ASBU / WorldDAB DAB+ technical webinar series
Q&A

This set of Q&A is derived from both the Q&A and the Chat facility in Zoom.

Some question text has been adjusted to make it clearer and some questions combined when from the same person on the same topic.

All attendee names have been removed due to personal information privacy requirements.

I will answer questions with no Note for response

Day 1 – 15 September 2020

1. Topic: Receivers

Question: receivers are too expensive – around 25 dollars – which is too much in Tunisia. It's an obstacle in order to properly launch DAB A large number of people will have difficulty to migrate to DAB receiver besides, while DAB products are also not widespread in the Tunisian market.

Answer

- Dr Adnan Salhab: $25 should be acceptable
- Les Sabel: As discussed in Day 3 by Prem Rajalingham, the incremental cost of adding DAB+ is around $4USD which translates to less that $10USD in the end product.

2. Topic: Business model

Q: Is there a standard business model for migration from FM network to DAB+ network, including timing and cost?

A (Les Sabel):

There is no established standard business model as every country is different in terms of geography, number of stations, technical maturity, politics and so on. We can however learn from the experience in Norway where they have successfully migrated from FM to DAB+ and now Switzerland is also starting that journey. The operating cost of DAB+ is well known to be significantly less than FM/AM so the decision to proceed with an ASO is usually related to digital take up (which usually needs to be greater than 50% to start) and the belief of the broadcasters (and government) that the ASO will result in a better radio business environment.

3. Topic: DAB establishment

Q: How can we make this system available here in Comoros?

A (Les Sabel):

Comoros is an island nation between Mozambique and Madagascar of 3 islands, pop 832k. Establishing a DAB+ trial in Moroni would be a great start to demonstrate the technology. Coverage studies will provide clear guidance to the number of transmission sites needed to cover the population on the 3 islands and get a budgetary estimate of the cost of permanent services. It is expected that a single multiplex will be adequate, and this may also be a candidate for low cost SS-DAB+, at least initially.

4. Topic: 5G

Q: Could we plan a 5G/DAB+ common receiver or upgradable one?

A (Les Sabel):

This would be a great step forward, basically 5G smartphone with DAB+! The primary issue is getting Telcos to support such a development, only then will the receiver manufacturers incorporate DAB+ into their products.

5. Topic: Slideshow

Q: To what extent are the basic and advanced features incorporated in the receivers in the market? I am thinking about service following support of PNG and APNG slideshows, scheduled slides

A (Lindsay Cornell):

Almost all automotive receivers implement service following, whether they be line fit, after market replacements or adapters. Depending on the capabilities of the underlying hardware, the implementations vary from simple following to another ensemble, service or to FM to seamless switching with level and delay matching.

Regarding SlideShow support, this is obviously only implemented in receivers with a colour screen - again this tends to be automotive receivers more than domestic receivers. The safety policy of the car maker and the market into which the receiver is being sold have a role in how much the display will change - some manufacturers restrict animation and interaction to when the car is stationary, for example.

6. Topic: PAD

Q: DAB is supporting PAD for metadata. Can we integrate animated logo and photo and a scrolling bar news, or can we just use static data?

A (Lindsay Cornell):

Animated slides - of anything you like - are possible - the SlideShow standard includes the necessary definitions in an annex - and for receivers that do not have the ability to provide animation, a still can be nominated. The Dynamic Label feature is often implemented in receivers as a scrolling text bar, but on receivers with larger displays it may be presented in full.

Day 2 – 16 September 2020

7. Topic: Streaming input to multiplexer

Q: Is SRT Streaming supported with IZT mux dab server?

A (Arne Borsum):

The short answer is: No, the DAB ContentServer does not support SRT as direct inputs.

For compressed streaming inputs, we support MPEG-4 AAC, HE-AAC, HE-AACv2, AAC-LD, AAD-ELD, MPEG Layer 2, MPEG Layer 3. Signalling options are EBU-ACIP, SDP, RTSP and SIP. The mentioned formats are supported directly by the audio software module of the DAB ContentServer, i.e. no external Decoders are required.

