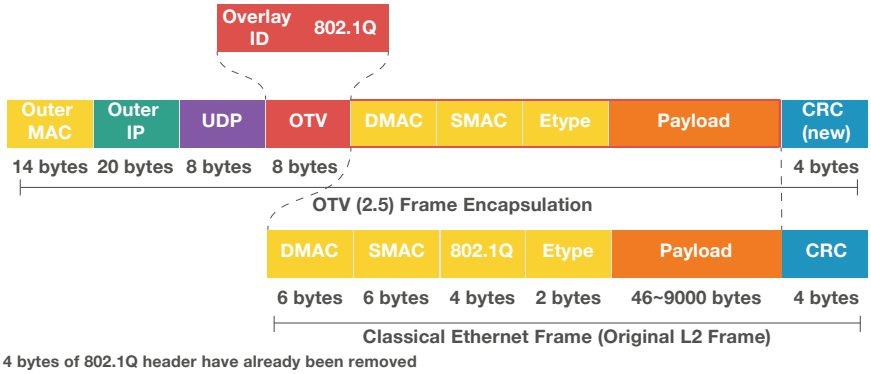
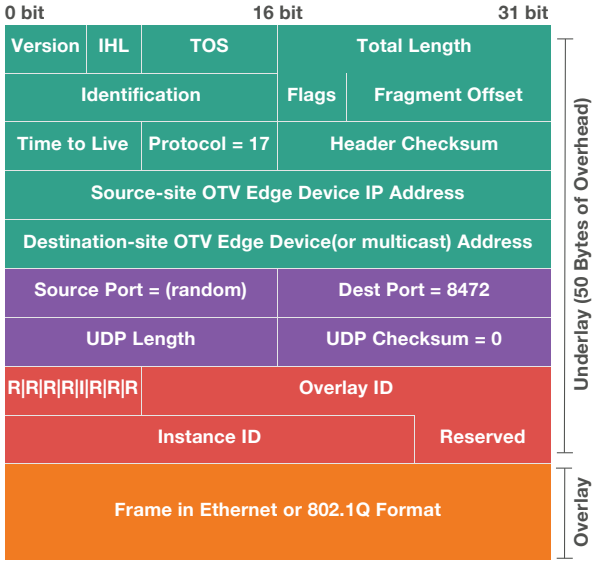
OTV

OTV 2.5 Encapsulation



* 4 bytes of 802.1Q header have already been removed

OTV 2.5 Encapsulation(Detail)



Terminology

OTV Control Group Multicast address used to build adjacency with remote sites in the control plane.

OTV Data Group Used to encapsulate L2 multicast traffic across overlay.

IGMP V3 Needed to send (S,G) IGMP Report messages towards the DCI network on the Join Interface.

Extend VLANs VLANs that are explicitly allowed to be extended across the overlay between sites.

Site VLAN used for communication between local OTV edge devices within a site to facilitate role election of Authoritative Edge Devices (AED).

Site Identifier a number which define the site, must be unique for each site, any number between 0000.0000.0001 and ffff.ffff.ffff in MAC format.

Edge Device Performs all OTV functionality, Usually located at the Aggregation or Core Layer,

Authoritative Edge Device OTV supports multiple edge devices per site, only single OTV device is elected as AED on a per-vlan bassis.

OTV Interfaces & Device Role

Internal Interface Site facing interfaces of the edge devices, carry VLANs extended through OTV. Regular layer 2 interfaces, no OTV configuration required.

Join Interface Uplink of the edge device, point-to-point routed interface. Used to physically “join” the overlay network. No OTV specific configuration required.

Overlay Interface Virtual/Tunnel interface with most of the OTV configuration, encapsulates layer 2 frames in IP unicast or multicast.

