

ASA: Konfigurationsbeispiel für DHCPv6-Relay und Fehlerbehebung

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Einführung

In diesem Dokument wird beschrieben, wie eine Cisco Adaptive Security Appliance (ASA) als DHCPv6 Relay Agent konfiguriert wird. Darüber hinaus werden einige grundlegende Problembehebungen behandelt. In ASA Code Version 9.0 und höher unterstützt die ASA

Voraussetzungen

Anforderungen

Cisco empfiehlt, dass Sie über Kenntnisse in folgenden Bereichen verfügen:

- Grundlegende IPv6-Konzepte
- IPv6-Adressierungsmechanismus
- DHCPv6-Paketfluss
- DHCP Relay-Konzepte

Verwendete Komponenten

Die Informationen in diesem Dokument basieren auf der ASA 5500 Version 9.1.2.

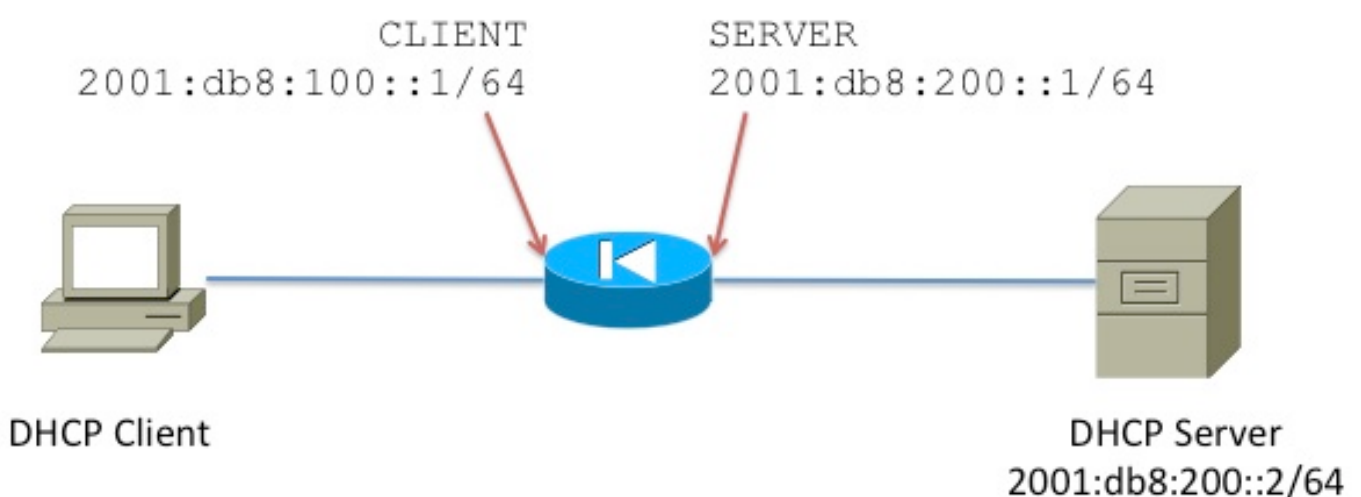
Die Informationen in diesem Dokument beziehen sich auf Geräte in einer speziell eingerichteten Testumgebung. Alle Geräte, die in diesem Dokument benutzt wurden, begannen mit einer gelöschten (Nichterfüllungs) Konfiguration. Wenn Ihr Netz Live ist, überprüfen Sie, ob Sie die mögliche Auswirkung jedes möglichen Befehls verstehen.

Stateful/Stateless DHCPv6

Wenn Sie die verschiedenen Methoden zur Adresszuweisung in IPv6 verstehen, hilft Ihnen dies, die Funktionsweise der DHCPv6-Relay-Funktion auf der ASA zu verstehen. Eine Einführung in die Stateless Address Autoconfiguration (SLAAC) und DHCPv6 finden Sie unter [Dynamische Adressenzuweisung in IPv6 mit SLAAC und DHCP](#).

Netzwerkdiagramm

In dieser Beispielkonfiguration wird beschrieben, wie die ASA als DHCPv6-Relay-Agent konfiguriert wird. In dieser Konfiguration ist **CLIENT** die Schnittstelle, über die der IPv6-Client verbunden ist. **SERVER** ist die Schnittstelle, über die der DHCPv6-Server **2001:db8:200::2/64** erreichbar ist.



DHCPv6 und DHCPv4-Nachrichtentypen

DHCPv6 Message Type	DHCPv4 Message Type
Solicit (1)	DHCPDISCOVER
Advertise (2)	DHCPOFFER
Request (3), Renew (5), Rebind (6)	DHCPREQUEST
Reply (7)	DHCPACK / DHCPNAK
Release (8)	DHCPRELEASE
Information-Request (11)	DHCPINFORM
Decline (9)	DHCPDECLINE
Confirm (4)	none
Reconfigure (10)	DHCPFORCERENEW
Relay-Forw (12), Relay-Reply (13)	none

Stateless DHCPv6 Relay

Konfiguration

Nachfolgend finden Sie die grundlegende Konfiguration für die Stateless DHCPv6 Relay-Konfiguration auf der ASA:

