



WorldDMB Workshop in Collaboration with NAB and SABC Johannesburg

Structure and Efficiency of the DAB+ System

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Dr. Les Sabel, WorldDMB TC and S-Comm Technologies

Overview of the DAB+ System

Overview

DAB Family of Standards

DAB+ Features

Ensemble Structure

System Structure

Overview of the DAB+ System

An Introduction

Welcome to the DAB Family of Standards



Overview of the DAB+ System

The DAB Family of Standards



The Eureka Family of Standards

- DAB : 1995 Original audio with PAD and data services standard
- T-DMB : 2006 added video services for Mobile TV and enhanced data streaming
- DAB+ : 2007 enhanced audio service efficiency

Why DAB+?

- 2.5 times more audio services than DAB due to the use of HE AAC+ v2
- Slightly better coverage – 1 to 2dB better than DAB
- More flexibility for Programme Associated Data delivery
- PAD content has much stronger error protection



Overview of the DAB+ System

DAB Standards

For detailed description of the DAB+ system refer to the following ETSI standards documents

- EN 300 401 Main document
- TR 101 496-1, -2, -3 Guidelines of use and operation
- TS 102 563 Transport of AAC audio



<http://www.worlddab.org>

Overview of the DAB+ System

DAB+ Features

Overview of the DAB+ System

DAB+ Features – Audio - Room for Lots of Services from existing broadcasters

Sydney



Perth



Brisbane



Adelaide



Melbourne

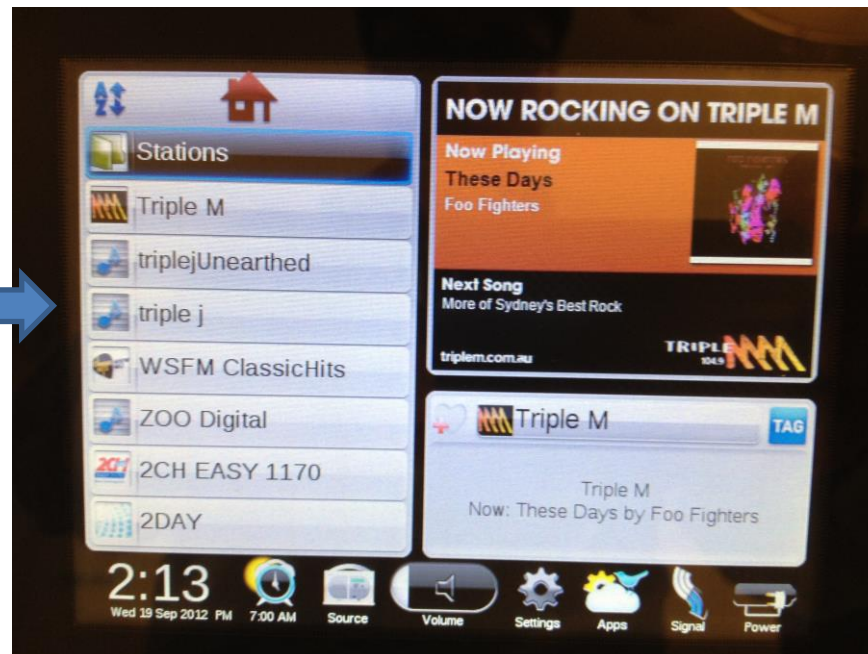


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Choose the station from a list

No more need to remember the station's frequency!!!

Station list



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PAD – Scrolling Text (Dynamic Label Segment)

Straight forward, effective

Limited to 128 characters per text segment

All DAB+ receivers have DLS

Good receivers should have options to vary scroll speed



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PAD – SlideShow (SLS)

Further strengthens the audio message

Standalone advertising during song items

Promotion of station activities, e.g. OB's

Traffic and weather reports

Race / betting and stock market information

Local news, happenings, community events



Next Race
12:47 Angle Park Greys Race 7

Tips by Jin Jacques

1. Twilight Fantasy
2. Genstone Rusty
3. Victa Anity
4. Knight School

Sky Ratings

1. Twilight Fantasy	188	----
7. Genstone Rusty	85	----
4. Suzy Tee	78	----
5. Battle Blitz	78	----

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Data Services

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Data Services – Electronic Programme Guide (EPG)

Very useful tool for promotion of programs, talent, competitions

Especially useful for multilingual national broadcasters with blocked programming

