DAB+ Digital Radio

Why choose DAB+ for Digital Radio

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Contents

1. Basics of DAB+
2. Other options
3. Overview of choices
4. Current industry activities

DAB+ basics

- Modulation & Coding – robustness vs capacity
- Impact of higher order modulation on power / coverage
- EBU E138 – why?

EBU
OPERATING EUROVISION AND EURORADIO

R 138

DIGITAL RADIO DISTRIBUTION IN EUROPE

Immediate deployment be done using DAB transmission as defined in ETSI EN 300 401 with DAB+ services as defined in ETSI TS 102 563 for digital radio broadcasting in VHF Band III;

WORLD DAB

Other options

- AM
- FM
- DAB+
- DRM30
- DRM+
- ISDB-T
- HD
- P2P streaming
- eMBMS - 4G and 5G

Other options

Kenneth video clip

- AM
  - Analogue, Prone to interference and variable coverage
  - No metadata

Many receivers but reducing, 1000s

- FM
  - Analogue, variable quality audio
  - Massive congestion

Many receivers, 1000s

- DAB+
  - Good balance of reach and robustness
  - Targets high capacity areas, typically more than 9 services in the target area
  - High quality audio and metadata
  - Around 1/10th the cost of FM

Many receivers and increasing, 100s

- DRM30
  - Long distance and wide area
  - HF band, medium quality audio, low bit rate metadata
  - Very expensive and large transmitter systems

Very few receivers, slowly increasing <10

Other options

- DRM+
  - Low capacity in VHF, typically 2 services per transmitter
  - Medium to high audio quality and metadata
  - Higher cost than DAB+

Prototype receivers, <5

- HD
  - Struggling in the USA due to business model and content
  - IBOC technology challenged
  - Auto market starting now

Many receivers, 100s

- ISDB-T
  - DTV focus not radio
  - reducing receivers

reducing receivers , <100

- Mobile networks
  - Unicast IP
  - Evolved Multimedia Broadcast Multicast Services (eMBMS)

Very few but increasing

Previous IP studies

- Sweden – “Alternative distribution of linear sound broadcasting – Broadcasting via mobile networks”, a-focus report, October 2013
- Germany – “broadcast or broadband?, on the future of terrestrial radio supply”, Prof. Dr. Gunther Freidl, March 2014
- Australia – “Can mobile networks deliver broadcast radio in Australia?”, Prof. Reg Coutts, Coutts Communications , November 2014

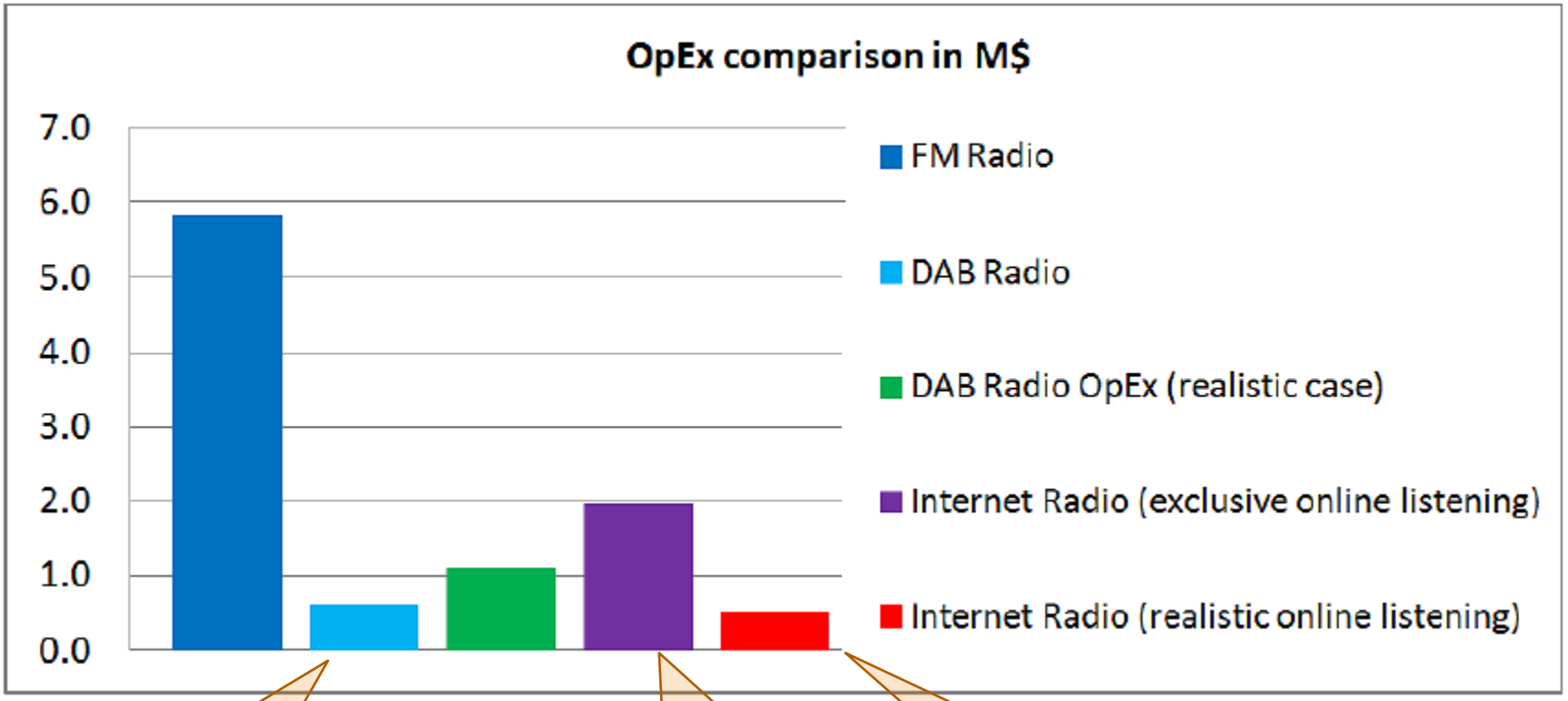
- Key findings
  - not cost effective relative to broadcast, especially DAB+ digital radio
  - not free-to-air for listeners
  - not robust in times of emergency
  - not robust in times of user congestion for IP p2p delivery, eMBMS may resolve this issue in some locations if it is only being used for radio.