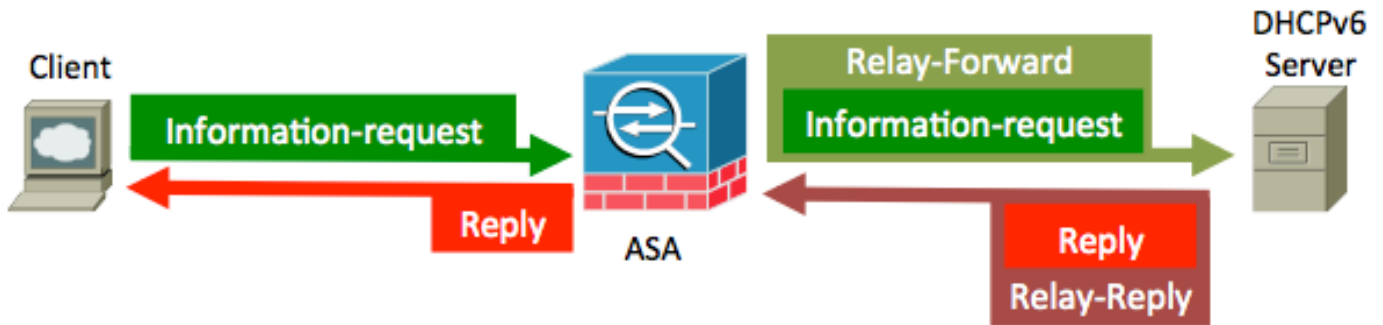
```
interface GigabitEthernet0/1
  nameif CLIENT
  security-level 100
  ipv6 address 2001:db8:100::1/64
  ipv6 enable
  ipv6 nd other-config-flag
!
interface GigabitEthernet0/0
  nameif SERVER
  security-level 0
  ipv6 address 2001:db8:200:1/64
  ipv6 enable
!
ipv6 dhcprelay server 2001:db8:200:2 inside
ipv6 dhcprelay enable outside
```

Paketfluss

Bei Stateless DHCPv6 gibt es den Paketfluss vom Client:



Die ASA fängt diese Pakete ab und bindet sie in das DHCP-Relay-Format ein:



Überprüfung

Debugger

Wenn Sie **debug ipv6 dhcprelay** und **debug ipv6 dhcp** aktivieren, werden relevante Ausgaben auf dem Bildschirm ausgegeben. Diese Ausgabe stammt aus einem Arbeitsszenario:

```
IPv6 DHCP: Received INFORMATION-REQUEST from fe80::c671:feff:fe93:b51a on CLIENT
```

```
IPv6 DHCP: detailed packet contents
src fe80::c671:feff:fe93:b51a (CLIENT)
dst ff02::1:2
type INFORMATION-REQUEST(11), xid 1588088
option ELAPSED-TIME(8), len 2
  elapsed-time 0
option CLIENTID(1), len 10
  00030001c471fe93b516
option ORO(6), len 6
  DNS-SERVERS,DOMAIN-LIST,UNKNOWN
```

```
IPv6 DHCP_RELAY: Relaying INFORMATION-REQUEST from fe80::c671:feff:fe93:b51a on CLIENT
IPv6 DHCP_RELAY: Creating relay binding for fe80::c671:feff:fe93:b51a at interface CLIENT
IPv6 DHCP_RELAY:   to 2001:db8:200::2 via 2001:db8:200::2 using SERVER
IPv6 DHCP: Sending RELAY-FORWARD to 2001:db8:200::2 on SERVER
```

```
IPv6 DHCP: detailed packet contents
src 2001:db8:200::1
dst 2001:db8:200::2 (SERVER)
type RELAY-FORWARD(12), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 34
  type INFORMATION-REQUEST(11), xid 1588088
  option ELAPSED-TIME(8), len 2
    elapsed-time 0
```

```
option CLIENTID(1), len 10
  00030001c471fe93b516
option ORO(6), len 6
  DNS-SERVERS,DOMAIN-LIST,UNKNOWN
option INTERFACE-ID(18), len 4
  0x00000015
```

IPv6 DHCP: Received RELAY-REPLY from 2001:db8:200::2 on SERVER

IPv6 DHCP: detailed packet contents

```
src 2001:db8:200::2 (SERVER)
dst 2001:db8:200::1
type RELAY-REPLY(13), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 67
type REPLY(7), xid 1588088
option SERVERID(2), len 10
  00030001002414a33c94
option CLIENTID(1), len 10
  00030001c471fe93b516
option DNS-SERVERS(23), len 16
  2001:db8:1000::1
option DOMAIN-LIST(24), len 11
  cisco.com
option INTERFACE-ID(18), len 4
  0x00000015
```

IPv6 DHCP_RELAY: Relaying RELAY-REPLY from 2001:db8:200::2 on SERVER

IPv6 DHCP_RELAY: relayed msg: REPLY

IPv6 DHCP_RELAY: to fe80::c671:feff:fe93:b51a

IPv6 DHCP: Sending REPLY to fe80::c671:feff:fe93:b51a on CLIENT

IPv6 DHCP: detailed packet contents

```
src fe80::219:7ff:fe24:2e44
dst fe80::c671:feff:fe93:b51a (CLIENT)
type REPLY(7), xid 1588088
option SERVERID(2), len 10
  00030001002414a33c94
option CLIENTID(1), len 10
  00030001c471fe93b516
option DNS-SERVERS(23), len 16
  2001:db8:1000::1
option DOMAIN-LIST(24), len 11
  cisco.com
```

Im Anforderungspaket INFORMATION-REQUEST fordert der Client nur **DNS-Server** und **Domäne** an, was erwartet wird, da der Client für Stateless DHCPv6 konfiguriert ist.