Can be multiple ensemble to network based



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Data Services - Other

Traffic e.g. TMC and TPEG can provide up to the moment information on

- current traffic flow and congestion
- fuel locations and prices
- parking

Journaline

- Hierarchical categorised text service

Custom Applications



Overview of the DAB+ System

Ensemble Structure

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Ensemble Structure

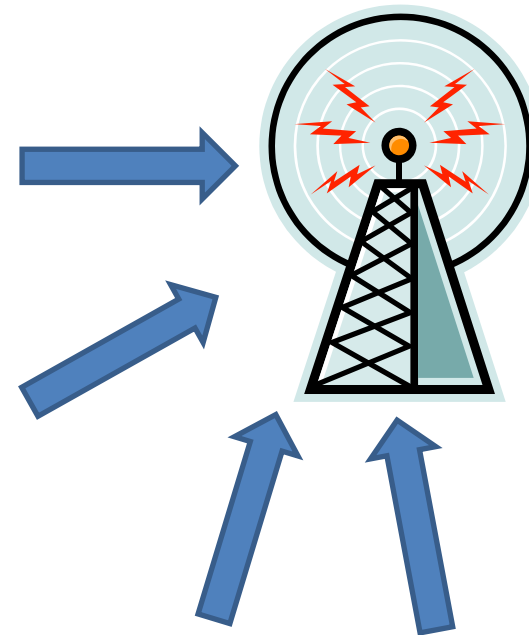
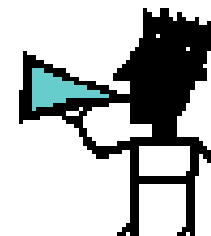
Multiple different radio stations transmitting on the same frequency



Multiple different radio stations use the same transmitter



Multiple different radio stations share the cost of that single transmission



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Ensemble Structure

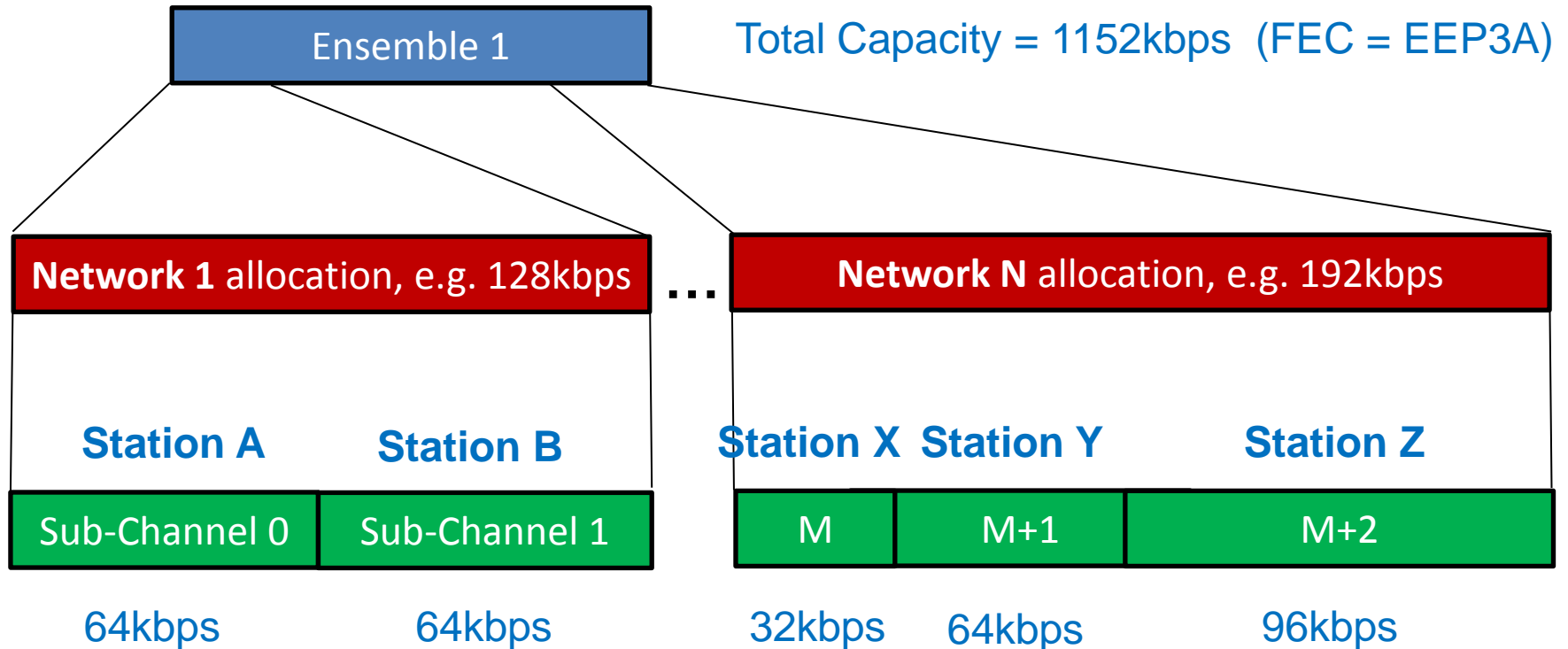
An Ensemble will typically carry multiple services from multiple radio networks, example:

