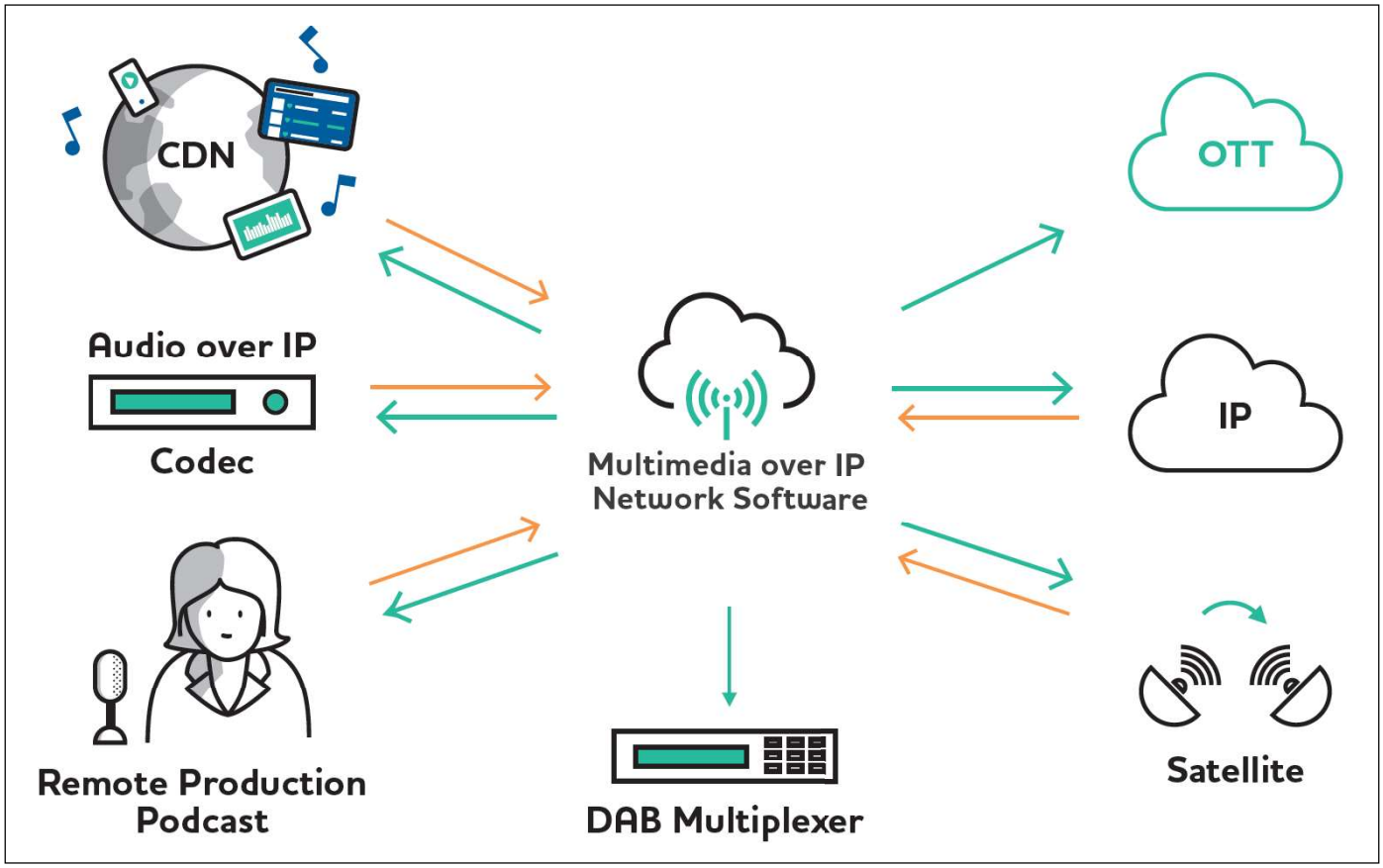

Protect the Elements of Your DAB+ Network

There are benefits in keeping your studios, headend multiplexing and distribution network independent

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The Digital Audio Broadcasting standard has become an integral part of our broadcast world. Australia completed its DAB+ rollout in June. The Bayerische Rundfunk in Germany plans to expand its network to 77 additional stations. In France, the next step of national DAB+ deployment shall happen in the autumn of this year.

The speed at which DAB is implemented depends mostly on a country's government. National broadcasters must then follow the call for digital switchover where it has been decided.

