

Test Details	
Goal of Test	Outline OTV design and configuration steps in a methodical "cook-book" manner.
Data to Record	<i>show otv</i> <i>show otv adjacency</i> <i>show otv route</i> <i>show otv vlan</i> <i>show mac address-table</i>
Estimated Time Needed	30 min (assuming all pre-requisites are met)

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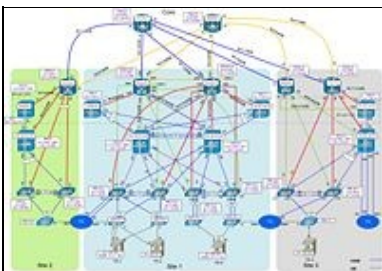
Overview

For additional information regarding Overlay Transport Virtualization (OTV) on Cisco NX-OS devices, refer to the overview chapter available in the *Cisco Nexus 7000 Series NX-OS OTV Configuration Guide* available at:

http://www.cisco.com/c/en/us/td/docs/switches/datacenter/sw/nx-os/OTV/config_guide/b Cisco Nexus 7000 Series NX

Diagram

Click on thumbnail to enlarge:



Design & Prerequisites

With OTV, it is extremely important to ensure that you have a good network design and that your network meets all the pre-requisites to support OTV deployment:

1. Network design - have clear understanding of boundaries between:
 1. L2 and L3 in each site
 2. Functional data center layers (access, aggregation, core) in each site
 3. Each site and provider / WAN network.
2. Ensure that there is L3 connectivity between all the sites.
3. Ensure that provider / WAN network supports IP Multicast. For IP Multicast, ASM / Bidir need to be supported for control plane communication and SSM for any data multicast traffic between sites.
4. Identify number and placement of OTV edge devices in each site. Remember that at FCS, L3 gateway and OTV edge for a VLAN can not reside on the same logical device. This may require provisioning a VDC off aggregation layer N7Ks to serve as OTV edge device.
5. Identify **internal interface** L2 connectivity of each OTV edge device to aggregation layer. Will L2 connection be single-homed to one aggregation switch, multi-homed using STP or multi-homed with VPC?
6. Identify L3 connectivity of each OTV edge device to the provider network / WAN. Will L3 connection be single-homed or multi-homed connecting to 2 or more WAN endpoints? In multi-homed case, consider that there can only be 1 **join-interface**.
7. Decide which VLANs will be extended and how many Overlays will be used for that. Most simple design can just use 1 Overlay, however a more complex design can be used with VLANs split between Overlays for loadbalancing.
8. Note if any of the VLANs being extended are running FHRPs on L3 gateways. If multiple sites have FHRP running for VLAN being extended, **HSRP localization** feature should be used.
9. Designate a **site VLAN** to be used for communication between 2 OTV edge devices in the same site. In case sites ever get merged, it is recommended to use the same VLAN to provision a **site VLAN** in each site, regardless whether it currently has 1 or 2 **edge devices**.

Procedures

These procedures outline the configuration necessary for OTV to be enabled in each site. In this example, it is assumed that certain prerequisites (such as L3 connectivity and Multicast) are already configured.

1. Enable OTV feature.
2. Create a logical **Overlay** interface.
3. Configure IGMP v3 on join-interface.
4. Configure join-interface (you will get a warning about IGMP v3 regardless of completion of STEP 3).
5. Configure multicast groups for control traffic between OTV sites and for any multicast data traffic between OTV sites.
6. Configure VLANs to be extended over this **Overlay**.
7. Repeat steps 2-6 for any additional **Overlays** that need to be configured.
8. Configure **site VLAN** and make sure that between 2 OTV edge devices in a single site, a L2 connectivity exists through that VLAN.
9. Verify proper OTV operation.

Examples

Following contains configuration example from one of OTV edge devices:

```
!STEP 1:

feature otv

!STEP 2:
interface Overlay1

!STEP 3:
interface Ethernet1/9
 ip igmp version 3

!STEP 4:
 otv join-interface Ethernet1/9

!STEP 5:
 otv control-group 239.1.1.1
 otv data-group 232.1.1.0/24

!STEP 6:
 otv extend-vlan 110

!STEP 8:
 otv site-vlan 200
```

Verification of OTV operation and connectivity between multiple sites:

SITE 1

```
!STEP 9:
! From SITE 1, OTV EDGE 1:
show otv

OTV Overlay Information

Overlay Interface Overlay1
VPN Name           : Overlay1
VPN ID             : 230
State              : UP
IPv4 multicast group : Overlay1-239.1.1.1
IPv6 multicast group : [None]
Mcast data group range(s) : 232.1.1.0/24
External interface(s) : Ethernet1/9
External IPv4 address  : 10.4.9.2
External IPv6 address  : 0::
Encapsulation format  : GRE/IPv4
Site-vlan           : 200
Capability           : Multicast-Reachable
Is Adjacency Server   : NO
Adj Server Configured : NO
Prim/Sec Adj Svr(s)   : [None] / [None]

OTV_EDGE1_SITE1# show otv adjacency

Overlay Adjacency database
```

Nexus_7000_-_OTV_-_Design_and_Configuration_Example

Overlay-Interface Overlay1 :

System-ID	Dest Addr	Adj-State	TM_State	Up Time	Adj-State
001b.54c2.43c1	10.3.8.2	default	default	1w3d	UP
001b.54c2.43c3	10.5.10.2	default	default	1w3d	UP
001b.54c2.43c4	10.7.11.2	default	default	2d17h	UP

OTV_EDGE1_SITE1# show otv isis adjacency

OTV-IS-IS process: default VPN: Overlay1

OTV-IS-IS adjacency database:

System ID	SNPA	Level	State	Hold Time	Interface
N7010-I4-OTV_E	001b.54c2.43c1	1	UP	00:00:25	Overlay1
OTV_EDGE2_SITE	001b.54c2.43c3	1	UP	00:00:27	Overlay1
OTV_EDGE_SITE3	001b.54c2.43c4	1	UP	00:00:07	Overlay1

OTV_EDGE1_SITE1# show otv route

OTV Unicast MAC Routing Table For Overlay1

VLAN	MAC-Address	Metric	Uptime	LastUpdtd	Owner	Next-hop(s)
!100 MACs from SITE 1 - local						
110	0000.6e01.010a	1	2d16h	2d16h	lmac	port-channel1
110	0000.6e01.010b	1	2d16h	2d16h	lmac	port-channel1
...						
110	0000.6e01.016c	1	2d16h	2d16h	lmac	port-channel1
110	0000.6e01.016d	1	2d16h	2d16h	lmac	port-channel1
!100 MACs from SITE 2						
110	0000.6e02.020a	42	2d16h	2d16h	isis_otv-default	Overlay1-10.3.8.2
110	0000.6e02.020b	42	2d16h	2d16h	isis_otv-default	Overlay1-10.3.8.2
...						
110	0000.6e02.026c	42	2d16h	2d16h	isis_otv-default	Overlay1-10.3.8.2
110	0000.6e02.026d	42	2d16h	2d16h	isis_otv-default	Overlay1-10.3.8.2
!100 MACs from SITE 3						
110	0000.6e03.030a	42	2d16h	2d16h	isis_otv-default	Overlay1-10.7.11.2
110	0000.6e03.030b	42	2d16h	2d16h	isis_otv-default	Overlay1-10.7.11.2
...						
110	0000.6e03.036c	42	2d16h	2d16h	isis_otv-default	Overlay1-10.7.11.2
110	0000.6e03.036d	42	2d16h	2d16h	isis_otv-default	Overlay1-10.7.11.2

OTV_EDGE1_SITE1# show mac address-table

Legend:

* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen, + - primary entry using vPC Peer-Link

VLAN	MAC Address	Type	age	Secure	NTFY	Ports
G -	001b.54c2.43c2	static	-	F	F	sup-eth1 (R)
!100 MACs from SITE 1 - local						
* 110	0000.0c07.ac6e	dynamic	0	F	F	Po1
* 110	0000.6e01.010a	dynamic	0	F	F	Po1
...						
* 110	0000.6e01.016c	dynamic	0	F	F	Po1
* 110	0000.6e01.016d	dynamic	0	F	F	Po1
!100 MACs from SITE 2 learned via Overlay						
O 110	0000.6e02.020a	dynamic	0	F	F	Overlay1
O 110	0000.6e02.020b	dynamic	0	F	F	Overlay1
...						
O 110	0000.6e02.026c	dynamic	0	F	F	Overlay1
O 110	0000.6e02.026d	dynamic	0	F	F	Overlay1

