ETL Systems
Excelling in RF Engineering

Trends and techniques in RF signal distribution

Andrew Bond

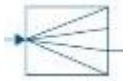
ETL Systems





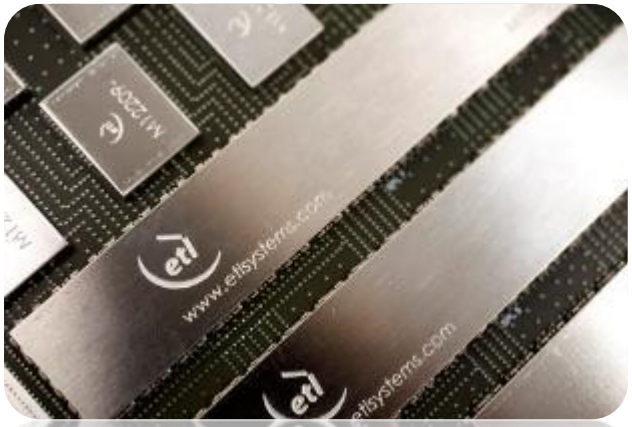







About ETL

- We Design & Manufacture RF products **- for over 30 years**
- **120 people** in UK headquarters, R&D lab and 2 international offices
- **70% of NATO governments** use our equipment.
- **75% of worlds satellite operators** use ETL equipment.
- In the last 10 years we have made **£100m worth** of RF distribution equipment for the Satcoms market

