TUNNEL SERVICES PIC

Product Overview

The Tunnel Services PIC leverages a comprehensive set of tunneling technologies to deliver revenue-generating IP/MPLS services over any IP infrastructure, whether owned by the provider or a third party. Tunnel services are available on all Juniper Networks Flexible PIC Concentrators (FPCs): Types 1, 2, 3 and 4.

A rich set of tunnel services along with tight integration allow for a variety of revenue-generating services. High network efficiency is achieved by supporting multiple tunnel types on the least amount of infrastructure, while at the same time maintaining cost efficiencies due to low modular scalability and comprehensive statistics.

Product Description

The Juniper Networks® Tunnel Services PIC operates on all Juniper Networks M Series Multiservice Edge Routers and T Series Core Routers and provides a number of key features that support the rich tunneling services available on Juniper Networks router portfolio.

Each tunnel PIC can simultaneously support a number of different tunnel types, facilitating a wide range of applications:

- IP-IP Encapsulation: IP-IP enables the transport of IPv4 and IPv6 over disparate IP infrastructures that may be owned by a third party or have disjointed capabilities or policies.
- Generic Routing Encapsulation (GRE): GRE is an alternative to IP-IP that supports IPsec and non-IP protocols such as MPLS, in addition to IPv4 and IPv6 over any
- IP infrastructure. Juniper's implementation of GRE complies with RFC 1701 and RFC 1702.
- PIM Sparse Mode Encapsulation: PIM-SM encapsulation and de-encapsulation on source designated routers and rendezvous points (RPs) are supported.
- Logical Tunnels: Logical Tunnels create a virtual interface within the router that supports the interconnection of VPNs and communication between logical routers.
- Virtual Tunnels: Virtual Tunnels support virtual private LAN Service (VPLS).
- Multicast Tunnels: Multicast Tunnels are used to create Multicast Distribution Trees (MDTs), which transport VPN multicast packets across an RFC 2547bis Layer 3 VPN.

Architecture and Key Components

The Tunnel Services PIC enables the following applications:

Tunneling IPv6 over IPv4

Using either GRE or IP-IP tunneled across an IP network, providers can tunnel IPv6 packets over IPv4 infrastructure, providing a migration path to IPv6 as defined in RFC 2893.

GRE over IPsec for Interoperability

Some vendor IPsec implementations require a GRE tunnel interface to support dynamic routing protocols. The Tunnel Services PIC can be used to support GRE over IPsec, providing interoperability between Juniper platforms and these third-party vendors' platforms.

GRE Tunnels for Non-IP Protocol Transport

Providers can deploy GRE to support the transport of non-IP protocols over third-party private IP infrastructure or even over the public Internet.

RFC 2547bis MPLS VPNs for Non-MPLS-Enabled Infrastructure

Providers can deploy MPLS over GRE to support MPLS-based services over non-MPLS-enabled IP infrastructure. This allows a provider to deliver these MPLS services over a third-party private IP infrastructure or even over the public Internet.

Dynamic GRE Tunnels

To reduce operational costs, the destination IP address is looked up and a GRE tunnel is automatically set up to the destination endpoint when an MPLS label with an unknown next hop is received by the router.

Multicast over RFC 2547 VPNs

Multicast Tunnels leverage a point-to-multipoint GRE tunnel to support multicast over Layer 3 MPLS RFC2547bis VPNs. This enables the efficient delivery of a new revenue-generating private multicast service. This implementation is compliant with draft-rosen-vpn-mcast-06 section 2 and draft-raggarwa-l3vpn-2547-mvpn-00.

Egress Filtering for RFC 2547 VPNs

This capability maps filters to the appropriate L3 2547 VPN routing and forwarding (VRF) table regardless of the number of VRFs or the type of interface. This application allows providers to use overlapping IP address space in multiple VPNs, and it adds another layer of protection to traffic as it moves between the provider edge and the customer edge on Layer 3 VPNs.

Communication Between Logical Routers

Providers can leverage the logical tunnel interface to support communications between logical routers. Logical routers can be used on Juniper routers to create separate routing protocol instantiations where the logical routers effectively appear as separate routers. A logical tunnel interface can then be set up between those routers to create peering relationships.

