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# Ofcom Technical Codes consultation

## Maxxwave Response

## PART A - PUBLIC RESPONSE

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### Question 1 – Resilience of Broadcast Networks

Maxxwave operates safety of life communications networks and has considerable experience with providing 100% uptime systems that have delivered 100% uptime over 15+ years.

100% uptime is expensive, and we are not advocating for such for SSDAB.

However we do find the Ofcom requirements proposed wholly unsuitable and already have serious and grave concerns about the performance of SSDAB networks.

There is a public interest test to this, as summarised in a few scenarios below:-

- We know of one group who intends to broadcast messages via radio to the homeless regarding shelters in cold winter months, food and health services. These messages will save lives and therefore could be considered “safety of life”. Ofcom has refused to give this group a suitable AM or FM license and therefore SSDAB is the only means of broadcast for this group
- We know of a number of groups who are running local services to their local area. Their local commercial analogue licenses have been auto-renewed for a number of years but no longer carries any local programming. Ofcom is refusing to run AM or FM rounds. Therefore SSDAB is their only means of broadcast
- Running a SSDAB multiplex is a complicated proposition. It therefore cannot be expected of broadcasters that they should run the multiplex, and they must not be penalised if a third-party operator is running the multiplex. In this scenario the service provided must be “fit for purpose” – it must actually be on air
- We are aware of several multiplex operators who are putting very wide ranging “force majeure” clauses in their carriage contracts which allow the multiplex to be off air effectively indefinitely with no recourse to the multiplex operator. The fortunes or otherwise of stations is being placed at the whim of a third-party multiplex operator
- We are aware that the unreliability of certain SSDAB multiplexes is severely affecting the willingness of operators to go onto SSDAB, which is therefore having a significant detrimental impact upon the viability all SSDAB operators
- There is no currently agreed “uptime” and therefore it is not clear what would be “acceptable”

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- The scenarios described are in the context of the Bilsdale Fire. Maxxwave were heavily involved with restoring non-broadcast services after the Bilsdale Fire and we consider this does not represent the typical failures that would be experienced by SSDAB
- We have carried out our own independent off-air monitoring of several SSDAB mutliplexes that are now on air and are finding some are barely reaching 95% uptime

For these reasons and more, we therefore believe a higher-level view should be taken of reliability:-

- In relation to power, National Grid has specified that they cannot currently guarantee 100% power uptime. Therefore battery and/or generator backup should be a serious consideration
- In the world of IP, multiple redundant connections should be a serious consideration
- In the ODR software used by the majority of SSDAB multiplexes, we have noted serious bugs with breaks in service if high IP packet loss and/or connection interruptions are experienced. Using a flaky 4G connection will cause a poor end-user experience
- We have noted several DAB radios actually “locking up” if poor IP connections are experienced due to ODR transmitting out of sequence or unusual corrupt data. We found a car manufacturer that required the engine to be powered off and on to “unlock” the entertainment console

We therefore would make the following higher-level recommendations:-

- All multiplex operators have some form of telemetry that logs the actual uptime (this could be either off-air monitoring or logs from the actual transmitter of uptime). These should be kept for at least 365+42 days = 407 days. As this is simply telemetry (typically 50 kilobytes per day) this is not at all burdensome. This needs to log each individual transmitter uptime and the uptime of each audio service (to consider complaints from the individual services).
- The multiplex should achieve full operation (all sites operating with all services) for 99.25% of time across any 1 year period (2d, 17h downtime). With respect to the services, if a service isn’t actually sending data then it doesn’t have to be on, but if a service is alleging that only perhaps the local services are on 100% and perhaps 12 out-of-area services are going off all the time, this is a consideration
- The multiplex should be allowed reduced operation that will deliver 75% population coverage for periods of time, up to 99.5% uptime (1d, 19h downtime). This could perhaps be one site of a SFN down, on a lower power backup antenna or transmitter, etc

We believe this two-tier 99.25%/99.5% uptime is very achievable and is very fair on the multiplex operator whilst providing a reasonable level of service for the multiplex.

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**Question 2**

Firstly, it appears that some within the industry are confusing vertical/horizontal radiation patterns with mixed polarisation. We firmly believe mixed polarisation should not be permitted on DAB and it should be vertical polarization only.

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In relation to vertical radiation patterns, we have significant experience with this with downtilted and downfire antennas. We note that when considering vertical radiation patterns close-in, typically these rarely resemble the manufacturers recommendations unless the antennas are mounted around 5 wavelengths above a roof – often the roof itself will significantly affect the radiation pattern. In our experience it reduces the radiation downwards which in the case of on-site PMR is very undesirable, but in the case of DAB blocking is highly desirable.

We considered a downtilted antenna for a DAB multiplex we are involved with which is the smallest in the UK. Even across 2 miles, the benefits were minimal.

In our opinion and experience this is something of a “red herring” to refer to vertical radiation patterns as the reality rarely resembles the theory close-in.

We have operated on-site PMR equipment on 200mhz (now used by SSDAB) for a number of years, where the close-in propagation is desired and actually essential, and the signal levels are always a lot lower than hoped for.

