ETHERNET BACKHAUL

Scalable backhaul connectivity with national coverage

Backhaul bandwidth requirements have been increasing exponentially, driven by mobile data usage, content (Video on Demand, IPTV), and increasing Internet data plans. Industry-standard Ethernet services are being widely adopted due to their cost-efficiency and scalability to support a broad range of applications on a unified network.

Whether you need backhaul connectivity to carry traffic between your Points of Presence (PoPs) into Telstra equipment buildings or National Broadband Network (NBN) Points of Interconnect, our robust national pseudowire/Virtual Private LAN Service (VPLS) platform allows you to backhaul a broad range of performance sensitive traffic.

Ethernet Backhaul Overview

Ethernet Backhaul combines our high-quality Layer 2 network, services and operational capabilities into a simple, standardised solution.

Ethernet Backhaul is a MEF 9 and MEF 14 certified backhaul service, providing metropolitan and regional coverage at approximately 1,700 Exchange Service Areas across Australia. Four Classes of Service (CoS) allows you to cost-efficiently prioritise traffic according to network and end user needs.

Ethernet Backhaul uses proven pseudowire and Virtual Private LAN Service (VPLS) technology in our core network to provide flexible and robust point-to-point and point-to-multipoint (aggregation) services. Fibre optic access cables (tail ends and head ends) provide physical connectivity from each site, where the Network Terminating Unit (NTU) on each end of the service is located, to the serving Telstra exchanges and the pseudowire/VPLS 'cloud' in our core network.

End-to-end 'logical' service connectivity across these access cables and the cloud is via an Ethernet Virtual Circuit (EVC). This associates two or more User Network Interfaces (UNIs) which are ports on each Network Terminating Unit (NTU) into which the user connects their own equipment, as per fundamental MEF E-Line service constructs.

We also offer an optional customer-managed protection capability via redundant fibre optic access cables to geographically diverse nodes in Telstra exchanges at the 'layer 2 edge' of the cloud.

Ethernet Backhaul uses the International Telecommunications Union (ITU) Y.1731 recommendation on Ethernet networks and Operations, Administration, Maintenance (OAM) functionality.

This provides comprehensive layer 2 fault management on a per Ethernet Virtual Circuit (EVC) basis and performance monitoring on a per-EVC and per-Class of Service (CoS) basis, enabling rapid fault diagnosis, response and resolution.

Using Ethernet Backhaul

For Service Providers

Ethernet Backhaul connects your Points of Presence (PoPs), Telstra equipment buildings where you have equipment (eg DSLAMs) and data centre sites. It is also suitable for backhaul of traffic from NBN POIs.

You can use different bandwidth Ethernet Virtual Circuits (EVCs) and different Classes of Service (Cos) to prioritise network management and signalling, voice, content delivery (IPTV channels) and residential internet data.

For Mobile Network Operators

Ethernet Backhaul connects your mobile base stations, Hub sites and centralised Radio Network Controller (RNC) sites.
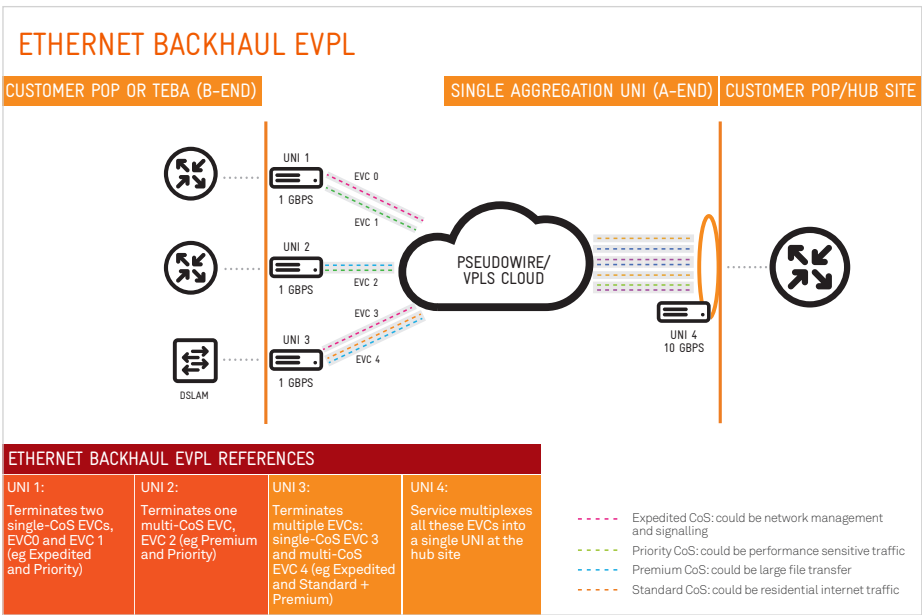
You can use different bandwidth Ethernet Virtual Circuits (EVCs) and different Classes of Service (Cos) to prioritise network management and signalling, Ethernet synchronisation, voice and data.

