

مرحلة DHCP لوكوتورب ىلع لفطتلا مهف

3 ةقبطلا تالقن ربت يتلا

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عمدقمل

نإو ةادأ L3 يأ ربت نوكتي طبرلا امدنع كولسولعافت لفطتي DHCP ل ةقيثواذه فصوي
سأر L3 يف تنمضت نوكتي طبرلا

قيساسلا تابلطتلا

تابلطتلا

ةيلاتلا عيضاوملاب ةفرعم كيذل نوكت نأ Cisco ي صوت

- ليغشتال او نيوكتال رماو في Cisco IOS® XE ناقتا
- Cisco Catalyst 9000 Series لوحمل اينيون و زهجا لىل فرعت
- DHCP لوكوتورب لىل لفطتال تايل او DHCP لوكوتورب تايل لمعل يوق مهف
- ليحرتال ليك و رودو DHCP 82 رايل لىل يروصت مهف
- ساسال هيجوتال لوكوتورب فرعم

عمدختسمال تانوكمال

ةيلالتال ايدامال تانوكمال او جماربال تارادصا لىل دننسمال اذه في ادرالال تامولعملال دننست

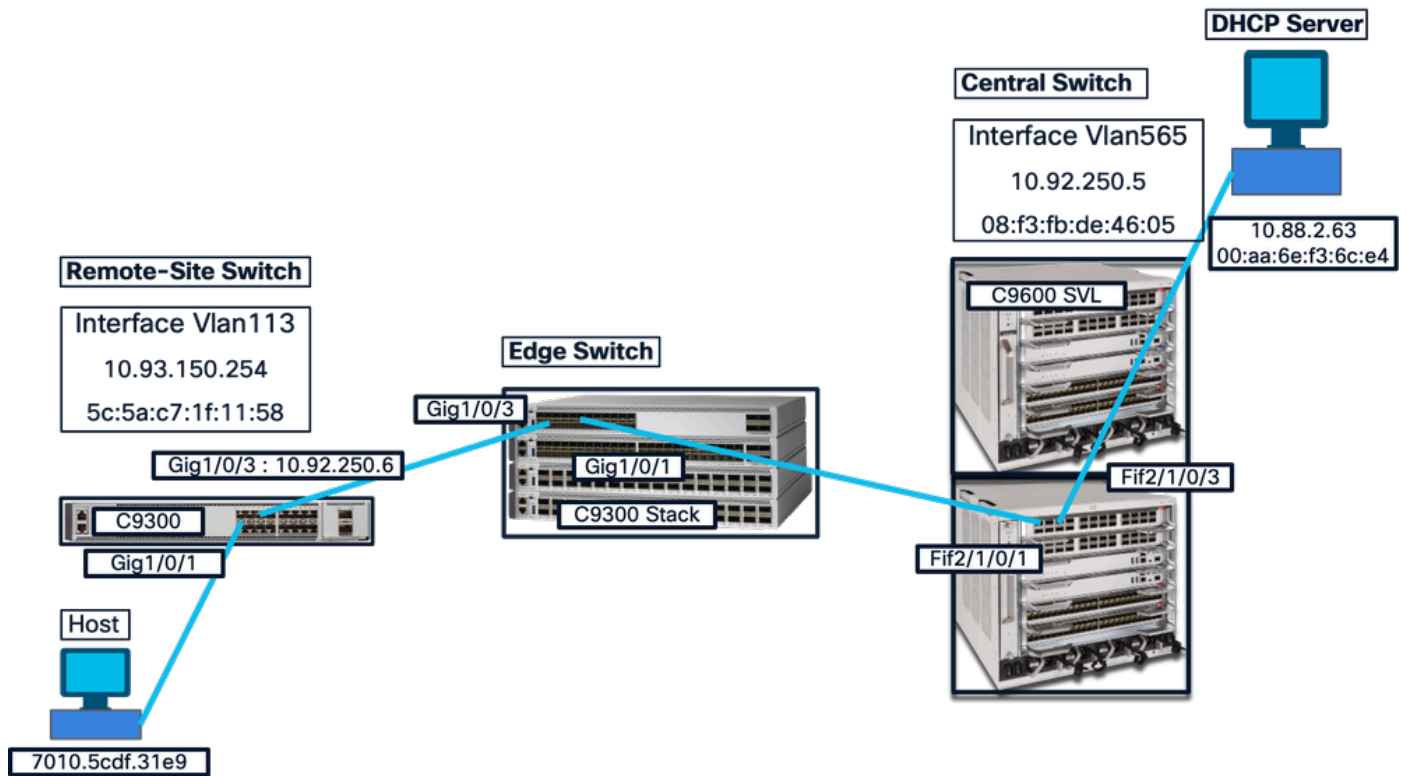
- Cisco Catalyst 9600X Series السلسال : عيزوتال لوحمل/زكرمال
- Cisco Catalyst 9300 Series السلسال : لوصوال حاتفم
- يئاهن فيضم زاهج : DHCP لي مع
- ايزكرمال اكبشال عمدخ دوزم : DHCP م داخ

صاخ ايلمع م ائيبي في ادوجومال زهجال نم دننسمال اذه في ادرالال تامولعملال عاشنإ مت
تناك اذا . (يضارتفا) حوسمم نيوكتب دننسمال اذه في عمدختسمال زهجال عي مع تادب
رما يال لمحتحمل ريثأتلل كمهف نم كأتف ، ليغشتال دي قكتكبش

ةيساسا تامولعم

اهضارتعاو DHCP مزحل DHCP لوكوتورب لىل لفطتال صخف ايفي ك دننسمال اذه صخفي
مزحل تاوومجم لي لحتو ايلمعال نيوكتال اثلثما مادختساب 3. اقبطال اوطخل اهزاي تاجا انثأ
لخاد 3 اقبطال تالقن لىل DHCP لوكوتورب لىل لفطتال ني ل عافتال حضوي ، ايلصال تاذ
Cisco Catalyst 9000 Series اكبش ائيبي

