DHCP-gerelateerde problemen oplossen bij Nexus 9000

Inhoud

Inleiding

Dit document beschrijft de stappen om de juiste configuratie voor een DHCP Relay Agent op een Nexus 9000 te verifiëren.

Voorwaarden

Vereisten

Cisco NXOS® raadt u aan kennis te hebben van deze onderwerpen:

- DHCP
- ELAM
- Ethanalyzer

Gebruikte componenten

Dit document is beperkt tot specifieke hardware zoals Nexus 9000

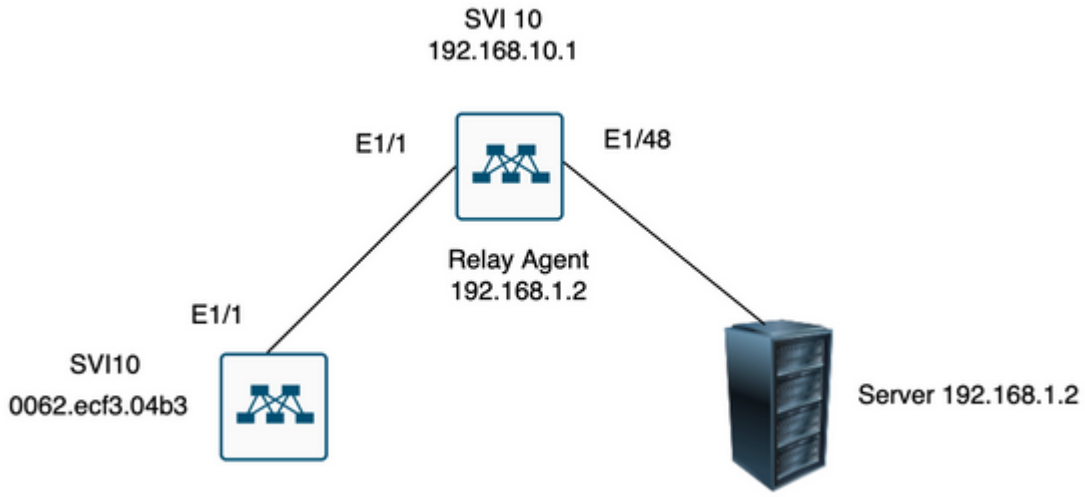
De informatie in dit document is gebaseerd op de apparaten in een specifieke laboratoriumomgeving. Alle apparaten die in dit document worden beschreven, hadden een opgeschoonde (standaard)configuratie. Als uw netwerk live is, moet u zorgen dat u de potentiële impact van elke opdracht begrijpt.

Achtergrondinformatie

U kunt het apparaat configureren om een DHCP Relay Agent uit te voeren, die DHCP-pakketten doorstuurt tussen clients en servers. Deze optie is handig wanneer clients en servers niet op dezelfde fysieke subnetverbinding staan. Relay-agents ontvangen DHCP-berichten en genereren vervolgens een nieuw DHCP-bericht om op een andere interface te verzenden.

Topologie

De Nexus Switches werken als een DHCP relay om een IP te leveren aan de client vanaf de server.



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Verifiëren

1) Controleer de configuratie van de client (geen IP-adres toegewezen)

```
Client# show interface vlan 10
Vlan10 is up, line protocol is up, autostate enabled
Hardware is EtherSVI, address is 0062.ecf3.04b3
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive not supported
ARP type: ARPA
Last clearing of "show interface" counters never
L3 in Switched:
ucast: 0 pkts, 0 bytes
```

2) Controleer de DHCP-configuratie

```
Switch1# show run dhcp

ip dhcp snooping
service dhcp
ip dhcp relay
ipv6 dhcp relay

interface Vlan10
  ip dhcp relay address 192.168.1.2
ip dhcp snooping vlan 1,10
```

3) Controleer de verbinding met de server

```
Switch1# ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2): 56 data bytes
64 bytes from 192.168.1.2: icmp_seq=0 ttl=253 time=1.678 ms
64 bytes from 192.168.1.2: icmp_seq=1 ttl=253 time=1.329 ms
64 bytes from 192.168.1.2: icmp_seq=2 ttl=253 time=1.742 ms
64 bytes from 192.168.1.2: icmp_seq=3 ttl=253 time=1.382 ms
64 bytes from 192.168.1.2: icmp_seq=4 ttl=253 time=1.241 ms
--- 192.168.1.2 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 1.241/1.474/1.742 ms
Switch1#

Switch1# show ip route 192.168.1.2
IP Route Table for VRF "default"
'*' denotes best ucast next-hop
'**' denotes best mcast next-hop
'[x/y]' denotes [preference/metric]
'%<string>' in via output denotes VRF <string>
192.168.1.2/32, ubest/mbest: 1/0, attached
*via 192.168.1.2, Eth1/48, [250/0], 02:13:58, am
Switch1#
```

