AOS-CX 10.10 Update

## IP Directed Broadcast Over VXLAN

Presenter

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## **EVPN-VXLAN**

### Enhancements in AOS-CX 10.10

- Campus
  - FIB optimization for better scalability
  - Multi-fabric:
  - Shared border VTEP between multiple EVPN fabrics (no stretched VLAN)
  - Border VTEP as route-reflector
  - IPv6 overlay support (POC only)
  - IP Directed Broadcast over VXLAN
    - Scale improvement: 6300, 6400, 8325, 8360, 8400
- Datacenter
  - Scale improvement: 8325, 8360, 8400, 10000

## Agenda

- Overview
- 2 Use Cases
- 3 Details and Caveats
- 4 Configuration
- 5 Best Practices
- 6 Troubleshooting
- 7 Demo
- 8 Additional Resources

# Overview

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## **IP Directed Broadcast Over VXLAN Overview**

- Broadcasts are normally contained within a subnet
  - This feature forwards broadcasts across different subnets
- 10.10 adds support for IP Directed Broadcast Over VXLAN
  - IP Directed Broadcast with non VXLAN networks was supported before 10.10
- Supported platforms:
  - 6300, 6400, 8360



## Use Cases

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## Wake on LAN (WoL) or Banking Applications

- Software distribution in large networks typically utilize WoL which requires IP Directed Broadcast
- Financial/Banking environments also require it for stock related applications



IP directed broadcast from WoL server on subnet 10 to WoL clients on subnets 12 and 13

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## **IP Directed Broadcast Over VXLAN Details**

- Disabled by default
  - Must be enabled on SVIs
- In this example: Source SVI and destination SVI are on different VTEPs
  - IP Directed Broadcast is enabled on VTEP2, SVI 12
  - VTEP2 will receive broadcast over L3 VNI



## **IP Directed Broadcast Over VXLAN Details**

- Disabled by default
  - Must be enabled on SVIs
- In this example: Source SVI and destination SVI are on the same VTEP + same destination SVI on remote VTEP
  - IP Directed Broadcast is enabled on VTEP1, SVI 12
  - VTEP2 will receive broadcast over L2 VNI



IP directed broadcast from 10 to 12 subnet

### **IP Directed Broadcast Over VXLAN Packet Capture**

- Packet capture from source on subnet 10 to destination subnet 12 over VXLAN tunnel

	1 0.000000000	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=80/20480,	ttl=63 (r	o response	found!)
	4 1.000585560	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=81/20736,	ttl=63 (r	o response	found!)
	7 2.001850280	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=82/20992,	ttl=63 (r	o response	found!)
1	LO 3.003039080	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=83/21248,	ttl=63 (r	o response	found!)
1	L3 4.004127160	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=84/21504,	ttl=63 (r	o response	found!)
1	L6 5.005294520	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=85/21760,	ttl=63 (r	o response	found!)
1	L9 6.006534760	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=86/22016,	ttl=63 (r	o response	found!)
2	25 7.007670800	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=87/22272,	ttl=63 (r	o response	found!)
2	29 8.009505320	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=88/22528,	ttl=63 (r	o response	found!)
3	34 9.010645560	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=89/22784,	ttl=63 (r	o response	found!)
3	88 10.011869560	10.1.10.15	10.1.12.255	ICMP	148 Echo (ping)	request	id=0x1bef,	seq=90/23040,	ttl=63 (r	o response	found!)

> Frame 1: 148 bytes on wire (1184 bits), 148 bytes captured (1184 bits) on interface MirrorRxNet, id 0

> Ethernet II, Src: ArubaaHe\_9a:7a:00 (88:3a:30:9a:7a:00), Dst: ArubaaHe\_6c:ea:00 (10:4f:58:6c:ea:00)

> Internet Protocol Version 4, Src: 192.168.2.5, Dst: 192.168.2.7

> User Datagram Protocol, Src Port: 9811, Dst Port: 4789

Virtual eXtensible Local Area Network

> Flags: 0x0800, VXLAN Network ID (VNI)

Group Policy ID: 0

VXLAN Network Identifier (VNI): 10012

Reserved: 0

> Ethernet II, Src: ArubaaHe\_9a:7a:00 (88:3a:30:9a:7a:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff:ff)

> Internet Protocol Version 4, Src: 10.1.10.15, Dst: 10.1.12.255

#### V Internet Control Message Protocol

Type: 8 (Echo (ping) request) Code: 0 Checksum: 0x0e62 [correct] [Checksum Status: Good] Identifier (BE): 7151 (0x1bef) Identifier (LE): 61211 (0xef1b) Sequence Number (BE): 80 (0x0050)

Sequence Number (LE): 20480 (0x5000)

#### > [No response seen]

Timestamp from icmp data: Apr 4, 2022 15:22:43.00000000 PDT

[Timestamp from icmp data (relative): -372.449391320 seconds]

> Data (48 bytes)