اكبشال لطيطختال مسرلا



ططخملا

لمعلا مدع ويراني س

3، قبطلا ةوطخ في DHCP فاشتكا ةمزح طاقسا هي ف متي يذلا ويراني سلا حرش متي ،الوأ
نوبز DHCP لا نم زفقب زفقي ةلحر طبرلا للح ،نآلا .يزكرملا لوحملا ىلع ةصاخو

ديعبلا عقوملا لوحم ةمزح ةجلاعم

ىلا لصت يتلاو ، DHCP فاشتكا ةمزح MAC 7010.5cdf.31e9 ناو نع بحاص فيضملا لسري
ديعبلا عقوملا لوحم ىلع GigabitEthernet1/0/1 ةهجالا

ديعبلا عقوملا نيوكت

<#root>

!

Remote-Site#show run int vlan 113

Building configuration...

Current configuration : 170 bytes

```
!  
interface Vlan113  
ip address 10.93.150.254 255.255.255.0  
ip helper-address 10.88.2.63  
no ip redirects  
no ip proxy-arp  
end  
!  
!  
!
```

Host Access Port

Remote-Site#show run int gig1/0/1

Building configuration...

Current configuration : 90 bytes

```
!  
interface GigabitEthernet1/0/1  
switchport access vlan 113  
switchport mode access  
end  
!  
!  
!
```

Uplink Port

Remote-Site#show run int gig1/0/3

Building configuration...

Current configuration : 121 bytes

```
!  
interface GigabitEthernet1/0/3  
no switchport  
ip address 10.92.250.6 255.255.255.252  
end  
!  
!
```

Remote-Site#show run | sec dhcp

```
ip dhcp snooping vlan 1-999  
no ip dhcp snooping information option  
ip dhcp snooping
```

!
!

Remote-Site#show cdp neighbors

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
D - Remote, C - CVTA, M - Two-port Mac Relay

Device ID	Local Intrfce	Holdtme	Capability	Platform	Port ID
Edge-Switch	Gig 1/0/3	153	R S I	C9300-48H	Gig 1/0/3
					!
					!

Remote-Site#show ip eigrp neighbors

EIGRP-IPv4 Neighbors for AS(100)
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0 10.92.250.5 Gi1/0/3 14 00:04:40 1 100 0 20
!
!

Remote-Site#show ip route 10.88.2.63

Routing entry for 10.88.2.0/24
Known via "eigrp 100", distance 90, metric 3072, precedence routine (0), type internal
Redistributing via eigrp 100
Last update from 10.92.250.5 on GigabitEthernet1/0/3, 00:05:15 ago
Routing Descriptor Blocks:
* 10.92.250.5, from 10.92.250.5, 00:05:15 ago, via GigabitEthernet1/0/3
Route metric is 3072, traffic share count is 1
Total delay is 20 microseconds, minimum bandwidth is 1000000 Kbit
Reliability 255/255, minimum MTU 1500 bytes
Loading 1/255, Hops 1
!
!

دي عرب ال ع قوم ال ل و ح م ل خ دم

دي عرب ال ع قوم ال ل و ح م ل خ د ت ي ت ال Broadcast DHCP فاش ت ك ا ة م ز ح

<#root>

!
!

Remote-Site#show monitor capture tac parameter

```
monitor capture tac control-plane BOTH
monitor capture tac interface GigabitEthernet1/0/1 BOTH
monitor capture tac match any
monitor capture tac file location flash:pcport.pcap
!
```

Remote-Site#show monitor capture file flash:pcport.pcap packet-number 667 detailed

Starting the packet display Press Ctrl + Shift + 6 to exit

Frame 667: 345 bytes on wire (2760 bits), 345 bytes captured (2760 bits) on interface 0

~
~

[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:udp:bootp]

Ethernet II, Src: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9), Dst: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)

Destination: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
Address: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
.... ..1. = LG bit: Locally administered address (this is NOT the factory default)
.... ..1 = IG bit: Group address (multicast/broadcast)
Source: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)
Address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)
.... ..0. = LG bit: Globally unique address (factory default)
.... ..0 = IG bit: Individual address (unicast)
Type: IPv4 (0x0800)

Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255

0100 = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
0000 00.. = Differentiated Services Codepoint: Default (0)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 331
Identification: 0x0405 (1029)
Flags: 0x0000
0... = Reserved bit: Not set
.0.. = Don't fragment: Not set
..0. = More fragments: Not set
...0 0000 0000 0000 = Fragment offset: 0
Time to live: 255

Protocol: UDP (17)

Header checksum: 0xb69d [validation disabled]
[Header checksum status: Unverified]
Source: 0.0.0.0
Destination: 255.255.255.255
User Datagram Protocol, Src Port: 68, Dst Port: 67

Source Port: 68
Destination Port: 67
Length: 311
Checksum: 0x33de [unverified]
[Checksum Status: Unverified]
[Stream index: 3]
Bootstrap Protocol (Discover)
Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 0
Transaction ID: 0x000026ee
Seconds elapsed: 0
Bootp flags: 0x8000, Broadcast flag (Broadcast)
1... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0
Your (client) IP address: 0.0.0.0
Next server IP address: 0.0.0.0
Relay agent IP address: 0.0.0.0

Client MAC address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)

Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP

Option: (53) DHCP Message Type (Discover)

Length: 1
DHCP: Discover (1)
Option: (57) Maximum DHCP Message Size
Length: 2
Maximum DHCP Message Size: 1200
Option: (61) Client identifier
Length: 29
Type: 0
Client Identifier: cisco-7010.5cdf.31e9-Gi2/0/7
Option: (12) Host Name
Length: 2
Host Name: PC
Option: (55) Parameter Request List
Length: 8
Parameter Request List Item: (1) Subnet Mask
Parameter Request List Item: (6) Domain Name Server
Parameter Request List Item: (15) Domain Name
Parameter Request List Item: (44) NetBIOS over TCP/IP Name Server
Parameter Request List Item: (3) Router
Parameter Request List Item: (33) Static Route
Parameter Request List Item: (150) TFTP Server Address
Parameter Request List Item: (43) Vendor-Specific Information
Option: (60) Vendor class identifier
Length: 8
Vendor class identifier: ciscopnp
Option: (255) End
Option End: 255
!