4) Verdergaan om de statistieken van de DCHP te bekijken om te controleren of de informatie correct wordt verzonden.

```
Switch1# show ip dhcp relay statistics interface vlan 10
------------------------------------------------------------------------
Message Type Rx Tx Drops
------------------------------------------------------------------------
Discover 1 1 0
Offer 1 1 0
Request(*) 1 1 0
Ack 1 1 0
Release(*) 0 0 0
Decline 0 0 0
Inform(*) 0 0 0
Nack 0 0 0
------------------------------------------------------------------------
Total 4 4 0
------------------------------------------------------------------------
DHCP server stats:
-----------------------------------------------------------------------------
Server Vrf Request Response
-----------------------------------------------------------------------------
192.168.1.2 2 2
------------------------------------------------------------------------
DHCP L3 FWD:
Total Packets Received : 0
```

```
Total Packets Forwarded : 0
Total Packets Dropped : 0
Non DHCP:
Total Packets Received : 0
Total Packets Forwarded : 0
Total Packets Dropped : 0
DROP:
DHCP Relay not enabled : 0
Invalid DHCP message type : 0
Interface error : 0
Tx failure towards server : 0
Tx failure towards client : 0
Unknown output interface : 0
Unknown vrf or interface for server : 0
Max hops exceeded : 0
Option 82 validation failed : 0
Packet Malformed : 0
DHCP Request dropped on MCT : 0
Relay Trusted port not configured : 0
* - These counters show correct value when switch
receives DHCP request packet with destination ip as broadcast
address. If request is unicast it is being HW switched
Switch1#

Switch1# show ip dhcp global statistics
Packets processed 130
Packets received through cfsoe 0
Packets forwarded 24
Packets forwarded on cfsoe 0
Total packets dropped 106
Packets dropped from untrusted ports 0
Packets dropped due to MAC address check failure 0
Packets dropped due to Option 82 insertion failure 0
Packets dropped due to o/p intf unknown 0
Packets dropped which were unknown 0
Packets dropped due to no trusted ports 106
Packets dropped due to dhcp relay not enabled 0
Packets dropped due to no binding entry 0
Packets dropped due to interface error/no interface 0
Packets dropped due to max hops exceeded 0
Packets dropped due to Queue full 0
Switch1#
```

Problemen oplossen

1) Bevestig dat de statistieken correct zijn door een ethanalyzer uit te voeren.

```
Switch1# ethanalyzer local interface inband display-filter bootp limit-captured-frames 0
Capturing on inband

2023-07-18 21:30:01.935789 0.0.0.0 -> 255.255.255.255 DHCP DHCP Discover - Transaction ID 0x64b6400b
2023-07-18 21:30:01.937789 192.168.10.1 -> 192.168.1.2 DHCP DHCP Discover - Transaction ID 0x64b6400b
2023-07-18 21:30:03.938596 192.168.1.2 -> 192.168.10.1 DHCP DHCP Offer - Transaction ID 0x64b6400b
2023-07-18 21:30:03.938659 192.168.1.2 -> 192.168.10.1 DHCP DHCP Offer - Transaction ID 0x64b6400b
```

```
2023-07-18 21:30:03.940103 192.168.10.1 -> 255.255.255.255 DHCP DHCP Offer - Transaction ID 0x64b6400b
2023-07-18 21:30:07.939208 0.0.0.0 -> 255.255.255.255 DHCP DHCP Request - Transaction ID 0x64b6400b
2023-07-18 21:30:07.941220 192.168.10.1 -> 192.168.1.2 DHCP DHCP Request - Transaction ID 0x64b6400b
2023-07-18 21:30:07.941848 192.168.1.2 -> 192.168.10.1 DHCP DHCP ACK - Transaction ID 0x64b6400b
2023-07-18 21:30:07.941897 192.168.1.2 -> 192.168.10.1 DHCP DHCP ACK - Transaction ID 0x64b6400b
2023-07-18 21:30:07.942693 192.168.10.1 -> 255.255.255.255 DHCP DHCP ACK - Transaction ID 0x64b6400b
```

2) Ethanalyzer heeft een detailoptie die aanvullende informatie biedt, inclusief de kopregels van het opgenomen verkeer.

```
ethanalyzer local interface inband display-filter "((eth.addr==<MAC_address> and bootp ))" limit-capture
```

3) Het toevoegen van de detailvlag in de ethanalyzer-opname geeft meer details over de communicatie tussen de client en server.