If other streaming formats shall be used, an external streaming decoder is required which converts the stream to a supported format, e.g. AES67 PCM.

8. Topic: Mux operation

Q: Can you tell us more about URL call for Mux activation?

A (Arne Borsum):

The MUX operator can configure a number of MUX configurations, e.g. for different times of a day or different days of a week. If required, changes between those configurations are correctly signalled as dynamic reconfigurations according to the DAB standard.

There are different possibilities to change between those configurations:

- manual activation on the GUI

- automatic broadcast scheduler (global calendar, weekly calendar, ...) of the DAB ContentServer

- JSON/XML-RPC URL call from remote.

Here is an example RPC call for the activation of a MUX configuration:

Request:

curl -H "Content-Type: application/rpc" --insecure -d '{"jsonrpc":"2.0","method":"Multiplexes.activate_by_ref_id","id":42,

"params": {"ref_id":"<ref_id>","type":"mx"}}' -u "wwwactivation:gomez"

https://<cs ip>/rpc/activation/json | python -m json.tool

Response:

```
{
    "id": 42,
    "jsonrpc": "2.0",
    "result": {
        "message": "Successfully set Multiplex '<Multiplex label>'"
    }
}
```

The remote activation is very useful if the activation of a MUX configuration shall be triggered by an external automation system, e.g. the studio automation of a program provider.

We implemented such use case in Germany some months ago, where it was important that a program provider can activate different configurations remotely which affect only his capacities in the MUX. In contrast, only the MUX operator has the authority to define the allowed configurations:

https://www.izt-labs.de/izt-dab-solutions-enable-regionalization-of-charivari-in-german-region-upper-palatinate/

9. Topic: Mux operation

Q: What is the advantage and the inconvenient for having one Mux + encoder equipment and having a separate encoder and Mux, technically: bitrate, cost, most used one?

A (Hermann Zensen):

The advantage for having one mux + encoder equipment is that you can have a one box solution with a standard audio contribution.
The advantage for having a separate encoder and mux is that there is no transcoding, but you have a DAB specific audio contribution (DAB encoders instead of standard encoders).
The mux + encoder equipment is more cost efficient and can be SW based only. Among DIGIDIA's customers the centralised mux + encoder solution is by far more popular and also used by big European broadcast operators such as TdF.

10. Topic: Monitoring

Q: Can the monitor transmitter be used without internet?

A (Les Sabel):

Transmitter monitors can usually be used in both local and remote modes. This allows local operators to see the status of transmissions and equipment but also allows remote access, for example from a Network Operations Centre, when a fault is reported.

11. Topic: ETI recordings

Q: Do you have the DAB/DAB+ recordings from Arab States or ASBU that have the support of the FIG 2 Extended Service labels in both UTF8 & UCS2?

A (Andreas Gorsak, Chair of the ETI Files task force):

The broadcasting situation in the Arab state countries as far as the ETI library is concerned, is such that the new regional profile defined for the ASBU region has not been adopted in on-air services. We hold country snapshots from Saudi-Arabia and Kuwait, which use the EBU latin char set and encoding only.

In the development of the new specification of country profiles, we have created a number of test files which exemplify the use of the ASBU profile in both encoding and char set. These test files explore the full range of coding options, including left-to-right script. They are available for free download and exclusive use by W-DAB members only in line with the terms and conditions of the ETI library.

The attached provides an intro to the W-DAB ETI library for starters. The link below returns a current list of the ETI files in store. Please circulate both as you see fit.

https://www.worlddab.org/benefit/eti-library.pdf

Additional comments from Lindsay Cornell:

WorldDAB has two test files with Arabic included in the service labels; one includes service labels to the ASBU regional profile, and the other has bidirectional service labels (not ASBU regional profile) and dynamic labels to both ASBU regional profile and not to the profile.

12. Topic: ETI recordings

Q: Do you have the DAB/DAB+ recordings from Arab States or ASBU that have the support of the Services which have Bidirectional content in DLS/DLS+

A: see above

13. Topic: Character encoding

Q: Do broadcasters across the world still use UCS2 encoding in their transmissions? I have an information that UCS2 has been deprecated already.