!

دي عبالا عقوم لل لوحم لا جرم

حاحات فم ةفاح لا حاحات فم عقوم نم جرخي طبر فشتك ل unicast DHCP

<#root>

!

!

Remote-Site#show monitor capture tac1 parameter

```
monitor capture tac1 control-plane BOTH
monitor capture tac1 interface GigabitEthernet1/0/3 BOTH
monitor capture tac1 match any
monitor capture tac1 file location flash:remote_edge.pcap
!
```

Remote-Site#show monitor capture file flash:pcport.pcap packet-number 669 detailed

Starting the packet display Press Ctrl + Shift + 6 to exit

```
Frame 669: 345 bytes on wire (2760 bits), 345 bytes captured (2760 bits) on interface 0
~
~
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:udp:bootp]
```

Ethernet II, Src: 5c:5a:c7:1f:11:58 (5c:5a:c7:1f:11:58), Dst: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)

```
Destination: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)
Address: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)
.... ..0. .... = LG bit: Globally unique address (factory default)
.... ...0 .... = IG bit: Individual address (unicast)
Source: 5c:5a:c7:1f:11:58 (5c:5a:c7:1f:11:58)
Address: 5c:5a:c7:1f:11:58 (5c:5a:c7:1f:11:58)
.... ..0. .... = LG bit: Globally unique address (factory default)
.... ...0 .... = IG bit: Individual address (unicast)
Type: IPv4 (0x0800)
```

Internet Protocol Version 4, Src: 10.93.150.254, Dst: 10.88.2.63

```
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
0000 00.. = Differentiated Services Codepoint: Default (0)
```


.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 331
Identification: 0x001c (28)
Flags: 0x0000
0... .. = Reserved bit: Not set
.0.. .. = Don't fragment: Not set
..0. = More fragments: Not set
...0 0000 0000 0000 = Fragment offset: 0
Time to live: 255
Protocol: UDP (17)
Header checksum: 0x0c94 [validation disabled]
[Header checksum status: Unverified]
Source: 10.93.150.254
Destination: 10.88.2.63
User Datagram Protocol, Src Port: 67, Dst Port: 67
Source Port: 67
Destination Port: 67
Length: 311
Checksum: 0xe48f [unverified]
[Checksum Status: Unverified]
[Stream index: 4]
Bootstrap Protocol (Discover)
Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 1
Transaction ID: 0x000026ee
Seconds elapsed: 0
Bootp flags: 0x8000, Broadcast flag (Broadcast)
1... .. = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0
Your (client) IP address: 0.0.0.0
Next server IP address: 0.0.0.0

Relay agent IP address: 10.93.150.254

Client MAC address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP

Option: (53) DHCP Message Type (Discover)

Length: 1
DHCP: Discover (1)
Option: (57) Maximum DHCP Message Size
Length: 2
Maximum DHCP Message Size: 1200
Option: (61) Client identifier
Length: 29
Type: 0
Client Identifier: cisco-7010.5cdf.31e9-Gi2/0/7
Option: (12) Host Name
Length: 2
Host Name: PC
Option: (55) Parameter Request List

```
Length: 8
Parameter Request List Item: (1) Subnet Mask
Parameter Request List Item: (6) Domain Name Server
Parameter Request List Item: (15) Domain Name
Parameter Request List Item: (44) NetBIOS over TCP/IP Name Server
Parameter Request List Item: (3) Router
Parameter Request List Item: (33) Static Route
Parameter Request List Item: (150) TFTP Server Address
Parameter Request List Item: (43) Vendor-Specific Information
Option: (60) Vendor class identifier
Length: 8
Vendor class identifier: ciscopnp
Option: (255) End
Option End: 255
!
```

 ال اهنكلو 'Relay agent IP address:10.93.150.254' ىلع يوتحت يتال ةمزال: ةطالما
'no ip dhcp snooping information option' نيوكتال ببسب 82 DHCP راىخ ىلع يوتحت
DHCP. مسق نم عىجك

Edge لوحم ةمزالع

طقف همادختسا متي L2 لوحم وه Edge لوحم نإف، قلق ردصم وه DHCP قفدتل ةبسنلاب
ىلع دمتعي وه. هنمو ديعبالا عقوملا تالوحمو ويسيسئرلا/يزكرملا لوحملا ىلع مزال عيزوتل
DHCP. مز عىج

Edge لوحم نيوكت

<#root>

```
!
```

```
!
```

```
Edge-Switch#show run int gig1/0/3
```

```
Building configuration...
```

```
Current configuration : 152 bytes
```

```
!
```

```
interface GigabitEthernet1/0/3
```

```
switchport access vlan 565
```

```
ip flow monitor IPv4_NETFLOW input
```

```
ip dhcp snooping trust
```

```
end
```

```
!
```

```
!
```

Edge-Switch#show run int gig1/0/1

Building configuration...

