

# DAB+ technical business case

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ABU DBS DAB+ workshop March 2019

Cost effective delivery

4G streaming

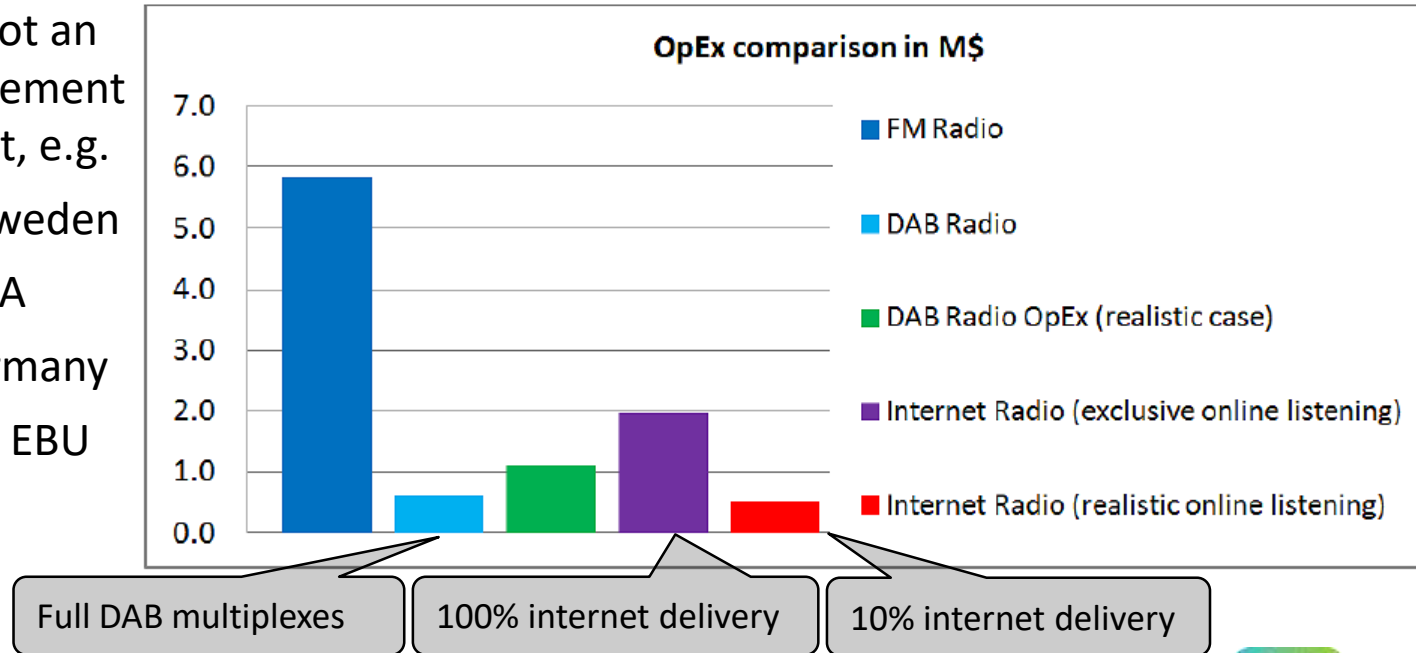
5G – Spectrum

5G – Features

# FM, DAB+ and IP Opex comparison

We already know that:

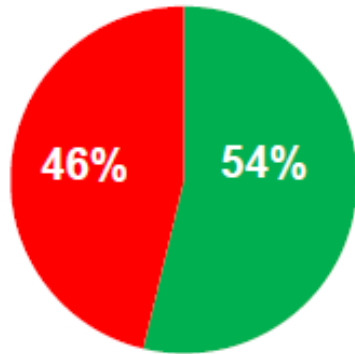
- DAB is 10x more cost effective than FM, more for AM
- IP streaming is not an economic replacement to DAB broadcast, e.g.
  - A-focus – Sweden
  - Coutts – CRA
  - Freidl – Germany
  - Lombardo - EBU



# DAB+ and IP

Current European analysis shows that 10% of traffic via IP costs similar to 100% traffic by DAB+

Distribution budget for technologies combined



- DAB Radio OpEx (best case) in M\$
- Internet Radio (realistic online listening) OpEx in M\$

