ASR1000 OTV Deployment Modes (OTV on a Stick)

Contents

Introduction

This document describes the configuration for a specific deployment Model of the Overlay Transport Virtualization (OTV) on ASR1000 Family.

Prerequistes

Requirements

Cisco recommends that you have knowledge of these topics:

- Basic Knowledge of the ASR 1000 Platform architecture
- Basic Knowledge of ASR 1000 OTV Unicast Adjacency Server Configuration
- Unicast reachability between the L3 Border routers

Components Used

The information in this document is based on the ASR 1002 with Cisco IOS[®] Version asr1001-universal.03.13.05.S.154-3.S5-ext.bin.
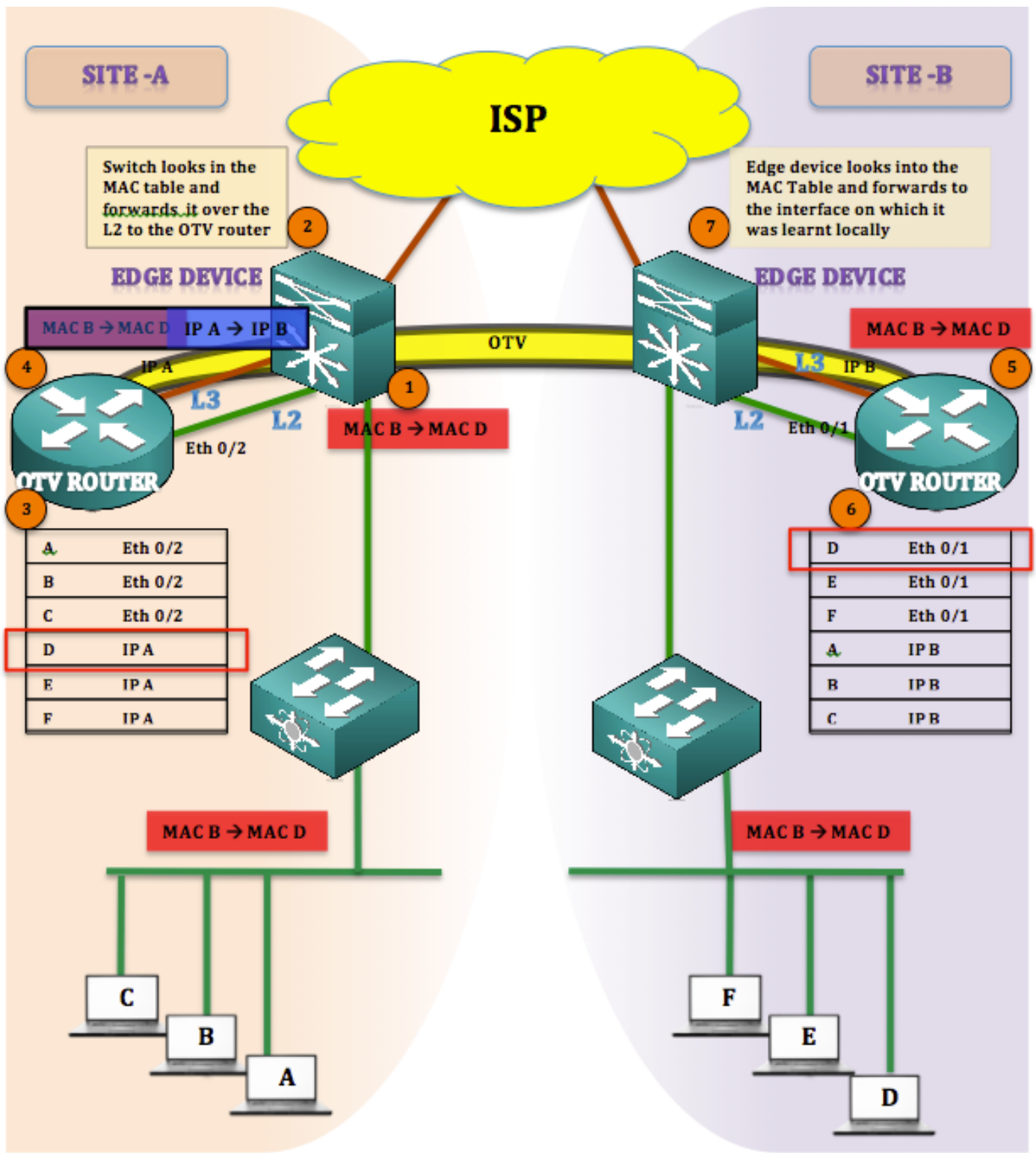
Background Information

