ASR 1000: OTV Multihoming Software Upgrade Best Practice

Contents

Introduction

This document describes the IOS upgrade order for a specific deployment Model of the Overlay Transport Virtualization (OTV) on ASR1000 Family in a multihoming design setup.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Basic Knowledge of the ASR 1000 Platform architecture
- Basic Knowledge of ASR1000 OTV Unicast Adjacency Server Configuration
- Basic knowledge of the Multihoming design

Components Used

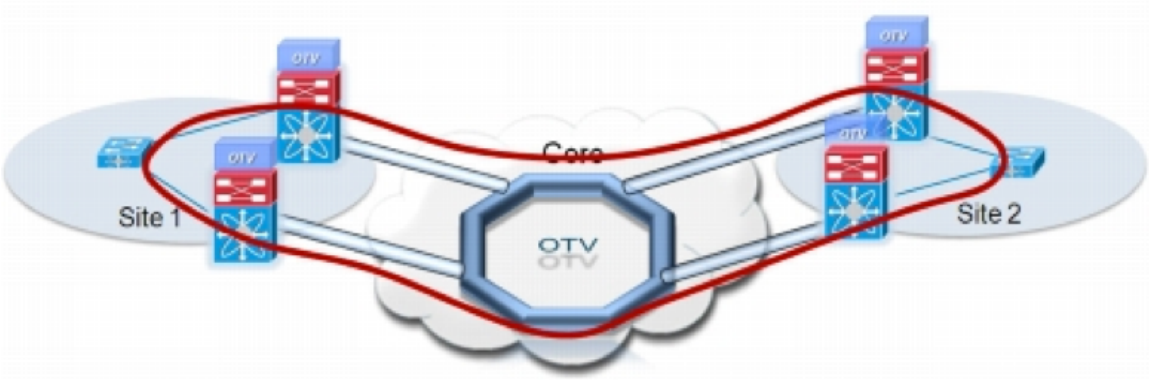
The information in this document is based on the ASR 1001 with Cisco IOS®Versionasr1001-universalk9.03.10.03.S.153-3.S3-ext.bin.

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.

Background Information

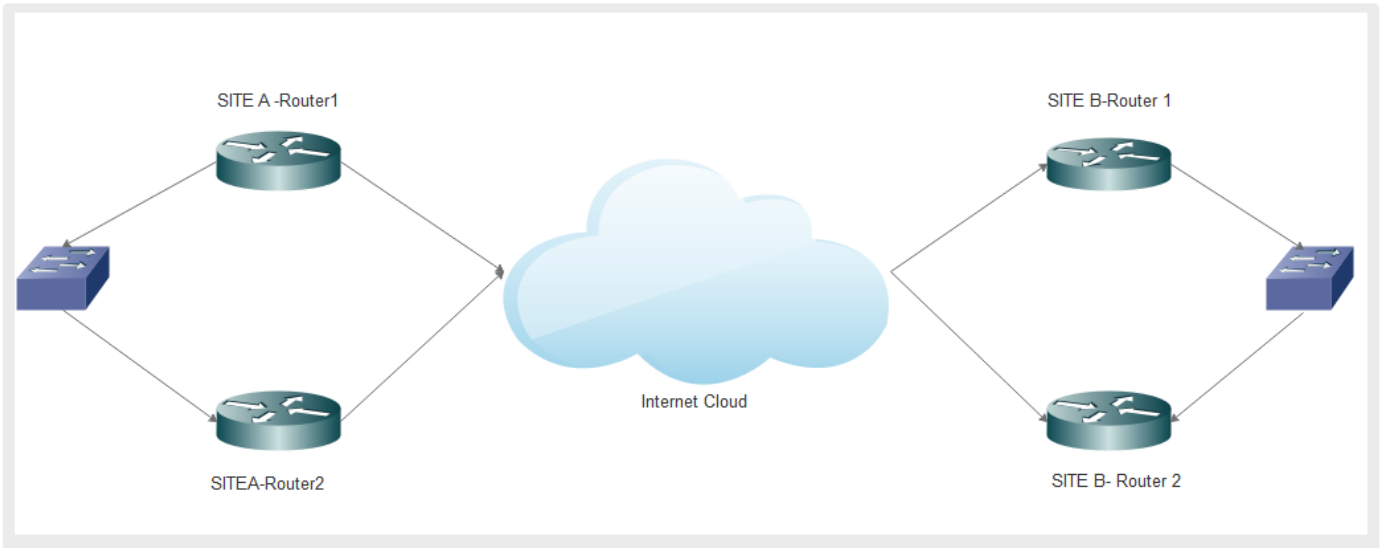
If possible, multihoming is always recommended because it adds another layer of redundancy and scalability. Note that the multihoming of Cisco ASR 1000 Series and other Cisco platforms within a

single site is not supported.