A (Lindsay Cornell):

UCS-2 has been absorbed into UTF-16. In the latest version of the standards, we have changed entries for UCS-2 to UTF-16 but we restrict usage to two-bytes to maintain compatibility with previous versions. This means that all characters in the Basic Multilingual Plane (BMP) are available, which is all text scripts, but it excludes emojis, etc. The use of UTF-8 or UTF-16 (UCS-2) is at the choice of the service provider, but depending on the characters in use in the labels, one or other encoding will produce fewer bytes, and we recommend that the coding that produces the lowest byte count is used.

14. Topic: Network architecture

Q: Looking at cost; which architecture would you recommend for a developing country?

A (Arne Borsum):

Usually, you would start with a single encoder/multiplexer system installed on a dedicated IT server (Turn-key) solution.

The software system is scalable, so you could start with basic functionality which can later be extended by software upgrades.

We prefer central DAB+ encoding in the head-end to have full control over all DAB-related components on-site. The variety of audio input interfaces allows a flexible integration of audio services. However, it sometimes appears to be more feasible to use external DAB+ encoders in the studios. In this case, it is recommended to use the FhG Muxenc protocol to control the remote encoders from the head-end automatically.

I would recommend to start with a single system without redundancy. To be prepared for potential hardware failures, you should have a spare server hardware on shelf. The spare system has the complete software system installed but without a software license. In consequence, it would be possible to transfer the Multiplexer software license to the spare system within reasonable time.

To improve reliability and to eliminate reaction times, such system can later be extended to a full 1+1 redundant system. The redundant system can be installed either in the same facilities or alternatively at different sites. However, site redundancy only gives an advantage if there is a stable network connection between both sites which might be difficult to achieve in developing countries.

Response from Hermann Zensen:

The main point even in developed countries is to get the audio to the encoder-mux equipment (audio contribution).
Most of the radio stations have web sites with Icecast servers. Bringing Icecast over IP on the public internet to the encoder-mux is by far the most cost efficient solution, and good enough for a DAB trial. It is even possible to transform the Icecast metadata in text and slides.
However the quality of the public internet is not always good and the Icecast audio quality is also not very high. It can be improved by having standard audio codecs on a dedicated IP network.
With this you can also transport higher audio over IP bitrates and increase the audio quality of the DAB transmission. After all DAB was conceived to have a very good audio quality.

15. Topic: Network performance requirements

Q: What is the requirements in term of QOS LATENCY BITRATE AND JITTER in the case of REMOTE MULTIPLEXING?

A (Hermann Zensen):

Typically a 2 Mbit line is largely sufficient for the EDI distribution to the transmitters.
Jitter is a very sensitive point as we are in broadcast distribution networks and transmitters can react with shut downs even if very few packets are missing or too late.
Note that workaround solutions are possible, for example by adding artificially missing packets (keep alive function.)

16. Topic: FEC code rates

Q: about 3A coding compared to other codings the power level needed is related to what coverage?

A (Les Sabel):

The coverage for a specific transmission is usually defined in terms of Effective Radiated Power

relative to a half wave dipole antenna gain (2.15 dB). The coverage obtained from an example transmission of 10 kW ERP will be around 30 km at Urban grade (60 dBuV/m at 1.5m receive antenna height) when using FEC code rate EEP-3A, which is most commonly used as it balances error correction and coverage well. If a stronger code is used, e.g. EEP-1A AND the transmission system is the same including transmitter power, then the coverage area will increase due to the 3 to 6 dB of additional error correction performance, this means that the area covered will increase to be equivalent to 20 to 40 kW ERP when EEP-3A is used. Note that for hilly terrain the lower increase is more likely due to strongly Rayleigh channels while if the terrain is clear / flat the latter performance improvement is more likely due to higher probability of Line Of Sight channels. In this case the payload capacity is decreased, for instance if all services use EEP-1A instead of 3A then the payload capacity is half (576 kbps).

