CenturyLink Technology Solutions

CenturyLink Technology Solutions Service Guide

Network Service Guide

This Service Guide sets forth a description of CenturyLink Technolgy Solutions' ("CenturyLink") Network Service ("Service") offerings, including technical details and additional requirements, if any. This guide is subject to and incorporated into the Master Service Agreement and Service Schedule between the parties. The specific details of the Service ordered by Customer will be set forth on the relevant Service Order.

Network Service offerings presented in this service guide include:

- Application Transport Service (ATS) – Private IP
- Application Transport Service (ATS) – Public IP
- Ethernet Virtual Private Line Service Guide (EVPL)
- Ethernet Private Line Service (EPL)

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Application Transport Service (ATS) – Private IP

Service Description

The Service delivers connections ranging from T1 to GiGE from a Customer Site to the CenturyLink Technolgy Solutions (CenturyLink) MPLS network. The Service provides access to a fully meshed private routing context within the CenturyLink Global IP Network for the purpose of wide area networking. The Service connections terminate on a device that sits at a Customer Site ("CPE"), which device may be a router, bridge, or a switch depending on the options selected by the Customer. The CPE can be CenturyLink managed (CenturyLink Equipment) or unmanaged (Customer Equipment) depending on the option selected by Customer.

The Private IP Service is one variety of service provided under the CenturyLink Application Transport Service ("ATS") product family. ATS itself refers to the physical connection (i.e., loop and port) that is delivered to the Customer. Once an ATS service is in place, Customer can order additional logical services delivered as logical connections over that physical connection, including services such as network-based firewall and Public IP (Internet) services (under separate terms and charges).

Service Provisioning

CenturyLink Managed Customer Installation

Installation of the Service will include delivery of the ATS connection to the Customer Site. Once the ATS access port is installed, the CenturyLink installation engineer will work with the customer on IP addressing space requirements and other reasonable requirements to deliver the Service. IP addressing is subject to the CenturyLink IP policy document and the customer justification process. The CenturyLink installation engineer will then configure the services on the CenturyLink network. If the CPE is CenturyLink provided and Managed, the installation will consists of procuring, staging, configuring, and installing the router or bridge and dial line and modem.

Unmanaged Customer Installation

Customers ordering their own local access will be provided LOA/CFA by the CenturyLink install engineer. The CenturyLink engineer will work with the Customer to coordinate the delivery of the connection to the appropriate CenturyLink network termination gear. For unmanaged CPE customers, CenturyLink will provide necessary information to the Customer, but the CPE procuring, staging, configuration and installation is the customer's sole responsibility.

Monitoring, Fault Reporting and Service Restoration

Managed Customer Support

Once the service is operational, CenturyLink will ping the CPE on five minute intervals. If two consecutive pings are not returned, the customer will be notified and CenturyLink will begin troubleshooting the issue, subject to the applicable SLA.

Unmanaged Customer Support

Customers that choose to deliver their own local loop or manage their own CPE will have their service monitored up to the CenturyLink provider edge terminating equipment on five minute intervals. If 2 consecutive pings are not returned CenturyLink will make reasonable attempts to contact the customer and begin troubleshooting, subject to the applicable SLA, if any. CenturyLink will not be responsible for the management of BGP routing in the event customer chooses to multi-home between CenturyLink and another provider. CenturyLink will, at the Customer's request, take reasonable steps to enable Customer's implementation of BGP routing. Customer is required to maintain an Autonomous Systems (AS) number and explicitly request that CenturyLink enable BGP routing.

Miscellaneous and Optional Add-ons

Customer may order the following optional features (subject to additional charges) in connection with the Private IP Service:

Service Add-On	Description
VRRP/HSRP	A routing protocol for failover routing between two CenturyLink managed connections at a single site.
DHCP & DHCP Relay	Private IP Service will support DHCP and DHCP relay as an add-on service for those customers that require it.
Quality of Service ("QoS") Options	Customers have the ability to separate Private IP traffic into five QoS levels; Normal, Priority, Business, Interactive, and Real time. Normal, Priority and Business may be selected for no additional charge, while Interactive and Real time are charged based on the QoS CIR level selected.

