DAB+ Workshop

DAB Network Architectures and Equipment

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16 December 2014

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Overview

DAB+ Network Structures

Redundancy

Proposed Network Architectures

Ancillary Equipment

Next Steps

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DAB+ Network Structures

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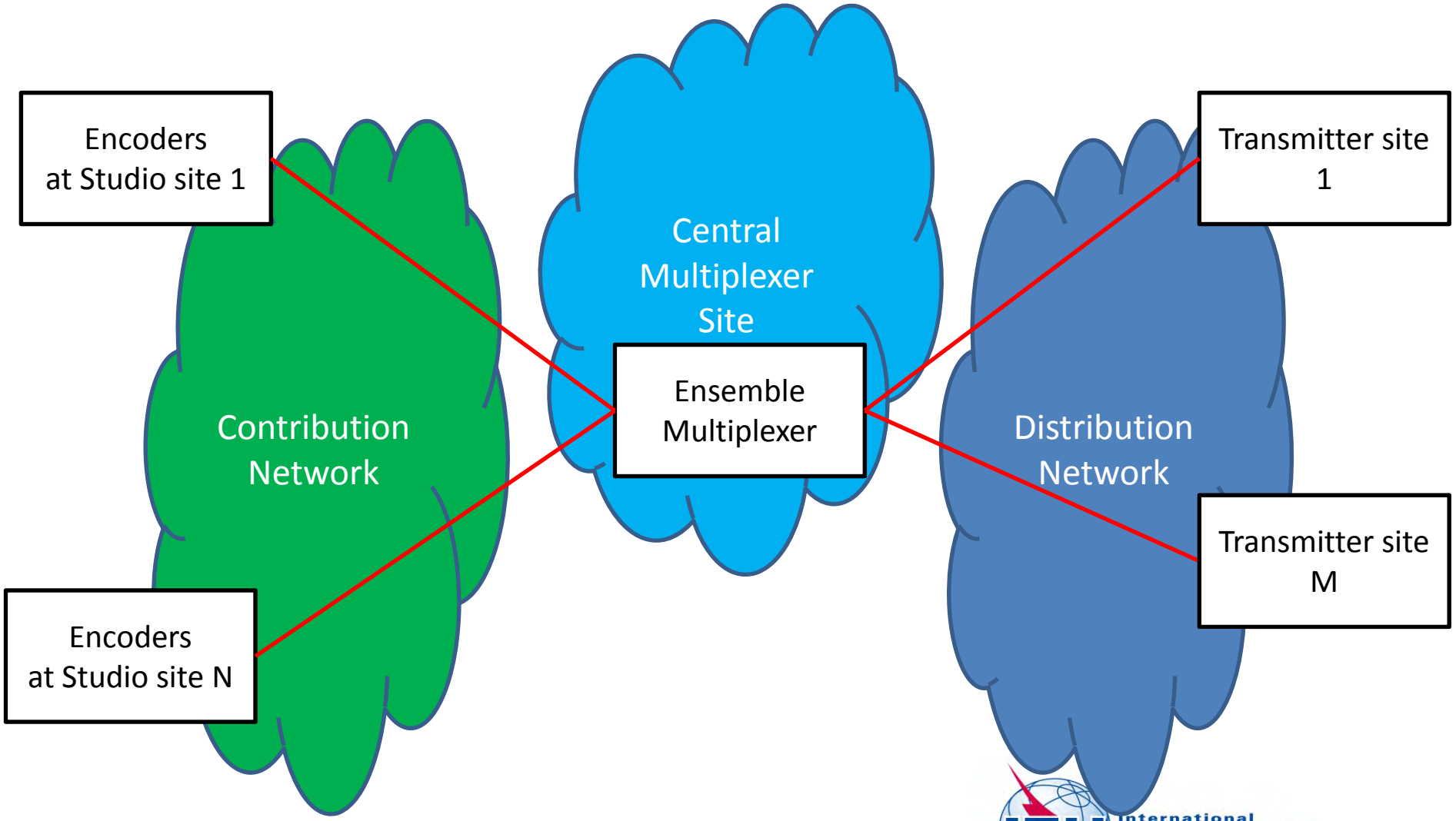
DAB+ Network Structures



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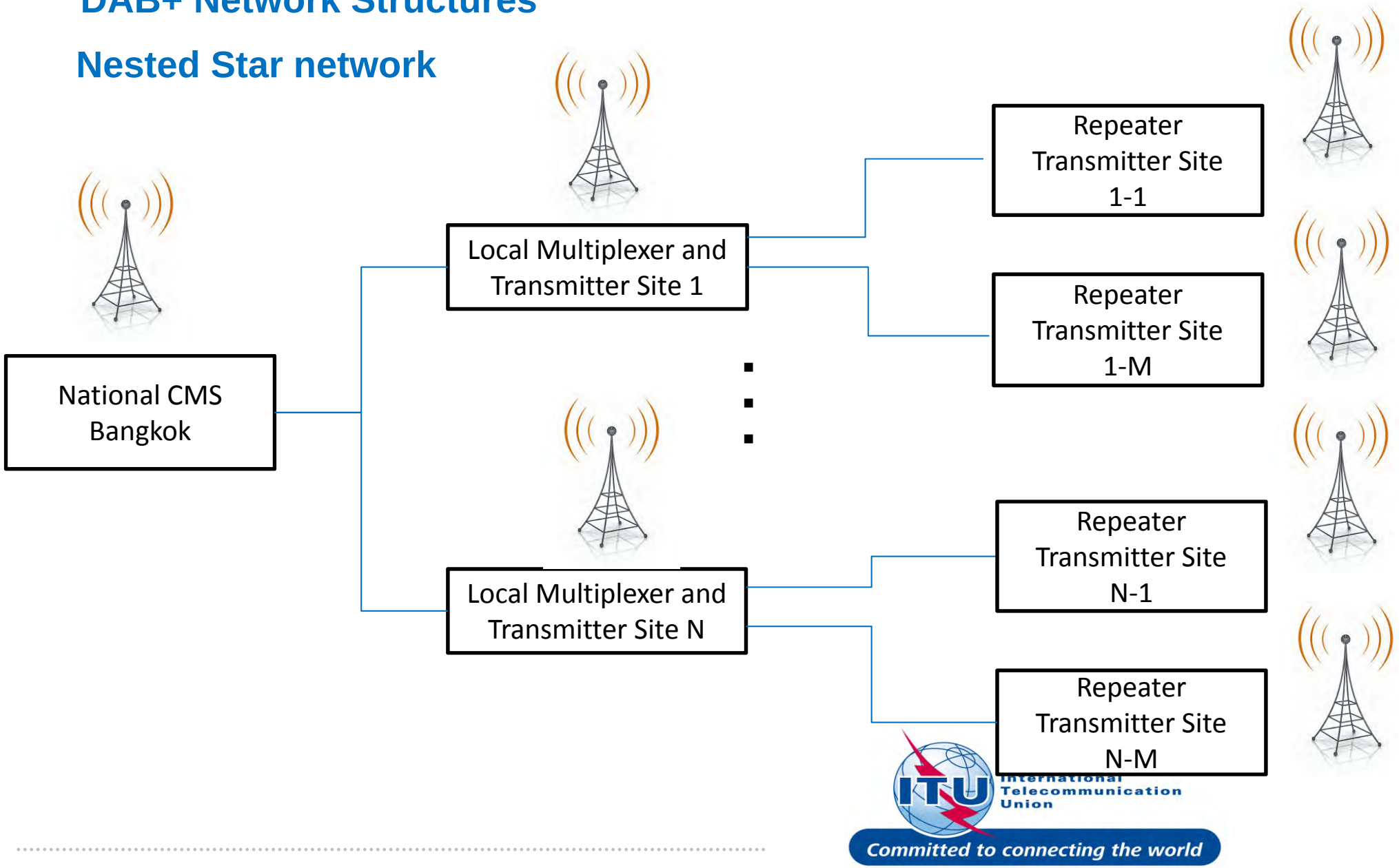
Nested Star network