• Network 1 – 2 stations (services)	128kbps
• Network 2 – 4 stations	256kbps
• Network 3 – 3 stations	192kbps
• Network 4 – 9 stations	576kbps
Total 18 stations	1152kbps

- Each network can have their own allocated capacity on the ensemble
 - No other network has access to that capacity
- Each network can **reconfigure** their allocated capacity anytime without impacting the other networks' services
 - **Pop-up services** change their name and sometimes bit rate regularly

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Ensemble Structure



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Ensemble Structure

Each ensemble has

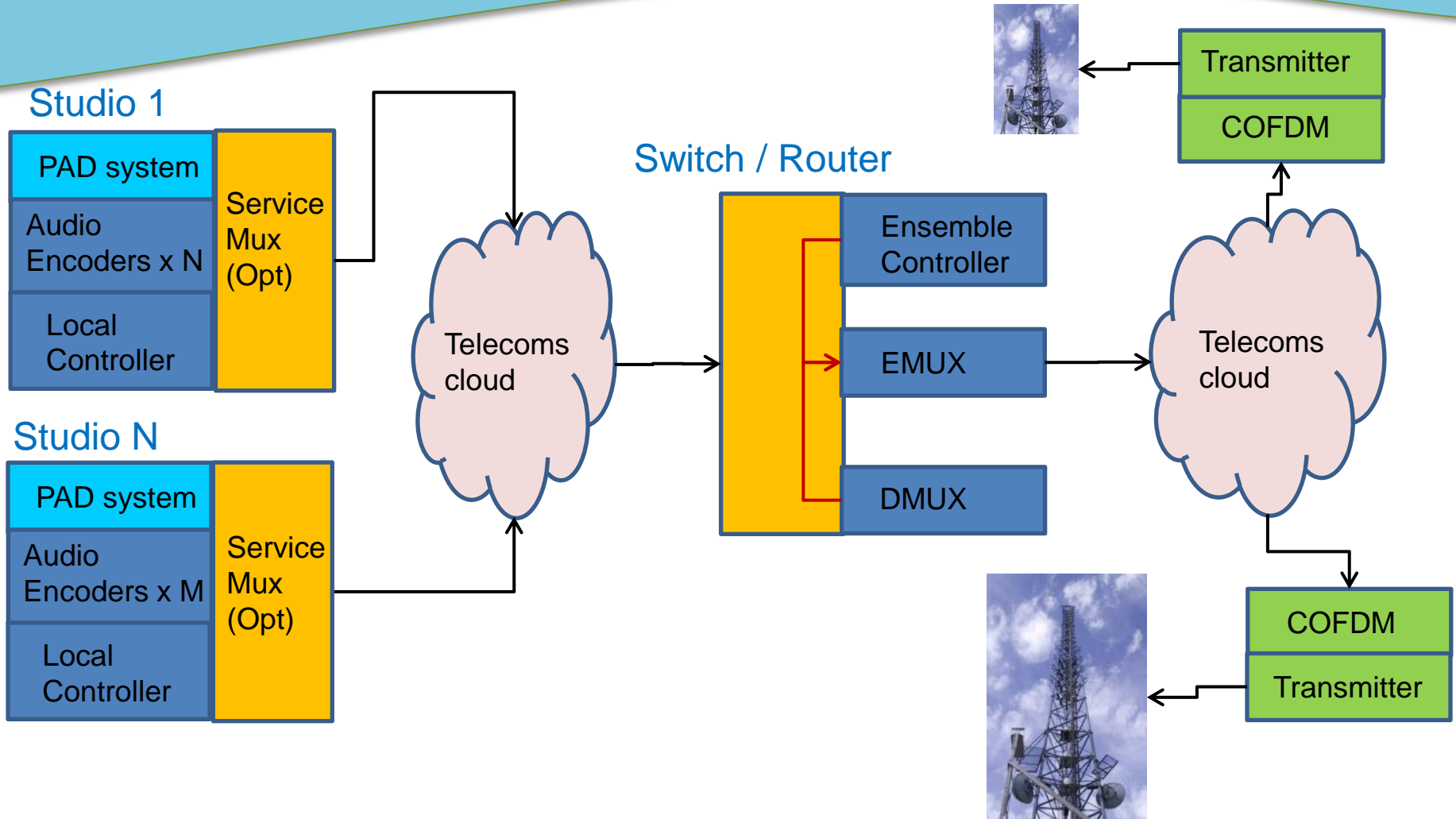
- Its own (unique) Ensemble Label
- Its own Ensemble ID code
- Can carry unique identifying code of the transmitter (TII)
- a Signalling Channel – the Fast Information Channel (FIC)
 - Provides details about all services (stations) carried
 - Labels
 - Bit rates
 - Data location in the stream
 - Provides details of all data services and PAD
 - Provides announcements and warnings