Layer 2 Extension Methods

	Data-Plane	Control-Plane	Multi-Homing	Loop Prevention	Multicast Optimisation	Fault Containment
OTV(1.0)	EoMPLSoGRE	IS-IS	Native	Block BPDU STP Integration	IGMP Snooping	Stop Unknown Unicast Selective Unicast Flooding ARP Suppression
OTV(2.5)	UDP, “VXLAN”	IS-IS	Native	Block BPDU STP Integration	IGMP Snooping	Stop Unknown Unicast Selective Unicast Flooding ARP Suppression
VXLAN	VXLAN	Flood & Learn	MC-LAG/VPC	Block BPDU	Flood	none
VXLAN	VXLAN	BGP EVPN	MC-LAG/VPC	Block BPDU	Flood	Minimised Unknown Unicast ARP Suppression
VPLS	MPLS/GRE	Flood & Learn	MC-LAG/VPC	Block BPDU	none	none

OTV Over Multicast Transport

Multicast transport require the configuration of a control-group and data-group. This addresses should not overlap.

Control-Group required to build adjacencies and exchange MAC reachability information.

Data-Group is a SSM delivery group for extending multicast traffic across overlay. Any subnet within transport SSM range.

OTV Over Unicast Transport

OTV can run across a unicast only transport, a primary and secondary server can be configured for redundancy.

Adjacency Servers unicast transport require one or more adjacency servers. OTV devices register with the adjacency servers which in turn provides each with an OTV neighbor list (oNL).

OTV

OTV Control Plane (Multicast Transport)

Neighbor Discovery 1- OTV edge device sends IGMP report to join ASM group (edge use IGMP not PIM). 2- OTV hello packets are generated for other OTV to build control plane adjacencies.3- Hello packet are encapsulated by adding extra ip header, source ip is from joined interface, destination is ASM multicast group. 4- with multicast transport network, every multicast frame will be replicated for each OTV device. 5- Receiver OTV will decapsulate the IP header. 6-hello are pass it to control plane for processing.

MAC Address Advertisement 1- Each OTV will learn local lan MAC using internal interface, via traditional data plane learning. 2. OTV will send all of its MAC table using OTV updated messages to ASM multicast group. 3- frames are replicated for each OTV device that joined the group. 4- MAC reachability information are imported into CAM table of OTV edge device.

OTV Control Plane (Unicast Transport)

Adjacencies 1- Edge device generate hello packet, to build adjacencies. 2- OTV device will replcate the hello packet for each remote neighbor, each of this frame will be encapsulated, adding external IP header.unicast frame then sent out the join interface to L3 network. 3- Unicast frame are routed to destination. 4- reciving OTV will decapsulate the packet. 5- hellos are passed to the control plane process.

MAC Address Advertisement 1- OTV edge learn MAC from internal interfaces. 2- OTV update message contain MAC info is created for each remote OTV neighbor & will OTV encapsulate 3- OTV updates are routed in unicast transport to destination. 4- MAC info will be added to CAM table of remote OTV.

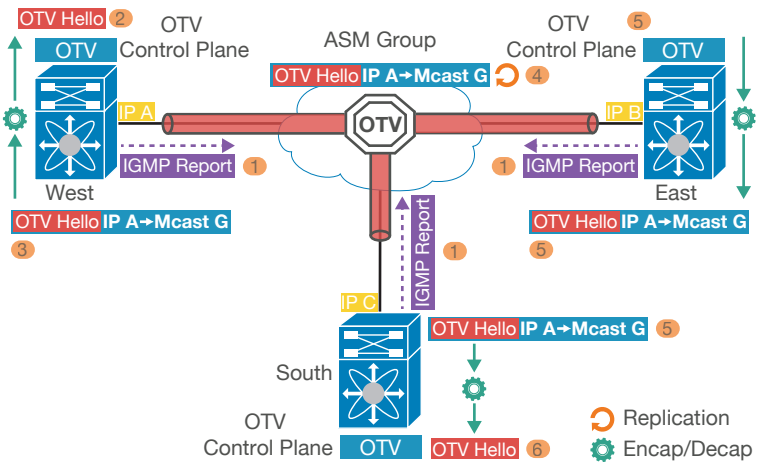
OTV Data Plane (Unicast Traffic)

Inter Site Layer 2 unicast traffic 1- L2 frame is recived from client destined other sites, OTV mac address point to IP add of remote OTV device instead of local interface. 2- OTV will encapsulate the original L2 frame. 3- OTV encapsulated frame is carried across the transport infrastructure and deliverd to remote OTV device. 4- Remote OTV will decapsulates the frame. 5- Edge device will perform another L2 lookup to find the MAC 6- The frame is delivered to the destination.

