Of Raman Rings and other things... the BBC's plans for one good network

by Steve Westlake, BBC, United Kingdom

“Why **one** good network”

- A network that provides a **shared infrastructure** for all user requirements so that economic “ caring and sharing” provides **the cheapest overall solution**
  - BBC Distribution Services
    - real time carriage of Vision and audio (multiple platforms to be connected to the interchange points with the Transmission provider)
  - BBC Contribution Services
    - real time carriage of Vision and audio (studio to studio)
  - Packet network for business applications
  - Packet network for media applications
  - Packet network for monitoring and control
  - Storage Area network
  - Telephony

“One good network” must serve:-

- 24 Million UK Licence payers = viewers and listeners ref1
  - Seven National TV networks with four National regional and 13 regional variants for the major channels BBC 1 & 2.
  - Ten National Radio channels, and 47 National Regions & Regional Local Stations
    - TV on analogue, DSat, DTT.
    - Radio on DAB, VHF, MF, LF DSat, DTT
- 1200 Million hits a day on the BBC web site
- 27,633 staff ref1 spread throughout the UK
    - Office PC and telephony requirements
- Radio and TV studios in major UK regional cities
- District offices and reporting points in most UK towns

- Ref1 2004 BBC annual report

“One good network” must also:-

- Migrate seamlessly from the current network(s)
- Meet “expected” growth in network traffic as working practices change
- Meet the “unexpected” !
- Enable transformation of the business processes rather than reacting to traffic growth
- Meet or exceed the current network availability targets
- Do it all less expensively!

A bit of BBC network history

- To'94 - "Analogue" Networks (PTT Monopoly)

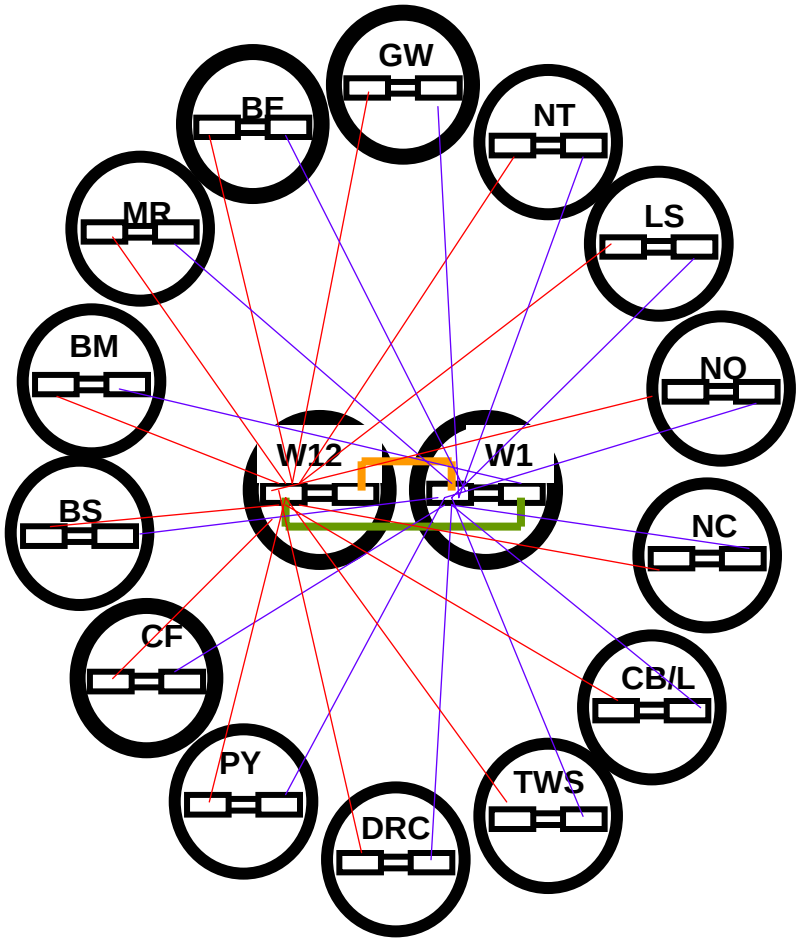
- 1995 - Energis SDH network connecting major regional centres
  - Conveyed Radio & TV Distribution (then analogue PAL only)
  - Conveyed vision contribution (then analogue PAL only)
- 1998 - Converted part of the SDH capacity to ATM
  - Conveyed DTT & DSat MPEG distribution
  - Conveyed SDI/PAL vision contribution
  - Conveyed (then) High Capacity IP network
- 2000 - Fibre Optic Network connecting 19 London sites (LFN)
  - Inexpensive, scalable capacity (Telco costs not Telco prices)
- 2003 - Commenced a set of trials using DWDM
  - Wavelengths with UK Telcos using TDM & IP- based terminal equipment
- 2004 - BBC sells BBC Technology to Siemens Business Services
  - Connectivity (continued supply by Energis) is part of the contract
- 2005 on – Siemens transformation
  - within BBC contract to include network upgrade (Raman Core & Clusters)

