world dab

SS-DAB Distribution – A UK-based example
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A 'not-for-profit' company providing digital audio broadcasting audio and data services to the Greater Norwich Area since 2015.

Awarded a long-term DAB broadcasting licence for Norwich and surrounding areas in 2022.

[United Kingdom]:

Working closely with the operators of the Cambridge Small Scale multiplex – sharing ownership of the King's Lynn Small Scale multiplex in the North of Norfolk.

Carrying just under 20 services, mostly DAB+ at 48kbps (stereo).

Providing support for other prospective non-profit DAB operators.

Future Digital Norfolk Limited – Background Information

- Future Digital Norfolk Limited began operating a single transmitter DAB service for the City of Norwich in East Anglia in the summer of 2015 (DAB Block 9A, 202.928MHz)

- The service was one of ten trial licences granted that were originally intended to operate for only a few months.

- The service was provided using open-source software and hardware provided by Ofcom the UK broadcast radio regulator
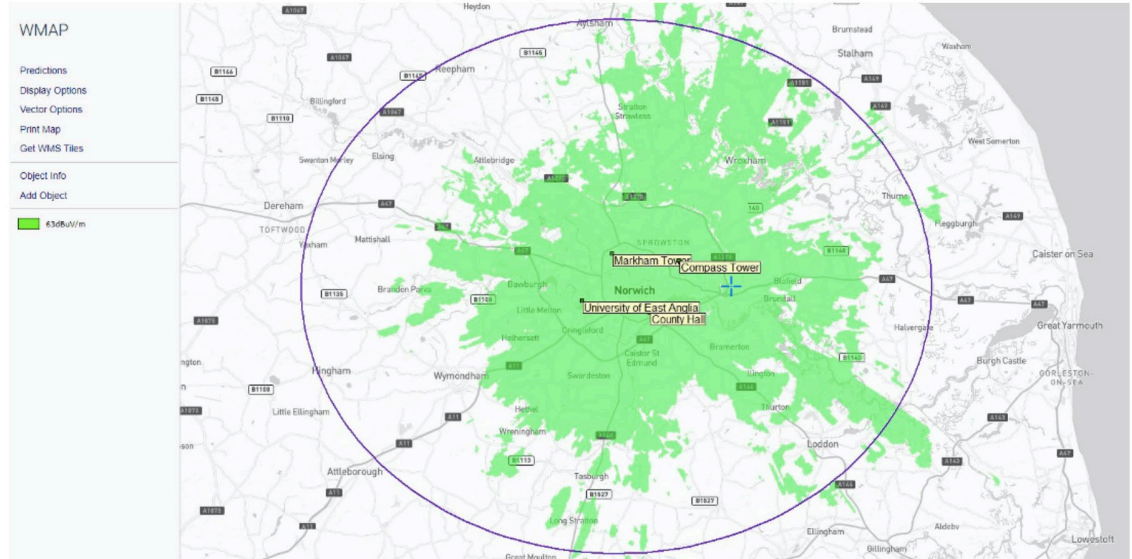