Application Transport Service (ATS) – Public IP

Service Description

The Service delivers connections ranging from T1 to GiGE from a Customer Site to the CenturyLink MPLS network (AS3561). The connection can terminate on CenturyLink managed (CenturyLink Equipment) or unmanaged (Customer Equipment) equipment (CPE) depending on the selected option. Once the Service connection is in place, customers will have the option to select a standalone single service or multiple logical services delivered as VLANs over that connection.

The Public IP service is a standalone single service. The Public IP service gives customers access to the CenturyLink Global IP Network for the purpose of accessing the Internet, generally for viewing or exchanging publicly available content. This service could also be combined with security services (either customer provided or CenturyLink provided for additional service fees) to protect private traffic passing over the public internet as well (i.e. IPSEC VPN).

Service Provisioning

CenturyLink Managed Customer Installation

Installation of the Public IP service will include delivery of the Application Transport Service connection by CenturyLink to the Customer Site. Once the Application Transport Service access port is installed the CenturyLink installation engineer will work with the customer on IP addressing space requirements and any other requirements to deliver the Service. IP addressing is subject to the CenturyLink IP policy document and the customer justification process. The CenturyLink installation engineer will then configure the services on the CenturyLink network. If the CPE is CenturyLink provided and managed, the installation will consists of procuring, staging, configuring, and installing the router or bridge and dial line and modem.

CenturyLink Unmanaged Customer Installation

Customers ordering their own local access will be provided LOA/CFA by the CenturyLink install engineer. The CenturyLink engineer will work with the Customer to coordinate the delivery of the connection to the appropriate CenturyLink network termination gear. For unmanaged CPE customers, CenturyLink will provide necessary information to the Customer, but the CPE procuring, staging, configuration and installation is the customer's sole responsibility.

Common Service Description

Please reference this documentation for the definition of common Network Based Firewall Service elements.

Ethernet Private Line Service (EPL)

Service Description

The Service provides direct, unmanaged Layer 1 Ethernet connectivity between fixed points on the CenturyLink Metro Network using Ethernet technology. It can provide end-to-end connections between on-net locations within CenturyLink Metro Rings, or to an off-net location via a carrier hotel facility. The Service consists of a private line, point-to-point Ethernet service provided via the CenturyLink DWDM Metro Networks at speeds ranging from One (1) Gigabit Ethernet to Ten (10) Gigabit Ethernet. These circuits are dedicated to an individual customer who wants to connect two points or to use the Service as a transport leg in a broader connection path. The Service does not offer protected services, however it does offer resiliency. A secondary EPL service can be provisioned on separate equipment across a separate side of the ring from a primary circuit. This option provides a very high level of protection for customer's traffic. In the event of a failure, the customer can switch traffic from one connection to the other quickly and easily.

Included in Service

- Ethernet Point-to-Point connection between two CenturyLink network facilities.
- Standard cross connect on each end of circuit, extending to either customer cage or Meet Me Room (MMR).
- Service can be terminated as Single-mode Fiber or Multimode Fiber, with either SC or LC connectors
- Bandwidth option of either 1Gbps or 10 Gbps, based on a customer’s defined commit level
- Reporting of circuit on Customer Portal

Not Included in Service

- Customer Premise Equipment(CPE)
- Management of the Customer’s internal network
- Circuit protection on the EPL connection. A secondary EPL service can be provisioned on separate CenturyLink equipment across a separate side of the ring from a primary circuit, providing resiliency of service.

Optional Service Offering

- 3rd Party local access loops needed to extend the EPL connection to the Customer's premise are available for additional charges

Specific Service Requirements

CenturyLink' provision of the Service to Customer is subject to the condition that more than 10% of all of Customer's transmissions (not limited to those carried on the CenturyLink network) are interstate transmissions.

Common Service Description

Please reference this documentation for the definition of common Network Based Firewall Service elements.