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System Structure

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Example DAB+ network



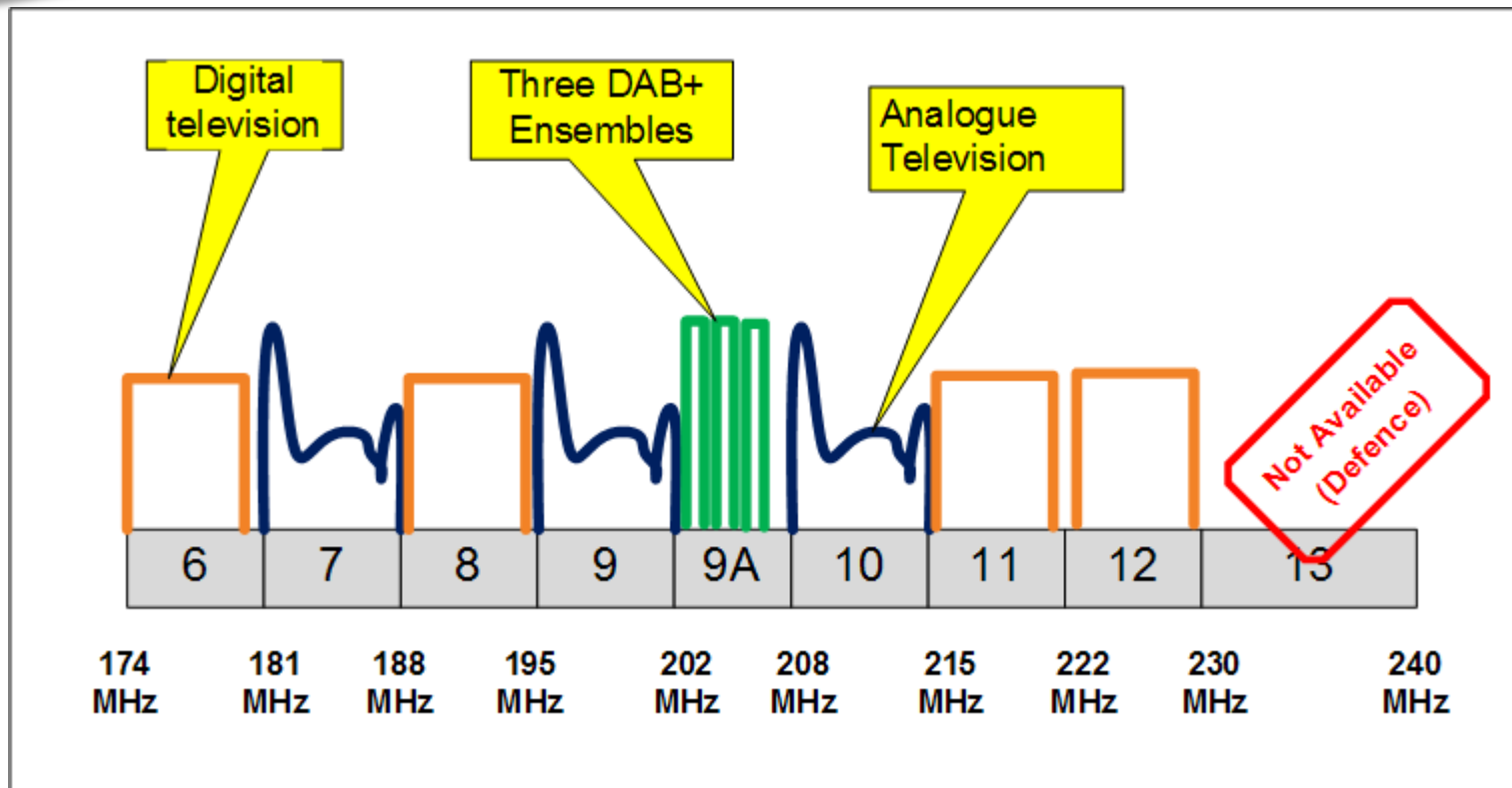
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FEC Code Rate Comparison

FEC Code	Code Rate	Capacity (kbps)	Number of 64kbps channels	Approximate power required relative to 3A
1A	1/4	576	9	-6dB
2A	3/8	864	13	-3dB
3A	1/2	1152	18	0
3B	2/3	1536	24	+3dB
4A	3/4	1728	27	+6dB