Ethernet Backhaul EVPL

The diagram below shows how you can use Ethernet Backhaul from several sites to a Point of Presence (PoP) using an aggregated Ethernet Backhaul service (supplied via an Ethernet Virtual Private Line (EVPL) in our core network).

The diagram highlights some key features of Ethernet Backhaul:

- high-speed service aggregation (up to 10Gbps) at the User Network Interface (UNI) at the PoP site, also known as the A-end or head-end of the service (see UNI 4)

- multiple Classes of Service (CoS) can be used to provide specific data traffic priorities for different applications over a single Ethernet Virtual Circuit (EVC)

- service multiplexing (which allows one UNI to support more than one EVC) on the UNI, as shown on the tail end of the service at UNI 3 as well as at the head-end (UNI 4)

- both single-CoS EVCs and multi-CoS EVCs can be delivered to the same UNI (see UNI 3)

- bandwidth profiles may be applied on a per-EVC basis (see EVC0, EVC1 and EVC3), providing rate enforcement of data transmission for the whole EVC

- bandwidth profiles may also be applied on a per-CoS basis on a single EVC (see EVC2 and EVC4), providing more granular rate enforcement of data transmission on each individual CoS within the EVC.

ETHERNET BACKHAUL EVPL

| CUSTOMER POP OR TEBA (B-END) | SINGLE AGGREGATION UNI (A-END) | CUSTOMER POP/HUB SITE |

UNI 1 — 1 GBPS — EVC 0 / EVC 1

UNI 2 — 1 GBPS — EVC 2 / EVC 3

UNI 3 — 1 GBPS — EVC 4

DSLAM

PSEUDOWIRE/ VPLS CLOUD

UNI 4 — 10 GBPS

ETHERNET BACKHAUL EVPL REFERENCES

UNI 1:	UNI 2:	UNI 3:	UNI 4:
Terminates two single-CoS EVCs, EVC0 and EVC 1 (eg Expedited and Priority)	Terminates one multi-CoS EVC, EVC 2 (eg Premium and Priority)	Terminates multiple EVCs: single-CoS EVC 3 and multi-CoS EVC 4 (eg Expedited and Standard + Premium)	Service multiplexes all these EVCs into a single UNI at the hub site

- - - - Expedited CoS: could be network management and signalling
- - - - Priority CoS: could be performance sensitive traffic
- - - - Premium CoS: could be large file transfer
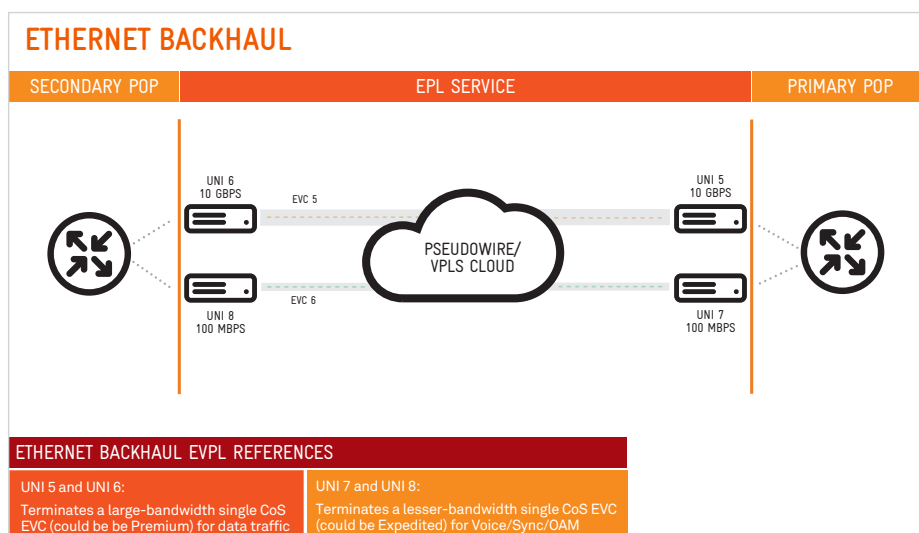- - - - Standard CoS: could be residential internet traffic

Ethernet Backhaul EPL

The diagram below shows how Ethernet Backhaul lets you 'long-haul' traffic between a Primary Point of Presence (PoP) and a secondary PoP (potentially in a different state), using a point to point Ethernet Backhaul service (supplied via an Ethernet Virtual Private Line (EPL) in our core network).