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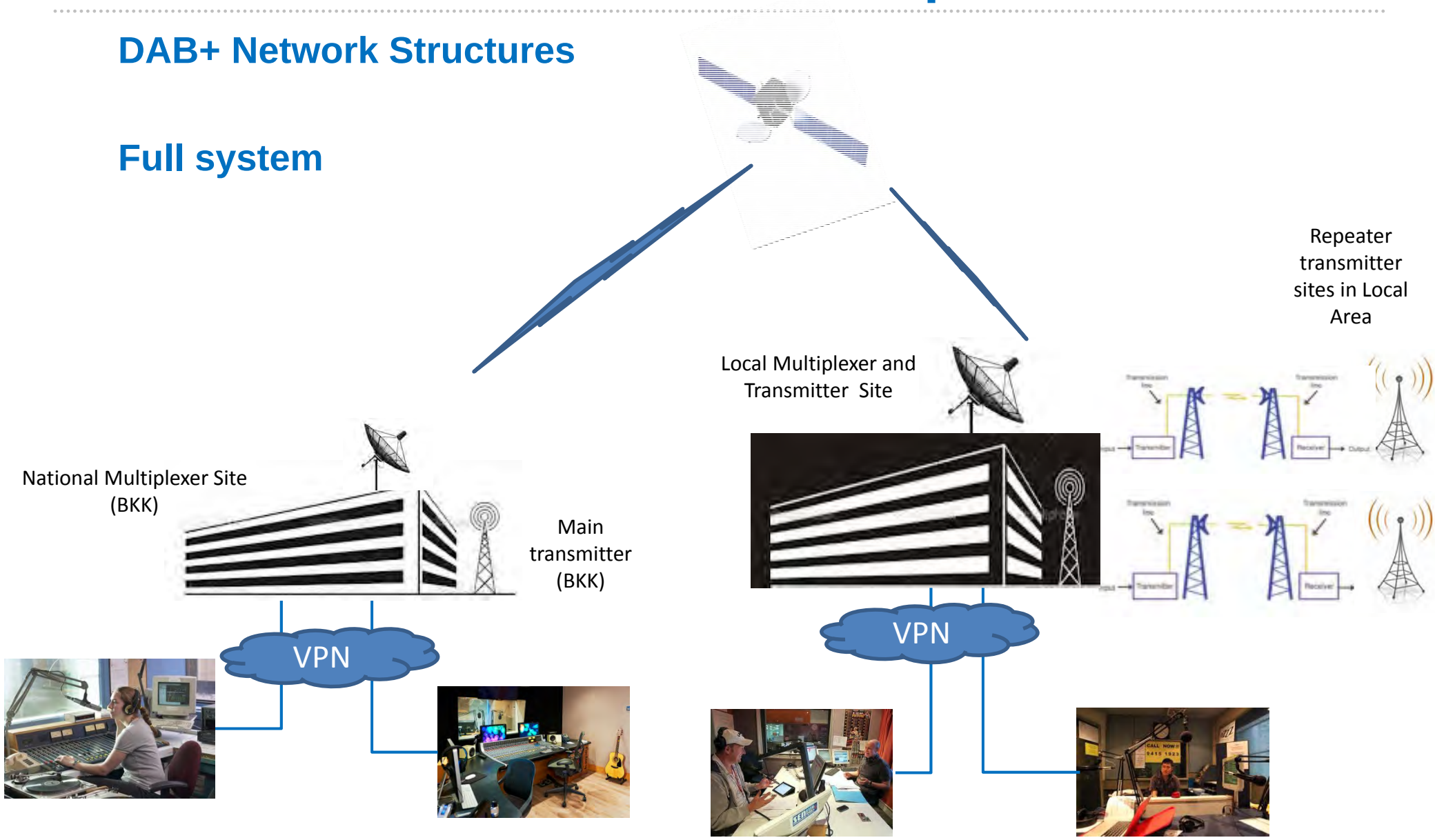
Full system



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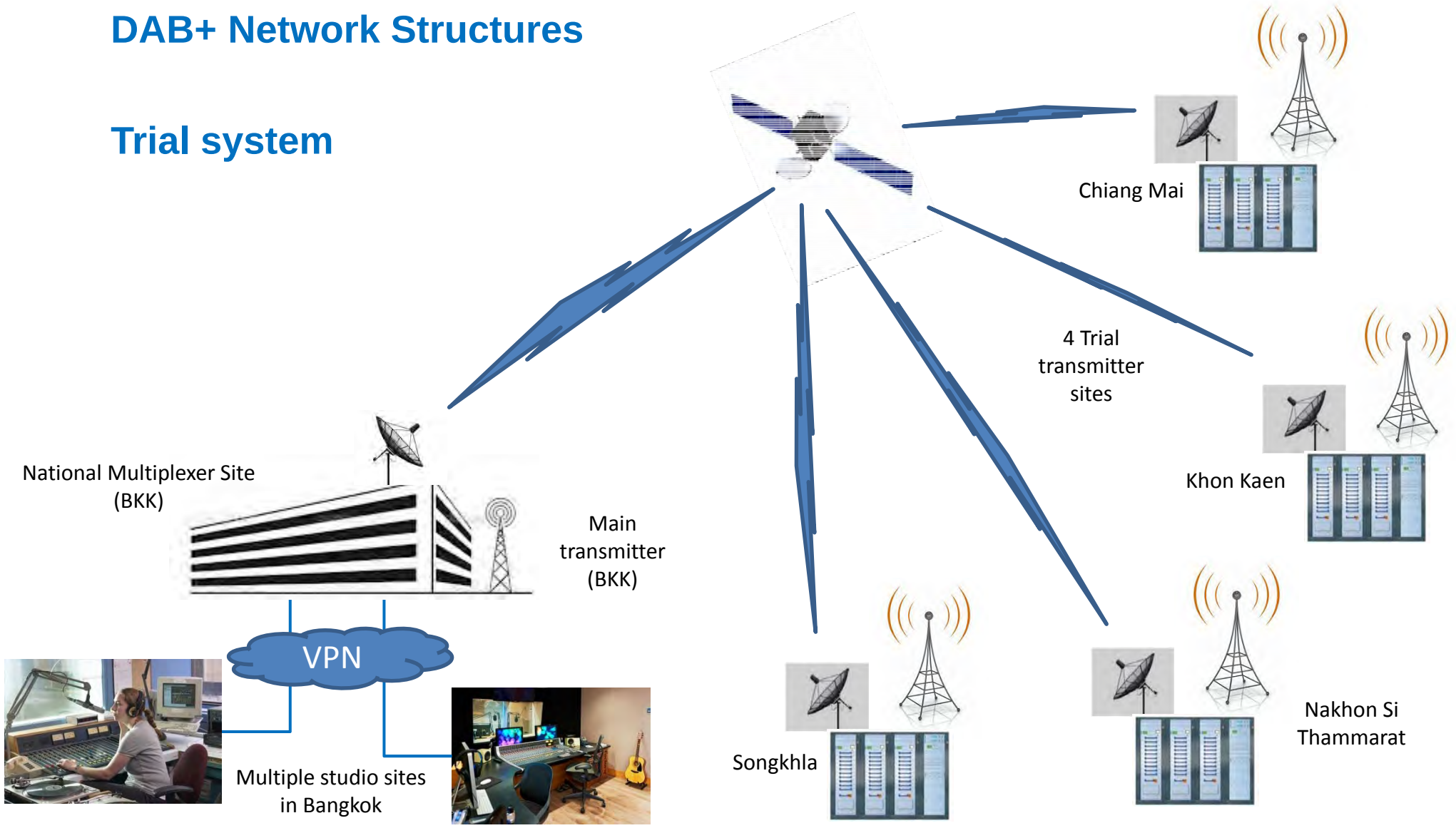
Trial system



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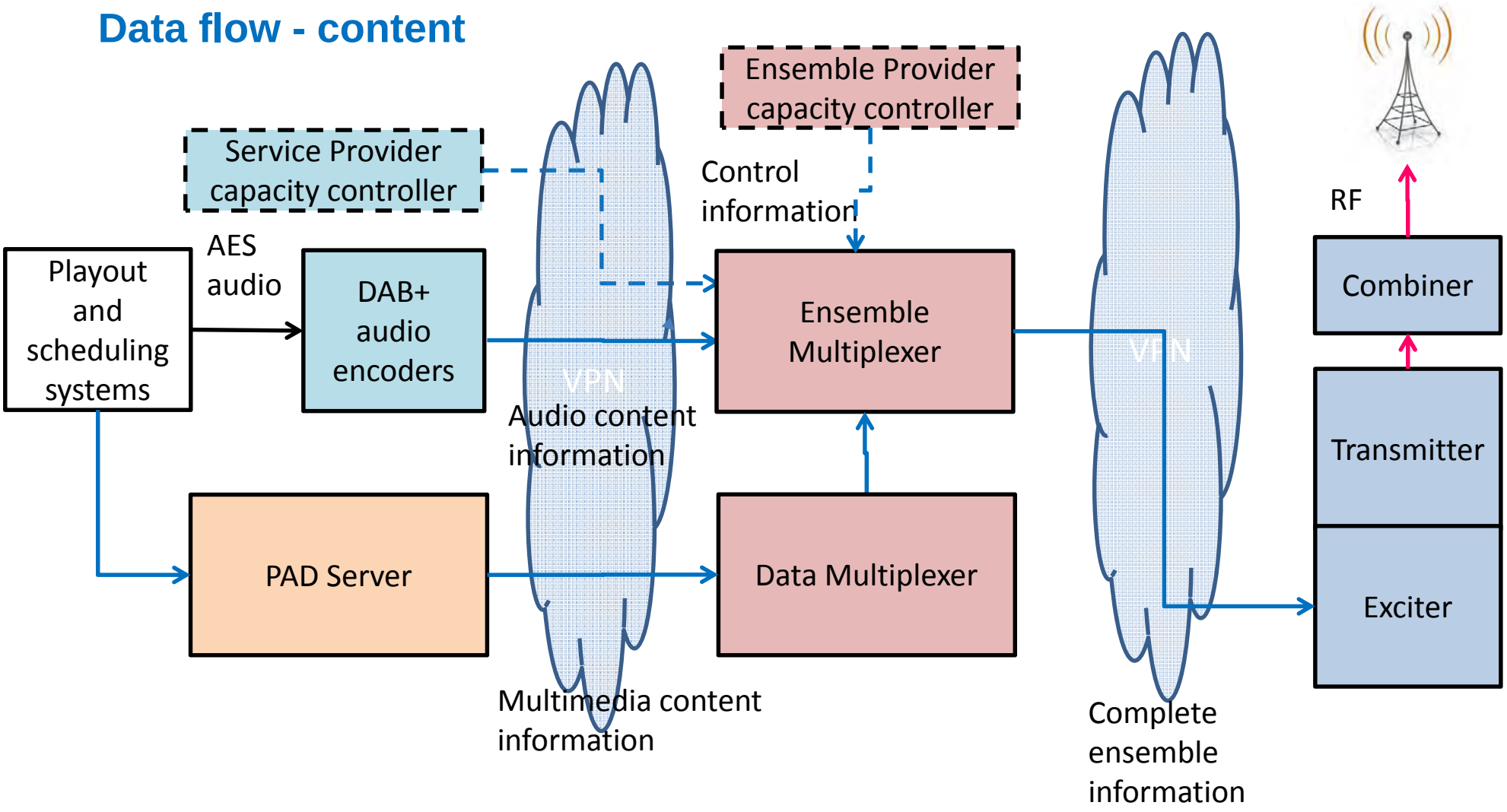
Data flow - content