[1] De Relay Agent ontvangt een DHCP Discover van de client als een uitzending:
Source MAC is client-MAC: 00:62:ec:f3:04:b3
BestemmingsMAC is broadcast: ff:ff:ff:ff:ff:ff
Aangezien client geen IP-adres heeft, is de bron-IP 0.0.0
Bron IP: 0.0.0.0
Bestemming IP : 255.255.255.255
Bron poort: bootpc (68)
Haven van bestemming: bootps (67)
Berichttype: Boot Aanvraag (1)
DHCP-berichttype = DHCP-detectie

```
Frame 14 (358 bytes on wire, 358 bytes captured)
Arrival Time: Jul 19, 2023 21:53:29.339064000
[Time delta from previous captured frame: 0.096490000 seconds]
[Time delta from previous displayed frame: 2.618117000 seconds]
[Time since reference or first frame: 2.618117000 seconds]
Frame Number: 14
Frame Length: 358 bytes
Capture Length: 358 bytes
[Frame is marked: False]
[Protocols in frame: eth:vlan:ip:udp:bootp]
Ethernet II, Src: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3), 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 .... .... .... .... = IG bit: Group address (multicast/broadcast)
.... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory default)
Source: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: 802.1Q Virtual LAN (0x8100)
802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 10
000. .... .... .... = Priority: 0
...0 .... .... .... = CFI: 0
.... 0000 0000 1010 = ID: 10
Type: IP (0x0800)
```

```
Internet Protocol, Src: 0.0.0.0 (0.0.0.0), Dst: 255.255.255.255 (255.255.255.255)
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
0000 00.. = Differentiated Services Codepoint: Default (0x00)
.... ..0. = ECN-Capable Transport (ECT): 0
.... ...0 = ECN-CE: 0
Total Length: 340
Identification: 0x0000 (0)
Flags: 0x00
0.. = Reserved bit: Not Set
.0. = Do not fragment: Not Set
..0 = More fragments: Not Set
Fragment offset: 0
Time to live: 255
Protocol: UDP (0x11)
Header checksum: 0xba99 [correct]
[Good: True]
[Bad : False]
Source: 0.0.0.0 (0.0.0.0)
Destination: 255.255.255.255 (255.255.255.255)
User Datagram Protocol, Src Port: bootpc (68), Dst Port: bootps (67)
Source port: bootpc (68)
Destination port: bootps (67)
Length: 320
Checksum: 0x2bbb [validation disabled]
[Good Checksum: False]
[Bad Checksum: False]
Bootstrap Protocol
Message type: Boot Request (1)
Hardware type: Ethernet
Hardware address length: 6
Hops: 0
Transaction ID: 0x64b14fa7
Seconds elapsed: 0
Bootp flags: 0x8000 (Broadcast)
1... .... .... .... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0 (0.0.0.0)
Your (client) IP address: 0.0.0.0 (0.0.0.0)
Next server IP address: 0.0.0.0 (0.0.0.0)
Relay agent IP address: 0.0.0.0 (0.0.0.0)
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP Discover
Option: (53) DHCP Message Type
Length: 1
Value: 01
Option: (t=61,l=18) Client identifier
Option: (61) Client identifier
Length: 18
Value: 0046444F32303234314355485566C616E3130
Option: (t=51,l=4) IP Address Lease Time = 2 hours
Option: (51) IP Address Lease Time
Length: 4
Value: 00001C20
Option: (t=60,l=19) Vendor class identifier = "Cisco NXOS® N9K-C9372PX-E"
Option: (60) Vendor class identifier
Length: 19
```

```
Value: 436973636F204E394B2D433933373250582D45
Option: (t=43,l=8) Vendor-Specific Information
Option: (43) Vendor-Specific Information
Length: 8
Value: F1060062ECF304AC
Option: (t=55,l=8) Parameter Request List
Option: (55) Parameter Request List
Length: 8
Value: 010306070C424396
1 = Subnet Mask
3 = Router
6 = Domain Name Server
7 = Log Server
12 = Host Name
66 = TFTP Server Name
67 = Bootfile name
150 = TFTP server address
End Option
Padding
Frame 15 (354 bytes on wire, 354 bytes captured)
Arrival Time: Jul 19, 2023 21:53:29.340263000
[Time delta from previous captured frame: 0.001199000 seconds]
[Time delta from previous displayed frame: 0.001199000 seconds]
[Time since reference or first frame: 2.619316000 seconds]
Frame Number: 15
Frame Length: 354 bytes
Capture Length: 354 bytes
[Frame is marked: False]
[Protocols in frame: eth:ip:udp:bootp]
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), Dst: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Destination: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: IP (0x0800)
```