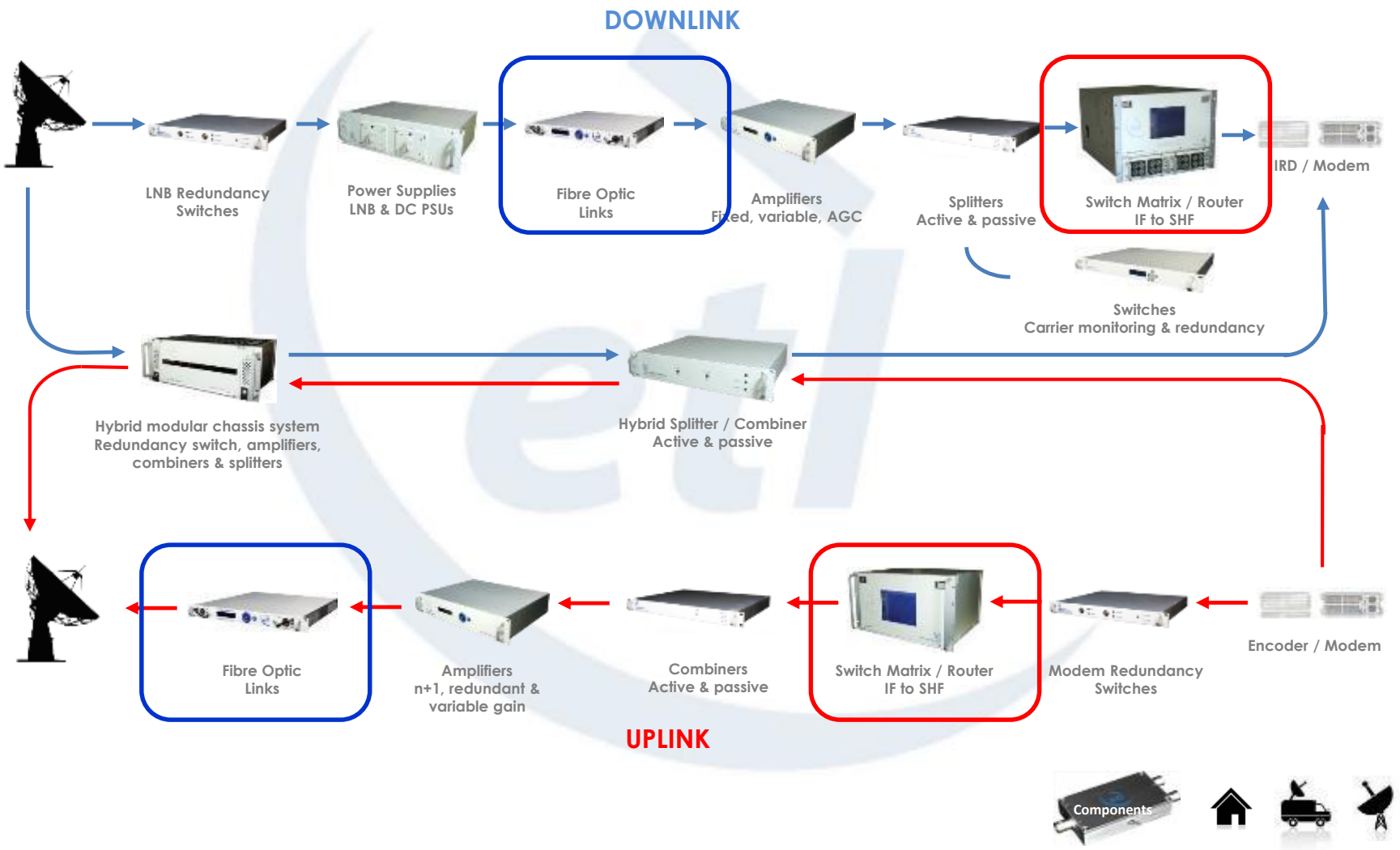


100% of our products are tested and soak tested

Focus on customisation and customer service

Some Challenging Teleports

The Importance of the RF Chain



GROWING RF MATRICES

The brief: US systems integrator required a 128x256 matrix system with variable gain, variable slope, LNB powering and RF input detection. System splitters to have 1+1 redundant amplifiers.

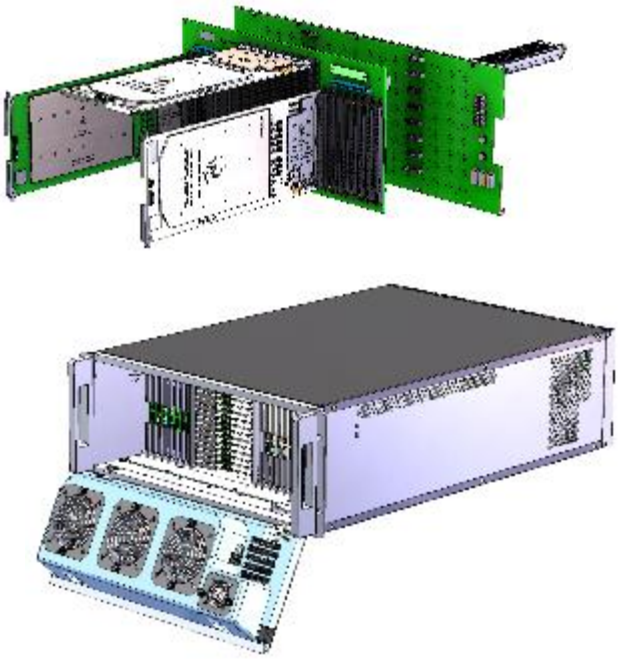
Vulcan based 128x256 system in 4 racks

ETL solution & roles:

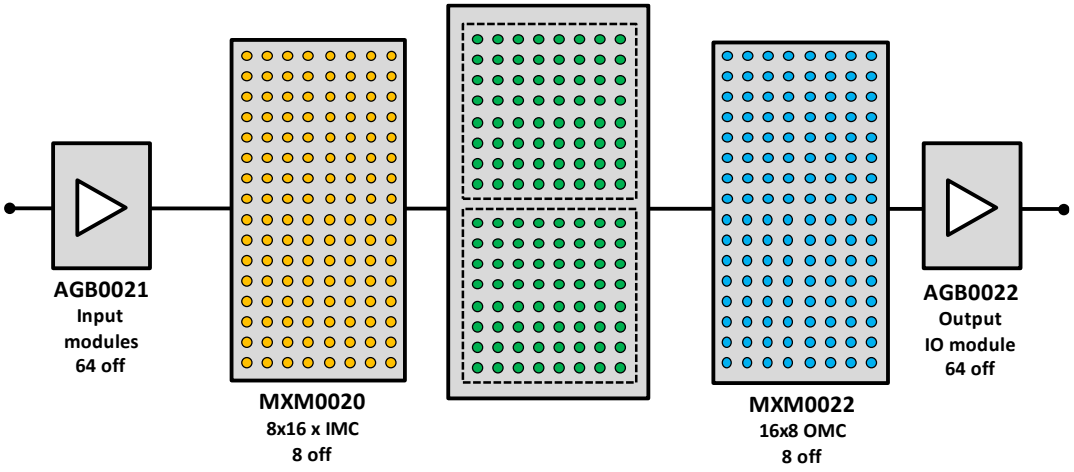
- Supply of Vulcan matrix modules; system splitters (with redundant amplifiers, variable gain/slope, LNB power, RF detection); termination panels and RF cables
- Installed hardware into customer supplied racks
- Additional services: Full FAT report, on-site commissioning and training