The diagram highlights some further features of Ethernet Backhaul:

- the ability to apply different Class of Service (CoS) priorities to each Ethernet Virtual Circuit (EVC) (multiple CoS can also be applied on a single EVC) – for example, applying a lower CoS on the EVC carrying the data traffic and a higher CoS on the EVC carrying the VoIP/video

- all-to-one (port-based) service bundling, where all CE-VLAN IDs are mapped to a single EVC.

ETHERNET BACKHAUL

SECONDARY POP	EPL SERVICE	PRIMARY POP

UNI 6
10 GBPS

EVC 5

UNI 5
10 GBPS

PSEUDOWIRE/
VPLS CLOUD

EVC 6

UNI 8
100 MBPS

UNI 7
100 MBPS

ETHERNET BACKHAUL EVPL REFERENCES

UNI 5 and UNI 6: Terminates a large-bandwidth single CoS EVC (could be be Premium) for data traffic	UNI 7 and UNI 8: Terminates a lesser-bandwidth single CoS EVC (could be Expedited) for Voice/Sync/OAM

How Ethernet Backhaul can benefit your business

- Our **national coverage** means a single supplier footprint, leading to both operational and total cost of ownership benefits.

- **Ethernet aggregation handoff** to customers at User Network Interface (UNI) speeds of up to 10Gbps leads to cost saving, port count and rack space reduction compared to other established technologies or using multiple lower speed Ethernet interfaces.

- **Scalable bandwidth options** on Ethernet Virtual Circuits (EVCs) and Classes of Service (CoS) provide flexible service provisioning across a range of bandwidths from 2Mbps to 2Gbps and you can upgrade bandwidth when you need to.

- **Multiple classes of service (Cos)** means you can prioritise traffic to meet your needs. This can be done using either Layer 2 (802.1p) or Layer 3 (DSCP) mapping and/or VLAN ID.

- **Service multiplexing** allows one User Network Interface (UNI) to support multiple EVCs which lowers equipment costs and reduces space, power and cabling requirements. It also allows new EVCs to be provisioned more efficiently on the same UNI.

- We will implement **end-to-end Connectivity Fault Management (CFM)** that will allow us to quickly diagnose and address connectivity issues. Ethernet Backhaul will also enable tunnelling of selected customer S-OAM frames for end-user Layer 2 diagnosis.

- We will implement **ongoing performance monitoring** on EVCs and on a per CoS basis to give you a high level of confidence in service level assurance (SLA) parameters because we will be able to monitor whether target SLA parameters like frame loss, frame delays and variation will be met.

- You can **choose the access availability options** on each User Network Interface (UNI) of a service to suit the importance and priority of the site and the data passing through the UNI (for example a fully redundant UNI option provides geographic diversity and protection to minimise potential service outages).

- We provide online **access to quoting, ordering and billing** to enable a faster and more efficient pre- and post-sales experience.

- **MEF 9 and MEF 14 certification** means that you can expect industry best-practice.

WHAT YOU CAN EXPECT WHEN YOU CHOOSE TELSTRA WHOLESALE FOR YOUR ETHERNET BACKHAUL SERVICE

As always, when you are transitioning on to a new platform or employing a new solution we understand the need for reassurance and certainty.

Our experienced people

Telstra Wholesale offers an experienced and skilled team of dedicated specialists to help identify the Ethernet Backhaul solution that best suits your needs. You will also receive our expert technical and operational support once the service has been delivered.

Our unrivalled network

We're in the places that you need us, with national coverage across approximately 1,700 exchange service areas (a list of which is available from Telstra Wholesale on request). We pride ourselves on our consistency, service assurance and the cost efficiencies that we can drive from our market-leading position.

Our superior systems

Our proven, integrated systems capabilities and operational support help you manage your business needs with a range of online tools which help you quote, order, support and review the ongoing performance of your Ethernet Backhaul services.

