A carrier's view of the evolution of Ethernet to VPLS

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- 5 years implementing Metro Ethernet
- Large deployments
  - Department of Education and Training
    - 260 x 10/100/1000Mbps Sites
    - 5Gbps core network
    - Fully redundant and Diverse
- National Layer 2 GbE network
  - >5,200 Ethernet services
  - Including xDSL & E1 tails

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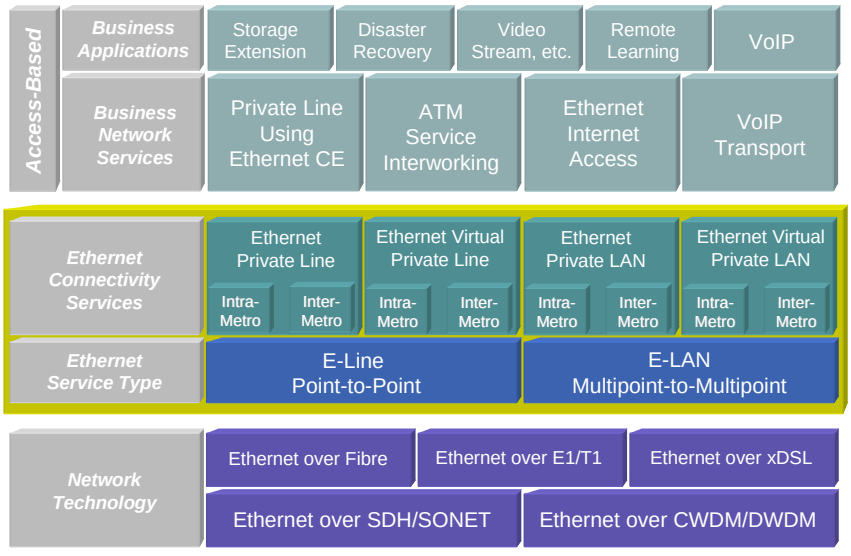
Key Message

The two main questions facing Uecomm as a layer 2 Ethernet service provider today are:

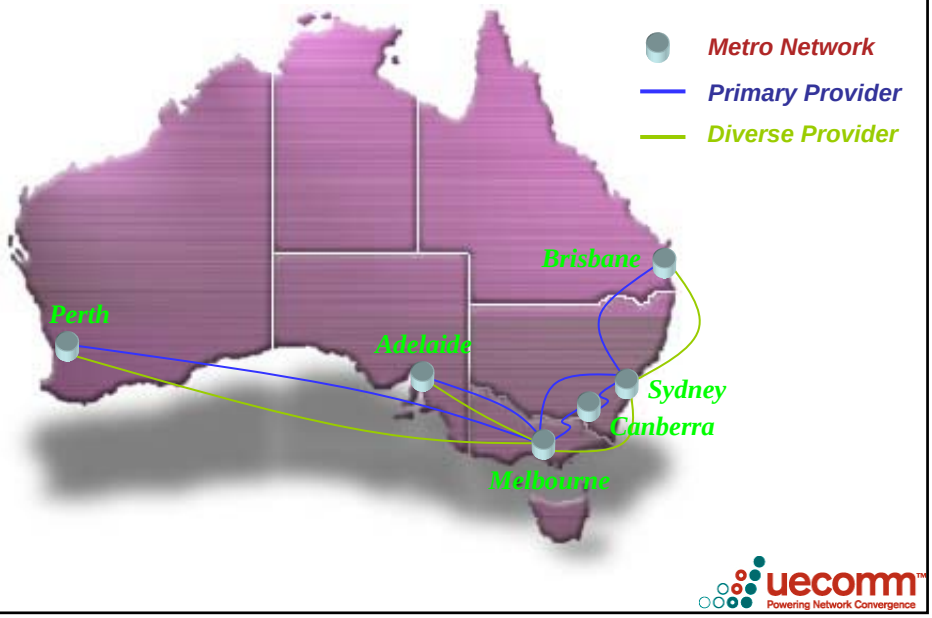
- Layer 2 Gigabit Ethernet – A WAN technology that allows carriers to remain competitive in a constantly evolving marketplace?
- If not, is VPLS the answer to our prayers?