Current configuration : 119 bytes

```
!  
interface GigabitEthernet1/0/1  
switchport trunk native vlan 999  
switchport mode trunk  
ip dhcp snooping trust  
end  
!  
!
```

Edge-Switch#show run | sec dhcp

```
ip dhcp snooping vlan 1-4094  
no ip dhcp snooping information option  
ip dhcp snooping  
!  
!
```

Edge-Switch#show cdp neighbors

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
D - Remote, C - CVTA, M - Two-port Mac Relay

Device ID	Local Intrfce	Holdtme	Capability	Platform	Port ID
Remote-Site	Gig 1/0/3	153	R S I	C9300L-48	Gig 1/0/3
Central-Switch	Gig 1/0/1	170	R S I	C9606R	Fif 2/1/0/1
					!
					!

Edge لوحه لخدم

يہ امك Edge لوحه بديع بل عقوم لوحه نم مزحل فاشتك ازيه لصتت

Edge Switch لوحه لخدم

عوطخ الى لقتني وه نا ام بريغت نود حات فم لخدم وه، عمزحلل عوطخ 2 عوطط اذه نا ام ب
في ظحال لي دعيت يا نود يزكرم لوحه الى عمزحلل هيجوت اداع اب Edge لوحه موقوي. يلات
عمزحلل

يزكرم لوحه لخدم لخدم Edge Switch لوحه لخدم

<#root>

!
!

Edge-Switch#show monitor capture tac parameters

```
monitor capture tac control-plane BOTH
monitor capture tac interface GigabitEthernet1/0/1 BOTH
monitor capture tac match any
monitor capture tac file location flash:edge_central.pcap
!
```

Edge-Switch#show monitor capture file flash:edge_central.pcap packet-number 25597 detail

Starting the packet display Press Ctrl + Shift + 6 to exit

Frame 25597: 345 bytes on wire (2760 bits), 345 bytes captured (2760 bits) on interface /tmp/epc_ws/wif.

```
~
~
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:udp:dhcp]
```

Ethernet II, Src: 5c:5a:c7:1f:11:58 (5c:5a:c7:1f:11:58), Dst: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)

```
Destination: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)
Address: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)
.... ..0. .... = LG bit: Globally unique address (factory default)
          .... ..0 .... = IG bit: Individual address (unicast)
Source: 5c:5a:c7:1f:11:58 (5c:5a:c7:1f:11:58)
Address: 5c:5a:c7:1f:11:58 (5c:5a:c7:1f:11:58)
.... ..0. .... = LG bit: Globally unique address (factory default)
          .... ..0 .... = IG bit: Individual address (unicast)
Type: IPv4 (0x0800)
```

Internet Protocol Version 4, Src: 10.93.150.254, Dst: 10.88.2.63

```
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
0000 00.. = Differentiated Services Codepoint: Default (0)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 331
Identification: 0x001c (28)
Flags: 0x0000
0... .... = Reserved bit: Not set
.0.. .... = Don't fragment: Not set
..0. .... = More fragments: Not set
Fragment offset: 0
Time to live: 255
```

Protocol: UDP (17)

Header checksum: 0x0c94 [validation disabled]
[Header checksum status: Unverified]
Source: 10.93.150.254
Destination: 10.88.2.63
User Datagram Protocol, Src Port: 67, Dst Port: 67
Source Port: 67
Destination Port: 67
Length: 311
Checksum: 0xe48f [unverified]
[Checksum Status: Unverified]
[Stream index: 5]
[Timestamps]
[Time since first frame: 0.000000000 seconds]
[Time since previous frame: 0.000000000 seconds]

Dynamic Host Configuration Protocol (Discover)

Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 1
Transaction ID: 0x000026ee
Seconds elapsed: 0
Bootp flags: 0x8000, Broadcast flag (Broadcast)
1... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0
Your (client) IP address: 0.0.0.0
Next server IP address: 0.0.0.0

Relay agent IP address: 10.93.150.254

Client MAC address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
Option: (53) DHCP Message Type (Discover)
Length: 1
DHCP: Discover (1)
Option: (57) Maximum DHCP Message Size
Length: 2
Maximum DHCP Message Size: 1200
Option: (61) Client identifier
Length: 29
Type: 0
Client Identifier: cisco-7010.5cdf.31e9-Gi2/0/7
Option: (12) Host Name
Length: 2
Host Name: PC
Option: (55) Parameter Request List
Length: 8
Parameter Request List Item: (1) Subnet Mask
Parameter Request List Item: (6) Domain Name Server
Parameter Request List Item: (15) Domain Name
Parameter Request List Item: (44) NetBIOS over TCP/IP Name Server
Parameter Request List Item: (3) Router

```
Parameter Request List Item: (33) Static Route
Parameter Request List Item: (150) TFTP Server Address
Parameter Request List Item: (43) Vendor-Specific Information
Option: (60) Vendor class identifier
Length: 8
Vendor class identifier: ciscopnp
Option: (255) End
Option End: 255
!
!
```

يزك رمل لوح ملة مزح ةجل اع م

يزك رمل لوح ملة ني وكت

<#root>

!
!

Central-Switch#show cdp neighbors

Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone,
D - Remote, C - CVTA, M - Two-port Mac Relay

Device ID	Local Intrfce	Holdtme	Capability	Platform	Port ID
Edge-Switch	Fif 2/1/0/1	177	R S I	C9300-48H	Gig 1/0/1
					!
					!

