

DHCP Server Does Not Work on a Router That Runs Cisco IOS-XE SD-WAN with DIA

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Introduction

This document describes typical problems that might be expected when centralized data policy for direct internet access (DIA) and DHCP server are configured on service-side VPN of the same router running IOS®-XE SDWAN software. Similar problems might be seen with any other traffic that ingresses to the device from the service side VPN and is intended for router local processing.

Problem

DHCP server does not work on the router with Cisco IOS®-XE SDWAN software. DIA is configured with a centralized data policy as shown here:

```
policy
data-policy _LAN_DIA
  vpn-list LAN
  sequence 1
  match
    destination-data-prefix-list EXCLUDE_SUBNET
  !
  action accept
  set
    local-tloc-list
    color biz-internet lte
    encaps ipsec
  !
  !
  !
  sequence 11
  action accept
  nat use-vpn 0
  !
  !
  default-action accept
!
lists
  data-prefix-list EXCLUDE_SUBNET
  ip-prefix 10.0.0.0/8
  !
  site-list DIA_BRANCHES
  site-id 7
  site-id 6
  !
```

```

vpn-list LAN
  vpn 10
  !
!
!
apply-policy
site-list DIA_BRANCHES
  data-policy _LAN_DIA_EXCLUDE from-service
!
!

```

Solution

In order to make this work, DHCP packets should be excluded from the data policy, since it is clearly seen from packet-trace debugs that packets to broadcast addresses can't be routed (DROP 72 Ipv4RoutingErr) and they are NATed (Action: REDIRECT_NAT) according to the SDWAN policy (Feature: SDWAN Data Policy IN):

```

B2#show platform packet-trace summary
<skipped>
28  V190          V190          DROP  72  (Ipv4RoutingErr)
29  Gi0/1/0       Gi0/0/0       FWD
30  V190          V190          DROP  72  (Ipv4RoutingErr)

```

```

B2#show platform packet-trace packet 28
Packet: 28          CBUG ID: 28
Summary
  Input       : Vlan90
  Output      : Vlan90
  State       : DROP 72  (Ipv4RoutingErr)
Timestamp
  Start      : 14482257476440 ns (12/17/2018 13:56:58.524691 UTC)
  Stop       : 14482257534440 ns (12/17/2018 13:56:58.524749 UTC)

```

```

Path Trace
Feature: IPV4(Input)
  Input       : Vlan90
  Output      : <unknown>
  Source      : 0.0.0.0
  Destination : 255.255.255.255
  Protocol    : 17 (UDP)
  SrcPort     : 68
  DstPort     : 67
Feature: DEBUG_COND_INPUT_PKT
  Entry       : Input - 0x10e44b40
  Input       : Vlan90
  Output      : <unknown>
  Lapsed time : 106 ns
Feature: IPV4_INPUT_DST_LOOKUP_CONSUME
  Entry       : Input - 0x10e5ca94
  Input       : Vlan90
  Output      : <unknown>
  Lapsed time : 253 ns
Feature: IPV4_INPUT_FOR_US_MARTIAN
  Entry       : Input - 0x10e5cb24
  Input       : Vlan90
  Output      : <unknown>
  Lapsed time : 4853 ns
Feature: IPV4_INPUT_FNF_FIRST_EXT
  Entry       : Input - 0x10e48968

