

# Fehlerbehebung bei DHCP-bezogenen Problemen auf dem Nexus 9000

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## Einleitung

In diesem Dokument werden die Schritte zum Überprüfen der ordnungsgemäßen Konfiguration eines DHCP-Relay-Agenten auf einem Nexus 9000 beschrieben.

## Voraussetzungen

### Anforderungen

Cisco NX-OS® empfiehlt, dass Sie über Kenntnisse in den folgenden Bereichen verfügen:

- DHCP
- ELAM
- Ethanalyzer

### Verwendete Komponenten

Dieses Dokument ist auf bestimmte Hardware wie den Nexus 9000 beschränkt.

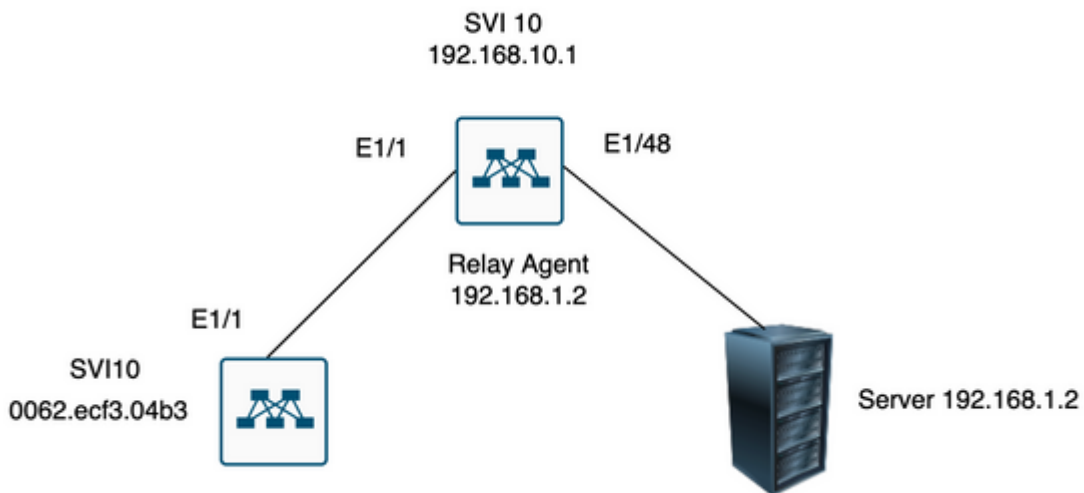
Die Informationen in diesem Dokument beziehen sich auf Geräte in einer speziell eingerichteten Testumgebung. Alle Geräte, die in diesem Dokument benutzt wurden, begannen mit einer gelöschten (Nichterfüllungs) Konfiguration. Wenn Ihr Netzwerk in Betrieb ist, stellen Sie sicher, dass Sie die möglichen Auswirkungen aller Befehle kennen.

## Hintergrundinformationen

Sie können das Gerät so konfigurieren, dass ein DHCP-Relay-Agent ausgeführt wird, der DHCP-Pakete zwischen Clients und Servern weiterleitet. Diese Funktion ist nützlich, wenn sich Clients und Server nicht im gleichen physischen Subnetz befinden. Relay-Agenten empfangen DHCP-Nachrichten und generieren dann eine neue DHCP-Nachricht, die an eine andere Schnittstelle gesendet wird.

## Topologie

Die Nexus Switches fungieren als DHCP-Relay, um dem Client vom Server eine IP-Adresse zuzustellen.