Central-Switch#show run int fif2/1/0/1

Building configuration...

```
Current configuration : 115 bytes
!
interface FiftyGigE2/1/0/1
switchport trunk native vlan 999
switchport mode trunk
end
!
!
```

Central-Switch#show run int fif2/1/0/3

Building configuration...

```
Current configuration : 87 bytes
!
interface FiftyGigE2/1/0/3
no switchport
ip address 10.88.2.254 255.255.255.0
end
!
```

```
interface Vlan565
```

```
ip address 10.92.250.5 255.255.255.252
!
```

```
Central-Switch#show run | sec dhcp
```

```
ip dhcp snooping vlan 1-4094
no ip dhcp snooping information option
ip dhcp snooping
!
```

```
Central-Switch#show ip eigrp neighbors
```

```
EIGRP-IPv4 Neighbors for AS(100)
H Address Interface Hold Uptime SRTT RTO Q Seq
(sec) (ms) Cnt Num
0
```

```
10.92.250.6
```

```
V1565 11 00:10:32 3 100 0 19
~
~
!
```

```
router eigrp 100
```

```
network 10.0.0.0
network 10.88.0.0 0.0.255.255
passive-interface default
no passive-interface Vlan565
eigrp router-id 10.255.255.254
!
```

يترك رمل لوحه المخدم

يتركز الولوج لادخا ةمزع هه Edge لوجم جرحم ةمزع ناف ،اقباس انركذ امكو

لجسلا اذه ةظحال ممتيس ، fif 2/1/0/1 ةهجاوالا ىل ةمزالا لصت امدنع

%DHCP_SNOOPING-5-DHCP_SNOOPING_NONZERO_GIADDR: DHCP_SNOOPING drop message with non-zero giaddr or option

DHCP لوكونورب ىل لفطتلل هب قووم ريغ ذفنمك FIF 2/1/0/1 ةهجاوالا نيوكت مت

ممي ةمزالا نأ نم مغرلا ىل .ءانيم اذه لالخنم لخدي طبر فشتك DHCP لسري 3 ةقبط
ىل اءصحي لازي ال DHCP لوكونورب ىل لفطتلل ناف ، 3 ةقبطلا ي ف اءفيلغت واهالاسرا
ءراعلل IP ناوع ىل يوتحت ةمزالا نأ هب قووم ريغ ذفنملا اذه نأل ارطن . 2 ةقبطلا ذفنم
ىل ةمزالا طاقساب DHCP لوكونورب ىل لفطتلل موقيس ، 82 رايلال نود (ليحرت ليكو)
ممي صتل لالخنم و عقوم كولسل اذه . هب قووملا ريغ ذفنملا اذه



ي ف طوقسل فشتك DHCP لوكونورب نأ يري ، تالالال نم ديدعلا ي ف : ةظحال
DHCP لوكونورب ىل لفطتلل ببسب لقنلا

جرحم يزكرم لدبم

DHCP ي لكانه نوكي نلو DHCP فاشتك ةمزالا Central-Switch طقسيس ، ةلالا هه ي
ةهجاوالا نم ةفاضل MAC 70:10:5c:df:31:e9 ناوع عم فيضملا ةطساوب أدبي Discover Packet
FIF 2/1/0/3.

ةلكشملا لحن فيك

نوبز DHCP ل نم ىلوالا ةوطخلا ىل نكمي 82 رايلال ىلتي . 1
ديعلال لوجملا ىل ip dhcp snooping information option رمالا نيوكتب مق ، يلالا لاثملا ي

DHCP ليمع نم DHCP راسم ربع DHCP لوكونورب ىل لفطتلل ي ف ةقتل نيكم تبجي . 2
DHCP مداخ ىل

لوجملا نم fif2/1/0/1 ةهجاوالا ىل ip dhcp snooping trust رمالا نيوكتب مق ، يلالا لاثملا ي
يتركز

Central-Switch#show run int fif2/1/0/1

Building configuration...

Current configuration : 115 bytes

!

interface FiftyGigE2/1/0/1

switchport trunk native vlan 999

switchport mode trunk

ip dhcp snooping trust

end

DHCP. مداخل إلى مركز المرحل نم جورخال فاشتكاة مزح أدبتس، تاريخي غتال هذه دعب

<#root>

Frame 9: 345 bytes on wire (2760 bits), 345 bytes captured (2760 bits) on interface 0

~

~

[Frame is marked: False]

[Frame is ignored: False]

[Protocols in frame: eth:ethertype:ip:udp:dhcp]

Ethernet II, Src: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05), Dst: 00:aa:6e:f3:6c:e4 (00:aa:6e:f3:6c:e4)

Destination: 00:aa:6e:f3:6c:e4 (00:aa:6e:f3:6c:e4)

Address: 00:aa:6e:f3:6c:e4 (00:aa:6e:f3:6c:e4)

.... ..0. = LG bit: Globally unique address (factory default)

.... ...0 = IG bit: Individual address (unicast)

Source: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)

Address: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)

.... ..0. = LG bit: Globally unique address (factory default)

.... ...0 = IG bit: Individual address (unicast)

Type: IPv4 (0x0800)

Internet Protocol Version 4, Src: 10.93.150.254, Dst: 10.88.2.63

0100 = Version: 4

.... 0101 = Header Length: 20 bytes (5)

Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

0000 00.. = Differentiated Services Codepoint: Default (0)

.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)

Total Length: 331

Identification: 0x02ff (767)

Flags: 0x0000

0... = Reserved bit: Not set

.0.. = Don't fragment: Not set
..0. = More fragments: Not set
...0 0000 0000 0000 = Fragment offset: 0
Time to live: 254
Protocol: UDP (17)
Header checksum: 0x0ab1 [validation disabled]
[Header checksum status: Unverified]
Source: 10.93.150.254
Destination: 10.88.2.63
User Datagram Protocol, Src Port: 67, Dst Port: 67
Source Port: 67
Destination Port: 67
Length: 311
Checksum: 0x061b [unverified]
[Checksum Status: Unverified]
[Stream index: 0]
[Timestamps]
[Time since first frame: 0.000000000 seconds]
[Time since previous frame: 0.000000000 seconds]

Dynamic Host Configuration Protocol (Discover)

Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 1
Transaction ID: 0x00000563
Seconds elapsed: 0
Bootp flags: 0x8000, Broadcast flag (Broadcast)
1... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0
Your (client) IP address: 0.0.0.0
Next server IP address: 0.0.0.0
Relay agent IP address: 10.93.150.254

Client MAC address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)

Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
Option: (53) DHCP Message Type (Discover)
Length: 1
DHCP: Discover (1)
Option: (57) Maximum DHCP Message Size
Length: 2
Maximum DHCP Message Size: 1200
Option: (61) Client identifier
Length: 29
Type: 0
Client Identifier: cisco-7010.5cdf.31e9-Gi2/0/7
Option: (12) Host Name
Length: 2
Host Name: PC
Option: (55) Parameter Request List
Length: 8
Parameter Request List Item: (1) Subnet Mask

```

        Parameter Request List Item: (6) Domain Name Server
        Parameter Request List Item: (15) Domain Name
Parameter Request List Item: (44) NetBIOS over TCP/IP Name Server
        Parameter Request List Item: (3) Router
        Parameter Request List Item: (33) Static Route
        Parameter Request List Item: (150) TFTP Server Address
Parameter Request List Item: (43) Vendor-Specific Information
        Option: (60) Vendor class identifier
                                Length: 8
        Vendor class identifier: ciscopnp
                                Option: (255) End
                                Option End: 255

```

DHCP. DHCP ضرع ىلع DHCP مداخل دريسو DHCP مداخل فاشتكالال غلبيس

DHCP: ضرع ةمزنح

<#root>

Frame 128: 353 bytes on wire (2824 bits), 353 bytes captured (2824 bits) on interface 0

```

~
~
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:udp:bootp]

```

Ethernet II, Src: 00:aa:6e:f3:6c:e4 (00:aa:6e:f3:6c:e4), Dst: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)

```

        Destination: 08:f3:fb:de:46:05 (08:f3:fb:de:46:05)
        Address: 08:f3:fb:de:46:05 (5c:5a:c7:1f:11:58)
.... ..0. .... = LG bit: Globally unique address (factory default)
        .... ..0 .... = IG bit: Individual address (unicast)
        Source: 00:aa:6e:f3:6c:e4 (00:aa:6e:f3:6c:e4)
        Address: 00:aa:6e:f3:6c:e4 (00:aa:6e:f3:6c:e4)
.... ..0. .... = LG bit: Globally unique address (factory default)
        .... ..0 .... = IG bit: Individual address (unicast)
        Type: IPv4 (0x0800)

```

Internet Protocol Version 4, Src: 10.88.2.63, Dst: 10.93.150.254

```

        0100 .... = Version: 4
        .... 0101 = Header Length: 20 bytes (5)
        Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
        Total Length: 339
        Identification: 0x0006 (6)

```

Flags: 0x0000
0... .. = Reserved bit: Not set
.0... .. = Don't fragment: Not set
..0. = More fragments: Not set
...0 0000 0000 0000 = Fragment offset: 0
Time to live: 252
Protocol: UDP (17)
Header checksum: 0x0fa2 [validation disabled]
[Header checksum status: Unverified]
Source: 10.88.2.63
Destination: 10.93.150.254
User Datagram Protocol, Src Port: 67, Dst Port: 67
Source Port: 67
Destination Port: 67
Length: 319
Checksum: 0x9c4c [unverified]
[Checksum Status: Unverified]
[Stream index: 2]
Bootstrap Protocol (Offer)
Message type: Boot Reply (2)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 0
Transaction ID: 0x00000563
Seconds elapsed: 0
Bootp flags: 0x8000, Broadcast flag (Broadcast)
1... .. = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0

Your (client) IP address: 10.93.150.11

Next server IP address: 0.0.0.0

Relay agent IP address: 10.93.150.254

Client MAC address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)

Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP

Option: (53) DHCP Message Type (Offer)

Length: 1
DHCP: Offer (2)
Option: (61) Client identifier
Length: 29
Type: 0
Client Identifier: cisco-7010.5cdf.31e9-Gi2/0/7
Option: (54) DHCP Server Identifier
Length: 4

DHCP Server Identifier: 10.88.2.63

```
Option: (51) IP Address Lease Time
Length: 4
IP Address Lease Time: (73119s) 20 hours, 18 minutes, 39 seconds
Option: (58) Renewal Time Value
Length: 4
Renewal Time Value: (36559s) 10 hours, 9 minutes, 19 seconds
Option: (59) Rebinding Time Value
Length: 4
Rebinding Time Value: (63973s) 17 hours, 46 minutes, 13 seconds
Option: (1) Subnet Mask
Length: 4
Subnet Mask: 255.255.255.0
Option: (6) Domain Name Server
Length: 4
Domain Name Server: 8.8.8.8
Option: (255) End
Option End: 255
```

ةصاخلا fif2/1/0/3 ةهجاو DHCP مداخ ةطساوب اهيلع درلا متي يتي لضرعلا ةمزح برضت فوس
Core/Central Switch لوجملاب

<#root>

Central-Switch#show run int fif2/1/0/3

```
Building configuration...

Current configuration : 87 bytes
!
interface FiftyGigE2/1/0/3
no switchport
ip address 10.88.2.254 255.255.255.0
end
```

ال اذامل مٲ ،هلإخاإ مٲ تي ضرعلاو DHCP لوكوتورب ىلع لفطتلل ةياهن نم ةقت دجوت ال انه
؟هب قوٲوم ريغ ذفنم ىلع ضرعلا طاقسإ مٲ تي

ففينصت مٲ تي ، DHCP لوكوتورب ىلع لفطتلل نيكمٲ اهيف مٲ تي ةكبش يف ،فرعت امك
.اهب قوٲوم ريغ وأ اهب قوٲوم اما اهنأ ىلع ذفانملا

لئاسر ةفاك .اهب قوٲوم ىرخأ تالوحم وأ ةيعرشلل DHCP مداوخب اهب قوٲوملا ذفانملا لصتت
.اهب حومسم DHCP
اهديقت مٲ تي .(عالملعلا) يئاهنلل مدختسملا ةزهجأب ةداع اهب قوٲوملا ريغ ذفانملا لصتت