Trends in RF input signal distribution and switching

- Resilience
- Reliability
- Redundancy
- Configurable
- Performance



- Compact size, e.g. 64x64 4U
- All modules hot swap.
- Extensive redundancy
- Auto routing
- LNB powering



Redundancy Switching

The brief: Hong Kong teleport required a fully redundant, remotely controlled switch with automatic failover and ability to switch different audio signals to replace obsolete equipment and prevent signal loss issues.

New!

ETL solution & roles:

- Initial definition of project conditions & design of system.
- Supply of Griffin Redundancy Switch with 2 ASI Modules for switch and selection of audio signals

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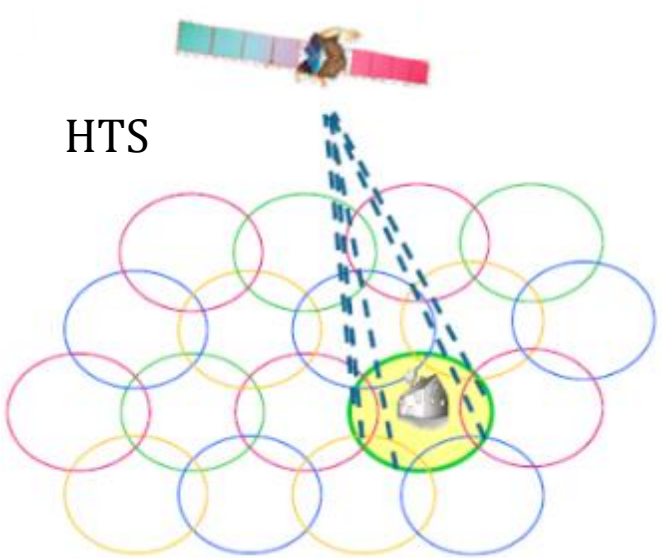
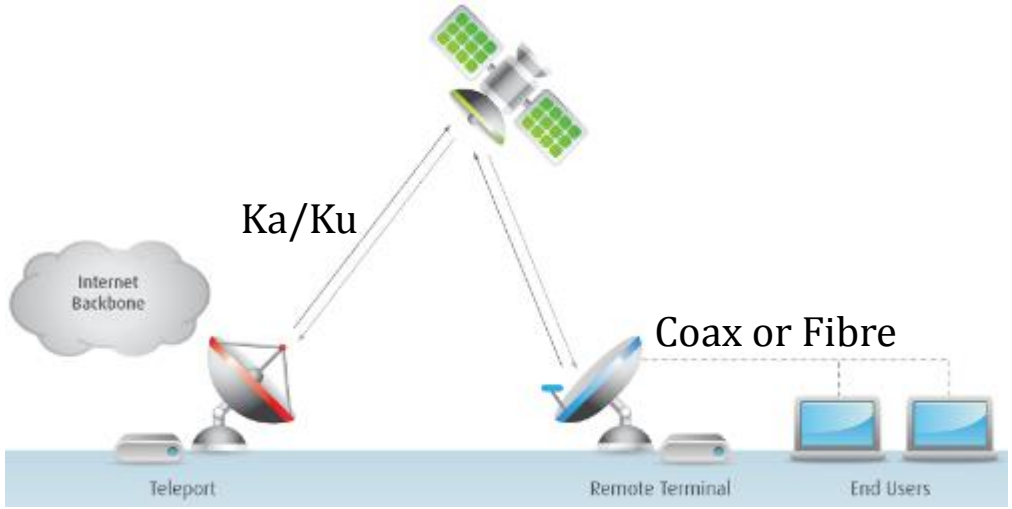
RF over Fibre in Satellite Communication Networks

Selecting your switch matrix and transmission medium: Fibre vs. Coax.