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## Überprüfung

1) Überprüfung der Client-Konfiguration (keine zugewiesene IP-Adresse)

```
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) Überprüfen der DHCP-Konfiguration

```
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) Überprüfen der Verbindung zum 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) Fahren Sie fort, um sich die Statistiken des DHCP anzusehen und zu überprüfen, ob die Informationen richtig gesendet wurden.

```
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#
```

## Fehlerbehebung

1) Stellen Sie sicher, dass die Statistiken korrekt sind, indem Sie einen Ethalyzer ausführen.

```
Switch1# ethalyzer 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) Ethalyzer verfügt über eine Detailoption, die zusätzliche Informationen bereitstellt, einschließlich der Kopfzeilen des erfassten Datenverkehrs.

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

3) Das Hinzufügen des Detail-Flags in der Ethalyzer-Erfassung liefert weitere Details über die Kommunikation zwischen Client und Server.

[1] Der Relay-Agent empfängt eine DHCP-Erkennung vom Client als Broadcast:

Quell-MAC ist Client-MAC: 00:62:ec:f3:04:b3

Ziel-MAC wird übertragen: ff:ff:ff:ff:ff:ff

Da der Client noch keine IP-Adresse hat, ist die Quell-IP 0.0.0.0.

Quell-IP: 0.0.0.0

Ziel-IP: 255.255.255.255

Quellport: bootpc (68)

Ziel-Port: Bootps (67)

Meldungstyp: Bootanforderung (1)

DHCP-Nachrichtentyp = DHCP Discovery

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: 0046444F3230323431435548566C616E3130  
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] Der Relay-Agent sendet eine Erkennung mithilfe von Unicast an den Server.

Quell-MAC ist Nexus-MAC: 6c:31:0e:a3:0c:57

Ziel-MAC ist DHCP-Server-MAC: c4:c6:03:09:cf:47

Quell-IP ist Nexus IP auf SVI10:192.168.10.1

Ziel-IP ist DHCP-Server-IP: 192.168.1.2

Quell-Port: Bootps (67)

Ziel-Port: Bootps (67)

Client-MAC-Adresse: 00:62:ec:f3:04:b3 <<<<<<< Client-MAC ist im UDP/DHCP-Header enthalten

Meldungstyp: Bootanforderung (1)

DHCP-Nachrichtentyp = DHCP Discovery

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: 0046444F3230323431435548566C616E3130  
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] Der Server antwortet dem Relay Agent auf das Unicast-Angebot.

Quell-MAC ist DHCP-Server-MAC: c4:c6:03:09:cf:47

Ziel-MAC ist Nexus MAC: 6c:31:0e:a3:0c:57

Quell-IP ist DHCP-Server: 192.168.1.2

Ziel-IP-Nexus-IP auf SVI10: 192.168.10.1

Quell-Port: Bootps (67)

Ziel-Port: Bootps (67)

Meldungstyp: Bootantwort (2)

Ihre (Client-)IP-Adresse: 192.168.10.19 (192.168.10.19) <<<<< Dieses Angebotspaket enthält die IP-Adresse, die dem Client zugewiesen werden soll.

Client-MAC-Adresse: 00:62:ec:f3:04:b3 (00:62:ec:f3:04:b3) <<<< MAC-Adresse vom Client

DHCP-Nachrichtentyp = DHCP-Angebot

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: 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: FFFFFFF0  
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] Der Relay Agent leitet das DHCP-Angebot per Broadcast vom DHCP-Server weiter. Dieses Broadcast-Paket wird vom Subnetz empfangen, enthält jedoch die Client-MAC. Daher verarbeitet nur der Eigentümer der MAC dieses Paket.

Quell-MAC ist Nexus-MAC: 6c:31:0e:a3:0c:57  
Ziel-MAC wird übertragen: ff:ff:ff:ff:ff:ff:ff:ff  
Quell-IP ist Nexus IP auf SVI10:192.168.10.1  
Ziel-IP ist Broadcast-Adresse: 255.255.255.255  
Quell-Port: Bootps (67)  
Ziel-Port: bootpc (68)  
Meldungstyp: Bootantwort (2)  
Ihre (Client-)IP-Adresse: 192.168.10.19  
Client-MAC-Adresse: 00:62:ec:f3:04:b3  
DHCP-Nachrichtentyp = DHCP-Angebot

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: 000000000000000000000000
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
```



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: 0046444F3230323431435548566C616E3130  
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] Der Relay-Agent leitet die DHCP-Anfrage vom Client an den DHCP-Server weiter.