No one can say today how sustainable DAB+ technology is, or if 5G will be the rising star, or that any other technology is the future for audio broadcast.

Considering this, it makes sense to plan a system that is economical in budget and rack space, one that offers exchangeability of equipment and 365/24/7 transmission robustness.

This can be achieved by a "non-locked-in arrangement" that keeps studio networks, headend multiplexing and the distribution network independent. Such a solution should also be adaptable to future technologies in order to enable a changeover from DAB to the next distribution standard by means of an update. 2wcom's products support such an approach.

Above Multimedia over IP network software allows the modern digital network to do much more.

> **In addition to the ability to replace various parts as necessary, there are many advantages to separating the audio portion from your DAB distribution system.**

Local studio contribution networks

In addition to the ability to replace various parts as necessary, there are many advantages to separating the audio portion from your DAB distribution system.

All studios of a network can fall back on a unified solution and retain their flexibility. Connection configuration allows for independent selection of the most suitable audio codec. From a budgetary view, such an approach allows all studios in a network to rely on existing audio over IP systems. Or, if existing equipment is at its end of its life, broadcasters have the opportunity to modernize their studio networks.

On the studio side, the AoIP encoder should be adaptable to upcoming broadcast standards. The device should provide multiple channels to save rack space and energy costs, and it should support all audio formats normally in use at the studios.

For example, this allows choosing audio codecs that have a positive impact on bandwidth economies, such as E-aptX, MPEG Layer, or AAC profiles. By providing common protocols and standards for internet interoperability, this assures compatibility between networks.

Absolute stability when operating in wide-area networks is mandatory; this can be attained with features for transmission robustness, like two internal or external power supplies and software redundancy mechanisms. In this respect, the new forward error correction mechanisms SRT (Secure Reliable Transport) and RIST (Reliable Internet Streaming) offer advantages like bandwidth or latency savings in comparison to Dual Streaming (SMPTE 2022-7) or Pro-MPEG FEC.

Coordinating studio streams at the headend

At the headend, a Linux-based multimedia over IP network server software is recommended, because it supports the future-proven approach to be expandable for new audio and video broadcast standards. It gives operators flexibility in system design, because the installation can be done on a hardware server or a virtual machine or as a service in the cloud.

The 2wcom solution consists of containers that can be run separately and isolated to achieve good scalability and reliability of the system. Further, Kubernetes can be used as an orchestrator to manage and monitor the containers.

From a budgetary point of view, the transcoding facilities of the software solution not only support the distribution via DAB but also via IP or satellite, or to feed CDNs, OTT services and cable networks. For this purpose, the solution provides protocols and standards for solid network conditions for unicast, multicast and multiple unicast, such as AES67 (and related standards), EBU Tech 3326 or SMPTE ST 2110.

Moreover, due to its channel scalability, it provides the advantage of high density. In interaction with the DAB Ensemble Multiplexer, the multimedia over IP network software has the following tasks:

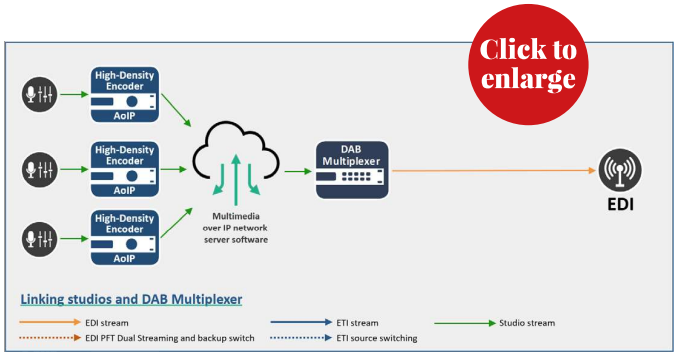
- Transcoding to linear PCM / AES67 of any codec or protocol that the studio forwards.
- Routing to coordinate the incoming streams and available interfaces.
- Clock synchronization via NTP. Because DAB is GPS-tagged, the software solution must adjust the clock of the incoming streams accordingly.
- To forward the station programs via an internal interface to the Ensemble Multiplexer for DAB+ signal assembling.