Configure

Network Diagram



Configurations

Here is the configuration for both the routers on site A:

```
SITEA-ROUTER1#sh run
Building configuration...
otv site bridge-domain 1
 otv isis hello-interval 3
!
otv fragmentation join-interface
Port-channel19
otv site-identifier
0000.0000.0003
!
!
interface Port-channel19
 description OTV Layer 3 to
Distribution
 mtu 9216
```

```
SITEA-ROUTER2#sh run
Building configuration...
otv site bridge-domain 1
 otv isis hello-interval 3
!
otv fragmentation join-interface
Port-channel20
otv site-identifier
0000.0000.0003
!
!
interface Loopback0
 ip address 192.168.1.1
255.255.255.255
!
```

```
 ip address 10.23.1.124
255.255.255.248
 no ip redirects
 load-interval 30
 no negotiation auto
!
interface Overlay1
 description Overlay Network
 no ip address
 otv join-interface Port-
channel19
 otv vpn-name DRT-
CDC_Overlay
 otv use-adjacency-server
172.31.1.212 unicast-only
 otv adjacency-server unicast-
only
 otv isis hello-interval 3
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
!
 service instance 1011 ethernet
 encapsulation dot1q 1011
 bridge-domain 1011
 !
!
interface GigabitEthernet0/0/0
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 service instance 1 ethernet
 encapsulation dot1q 1
 bridge-domain 1
 !
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
 !
 service instance 1011 ethernet
 encapsulation dot1q 1011
 bridge-domain 1011
 !
interface GigabitEthernet0/0/1
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 channel-group 19 mode active
!
interface GigabitEthernet0/0/2
 mtu 9216
```

```
interface Port-channel20
 description OTV Layer 3 to
Distribution
 mtu 9216
 ip address 10.23.1.164
255.255.255.248
 no ip redirects
 load-interval 30
 no negotiation auto
!
interface Overlay1
 description Overlay Network
 no ip address
 otv join-interface Port-
channel20
 otv vpn-name DRT-
CDC_Overlay
 otv use-adjacency-server
172.31.1.212 10.23.1.124
unicast-only
 otv isis hello-interval 3
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
 !
 service instance 1011 ethernet
 encapsulation dot1q 1011
bridge-domain 1011
 !
!
interface GigabitEthernet0/0/0
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 service instance 1 ethernet
 encapsulation dot1q 1
 bridge-domain 1
 !
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
!
 service instance 1011 ethernet
 encapsulation dot1q 1011
 bridge-domain 1011
 !
!
interface GigabitEthernet0/0/1
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
```

```
 channel-group 20 mode active
!
interface GigabitEthernet0/0/2
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 channel-group 20 mode active
!
 no ip address
 negotiation auto
 cdp enable
 channel-group 19 mode active
```

Here is the configuration for both the routers on site B:

```
SITEB-ROUTER1#SH RUN
Building configuration...
otv site bridge-domain 1
 otv isis hello-interval 3
!
otv fragmentation join-interface
Port-channel19
otv site-identifier
0000.0000.0002
!
interface Port-channel19
 description OTV Layer 3 to
Distribution
 mtu 9216
 ip address 172.31.1.212
255.255.255.248
 no ip redirects
 load-interval 30
 no negotiation auto
!
interface Overlay1
 description Overlay Network
with CDC
 no ip address
 otv join-interface Port-
channel19
 otv vpn-name DRT-
CDC_Overlay
 otv adjacency-server unicast-
only
 otv isis hello-interval 3
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
 !
 service instance 1011 ethernet
 encapsulation dot1q 1011
 bridge-domain 1011
 !
!
interface GigabitEthernet0/0/0
```

```
SITEB-ROUTER2#SH RUN
Building configuration...
otv site bridge-domain 1
 otv isis hello-interval 3
!
otv fragmentation join-interface
GigabitEthernet0/0/0
otv fragmentation join-interface
GigabitEthernet0/0/1
otv fragmentation join-interface
GigabitEthernet0/0/2
otv fragmentation join-interface
GigabitEthernet0/0/3
otv fragmentation join-interface
Port-channel20
otv fragmentation join-interface
Tunnel0
otv site-identifier
0000.0000.0002
!
interface Port-channel20
 description OTV Layer 3 to
Distribution
 mtu 9216
 ip address 172.31.1.220
255.255.255.248
 no ip redirects
 load-interval 30
 no negotiation auto
!
interface Overlay1
 description Overlay Network
with CDC
 no ip address
 otv join-interface Port-
channel20
 otv vpn-name DRT-
CDC_Overlay
 otv use-adjacency-server
172.31.1.212 10.23.1.124
unicast-only
```

```
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 service instance 1 ethernet
 encapsulation untagged
 bridge-domain 1
 !
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
 !
 service instance 1011 ethernet
 encapsulation dot1q 1011
 bridge-domain 1011
 !
!
interface GigabitEthernet0/0/1
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 channel-group 19 mode active
!
interface GigabitEthernet0/0/2
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 channel-group 19 mode active
```

```
 otv isis hello-interval 3
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
 !
 service instance 1011 ethernet
 encapsulation dot1q 1011
  bridge-domain 1011
 !
!
interface GigabitEthernet0/0/0
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 service instance 1 ethernet
 encapsulation untagged
 bridge-domain 1
 !
 service instance 6 ethernet
 encapsulation dot1q 6
 bridge-domain 6
 !
 service instance 1011 ethernet
 encapsulation dot1q 1011
 bridge-domain 1011
 !
!
interface GigabitEthernet0/0/1
mtu 9216
 no ip address
 negotiation auto
 cdp enable
 channel-group 20 mode active
!
interface GigabitEthernet0/0/2
 mtu 9216
 no ip address
 negotiation auto
 cdp enable
 channel-group 20 mode active
```