Uecomm – Product & Network Framework

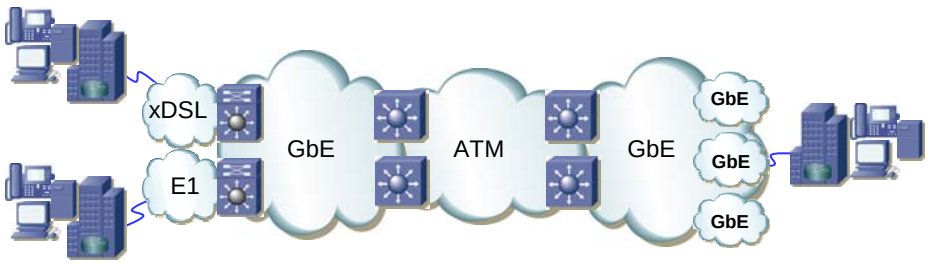


Source: Heavy Reading

National Network Architecture



Network Architecture (cont)

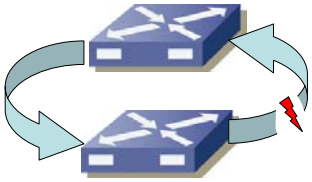


Layer 2 Ethernet				
MSP ~50ms *		MSTP ~10s	PNNI ~15s	MSTP ~10s
2684-B	2427-B	802.3	2684-B	802.3
xDSL	E1	Fibre	STM-X SDH	Fibre

* Limited to the Point-of-interconnect

Ethernet Network Limitations

- Spanning Tree Scalability
  - Network Diameter limitations
  - Complexity of operation and maintenance
  - Fault propagation due to flat architecture
- Endless Traffic Loops
  - Metro wide VLAN awareness propagates broadcast Storms
- VLAN depletion
  - ~4K broadcast domains per Metro network
- Non-Converged; Transport Technology dependant
  - Inconsistent end-to-end QoS model
  - Inconsistent Service bandwidths
  - Inconsistent Service Provisioning, Monitoring and Reporting



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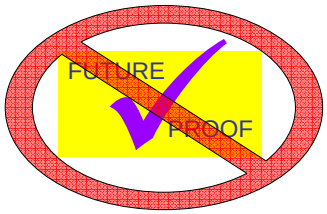
Ethernet Network Limitations (cont)

- Resiliency and Robustness
  - Lack of HA feature availability
  - Convergence times in the 10s of seconds
  - Single point of failure at bridging points



- Limited Traffic Engineering Capabilities
  - Per Service Type
  - Per Class of Service

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Answer to Question #1

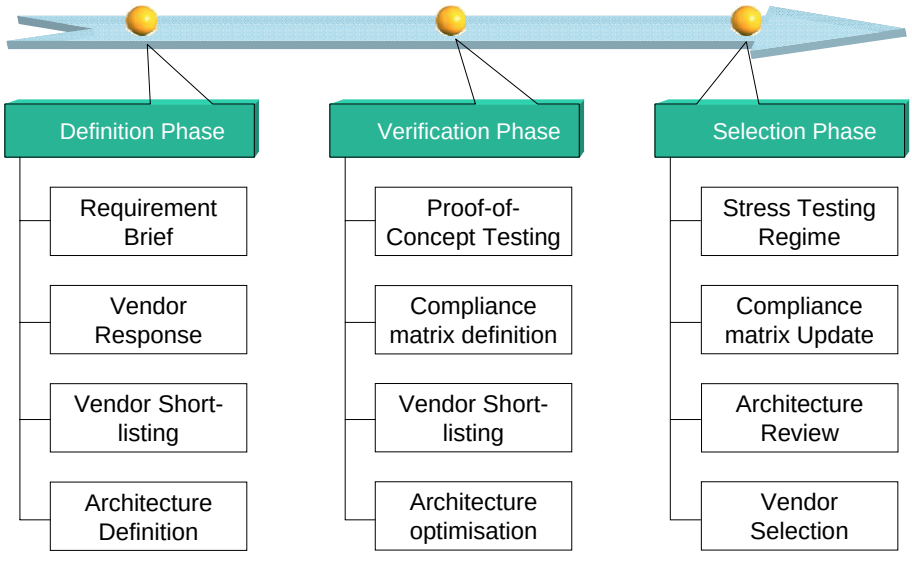
Question

- Ethernet - A future-proof WAN technology?