Ethernet Virtual Private Line Service Guide (EVPL)

Service Description

The Service provides customers with Point to Point, Layer 2 Ethernet connectivity between two fixed points within a CenturyLink Metro Network, or across the CenturyLink Core Network at speeds ranging from 1Mbps to 1Gbps. The Service provides a transparent Layer 2 connection that enables Customer control of Layer 3 routing and IP addressing, as well as support for the transmission of many legacy protocols over the connection. Each EVPL is configured with its own separate label for transport across the network. No other customer utilizes or shares this label for transport within the network, providing additional privacy for customer data. No special CPE is required to utilize the EVPL service because any existing CPE that is compatible with a standard Ethernet, Fast Ethernet, or Gigabit Ethernet port will be compatible with the EVPL service.

Service Overview

EVPL Service Support	**Connectivity Options**	
Port size Support	100Mbps	
	1000Mbps	
Physical Presentation	Fast Ethernet	Copper (RJ45)
		Singlemode Fiber (SC or LC connectors) *(available at Select Locations)*
	Gigabit Ethernet	Singlemode Fiber (SC or LC connectors)
		Multimode Fiber (SC or LC connectors)
Logical Presentation	Layer 2 802.1Q VLAN (supports "Q-in-Q" VLAN tag stacking)	
Metro EVPL – Data Rate Support	Fast Ethernet (1-100) Mbps	(1 - 10) Mbps in 1Mbps increments
		(10-100) Mbps in 5Mbps increments
	Gigabit Ethernet (100-1000) Mbps	(100-1000) Mbps in 25Mbps increments
WAN EVPL – Data Rate Support	Fast Ethernet (1-100) Mbps	(10, 25, 50, 75-100) Mbps
	Gigabit Ethernet (100-1000) Mbps	(100-1000) Mbps in 100Mbps increments
		(250, 750) Mbps
WAN Topologies Supported	Point-to-Point	
Max MTU Size	1500	

Included in Service

- Ethernet Point-to-Point connection between two CenturyLink network facilities.
- Bandwidth ranging from 1Mbps to 1Gbps, based on a customer's defined commit level
- Circuit protection between CenturyLink Provider Edge Equipment, as EVPL circuits are designed to route around network failures
- Reporting of circuit on Customer Portal

Not Included in Service

- Customer Premise Equipment(CPE)
- CenturyLink Provided VLANs
- Management of the Customer's internal network
- Circuit protection on cross-connects, Provider Edge ports, or local access loops beyond the CenturyLink provider Edge equipment.
- Service does not support "Spanning Tree Protocol", "BPDU tunneling" , LACP ,or "Etherchannel"

Optional Service Offering

- 3rd Party local access loops needed to extend the EVPL connection to the Customer's premise are available for additional charges Flat Rate Billing

Flat Rate Billing

CenturyLink' EVPL service allows customers flexibility in selecting both ports speeds and committed bandwidth levels. For each Ethernet connection, the customer selects a level of "Committed Bandwidth", or level of usage that the customer commits to on that connection. Customer will be billed for committed bandwidth regardless of usage. Customer can burst up to, but not over, the committed bandwidth level; minus any protocol overhead.

Specific Service Requirements

CenturyLink' provision of the Service to Customer is subject to the condition that more than 10% of all of Customer's transmissions (not limited to those carried on the CenturyLink network) are interstate transmissions.

Common Service Description

Please reference this documentation for the definition of common Network Based Firewall Service elements.

Common Service Description

The following service definitions apply to all CenturyLink service offerings describe in this service guide. Any Service definition specific to individual Service offerings will be defined within the body of the Service offering.

Service Guide Release

This CenturyLink Service Guide updates and replaces the following legacy Savvis Service Guides (SSG),

- *NET20080707-External-SSG-US-ApplicationTransport_PrivateIP*
- *NET20071005-External-SSG-US-ApplicationTransport(Public_IP)*
- *NET20080827-External-SSG-US-EPL*
- *NET20080618-External-SSG-US-EVPL*

Service Requirements

If any third party software, including any corresponding documentation, is provided to Customer by CenturyLink in connection with the Service, Customer agrees to use such third party software strictly in accordance with all applicable licensing terms and conditions. CenturyLink makes no representations or warranties whatsoever with regard to such third party software.