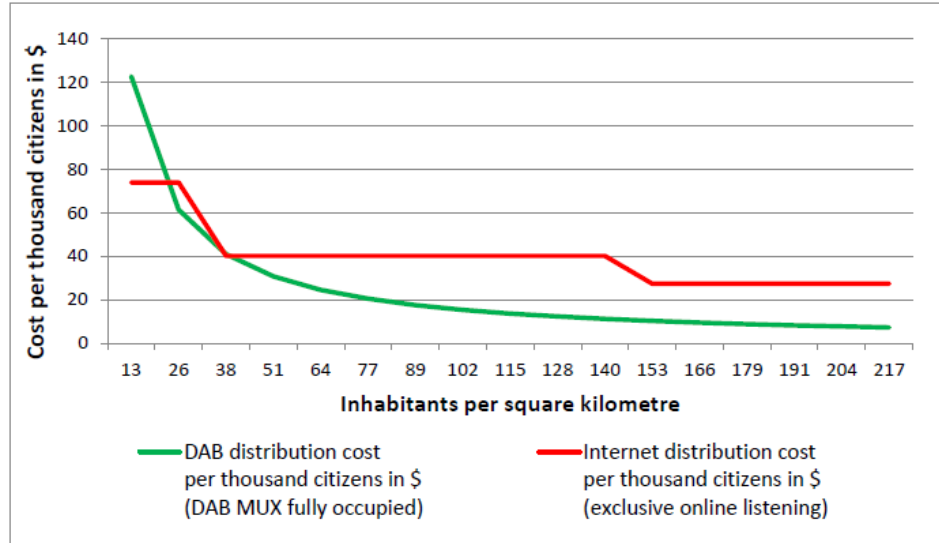
Full DAB multiplexes

10% of listening

For a model European country of 72m people

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

# DAB+ and IP



DAB+ costs less to operate than Full-IP streaming which is less than FM

DAB+ and IP are complimentary,  
Hybrid DAB-IP is the most cost effective multimedia delivery combination

# Using 4G for streaming radio delivery

A recent study by Arqiva investigated the performance of IP streaming radio over mobile IP

The investigation used

- the best 4G network in the UK, EE
- the best App – the BBC Radio iPlayer
- the best handset



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# Using 4G for streaming radio delivery

The study found multiple issues including

- Poor or lack of coverage in many rural areas
- High impact of video streaming on cell congestion
- Different streaming Apps had different responses to loss of coverage, congestion and errors resulting in audio dropouts
  - » Some took up to 3 mins to recover!!

Congestion occurs frequently in densely populated areas

- Traffic jams, train stations, high density urban areas

**Conclusion: Streaming over 4G is not reliable**

# 5G and broadcasting

5G has some really good new capabilities.....

but needs a reality check



# 5G – where does radio fit

The European Commission view



# 5G – where does radio fit?

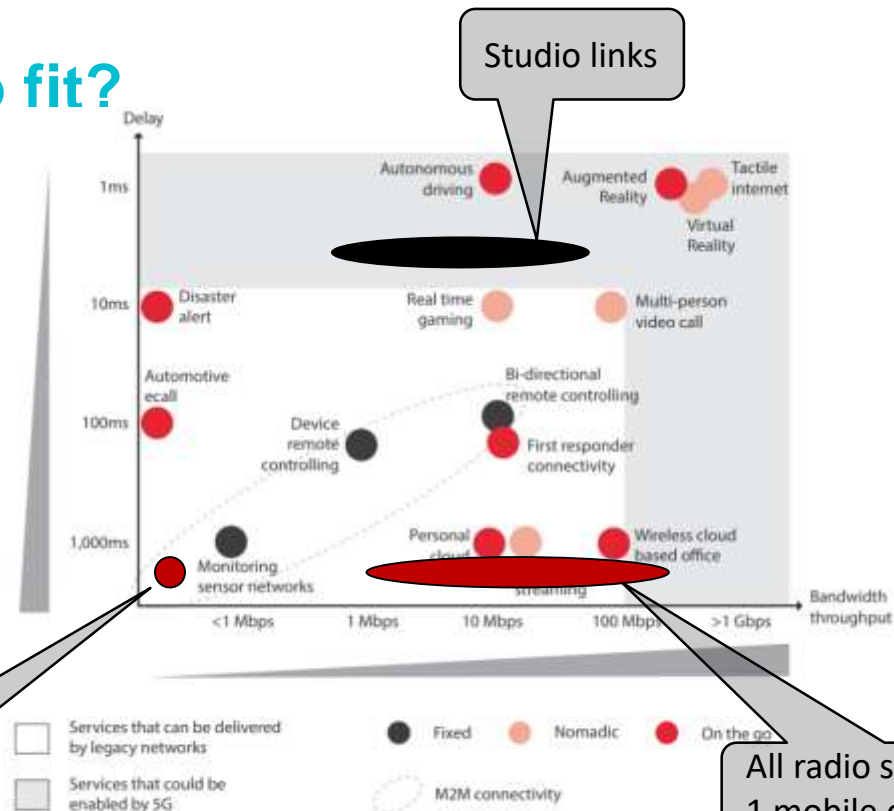
## 5G applications

“5G” is an evolution from 4G

New technologies are gradually being rolled into the existing LTE/4G mobile ecosystem to provide improvements in:

- Increased speed
- Improved reliability and QoS
- Lower latency

Individual radio streaming



Studio links

All radio streaming in 1 mobile cell

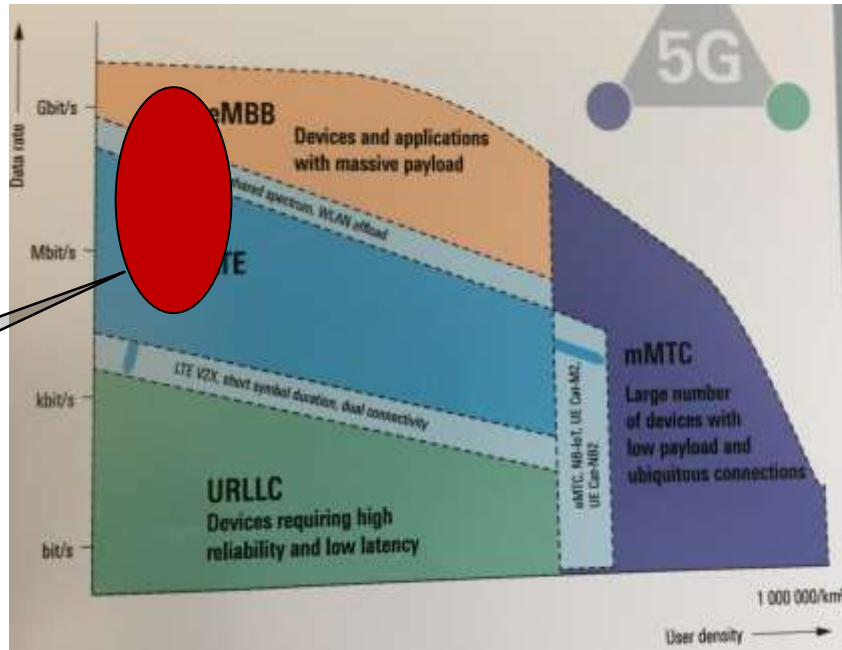
Figure 1: Bandwidth and latency requirements of potential 5G use cases

Source: GSMA Intelligence

# 5G Application space

5G provides improved solutions for

- Massive machine comms for IoT - mMTC
- Ultra reliable and low latency for IoT - URLLC
- Ultra high bit rate mobile broadband - eMBB



radio  
streaming

All extensions and capabilities are NOT available at the same time

Source: Rhode & Schwarz

5G retains the basic spectral efficiency of current 4G – max of approx 5 bps/Hz.

- High connection speeds are possible by using more spectrum
  - Carrier Aggregation (CA)
- the highest speeds requires the use of the 3.6 GHz frequency band and the millimetre Wave (mmW) frequency band 26/39 GHz.
  - ACMA auction of 3.6 GHz spectrum in Australia has been completed
    - Raised \$853m for

Source: ACMA - Telstra 143 lots of 5 MHz @ \$386m, TPG/VHA 131 lots @ \$263m, Optus 47 lots @ \$185m, Dense Air 29 lots @ \$18m

# Spectrum implications

Significant distance loss impact at high frequencies and long distances

26/39 GHz is limited to micro / pico cells with max range of approx. 0.5 km

3.6 GHz micro cells with range up to a few km max

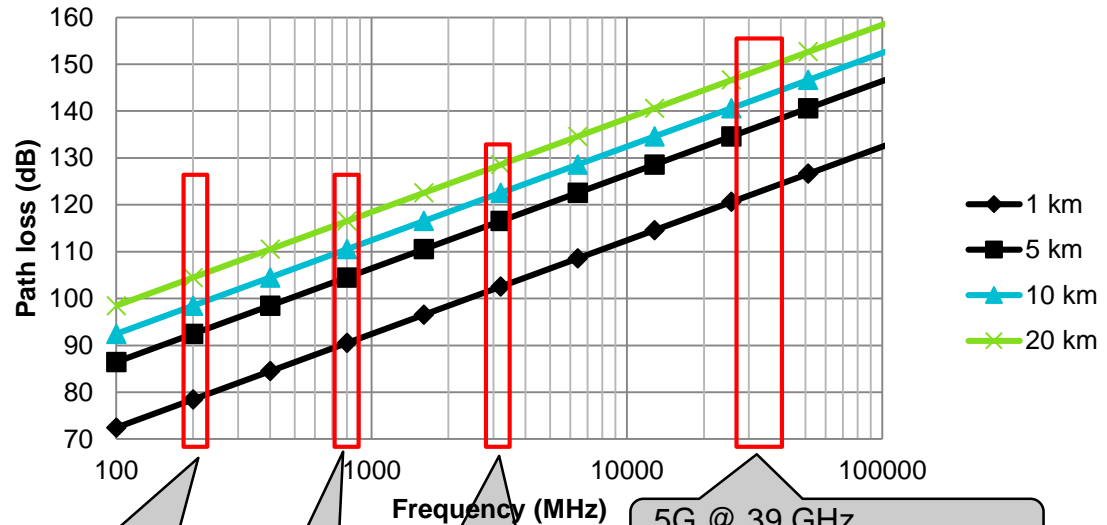
Sub 1 GHz band still needed for macro cells and wide area coverage