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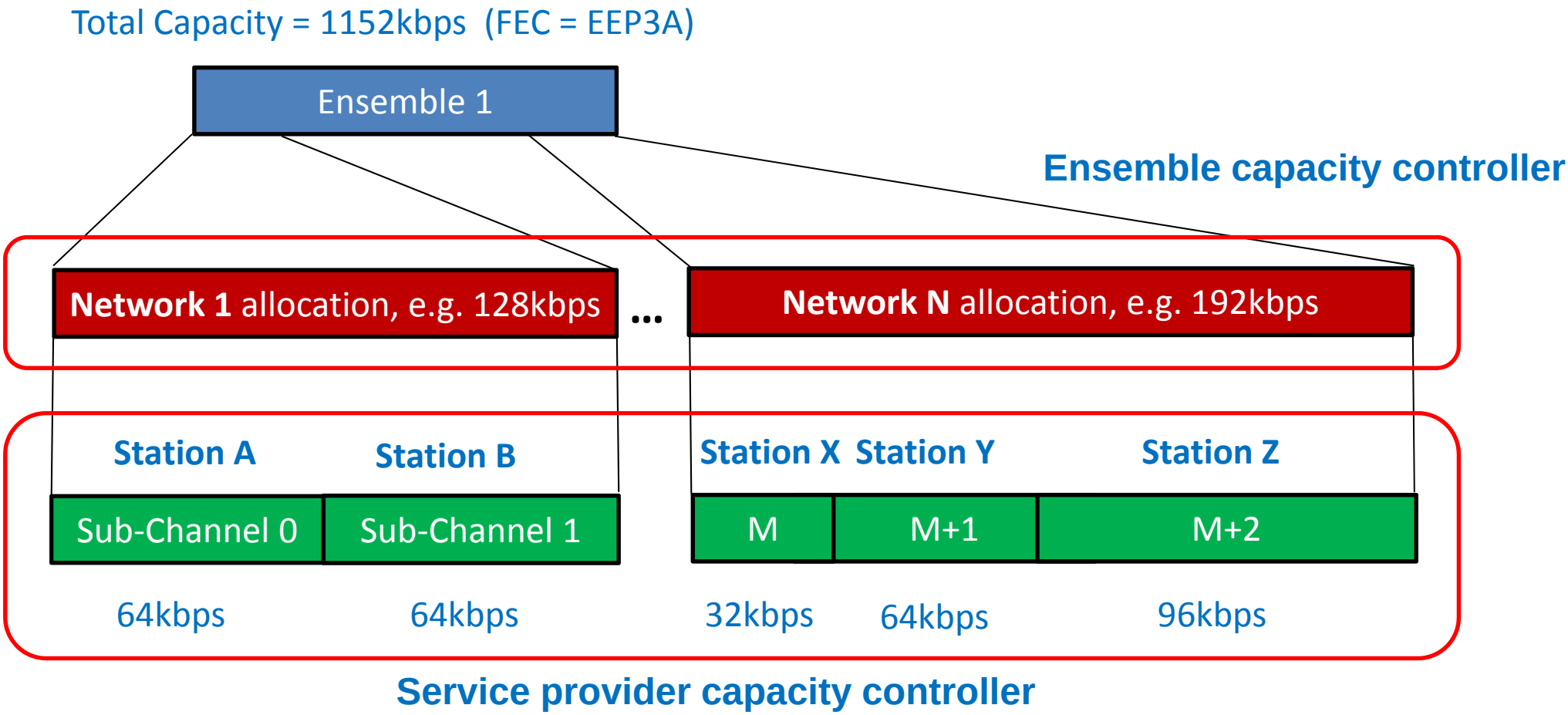
DAB+ Network Structures – Capacity control



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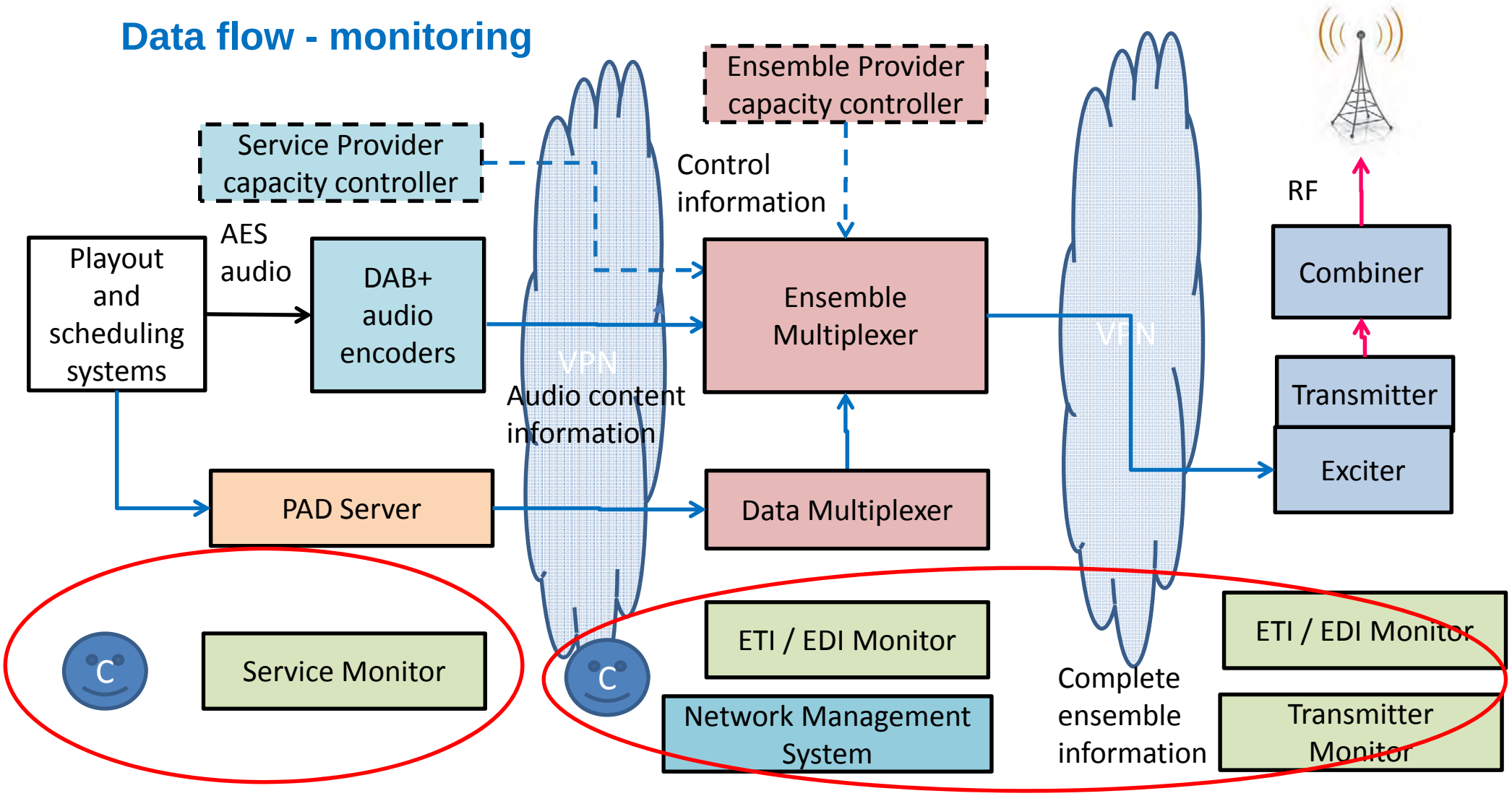
Data flow - monitoring



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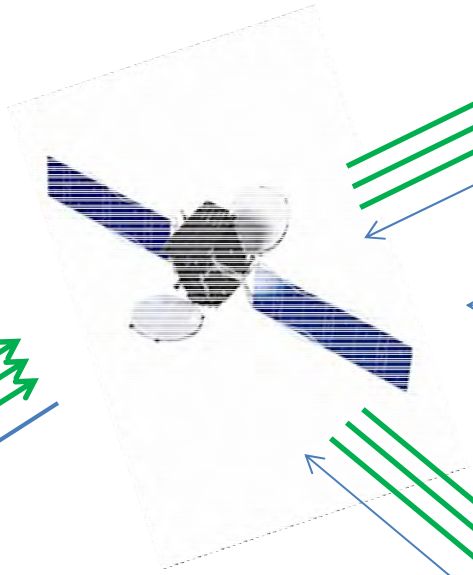
preferred satellite solution



3 x 1.5Mbps outbound per ensemble
IP over DVB-S2

TDMA aggregated return traffic 512kbps

Return traffic 512kbps peak

Central multiplexer site

Transmitter site N

Transmitter site 3

Transmitter site 2

Transmitter site 1

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Architectures are proposed for the three main site types

- Studio Site
- Central Multiplexing Site (CMS)
- Transmitter Site

The architecture for each site type is reused at all sites with minimal variations

The contribution and distribution networks will generally be very similar with only slight variations in both contribution and distribution based on local conditions

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Redundancy

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Redundancy

Purpose

- Minimise service interruptions
  - Equipment failures
  - Equipment servicing and maintenance

Cost Benefit

- Increases as the listening population increases
- Redundancy can be added in stages to spread Capex over time
- Need a minimum amount to counter potential long periods of outage