Wireshark-Snapshots

DHCP-Client-Anfrage

No.	Time	Source	Destination	Protocol	Length	Identification	Info
1	0.000000	fe80::c671:feff:fe93:b51a	ff02::1:2	DHCPv6	100		Information-request XID: 0xfc3adf CID: 00030001c471fe93b516
2	0.005584	fe80::219:7ff:fe24:2e44	fe80::c671:feff:fe93:b51a	DHCPv6	133		Reply XID: 0xfc3adf CID: 00030001c471fe93b516

Payload length: 42
 Next header: UDP (17)
 Hop limit: 255
 Source: fe80::c671:feff:fe93:b51a (fe80::c671:feff:fe93:b51a) → Src. Address field set to link-local IPv6 address assigned to the sending interface.
 [Source SA MAC: c4:71:fe:93:b5:1a (c4:71:fe:93:b5:1a)]
 Destination: ff02::1:2 (ff02::1:2) → Dst. Address set to link-local scope all-routers Multicast address (FF02::2).
 [Source GeoIP: Unknown]
 [Destination GeoIP: Unknown]
 User Datagram Protocol, [Src Port: dhcpv6-client (546), Dst Port: dhcpv6-server (547)] → UDP ports used for DHCPv6.
 DHCPv6
 Message type: Information-request (11)
 Transaction ID: 0xfc3adf
 Elapsed time
 Option: Elapsed time (8)
 Length: 2
 Value: 0000
 Elapsed-time: 0 ms
 Client Identifier
 Option: Client Identifier (1)
 Length: 10
 Value: 00030001c471fe93b516
 DUID: 00030001c471fe93b516
 DUID Type: link-layer address (3)
 Hardware type: Ethernet (1)
 Link-layer address: c4:71:fe:93:b5:16
 Option Request
 Option: Option Request (6)
 Length: 6
 Value: 001700180020
 Requested option code: DNS recursive name server (23)
 Requested option code: Domain Search List (24)
 Requested option code: Lifetime (32) → Requested options.

DHCP-Anfrage von ASA aktualisiert

No.	Time	Source	Destination	Protocol	Length	Identification	Info
1	0.000000	2001:db8:200::1	2001:db8:200::2	DHCPv6	146		Relay-Forward: 2001:db8:100::1 Information-request XID: 0xfc3adf CID: 00030001c471fe93b516
2	0.004836	2001:db8:200::2	2001:db8:200::1	DHCPv6	179		Relay-reply L: 2001:db8:100::1 Reply XID: 0xfc3adf CID: 00030001c471fe93b516

User Datagram Protocol, [Src Port: dhcpv6-server (547), Dst Port: dhcpv6-server (547)] → Ports used for DHCPv6 Relay
 DHCPv6
 Message type: Relay-forward (12)
 Hopcount: 0
 Link address: 2001:db8:100::1 (2001:db8:100::1)
 Peer address: fe80::c671:feff:fe93:b51a (fe80::c671:feff:fe93:b51a)
 Relay Message
 Option: Relay Message (9)
 Length: 34
 Value: 0bf3adf008000200000001000a00030001c471fe93b516...
 DHCPv6
 Message type: Information-request (11)
 Transaction ID: 0xfc3adf
 Elapsed time
 Option: Elapsed time (8)
 Length: 2
 Value: 0000
 Elapsed-time: 0 ms
 Client Identifier
 Option: Client Identifier (1)
 Length: 10
 Value: 00030001c471fe93b516
 DUID: 00030001c471fe93b516
 DUID Type: link-layer address (3)
 Hardware type: Ethernet (1)
 Link-layer address: c4:71:fe:93:b5:16
 Option Request
 Option: Option Request (6)
 Length: 6
 Value: 001700180020
 Requested option code: DNS recursive name server (23)
 Requested option code: Domain Search List (24)

DHCP-Antwort vom Server


```

ipv6 enable
!
ipv6 dhcprelay server 2001:db8:200:2 inside
ipv6 dhcprelay enable outside

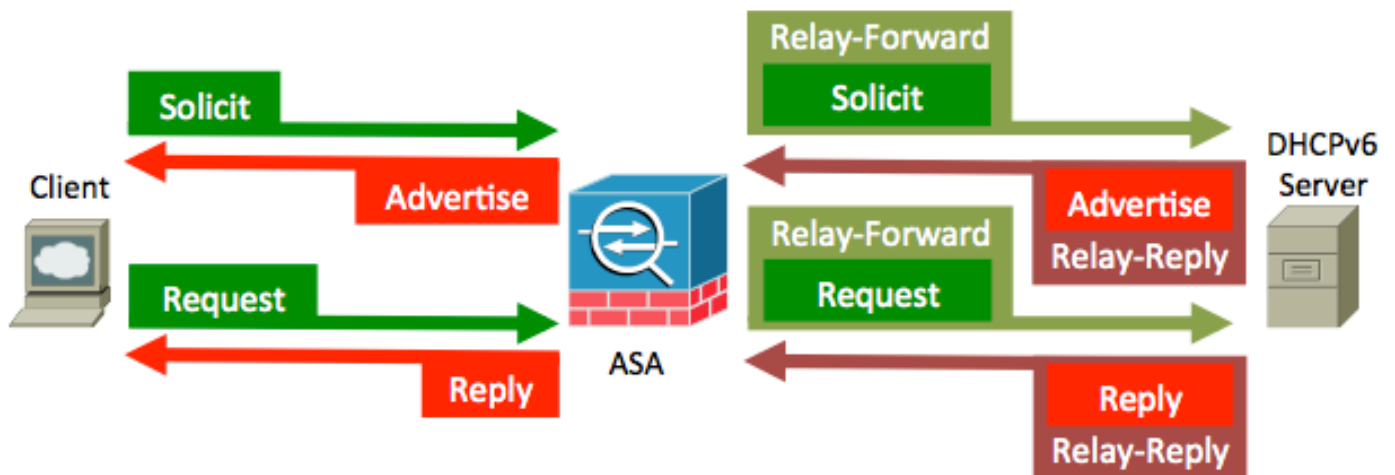
```