```

Input : Vlan90
Output : <unknown>
Lapsed time : 600 ns
Feature: SDWAN Data Policy IN
VRF : 1
Seq : 1
DNS Flags : (0x0) NONE
Policy Flags : 0x10
Action : REDIRECT_NAT
Feature: SDWAN_DATA_POLICY_IN_EXT
Entry : Input - 0x10eb9d7c
Input : Vlan90
Output : <unknown>
Lapsed time : 5360 ns
Feature: IPV4_INPUT_DST_LOOKUP_ISSUE
Entry : Input - 0x10e5c9d8
Input : Vlan90
Output : <unknown>
Lapsed time : 200 ns
Feature: IPV4_INPUT_ARL
Entry : Input - 0x10e46158
Input : Vlan90
Output : <unknown>
Lapsed time : 200 ns
Feature: IPV4_INTERNAL_DST_LOOKUP_CONSUME
Entry : Input - 0x10e5cac4
Input : Vlan90
Output : <unknown>
Lapsed time : 253 ns
Feature: STILE_LEGACY_DROP
Entry : Input - 0x10eb294c
Input : Vlan90
Output : <unknown>
Lapsed time : 306 ns
Feature: INGRESS_MMA_LOOKUP_DROP
Entry : Input - 0x10eae2a4
Input : Vlan90
Output : <unknown>
Lapsed time : 213 ns
Feature: INPUT_DROP_FNF_AOR
Entry : Input - 0x10e5b864
Input : Vlan90
Output : <unknown>
Lapsed time : 386 ns
Feature: INPUT_FNF_DROP
Entry : Input - 0x10e48cf8
Input : Vlan90
Output : <unknown>
Lapsed time : 493 ns
Feature: INPUT_DROP_FNF_AOR_RELEASE
Entry : Input - 0x10e5b234
Input : Vlan90
Output : <unknown>
Lapsed time : 213 ns
Feature: INPUT_DROP
Entry : Input - 0x10e439d4
Input : Vlan90
Output : <unknown>
Lapsed time : 106 ns
Feature: IPV4_INTERNAL_FOR_US
Entry : Input - 0x10e5cb54
Input : Vlan90
Output : <unknown>
Lapsed time : 4640 ns

The data policy is modified to exclude DHCP packets (UDP ports 67,68) from NAT as shown here:

```
B2# show sdwan policy from-vsmart
from-vsmart data-policy _LAN_DIA
direction from-service
vpn-list LAN
sequence 1
match
destination-data-prefix-list EXCLUDE_SUBNET
action accept
set
local-tloc-list
color biz-internet lte
encap ipsec
sequence 11
match
destination-port 67-68
protocol 17
action accept
sequence 21
match
source-port 67-68
protocol 17
action accept
sequence 31
action accept
nat use-vpn 0
no nat fallback
default-action accept
from-vsmart lists vpn-list LAN
vpn 10
from-vsmart lists data-prefix-list EXCLUDE_SUBNET
ip-prefix 10.0.0.0/8
```

Packet-trace debug will show a different picture for DHCP packets and they will be punted to RP CPU for further local processing (State: PUNT 60) as they should be:

```
B2#show platform packet-trace summary
Pkt  Input          Output          State  Reason
<skipped>
88   V190            internal0/0/rp:0 PUNT   60   (IP subnet or broadcast pac
89   INJ.7          Gi0/1/0.MOD0    FWD
90   Gi0/1/0        internal0/0/rp:0 PUNT   60   (IP subnet or broadcast pac
91   INJ.7          Gi0/1/0.MOD0    FWD
92   Gi0/0/0        internal0/0/rp:0 PUNT   60   (IP subnet or broadcast pac
93   Gi0/1/1        Ce0/2/0         FWD
94   Gi0/0/0        internal0/0/rp:0 PUNT   60   (IP subnet or broadcast pac
95   V190            internal0/0/rp:0 PUNT   60   (IP subnet or broadcast pac
96   INJ.7          Gi0/1/0.MOD0    FWD
97   Gi0/1/1        internal0/0/rp:0 PUNT   60   (IP subnet or broadcast pac
98   INJ.7          Gi0/1/0.MOD0    FWD
```

```
B2# show platform packet-trace packet 88
Packet: 88          CBUG ID: 88
Summary
Input       : Vlan90
Output      : internal0/0/rp:0
State       : PUNT 60 (IP subnet or broadcast pac
```

Timestamp

Start : 16485953871600 ns (12/17/2018 14:30:22.221086 UTC)

Stop : 16485953959680 ns (12/17/2018 14:30:22.221174 UTC)

Path Trace

Feature: IPV4(Input)

Input : Vlan90

Output : <unknown>

Source : 0.0.0.0

Destination : 255.255.255.255

Protocol : 17 (UDP)

