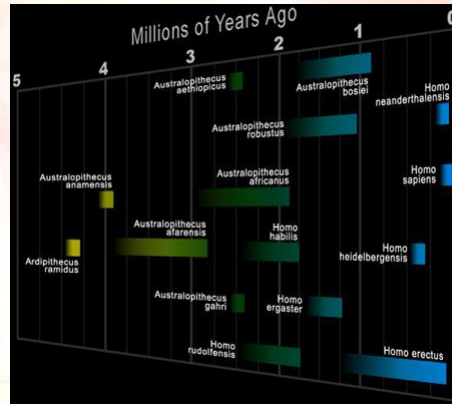


## MPLS Continues to Evolve

- Connection state returns to IP
- QoS problem addressed
- VPNs
- Traffic engineering
- GMPLS
- 3rd Generation VPNs
- Wireless MPLS



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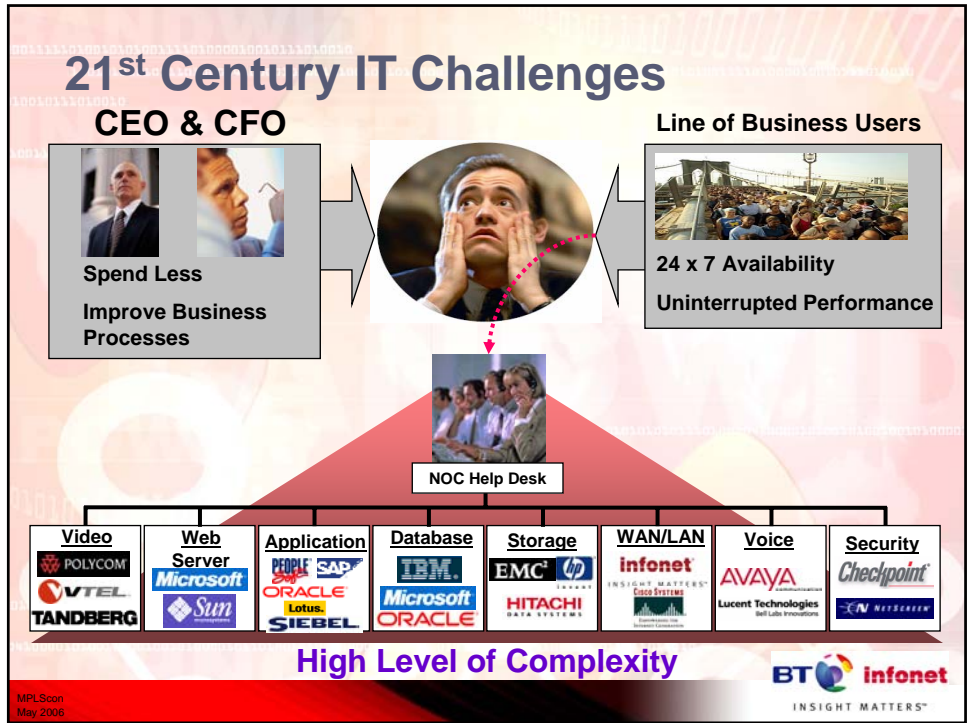
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## MPLS Role Today and Tomorrow

- Technologies
  - Multi-Layer (1, 2 & 3) VPNs over MPLS
  - Virtual Private Wire Service (pseudo wire) (VPWS)
  - Virtual Private Lan Service (VPLS)
  - Generalised MPLS (GMPLS)
  - Wireless MPLS (WMPLS)
  - Inter-carrier MPLS VPNs


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## MultiLayer MPLS

- AToM (Frame Relay, ATM, Ethernet, TDM, Sonet/SDH)
  - The multi-service switch? Still not here.
  - Too late for Frame Relay
- Driver today is local access
  - ATM DSLAMS will be replaced by IP DSLAMS and Ethernet / PONs
  - QoS requirements will continue to drive MPLS into access
  - WiMax - ??



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## VPLS and VPWS

- Standards are still evolving
- Accelerating the move from circuit switch to packet switched services
- VPLS appropriate in Metro Ethernet & connecting MANs
- Will raise the question of priority when used across public networks



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## GMPLS

- Protocol standards are still evolving
- Success dependent on interworking at control plane
- End to end QoS through dissimilar networks
- Dataplane interworking, i.e. frames vs cells
- GMPLS has been quiet this year

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**WMPLS**

- CAPEX / OPEX costs have to come down
  - Backhaul costs drive towards packet solutions
  - GPRS / GSM are separate networks and need to be converged
  - Network simplification using MPLS is a solution
- 3GPP Transport Specification Evolution R5 is the next milestone. All IP: RAN – backbone – handset

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**The Role of MPLS  
in the  
VPN Landscape**

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## When Networks Meet Applications

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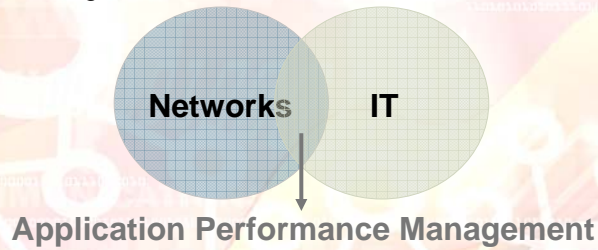
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# The Fusion of Networks and IT

- 1995: 1st and 2nd generation Networks



- 2005: 3rd generation networks



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# What is a 3<sup>rd</sup> Generation VPN ?