Types

- None
- N+1
- 1+1

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Redundancy

Equipment options	Audio Service Interruption					
	Failure			Maintenance		
	None	N+1	1+1	None	N+1	1+1
• Studio						
• Encoders	Y	Y	N	Y	N	N
• Service Controller	N	N	N	N	N	N
• Studio to EMUX link	Y	-	N	Y	-	N
• PAD Server	N	N	N	N	N	N
• Multiplexer Sites						
• Ensemble Multiplexer	Y	-	N	Y	-	N
• Ensemble Controller	N	N	N	N	N	N
• Data Multiplexer	N	N	N	N	N	N
• NTP server	Y	-	N	Y	-	N
• NMS	N	N	N	N	N	N

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Redundancy

Equipment options	Audio Service Interruption					
	Failure			Maintenance		
	None	N+1	1+1	None	N+1	1+1
• Transmitter site						
• Distribution Links	Y	Y	N	Y	N	N
• Transmitters						
• Exciter	Y	-	N	Y	-	N
• PA	Y	Y	N	Y	N	N
• Combiner	Y	-	-	Y	-	-
• Antenna system	Y	-	N	Y	-	N
• Monitors	N	N	N	N	N	N

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Redundancy Proposal – Trial System

Use an N+1 approach on a site basis where possible

- Avoids long outages
- Minimum cost impact
- Some service interruptions are possible
  - Encoders
  - Service and Ensemble Controllers
  - Transmitters
  - Monitors

To minimise service interruptions

- EMUX = 1+1
- Satellite transceivers = 1+1
- Transmitter exciters = 1+1
- Antenna = 1+1 split system

Full System variations

Encoders => 1+1

Microwave distribution links transceivers = 1+1

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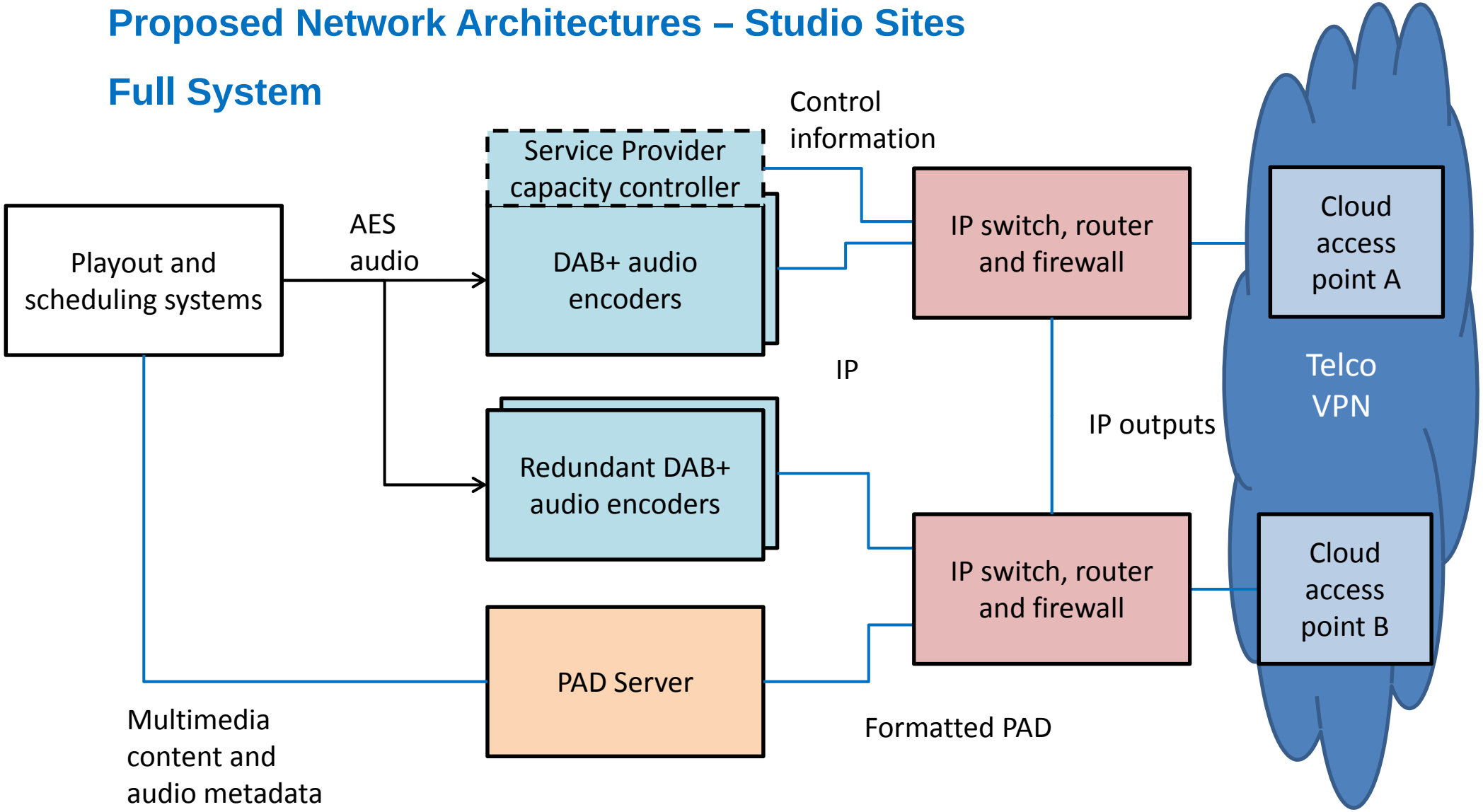
Proposed Network Architectures – Studio Sites

Full System



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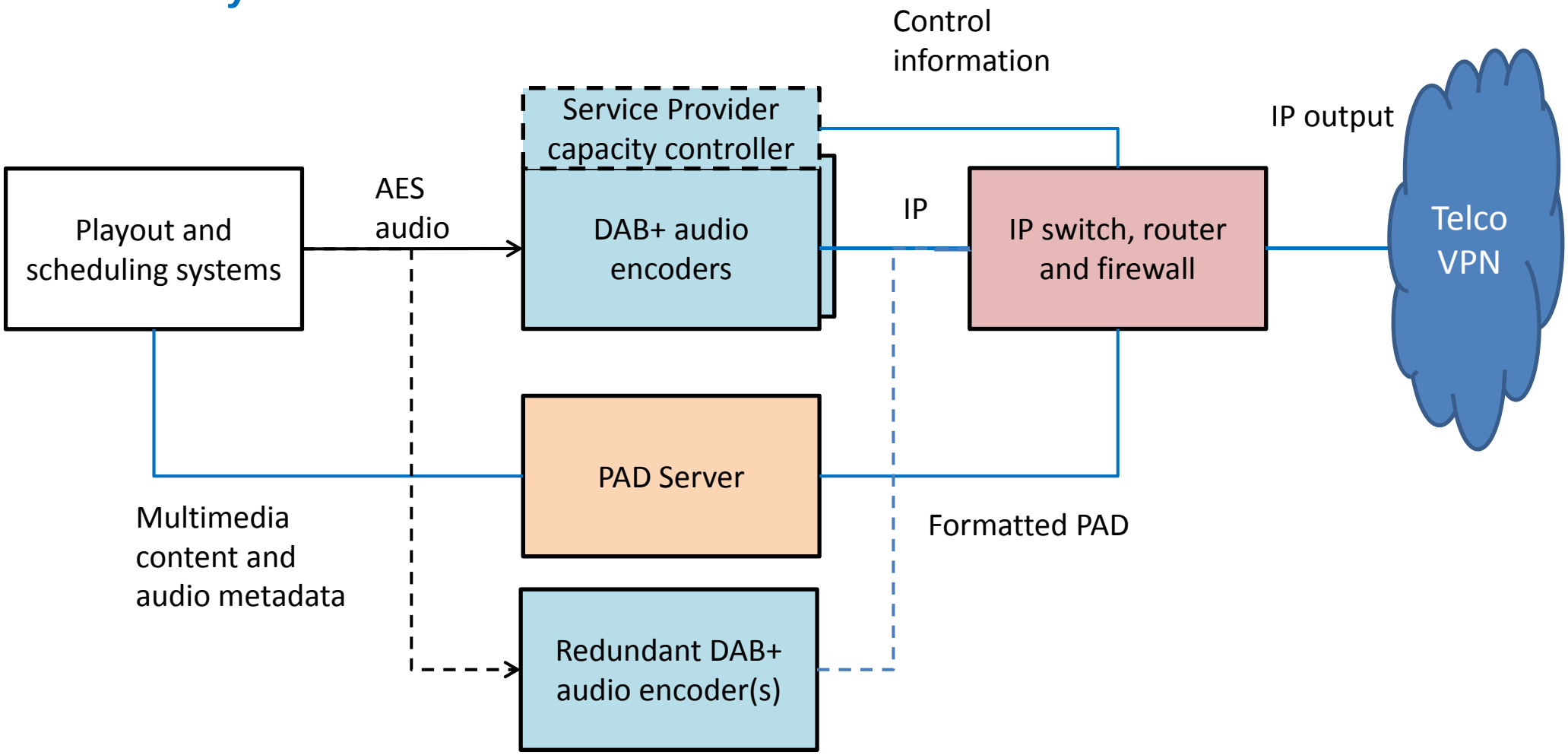
Proposed Network Architectures – Studio Sites