Nexus_7000_-_OTV_-_Design_and_Configuration_Example

```
!100 MACs from SITE 3 learned via Overlay
O 110      0000.6e03.030a   dynamic  0          F    F    Overlay1
O 110      0000.6e03.030b   dynamic  0          F    F    Overlay1
...
O 110      0000.6e03.036c   dynamic  0          F    F    Overlay1
O 110      0000.6e03.036d   dynamic  0          F    F    Overlay1
```

```
OTV_EDGE1_SITE1# show otv site
OTV Overlay Information
Site-VLAN           : 200
Site Adjacency database
Overlay: Overlay1-239.1.1.1, Adjacencies: 2
  System-ID          Priority  Ordinal
* 001b.54c2.43c2     0        0
  001b.54c2.43c3     0        1
```

```
OTV_EDGE1_SITE1# show otv vlan
OTV VLAN Configuration Information
VLAN-ID  VlanState      Switchport/  External      Overlay
         VlanState      Forward Count Interface      Group
110      UP          1/1          Ethernet1/9   Overlay1-239.1.1.1
```

```
!Will only show up at AED - so we know EDGE 1 is AED
OTV_EDGE1_SITE1# show otv vlan auth
```

```
OTV VLAN Configuration Information
VLAN-ID  VlanState      Switchport/  External      Overlay
         VlanState      Forward Count Interface      Group
110      UP          1/1          Ethernet1/9   Overlay1-239.1.1.1
```

```
OTV_EDGE1_SITE1# show otv arp
```

```
OTV ARP/ND L3->L2 Address Mapping Cache
Overlay Interface Overlay1
VLAN/MAC Address      Uptime      Layer-3 Address      Exp Time Left
0110-001b.54c2.4c41    2w4d        110.2.2.1             00:19:55
0110-0000.6e02.020a    00:06:05    110.2.2.10            00:13:54
0110-0000.6e02.020b    00:06:05    110.2.2.11            00:13:54
0110-0000.6e02.020c    00:06:05    110.2.2.12            00:13:54
...
0110-0000.6e02.026c    00:06:05    110.2.2.108           00:13:54
0110-0000.6e02.026d    00:06:05    110.2.2.109           00:13:54
0110-0000.6e03.030a    00:06:06    110.3.3.10            00:13:53
0110-0000.6e03.030b    00:06:06    110.3.3.11            00:13:53
0110-0000.6e03.030c    00:06:05    110.3.3.12            00:13:54
...
0110-0000.6e03.0348    00:06:05    110.3.3.72            00:13:54
0110-0000.6e03.0349    00:06:05    110.3.3.73            00:13:54
0110-0000.6e03.034a    00:06:05    110.3.3.74            00:13:54
0110-0000.6e03.034b    00:06:05    110.3.3.75            00:13:54
```

SITE 3

```
!On SITE 3
```

```
OTV_EDGE_SITE3#
show otv
```

```
OTV Overlay Information
```

Nexus_7000_-_OTV_-_Design_and_Configuration_Example

```
Overlay Interface Overlay1
  VPN Name           : Overlay1
  VPN ID             : 245
  State              : UP
  IPv4 multicast group : Overlay1-239.1.1.1
  IPv6 multicast group : [None]
  Mcast data group range(s) : 232.1.1.0/24
  External interface(s) : Ethernet1/17
  External IPv4 address : 10.7.11.2
  External IPv6 address : 0::
  Encapsulation format : GRE/IPv4
  Site-vlan          : 1
  Capability          : Multicast-Reachable
  Is Adjacency Server : NO
  Adj Server Configured : NO
  Prim/Sec Adj Svr(s) : [None] / [None]
```

```
OTV_EDGE_SITE3#
show otv adjacency
```

Overlay Adjacency database

```
Overlay-Interface Overlay1 :
System-ID      Dest Addr      Adj-State  TM_State  Up Time   Adj-State
001b.54c2.43c1 10.3.8.2      default   default   2d17h    UP
001b.54c2.43c2 10.4.9.2      default   default   2d17h    UP
001b.54c2.43c3 10.5.10.2     default   default   2d17h    UP
```

```
OTV_EDGE_SITE3#
show otv arp
```

OTV ARP/ND L3->L2 Address Mapping Cache

```
Overlay Interface Overlay1
VLAN/MAC Address      Uptime      Layer-3 Address      Exp Time Left
0110-001b.54c2.39c1   3d05h      110.1.1.2            00:19:55
0110-001b.54c2.8541   2w3d       110.1.1.3            00:19:55
0110-0000.6e01.010a   00:06:06   110.1.1.10           00:13:53
0110-0000.6e01.010b   00:06:06   110.1.1.11           00:13:53
0110-0000.6e01.010c   00:06:06   110.1.1.12           00:13:53
```

```
show otv isis adjacency
```

OTV-IS-IS process: default VPN: Overlay1

OTV-IS-IS adjacency database:

```
System ID      SNPA          Level  State  Hold Time  Interface
N7010-I4-OTV_E 001b.54c2.43c1 1      UP     00:00:29   Overlay1
OTV_EDGE1_SITE 001b.54c2.43c2 1      UP     00:00:31   Overlay1
OTV_EDGE2_SITE 001b.54c2.43c3 1      UP     00:00:29   Overlay1
```

```
OTV_EDGE_SITE3# show otv route
```