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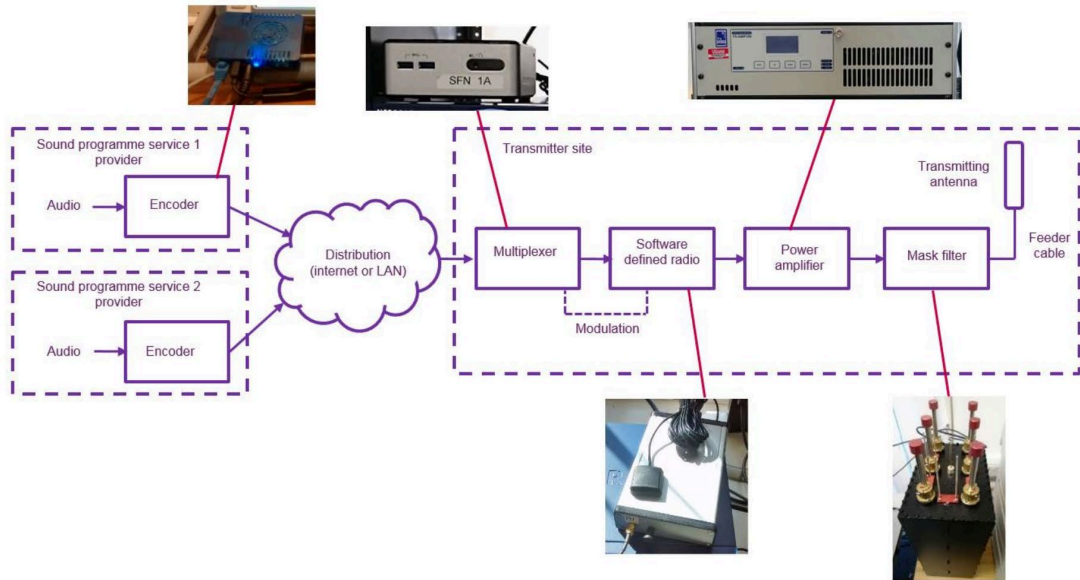# Future Digital Norfolk – Trial Licence Coverage 2015 - 2022
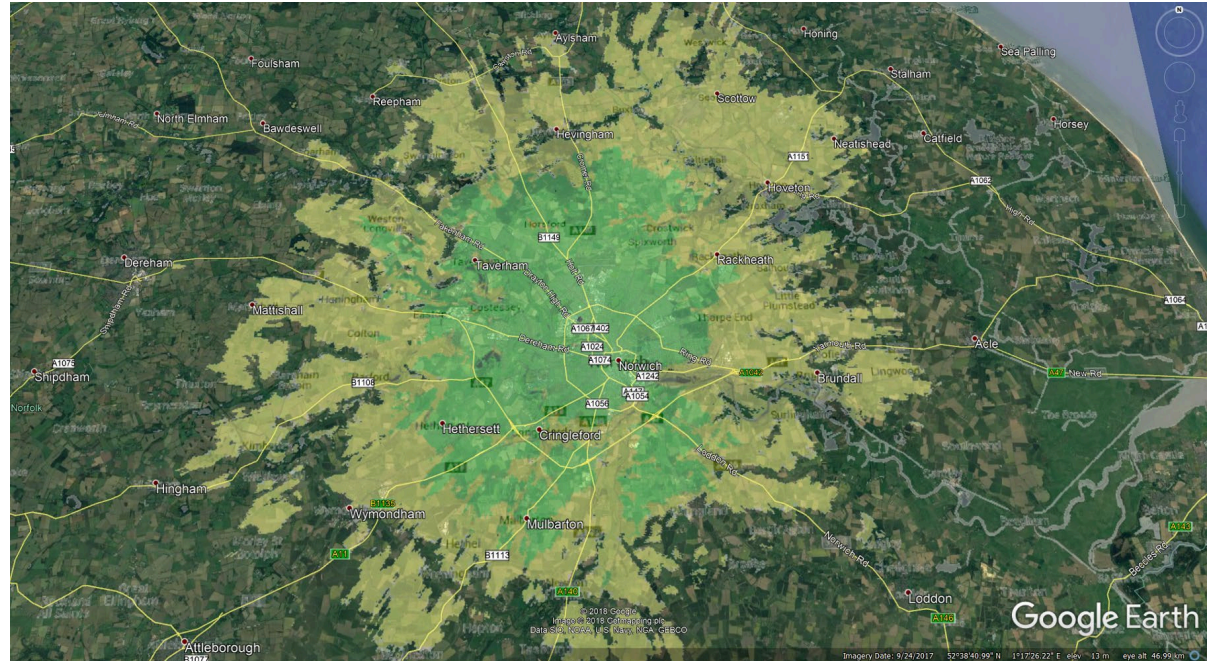
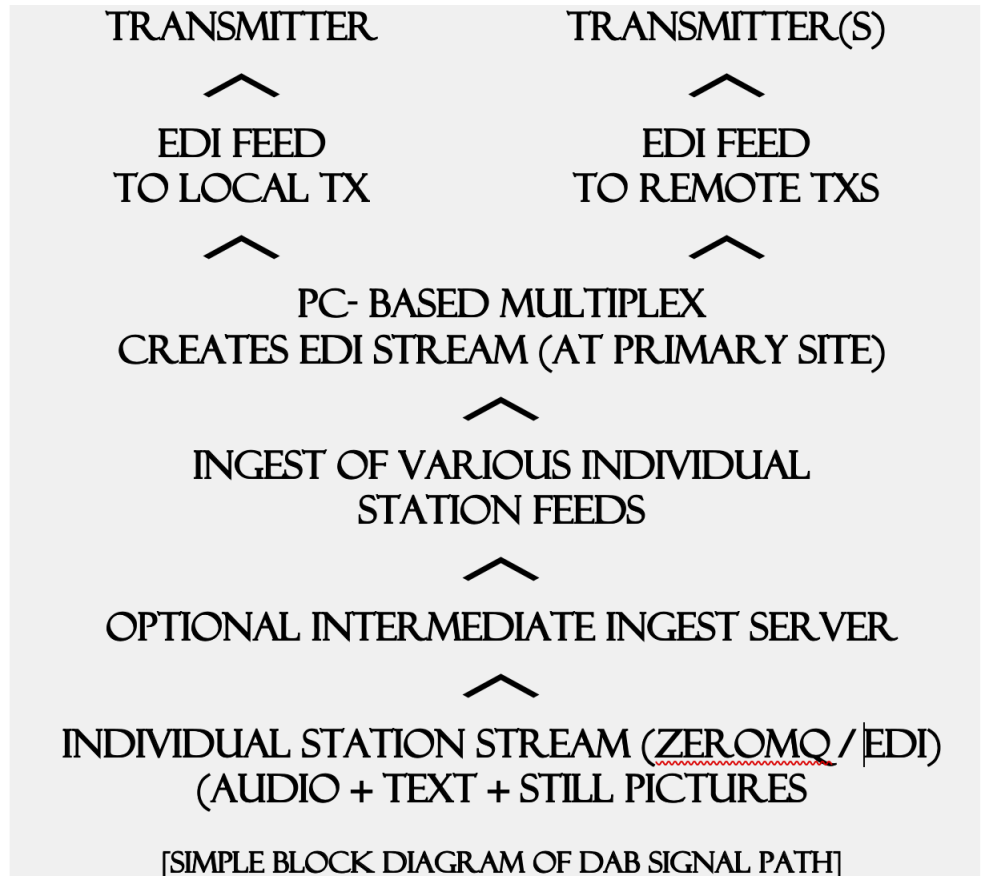# Future Digital Norfolk – Long-term licence application

