
# Networking on the Horizon

## University of Melbourne

An Enterprise MPLS Network

THE UNIVERSITY OF MELBOURNE

NetStar Networks - Rick Frank

NETSTAR

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- Introduction to NetStar
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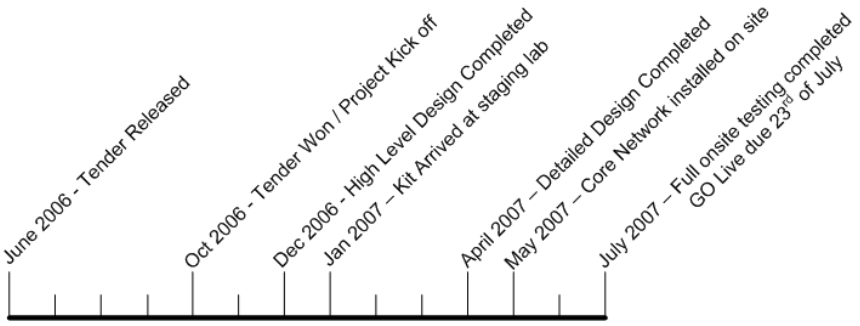
## Introduction to NetStar

- **IP Lifecycle Services Provider**
  - Cisco Gold Partner
- **Network Services Company that has built an excellent technical reputation**
  - Established Business processes, Methodologies
  - People
- **Customer-focused**
  - Fast, flexible and responsive
- **Global NetCentre 24 x 7 (GNC)**
  - Proactive
  - Local and remote expertise

## A Bit of History

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## University's Network Refresh Initiatives

- Part of the UoM $25million Network Refresh Project

- Core Network Renewal
- Access Layer Renewal
- Wireless Networking
- IP Telephony

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## The Business drivers

- Why move away from their current infrastructure?
  - Over 3 years old
  - Legacy protocols
  - Failing Hardware
- What functionality did the business see in the implementation of MPLS as a technology?
  - Cutting edge technology
  - Traffic Segregation (Affiliates/Guests)
  - Increased Security (Departmental separation)
  - Lower Convergence times (Less reliance on L2 Protocols)

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## Project Management

- How did NetStar Project Manage this project
  - Technical Representative from UoM
  - Split Resources
    - Design Team
    - Implementation Team
  - Series of Design Meetings with UoM
  - Regular Design reviews with UoM
  - Adoption of Prince2 methodologies on both sides

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## Design Summary

- Enterprise MPLS network
- Utilizing 10 Gigabit Ethernet interconnects
- 70x 6509-E Chassis /Sup 720 3B's/FWSM/DFC3's/IDSM2
- Split in to
  - 1 MPLS Core zone
  - 1 data centre zone
  - 1 Internet border zone
  - 5 geographical user zones (spread over 3 physically separate DC's)
- Designed to carry IPv4 unicast/multicast, IPv6 unicast, VoIP and Videoconferencing seamlessly
- Designed for full logical and physical redundancy
- Follows the Cisco "Next Generation Enterprise MPLS VPN-Based MAN Design and Implementation guide"

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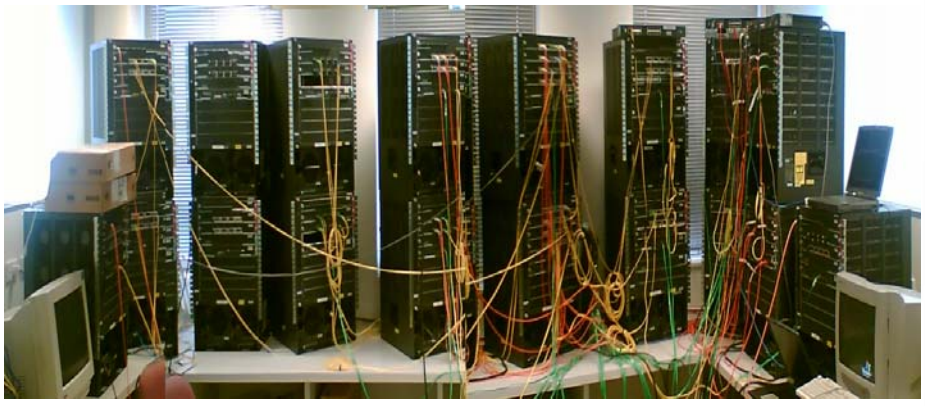
## Design Summary