OTV Unicast MAC Routing Table For Overlay1

```
VLAN MAC-Address      Metric Uptime   LastUpdtd Owner              Next-hop(s)
!100 MACs from SITE 1
110 0000.6e01.010a 42     2d16h    2d16h    isis_otv-default   Overlay1-10.4.9.2
110 0000.6e01.010b 42     2d16h    2d16h    isis_otv-default   Overlay1-10.4.9.2
...
110 0000.6e01.016c 42     2d16h    2d16h    isis_otv-default   Overlay1-10.4.9.2
110 0000.6e01.016d 42     2d16h    2d16h    isis_otv-default   Overlay1-10.4.9.2
```

Nexus_7000_-_OTV_-_Design_and_Configuration_Example

```

!100 MACs from SITE 2
110 0000.6e02.020a 42      2d16h  2d16h  isis_otv-default  Overlay1-10.3.8.2
110 0000.6e02.020b 42      2d16h  2d16h  isis_otv-default  Overlay1-10.3.8.2
...
110 0000.6e02.026c 42      2d16h  2d16h  isis_otv-default  Overlay1-10.3.8.2
110 0000.6e02.026d 42      2d16h  2d16h  isis_otv-default  Overlay1-10.3.8.2

!100 MACs from SITE 3 - local
110 0000.6e03.030a 1       2d16h  2d16h  lmac              Ethernet1/19
110 0000.6e03.030b 1       2d16h  2d16h  lmac              Ethernet1/19
...
110 0000.6e03.036c 1       2d16h  2d16h  lmac              Ethernet1/19
110 0000.6e03.036d 1       2d16h  2d16h  lmac              Ethernet1/19

```

```

OTV_EDGE_SITE3#
show mac address-table

```

Legend:

* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen, + - primary entry using vPC Peer-Link

VLAN	MAC Address	Type	age	Secure	NTFY	Ports
-----+-----+-----+-----+-----+-----+-----						
!100 MACs from SITE 1						
O 110	0000.6e01.010a	dynamic	0	F	F	Overlay1
O 110	0000.6e01.010b	dynamic	0	F	F	Overlay1
...						
O 110	0000.6e01.016c	dynamic	0	F	F	Overlay1
O 110	0000.6e01.016d	dynamic	0	F	F	Overlay1
!100 MACs from SITE 2						
O 110	0000.6e02.020a	dynamic	0	F	F	Overlay1
O 110	0000.6e02.020b	dynamic	0	F	F	Overlay1
...						
O 110	0000.6e02.026c	dynamic	0	F	F	Overlay1
O 110	0000.6e02.026d	dynamic	0	F	F	Overlay1
!100 MACs from SITE 3 - local						
* 110	0000.6e03.030a	dynamic	0	F	F	Eth1/19
* 110	0000.6e03.030b	dynamic	0	F	F	Eth1/19
...						
* 110	0000.6e03.036c	dynamic	0	F	F	Eth1/19
* 110	0000.6e03.036d	dynamic	0	F	F	Eth1/19

```

OTV_EDGE_SITE3# show otv site
OTV Overlay Information

```

```

Site-VLAN          : 1

```

Site Adjacency database

```

Overlay: Overlay1-239.1.1.1, Adjacencies: 1

```

System-ID	Priority	Ordinal
* 001b.54c2.43c4	0	0

```

OTV_EDGE_SITE3#
show otv vlan

```

OTV VLAN Configuration Information

VLAN-ID	VlanState	Switchport/ Forward Count	External Interface	Overlay Group
110	UP	1/1	Ethernet1/17	Overlay1-239.1.1.1

Nexus_7000_-_OTV_-_Design_and_Configuration_Example

```
OTV_EDGE_SITE3#  
show otv vlan auth
```

```
OTV VLAN Configuration Information  
VLAN-ID  VlanState          Switchport/  External  Overlay  
          VlanState          Forward Count Interface  Group  
110      UP                    1/1          Ethernet1/17  Overlay1-239.1.1.1
```

Additional Resources

For more detailed information on OTV, please see the following link:

[OTV IETF draft](#)

[*Cisco Nexus 7000 Series NX-OS OTV Configuration Guide, Release 5.x*](#)

Acronyms

OTV - Overlay Transport Virtualization

ASM - Any Source Multicast

DCI - Data Center Interconnect

SSM - Source Specific Multicast

WAN - Wide Area Network

FCS - First Customer Ship

SP - Service Provider