2003 Network WAN Trial Issues

DWDM	2.5G	10G
Terminal equipment compatability	Several manafacturers offer products	Only Telco and big Enterprise
Availability in UK	widely	limited
Tests with SDH	no problems	not tested
Tests with IP	no problems	not tested

Terminal Equipment	SDH Based	IP Based
270M SDI	ok	Compressed ok, Uncompressed - signiciant issues
PAL	ok	Compressed only - significant legacy re-engineering issues
ASI	ok	ok
G703 2M	ok	Significant issues
STM-1	ok	no
ATM	ok	Not tested but significant issues
General	Few problems	Many un-resolved issues

Starter Concept of resilient fibre network



(W1 and W12 linked by the LFN dual-path fibres)

- Star is the optimally efficient topology
- Resilience comes from the double star configuration
- BBC Distribution needs are covered
- BBC Contribution needs are covered
- BBC Data (especially Media Data) needs are covered optimally as a star is the fastest way to exchange WAN data
- DR problems as London W1 & W12 are very close to each other
- The LFN provides key high capacity links between London star hubs at lowest costs, therefore lowest price.

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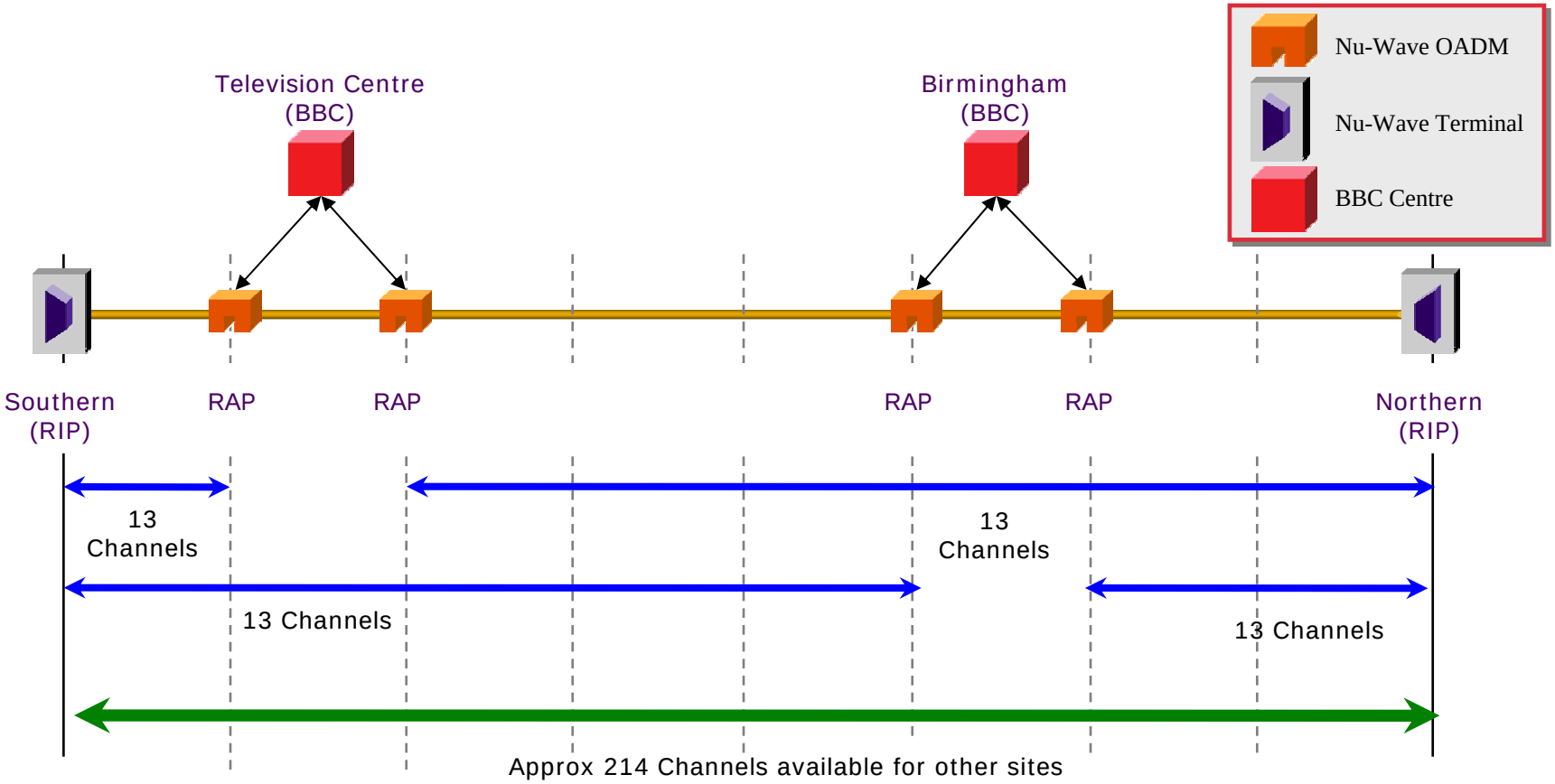
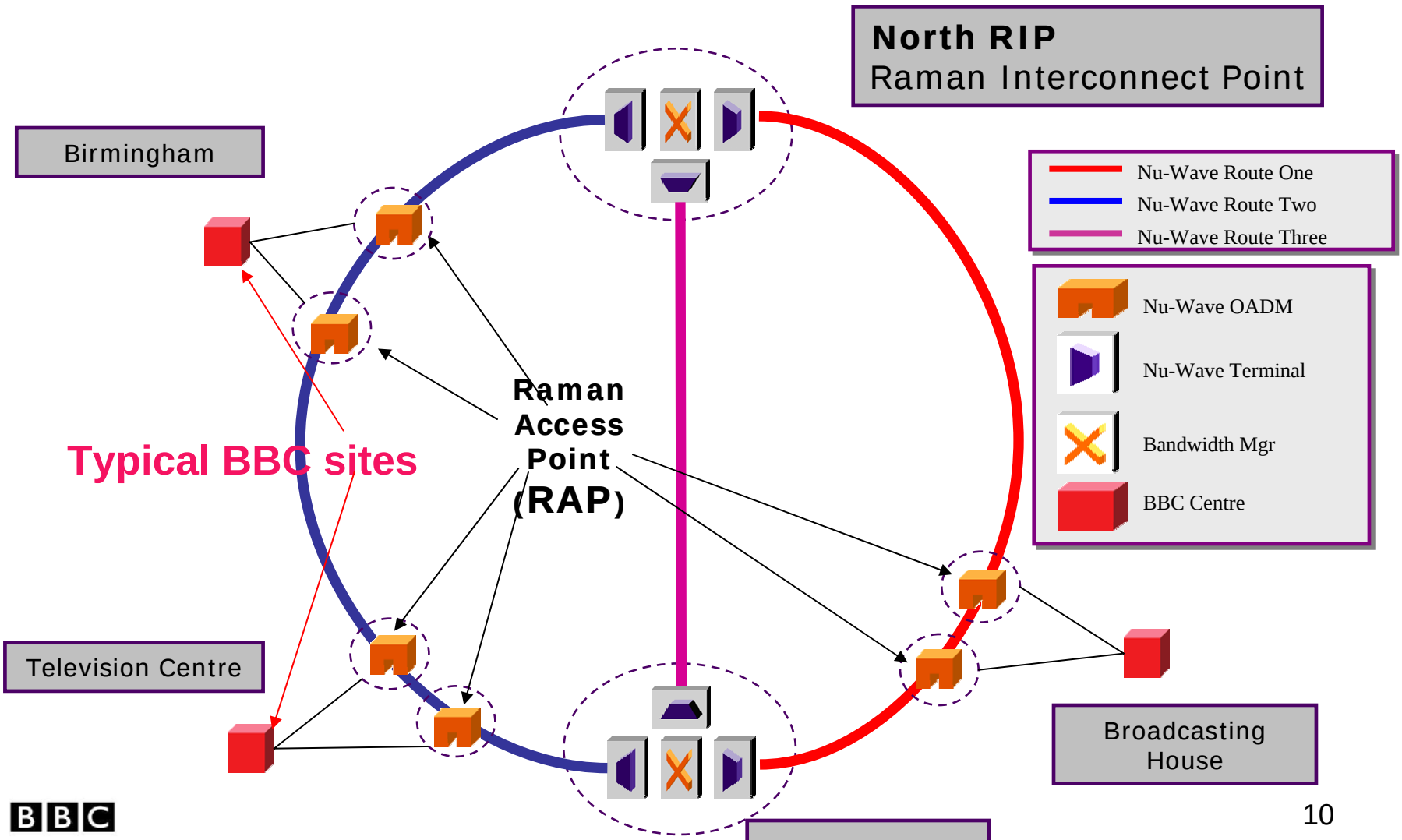
Practical realisation using Raman