If ordered by Customer, CenturyLink will use good faith efforts to assign Internet address space for the benefit of Customer during the Service Term. Any IP addresses and space provided to Customer by CenturyLink are solely for Customer's use with the Service, and are non-portable and non-transferable. Neither Customer nor any End Users will own or route any IP addresses or space provided by CenturyLink, and, upon any termination of Service, Customer's access to such IP addresses and space will cease.

Definitions

ATS Application Transport Service is the CenturyLink product name for the physical connection (loop & port) delivered to a customer premise. There is a family of optional Service offerings available under Application Transport Service.

Backhaul Option Wavelengths are available for backhaul connections at bandwidths of 10 Gbit/s. Customers can take a standard backhaul circuit, which provides a connection from a cable landing station to an access point-- usually a CenturyLink node. Alternatively, customers can extend their backhaul connection to their required site, combining the backhaul and access options.

Customers requiring protection for their service also have the option of diverse routing.
This option provides a very high level of protection for customer's traffic. In the event of a failure, traffic can be switched from one connection to the other quickly and easily.

BLSR Should a fiber be cut or other network outage occur, traffic is rerouted back around the ring in milliseconds, so service continues uninterrupted. BLSR is available as two fiber or four fiber.

BLSR 2 Fiber Both rings in the ring carry working traffic and half the capacity of each fiber is reserved for protection.

BLSR 4 Fiber Each working fiber is assigned a protection fiber. If a working fiber is cut, it switches to the protection fiber on that span only.

BPDU enables switches that participate in a spanning tree protocol to gather information about each other

Business Hours are Monday to Friday 0900 to 1700 local time, excluding public holidays.

Card Protection CenturyLink offers 1+1 card protection, which means that one working optical port is protected by another optical port on a different card.

Colocation the provision of space at a CenturyLink Location for the housing of Customer's equipment.

Committed Bandwidth is the level of usage that the customer commits to on a connection.

Core Network is the CenturyLink owned and operated network between CenturyLink Points of Presence (PoPs). Local access and customer premise equipment are specifically excluded.

Core Protection The CenturyLink US network has a mesh design allowing traffic to be easily rerouted around a fault.

For SONET circuits of OC-3 or above, CenturyLink uses a protection mechanism called Dedicated Transit Line (DTL) in the core to reroute the traffic. DTL is custom designed, diverse routed protection used for 155 Mbit/s and higher circuits. It uses simple static routes, meaning that the primary and protection paths are predetermined, which means that the switch over time is faster than OSRP. For circuits OC-3 and above we offer 1+1 protection.

For SONET circuits of DS3 and below, CenturyLink uses Optical Signaling & Routing Protocol (OSRP) to reroute traffic. OSRP does not determine the protection path until it is needed which makes the switch over slightly slower than DTL. CenturyLink tries to avoid delayed failover or dropped circuits wherever possible by not allowing the network to become over-utilized (50 percent is policy). For circuits DS3 and below we offer 1:n protection.

For all SONET circuits, CenturyLink uses non-revertive switching, meaning that once the failed path is restored traffic is not moved back to the original path and the protect path becomes the primary path.

CenturyLink can offer protection for 2.5 Gbit wavelength circuits; although wavelengths are normally unprotected. For our 2.5 Gbit offering, we can offer protection using Automatic Protection Switching (APS).

Customer Location means premises designated by the Customer for the delivery of Capacity.

Customer Premise Equipment (CPE) is the terminating device that is located at a Customer Site and terminates the Application Transport Service connection. This equipment can be defined as a router, and bridge or a switch depending on the Application Transport Service options selected by the customer.

Demarcation The Ethernet port on CenturyLink' Provider Edge Equipment shall be the network connection demarcation point.

Dense Wave Division Multiplexing (DWDM) works by combining and transmitting multiple signals simultaneously at different wavelengths on the same fiber, allowing one fiber to be transformed into multiple virtual fibers.