Paketfluss

Mit Stateful DHCPv6 ist hier der Paketfluss vom Client:



Die ASA fängt diese Pakete ab und bindet sie in das DHCP-Relay-Format ein:



Überprüfung

Debugger

```
IPv6 DHCP: Received SOLICIT from fe80::c671:feff:fe93:b51a on CLIENT
```

```

IPv6 DHCP: detailed packet contents
src fe80::c671:feff:fe93:b51a (CLIENT)
dst ff02::1:2
type SOLICIT(1), xid 2490681
option ELAPSED-TIME(8), len 2
elapsed-time 0
option CLIENTID(1), len 10
00030001c471fe93b516
option ORO(6), len 4
DNS-SERVERS,DOMAIN-LIST
option IA-NA(3), len 12
IAID 0x00040001, T1 0, T2 0

```


IPv6 DHCP_RELAY: Relaying SOLICIT from fe80::c671:feff:fe93:b51a on CLIENT
IPv6 DHCP_RELAY: Creating relay binding for fe80::c671:feff:fe93:b51a at interface CLIENT
IPv6 DHCP_RELAY: to 2001:db8:200::2 via 2001:db8:200::2 using SERVER
IPv6 DHCP: Sending RELAY-FORWARD to 2001:db8:200::2 on SERVER

IPv6 DHCP: detailed packet contents

```
src 2001:db8:200::1
dst 2001:db8:200::2 (SERVER)
type RELAY-FORWARD(12), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 48
type SOLICIT(1), xid 2490681
option ELAPSED-TIME(8), len 2
  elapsed-time 0
option CLIENTID(1), len 10
  00030001c471fe93b516
option ORO(6), len 4
  DNS-SERVERS,DOMAIN-LIST
option IA-NA(3), len 12
  IAID 0x00040001, T1 0, T2 0
option INTERFACE-ID(18), len 4
  0x00000015
```

IPv6 DHCP: Received RELAY-REPLY from 2001:db8:200::2 on SERVER

IPv6 DHCP: detailed packet contents

```
src 2001:db8:200::2 (SERVER)
dst 2001:db8:200::1
type RELAY-REPLY(13), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 111
type ADVERTISE(2), xid 2490681
option SERVERID(2), len 10
  00030001002414a33c94
option CLIENTID(1), len 10
  00030001c471fe93b516
option IA-NA(3), len 40
  IAID 0x00040001, T1 43200, T2 69120
option IAADDR(5), len 24
  IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
  preferred INFINITY, valid INFINITY
option DNS-SERVERS(23), len 16
  2001:db8:1000::1
option DOMAIN-LIST(24), len 11
  cisco.com
option INTERFACE-ID(18), len 4
  0x00000015
```

IPv6 DHCP_RELAY: Relaying RELAY-REPLY from 2001:db8:200::2 on SERVER

IPv6 DHCP_RELAY: relayed msg: ADVERTISE

IPv6 DHCP_RELAY: to fe80::c671:feff:fe93:b51a

IPv6 DHCP: Sending ADVERTISE to fe80::c671:feff:fe93:b51a on CLIENT

IPv6 DHCP: detailed packet contents

```
src fe80::219:7ff:fe24:2e44
dst fe80::c671:feff:fe93:b51a (CLIENT)
type ADVERTISE(2), xid 2490681
option SERVERID(2), len 10
  00030001002414a33c94
option CLIENTID(1), len 10
  00030001c471fe93b516
option IA-NA(3), len 40
  IAID 0x00040001, T1 43200, T2 69120
option IAADDR(5), len 24
```

```
IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
preferred INFINITY, valid INFINITY
option DNS-SERVERS(23), len 16
2001:db8:1000::1
option DOMAIN-LIST(24), len 11
cisco.com
```

IPv6 DHCP: Received REQUEST from fe80::c671:feff:fe93:b51a on CLIENT

IPv6 DHCP: detailed packet contents

```
src fe80::c671:feff:fe93:b51a (CLIENT)
dst ff02::1:2
type REQUEST(3), xid 2492842
option ELAPSED-TIME(8), len 2
elapsed-time 0
option CLIENTID(1), len 10
00030001c471fe93b516
option ORO(6), len 4
DNS-SERVERS,DOMAIN-LIST
option SERVERID(2), len 10
00030001002414a33c94
option IA-NA(3), len 40
IAID 0x00040001, T1 0, T2 0
option IAADDR(5), len 24
IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
preferred INFINITY, valid INFINITY
```