Trial System



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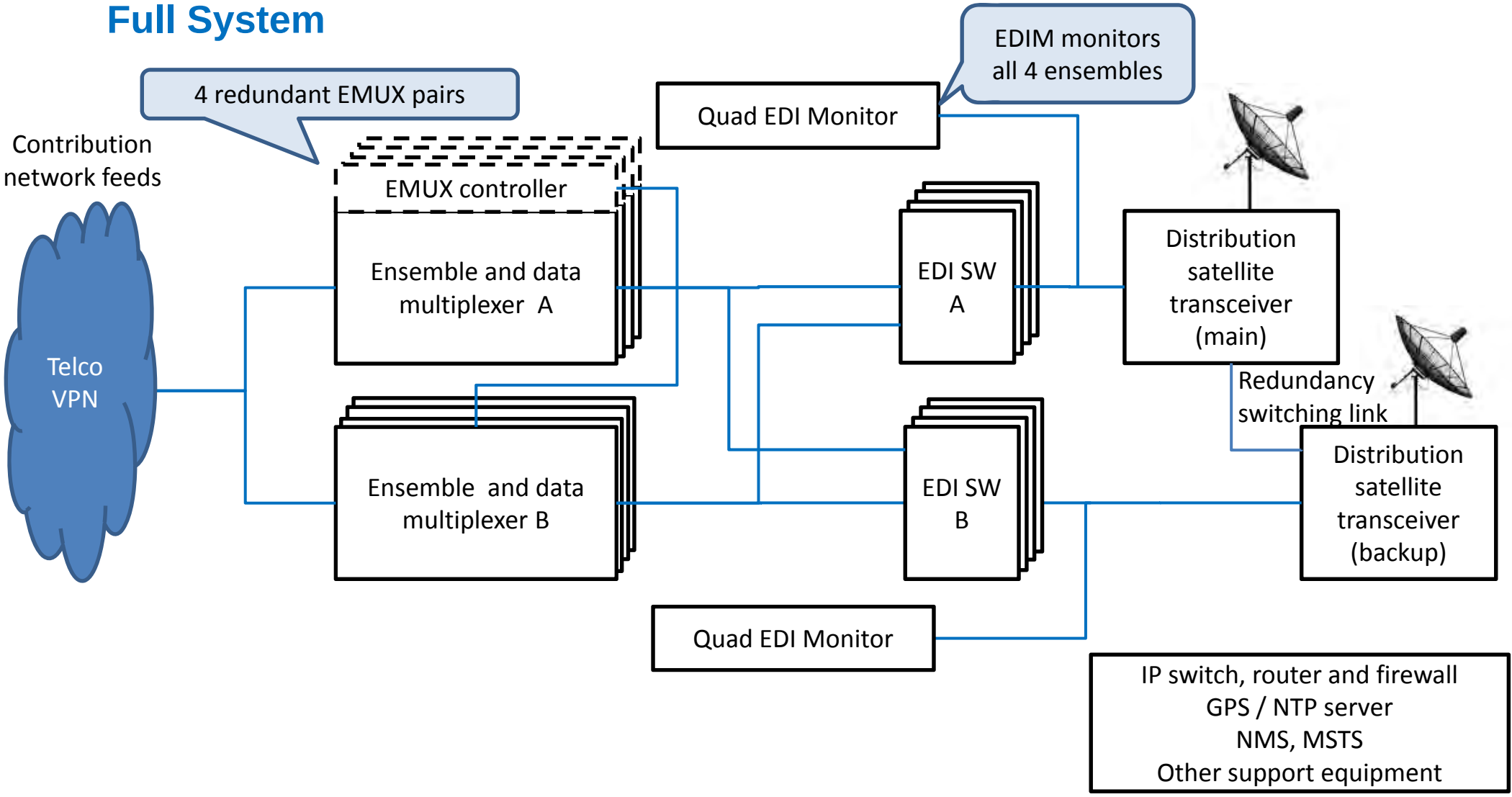
Proposed Network Architectures – National Multiplexing Site

Full System



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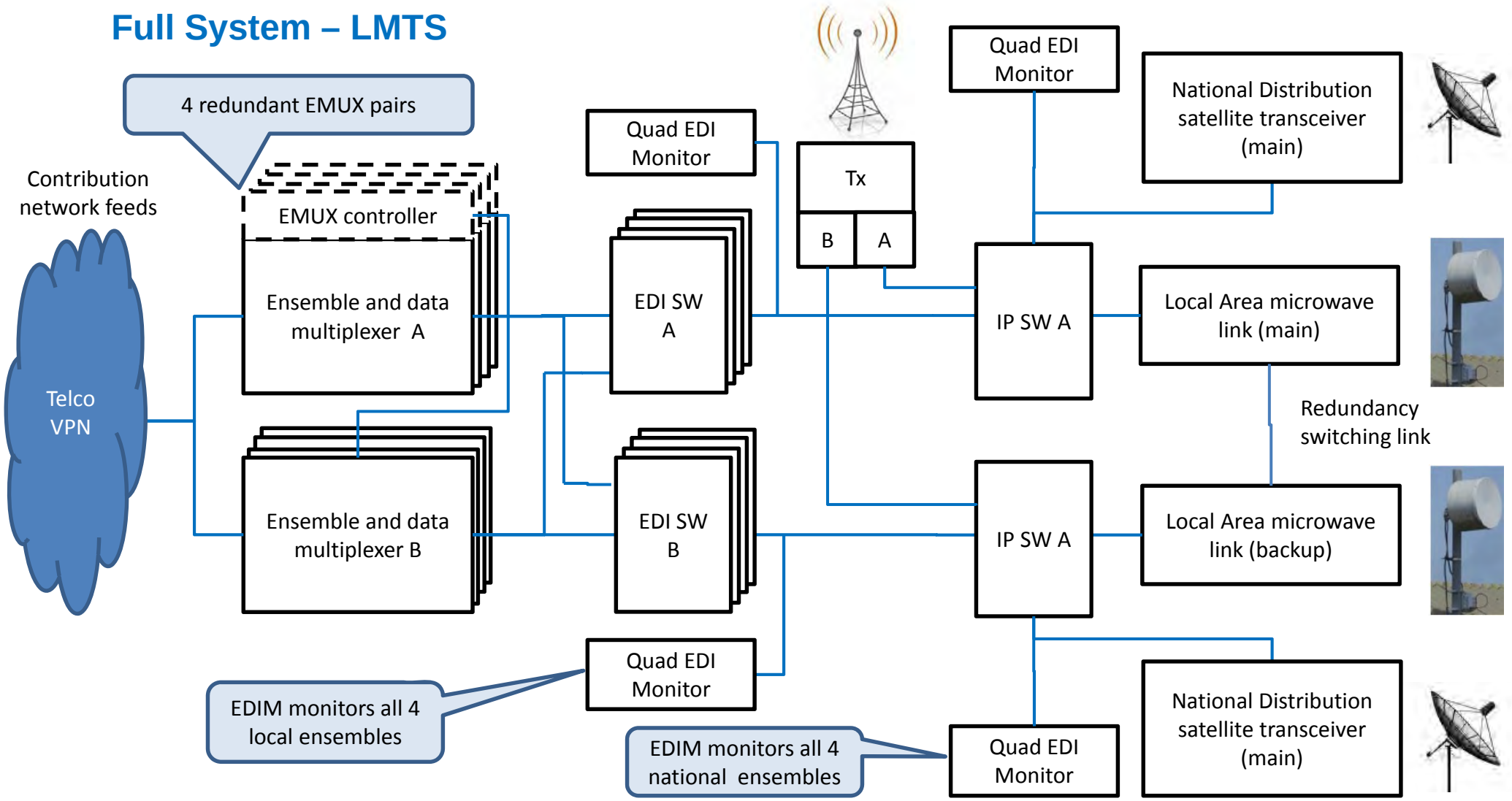
Proposed Network Architectures

Full System – LMTS



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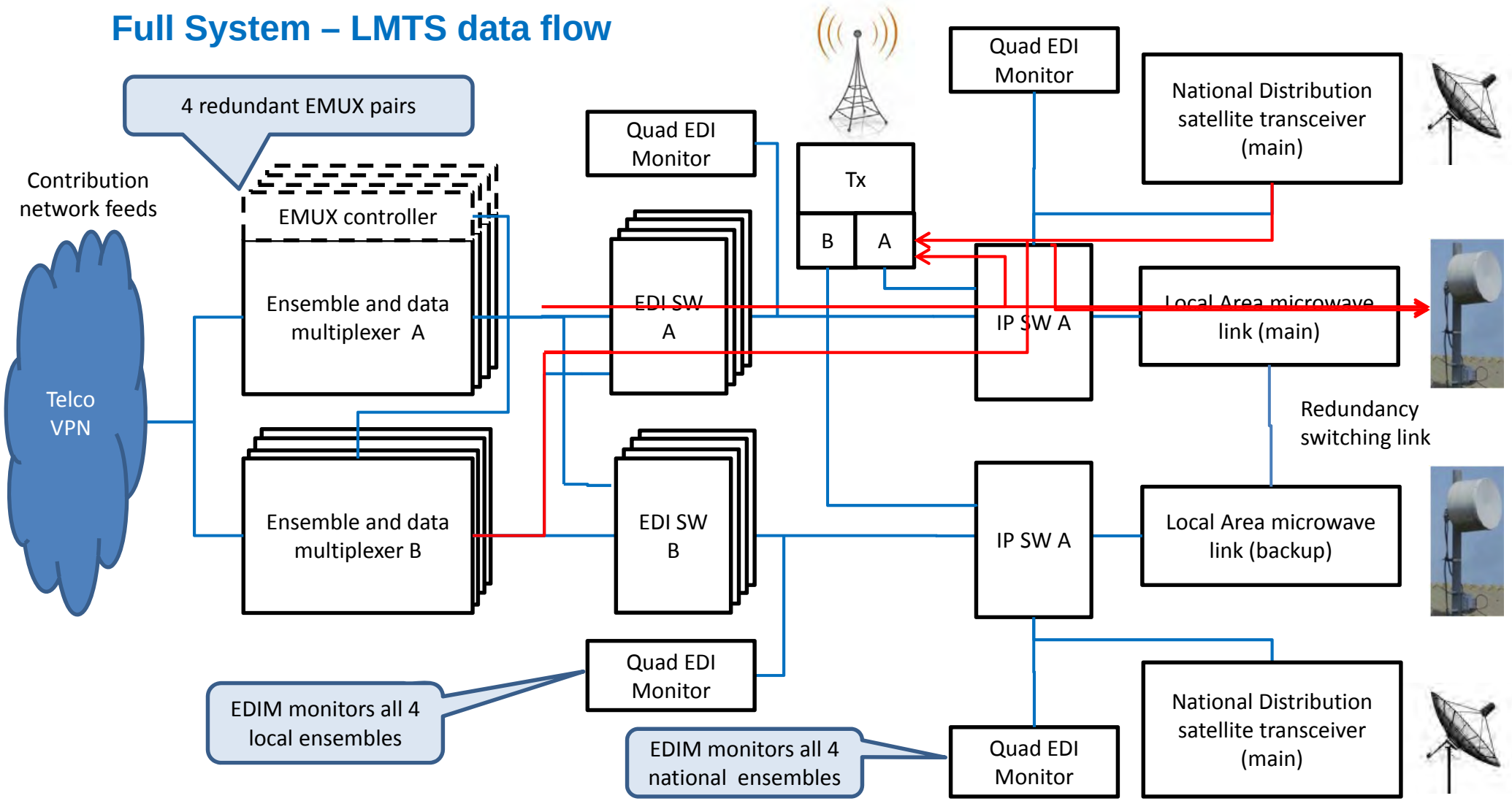
Proposed Network Architectures