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DAB+ Transmission



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RF Spectrum

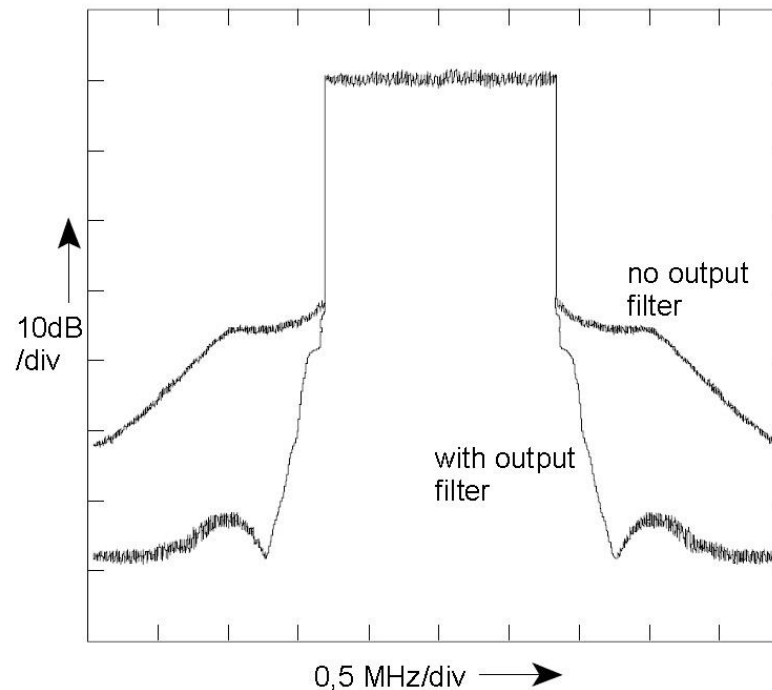


Figure 4.3.4: Example of DAB transmitted signal spectrum (VHF band III)

Signal bandwidth = 1536 carriers at 1kHz each => 1.537MHz
Channel bandwidth = 1.712 MHz

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Network Options

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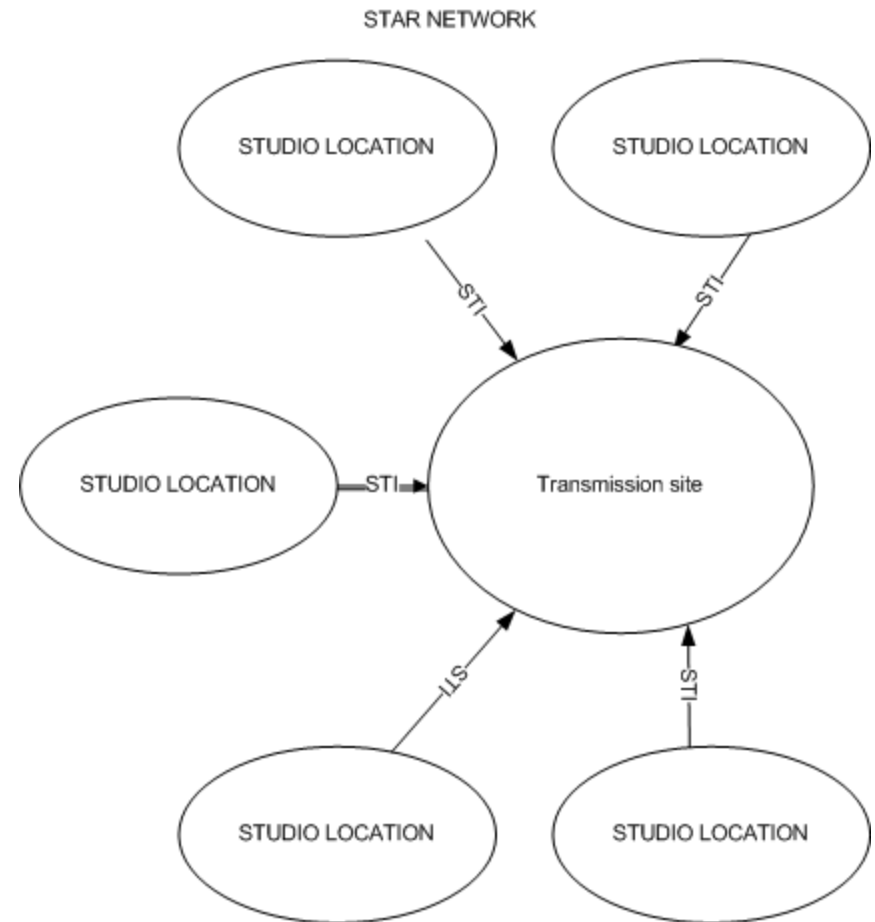
Star Network