IPv6 DHCP_RELAY: Relaying REQUEST from fe80::c671:feff:fe93:b51a on CLIENT

IPv6 DHCP_RELAY: to 2001:db8:200::2 via 2001:db8:200::2 using SERVER

IPv6 DHCP: Sending RELAY-FORWARD to 2001:db8:200::2 on SERVER

IPv6 DHCP: detailed packet contents

```
src 2001:db8:200::1
dst 2001:db8:200::2 (SERVER)
type RELAY-FORWARD(12), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 90
type REQUEST(3), xid 2492842
option ELAPSED-TIME(8), len 2
elapsed-time 0
option CLIENTID(1), len 10
00030001c471fe93b516
option ORO(6), len 4
DNS-SERVERS,DOMAIN-LIST
option SERVERID(2), len 10
00030001002414a33c94
option IA-NA(3), len 40
IAID 0x00040001, T1 0, T2 0
option IAADDR(5), len 24
IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
preferred INFINITY, valid INFINITY
option INTERFACE-ID(18), len 4
0x00000015
```

IPv6 DHCP: Received RELAY-REPLY from 2001:db8:200::2 on SERVER

IPv6 DHCP: detailed packet contents

```
src 2001:db8:200::2 (SERVER)
dst 2001:db8:200::1
type RELAY-REPLY(13), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 111
type REPLY(7), xid 2492842
option SERVERID(2), len 10
00030001002414a33c94
```

```

option CLIENTID(1), len 10
  00030001c471fe93b516
option IA-NA(3), len 40
  IAID 0x00040001, T1 43200, T2 69120
option IAADDR(5), len 24
  IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
  preferred INFINITY, valid INFINITY
option DNS-SERVERS(23), len 16
  2001:db8:1000::1
option DOMAIN-LIST(24), len 11
  cisco.com
option INTERFACE-ID(18), len 4
  0x00000015

```

```

IPv6 DHCP_RELAY: Relaying RELAY-REPLY from 2001:db8:200::2 on SERVER
IPv6 DHCP_RELAY:   relayed msg: REPLY
IPv6 DHCP_RELAY:   to fe80::c671:feff:fe93:b51a
IPv6 DHCP: Sending REPLY to fe80::c671:feff:fe93:b51a on CLIENT

```

```

IPv6 DHCP: detailed packet contents
src fe80::219:7ff:fe24:2e44
dst fe80::c671:feff:fe93:b51a (CLIENT)
type REPLY(7), xid 2492842
option SERVERID(2), len 10
  00030001002414a33c94
option CLIENTID(1), len 10
  00030001c471fe93b516
option IA-NA(3), len 40
  IAID 0x00040001, T1 43200, T2 69120
option IAADDR(5), len 24
  IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
  preferred INFINITY, valid INFINITY
option DNS-SERVERS(23), len 16
  2001:db8:1000::1
option DOMAIN-LIST(24), len 11
  cisco.com

```

Wireshark-Snapshots

SOLIKIT (1)

Ein DHCPv6-Client sendet eine Anfrage zur Suche nach DHCPv6-Servern.

The screenshot shows a network traffic capture in Wireshark. The packet list at the top shows three packets: a DHCPv6 SOLICIT message from fe80::c671:feff:fe93:b51a to ff02::1:2, and two subsequent packets (Advertise and Reply) from the server back to the client. The details pane for the first packet (SOLICIT) is expanded, showing the following options:

- Message type:** SOLICIT (1) - DHCPv6 client sends a solicit message.
- Transaction ID:** 0x260139
- Elapsed time:** 0 ms
- Client Identifier:**
 - Option: Client Identifier (1)
 - Length: 10
 - Value: 00030001c471fe93b516
 - DUID: 00030001c471fe93b516
 - DUID Type: link-layer address (3)
 - Hardware type: Ethernet (1)
 - Link-layer address: c4:71:fe:93:b5:16
- Option Request:**
 - Option: option Request (6)
 - Length: 4
 - Value: 00170018
 - Requested option code: DNS recursive name server (23)
 - Requested option code: Domain search List (24)
- Identity Association for Non-temporary Address:**
 - Option: Identity Association for Non-temporary Address (3)
 - Length: 12
 - Value: 00040001000000000000000000
 - IAID: 00040001
 - T1: 0
 - T2: 0

Annotations in the image highlight the DUID and Link-layer address, and the Identity Association for Non-temporary Address option, with explanatory text: "Each DHCP client and server has a DUID. DHCP servers use DUIDs to identify clients for the selection of configuration parameters and in the association of IAs with clients." and "The client is responsible for creating IAs and requesting that a server assign IPv6 address to IA."

Die ASA leitet die Nachricht erneut ein.