"يلايخ دل DHCP مداخل" وأ DHCP لوكوتورب لاحتنا" تامجه عنمل
ردصم نوكي نأ بجي، نامأل دعاوقل اقفو. 'server-side' لئاسر DHCP ACK و DHCP مزح ربتعت
طقف يعرش مداخل نم لئاسرلا هذه

يلع DHCP ضرع ثلاثل يوتسملا نم لوحم/هجوم ي وأ DHCP ليحرت ليكو ملتسي امندن
هنا يلع اذه DHCP يلع لفطتل ةيلآ فرعت، هب قوثوم ريغ هنا يلع هنيوكت مت L2 ذفنم
ةدمتعمل ريغ IP نيوانع ريفوت لواحي عداخم DHCP مداخل نأ ضررتفي وه. نامأ كاهتنا
ةكبشل يلع عالمعلل

ةقثلا ةلاح ناف، (ليحرتل ليكو يلا اصيصخ ةهجوم) Unicast يه ةمزلال نأ نم مغرلا يلع
يوتسم يلع نامأل نم ققحتلا عارجا متي. ةيولوالا اهل نوكت يقطنملا وأ يداملا ذفنم لل
ال ما يداخال ثبل وأ اهثب متي ةمزلال تناك اذا امع رظنل اضغب ذفنملا
تانايب نم ةكبشل ةيامل DHCP ضرع رطحب ماظنل موقيس، هب قوثوم ريغ ذفنملا نأل
هب حرصم ريغ ردصم نم ةدراول ةحيحص ريغ وأ ةراض نوكت نأ لمحتحي يتل نيوكتلا

دعاوق ظحالي ال هناف، ةهجوم ةهناو هنأل ارظن. 3 ةقبطلا ي ف (ةهجوم ةهناو) L3 ذفنم لمعي
تالوحملا ذفانم يلع قبطنت يتل DHCP L2 لوكوتورب يلع لفطتل ي ف ةقثلا مدع/ةقثلا
يداخال ثبل بلط لسري و اذه (L3 زاهج) ليحرتل ليكو ضررتعي. ثب بلط عالمعل دحأ لسري
DHCP مداخل يلا

ليحرتل ليملعب صاخلا IP ناوانع يلا ىرخأ ةرم يداخال ثبل DHCP ضرع DHCP مداخل لسري
(ةرابعل وأ ةرابعلل IP ناوانع يلا اديحت)

ةمزلال راسم ي ف L3 ةوطخ ي يلع وأ ليحرتل ليكو نم L3 ذفنملا يلا ةمزلال لصت امندن
ةيعرش هيجوت رورم ةكرح ةمزلال زاهجلا لبق ي

بناج' لئاسر نع لوحمل شحب ي شيح، (هب قوثوم ريغ L2 ذفنم) قباسلا ويرانيسلال فالخب
ةيعرش L3 ةوطخ وأ ةدوصقم ةهجوكت L3 ذفنم لمعي، ليملعل هجاوي ذفنم نم ةدراول 'مداخل'
مداخل ةباجتسال

نأل، ادبأ DHCP ليحرت ةيلآ لمعت نل ف، يداخال ثبل DHCP ضرع L3 ذفانم تطقسأ اذا
ليحرتل ليكوب ىرخأ ةرم لاصتالا يلع ارداق نوكي نل مداخل

ليملعل يلا لصت يتح ضرعل ةمزح زايحتجا متي، اريخأو

DHCP. بلط يلع ليملعل/لفيضملا دريس

<#root>

Frame 20: 363 bytes on wire (2904 bits), 363 bytes captured (2904 bits) on interface 0

~
~

[Frame is marked: False]

[Frame is ignored: False]

[Protocols in frame: eth:ethertype:ip:udp:bootp]

Ethernet II, Src: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9), Dst: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)

Destination: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
Address: ff:ff:ff:ff:ff:ff (ff:ff:ff:ff:ff:ff)
.... ..1. = LG bit: Locally administered address (this is NOT the factory default)
 1 = IG bit: Group address (multicast/broadcast)
 Source: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)
 Address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)
.... ..0. = LG bit: Globally unique address (factory default)
 0 = IG bit: Individual address (unicast)
 Type: IPv4 (0x0800)

Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255

0100 = Version: 4
 0101 = Header Length: 20 bytes (5)
Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
 0000 00.. = Differentiated Services Codepoint: Default (0)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
 Total Length: 349
 Identification: 0x3be5 (15333)
 Flags: 0x0000
 0... = Reserved bit: Not set
 .0.. = Don't fragment: Not set
 ..0. = More fragments: Not set
 ...0 0000 0000 0000 = Fragment offset: 0
 Time to live: 255
 Protocol: UDP (17)
Header checksum: 0x7eab [validation disabled]
 [Header checksum status: Unverified]
 Source: 0.0.0.0
 Destination: 255.255.255.255
User Datagram Protocol, Src Port: 68, Dst Port: 67
 Source Port: 68
 Destination Port: 67
 Length: 329
 Checksum: 0xed98 [unverified]
 [Checksum Status: Unverified]
 [Stream index: 1]
 Bootstrap Protocol (Request)

Message type: Boot Request (1)

Hardware type: Ethernet (0x01)
 Hardware address length: 6
 Hops: 0
 Transaction ID: 0x00000563
 Seconds elapsed: 0
Bootp flags: 0x8000, Broadcast flag (Broadcast)
1... = Broadcast flag: Broadcast
 .000 0000 0000 0000 = Reserved flags: 0x0000
 Client IP address: 0.0.0.0
 Your (client) IP address: 0.0.0.0
 Next server IP address: 0.0.0.0
 Relay agent IP address: 0.0.0.0

Client MAC address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)

Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP

Option: (53) DHCP Message Type (Request)