Verify

Use this section in order to confirm that your configuration works properly.

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

- Show otv adjacency

```
SITEA-ROUTER1#sh otv
Overlay Interface Overlay1
 VPN name             : DRT-CDC_Overlay
 VPN ID               : 1
 State                : UP
 AED Capable          : Yes
 Join interface(s)    : Port-channel19
Join IPv4 address     : 10.23.1.124
Tunnel interface(s)   : Tunnel0
Encapsulation format  : GRE/IPv4
 Site Bridge-Domain   : 1
 Capability           : Unicast-only
 Is Adjacency Server  : Yes
Adj Server Configured : Yes
Prim/Sec Adj Svr(s)   : 172.31.1.212
OTV instance(s)       : 0
 FHRP Filtering Enabled : Yes
 ARP Suppression Enabled : Yes
 ARP Cache Timeout    : 600 seconds
```

```
SITEA-ROUTER2#sh otv de
Overlay Interface Overlay1
 VPN name             : DRT-CDC_Overlay
 VPN ID               : 1
 State                : UP
 AED Capable          : Yes
 Join interface(s)    : Port-channel20
Join IPv4 address     : 10.23.1.164
Tunnel interface(s)   : Tunnel0
Encapsulation format  : GRE/IPv4
 Site Bridge-Domain   : 1
 Capability           : Unicast-only
 Is Adjacency Server  : No
Adj Server Configured : Yes
Prim/Sec Adj Svr(s)   : 172.31.1.212/10.23.1.124
OTV instance(s)       : 0
 FHRP Filtering Enabled : Yes
 ARP Suppression Enabled : Yes
 ARP Cache Timeout    : 600 seconds
```

```
SITEB-ROUTER1#sh otv de
Overlay Interface Overlay1
 VPN name             : DRT-CDC_Overlay
 VPN ID               : 1
 State                : UP
 AED Capable          : Yes
 Join interface(s)    : Port-channel19
 Join IPv4 address    : 172.31.1.212
 Tunnel interface(s)  : Tunnel0
 Encapsulation format : GRE/IPv4
 Site Bridge-Domain   : 1
 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 :
```

```
SITEB-ROUTER2#sh otv de
Overlay Interface Overlay1
 VPN name             : DRT-CDC_Overlay
 VPN ID               : 1
 State                : UP
 AED Capable          : Yes
 Join interface(s)    : Port-channel20
 Join IPv4 address    : 172.31.1.220
 Tunnel interface(s)  : Tunnel0
 Encapsulation format : GRE/IPv4
 Site Bridge-Domain   : 1
 Capability           : Unicast-only
 Is Adjacency Server  : No
 Adj Server Configured : Yes
 Prim/Sec Adj Svr(s)  : 172.31.1.212/10.23.1.124
 OTV instance(s)      : 0
 FHRP Filtering Enabled : Yes
```

Yes

ARP Suppression Enabled : Yes
ARP Cache Timeout : 600 seconds

Troubleshoot

This section provides information you can use in order to troubleshoot your configuration.

SITEA-ROUTER1 is the primary Authoritative Edge Device (AED) for SITE A and SITEB-ROUTER1 is the primary AED for SITE B.