[2] De Relay Agent stuurt een Discover met behulp van unicast naar de Server.
Source MAC is nexus MAC: 6c:31:0e:a3:0c:57
BestemmingsMAC is DHCP-server MAC: c4:c6:03:09:cf:47
Source IP is Nexus IP op SVI10:192.168.10.1
IP van bestemming is DHCP-server IP: 192.168.1.2
Bronpoort: bootps (67)
Haven van bestemming: bootps (67)
MAC-adres client: 00:62:ec:f3:04:b3 <<<<<</client-MAC is opgenomen in de UDP/DHCP-header
Berichttype: Boot Aanvraag (1)
DHCP-berichttype = DHCP-detectie

```
Frame 15 (354 bytes on wire, 354 bytes captured)
Arrival Time: Jul 19, 2023 21:53:29.340263000
[Time delta from previous captured frame: 0.001199000 seconds]
[Time delta from previous displayed frame: 0.001199000 seconds]
[Time since reference or first frame: 2.619316000 seconds]
Frame Number: 15
Frame Length: 354 bytes
```

```
Capture Length: 354 bytes
[Frame is marked: False]
[Protocols in frame: eth:ip:udp:bootp]
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), Dst: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Destination: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: IP (0x0800)


Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 192.168.1.2 (192.168.1.2)
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
0000 00.. = Differentiated Services Codepoint: Default (0x00)
.... ..0. = ECN-Capable Transport (ECT): 0
.... ...0 = ECN-CE: 0
Total Length: 340
Identification: 0xefab (61355)
Flags: 0x00
0.. = Reserved bit: Not Set
.0. = Do not fragment: Not Set
..0 = More fragments: Not Set
Fragment offset: 0
Time to live: 255
Protocol: UDP (0x11)
Header checksum: 0x3e99 [correct]
[Good: True]
[Bad : False]
Source: 192.168.10.1 (192.168.10.1)
Destination: 192.168.1.2 (192.168.1.2)
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)
Source port: bootps (67)
Destination port: bootps (67)
Length: 320
Checksum: 0xd4bc [validation disabled]
[Good Checksum: False]
[Bad Checksum: False]
Bootstrap Protocol
Message type: Boot Request (1)
Hardware type: Ethernet
Hardware address length: 6
Hops: 1
Transaction ID: 0x64b14fa7
Seconds elapsed: 0
Bootp flags: 0x8000 (Broadcast)
1... .... .... .... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0 (0.0.0.0)
Your (client) IP address: 0.0.0.0 (0.0.0.0)
Next server IP address: 0.0.0.0 (0.0.0.0)
Relay agent IP address: 192.168.10.1 (192.168.10.1)
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: (OK)
```

```
Option: (t=53,l=1) DHCP Message Type = DHCP Discover
Option: (53) DHCP Message Type
Length: 1
Value: 01
Option: (t=61,l=18) Client identifier
Option: (61) Client identifier
Length: 18
Value: 0046444F32303234314355548566C616E3130
Option: (t=51,l=4) IP Address Lease Time = 2 hours
Option: (51) IP Address Lease Time
Length: 4
Value: 00001C20
Option: (t=60,l=19) Vendor class identifier = "Cisco NXOS® N9K-C9372PX-E"
Option: (60) Vendor class identifier
Length: 19
Value: 436973636F204E394B2D433933373250582D45
Option: (t=43,l=8) Vendor-Specific Information
Option: (43) Vendor-Specific Information
Length: 8
Value: F1060062ECF304AC
Option: (t=55,l=8) Parameter Request List
Option: (55) Parameter Request List
Length: 8
Value: 010306070C424396
1 = Subnet Mask
3 = Router
6 = Domain Name Server
7 = Log Server
12 = Host Name
66 = TFTP Server Name
67 = Bootfile name
150 = TFTP server address
End Option
Padding
```

[3] De Server antwoordt unicast Aanbieding aan de Relay Agent.
Source MAC is DHCP-server MAC: c4:c6:03:09:cf:47
BestemmingsMAC is Nexus MAC: 6c:31:0e:a3:0c:57
Source IP is DHCP-server: 192.168.1.2
IP-Nexus IP op bestemming op SVI10: 192.168.10.1
Bronpoort: bootps (67)
Haven van bestemming: bootps (67)
Berichttype: Boot Reply (2)
Uw IP-adres (client): 192.168.10.19 (192.168.10.19) <<<<</Dit pakket voor aanbiedingen bevat het IP-adres dat aan de client moet worden toegewezen
MAC-adres client: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3) <<</MAC-adres van client
DHCP-berichttype = DHCP-aanbieding

```
Frame 27 (348 bytes on wire, 348 bytes captured)
Arrival Time: Jul 19, 2023 21:53:31.340920000
[Time delta from previous captured frame: 0.097549000 seconds]
[Time delta from previous displayed frame: 2.000657000 seconds]
[Time since reference or first frame: 4.619973000 seconds]
Frame Number: 27
Frame Length: 348 bytes
Capture Length: 348 bytes
[Frame is marked: False]
[Protocols in frame: eth:ip:udp:bootp]
Ethernet II, Src: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47), Dst: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
```

```
Destination: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Source: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: IP (0x0800)
Internet Protocol, Src: 192.168.1.2 (192.168.1.2), Dst: 192.168.10.1 (192.168.10.1)
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
0000 00.. = Differentiated Services Codepoint: Default (0x00)
.... ..0. = ECN-Capable Transport (ECT): 0
.... ...0 = ECN-CE: 0
Total Length: 334
Identification: 0x0014 (20)
Flags: 0x00
0.. = Reserved bit: Not Set
.0. = Do not fragment: Not Set
..0 = More fragments: Not Set
Fragment offset: 0
Time to live: 254
Protocol: UDP (0x11)
Header checksum: 0x2f37 [correct]
[Good: True]
[Bad : False]
Source: 192.168.1.2 (192.168.1.2)
Destination: 192.168.10.1 (192.168.10.1)
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)
Source port: bootps (67)
Destination port: bootps (67)
Length: 314
Checksum: 0x0500 [validation disabled]
[Good Checksum: False]
[Bad Checksum: False]
Bootstrap Protocol
Message type: Boot Reply (2)
Hardware type: Ethernet
Hardware address length: 6
Hops: 0
Transaction ID: 0x64b14fa7
Seconds elapsed: 0
Bootp flags: 0x8000 (Broadcast)
1... .... .... .... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0 (0.0.0.0)
Your (client) IP address: 192.168.10.19 (192.168.10.19)
Next server IP address: 0.0.0.0 (0.0.0.0)
Relay agent IP address: 192.168.10.1 (192.168.10.1)
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP Offer
Option: (53) DHCP Message Type
Length: 1
Value: 02
Option: (t=61,l=18) Client identifier
Option: (61) Client identifier
```

```
Length: 18
Value: 0046444F32303234314355485566C616E3130
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2
Option: (54) DHCP Server Identifier
Length: 4
Value: C0A80102
Option: (t=51,l=4) IP Address Lease Time = 1 day
Option: (51) IP Address Lease Time
Length: 4
Value: 00015180
Option: (t=58,l=4) Renewal Time Value = 12 hours
Option: (58) Renewal Time Value
Length: 4
Value: 0000A8C0
Option: (t=59,l=4) Rebinding Time Value = 21 hours
Option: (59) Rebinding Time Value
Length: 4
Value: 00012750
Option: (t=1,l=4) Subnet Mask = 255.255.255.0
Option: (1) Subnet Mask
Length: 4
Value: FFFFFF00
Option: (t=3,l=4) Router = 192.168.1.2
Option: (3) Router
Length: 4
Value: C0A80102
Option: (t=6,l=4) Domain Name Server = 8.8.8.8
Option: (6) Domain Name Server
Length: 4
Value: 08080808
End Option
```