If the FEC code is weakened, e.g. EEP-4A, then the coverage is reduced for the same transmission power as the error correcting code can correct fewer errored bits. In this case however the payload capacity is increased.

Finally, it is useful to remember that all services have their FEC code rate set individually so you can have a mix of different FEC codes rates being used on the same multiplex.

17. Topic: Transmitter behaviour

Q: What should be the right behaviour of the DAB+ transmitter in the case wrong ETI/EDI input, and in the case of wrong GPS input time reference?

A (Rich Redmond):

Not sure exactly what is meant by wrong ETI or EDI input, however if it is a valid transport stream, the transmitter will transmitter it. There are however several parameters that are monitored to ensure a valid EDI or ETI steam, and if the stream fails that test the unit will try the second input for a valid transport steam, and if that either does not exists or the transmitter sees another invalid stream, the transmitter mutes. These setting have some user definable options. On the GPS, there are also user definable options of how the transmitter should behave with loss of GPS sync ranging from muting the transmitter, to simply allowing the internal time refence to run the transmitter. Loss of GPS is only critical in a SFN operation such that you want to be sure the transmitters are all locked to the exact same frequency, and an off frequency transmitter does not cause destructive interference with in the SFN.

18. Topic: Network design

Q: Which is more efficient and cost-effective, to design the DAB+ network and implement it with one provider or separate providers, supposing you trust the parties you work with? By efficiency I mean timing, cost and reliability.

A (Les Sabel):

This is dependant on the country, in some countries the control of broadcasting is centralised so

it is typical for the local network provider to do all design and implementation and then charge the broadcasters for a transmission service.

In other countries there is often a tendering process for the provision of both Headend and Transmission systems, these may be combined into one tender or be separate. This approach allows a competitive bidding process which should provide the best solution at the lowest price.

The separation of headend and transmission systems allows for new operating models where the headend systems (encoding, multiplexing and monitoring) can be deployed in virtualised environments such as the cloud / datacentres. The trade-off here is between the lower operating cost model of the datacentre/cloud and the higher transmission costs to deliver the unencoded audio to the datacentre and then the EDI stream to the transmission sites. As the cost of transmission and cloud services differs between countries the most cost effective solution is also different between those countries.

19. Topic: Power supply stability

Q: Here in the Comoros we live on several power cuts. What would you advice if we want to buy this system?

A (Rich Redmond):

Power line stability is an issue at some transmitter sites. Firstly modern transmitters like the Gates-Air line have auto ranging switching power supplies which provide good regulation for variance in the power line voltage. If however you have frequent loss of power, or brief interruptions, you would be wise to look at a UPS system to run the transmitter on. UPS system can be very cost effective in many DAB sites, as DAB transmitter often run less power than a similar coverage FM transmitter.

20. Topic: Multi-channel transmission

Q: What is the max RF power on those transmitters where these multichannel transmission could be carried out?

A (Rich Redmond):

Currently we have specified the multichannel transmitter to run up to 1KW of transmitter power.

Day 3 – 17 September 2020

21. Topic: Monitoring

Q: How should we recommend the monitoring transmitter?

A (Les Sabel):

There are many parameters which can be measured and monitored at the transmission site,

however when designing the monitoring and control system it is recommended not to overcomplicate the monitoring, i.e. do not monitor too many individual points or parameters as there is often a flow on effect where one fault can cascade to cause many other faults and then cause an ‘Alarm Storm’ where there are so many alarms that it is difficult to determine the root cause.

When monitoring transmitters, usually from a ‘RF sniff’ point close to the antenna feed (after filtering/combining) the most valuable parameters are

Transmitter power, has the transmission system power been reduced below a warning or critical threshold (e.g. the Tx has stopped)?

The signal quality, usually measured in terms of MER, again has the MER reduced below a specific warning or critical threshold?

There are many other monitoring points throughout the signal chain from the input audio all the way to the final transmitted signal, it is important to differentiate between primary indicators and other measurements which can be used after an issue is detected to determine the root cause of the issue and then quickly resolve it.