Length: 1
DHCP: Request (3)
Option: (57) Maximum DHCP Message Size
Length: 2
Maximum DHCP Message Size: 1200
Option: (61) Client identifier
Length: 29
Type: 0
Client Identifier: cisco-7010.5cdf.31e9-Gi2/0/7
Option: (54) DHCP Server Identifier
Length: 4

DHCP Server Identifier: 10.88.2.63

Option: (50) Requested IP Address
Length: 4

Requested IP Address: 10.93.150.11

Option: (51) IP Address Lease Time
Length: 4
IP Address Lease Time: (73119s) 20 hours, 18 minutes, 39 seconds
Option: (12) Host Name
Length: 2
Host Name: PC
Option: (55) Parameter Request List
Length: 8
Parameter Request List Item: (1) Subnet Mask
Parameter Request List Item: (6) Domain Name Server
Parameter Request List Item: (15) Domain Name
Parameter Request List Item: (44) NetBIOS over TCP/IP Name Server
Parameter Request List Item: (3) Router
Parameter Request List Item: (33) Static Route
Parameter Request List Item: (150) TFTP Server Address
Parameter Request List Item: (43) Vendor-Specific Information
Option: (60) Vendor class identifier
Length: 8
Vendor class identifier: ciscopnp
Option: (255) End
Option End: 255

IP. ناو ن ي ع ت با و ح ت س اب ا ر ي خ ا DHCP م دا خ م و ق ي س

<#root>

Hardware address length: 6
Hops: 0
Transaction ID: 0x00000563
Seconds elapsed: 0
Bootp flags: 0x8000, Broadcast flag (Broadcast)
1... .. = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0

Your (client) IP address: 10.93.150.11

Next server IP address: 0.0.0.0

Relay agent IP address: 10.93.150.254

Client MAC address: 70:10:5c:df:31:e9 (70:10:5c:df:31:e9)

Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP

Option: (53) DHCP Message Type (ACK)

Length: 1
DHCP: ACK (5)
Option: (61) Client identifier
Length: 29
Type: 0
Client Identifier: cisco-7010.5cdf.31e9-Gi2/0/7
Option: (54) DHCP Server Identifier
Length: 4

DHCP Server Identifier: 10.88.2.63

Option: (51) IP Address Lease Time
Length: 4
IP Address Lease Time: (86400s) 1 day
Option: (58) Renewal Time Value
Length: 4
Renewal Time Value: (43200s) 12 hours
Option: (59) Rebinding Time Value
Length: 4
Rebinding Time Value: (75600s) 21 hours
Option: (1) Subnet Mask
Length: 4
Subnet Mask: 255.255.255.0
Option: (6) Domain Name Server
Length: 4
Domain Name Server: 8.8.8.8
Option: (255) End

حاجت IP ناو نع فيضمل اى قلىتو و DORA لامك ا متو

صخلم

ةمزل ا هىوت ةءاع ا تاوو يرانيس مهفل لودل ا اءه ا عرا

ذفنم ا عون	ةءال ا	ةملىل سمل ا ةمزل ا عون	ةءىل ا	بب س ا
ذفنم L2	رىغ قوئوم هب	Unicast DHCP اضرع/ACK	اىل س ا	DHCP لوكوئورب اىل ل فطلل ا عنمى رىغ L2 ذفانم اىل مءال لئاسر ا هب قوئوم ا
ذفنم L3	N/A (هجوم)	Unicast DHCP اضرع/ACK	لوبقم	ةءوصقم ا ءق ا اىه ةهجوم ا ذفانم ا ل اءرل لىك و لاصلال
ذفنم L2	املىل نملىل	Unicast DHCP اىل اىل 82 رايخ عم	لوبقم	عمىل ب قوئوم ا ذفنم ا اىل سى DHCP ااراش ا
ذفنم L2	رىغ قوئوم هب	Unicast DHCP اىل اىل 82 رايخ عم	لوبقم	IP ناو نع اىل اىل ولىل اىل ا ةمزل ا ةءورشم 82 رايخو ل اىل لىك ولىل
ذفنم L2	املىل نملىل	اىل ل DHCP اىل اىل 82 رايخ نول اىل اىل	لوبقم	عمىل ب قوئوم ا ذفنم ا اىل سى DHCP ااراش ا
ذفنم L2	رىغ قوئوم هب	اىل ل DHCP اىل اىل 82 رايخ نول اىل اىل	اىل س ا	IP ناو نع اىل اىل ولىل اىل ا ةمزل ا اىه 82 رايخ نول و ل اىل لىك ولىل ةءاخم ةءومم

ةمچرتل هذه ل و ح

ةيلآل ا تاي ن ق ت ل ا ن م ة و م ج م ا د خ ت س ا ب د ن ت س م ل ا ا ذ ه Cisco ت م چ ر ت م ل ا ع ل ا ا ح ن ا ع م ج ي ف ن ي م د خ ت س م ل ل م ع د ي و ت ح م م ي د ق ت ل ة ي ر ش ب ل ا و ا م ك ة ق ي ق د ن و ك ت ن ل ة ي ل آ ة م چ ر ت ل ض ف ا ن ا ة ط ح ا ل م ي ج ر ي . ة ص ا خ ل ا م ه ت غ ل ب Cisco ي ل خ ت . ف ر ت ح م م چ ر ت م ا ه م د ق ي ي ت ل ا ة ي ف ا ر ت ح ا ل ا ة م چ ر ت ل ا ع م ل ا ح ل ا و ه ي ل ا ا م ا د ع و ج ر ل ا ب ي ص و ت و ت ا م چ ر ت ل ا ه ذ ه ة ق د ن ع ا ه ت ي ل و ئ س م Systems (ر ف و ت م ط ب ا ر ل ا) ي ل ص ا ل ا ي ز ي ل ج ن ا ل ا د ن ت س م ل ا