



Regional DAB+ network feeding via IP links
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Introduction

- Swiss company with 12 employees, whose activity started in 2014
- DAB+ operator with a swiss license dedicated to local coverage (national wide, about 42 transmitters for local services)
- We started with small MFN coverage's and progressively implemented SFN solutions to improve services
- Later, France (more than 300 radio stations on-air) and UK small scale market has been addressed (started in 2022)
- In Switzerland we deploy for another operator (DABcom, 4Layer) a large SFN network
- Solutions based on ODR (Open Digital Radio) software, with in-house integration services management, monitoring, ticketing
- We support in addition to our internal tools 'on the shelf' market products
- Full IP based network for contribution and distribution

Full IP Based Network

- When starting activities in 2014 it was clear that IP would be the protocol used for any content/stream transport.
- As a consequence EDI is used and ETI over G703 was an exception to feed some existing transmitters at the very beginning (local conversion just before the transmitter input).
- Satellite links even if very reliable was not an option for our application, as too expensive for a local coverage.
- Fiber and consumer xDSL lines were used from the radio studio.
- Transmitter sites were connected via the same solution and/or via radio IP links.
- Reliable transport was needed to carry the EDI stream between DAB encoders, multiplexers and transmitters, so ZeroMQ (network library) was implemented in the ODR software modules.
- This provided robust UDP IP stream by adding buffering, FEC (Forward Error Correction), Interleaving, Encryption
- First MFN sites were hosting the DAB multiplexer next to the transmitter. Only audio contributions were remotely carried to a transmitter site.