240 x 10G wavelengths (channels) per Raman Arc

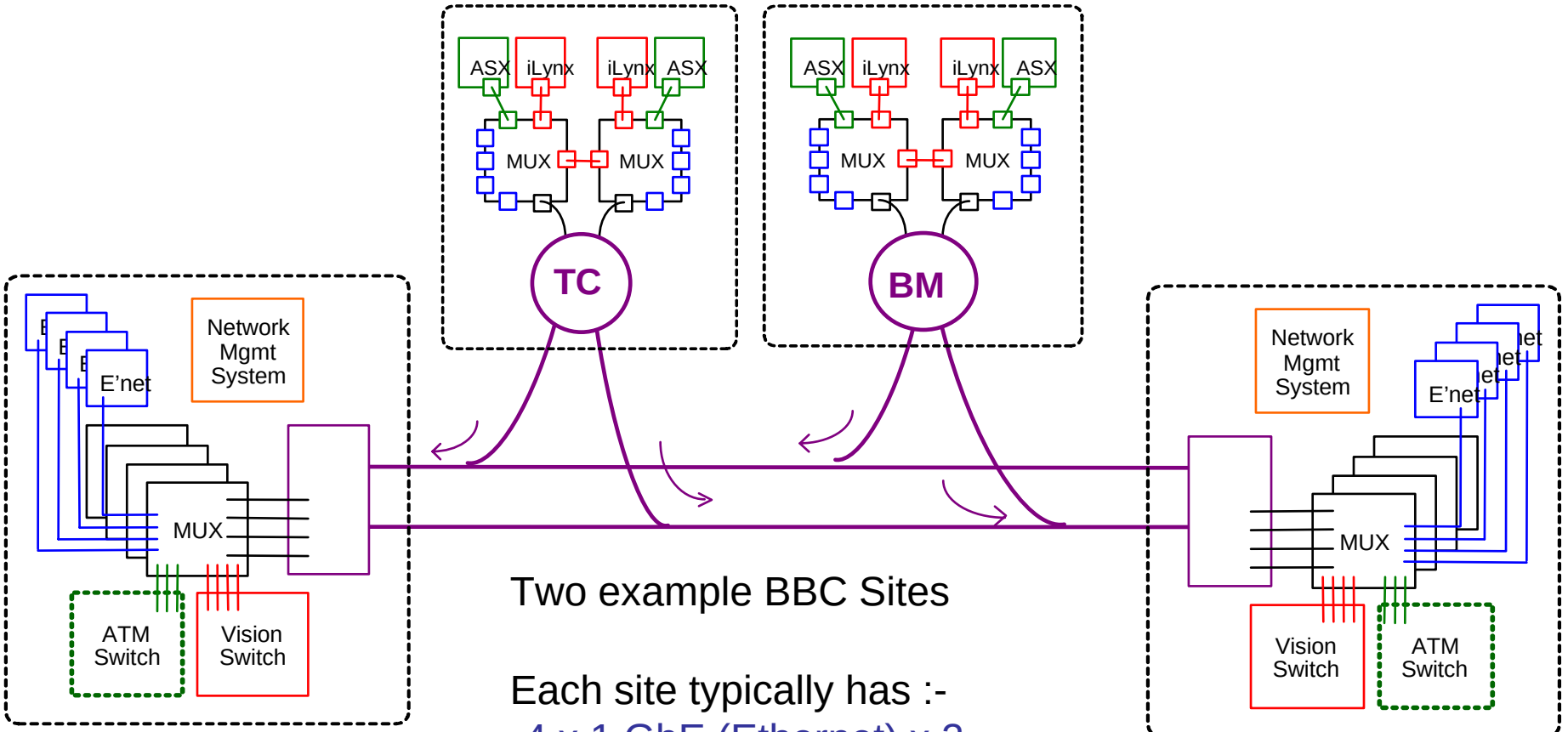
Logical view of developing Raman



Expected Terminal Equipment

- Marconi OMS16/64 SDH based multiplexer with 10G, 2.5 G, STM-1, 2M & GbE interfaces
- Scientific Atlanta iLynx for SDI, PAL & ASI interfaces
- Utilise existing ATM switches for ATM services
- Audio (analogue and transparent AES3) to be delivered via AES47
- Packet Network terminal Equipment -Foundry Big Iron