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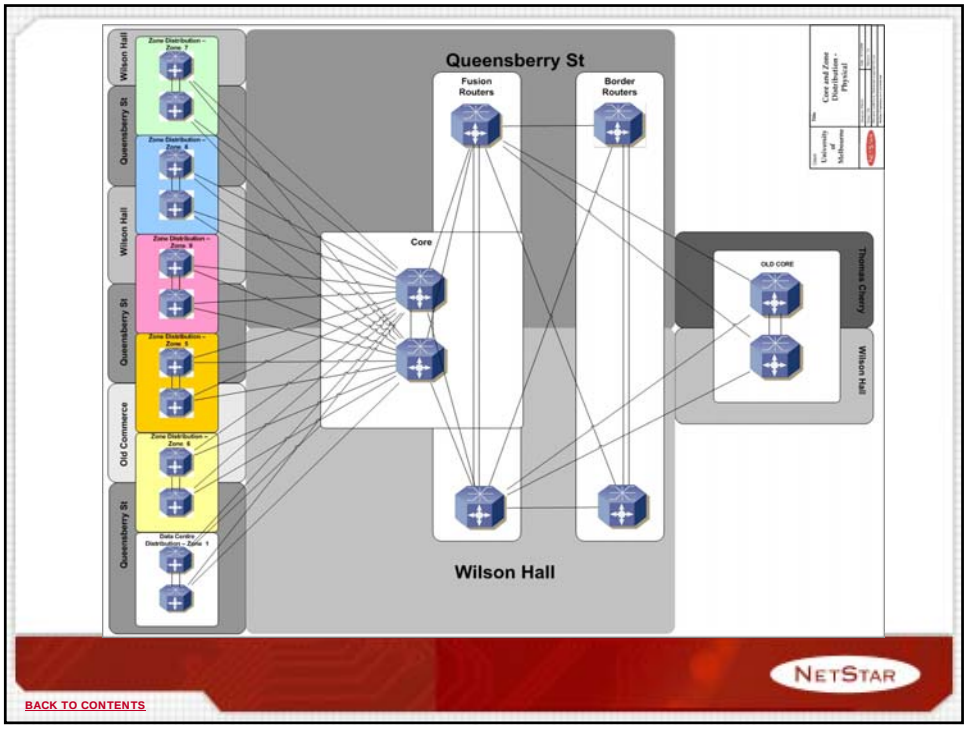


## Features and Functions

- Physical Design
  - Redundant Core (P routers)
  - Redundant Zone routers (PE routers)
  - Redundant BGP Router Reflectors
  - Collapsed PE/CE architecture
- IPv4 Unicast
  - Enterprise level MPLS Cisco recommended best practices
  - Multi VPN environment (role specific)
  - Inter VPN routing permitted but secured by resilient L2 Firewalling in the 'Fusion' Routers
  - Fusion routers acting as Route reflectors for M-BGP (data path)
- IPv4 Multicast
  - Per VPN Multicast Distribution Tree (MDT) groups
  - Anycast static RP's configured on the 'Fusion' Routers
  - Proven Redundant MSDP relationships to the internet.

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## Features and Functions

- IPv4 QoS
  - End to end QoS
  - CoS to EXP bit mappings
- IPv6 Unicast
  - Non VPN'd IPv6 routing has been configured, using IPv4 BGP loopbacks to distribute routes
  - Routing to AArNet using IPv6 BGP peers
  - Extended Feature requirement still in development
- User and Role based VPN design
  - VPN's defined based on user grouping
  - VPN-General, VPN-BAS, VPN-Networks, VPN-Old_Core, VPN-Research
  - VPN-Shared-Services (DNS,DHCP,File and Print)
  - VPN-Fusion (inter VPN traffic VPN)

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## Features and Functions

- IPv4 Security
  - Firewalling between all VPN's
  - Firewalling to the internet
  - IPS reporting from the border routers
  - CSM used to ensure configuration conformity across the board.
  - CS-MARS to be implemented for security threat collation.
- IPv4 Wireless ready
  - Design submitted to UoM as part of Wireless Tender
  - NetStar's design incorporated the functions and features of UoM MPLS Network to provide a security focused wireless design
- IPv4 IP Telephony ready
  - Currently under tender (Submission 11th July)
  - NetStar's design incorporated the functions and features of UoM MPLS Network to provide a security focused Telephony design

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## Features and Functions

- Failover times
  - Cisco Best Practice High availability timers implemented (OSPF/BGP/HSRP/BFD)
  - Hardware feature limited (6500 supervisors)
  - Highly complex environment,
  - Multi protocol interaction.

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## What have been the technical challenges?

- Highly Complex Green Field Design
- Cisco Hardware based platforms
  - Catalyst 6500-E
  - Supervisor 720 3B
- Limitation of current MPLS Software features on 6500
- 12.2(18)SXF6 – SXF9 in 6 months (for bug fixes)
- Divergence of 6500 / 7600 Platforms
- Inter VPN Unicast routing (VPN-Fusion)
- Inter VPN Multicast routing

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## The implementation process.

- How is this new network being implemented
  - Split in to 10 Separable portions
    - Portions 1-4 are is the first 18 6500 Core & Internet
    - Portions 5-10 are the remaining 52 buildings
- How will the new functions of MPLS network integrate with the current features of the UoM Campus LAN and ATM backbone
  - Current Network and New Network to be interconnected at one point.
- What will be the transition phase
  - 8-12 month move of 52 building distribution switches
- How long will it take?
  - Expected completion Q1 2008

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## What are the University's Future Application Requirements?

- Increase in Legitimate Peer to Peer Apps
- Use of IPv6 functionality
- Use of IPv6 Multicast (Research only)
- Increase usage of the Atlas Project
- L2 MPLS VPN (DC-DC)

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## Summary

- Should Enterprises attempt to implement their own MPLS MAN/LAN/WAN?
- Yes they should
- IF, the functionality of MPLS and MPLS VPN's are required by the business and security groups.
- Ensure features and functions available in the carrier world are available on the hardware platform you choose, if you require them.

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# Questions?

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