Up to 100m coax is okay
Beyond 100m use fibre
Medium distance best served by CWDM (up to 50km)
Very long distance up to 400km DWDM

UP/DOWN LINKS: Ka/Ku/C

IF: L Band (50 -3150MHz)

Optical: 1310 or 1550nm

RF over Fibre in Satellite Communication Networks

- **Fibre for low loss, low cost transmission**
- **Immunity from interference.**
- **Ideal for confined spaces, e.g. maritime**
- **Much bigger bandwidth**
- **DFB lasers with multiple lenses for enhanced isolation.**

Fibre Modules

50-3150 MHz operating frequency range

High isolation between modules for signal quality

TX & RX module options to transmit and receive signals up to 10 km

LNB Powering 18V on TX modules only

Chassis Options

Compact chassis options, which can be part populated

Resilience from dual redundant hot-swap power supplies, hot-swap fibre modules & fans

Remote control & monitoring via RJ45 Ethernet port with SNMP & web browser interface

Local control & monitoring via front panel push buttons & display

CWDM & DWDM Systems

- **CWDM – Coarse Wavelength Division Multiplexing**; combines multiple optical signals on a single fibre by using different wavelengths.
- Wavelengths are spread with coarse division: Up to 16 wavelengths.
- Up to 50km, dependent upon other system parameters.
- Do not require cooled laser or intermediate amplification.

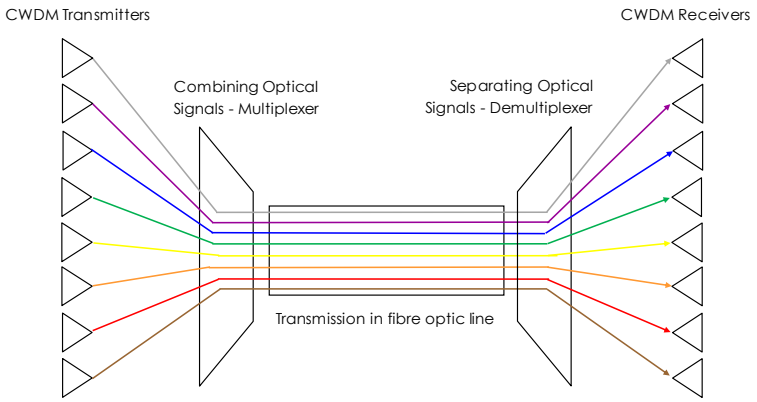
- **DWDM – Dense Wavelength Division Multiplexing**; combines multiple optical signals on a single fibre by using different wavelengths
- Wavelengths (more commonly referred to as channels) are defined by the ITU Grid:
- Can be used on long distances up to 400km
- Up to 48 channels over the same fibre

StingRay- Long Distance
100 & 200 series CWDM (Coarse wavelength division multiplexing)

FIBRE

New!

- Up to 50 Km links
- Full solution available – including fibre converters; MUX/DMUX; and delay lines when used for Ka-band diversity sites.
- 8 wavelengths on a single fibre cable, 1490 to 1610 nm reduces operator costs
- Ethernet and 10 MHz converters available
- Low Loss