Getting connected

You can order Ethernet Backhaul services through the standard ordering process, via LinxOnline™ Ordering (LOLO) or our business to business system LinxOnline Interaction Gateway™ (LOLIG). If you don't have access to LinxOnline™, ask your account manager to get you set up.

Provisioning lead times will depend on the details of your order. You'll find indicative lead times and activation processes in our Ordering and Provisioning Manual (OPM), available from your Business Operations Manager.

Our experienced team is happy to work with you to tailor EVC, Class of Service and Bandwidth bundles to meet your needs.

You'll also have access to our enhanced Quote Tool, an online web tool that is usually available 24 hours a day, 7 days a week, to check availability and give you preliminary pricing for prospective services.

We will offer optional per-UNI and per-EVC traffic statistics and performance monitoring and reporting capabilities in the future.

Charges and billing

Ethernet Backhaul uses zone-based pricing for the recurring charges for both point-to-point and aggregated point-to-multipoint services. Our pricing takes into account Class of Service (Cos) and Ethernet Virtual Circuit (EVC) bandwidths, User Network Interface (UNI) speed, and the service assurance on each EVC, giving you a comprehensive range of options. A minimum term of 12 months applies to each Ethernet Backhaul service. Non-recurring and recurring charges may be eligible for fixed term discounts.

We'll bill your services monthly, itemising the installation charges and recurring charges (plus service assurance charges if applicable).
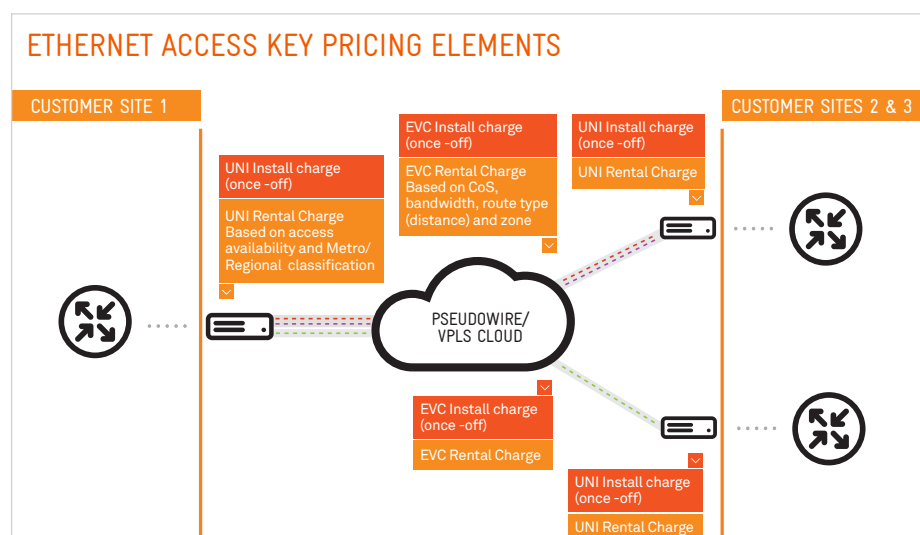
The diagram below conceptually summarises the key pricing elements for Ethernet Backhaul.

Operations and maintenance

You can report service difficulties 24 hours a day, 7 days a week through our LinxOnline™ Service (LOLS) system or by calling the Telstra fault reporting centre.

More information

To find out more, contact your Telstra Wholesale Account Manager or visit our website **telstrawholesale.com.au**

ETHERNET ACCESS KEY PRICING ELEMENTS

CUSTOMER SITE 1

CUSTOMER SITES 2 & 3

UNI Install charge (once -off)

UNI Rental Charge Based on access availability and Metro/ Regional classification

EVC Install charge (once -off)

EVC Rental Charge Based on CoS, bandwidth, route type (distance) and zone

UNI Install charge (once -off)

UNI Rental Charge

PSEUDOWIRE/ VPLS CLOUD

EVC Install charge (once -off)

EVC Rental Charge

UNI Install charge (once -off)

UNI Rental Charge

About Telstra Wholesale

Telstra Wholesale is more committed than ever to helping our customers connect to their full potential. We're delivering new capabilities in all our portfolios – data, mobiles and fixed services. We're continually investing in our business so that we can confidently deliver world class solutions to yours, enabling you to create a competitive advantage.

You can access the value of our superior capabilities and scale by connecting to our high performing networks and platforms. These are fully integrated with our operational capability to deliver value to your business. Our knowledgeable and responsive specialists are dedicated to delivering outstanding service to help your business succeed.

WHOLESALE