[4] De Relay Agent verstuurt de DHCP-aanbieding van de DHCP-server met behulp van broadcast, dit broadcast-pakket wordt ontvangen door het subnetnummer, maar het bevat de client-MAC, dus alleen de eigenaar van de MAC verwerkt dit pakket.
Source MAC is nexus MAC: 6c:31:0e:a3:0c:57
BestemmingsMAC is broadcast: ff:ff:ff:ff:ff:ff
Source IP is Nexus IP op SVI10:192.168.10.1
Bestemming IP is uitzendadres: 255.255.255.255
Bronpoort: bootps (67)
Doelpoort: bootpc (68)
Berichttype: Boot Reply (2)
Uw IP-adres (client): 192.168.10.19
MAC-adres client: 00:62:ec:f3:04:b3
DHCP-berichttype = DHCP-aanbieding

```
Frame 28 (348 bytes on wire, 348 bytes captured)
Arrival Time: Jul 19, 2023 21:53:31.341325000
[Time delta from previous captured frame: 0.000405000 seconds]
[Time delta from previous displayed frame: 0.000405000 seconds]
[Time since reference or first frame: 4.620378000 seconds]
Frame Number: 28
Frame Length: 348 bytes
Capture Length: 348 bytes
[Frame is marked: False]
[Protocols in frame: eth:ip:udp:bootp]
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), 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 .... .... .... .... = IG bit: Group address (multicast/broadcast)
.... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory default)
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: IP (0x0800)
Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 255.255.255.255 (255.255.255.255)
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
0000 00.. = Differentiated Services Codepoint: Default (0x00)
.... ..0. = ECN-Capable Transport (ECT): 0
.... ...0 = ECN-CE: 0
Total Length: 334
Identification: 0x1400 (5120)
Flags: 0x00
0.. = Reserved bit: Not Set
.0. = Do not fragment: Not Set
..0 = More fragments: Not Set
Fragment offset: 0
Time to live: 255
Protocol: UDP (0x11)
Header checksum: 0xdbf5 [correct]
[Good: True]
[Bad : False]
Source: 192.168.10.1 (192.168.10.1)
Destination: 255.255.255.255 (255.255.255.255)
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootpc (68)
Source port: bootps (67)
Destination port: bootpc (68)
Length: 314
Checksum: 0xc6a8 [validation disabled]
[Good Checksum: False]
[Bad Checksum: False]
Bootstrap Protocol
Message type: Boot Reply (2)
Hardware type: Ethernet
Hardware address length: 6
Hops: 1
Transaction ID: 0x64b14fa7
Seconds elapsed: 0
Bootp flags: 0x8000 (Broadcast)
1... .... .... .... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0 (0.0.0.0)
Your (client) IP address: 192.168.10.19 (192.168.10.19)
Next server IP address: 0.0.0.0 (0.0.0.0)
Relay agent IP address: 192.168.10.1 (192.168.10.1)
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP Offer
Option: (53) DHCP Message Type
Length: 1
Value: 02
Option: (t=61,l=18) Client identifier
Option: (61) Client identifier
```

```
Length: 18
Value: 0046444F3230323431435548566C616E3130
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2
Option: (54) DHCP Server Identifier
Length: 4
Value: C0A80102
Option: (t=51,l=4) IP Address Lease Time = 1 day
Option: (51) IP Address Lease Time
Length: 4
Value: 00015180
Option: (t=58,l=4) Renewal Time Value = 12 hours
Option: (58) Renewal Time Value
Length: 4
Value: 0000A8C0
Option: (t=59,l=4) Rebinding Time Value = 21 hours
Option: (59) Rebinding Time Value
Length: 4
Value: 00012750
Option: (t=1,l=4) Subnet Mask = 255.255.255.0
Option: (1) Subnet Mask
Length: 4
Value: FFFFFF00
Option: (t=3,l=4) Router = 192.168.1.2
Option: (3) Router
Length: 4
Value: C0A80102
Option: (t=6,l=4) Domain Name Server = 8.8.8.8
Option: (6) Domain Name Server
Length: 4
Value: 08080808
End Option
```