Increased demand due to push for higher bit rates

$$P_R = \frac{P_T G_T G_R \lambda^2}{(4\pi d)^2}$$

$$FSPL = \left( \frac{4\pi d f}{c} \right)^2$$

### RF path loss due to frequency and distance



DAB+ @ 200 MHz  
10 km path loss = 97dB

5G @ 900 MHz  
10 km path loss = 111dB

5G @ 3.6 GHz  
10 km path loss = 124dB

5G @ 39 GHz  
10 km path loss = 150dB

# Spectrum implications

- There will be discussion on the acquisition of sub-700 MHz spectrum in the World Radio Conference 2019 – WRC19
  - Current mobile frequency bands of operation are listed from 450 MHz and higher
  - The implication is further compression of terrestrial DTV into UHF
    - Spectrum sharing
    - Pushing DTV into VHF bands
- **VHF Band III spectrum is very valuable.**
- It is likely that cells using frequencies below 1 GHz will mainly use existing 4G radio technology plus some networking enhancements are likely to be included overtime.
- Compression of UHF bands threatens the ability of DTV to both increase content offerings and video resolution – strong competition from UHD IP services.
- **The loss of spectrum for terrestrial DTV has potential to threaten the capacity available for DAB+ in VHF Band III**

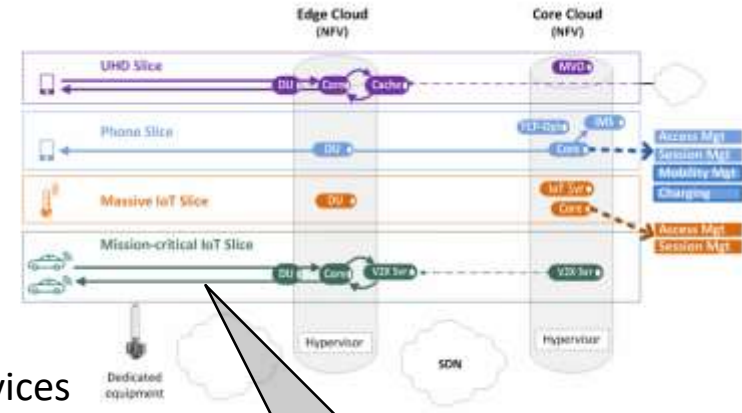
# 5G – the opportunities

## Network slicing and QoS guarantee

- Will provide improved delivery of specified QoS for broadcasters links
    - Outside broadcasts
    - Backup links to transmission sites and for main services
    - Initial services provide in Australia in 2018 for capacity but no QoS guarantee
- but**
- need business model with QoS from Telcos

## Higher link bit rates

- Great improvement
    - More capacity provides more opportunities for multimedia via mobile for OBs etc
- but**
- Need to be careful of the distance to the eNB distance for very high capacity in mmWave cells due to range and channel variation issues



e.g. mission critical backup link to a Tx site

# 5G – the opportunities

Bitrate / volume usage prices should come down in areas where the higher capacity cells are deployed

- Good for listeners on mobile delivery
- **but**
- Need feedback from Telcos on pricing expectations



## FeMBMS

- is good for venuecast situations – football stadiums, events/shows, games, golf...
- **but**
- Not currently considered to be viable for wide area coverage, i.e. replacement of broadcast
  - business model is unclear / non-existent
  - QoS needs to be guaranteed via Network Slicing
  - Need to provide the same content on all Telco networks simultaneously



# Conclusions

Hybrid DAB-IP is the most cost effective for multimedia radio delivery

Mobile streaming is less reliable than broadcast radio

5G will provide new capabilities for broadcasters to deliver feature rich multimedia radio services

Broadcasters need to protect VHF Band III for DAB+ radio

**DAB+ with 5G : the most cost effective delivery of multimedia radio offers exciting new functionality and interactivity for listeners and advertisers**

Thank You

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