Central multiplexing equipment

Individual links per studio site

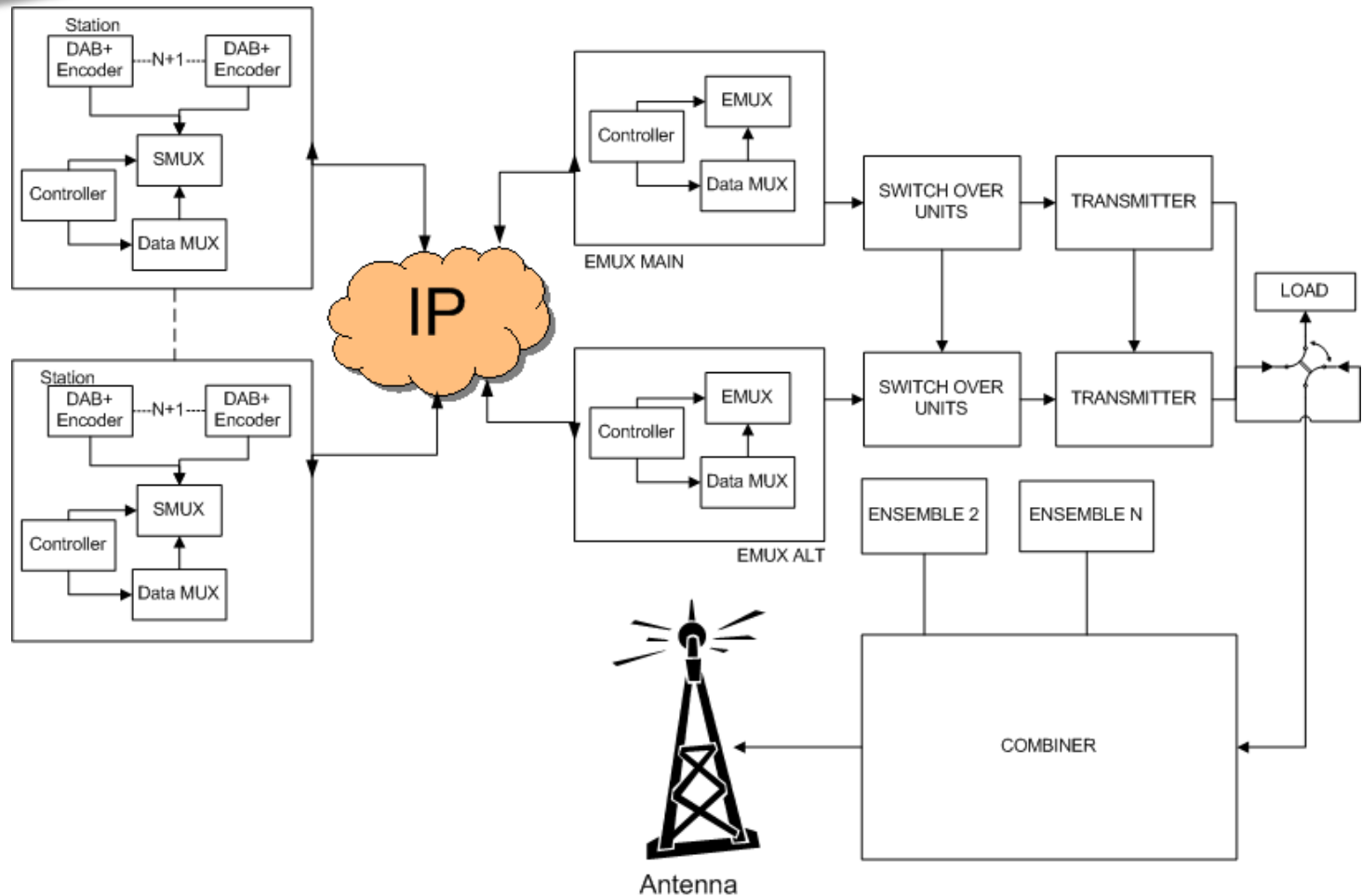
Stations are in control of their content

Privacy



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Star Network - Details



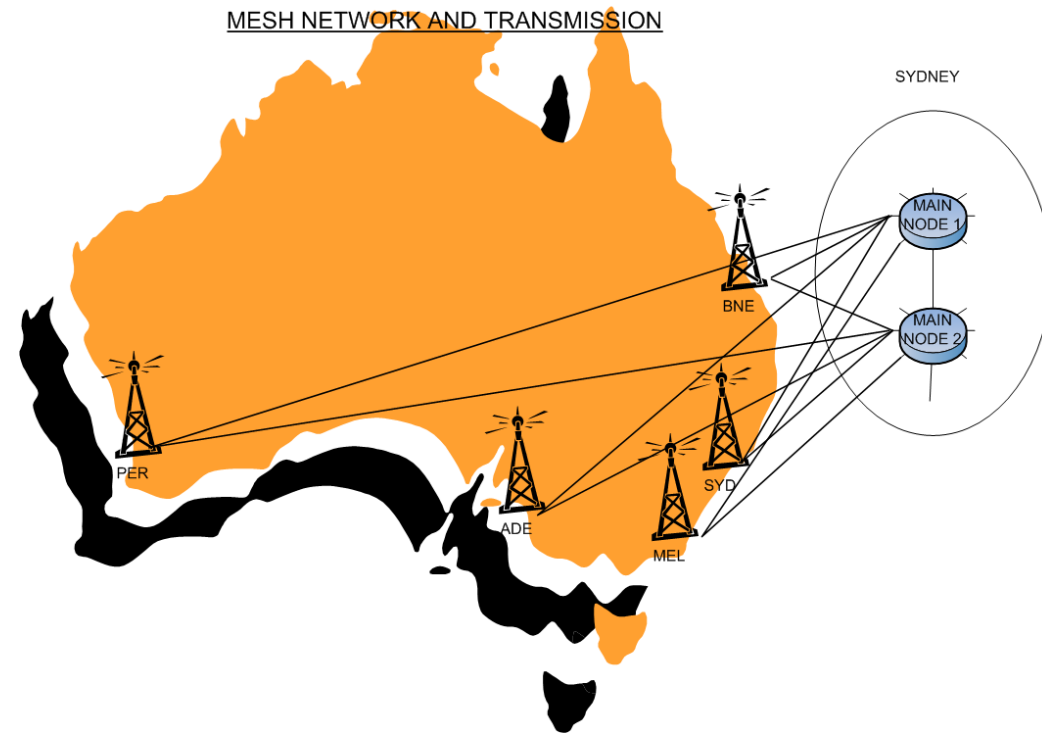
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Mesh Network