[5] De Relay Agent ontvangt een verzoek van de klant en wordt als uitzending geleverd.
Source MAC is client-MAC: 00:62:ec:f3:04:b3
BestemmingsMAC is broadcast: ff:ff:ff:ff:ff:ff
Op dit punt, client heeft nog geen IP-adres, de bron IP is nog steeds 0.0.0.0
Bron IP: 0.0.0.0
Bestemming IP : 255.255.255.255
Bron poort: bootpc (68)
Haven van bestemming: bootps (67)
Berichttype: Boot request (1) <<<<<</dit bericht is het verzoek van de client voor IP 192.168.10.19
Verzocht IP-adres = 192.168.10.19 <<<<<<<<<<<< client die om het IP verzoekt dat door de DHCP-server is toegewezen
DHCP-berichttype = DHCP-verzoek

```
Frame 47 (370 bytes on wire, 370 bytes captured)
Arrival Time: Jul 19, 2023 21:53:35.342380000
[Time delta from previous captured frame: 0.097649000 seconds]
[Time delta from previous displayed frame: 4.001055000 seconds]
[Time since reference or first frame: 8.621433000 seconds]
Frame Number: 47
Frame Length: 370 bytes
Capture Length: 370 bytes
[Frame is marked: False]
[Protocols in frame: eth:vlan:ip:udp:bootp]
Ethernet II, Src: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3), 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 .... .... .... .... = IG bit: Group address (multicast/broadcast)
.... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory default)
Source: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: 802.1Q Virtual LAN (0x8100)
802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 10
000. .... .... .... = Priority: 0
...0 .... .... .... = CFI: 0
.... 0000 0000 1010 = ID: 10
Type: IP (0x0800)
Internet Protocol, Src: 0.0.0.0 (0.0.0.0), Dst: 255.255.255.255 (255.255.255.255)
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
0000 00.. = Differentiated Services Codepoint: Default (0x00)
.... ..0. = ECN-Capable Transport (ECT): 0
.... ...0 = ECN-CE: 0
Total Length: 352
Identification: 0x0000 (0)
Flags: 0x00
0.. = Reserved bit: Not Set
.0. = Do not fragment: Not Set
..0 = More fragments: Not Set
Fragment offset: 0
Time to live: 255
Protocol: UDP (0x11)
Header checksum: 0xba8d [correct]
[Good: True]
[Bad : False]
Source: 0.0.0.0 (0.0.0.0)
Destination: 255.255.255.255 (255.255.255.255)
User Datagram Protocol, Src Port: bootpc (68), Dst Port: bootps (67)
Source port: bootpc (68)
Destination port: bootps (67)
Length: 332
Checksum: 0xbaae [validation disabled]
[Good Checksum: False]
[Bad Checksum: False]
Bootstrap Protocol
Message type: Boot Request (1)
Hardware type: Ethernet
Hardware address length: 6
Hops: 0
Transaction ID: 0x64b14fa7
Seconds elapsed: 0
Bootp flags: 0x8000 (Broadcast)
1... .... .... .... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0 (0.0.0.0)
Your (client) IP address: 0.0.0.0 (0.0.0.0)
Next server IP address: 0.0.0.0 (0.0.0.0)
Relay agent IP address: 0.0.0.0 (0.0.0.0)
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP Request
Option: (53) DHCP Message Type
Length: 1
```

```
Value: 03
Option: (t=61,l=18) Client identifier
Option: (61) Client identifier
Length: 18
Value: 0046444F32303234314355485 66C616E3130
Option: (t=50,l=4) Requested IP Address = 192.168.10.19
Option: (50) Requested IP Address
Length: 4
Value: C0A80A13
Option: (t=51,l=4) IP Address Lease Time = 2 hours
Option: (51) IP Address Lease Time
Length: 4
Value: 00001C20
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2
Option: (54) DHCP Server Identifier
Length: 4
Value: C0A80102
Option: (t=60,l=19) Vendor class identifier = "Cisco NXOS® N9K-C9372PX-E"
Option: (60) Vendor class identifier
Length: 19
Value: 436973636F204E394B2D433933373250582D45
Option: (t=43,l=8) Vendor-Specific Information
Option: (43) Vendor-Specific Information
Length: 8
Value: F1060062ECF304AC
Option: (t=55,l=8) Parameter Request List
Option: (55) Parameter Request List
Length: 8
Value: 010306070C424396
1 = Subnet Mask
3 = Router
6 = Domain Name Server
7 = Log Server
12 = Host Name
66 = TFTP Server Name
67 = Bootfile name
150 = TFTP server address
End Option
Padding
```

