EVP-Tree: Secure, Reliable, High-Speed One-to-Many Connectivity

OVERVIEW

Ethernet Virtual Private Tree (EVP-Tree) service from IFN provides high-speed, one-to-many connectivity across the IFN network. Like with Ethernet Private Tree (EP-Tree) service, each connected location is known as either a "Root" or "Leaf within IFN EVP-Tree service. However, unlike EP-Tree service, EVP-Tree is a virtual local area network (VLAN) based service, which allows users to multicast from one location to many locations. For this reason, EVP-Tree service is often used in support of other services, like VPL or EVP-LAN.

Key Highlights of EVP-Tree:

- **Private & Secure:** All data travels within the secure domain of a Layer 2 dedicated, high-capacity, one-to-many connection at native Ethernet speeds.
- **Fast & Reliable:** With speeds ranging from 10Mbps to 10Gbps, EVP-Tree is a reliable, flexible, and higher bandwidth alternative to TDM private lines like T1, DS3, and SONET.
- **Cost Savings:** Enables customers to connect their locations using a lower cost Ethernet interface.
- **Standards-Based:** Upholds Ethernet Virtual Private Tree (EVP-Tree) MEF 2.0 certifications.

Service Description

- IFN Ethernet Virtual Private Tree (EVP-Tree) Service is a reliable, flexible, and higher bandwidth alternative to traditional hub and spoke topologies utilizing Ethernet or TDM private lines (T1, DS3, SONET, etc.).
- The EVP-Tree service provides for multipoint connectivity without requiring all sites to scale to total service bandwidth.
- The EVP-Tree service enables customers to connect their locations using a lower cost Ethernet interface.
- The EVP-Tree service allows the customer to use VLANs or Ethernet control protocol across the service with prior coordination with IFN via a C-VLAN/EVC Map.
- The EVP-Tree service provides one Ethernet Virtual Connection (EVC) allowing any-to-any connectivity between multiple customer locations.
- The service is offered with 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network
- Interfaces (UNI) and is available in speed increments from 10Mbps to 10Gbps.

TECHNICAL SPECIFICATIONS

Ethernet User-to-Network Interface:

The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. The table below lists the available UNI physical interfaces:

UNI Speed	UNI Physical Interface
10Mbps	10Base-T
100Mbps	100Base-T
1Gbps	1000Base-T 1000Base-SX 1000Base-LX 1000Base-SR 1000Base-LR
10Gbps	10GBase-SX 10GBase-SR 10GBase-LR

Figure 1: *Available UNI interface types and CBS values for different CIR increments*

Service Multiplexing:

The service enables customers to multiplex multiple services (EVCs) on a given UNI. Note that when service multiplexing is used, the sum of CIR bandwidth for all EVCs multiplexed at the UNI cannot exceed the UNI port speed.

Traffic Management:

IFN's network traffic-policing policies restrict traffic flows to the subscribed CIR for each service. If the customer-transmitted bandwidth rate for any service exceeds the subscription rate (CIR) and burst size (CBS), IFN will discard the excess frames. For frames with CoS marking the service will transmit them without altering the customer's CoS markings.

Maximum Frame Size:

The service supports a Maximum Transmission Unit (MTU) frame size of 9000 bytes to support untagged or 802.1Q tagged frame sizes. For On-Net Services delivered via the IFN Last Mile Partner Network, frame sizes may not exceed 1518 MTU size (1522 with a single VLAN tag). All frames that exceed specifications shall be dropped.

VLAN Tag Preservation:

The service supports IEEE 802.1Q VLAN-tagged customer frames. All customer VLAN IDs and priority code points (IEEE 802.lp) for CoS conforming to the C-VLAN/EVC map are transmitted and received unaltered by the service. If a native VLAN is specified by the customer in the C-VLAN/EVC map, untagged frames are mapped to the native VLAN and transmitted over the corresponding EVC. Customers must coordinate their C-VLAN add/move/delete/changes with IFN. IFN may reserve one VLAN for network management purposes.

Locations:

EVP-Tree services interconnect multiple customer sites in a one-to-many manner, limited by the C-VLAN/EVC map. Each customer site is referred to as either a Root or Leaf within the service. A Root site within the service can communicate to all Root and Leaf sites. A Leaf site within the service can communicate only with Root sites. IFN EVP-Tree services support a maximum of 20 locations including a single Root site. Support for additional Root sites will be considered on an individual case basis. Support for additional Leaf sites will be considered on an individual case basis.

MAC Learning Support:

In order to efficiently move traffic, EVP-Tree services learn the MAC addresses of any customer devices attached to the service. Each EVC will support learning of 250 MAC addresses. Each UNI will support learning of 250 MAC addresses. Additional MAC learning will be supported on an individual case basis.

Standard number of EVCs per UNI:

Up to 20 for Off-Net Services and On-Net Services delivered via fiber. Additional EVCs are available, charges may apply. Only one EVC is permitted for On-Net Services delivered via the IFN Partner Last Mile Networking.

Standard number of VLAN IDs per EVC:

Up to 20. Additional VLAN IDs are available, charges may apply. Only 1 VLAN ID is permitted for On-Net Services delivered via the IFN Partner Last Mile Network.

Ethernet Service Frame Behavior:

All Frames are delivered conditionally through the network based on which EVCs they are sent to as specified in the VLAN ID to EVC map provided by the customer. Unicast frames will be forwarded to the UNI that hosts the destination MAC address only. Multicast and Broadcast frames will be flooded to all UNIs in the service.

Layer 2 Control Protocol (L2CP) Processing:

Certain L2CP frames are discarded at the UNI, tunneled across the IFN network or peered at (processed by) the UNI. Refer to the figure below for IFN's L2CP behavior. For L2CPs with multiple behavior possibilities, the customer must specify to IFN which behavior should be taken. The default behavior is to discard these L2CP service frames.

Destination MAC Address	Layer 2 Control Protocol	L2CP Frame Behavior
01-80-C2-00-00-00	STP, RSTP, MSTP	Peer or Discard (all UNIs)
01-80-C2-00-00-01	PAUSE	Discard (all UNIs)
01-80-C2-00-00-02	LACP, LAMP	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-02	Link OAM	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-03	Port Aunthentication	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-07	E-LMI	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-0E	LLDP	Discard (all UNIs)
01-80-C2-00-00-20 through 01-80-C2-00-00-2F	GARP, MRP	Peer of Tunnel (all UNIs)

Figure 5: *L2CP Frame Behaviors*

More advanced technical information can be found in the appendix »