22. Topic: transmission selection

Q: Has there already been a choice made for high power or low power transmitters in the Toulouse area?

A (Jerome Hirigoyen):

Toulouse area will start next November 5, with one low power local transmitter.

23. Topic: Transmission power

Q: when you say power of the transmitters (i.e. Sydney 45KW), are you referring to PRA or transmitter output power?

A (Les Sabel):

The transmission power should always be defined in terms of radiated ERP (Effective Radiated Power) which is relative to the gain of a half-wave dipole antenna element. The power required for the actual transmitter itself is then dependent on the gain of the antenna system including the antenna gain in dBd, the feeder and filter/combiner losses.

24. Topic: Transmission coverage

Q: Our country, Comoros is formed with islands. How does the system work for all the islands?

A (Les Sabel):

Comoros is a three-island nation between Mozambique and Madagascar. The islands have volcanic origins with tall mountains particularly on Grande Comore. The terrain of each island

should provide some good high transmission sites which will in turn provide good coverage of large areas of each island. Note that hilly terrain may also require more than 1 site per island to get full coverage due to shadowing.

The islands could operate in a single frequency network even though they are more than 73.8 km apart. There will be some zones of self interference however they will most likely be in ocean areas between the islands.

Such a SFN could provide the same services to all islands. Alternatively if each island has its own local radio services then a MFN design could be used.

Regardless of the input requirements for the system it is recommended that a coverage analysis using modern propagation prediction tools is undertaken. History shows that by using such a design approach the transmission system parameters, such as transmitter power and antenna patterns, can be optimised and the cost of the resulting system can then be minimised.

25. Topic: Reference field strengths

Q: what is the height for which the reference field strengths in France are defined: 10m or 1,5 m?

A (Jerome Hirigoyen):

1.5m

26. Topic: Service following

Question: please more clarification on rds following between DAB and FM

A: See answer to question 6 by Lindsay Cornell

27. Topic: SFN design

Q: why the distance between transmitters is specified to be not more than 73.8 km

A (Les Sabel):

The theoretical limit of 73.8 km is based solely on the timing of the transmissions, 73.8 km is the distance that the radio signal propagates in 246uS which is the DAB signal Guard Interval. Theoretically if the transmitters were more than 73.8 km apart and the SFN transmission signals were launched at exactly the same time then there could be some self interference. The further away, i.e. more than 73.8 km the worse that self interference will get. Practically however we must also consider the relative field strengths of the transmissions at the receiver location. If the stronger received transmission is greater than 12 dB above the weaker then there will be little or no interference, the bigger the difference the less impact.

28. Topic: Dynamic Label characters

Q: I would like to ask for a comment about the topic Arabic characters in dynamic label or service labels. The Arab States Broadcasting Union profile specifies to use mainly the "Arabic Presentation Forms-B"-character set (Unicode 0xFE70 to 0xFEFF). (See ETSI 103 176)

However, the Unicode standards does recommend to not use the Arabic Presentation Forms-B.

I would like to know:

Which character sets are usually transmitted by broadcasters in countries covered by the Arabic States Broadcasting Union?

Which character sets should be prepared by automotive receiver manufactures for an Arabic market?

A (Lindsay Cornell):

It is quite right that the Unicode standard recommends not to use the Arabic Presentation Forms-B code points, but Unicode is not simply a presentation system, it is used for editing too. Remember too that Unicode has not withdrawn these characters, because it is recognised that for some applications they are useful. The reason that these code points are used in the ASBU profile is because they do not change shape - there is a 1:1 relationship between the code point and the glyph and this is the relationship receiver manufacturers are used to in low-cost products. The ASBU profile, like all regional profiles, sets requirements on what broadcasters must do: one of those requirements is to encode the labels using the Arabic Presentation Forms-B code points. Almost certainly, the broadcast systems on which the labels will be prepared will use the "normal" 0x0600 range Arabic characters - they are much easier to edit with - but to help ensure good presentation of the labels, the broadcast systems then encode the SI labels and dynamic labels using the Arabic Presentation Forms-B code points. This makes it much easier for simpler receivers to display Arabic because there are no contextual characters in the label: this is why the ASBU profile does not set the contextual flag in the text control field. For higher-end receivers with large screens and lots of processing power, this step can of course be reversed as a pre-processing step: turn the Arabic Presentation Forms-B code points back into the normal 0x0600 range for a "standard" renderer to deal with - in a vehicle there will be other systems using a UI that may already deal with "standard" Arabic.