[6] De Relay Agent stuurt het DHCP-verzoek van de client naar de DHCP-server.
Source MAC is nexus MAC: 6c:31:0e:a3:0c:57
BestemmingsMAC is DHCP-server MAC: c4:c6:03:09:cf:47
Source IP is Nexus IP op SVI10:192.168.10.1
IP van bestemming is DHCP-server IP: 192.168.1.2
Bronpoort: bootps (67)
Haven van bestemming: bootps (67)
Berichttype: Boot Aanvraag (1)
Verzocht IP-adres = 192.168.10.19
MAC-adres client: 00:62:ec:f3:04:b3 <<<<<<</client-MAC is opgenomen in de UDP/DHCP-header
DHCP-berichttype = DHCP-verzoek

```
Frame 48 (366 bytes on wire, 366 bytes captured)
Arrival Time: Jul 19, 2023 21:53:35.343718000
[Time delta from previous captured frame: 0.001338000 seconds]
[Time delta from previous displayed frame: 0.001338000 seconds]
[Time since reference or first frame: 8.622771000 seconds]
Frame Number: 48
```

```
Frame Length: 366 bytes
Capture Length: 366 bytes
[Frame is marked: False]
[Protocols in frame: eth:ip:udp:bootp]
Ethernet II, Src: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57), Dst: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Destination: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Source: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: IP (0x0800)
Internet Protocol, Src: 192.168.10.1 (192.168.10.1), Dst: 192.168.1.2 (192.168.1.2)
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
0000 00.. = Differentiated Services Codepoint: Default (0x00)
.... ..0. = ECN-Capable Transport (ECT): 0
.... ...0 = ECN-CE: 0
Total Length: 352
Identification: 0xefac (61356)
Flags: 0x00
0.. = Reserved bit: Not Set
.0. = Do not fragment: Not Set
..0 = More fragments: Not Set
Fragment offset: 0
Time to live: 255
Protocol: UDP (0x11)
Header checksum: 0x3e8c [correct]
[Good: True]
[Bad : False]
Source: 192.168.10.1 (192.168.10.1)
Destination: 192.168.1.2 (192.168.1.2)
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)
Source port: bootps (67)
Destination port: bootps (67)
Length: 332
Checksum: 0x63b0 [validation disabled]
[Good Checksum: False]
[Bad Checksum: False]
Bootstrap Protocol
Message type: Boot Request (1)
Hardware type: Ethernet
Hardware address length: 6
Hops: 1
Transaction ID: 0x64b14fa7
Seconds elapsed: 0
Bootp flags: 0x8000 (Broadcast)
1... .... .... .... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0 (0.0.0.0)
Your (client) IP address: 0.0.0.0 (0.0.0.0)
Next server IP address: 0.0.0.0 (0.0.0.0)
Relay agent IP address: 192.168.10.1 (192.168.10.1)
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP Request
```

```
Option: (53) DHCP Message Type
Length: 1
Value: 03
Option: (t=61,l=18) Client identifier
Option: (61) Client identifier
Length: 18
Value: 0046444F32303234314355485 66C616E3130
Option: (t=50,l=4) Requested IP Address = 192.168.10.19
Option: (50) Requested IP Address
Length: 4
Value: C0A80A13
Option: (t=51,l=4) IP Address Lease Time = 2 hours
Option: (51) IP Address Lease Time
Length: 4
Value: 00001C20
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2
Option: (54) DHCP Server Identifier
Length: 4
Value: C0A80102
Option: (t=60,l=19) Vendor class identifier = "Cisco N9K-C9372PX-E"
Option: (60) Vendor class identifier
Length: 19
Value: 436973636F204E394B2D433933373250582D45
Option: (t=43,l=8) Vendor-Specific Information
Option: (43) Vendor-Specific Information
Length: 8
Value: F1060062ECF304AC
Option: (t=55,l=8) Parameter Request List
Option: (55) Parameter Request List
Length: 8
Value: 010306070C424396
1 = Subnet Mask
3 = Router
6 = Domain Name Server
7 = Log Server
12 = Host Name
66 = TFTP Server Name
67 = Bootfile name
150 = TFTP server address
End Option
Padding
```

[7] De Server antwoordt unicast (ACK) op de Relay Agent.
Source MAC is DHCP-server MAC: c4:c6:03:09:cf:47
BestemmingsMAC is Nexus MAC: 6c:31:0e:a3:0c:57
Source IP is DHCP-server: 192.168.1.2
IP-Nexus IP op bestemming op SVI10: 192.168.10.1
Bronpoort: bootps (67)
Haven van bestemming: bootps (67)
Berichttype: Boot Reply (2)
Uw IP-adres (client): 192.168.10.19
MAC-adres client: 00:62:ec:f3:04:b3
DHCP-berichttype = DHCP ACK <<<< Dit is de ACk vanaf de server