Map of Proposed > 63 dBµV/m DAB Coverage - Norwich

Future Digital Norfolk Limited – Basic System Block Diagram

Future Digital Norfolk Limited – Simple Signal Path Diagram

TRANSMITTER   TRANSMITTER(S)

^   ^

EDI FEED   EDI FEED
TO LOCAL TX   TO REMOTE TXS

^   ^

PC- BASED MULTIPLEX
CREATES EDI STREAM (AT PRIMARY SITE)

^

INGEST OF VARIOUS INDIVIDUAL
STATION FEEDS

^

OPTIONAL INTERMEDIATE INGEST SERVER

^

INDIVIDUAL STATION STREAM (ZEROMQ / EDI)
(AUDIO + TEXT + STILL PICTURES

[SIMPLE BLOCK DIAGRAM OF DAB SIGNAL PATH]

Future Digital Norfolk Limited – Signal Path In More Detail

- **GETTING INDIVIDUAL STATION FEEDS TO THE MULTIPLEXER**

- Individual station programme feeds can be "pushed" from the station from a Raspberry PI or Intel NUC or similar.

- Alternatively, they can be "pulled" from an existing web-stream or dedicated non-public stream.

- Primary and secondary (back-up) streams usually provided.

- Dynamic Label Text (DLS) messages can be inserted at each station's studio or, in the case of dropped provisioning, Generic (station IDs etc.) can be added at an intermediate PC (running ODRaudioenc & ODRpadenc) before the multiplex PC (running ODRdabmux)

- Station Logos can also be inserted at the station, or, at and intermediate PC as above.

- SPI (Service and Programme Information) (ETSI TS 102 818) not yet implemented.

- Stations currently stream to predefined IP addresses that terminate at our original (2015) DAB TX site.

- One address points to a standard BT ADSL line, the other to a local "Ethernet First Mile" provider for enhanced redundancy.

- This approach is due to be replaced by stations sending EDI to a Fully Qualified Domain Name (FQDN) record to allow for greater routing flexibility in future without the need for stations to change settings individually.