SrcPort : 68

DstPort : 67

Feature: DEBUG_COND_INPUT_PKT

Entry : Input - 0x10e44b40

Input : Vlan90

Output : <unknown>

Lapsed time : 93 ns

Feature: IPV4_INPUT_DST_LOOKUP_CONSUME

Entry : Input - 0x10e5ca94

Input : Vlan90

Output : <unknown>

Lapsed time : 320 ns

Feature: IPV4_INPUT_FOR_US_MARTIAN

Entry : Input - 0x10e5cb24

Input : Vlan90

Output : <unknown>

Lapsed time : 8053 ns

Feature: IPV4_INPUT_FNF_FIRST_EXT

Entry : Input - 0x10e48968

Input : Vlan90

Output : <unknown>

Lapsed time : 533 ns

Feature: SDWAN Data Policy IN

VRF : 1

Seq : 1

DNS Flags : (0x0) NONE

Policy Flags : 0x0

Action : NONE

Feature: SDWAN_DATA_POLICY_IN_EXT

Entry : Input - 0x10eb9d7c

Input : Vlan90

Output : <unknown>

Lapsed time : 5626 ns

Feature: IPV4_INPUT_LOOKUP_PROCESS_EXT

Entry : Input - 0x10e5cc70

Input : Vlan90

Output : internal0/0/rp:0

Lapsed time : 1600 ns

Feature: IPV4_INPUT_FNF_FINAL_EXT

Entry : Input - 0x10e489c8

Input : Vlan90

Output : internal0/0/rp:0

Lapsed time : 386 ns

Feature: IPV4_INPUT_IPOPTIONS_PROCESS_EXT

Entry : Input - 0x10e5ce10

Input : Vlan90

Output : internal0/0/rp:0

Lapsed time : 186 ns

Feature: IPV4_INPUT_GOTO_OUTPUT_FEATURE_EXT

Entry : Input - 0x10e46278

Input : Vlan90

Output : internal0/0/rp:0

Lapsed time : 493 ns

Feature: CBUG_OUTPUT_FIA_EXT

```
Entry      : Output - 0x10e44c00
Input      : Vlan90
Output     : internal0/0/rp:0
Lapsed time : 560 ns
Feature: IPV4_INTERNAL_ARL_SANITY_EXT
Entry      : Output - 0x10e46128
Input      : Vlan90
Output     : internal0/0/rp:0
Lapsed time : 253 ns
Feature: IPV4_OUTPUT_THREAT_DEFENSE_EXT
Entry      : Output - 0x10eb5cc4
Input      : Vlan90
Output     : internal0/0/rp:0
Lapsed time : 266 ns
Feature: IPV4_VFR_REFRAG_EXT
Entry      : Output - 0x10e5cf10
Input      : Vlan90
Output     : internal0/0/rp:0
Lapsed time : 66 ns
Feature: IPV4_OUTPUT_DROP_POLICY_EXT
Entry      : Output - 0x10e5e900
Input      : Vlan90
Output     : internal0/0/rp:0
Lapsed time : 2586 ns
Feature: DEBUG_COND_OUTPUT_PKT_EXT
Entry      : Output - 0x10e44ba0
Input      : Vlan90
Output     : internal0/0/rp:0
Lapsed time : 133 ns
Feature: INTERNAL_TRANSMIT_PKT_EXT
Entry      : Output - 0x10e45420
Input      : Vlan90
Output     : internal0/0/rp:0
Lapsed time : 5066 ns
```

IOSd Path Flow: Packet: 88 CBUG ID: 88

```
Feature: INFRA
  Pkt Direction: IN
  Packet Rcvd From DATAPLANE
```

```
Feature: IP
  Pkt Direction: IN
  Source      : 0.0.0.0
  Destination : 255.255.255.255
```

```
Feature: IP
  Pkt Direction: IN
  Packet Enqueued in IP layer
  Source      : 0.0.0.0
  Destination : 255.255.255.255
  Interface   : Vlan90
```

```
Feature: UDP
  Pkt Direction: IN
  src          : 0.0.0.0(68)
  dst          : 255.255.255.255(67)
  length       : 308
```

This is expected behaviour and similar problems might be spotted with any other traffic that is intended for a local device route processor (RP) CPU processing (e.g. Network Time Protocol (NTP) synchronization if router acts as an NTP source) if centralized data policy does not exclude particular traffic type appropriately.

Note: For more information about Datapath Packet Trace, refer to: <https://www.cisco.com/c/en/us/support/docs/content-networking/adaptive-session-redundancy-asr/117858-technote-asr-00.html>