Source	Destination	Protocol	Length	Identification	Info
2001:db8:200::1	2001:db8:200::2	DHCPv6	160		Relay-forw : 2001:db8:100::1 Solicit XID: 0x260139 CID: 00030001c471fe93b
2001:db8:200::2	2001:db8:200::1	DHCPv6	223		Relay-reply L: 2001:db8:100::1 Advertise XID: 0x260139 CID: 00030001c471fe93b
2001:db8:200::1	2001:db8:200::2	DHCPv6	202		Relay-forw L: 2001:db8:100::1 Request XID: 0x2609aa CID: 00030001c471fe93b
2001:db8:200::2	2001:db8:200::1	DHCPv6	223		Relay-reply L: 2001:db8:100::1 Reply XID: 0x2609aa CID: 00030001c471fe93b5

Frame 1: 160 bytes on wire (1280 bits), 160 bytes captured (1280 bits)

Ethernet II, Src: Cisco_a3:3c:98 (00:19:07:24:2e:44), Dst: Cisco_a3:3c:98 (00:19:07:24:2e:44)

802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 901

Internet Protocol Version 6, Src: 2001:db8:200::1 (2001:db8:200::1), Dst: 2001:db8:200::2 (2001:db8:200::2)

User Datagram Protocol, Src Port: dhcpv6-server (547), Dst Port: dhcpv6-server (547) **Ports used between ASA and DHCPv6 server.**

DHCPv6

Message type: Relay-forw (12) **ASA relay's Solicit message**

Hopcount: 0

Link address: 2001:db8:100::1 (2001:db8:100::1)

Peer address: fe80::c671:feff:fe93:b51a (fe80::c671:feff:fe93:b51a)

Relay Message

Option: Relay Message (9)

Length: 48

Value: 012601390008000200000001000a00030001c471fe93b516...

DHCPv6

Message type: solicit (1)

Transaction ID: 0x260139

- Elapsed time
- Client Identifier
- Option Request
- Identity Association for Non-temporary Address

Interface-Id

WERBUNG (2)

Ein Server sendet eine Werbenachricht, um anzuzeigen, dass er für den DHCP-Dienst verfügbar ist, als Reaktion auf eine von einem Client empfangene Aufforderung.

Source	Destination	Protocol	Length	Identification	Info
2001:db8:200::1	2001:db8:200::2	DHCPv6	160		Relay-forw L: 2001:db8:100::1 Solicit XID: 0x260139 CID: 00030001c471fe93b
2001:db8:200::2	2001:db8:200::1	DHCPv6	223		Relay-reply L: 2001:db8:100::1 Advertise XID: 0x260139 CID: 00030001c471fe93b
2001:db8:200::1	2001:db8:200::2	DHCPv6	202		Relay-forw L: 2001:db8:100::1 Request XID: 0x2609aa CID: 00030001c471fe93b
2001:db8:200::2	2001:db8:200::1	DHCPv6	223		Relay-reply L: 2001:db8:100::1 Reply XID: 0x2609aa CID: 00030001c471fe93b5

Frame 2: 223 bytes on wire (1784 bits), 223 bytes captured (1784 bits)

Ethernet II, Src: Cisco_a3:3c:98 (00:19:07:24:2e:44), Dst: Cisco_a3:3c:98 (00:19:07:24:2e:44)

802.1Q Virtual LAN, PRI: 6, CFI: 0, ID: 901

Internet Protocol Version 6, Src: 2001:db8:200::2 (2001:db8:200::2), Dst: 2001:db8:200::1 (2001:db8:200::1)

User Datagram Protocol, Src Port: dhcpv6-server (547), Dst Port: dhcpv6-server (547)

DHCPv6

Message type: Relay-reply (13)

Hopcount: 0

Link address: 2001:db8:100::1 (2001:db8:100::1)

Peer address: fe80::c671:feff:fe93:b51a (fe80::c671:feff:fe93:b51a)

Relay Message

Option: Relay Message (9)

Length: 111

Value: 022601390002000a00030001002414a33c940001000a0003...

DHCPv6

Message type: Advertise (2) **Server sends an Advertise message to indicate that it is available for DHCPv6 service.**

Transaction ID: 0x260139

- Server Identifier
- Client Identifier
- Identity Association for Non-temporary Address
- DNS recursive name server
- Domain Search List

Interface-Id

Message type: Advertise (2)

Transaction ID: 0x260139

- Server Identifier
 - Option: Server Identifier (2)
 - Length: 10
 - Value: 00030001002414a33c94 **Server DUID**
 - DUID: 00030001002414a33c94
 - DUID Type: Link-layer address (3)
 - Hardware type: Ethernet (1)
 - Link-layer address: 00:19:07:24:2e:44
- Client Identifier
- Identity Association for Non-temporary Address
 - Option: Identity Association for Non-temporary Address (3)
 - Length: 40
 - Value: 000400010000a8c000010e000005001820010db803000000...
 - IAID: 00040001
 - I1: 43200
 - T2: 69120
- IA Address
 - Option: IA Address (5)
 - Length: 24
 - Value: 20010db80300000048ae5f5d8290e926ffffffffffffffff
 - Ipv6 address: 2001:db8:300:0:48ae:5f5d:8290:e926 (2001:db8:300:0:48ae:5f5d:8290:e926) **Offered IP Address**
 - Preferred lifetime: infinity
 - Preferred lifetime: infinity
- DNS recursive name server
 - Option: DNS recursive name server (23)
 - Length: 16
 - Value: 20010db8100000000000000000000000
 - DNS server address: 2001:db8:1000::1 (2001:db8:1000::1) **DNS Server IP Address**
- Domain Search List
 - Option: Domain Search List (24)
 - Length: 11
 - Value: 05636973636f03636fd00
 - DNS Domain Search List
 - Domain: cisco.com **Domain Name Provided**

Interface-Id

ANTRAG (3)

Ein Client sendet eine Anforderungsmeldung, um Konfigurationsparameter, die IP-Adressen oder delegierte Präfixe enthalten, von einem bestimmten Server anzufordern.