Etherchannel is a port trunking technology which allows grouping several physical Ethernet links to create one logical Ethernet link for the purpose of providing fault-tolerance and high-speed links between switches, routers and servers.

LACP allows for the bundling of several physical ports together to form a single logical channel.

Leased Capacity or Capacity means any portion of the capacity specified as such in the applicable Service Order.

Local Access Facilities are the domestic facilities and related equipment required to connect the CenturyLink network to the Customer's premises. Local Access Facility termination points are located at the Customer's premise.

Local Access (Local Loop) A physical circuit, that connects from the demarcation point of the Customer premises to the edge of a service provider's network.

Maximum Transmission Unit (MTU) is the largest size packet or frame that can be sent in a packet- or frame-based network.

Meet Me Room is a central location within a collocation center or carrier hotel where multiple carriers and/or customers can interconnect with each other via a cross connect.

METRO Ethernet Virtual Private Line (EVPL) is a layer 2 point-to-point connection between two fixed points within a CenturyLink Metro Network.

MPLS Network is the CenturyLink owned and operated network between CenturyLink Points of Presence (PoPs). Local access and customer premise equipment are specifically excluded.

Network Node (Nodes) is a direct point of entry and departure on the CenturyLink network. Nodes provide the infrastructure to enable the Customer to connect to the CenturyLink network. The list of current CenturyLink Nodes and details of their locations are available from your CenturyLink Account Manager.

Network Termination Point is the telecommunication network interface at the Customer's premises, as provided by the local exchange carrier, if CenturyLink orders the local loop on behalf of the customer.

On-net means the Services or any part of them supplied over infrastructure owned by or controlled by CenturyLink or its Affiliates

Off-net means the Services or any part of them supplied over a third party's local loop.

Protection in the Access Circuit Most local loop providers offer a protection mechanism called Bi-Directional Line Switching Ring (BLSR) although Uni-Directional Path Switched Ring (UPSR) is often used instead.

Provider Edge (PE) Provider Edge is a router or switch on the CenturyLink network on which a customer's connection terminates.

Public IP Is an option of the Application Transport Service (ATS) that delivers Internet access service.

CenturyLink Network / Metro Network the fiber optic telecommunication network operated by CenturyLink, including such telecommunication capacity as CenturyLink may obtain from other network providers and integrate into its own network and including any cable system.

Spanning Tree Protocol (STP) is a link management protocol that provides path redundancy while preventing undesirable loops in the network.

Specifications Recommendation ITU G-826.

VLAN or logical connection Terms that refer to the layer 2 separation utilized on the Application Transport Service to separate various traffic types (e.g., Public and Private traffic).

WAN Ethernet Virtual Private Line (EVPL) is a layer 2 point-to-point connection between two fixed points across the CenturyLink Core Network.

Wavelength Access Option Wavelengths are available for access connections at bandwidths of 2.5 Gbit/s or 10 Gbit/s. CenturyLink can connect customers to a CenturyLink node from their own site or from a carrier hotel facility.

The configurations and service details of wavelength-based access services will vary, depending on whether customers require a connection to their site or a carrier hotel, and according to the local infrastructure. CenturyLink can provide the access connection (with the terminating equipment provided by the customer).

There are some distance limitations for access services where CenturyLink provides only the fiber-optic access connection and not the terminating equipment:

- 2.5 Gbit/s access connections - maximum distance of 10 kilometers between the customer site or carrier hotel and the CenturyLink node.
- 10 Gbit/s access connections - maximum distance of 3 kilometers between the customer site or carrier hotel and the CenturyLink node.

Wavelength Connectivity Wavelength connectivity is enabled by the use of Dense Wave Division Multiplexing (DWDM), a technology that allows a single fiber to perform as multiple 'virtual fibers.' The customer is allocated a wavelength (Lambda on our DWDM links), allowing the customer to transparently pass their SONET overheads through the CenturyLink network. Wavelength circuits provide customers with scalable network capability, without the expensive creation of fiber and at a quicker time to market.

CenturyLink supports a 2.5 Gbit/s framed service and a 10 Gbit/s transparent service (US).