You upgrade the active AED on site B and backup AED on site A fromasr1001-universalk9.03.10.03.S.153-3.S3-ext.bin to asr1001-universalk9.03.16.03.S.155-3.S3-ext.bin.

The devices were upgraded successfully but these were the issues that were seen after the upgrade:

- OTV Adjacency went down
- AED Capable state changed to NO and overlay neighbor version mismatch message was seen
- Configured VLANS went into inactive(NFC) Not Forward Capable state.
- inter-DC & intra-DC communication stopped completely

Primary/active AED on SITEB

```
SITEB-ROUTER1#sh otv de
Overlay Interface Overlay1
 VPN name             : DRT-CDC_Overlay
 VPN ID               : 1
 State                : UP
 Fwd-capable          : No
 Fwd-ready            : No
 AED-Server           : No
 AED Capable          : No, overlay neighbor version mismatch
 Join interface(s)    : Port-channel19
 Join IPv4 address    : 172.31.1.212
 Tunnel interface(s)  : Tunnel0
 Encapsulation format : GRE/IPv4
 Site Bridge-Domain   : 1
 Capability           : Unicast-only
 Is Adjacency Server  : Yes
 Adj Server Configured : No
 Prim/Sec Adj Svr(s)  : None
 OTV instance(s)      : 0
```

Secondary/backup AED on SITEA

```
SITEA-ROUTER2#sh otv
Overlay Interface Overlay1
 VPN name             : DRT-CDC_Overlay
 VPN ID               : 1
 State                : UP
 Fwd-capable          : No
 Fwd-ready            : No
 AED-Server           : No
 AED Capable          : No, overlay neighbor version mismatch
 Join interface(s)    : Port-channel20
 Join IPv4 address    : 10.23.1.164
 Tunnel interface(s)  : Tunnel0
 Encapsulation format : GRE/IPv4
 Site Bridge-Domain   : 1
 Capability           : Unicast-only
 Is Adjacency Server  : No
 Adj Server Configured : Yes
 Prim/Sec Adj Svr(s)  :
```

```
 FHRP Filtering Enabled   : Yes
 ARP Suppression Enabled  : Yes
 ARP Cache Timeout        : 600 seconds
SITEB-ROUTER1##sh otv vl
Key:  SI - Service Instance, NA - Non AED, NFC - Not Forward Capable.
Overlay 1 VLAN Configuration Information
 Inst VLAN BD   Auth ED            State              Site If(s)
 0    6    6    -                  inactive(NFC)      Gi0/0/0:SI6
 0    186  186  -                  inactive(NFC)      Gi0/0/0:SI186
 0    1011 1011 -                  inactive(NFC)      Gi0/0/0:SI1011
 0    1030 1030 -                  inactive(NFC)      Gi0/0/0:SI1030
 Total VLAN(s): 4
```

```
172.31.1.212/10.23.1.124
OTV instance(s)          : 0
 FHRP Filtering Enabled   : Yes
 ARP Suppression Enabled  : Yes
 ARP Cache Timeout        : 600 seconds
SITEA-ROUTER2#sh otv vlan
Key:  SI - Service Instance, NA - Non AED, NFC - Not Forward Capable.
Overlay 1 VLAN Configuration Information
 Inst VLAN BD   Auth ED            State              Site If(s)
 0    6    6    -                  inactive(NFC)      Gi0/0/0:SI6
 0    186  186  -                  inactive(NFC)      Gi0/0/0:SI186
 0    1011 1011 -                  inactive(NFC)      Gi0/0/0:SI1011
 Total VLAN(s): 3
```

This issue basically occurs since ISIS which runs at the backend has seen many changes to facilitate OTV Fast Convergence (FC). Hence, images which are pre FC and post FC will not work together.

In releases pre FC: the AED election runs in parallel, independently on each Edge Device (ED) in the site. Since the AED election is triggered independently and is uncoordinated among the multiple edge devices in the site, a short wait period of blackholing is required to ensure that two or more edge devices are not simultaneously AED and hence forwarding traffic for the same VLAN. This introduces a convergence delay when there are failures at an ED that is AED for some VLANs.

In addition, OTV traffic convergence upon an AED failure is dependent on the new AED at the site learning the local routing information and advertising the same to the remote sites. This dependency introduces delays that are non-deterministic and is also impacted by the scale of the routing databases. It is required to minimize the loss of existing traffic flows when there is a failure event on the edge devices to provide faster convergence of OTV deployed networks in such scenarios.

It is highly recommended that both ED’s which participate in OTV DC be on the same image. If we wish to upgrade to a different train it is recommended to bring the overlay interfaces down and upgrade all the four devices simultaneously and then after the upgrade bring the overlay interface up and adjacency will be established.