Expected Typical Deployment

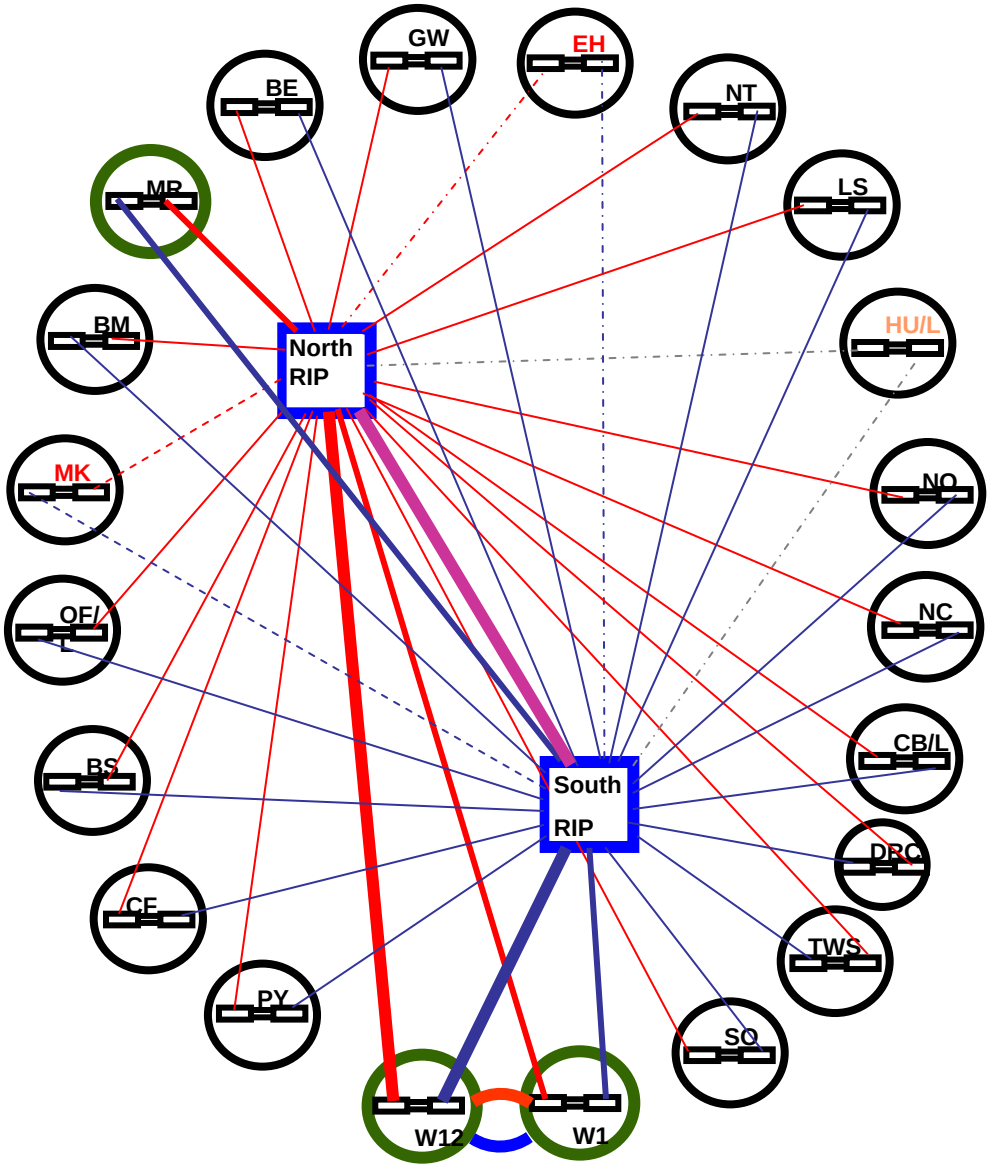


Two example BBC Sites

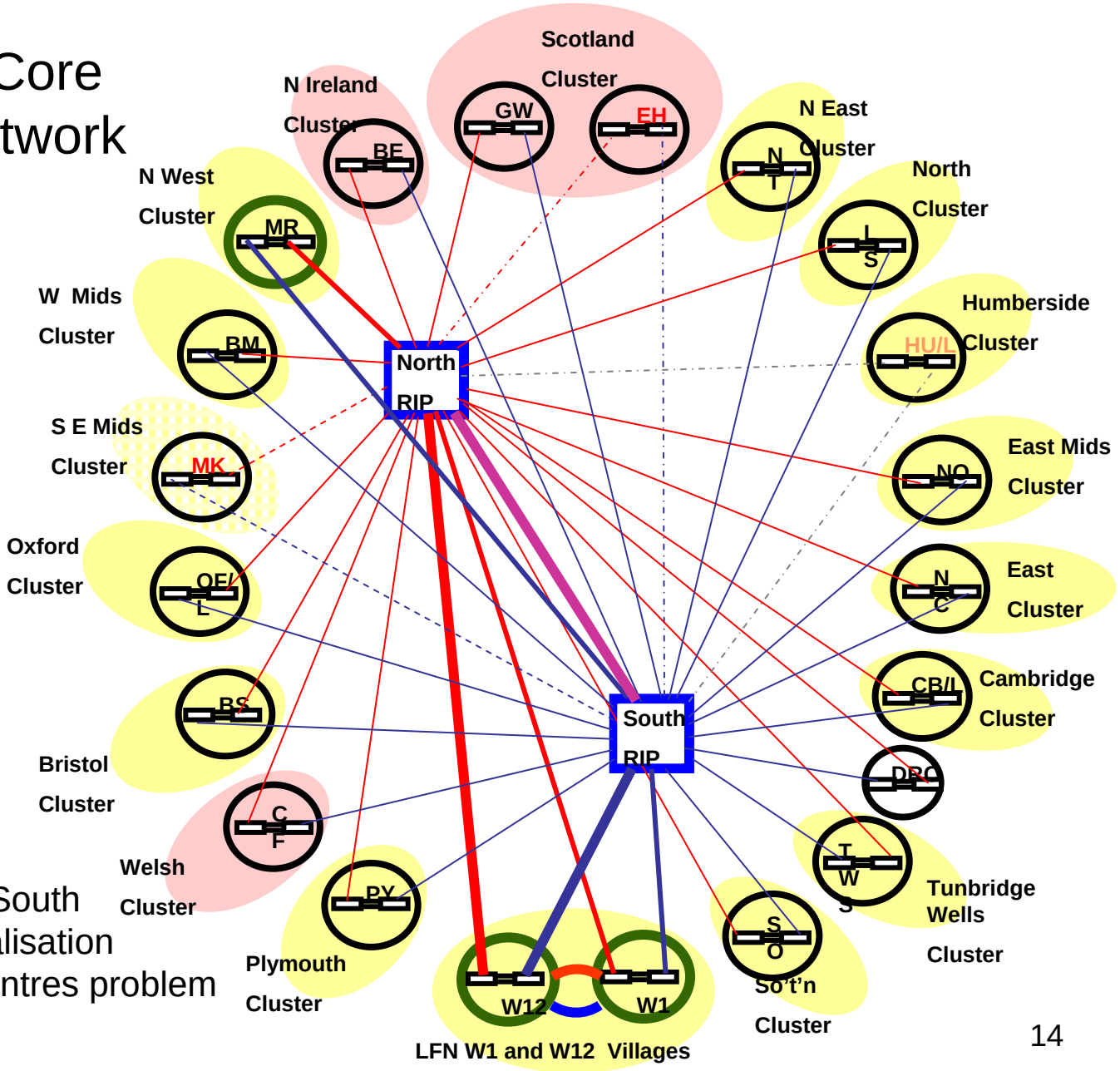
Each site typically has :-

- 4 x 1 GbE (Ethernet) x 2
- 2.5Gb/s for real time circuits x 2
- 1 x STM-1 x 2 for ATM services

Practical Concept of the Raman Core



Raman is the Core of a Hybrid Network



Dual hubs – North and South
- Reflects BBC decentralisation
- Sorts close resilient centres problem

Network transformation timescales

- Raman Network Transformation Project
  - Network build in progress now
  - Initial site trial – Q3 2005
  - Network Completion – Q3 2007
  - Raman network migration complete end 2007
  - IP telephony migration dependent on Raman Network completion

- Cluster Upgrade

  Probable – “all IP “ solution at the clusters (network edges)
  - Network upgrade of sites completed 2007

Summary

- Shared infrastructure for lowest costs
  - Hybrid network
    - Dark Fibre – Metro area connectivity
      - London Fibre Network – uses low cost fibre drivers
    - 10G DWDM “Raman” Network
      - Major regional centres – uses SDH
    - IP for Regional clusters