Full System – LMTS data flow



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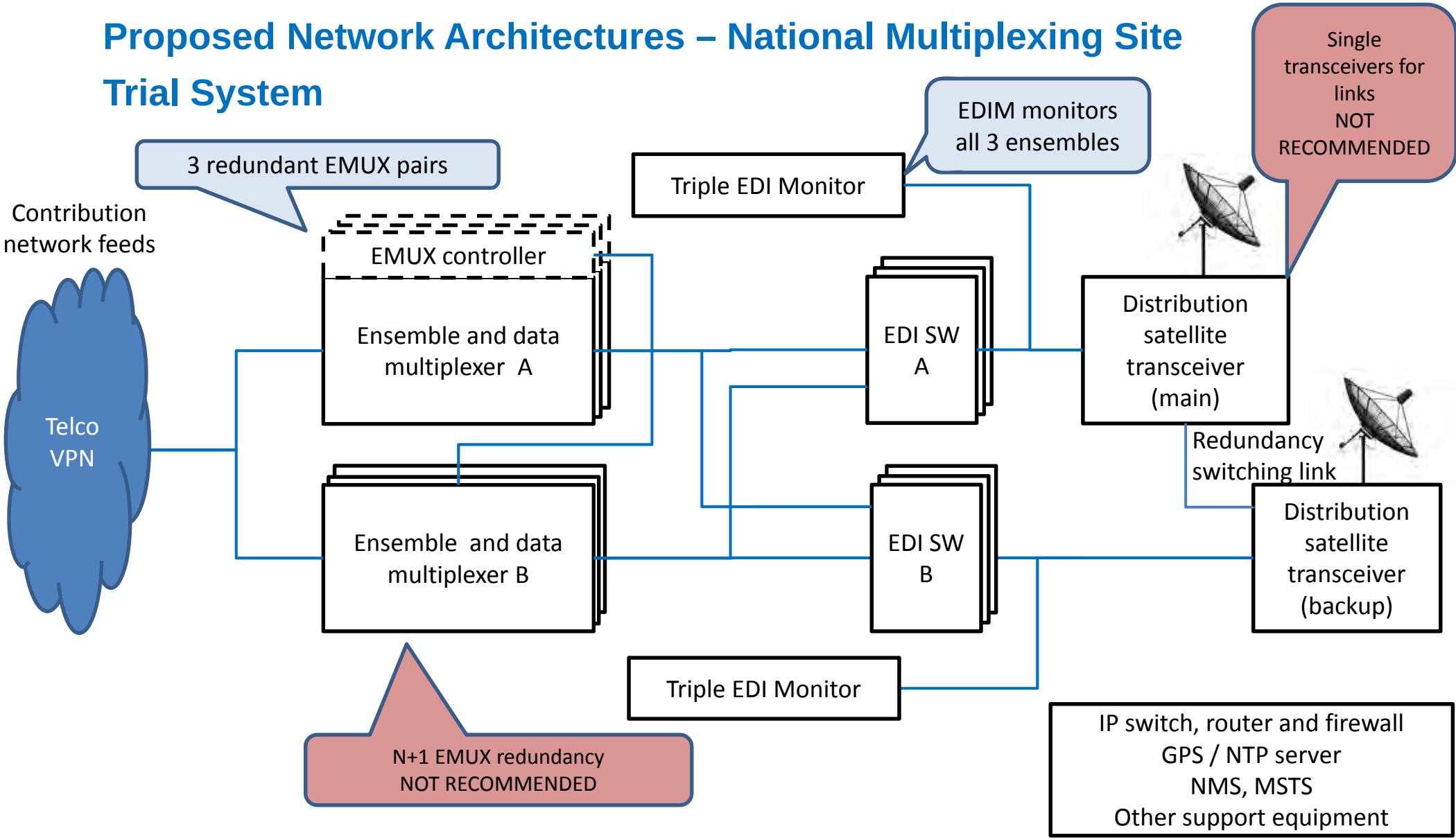
Proposed Network Architectures – National Multiplexing Site Trial System



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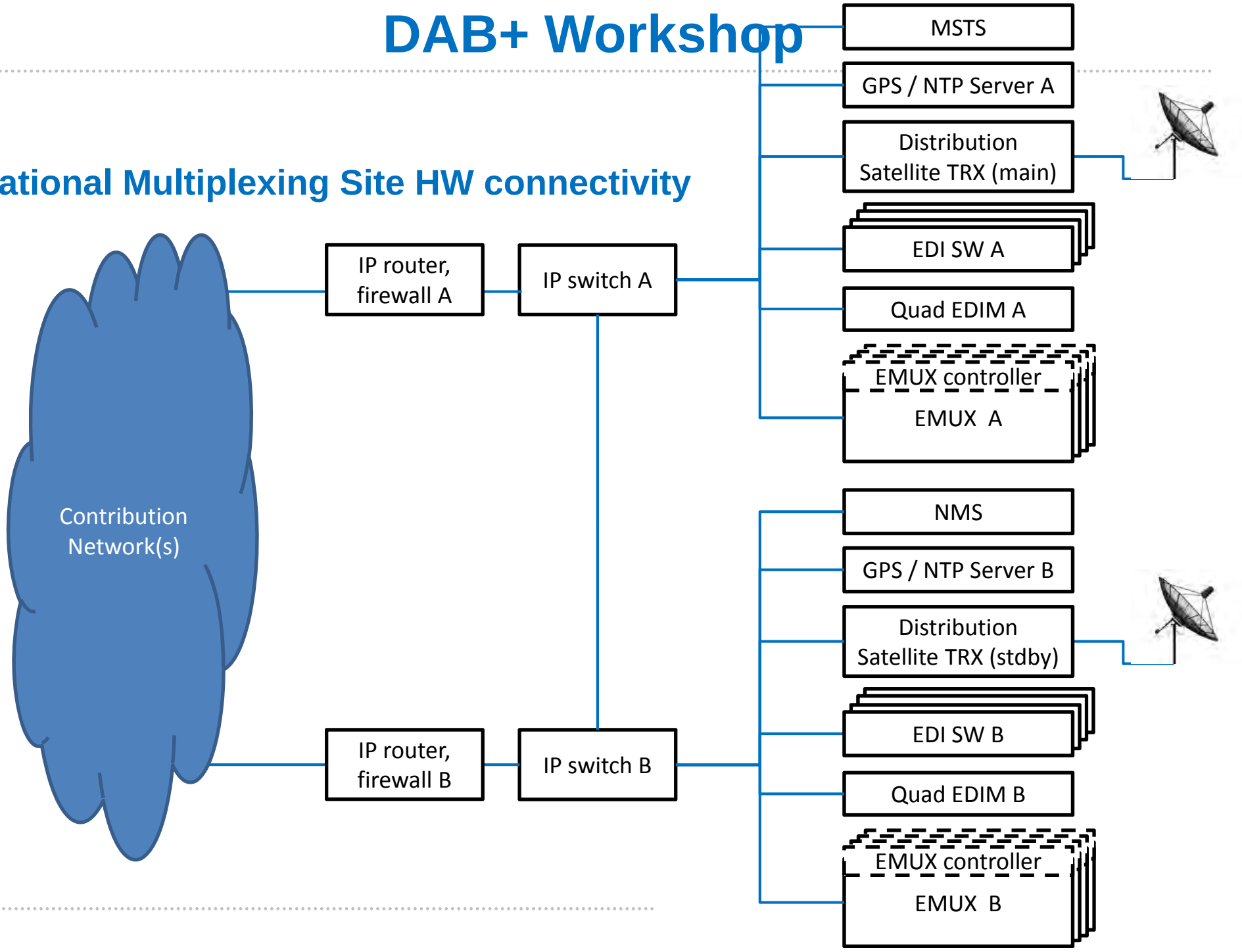
National Multiplexing Site HW connectivity