Previous IP studies

- **EBU – “Terrestrial distribution vs. online radio”, Marcello Lombardo, EBU, October 2016 and EBU Technical Review July 2017**
- Radio transmission
  1) DAB is a much cheaper option than FM, it allows cost sharing due to the MUX
  2) DAB cost saving is significant, allows the creation of new content and employment
  3) Internet delivery only is not competitive with the current pricing level
  4) Internet delivery expense is much higher than its current percentage market share

- Radio listening
  1) Internet is now part of everybody’s life but mobile broadband is too expensive for media consumption
  2) Internet-only delivery would prevent many families from accessing information and entertainment due to a prohibitive access cost
  3) The current expense for internet radio listening is much higher than its current percentage market share.
- A DAB backbone with low data hybrid services on top is the way forward.
- No radio receivers in handheld devices is a threat to public information.

Cost comparison



Full DAB multiplexes

100% internet delivery

10% internet delivery

Source: EBU Technical Review, Cost-benefit analysis of FM, DAB+ and broadband for radio broadcasters and listeners, July 2017

Summary

- Digital broadcast radio is gradually replacing analogue AM and FM radio
  - Cost effective
  - High quality
  - Flexible metadata features
- DAB+ leads the way forward for medium to high density areas
  - Most cost effective
  - Designed for purpose – wide area, mobile, robust, free-to-air
- IP based solutions
  - Are important - Black spot coverage, alternative content, flexible
  - Expensive for both broadcasters and listeners

Thank you

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Summary of studies to date

- Broadcaster costs
  - Support multiple Telcos – 3 currently in Australia, soon 4
  - Need to support broadcast (HPHT) until sufficient penetration of LTE-B
  - Approx 66% of listening is fixed, e.g. home and work so will need to provide 66% of delivery via IP streaming – expensive
  - Overall cost to the Broadcaster is prohibitive

Mobile Service provider market share				source: Roy Morgan Research		
Provider	**Oct-15**	**carrier N/W**	**total carriage**	**Oct-16**	**carrier N/W**	**total carriage**
Telstra	39.2	Telstra	43.4	39.1	Telstra	43.5
Optus	24.9	Optus	32.7	24.4	Optus	31.8
Vodafone	18.5	Vodafone	18.5	19.4	Vodafone	19.4
Virgin	4.5	Optus		4.4	Optus	
TPG/iiNET	3.3	Optus		3	Optus	
Amaysim	3.1	Telstra		3	Telstra	
Boost	1.1	Telstra		1.4	Telstra	
ALDImobile	0.9	Optus		1.1	Optus	
other	4.5			4.2		

- User costs
  - Fixed – users will need to have WiFi enabled receivers, this can be phone, PC or standalone IP streaming radio – in general users will need to purchase a new receiving device (as per DAB+)
  - Mobile – users will need to have eMBMS enabled smartphone or else will need to use IP streaming

Summary of studies to date

- Availability
  - Telco infrastructure
    - Telstra reportedly rolling out LTE-B in 2017-18 – will become a standard part of their network capabilities
      - Unclear whether this applies to rural areas
  - Receiving devices
    - Split between fixed broadband and mobile broadband
    - Very ow vailability of mobile phones with eMBMS (around 4% of know devices, no iPhone)
- Scalability
  - Minimum and maximum capacity that can be assigned to an eMBMS transmission
  - Synchronisation with other base stations
    - Frequency – they operate as an SFN
    - Time – must be time synchronised so eMBMS symbols must be aligned in the greater transmission frame structure

Summary of studies to date

- Regional impact
  - Limited range due to CP, currently maximum 10kms inter-base station distance
  - Limited and decreasing range due to migration to high frequencies, e.g. 3.6GHz and upwards

- Use and cost
  - Currently mainly proposed for “venue-casting”
  - Some focus on wider area use but business model is unclear