So, broadcasters that use the ASBU profile will use only the characters specified in the ASBU profile.
Automotive receiver manufacturers should prepare their products to deal with the ASBU profile - that might mean including the Arabic Presentation Forms-B code point glyphs (integrated receiver) or it might mean including in the label preprocessor a routine that re-encodes the label into "standard" Arabic for forwarding to a UI which has the 0x0600 glyphs and the contextual mapping needed to correctly display the labels; it all depends on the architecture of the system.

29. Topic: Automotive receivers

Q: What about dab receivers for cars, you didn't mention them, although it is more important?

A (Les Sabel):

The presentation focused on antennas for cars rather than the actual receiver or infotainment system. WorldDAB consider the radio experience in cars to be critical to adoption of DAB+ and that is why they have a specific working group focusing on that topic, you can see more at https://www.worlddab.org/automotive . This is also why WorldDAB has been active promoting the EECC directives on the inclusion of DAB+ receivers in vehicles in most European countries and the Minimum Requirements for the performance of receivers in vehicles.

30. Topic: Automotive antennas

Q: what about antennas comes originally in the car, it is not enough?

A (Honey Habibollahzadeh):

If the vehicle is equipped with a DAB antenna it should be enough. If it's, as an example, a used car equipped with only FM, the system could incorporate a filter that excludes the DAB frequencies. Then a DAB antenna is needed. If no such filter, it could be enough with a splitter that splits the received signals between FM and DAB.

31. Topic: Announcements

Q: How many DAB+ networks in Europe or AUS are using Traffic Announcements similar to FM/RDS? And are all DAB-receivers in the cars able to react/switch correctly on these announcements?

A (Lindsay Cornell):

DAB traffic announcements are in use in Europe with many broadcasters. Some broadcasters use them in the same way as they use FM-RDS traffic announcements - these tend to be the single station simulcasts. Other broadcasters have recognised that their DAB transmission areas are not identical to their FM areas, or that their DAB transmission is on a national or large area SFN and so that they cannot replicate exactly the way that an FM-RDS traffic area can be created: in these cases the DAB usage will be different to the FM-RDS usage. In other cases, the broadcaster has decided that delivering machine readable traffic information (in the form of TPEG) is more appreciated by their audience than audio announcements. Neither DAB nor FM-RDS traffic announcements are on-air in Australia.

32. Topic: SFN and MFN

Q: What is the comparison between SFN and MFN networks in terms of CAPEX, OPEX and quality of service?

A (Les Sabel):

First it is important to recognise the reasons that MFN or SFN is used. MFN is used when there is different content from the neighbouring transmissions. SFN is used when the area to be covered with the SAME content cannot be fully covered by a single transmission.

In the end there will be little cost difference between MFN and SFN coverage given that the area will be covered, what is important is that the spectrum efficiency will be greater when using SFN in a specific area which has the same content. A further reason for using SFN to provide coverage is that it will provide the best quality of service over the area required. A MFN could be used but then there would need to be service following between small islands of coverage within the overall coverage area when additional transmissions are required – that can lead to breaks/glitches in reception at the transfer time between two transmissions.

33. Topic: Automotive antennas

Q: How could we cohabit between FM/DAB at antenna level?

A (Honey Habibollahzadeh):

We sell antennas that are made for both FM and DAB. Depending on the receiver we have antennas with one cable out for both FM/DAB signals or we have antennas with two cables out. Further we have DAB splitters that is connected to the antenna and divides the received radio frequencies in two, one for FM and one for DAB.