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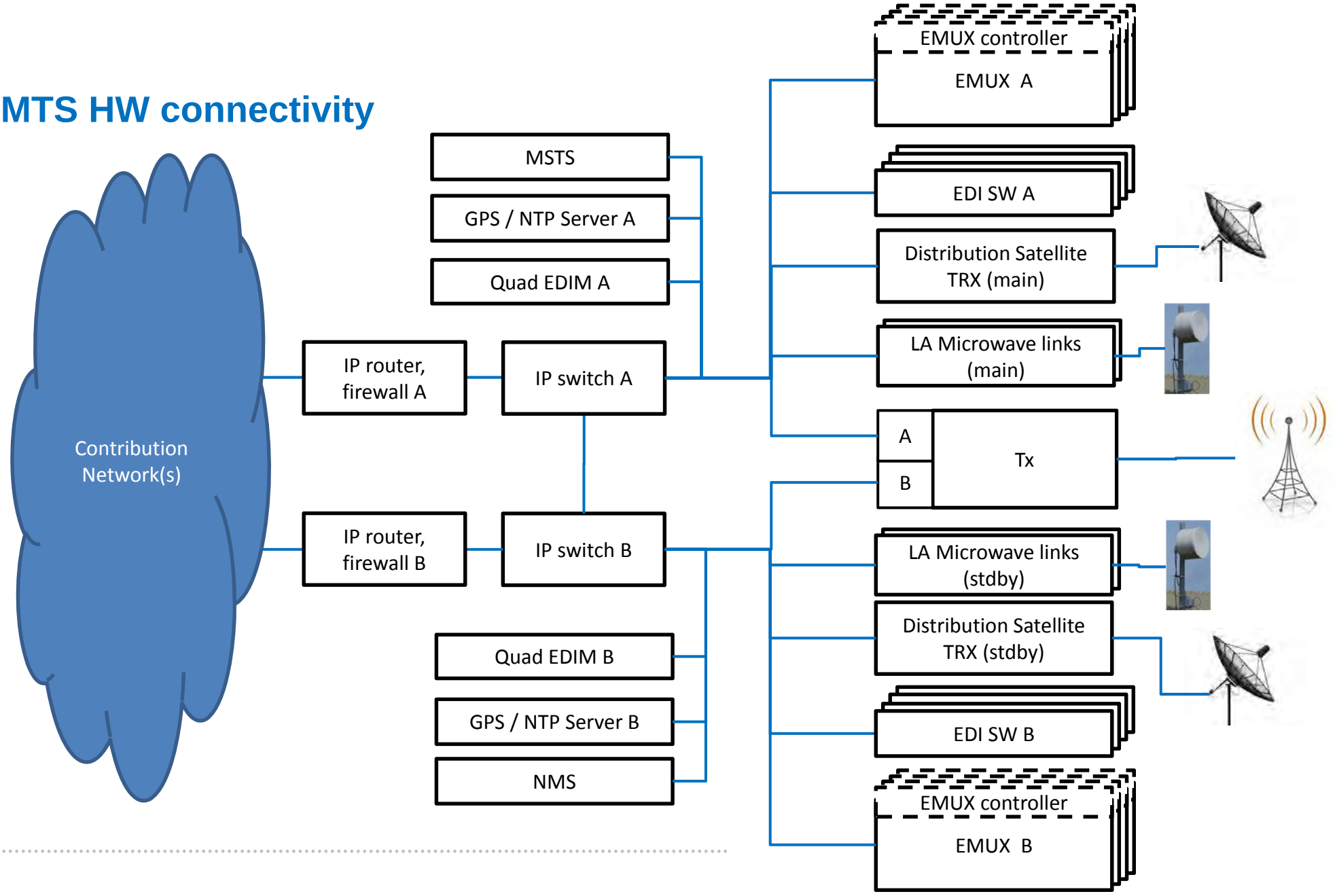
LMTS HW connectivity



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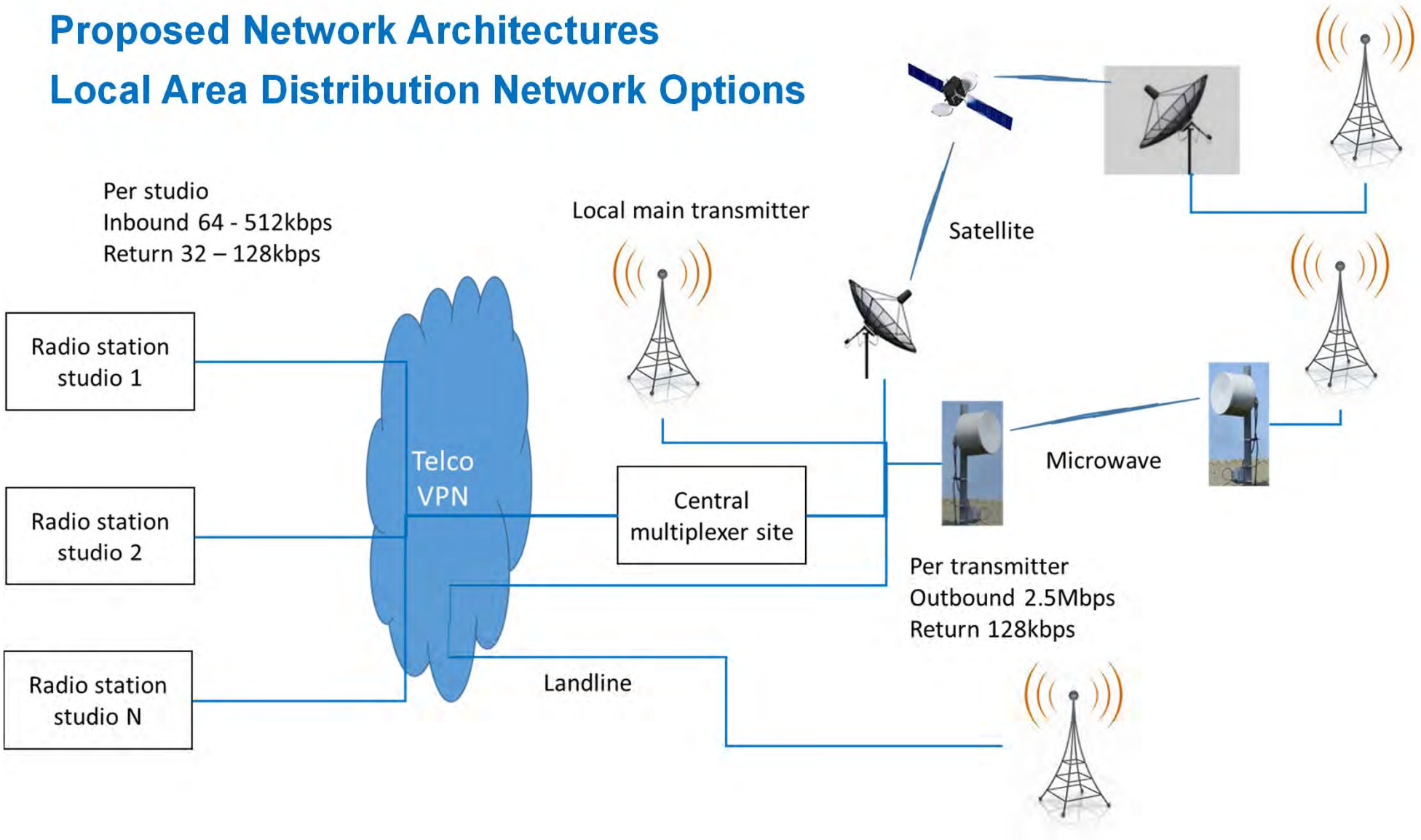
Proposed Network Architectures

Local Area Distribution Network Options



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Proposed Network Architectures – Repeater Transmitter Sites Full System

Microwave link transceiver

Microwave link transceiver

8 x EDI monitor

EDI over IP & inter Tx communications

IP Router / Switch

IP Router / Switch

8 x EDI monitor

UPS, NMS and other support equipment

RF

Spare Transmitter

Transmitter 1

Transmitter 8

RF switch

Load

RF switch

Load

8 Port Combiner system

8 Transmitter monitors

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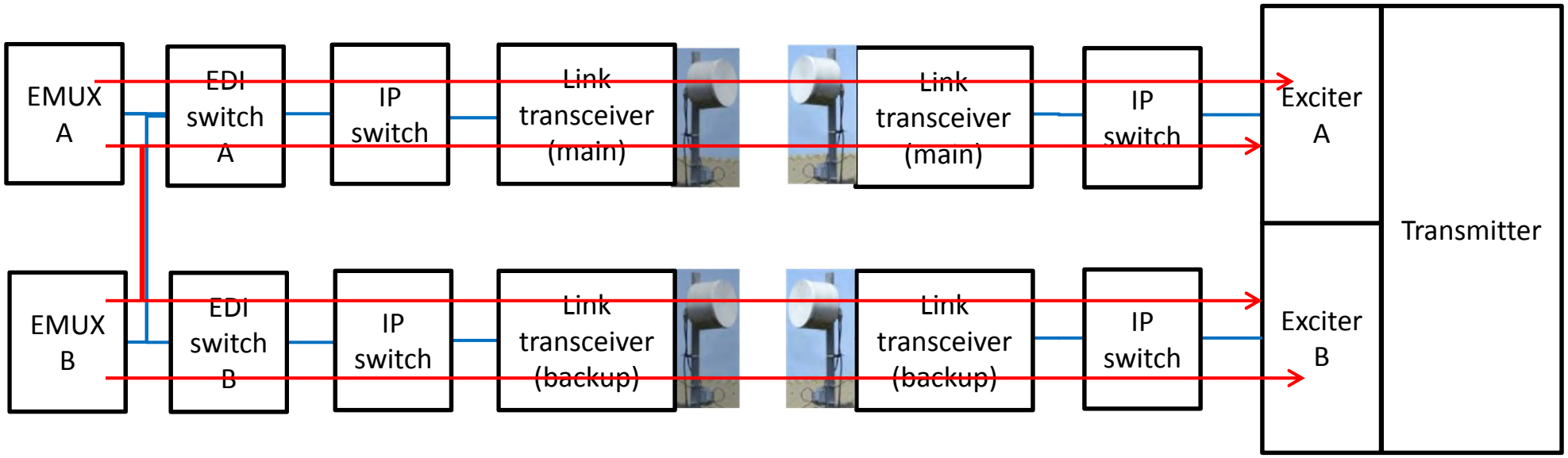
Proposed Network Architectures – Transmitter Sites