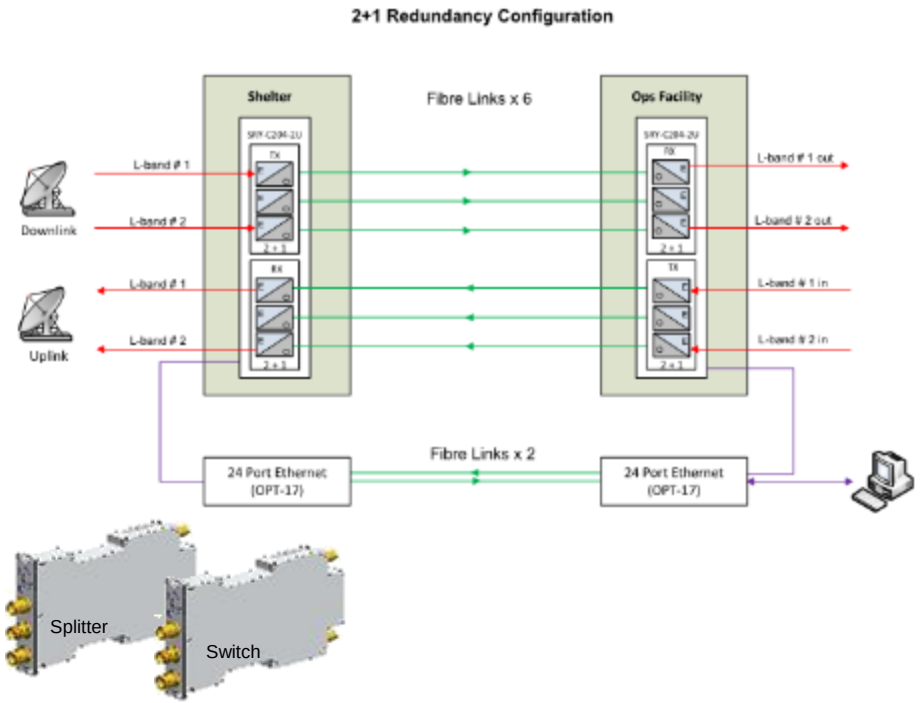


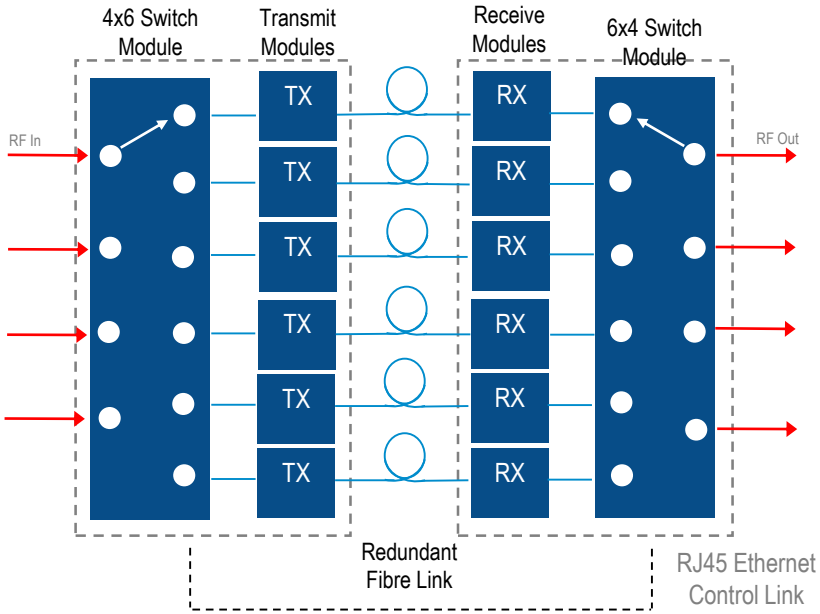
Benefits & basics:
- Up to 50km transmission distance
- L-band (850-2450 MHz) and broadband (50-2450MHz) modules
- Up to 16 RX or TX modules in a 1U hot-swap chassis for high capacity applications, with integrated MUX/DEMUX modules
- High Isolation between modules and good RF performance