The network is growing

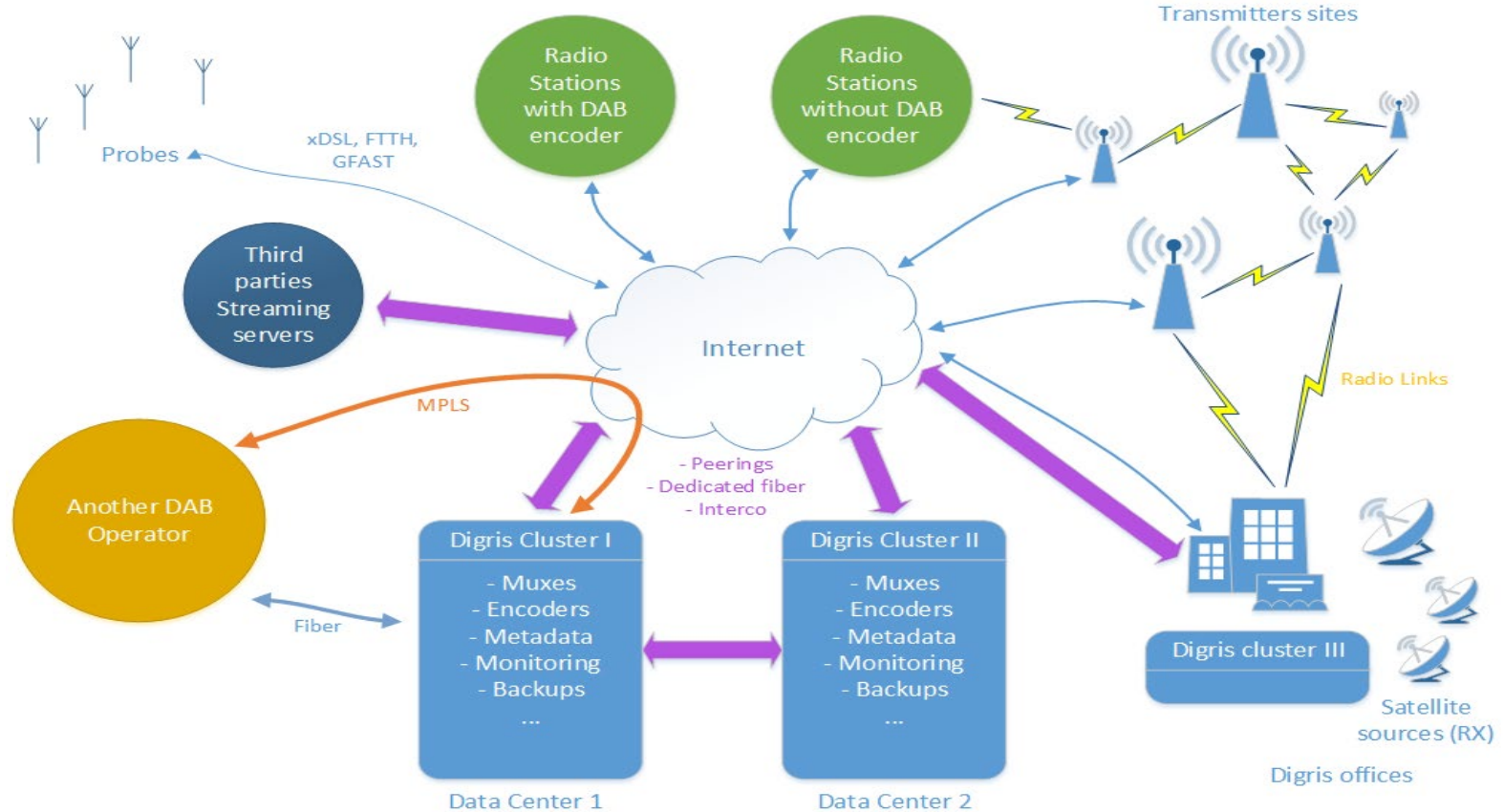
- Specifics developments were in progress to implement reliable timing information transport and management. A lot of tests has been carried out to validate compatibility with various market transmitters brands. The goal is to ensure stable SFN operation under problematic connectivity.
- Later with the deployment of additional sites and new service area, improvements on existing coverage by adding several transmitters in SFN, Multiplexers moved in data centers. (Virtual Machines on our own clusters).
- To get more control when using the Internet, the acquisition of our own AS (Autonomous System) with our associated IPV4 and IPV6 address classes.
- BGP (Border Gateway Protocol) announcement via various peering allows us to control our routes via the Internet.
- Internaly routing protocols like OSPF (Open Shortest Path First) provide redundancy on various links.
- Sites interconnection is improved by adding data link between them, to then provide loop or mesh network topology for each coverage area.
- Moving from ZeroMQ to new internal EDI tools gateway to add TCP IP (transmission control protocol) to fit 'industry official standard'

The network is growing

- Deployment tools and versioning are in place to handle systems size with ease (impact on monitoring too)
- Additional tools for contribution and stream routing distribution has been developed to ease the daily operations.
- Systems and Services monitoring have been dramatically improved at the same time.
- DAB+ Multi-encoders clusters and metadata managers has been implemented.
- Multiple backup scenarios for audio source from radio stations
- Integration of PADtool providing an easy solution to the radios when using SLS (MOT Slide show on a DAB services). It also allow publications to RadioDNS database.

- As a general rule to limit third parties impact we always install our own material in data center, sites, partner location etc. In case of a crisis situation we would like to keep some visibility and control over the network.

Network topology today



Additional services and developments

- To provides new revenues sources for the new radio stations Addcast has been developed and integrated in the system to automate advertising on SLS displayed on a DAB receiver screen. Local market is key for the radios ;)
- Addspot is another service, providing automatic and clean audio insertion on radio program. Over the air content/adds are automatically logged and reported to the advertiser too.
- Small transmitter for gapfiller needs is in progress. A few watt box with Ethernet input and RF output with full SFN capabilities. 'Pop Up' transmitter with monitoring and remote control management to maintain a perfect view of the network.
- New Internet services like streaming will be implemented, as per request by our customers. (Today streaming platforms are only used for internal uses, when a customer don't host a DAB+ encoder on their premises or for backup purposes)

Thank you for your attention ! Q&A