Quell-MAC ist Nexus-MAC: 6c:31:0e:a3:0c:57

Ziel-MAC ist DHCP-Server-MAC: c4:c6:03:09:cf:47

Quell-IP ist Nexus IP auf SVI10:192.168.10.1

Ziel-IP ist DHCP-Server-IP: 192.168.1.2

Quell-Port: Bootps (67)

Ziel-Port: Bootps (67)

Meldungstyp: Bootanforderung (1)

Angeforderte IP-Adresse = 192.168.10.19

Client-MAC-Adresse: 00:62:ec:f3:04:b3 <<<<<<< Client-MAC ist im UDP/DHCP-Header enthalten

DHCP-Meldungstyp = DHCP-Anfrage

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: 0046444F3230323431435548566C616E3130  
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] Der Server antwortet Unicast (ACK) an den Relay Agent.  
Quell-MAC ist DHCP-Server-MAC: c4:c6:03:09:cf:47  
Ziel-MAC ist Nexus MAC: 6c:31:0e:a3:0c:57  
Quell-IP ist DHCP-Server: 192.168.1.2  
Ziel-IP-Nexus-IP auf SVI10: 192.168.10.1  
Quell-Port: Bootps (67)  
Ziel-Port: Bootps (67)  
Meldungstyp: Bootantwort (2)  
Ihre (Client-)IP-Adresse: 192.168.10.19  
Client-MAC-Adresse: 00:62:ec:f3:04:b3  
DHCP Message Type = DHCP ACK <<<< Dies ist der ACK-Wert des Servers

Frame 49 (348 bytes on wire, 348 bytes captured)

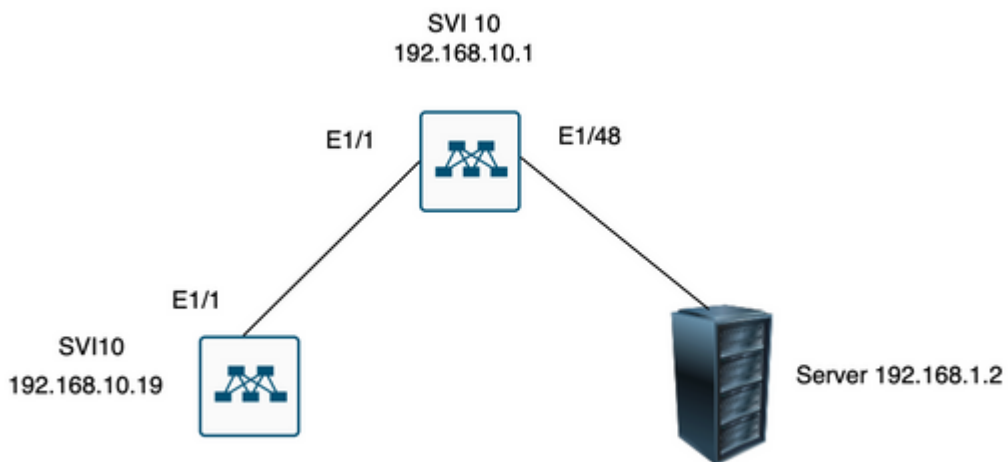
Arrival Time: Jul 19, 2023 21:53:35.344310000  
[Time delta from previous captured frame: 0.000592000 seconds]  
[Time delta from previous displayed frame: 0.000592000 seconds]  
[Time since reference or first frame: 8.623363000 seconds]  
Frame Number: 49  
Frame Length: 348 bytes  
Capture Length: 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: 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: FFFFFFF0
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
```

An diesem Punkt beginnt der Client mit der Verwendung der IP-Adresse und bestätigt, dass sie dem Client zugewiesen wurde.

```
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#



â€f

## Zugehörige Informationen

[Konfigurieren von DHCP](#)

[Ethanalyzer](#)

## Informationen zu dieser Übersetzung

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