The image shows a Wireshark packet capture of a DHCPv6 Request message. The packet list shows a request from source fe80::c671:feff:fe93:b51a to destination ff02::1:2. The packet details pane shows the following structure:

- Message type: Request (3)
- Transaction ID: 0x2609aa
- Elapsed time: 0 ms
- Client Identifier
- Option Request (6)
 - Requested option code: DNS recursive name server (23)
 - Requested option code: Domain Search List (24)
- Server Identifier
- Identity Association for Non-temporary Address
 - Option: Identity Association for Non-temporary Address (3)
 - IAID: 00040001
 - T1: 0
 - T2: 0
- IA Address
 - Option: IA Address (5)
 - IPv6 address: 2001:db8:300:0:48ae:5f5d:8290:e926 (2001:db8:300:0:48ae:5f5d:8290:e926)
 - Preferred lifetime: infinity
 - Preferred lifetime: infinity

Client request for IPv6 Address, DNS Server, Domain name.

ANTWORT (7)

Ein Server sendet eine Antwortnachricht, die zugewiesene Adressen und Konfigurationsparameter als Antwort auf eine von einem Client erhaltene Aufforderung, Anfrage, Verlängerung oder Neukennzeichnung enthält. Ein Server sendet eine Antwortnachricht, die Konfigurationsparameter als Antwort auf eine Informationsanforderungsmeldung enthält. Ein Server sendet als Antwort auf eine Bestätigungsmeldung eine Antwortnachricht, die bestätigt oder verweigert, dass die dem Client zugewiesenen Adressen für den Link geeignet sind, mit dem der Client verbunden ist. Ein Server sendet eine Antwortnachricht, um den Empfang einer Release- oder Ablehnungsnachricht zu bestätigen.

The image shows a Wireshark packet capture of a DHCPv6 Reply message. The packet list shows a reply from source 2001:db8:200::2 to destination 2001:db8:200::1. The packet details pane shows the following structure:

- Message type: Reply (7)
- Transaction ID: 0x2609aa
- Server Identifier
- Client Identifier
- Identity Association for Non-temporary Address
 - Option: Identity Association for Non-temporary Address (3)
 - IAID: 00040001
 - T1: 43200
 - T2: 69120
- IA Address
 - Option: IA Address (5)
 - IPv6 address: 2001:db8:300:0:48ae:5f5d:8290:e926 (2001:db8:300:0:48ae:5f5d:8290:e926)
 - Preferred lifetime: infinity
 - Preferred lifetime: infinity
- DNS recursive name server
 - Option: DNS recursive name server (23)
 - DNS server address: 2001:db8:1000::1 (2001:db8:1000::1)
- Domain Search List
 - Option: Domain Search List (24)
 - DNS Domain Search List
 - Domain: cisco.com

Fehlerbehebung

Die Verbindung mit dem DHCPv6-Server bestätigen.

```
ciscoasa# show ipv6 neighbor
```

```
IPv6 Address                               Age Link-layer Addr State Interface
2001:db8:200::2                            0 0024.14a3.3c98 REACH SERVER
```

Bestätigen Sie, dass Sie Pakete vom Client erhalten, wenn dieser eine IPv6-Adresse anfordert. Das vom Client gesendete Paket hängt von den Adressenzuweisungseinstellungen ab (Stateful vs. Stateless).

Wenn der Client mit dem DHCPv6-Prozess beginnt, sendet er eine Router-Anfrage, um das Vorhandensein von IPv6-Routern auf der Verbindung zu erkennen. Es sendet eine Multicast Router Solicitation-Nachricht, um die IPv6-Router zur Reaktion aufzufordern. Im Ethernet-Header der Router Solicitation-Meldung werden folgende Felder angezeigt:

- Das Feld "Quelladresse" ist die MAC-Adresse des Hosts, der die IPv6-Adresse anfordert.
- Das Feld "Zieladresse" ist auf 33-33-00-00-00-02 festgelegt.

Im IPv6-Header der Router Solicitation-Meldung werden diese Felder angezeigt.

- Das Feld Quelladresse wird entweder auf eine der sendenden Schnittstelle zugewiesene lokale IPv6-Adresse oder auf die nicht angegebene IPv6-Adresse (::) gesetzt.
- Das Feld "Destination Address" (Zieladresse) ist auf die Multicast-Adresse des Bereichs "Link-Local Scope All-Router" (FF02::2) eingestellt.
- Das Feld "Hop Limit" ist auf 255 eingestellt.