An applications driven VPN combining

**Apps Intelligence  
& Remediation**

**3<sup>rd</sup> Gen**

**Visibility**

**Control**

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## Approaching Application Performance Management

- A separate Application Management layer
  - Carrier supplied – Equant SNAP; BT AAI
  - Do it yourself – Shelf ware?
  - No integration with the VPN
- An integrated service into the IP VPN
  - No finger pointing
  - Application level SLA inclusive of the network parameters
  - Fully managed
  - Combined Network and Application Reporting, Monitoring and Control
  - BT Infonet Application Centric VPN
- Architectural approaches
  - Box shaping traffic at egress/ingress: Fire and Forget
  - System Approach: Air traffic Control with real time Remediation

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## MPLS 3<sup>rd</sup> Generation VPNs

- Application Intelligence and Remediation
  - Recognise applications
  - Monitor application performance
  - Set application business performance objectives
  - Modify performance based on holistic view of network
  - Compress traffic intelligently
  - Accelerate traffic intelligently



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## MPLS 3rd Generation VPNs

- **Visibility**
  - View application performance at a granular level
  - View VPN network status in real-time
  - Real-time alarms
  - View performance against objectives

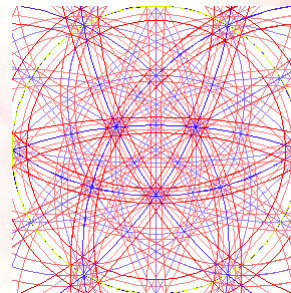


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## MPLS 3rd Generation VPNs

- **CONTROL**
  - Make changes in real-time
  - Granular control of application bandwidth and performance
  - Assign or restrict resources at flow level



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## MPLS Role Today and Tomorrow

- Tomorrow

- Convergence realised

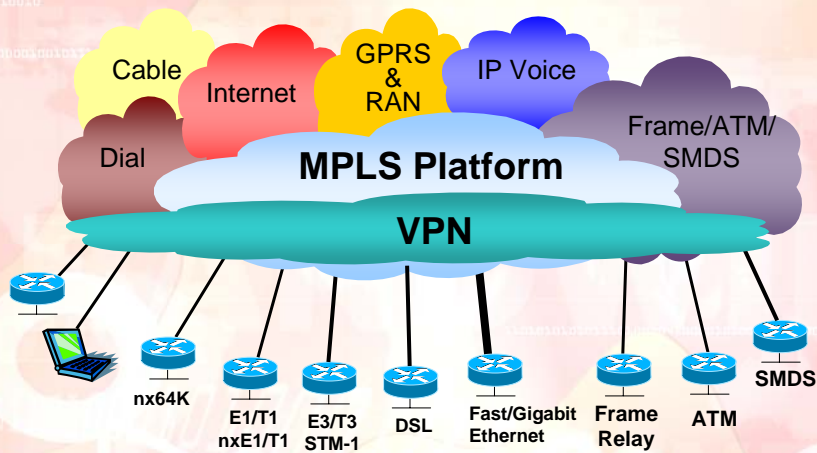
- VoIP
- Converged voice/data
- Audio
- Video

- MPLS Cable Networks

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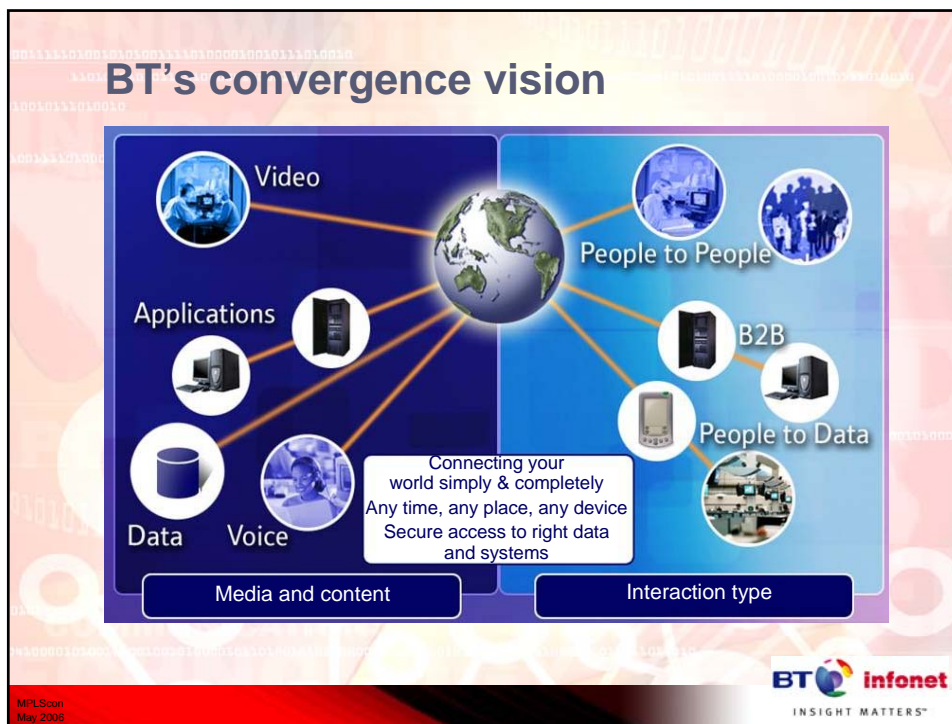
## Everything Converges on MPLS



- L3 IP VPN with multi-service access
- QoS Support

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- ## Summary
- Change continues at a fast pace in many areas
  - The rules and landscape will continue to shift underneath us
  - Standards develop so slowly they are often obsolete when released
  - Look before you leap, but when you leap, do it with conviction
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