## **IP Directed Broadcast Over VXLAN Caveats**

- IPv4 only, IPv6 doesn't utilize broadcasts
- In this example: Source SVI and destination SVI on the same VTEP + remote VTEP (could have the same destination SVI configured)
  - IP Directed Broadcast is enabled on VTEP1, SVI 12
  - VTEP2 will receive broadcast over L2 VNI



IP directed broadcast from 10 to 12 subnet

- Since IP Directed Broadcast over VXLAN is only supported on 6300, 6400, 8360
  - VTEP1 has to be 6300, 6400, 8360
  - VTEP2 could be 8325, 8400, 10000 (validated by QA)
  - VTEP2 could be 3<sup>rd</sup> party VTEP (might work but not validated by QA)

# Configuration

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## **Configuration Info**

- Feature is enabled on destination SVI connected to hosts that are supposed to receive the broadcast

interface vlan 12
 vrf attach VRF1
 ip address 10.1.12.1/24
 active-gateway ip mac 12:00:00:00:01:00
 active-gateway ip 10.1.12.1
 ip directed-broadcast

#### Verification command and output

6300-1-VSF# sh ip directed-broadcast				
IPv4 Directed	Broadcast Configuration			
Interface	Status			
vlan12	Enabled			

## Adding ACLs to source connected SVI

- It is possible to apply an inbound ACL on SVI connected to source which sends the broadcast
- Example below shows an ACL used to block directed broadcasts from a specific source to specific destination subnets, but allowed on all other destination subnets

```
access-list ip ipdb-vlan1002
    10 deny udp 102.102.102.2 192.137.1.255 eq 88 count
    20 deny udp 102.102.102.2 192.138.1.255 eq 88 count
    30 deny udp 102.102.102.2 192.139.1.255 eq 88 count
    40 deny udp 102.102.102.2 192.140.1.255 eq 88 count
    50 deny udp 102.102.102.2 192.141.1.255 eg 88 count
    60 deny udp 102.102.102.2 192.142.1.255 eq 88 count
    70 deny udp 102.102.102.2 192.143.1.255 eq 88 count
    80 deny udp 102.102.102.2 192.144.1.255 eq 88 count
    90 permit any any count
interface vlan 1002
   vrf attach VRF1
   ip mtu 9198
   ip address 102.102.102.4/24
   active-gateway ip mac 00:00:5e:00:01:10
   active-gateway ip 102.102.102.1
    apply access-list ip ipdb-vlan1002 routed-in
```

## Best Practices

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### **Best Practices**

- Enable IP Directed Broadcast only on required SVIs
- Ensure all remote VTEPs with the same SVI have it enabled
- In this example: Source SVI and destination SVI are on different VTEPs
  - IP Directed Broadcast is enabled on VTEP2 and VTEP3, SVI 12
  - VTEP2 and VTEP3 will receive broadcast over L3 VNI



IP directed broadcast from 10 to 12 subnet

### **Best Practices**

- Enable IP Directed Broadcast only on required SVIs
- Adding it on additional VTEPs doesn't cause any issues, but it doesn't accomplish anything
- In this example: Source SVI and destination SVI on the same VTEP + remote VTEP (could have the same destination SVI configured)
  - IP Directed Broadcast is enabled on VTEP1, SVI 12
  - VTEP2 and VTEP3 will receive broadcast over L2 VNI



IP directed broadcast from 10 to 12 subnet

# Troubleshooting

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## **IP Directed Broadcast Over VXLAN Troubleshooting**

- Have a topology diagram ready
- Ensure IPs, interface details are included
- Check physical cabling and generate "show tech" when opening a TAC case
- Check network: show LLDP neighbor, ensure directly connected neighbors have connectivity by using ping and traceroute between loopbacks and interfaces, fix any issues found



Recommended troubleshooting flow

## 1. Check VTEPs support IP Directed Broadcast Over VXLAN capability

- Check required software is loaded, e.g. 10.10

## 2. Verify IP Directed Broadcast is configured on correct VTEP and SVI

- Refer to best practices

## 3. Verify source VTEP sees IP Directed Broadcast traffic

- Enable mirror capability and packet capture traffic
- Sample config

```
mirror session 1
destination interface 1/1/46
source interface 1/1/49 both
enable
```

- If source VTEP doesn't see the traffic, the problem should be related to source device sending the broadcasts

## 4. Verify destination VTEP sees IP Directed Broadcast traffic

- Enable mirror capability and packet capture traffic
- Sample config



If destination VTEP doesn't see the traffic, ensure VXLAN tunnels are up and functioning for unicast and other BUM traffic

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## **IP Directed Broadcast Support Over VXLAN Demo**



- Source 10.1.10.15 on 6300-1
- Destination 10.1.12.15 on same VTEP
- Destination 10.1.12.16 on different VTEP
- Show IP directed broadcast from host in subnet 10 to subnet 12

## Resources

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## **Feature/Solution References**

<u>https://datatracker.ietf.org/doc/html/rfc922</u>





a Hewlett Packard Enterprise company