higher than predicted

DAB+ Coverage in Gauteng





Brixton Transmitter site and Sentech Test Vehicle



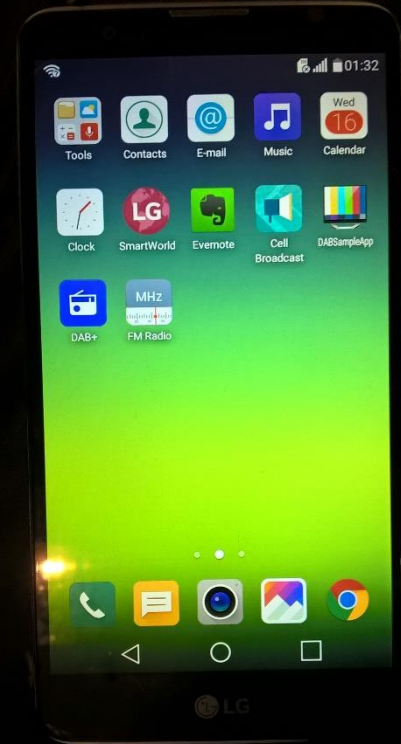


Phase 2 Audio and Data Testing



- Audio quality at bit rates ranging from 32kbps to 128kbps @ 48khz sample rate evaluated with various broadcasting genres
- Parametric stereo and SBR at lower bit rates
- Data speeds at 8Kbps and 16Kbps evaluated
- “Sweet spot” 64kbps at 48khz
- Highest bit rate used 80kbps at 48khz
- Amazing results with 32 and 40kbps in pop/talk formats using SBR and parametric stereo and a good audio processor

- WG has compiled a receiver testing template
- Divided into two main areas
- Receiver Functionality testing
- Build and audio quality testing
- FEC now standardised to 3A





Phase 2 Audio Delivery



- Digital path from studio source to receiver is encouraged
- STL preferably AES but analogue can be used but not encouraged
- Digital Codecs over Diginet (Data overheads must be taken into account when selecting data rate)
- Audio and data encoded at studio and stream delivered to Sentech. Gives flexibility and control when using dynamic data rate allocation to broadcaster (Best Solution)
- DStv/OpenHD emergency last resort not generally recommended (multiple transcoding /rain fade)



Phase 2 Data testing



- DLS Dynamic Label Segment
- Provides a static or “ticker” text stream.
- Available on all DAB+ Receivers.
- Similar to RDS but has more characters
- SLIDESHOW
- Available on DAB+ radios with colour screens.
- Resolution 320 X 240
- Display Dynamic slides e.g. news, sport, weather and business bulletins



Phase 2 Data Testing



- Display a stations logo in-between slides
- Track title and album art
- Presenters pics and programme lineups
- Synchronizing advertisements to spot log
- All in Media's RAPID software which is web based can compile slides/ DLS on a server and push to the multiplex. Software provides for each broadcaster to log in securely to their own portal to control their own content.
- Broadcasters can also run their own version at studio

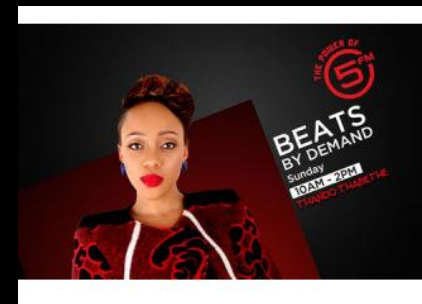


Phase 2 Audio Data Testing off air monitor





Trial Slideshow examples





Over 400 different consumer devices available





Phase 3 Closed Listener Group and Simulated Trial



- Receivers to be distributed by participating stations to closed listener groups
- Car manufacturers to participate (i.e. BMW Ford, Toyota Volvo, KIA)
- Simulated “Commercial Trial” consisting of participating broadcasters
- Comprehensive Report on all 3 Phases to be submitted to Broadcast Regulator ICASA



Questions / Information



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