In OTV Appliance on a stick model, the join interface connects back through the device that has the SVIs built on. This particular model of deployment is widely used as it needs no network re-design or re-cabling when OTV is activated or de-activated for any reason. It should be further noted that OTV enabled device (ASR1000) is one hop away from the layer 3 border routers providing Datacenter connectivity.
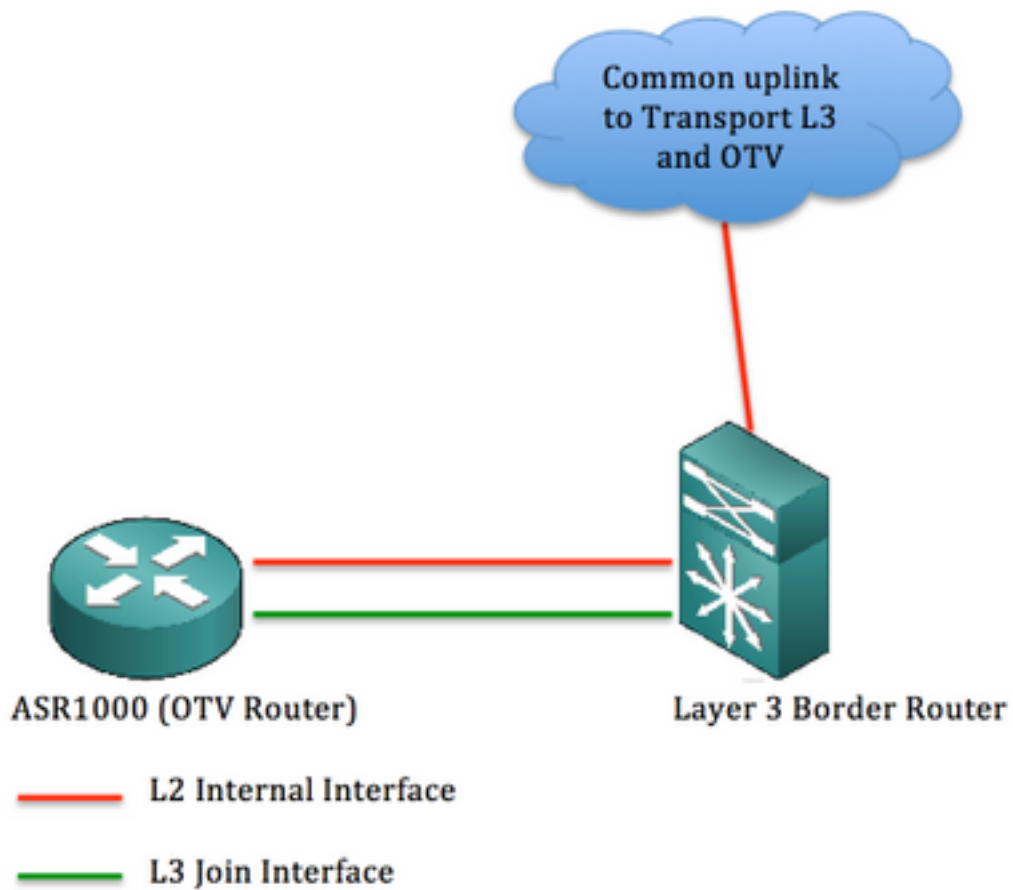
The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Theory

Network Diagram

SITE -A

ISP

SITE -B

Switch looks in the MAC table and forwards it over the L2 to the OTV router

2

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Edge device looks into the MAC Table and forwards to the interface on which it was learnt locally