As long as it is not mandatory to provide vertical radiation data, we have no real opinions, the results will have a variance of around 20-40dB with theory anyway.

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With respect to hole-punching, we welcome Ofcom being the arbiter. However, we note there is no provision for circumstances where the hole-punching is severe to attempt a “non-interference, non-protection” basis.

We have proposed a very high power site for Round 4 which will cause significant disruption for about 1km around due to very poor DAB reception from other sites. We have run 182mhz at 100W ERP from this site for many years and know first-hand the blocking effect is real. However, there is no public land for 2km around the site, so the population affected is zero.

On another proposed site at a more modest ERP we have a similar scenario – there will be significant blocking, but there is no public land (roads, footpaths, etc), for around 1km away, so the effects again will be zero. Again, consideration needs to be taken of this fact.

Alternatively we are aware of other people proposing installations on hospitals or similar sites where there is no permanently resident population, but a high number of members of the public likely to be using portable DAB radios, and strong consideration needs to be made in this scenario.

We believe we are one of the scenarios mentioned in the consultation document where there was around 5-10kW of commercial DAB (BBC, D1, local DAB) operating from effectively the same site, and a serious issue was made of us running 60W ERP. The additional effect of our

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60W transmitter against the 5-10kW already running was zero, and this demonstrates that incumbent operators are raising concerns for no valid reason in some cases.

We do have considerable evidence however that blocking does exist and is a real problem – we note some stakeholders believe it is some form of "urban legend". The problem even exists with FM transmitters – we have a site with a high power heavily filtered FM transmitter on and this causes blocking to DAB when cars pull up in the car park outside.

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We do wonder if with this blocking question if any consideration has been made that adjacent channel interference is worse than channels which are further separated in frequency. There are masks that give more protection to the immediately adjacent channel which does not appear to have been considered.

We note that the terms "ACI" and "hole punching" are often used interchangeably within the industry when they are two different phenomena – strictly speaking "ACI" relates to interference to a service on an adjacent block and relates to mobile units several km from both transmitters. "Hole punching" relates to immediately around a new transmitter, due to overload of a receiver.

**Question 4 - Acceptance checks**

We would expect Ofcom to attend the first installation by each installer to witness the compliance tests being undertaken using the installer's own equipment, then verifying with the Ofcom equipment.

We are concerned that some installers lack the skills or knowledge to undertake complicated tests such as filter response tests, intermodulation tests on a live system, calculation of spectral occupancy and similar.

We would also suggest that Ofcom considers that a number of filters are not particularly temperature stable.

In relation to spectral masks, we would suggest that Ofcom considers random sampling off-air from outside the transmitter site to check for spectral compliance, particularly on block 7D. We have previously witnessed engineers installing one filter to "pass the test", then removing it immediately afterwards.

Possibly requiring the model and SERIAL NUMBER of all equipment, including the filter, on the compliance test report, and requiring a report to be submitted to Ofcom if any equipment is changed could be a good idea. If a random test is undertaken and the same serial number equipment keeps appearing this could suggest deception.

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**Question 5**

Firstly, we would like to express our disappointment Ofcom has not yet permitted 9khz audio on AM broadcast through a change to the analogue technical code. This is desperately needed by most UK AM broadcasters to improve the viability of their transmission platform.

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Secondly, we are getting a number of complaints from stations regarding audio levels, that their level is too low, or that new stations on SSDAB are far too high.

Traditionally with DAB in the UK, Arqiva has strictly applied EBU R.128 in relation to audio levels on DAB to give a consistent experience for listeners.

We have installed processors fed via AES/EBU digital feeds on Arqiva multiplexes, and at the request of the customer have “heavily processed” the audio to make it “louder than everyone else”. What we find is that within a couple of days the audio level is reduced by Arqiva, who confirm they have a system that monitors the average level and reduce it. Effectively therefore “heavily processing” DAB audio when presented to Arqiva is pointless as they will reduce the level, simply reducing dynamic range.

Off-air monitoring a number of multiplexes and services we note with Arqiva the long-term loudness is consistent with EBU R.128.

However, we note a number of SSDAB operators are not having regard to EBU R.128, and therefore several new stations are “loud”. This causes listener annoyance. It also gives listener fatigue due to reduced dynamic range and a number of other factors.

It is something of a “prisoners dilemma”, that the person being “too loud” perceives a benefit. However if all stations then become equally loud, any benefit is lost, and it significantly reduces dynamic range, which is one of the primary benefits of DAB over analogue services as it has no background noise to contend with.

Tech 3344-2006 has an audio level presentation standard for DAB in accordance with EBU R.128, as does the BBC document “Audio Quality Information & Standards”.

We feel more work needs to be done in this regard to standardise audio levels across DAB services.

We are, at this stage, deliberately not specifying WHAT the level should be, as this needs to be open to further analysis.

It does appear the average level is typically around -14 LUFS across most services and this is where Maxxwave normally aims to set levels for our DAB services.

We have noted SSDAB services running just -5 LUFS, which is very heavily processed and a lot louder than “average”, causing significant annoyance to listeners.