Future Digital Norfolk Limited – Signal Path In More Detail

CREATING THE MULTIPLEX

- In the original Ofcom provided ODR configuration 0MQ feeds were routed to an Intel NUC which created both the DAB multiplex and the modulation waveform for the SDR.

- Current set-up is "an interesting hybrid"! The original ODR equipment (retuned to our new frequency block 9C (206.352 MHz) remains in use at our original Markham Tower Transmitter Site. A Gates Air 'Maxiva Ultra Compact' (VAXT150G2DA) has been installed at our second site at Norfolk County Hall.

- The two sites are connected by a point-to-point microwave link, currently configured to transport as an Internet connection.

- Individual EDI feeds arrive at Markham Tower and are feed over to County Hall where a NUC is used to create a composite EDI stream.

- The EDI stream feeds the Gates Air transmitter and is also sent back over the microwave to feed the ODR system located there.

- A third site has been cleared to use to the North-East of Norwich, but contractual issues with the building owners mean that this is not yet operational. When this site comes into use it will be connected to each of the existing DAB transmitter sites via additional microwave links.

- Ofcom has suggested that we may be permitted to add further low-power filler sites with relative ease and there are some coverage weak spots that we may seek to address, ideally linking via microwave.

Future Digital Norfolk Limited – Norfolk County Hall Transmitter
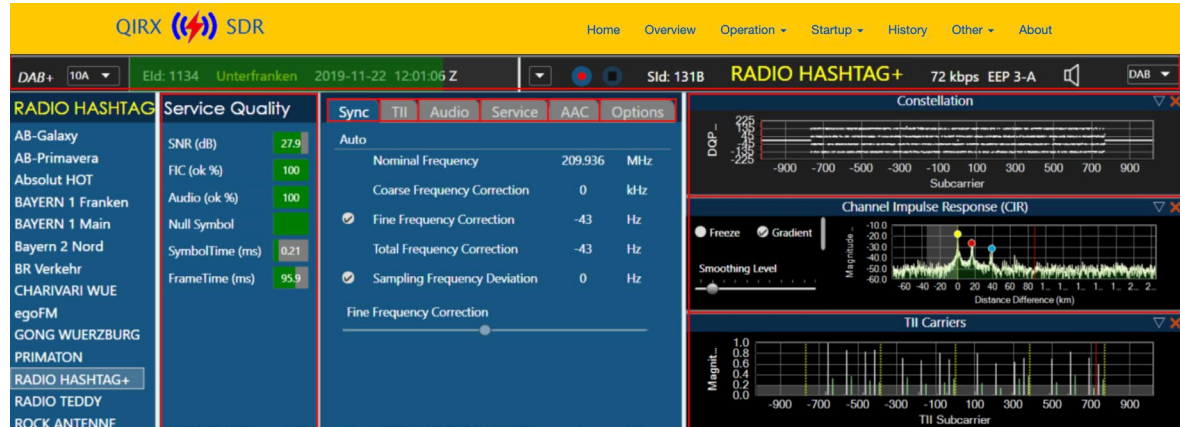
Future Digital Norfolk Limited – Signal Delivery Issues

Our system has developed piecemeal over a number of years – *this is not ideal!*

- We should NOT be using publicly visible IP Addresses. Rather, than hard-coded IP addresses, we should be using DNS to steer our connections.

- We should also be using VPNs / tunnelling! Encapsulating data transports within a VPN would be more secure.

- The current microwave link should be configured as a "virtual CAT 5" to provide fixed delay times. The current IP routing using the Internet should be removed.

- We should have a wired broad-band connection into County Hall (imminent but not yet operational).

- We should be creating a second standby multiplex and EDI stream

- For some services, we currently use a virtualised, cloud-based, solution to ingest service provider's audio and meta-data (as either ZeroMQ or EDI) and producing the EDI feed into the multiplex.

- The cloud-based virtual machine has the capacity to feed via a VPN. The connection being established from multiplex, thus allowing for IP changes at the multiplex and for internet connections without public IP addresses.

Future Digital Norfolk Limited – Monitoring - Inovonics DAB/DAB+ SiteStreamer

Future Digital Norfolk Limited – Monitoring - QIRX

Future Digital Norfolk Limited – Monitoring - ProDBR

Thank You.

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