Redundant ETI streams



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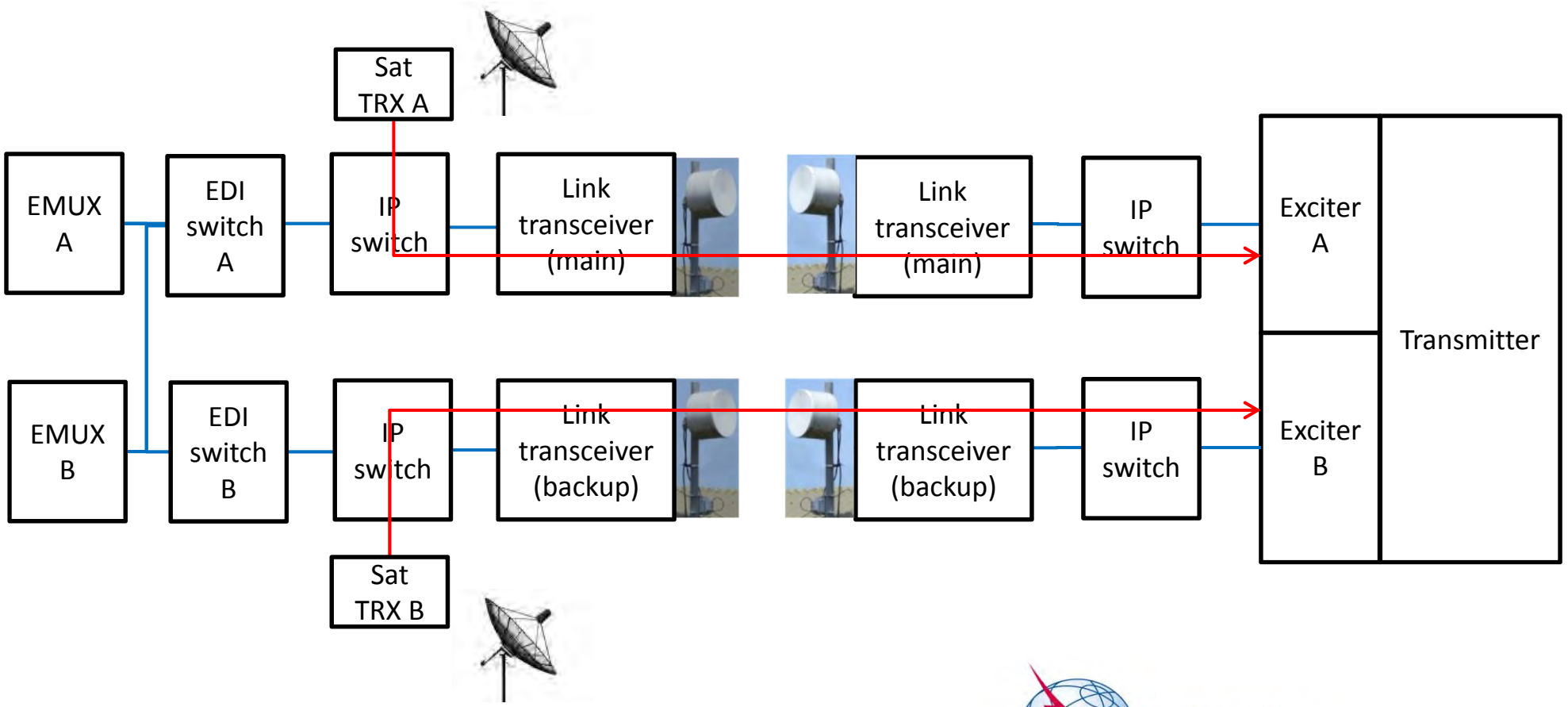
Proposed Network Architectures – Transmitter Sites

Redundant ETI streams



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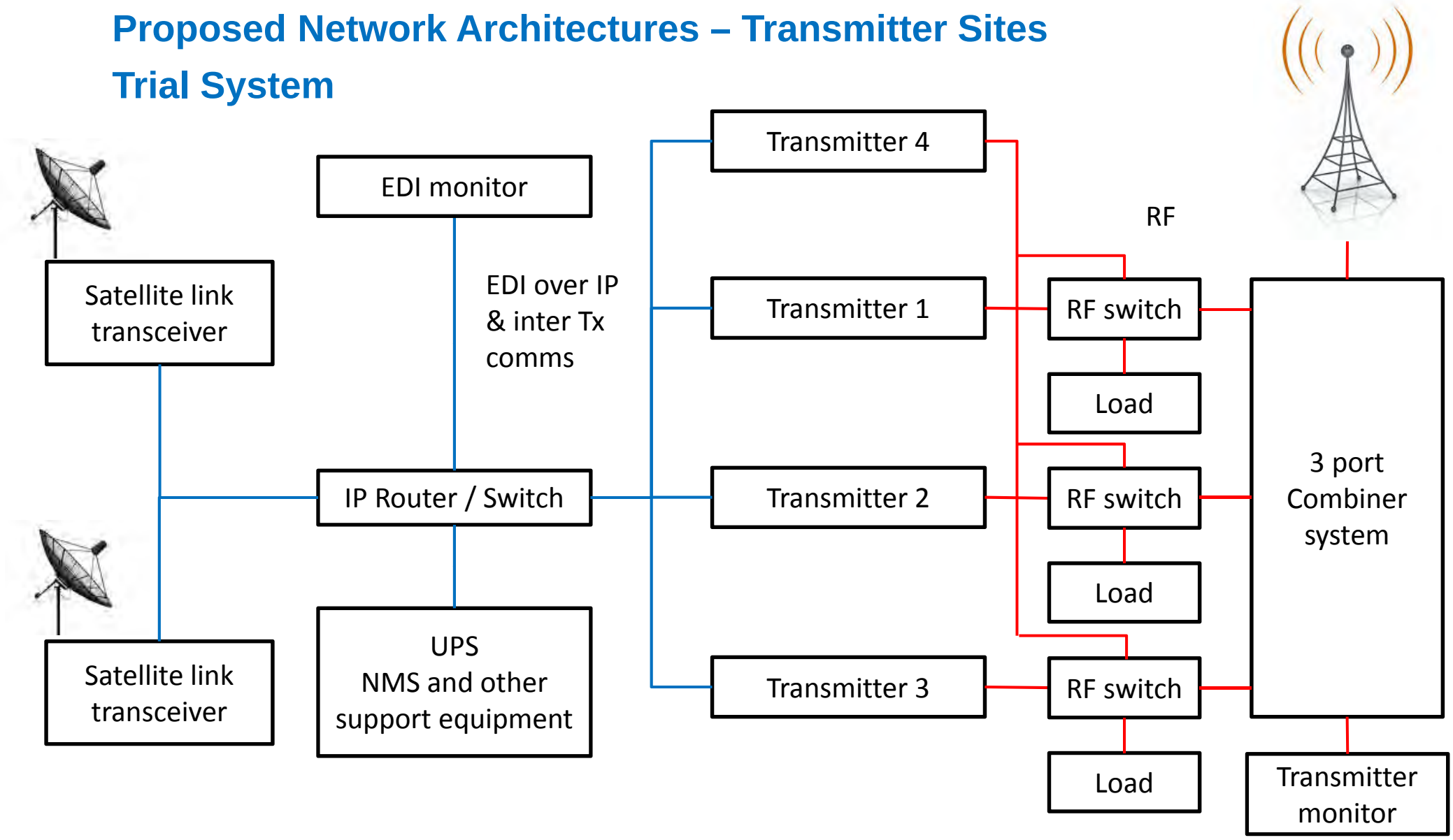
Proposed Network Architectures – Transmitter Sites

Trial System



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Ancillary Equipment

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Ancillary Equipment

- Essential for system operation
- Used to ‘glue’ the primary system components together
- Provides support functions
- Has a critical influence on system performance

Critical items

- NTP server
- IP switches and routers
- UPS

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Ancillary Equipment

Don’t forget….

- Power systems back up
- Lightning protection and grounding
- MSTS for system access and control

Measurement tools

- Field measurements and analysis
- Monitors – RF transmitter, ETI/EDI
- Network Management System

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Next Steps

The road is long…..

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Next Steps

- An assessment of the system cost has been undertaken
- Given agreement to proceed the budget needs to be examined to determine the level of redundancy possible
- It is recommended to construct with an architecture as close to the full system as possible to allow maximum systems and operations learning
- A detailed analysis of the coverage area and interference analysis is required to design the optimum transmission power and pattern ensure maximum population coverage
- The full system design should be undertaken including processes in the operation redundant systems – there maybe some system enhancements required

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Next Steps

- Site arrangements for equipment positioning
- Tower access and antenna positioning
- Operations planning – management, monitoring and maintenance
- Equipment tendering and purchase
- Factory and Site Acceptance Test plans
- Trials test plans
  - Testing different FEC rates
  - Testing On-Channel Repeater capabilities (additional equipment)
  - Testing SFN operation (additional equipment)
  - Tuning coverage analysis and modelling tools
- Engage with the industry

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The future

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Thank You

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