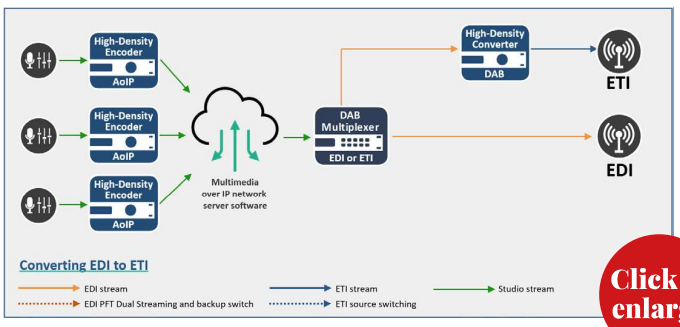
Headend to transmitter sites

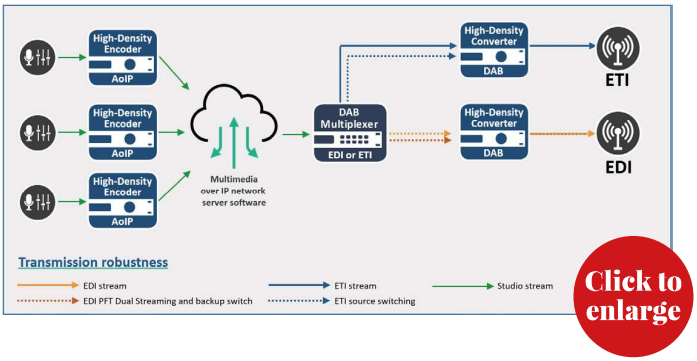
It is obvious that broadcasters have to deal with certain challenges, such as operating DAB in networks —including

Below Left Studio sites can be kept on the existing infrastructure, and all sites are independently interchangeable.

Below Right Operating legacy ETI and EDI transmitters in parallel.







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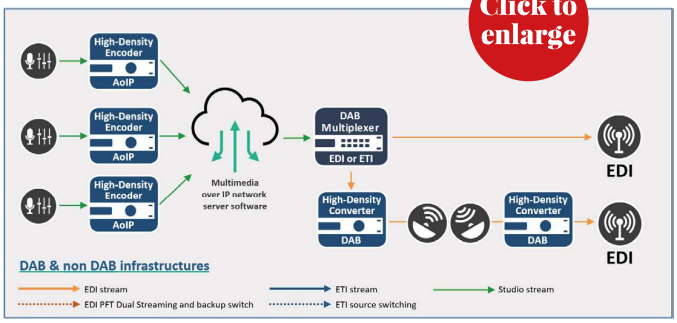

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EDI and ETI multiplexers, or legacy ETI and EDI transmitters in parallel — as well as using infrastructures not originally intended for DAB, such as DVB-S/S2 or ASI.

To cope, operators need solutions that enable them to use new and existing infrastructures in parallel.

For example, a high-density DAB+ converter allows reception of the DAB+ stream from legacy ETI and EDI multiplexers and converts the signals accordingly to ingest them into the EDI/ETI transmitters in the field.

As high-density solutions, the devices offer multiple EDI and ETI in/outputs. In addition, bidirectional ETI interfaces (in/out) are desirable to increase the number of ETI outputs if ETI mirroring is needed.

Moreover, the equipment needs to provide a sufficient number of Ethernet data interfaces in and out. Furthermore, an optional satellite tuner and ASI interfaces enable integration into cost-efficient, existing satellite distribution systems or ASI networks to optimize coverage and distribute programs to regions still lacking broadband IP.

For synchronization of all sites, the 2wcom solution provides PTPv2 or an external 10 MHz signal. In case of failure, an internal recovery from the EDI stream by jitter removal assures an ongoing synchronized transmission.

Some legacy ETI transmitter types make it necessary to provide a clock recovery so that the E1 output clock does not change too much in terms of the frequency. This is achieved by repeatedly restoring the GPS reference value using an algorithm calculation.

For redundancy, the solution provides PFT Dual Streaming. The ensemble multiplexers can send the streams to the two different data interfaces of the converter. Behind the interfaces, these streams are merged to recover lost packets. If bandwidth is not an issue, two networks can be set up and operated in parallel. To make full use of the dual streaming concept, it makes sense that the equipment not only combines the streams classically. If a stream fails on one data interface, it must be possible to check on the second data interface whether the stream can be received.

Above Left
Reliable distribution of EDI and ETI streams.

Above Right
Distributing DAB+ via ASI or DVB-s/S2 enables use of existing infrastructures and reaching regions still lacking IP.

Below
An economical and robust solution for IP networks that increases the coverage for DAB+ distribution.