Transparent interconnect
between sites

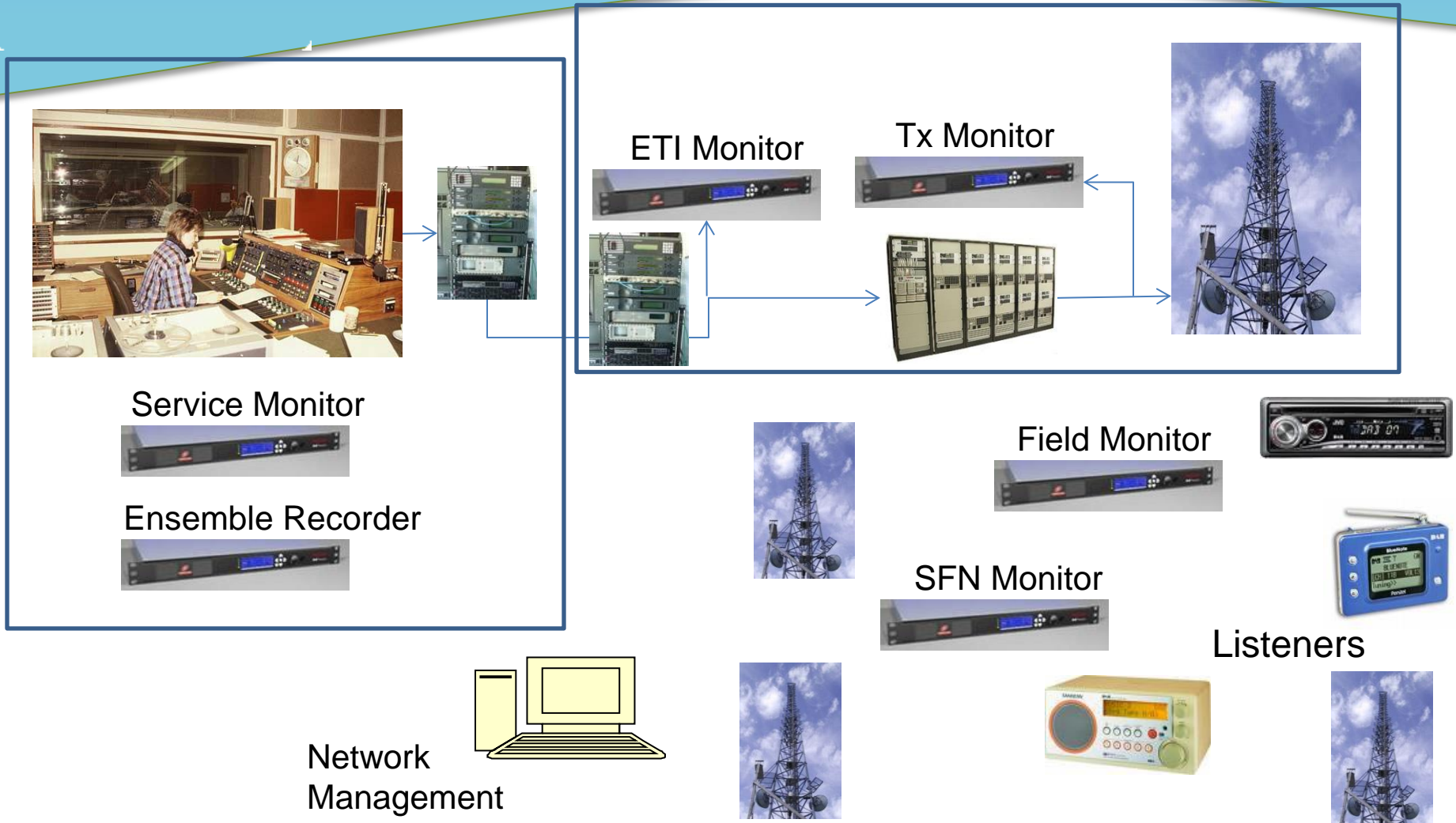
High Redundancy and Reliability

Typically uses a multicast
enabled VPN



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Monitoring Equipment - Overview