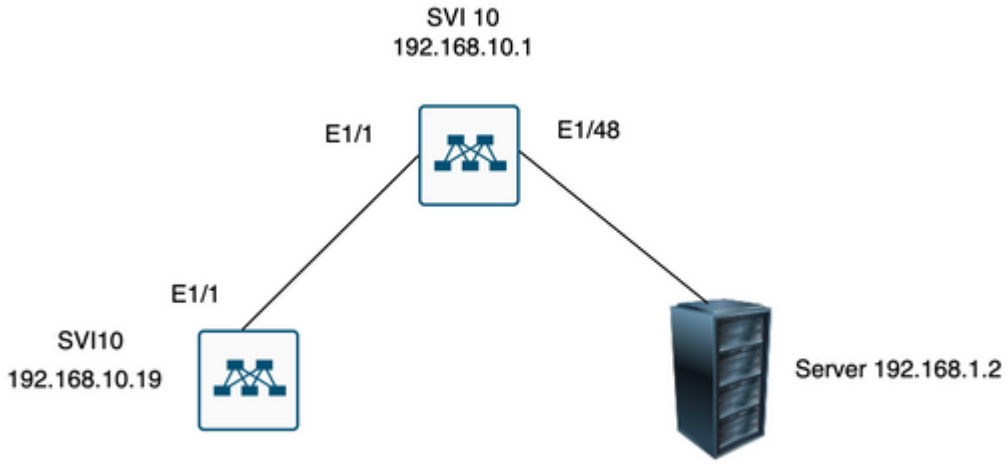
```
Frame 49 (348 bytes on wire, 348 bytes captured)
Arrival Time: Jul 19, 2023 21:53:35.344310000
[Time delta from previous captured frame: 0.000592000 seconds]
[Time delta from previous displayed frame: 0.000592000 seconds]
```

```
[Time since reference or first frame: 8.623363000 seconds]
Frame Number: 49
Frame Length: 348 bytes
Capture Length: 348 bytes
[Frame is marked: False]
[Protocols in frame: eth:ip:udp:bootp]
Ethernet II, Src: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47), Dst: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Destination: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
Address: 6c:31:0e:a3:0c:57 (6c:31:0e:a3:0c:57)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Source: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
Address: c4:c6:03:09:cf:47 (c4:c6:03:09:cf:47)
.... ...0 .... .... .... .... = IG bit: Individual address (unicast)
.... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
Type: IP (0x0800)
Internet Protocol, Src: 192.168.1.2 (192.168.1.2), Dst: 192.168.10.1 (192.168.10.1)
Version: 4
Header length: 20 bytes
Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
0000 00.. = Differentiated Services Codepoint: Default (0x00)
.... ..0. = ECN-Capable Transport (ECT): 0
.... ...0 = ECN-CE: 0
Total Length: 334
Identification: 0x0015 (21)
Flags: 0x00
0.. = Reserved bit: Not Set
.0. = Do not fragment: Not Set
..0 = More fragments: Not Set
Fragment offset: 0
Time to live: 254
Protocol: UDP (0x11)
Header checksum: 0x2f36 [correct]
[Good: True]
[Bad : False]
Source: 192.168.1.2 (192.168.1.2)
Destination: 192.168.10.1 (192.168.10.1)
User Datagram Protocol, Src Port: bootps (67), Dst Port: bootps (67)
Source port: bootps (67)
Destination port: bootps (67)
Length: 314
Checksum: 0x0200 [validation disabled]
[Good Checksum: False]
[Bad Checksum: False]
Bootstrap Protocol
Message type: Boot Reply (2)
Hardware type: Ethernet
Hardware address length: 6
Hops: 0
Transaction ID: 0x64b14fa7
Seconds elapsed: 0
Bootp flags: 0x8000 (Broadcast)
1... .... .... .... = Broadcast flag: Broadcast
.000 0000 0000 0000 = Reserved flags: 0x0000
Client IP address: 0.0.0.0 (0.0.0.0)
Your (client) IP address: 192.168.10.19 (192.168.10.19)
Next server IP address: 0.0.0.0 (0.0.0.0)
Relay agent IP address: 192.168.10.1 (192.168.10.1)
Client MAC address: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
```

```
Magic cookie: (OK)
Option: (t=53,l=1) DHCP Message Type = DHCP ACK
Option: (53) DHCP Message Type
Length: 1
Value: 05
Option: (t=61,l=18) Client identifier
Option: (61) Client identifier
Length: 18
Value: 0046444F32303234314355485566C616E3130
Option: (t=54,l=4) DHCP Server Identifier = 192.168.1.2
Option: (54) DHCP Server Identifier
Length: 4
Value: C0A80102
Option: (t=51,l=4) IP Address Lease Time = 1 day
Option: (51) IP Address Lease Time
Length: 4
Value: 00015180
Option: (t=58,l=4) Renewal Time Value = 12 hours
Option: (58) Renewal Time Value
Length: 4
Value: 0000A8C0
Option: (t=59,l=4) Rebinding Time Value = 21 hours
Option: (59) Rebinding Time Value
Length: 4
Value: 00012750
Option: (t=1,l=4) Subnet Mask = 255.255.255.0
Option: (1) Subnet Mask
Length: 4
Value: FFFFFF00
Option: (t=3,l=4) Router = 192.168.1.2
Option: (3) Router
Length: 4
Value: C0A80102
Option: (t=6,l=4) Domain Name Server = 8.8.8.8
Option: (6) Domain Name Server
Length: 4
Value: 08080808
End Option
```

Op dit punt begint de client met het IP-adres en bevestig dat het aan de client is toegewezen.

```
Client# show interface vlan 10
Vlan10 is up, line protocol is up, autostate enabled
Hardware is EtherSVI, address is 0062.ecf3.04b3
Internet Address is 192.168.10.19/24 <<<<<<< It is using the IP address
MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive not supported
ARP type: ARPA
Last clearing of "show interface" counters never
L3 in Switched:
ucast: 0 pkts, 0 bytes
Client#
```



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Gerelateerde informatie

DHCP configureren

Ethanalyzer

Over deze vertaling

Cisco heeft dit document vertaald via een combinatie van machine- en menselijke technologie om onze gebruikers wereldwijd ondersteuningscontent te bieden in hun eigen taal. Houd er rekening mee dat zelfs de beste machinevertaling niet net zo nauwkeurig is als die van een professionele vertaler. Cisco Systems, Inc. is niet aansprakelijk voor de nauwkeurigheid van deze vertalingen en raadt aan altijd het oorspronkelijke Engelstalige document (link) te raadplegen.