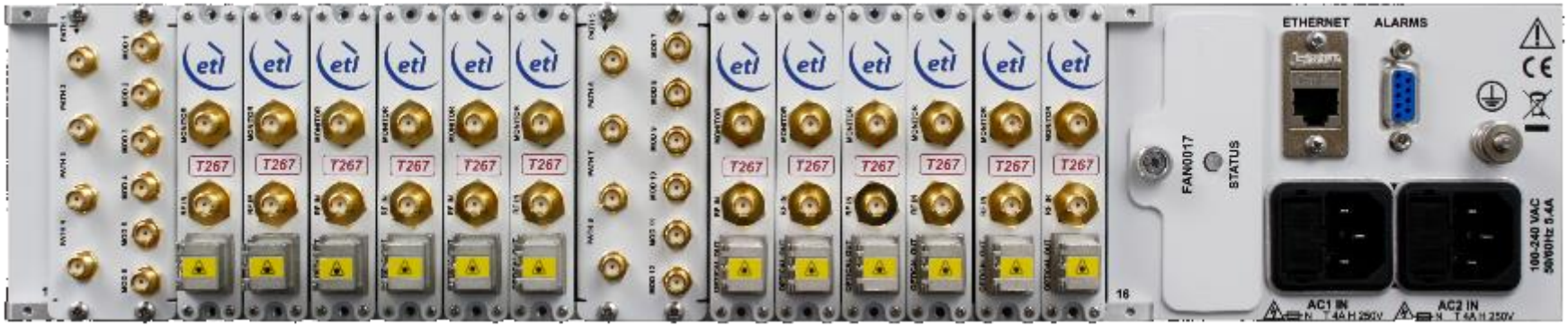
50 km

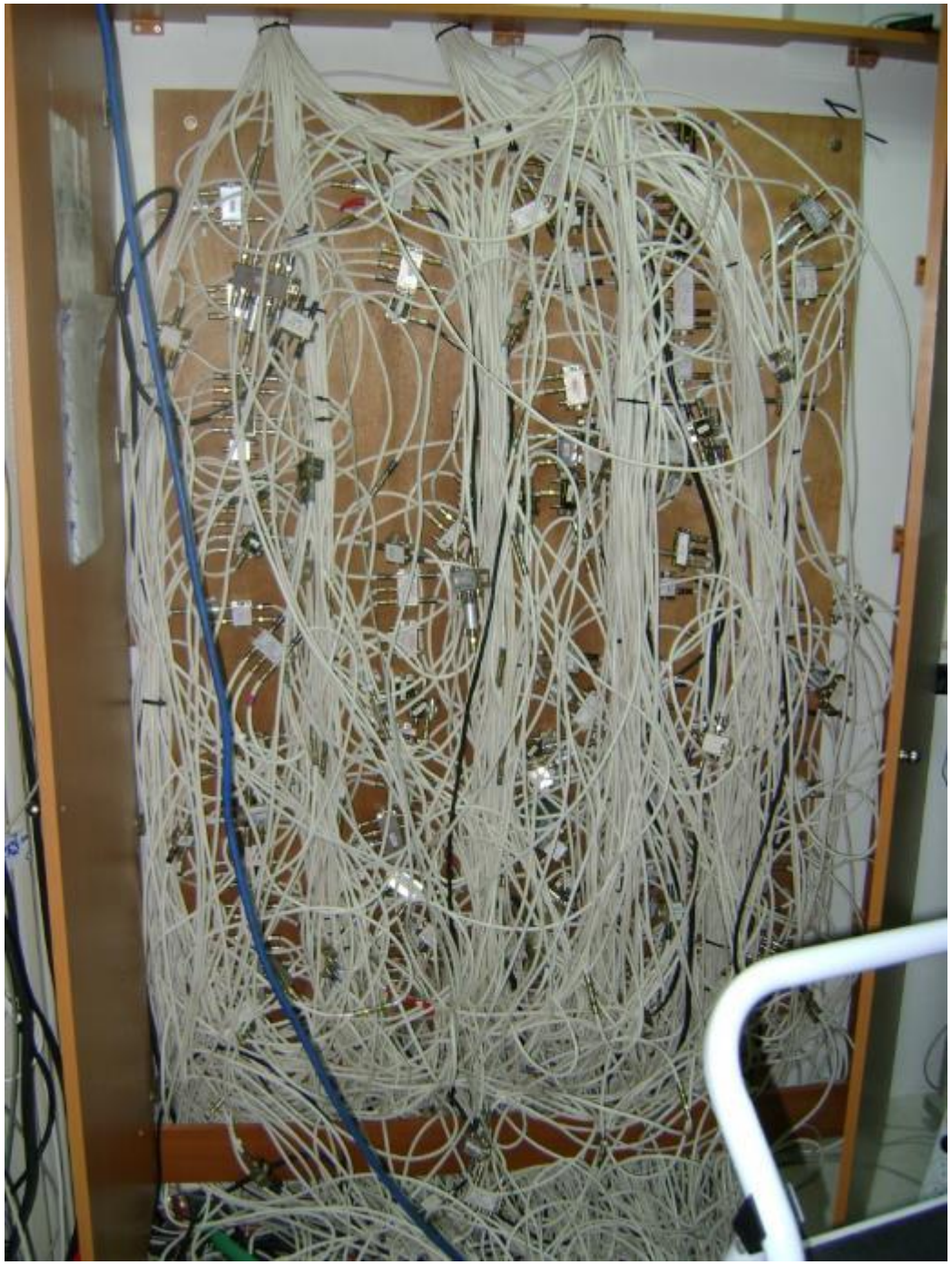
RF over Fibre: 4+2 Configurable Redundancy:

Trend for higher resilience and redundancy









Some interesting infrastructure still used

THANK YOU