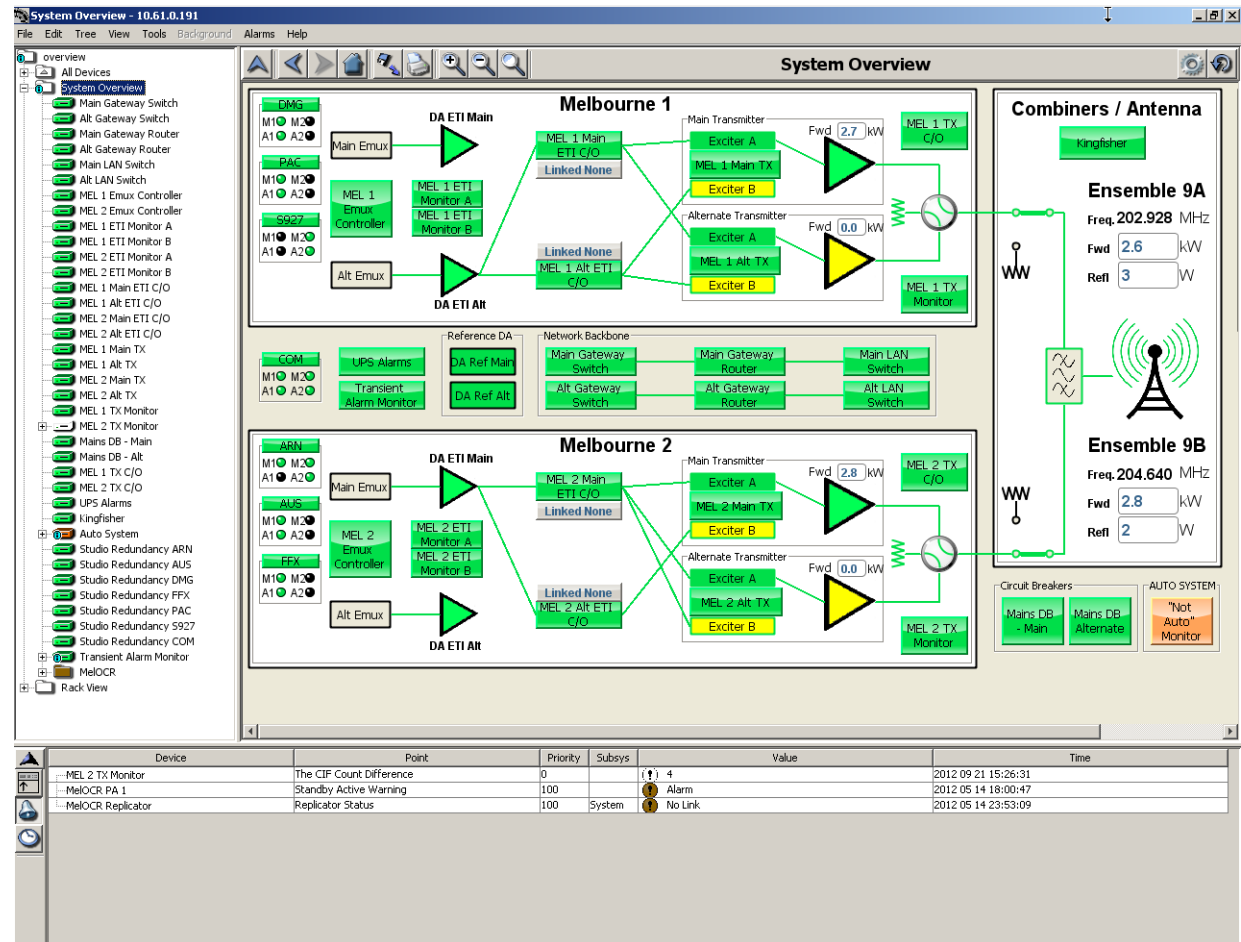


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Network Management System

Network Management is essential for rapid fault detection and correction

Remote access via web interface allows best grade of service



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Sydney commercial radio multiplexer equipment



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National multiplexer site installation

5 ensembles

20 encoders

Mesh network

Audio
preconditioning



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Sydney Transmitter – 2 ensembles



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Summary – Top Tips

1. DAB+ is the best Digital Radio delivery system available
2. Proven technology
3. Cost effective infrastructure
4. Deployed worldwide and expanding rapidly
5. Very flexible operation for broadcasters
6. Huge range of receiver products
7. Great features including scrolling text, images, EPG and data services
8. Many new developments including Interactivity and other Hybrid Radio features

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Thank You