EDGE DEVICE

EDGE DEVICE

MAC B → MAC D   IP A → IP B

MAC B → MAC D

OTV

IP A

L3   IP B

4

5

1

L3

L2

MAC B → MAC D

L2   Eth 0/1

Eth 0/2

OTV ROUTER

OTV ROUTER

3

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A.	Eth 0/2
B	Eth 0/2
C	Eth 0/2
D	IP A
E	IP A
F	IP A

D	Eth 0/1
E	Eth 0/1
F	Eth 0/1
A.	IP B
B	IP B
C	IP B

MAC B → MAC D

MAC B → MAC D

C

B

A

F

E

D

— L2
— L3

Packet Walk

In OTV it is always correct to say that there are no silent hosts (End hosts are not silent or Uni-directional). If there is any unicast traffic to a destination whose mac-address is not present in the OTV table, the traffic would be considered as Unknown Unicast and is dropped.

Consider that the OTV Table has already populated & all mac-addresses are learnt.

Traffic is initiated from Site A to Site B (MAC B to MAC D)

1. Traffic initiated from MAC B toMAC D reaches the Edge Device (Flood and Learn Mechanism)
2. Edge device will look into the mac-table and forward the frames on the dynamically learnt Interface (Eth 0/2) which is the L2 Interface
3. Frames arrive at the OTV Device (ASR1K), and upon looking into the OTV route table finds out that the frames are for Site B.
4. OTV encapsulates the frame changing the Source as IP A, its own Join-interface IP and destination as IP A, join-interface of Site B. ([MAC B to MAC D] IP A toIP B)
5. OTV Decapsulation happens at Site B and the original frame is recovered
6. A mac-address table look up is performed for the arriving frame and it is sent across the L2 Interface back to the Edge Device
7. Edge Device checks the interface on which MAC D was learnt and sends the frame on it

Advantages & Working

The Main advantages of this Topology are :

- No change to the existing topology
- Hassle free implementation
- Ease of config

The question that arises here is that how is this topology different than other in case of OTV deployment. The answer is:

Where is the Join-Interface?

As shown in the image, the Join-Interface resides behind the Edge Devices (i.e 6500 in this case). In the existing topology, put the join-interface behind the switch and build an overlay across it.

One more Question that arises here is How many interfaces do we use for the L2 and L3 connectivity from the Edge device towards ASR1000. The answer is:

There is simply no restriction to it . You can use separate interfaces for L2 and L3, or you can choose to leverage with one single interface which will act as both L2 and L3 and hence justify the name OTV ON A STICK.

A single interface can be used for L2, by building Service instances and extending the VLAN's from the Edge device towards the OTV router's and again a sub-interface can be built over the same interface which will be used as the Join-Interface.

The Configuration in this section focuses using of one single interface between the Edge device and the OTV router.

Configure

Note: Both the L2 & L3 links are hosted on a single Interface between Edge router & OTV router.

On The Edge Device : (Could be a Nexus or C6500)

```
LEFT-EDGE #sh run int gi4/3
Building configuration...
Current configuration : 109
bytes
!
interface GigabitEthernet4/3
switchport
switchport trunk
encapsulation dot1q
switchport mode trunk
end
LEFT-EDGE #sh run int vlan1
Building configuration...
Current configuration : 78
bytes
!
interface Vlan1
ip address 192.168.1.2
255.255.255.0
end
```

```
RIGHT-EDGE #sh run int
gi2/3
Building configuration...
Current configuration : 86
bytes
!
interface GigabitEthernet2/3
switchport
switchport mode trunk
no ip address
end
RIGHT-EDGE #sh run int
vlan 1
Building configuration...
Current configuration : 61
bytes
!
interface Vlan1
ip address 192.168.2.2
255.255.255.0
end
```