Hybrid Layer 2 - Layer 3 VPNs

This capability provides significant flexibility for migration from a legacy Layer 2 infrastructure to Layer 3 infrastructure. This can include the termination of a VPLS domain into a Layer 3 MPLS 2547 VPN, a L2 VPN into a Layer 3 MPLS 2547 VPN or a L2 VPN into a VPLS domain.

Virtual Private LAN Service

VPLS delivers a multipoint-to-multipoint Ethernet service that can span one or more metro areas, providing the same connectivity between multiple sites as if these sites were attached to the same Ethernet LAN.

PIM-SM Encapsulation/De-Encapsulation for Source-DRs and RP Routers

PIM Sparse Mode supports efficient communications between members of sparsely distributed multicast groups and significantly reduces the amount of multicast traffic in a network. Native multicast packets are not forwarded until downstream routers explicitly request to join the multicast distribution tree, reducing network congestion. The Type 4 Tunnel Services PIC supports 40 Gbps multicast reverse path forwarding (RPF).

Features and Benefits

Router Integration

The Tunnel Services PIC integrates directly into edge or core routers, enabling service providers to support tunnel termination directly in the router. The PIC also provides tight integration with other edge router services, such as MPLS VPNs and IPsec VPNs.

Modular Scalability

A Tunnel Services PIC delivers tunnel services to any or all interfaces in the chassis without restriction. For incremental needs of tunnel bandwidth, additional Tunnel Services PICs can be installed, allowing deployments to scale gracefully when high-density implementations are needed.

Monitoring and Statistics

The Tunnel Services PIC offers per-tunnel performance statistics such as bytes in/out and packets in/out to support accounting and network planning activities.

Specifications

Tunnel Services PIC

Encapsulation

- GRE
  - IP-IP
  - PIM-SM

Logical Interfaces

- Virtual Tunnel
- Logical Tunnel
- Multicast Tunnel

LEDs

- On: PIC is operating normally
- Off: PIC is not enabled

Agency Approvals

Safety

- CAN/CSA-C22.2 No. 60950-00/UL 60950 - Third Edition, Safety of Information Technology Equipment EN 60950, Safety of Information Technology Equipment

EMC

- AS/NZS 3548 Class A (Australia/New Zealand)
- BSMI Class A (Taiwan)
- EN 55022 Class A Emissions (Europe)
- FCC Part 15 Class A (USA)
- VCCI Class A (Japan)

ETSI

- ETS-300386-2 Telecommunication Network Equipment Electromagnetic Compatibility Requirements

Immunity

- EN 61000-3-2 Power Line Harmonics
- EN 61000-4-2 ESD
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency Common Immunity
- EN 61000-4-11 Voltage Dips and Sags

NEBS

Designed to meet these standards:

- GR-63-CORE: NEBS, Physical Protection
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment
- SR-3580 NEBS Criteria Levels (Level 3 Compliance)

Juniper Networks Services and Support

Juniper Networks is the leader in performance-enabling services and support, which are designed to accelerate, extend, and optimize your high-performance network. Our services allow you to bring revenue-generating capabilities online faster so you can realize bigger productivity gains and faster rollouts of new business models and ventures. At the same time, Juniper Networks ensures operational excellence by optimizing your network to maintain required levels of performance, reliability, and availability. For more details, please visit **www.juniper.net/us/en/products-services/.**

Ordering Information

MODEL NUMBER	DESCRIPTION	PRODUCTS SUPPORTED	TYPE
PE-TUNNEL	1 Gbps tunneling bandwidth	M7i, M10i	Type 1
PB-TUNNEL-1		M40e, M120, M320, T320, T640, TX Matrix, T1600	Type 1
PB-TUNNEL	4 Gbps tunneling bandwidth	M40e, M120, M320, T320, T640, TX Matrix, T1600	Type 2
PC-TUNNEL	10 Gbps tunneling bandwidth	M120, M320, T320, T640, TX Matrix, T1600	Type 3
PD-TUNNEL	40 Gbps tunneling bandwidth	T640, TX Matrix, T1600	Type 4

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at **www.juniper.net**.

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