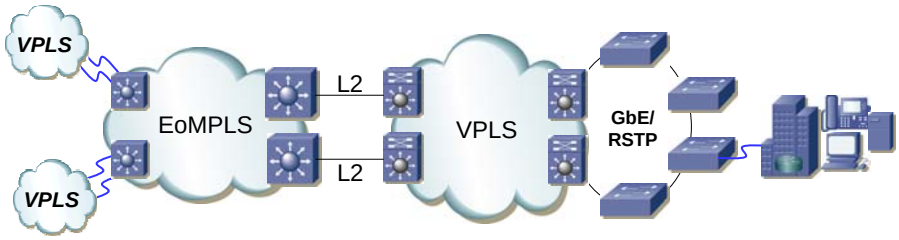
Uecomm's Answer

- Maintainable
- But not good enough….

From Ethernet to VPLS…

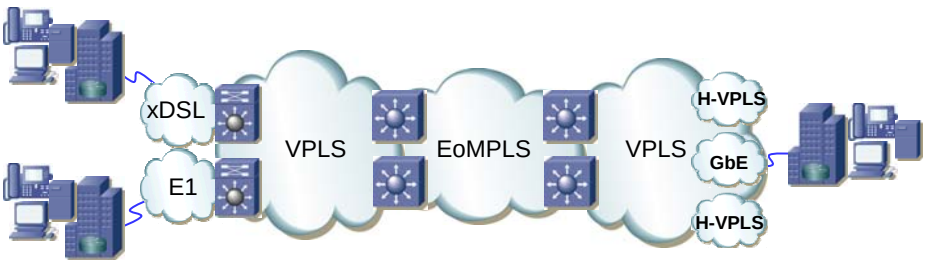


VPLS-based Network Architecture (cont)



- Fully meshed VPLS-based Metro network
- Fully meshed EoMPLS-based Inter-capital network
- L2 connection between Metro & Inter-capital network
- L2 RSTP-based Ethernet Access network

VPLS-based Network Architecture



Layer 2 Ethernet					
MSP ~50ms *		FRR ~50ms	FRR ~50ms	FRR ~50ms	RSTP
2684-B	2427-B	vpls-ldp/bgp	martini-l2circuit	vpls-ldp/bgp	802.3
xDSL	E1	Fibre	VPLS/STM-X SDH	Fibre	

* Limited to the Point-of-interconnect

VPLS Architecture Benefits

STP Scalability

Endless Traffic Loops

VLAN depletion

Non-converged

Resiliency and Robustness

Limited Traffic Engineering

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VPLS Architecture Benefits

- Scalable Service Definition
  - No VLAN depletion
  - No STP limitation
- SDH-like convergence
- Traffic Engineering capabilities
- Converged – Transport independent
- Service features due to new hardware introduction

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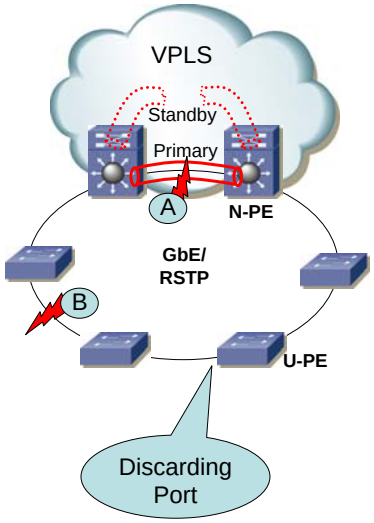
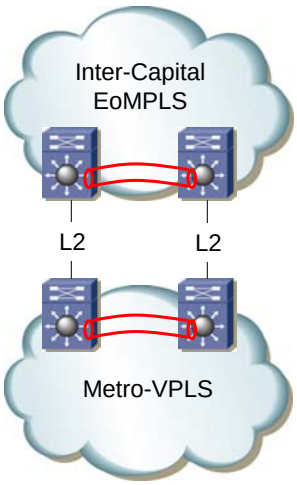
VPLS Architecture Optimisation

- Failure A – LSP Failure
  - PW protected via Standby LSP
  - No effect on RSTP
  - No effect on traffic
- Failure B – Link Failure
  - Uni-directional traffic may be blackholed by N-PE due to lack of FDB sync.
  - RSTP convergence time reverts to STP timers



VPLS Architecture Optimisation

- PE redundancy
  - Single entry point to avoid L2 loops
  - Convergence time
- Destination based policing
  - Ingress - At domain boundary
  - Per destination metro network
  - Across PEs



Answer to Question #2

Question

- Is VPLS the answer to our prayers?

Uecomm's Answer

- Step in the right direction
- Needs further development to ensure real-work practicality

Thank You

Questions ?

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