On The OTV Router : (In this case ASR1000)

```
LEFT-ASR #sh run int gi0/0/1
Building configuration...
Current configuration : 225
bytes
!
interface GigabitEthernet0/0/1
no ip address
negotiation auto
service instance 10 ethernet
encapsulation dot1q 10
bridge-domain 10
!
service instance 20 ethernet
encapsulation dot1q 20
bridge-domain 20
!
end
LEFT-ASR #sh run int
gi0/0/1.100
Building configuration...
Current configuration : 110
bytes
!
interface
GigabitEthernet0/0/1.100
encapsulation dot1Q 1 native
ip address 192.168.1.1
```

```
RIGHT-ASR #sh run int gi0/1/0
Building configuration...
Current configuration : 225 bytes
!
interface GigabitEthernet0/1/0
no ip address
negotiation auto
service instance 10 ethernet
encapsulation dot1q 10
bridge-domain 10
!
service instance 20 ethernet
encapsulation dot1q 20
bridge-domain 20
!
end
RIGHT-ASR #sh run int
gi0/1/0.100
Building configuration...
Current configuration : 110 bytes
!
interface
GigabitEthernet0/1/0.100
encapsulation dot1Q 1 native
ip address 192.168.2.1
255.255.255.0
end
```

255.255.255.0
end

Overlay Interface :

LEFT-ASR#sh run int overlay 1	RIGHT-ASR#sh run int overlay 1
interface Overlay1	interface Overlay1
no ip address	no ip address
otv join-interface	otv join-interface
GigabitEthernet0/0/1.100	GigabitEthernet0/1/0.100
otv adjacency-server unicast-only	otv use-adjacency-server
only	192.168.1.1 unicast-only
service instance 10 ethernet	service instance 10 ethernet
encapsulation dot1q 10	encapsulation dot1q 10
bridge-domain 10	bridge-domain 10
!	!
end	end

Verify

To verify if the set up is working as configured you need the same basic commands you use for any OTV set up.

The list of outputs that are collected to verify the set up :

- **Show otv detail**
- **Show otv adjacency**
- **Show otv route**

```
LEFT-ASR#sh otv detail
Overlay Interface Overlay1
VPN name               : None
VPN ID                 : 1
State                  : UP
Fwd-capable            : Yes
Fwd-ready              : Yes
AED-Server             : Yes
Backup AED-Server      : No
AED Capable            : Yes
Join interface(s)      : GigabitEthernet0/0/2
Join IPv4 address      : 192.168.1.1
Tunnel interface(s)    : Tunnel0
Encapsulation format   : GRE/IPv4
Site Bridge-Domain     : 20
Capability             : Unicast-only
Is Adjacency Server    : Yes
Adj Server Configured  : No
Prim/Sec Adj Svr(s)    : None
OTV instance(s)        : 0
FHRP Filtering Enabled : Yes
ARP Suppression Enabled : Yes
ARP Cache Timeout      : 600 seconds
  LEFT-ASR#sh otv adjacency
Overlay Adjacency Database for overlay 1
Hostname            System-ID     Dest Addr      Site-ID       Up Time    State
RIGHT-ASR           4403.a7d3.cf00   192.168.2.1   0000.0000.2222   1d03h      UP
```

```
LEFT-ASR#sh otv route
Codes: BD - Bridge-Domain, AD - Admin-Distance,
       SI - Service Instance, * - Backup Route
OTV Unicast MAC Routing Table for Overlay1
Inst VLAN BD    MAC Address    AD   Owner Next Hops(s)
-------------------------------------------------------- 0   10   10    0007.84bf.c8c0 40

BD Eng Gi0/0/1:SI10    <<<<<< LEARNT from Own Site


0   10   10    000a.8b38.4000 50   ISIS   RIGHT-ASR
0   10   10    d0d0.fd5a.a9a8 40   BD Eng Gi0/0/1:SI10
0   10   10    d0d0.fd5a.a9a9 50   ISIS   RIGHT-ASR         <<<<<< LEARNT from SITE-B
```
For troubleshooting and Verification purpose refer to the OTV unicast troubleshooting and verification guide:

http://www.cisco.com/c/en/us/support/docs/routers/asr-1000-series-aggregation-services-routers/117158-configure-otv-00.html