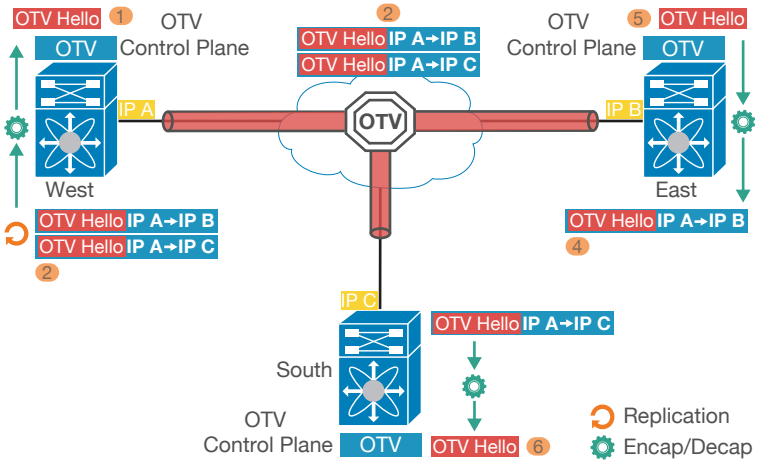
OTV Configuration

```
# Enable feature
feature otv

# OTV VLANs
vlan 99
 name OTV-SITE-VLAN
vlan 10-15
 name DATA-VLAN

# Join Interfaces
interface ethernet 2/1
 no switchport
 ip igmp version 3
 ip address 1.1.1.1/24

# Internal Interfaces
interface ethernet 2/3
 switchport mode trunk

# Local OTV Identifier
otv site-identifier 0x1
otv site-vlan 99

# Overlay Interfaces
interface Overlay 1
 otv join-interface eth2/1
 otv control-group 239.1.1.1
 otv data-group 232.1.1.0/28
 otv extend-vlan 10-15
 no shut
```

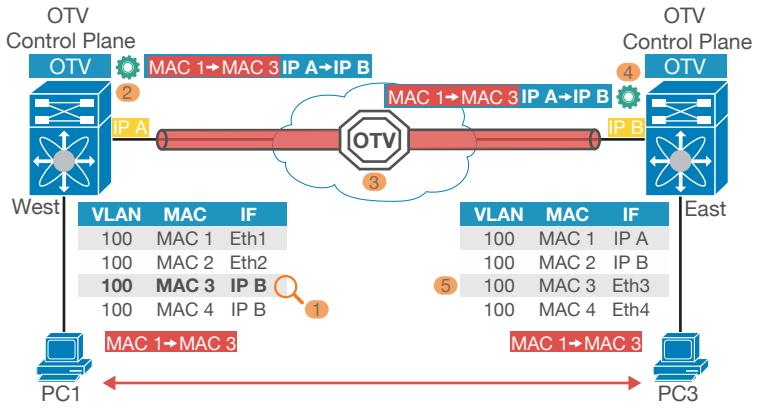
OTV Neighnor Discovery (Multicast Transport)



OTV Adjacencies (Unicast Transport)



Data Plane Inter Site Layer 2 (Unicast Traffic)



Troubleshooting & Debugging

```
# Show command
Show otv [overlay x | adjacency | vlan | route | site]
Show otv isis [ traffic | adjacency | site]
Show ip [mroute | igmp groups]

# Debug command
Debug otv isis adjacency
Debug ip igmp group
```