Als Antwort senden die IPv6-Router unerwünschte Router-Werbenachrichten. Die Router-Werbebotschaft enthält die Informationen, die Hosts benötigen, um die Link-Präfixe, die Link Maximum Transmission Unit (MTU) und bestimmte Routen zu bestimmen.

```
ciscoasa(config)# show capture capin detail
```

```
fe80::c671:feff:fe93:b51a.546 > ff02::1:2.547: [udp sum ok] udp 42
[hlim 255] (len 100)---->Request from client
```

```
fe80::219:7ff:fe24:2e44.547 > fe80::c671:feff:fe93:b51a.546: [udp sum ok]
udp 75 [class 0xe0] (len 133, hlim 255)
```

```
ciscoasa(config)# show capture capout detail
```

```
2 packets captured
```

```
1: 12:06:52.700799      2001:db8:200:1.547 > 2001:db8:200:2.547:  udp 88
[class 0xe0]---->ASA forwards request to DHCPv6 router
```

```
2: 12:06:53.289047      2001:db8:200:2.547 > 2001:db8:200:1.547:  udp 121
[class 0xe0]----> Reply from DHCPV6 server.
```

DHCP-Relay-Ausgaben

```
ciscoasa# show ipv6 dhcprelay binding
```

```
1 in use, 1 most used
```

```
Client: fe80::c671:feff:fe93:b51a (CLIENT)
DUID: 00030001c471fe93b516, Timeout in 56 seconds
```

Hinweis: Die Bindung wird nach kurzer Zeit von der ASA gelöscht. Dies wird in `debug ipv6 dhcprelay` gesehen.

IPv6 DHCP_RELAY: Deleting binding for fe80::c671:feff:fe93:b51a at interface CLIENT

```
ciscoasa# show ipv6 dhcprelay statistics
```

Relay Messages:

SOLICIT	2
ADVERTISE	2
REQUEST	2
CONFIRM	0
RENEW	0
REBIND	0
REPLY	9
RELEASE	1
DECLINE	0
RECONFIGURE	0
INFORMATION-REQUEST	6
RELAY-FORWARD	11
RELAY-REPLY	11

Relay Errors:

Malformed message:	0
Block allocation/duplication failure:	0
Hop count limit exceeded:	0
Forward binding creation failure:	0
Reply binding lookup failure:	0
No output route:	0
Conflict relay server route:	0
Failed to add server input rule:	0
Unit or context is not active:	0

Total Relay Bindings Created: 8

Freigabeadressen

Clients können ihre DHCPv6-zugewiesene Adresse freigeben, nachdem sie sie für das Netzwerk verwendet haben. Im nächsten Abschnitt wird die Debug-Ausgabe dargestellt, die der Adressfreigabe in Stateful DHCPv6 zugeordnet ist.

Debugger

IPv6 DHCP: Received RELEASE from fe80::c671:feff:fe93:b51a on CLIENT

IPv6 DHCP: detailed packet contents

```
src fe80::c671:feff:fe93:b51a (CLIENT)
dst ff02::1:2
type RELEASE(8), xid 3180815
option ELAPSED-TIME(8), len 2
elapsed-time 0
option CLIENTID(1), len 10
00030001c471fe93b516
option SERVERID(2), len 10
00030001002414a33c94
option IA-NA(3), len 40
IAID 0x00040001, T1 0, T2 0
option IAADDR(5), len 24
IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
```

```
    preferred INFINITY, valid INFINITY
IPv6 DHCP_RELAY: Relaying RELEASE from fe80::c671:feff:fe93:b51a on CLIENT
IPv6 DHCP_RELAY: Creating relay binding for fe80::c671:feff:fe93:b51a at interface CLIENT
IPv6 DHCP_RELAY:   to 2001:db8:200::2 via 2001:db8:200::2 using SERVER
IPv6 DHCP: Sending RELAY-FORWARD to 2001:db8:200::2 on SERVER
```

```
IPv6 DHCP: detailed packet contents
```

```
src 2001:db8:200::1
dst 2001:db8:200::2 (SERVER)
type RELAY-FORWARD(12), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 82
type RELEASE(8), xid 3180815
option ELAPSED-TIME(8), len 2
  elapsed-time 0
option CLIENTID(1), len 10
  00030001c471fe93b516
option SERVERID(2), len 10
  00030001002414a33c94
option IA-NA(3), len 40
  IAID 0x00040001, T1 0, T2 0
  option IAADDR(5), len 24
    IPv6 address 2001:db8:300:0:48ae:5f5d:8290:e926
    preferred INFINITY, valid INFINITY
option INTERFACE-ID(18), len 4
  0x00000015
```

```
IPv6 DHCP: Received RELAY-REPLY from 2001:db8:200::2 on SERVER
```

```
IPv6 DHCP: detailed packet contents
```

```
src 2001:db8:200::2 (SERVER)
dst 2001:db8:200::1
type RELAY-REPLY(13), hop 0
link 2001:db8:100::1
peer fe80::c671:feff:fe93:b51a
option RELAY-MSG(9), len 45
type REPLY(7), xid 3180815
option SERVERID(2), len 10
  00030001002414a33c94
option CLIENTID(1), len 10
  00030001c471fe93b516
option STATUS-CODE(13), len 9
  status code SUCCESS(0)
  status message: SUCCESS
option INTERFACE-ID(18), len 4
  0x00000015
```

```
IPv6 DHCP_RELAY: Relaying RELAY-REPLY from 2001:db8:200::2 on SERVER
```

```
IPv6 DHCP_RELAY:   relayed msg: REPLY
IPv6 DHCP_RELAY:   to fe80::c671:feff:fe93:b51a
IPv6 DHCP: Sending REPLY to fe80::c671:feff:fe93:b51a on CLIENT
```

```
IPv6 DHCP: detailed packet contents
```

```
src fe80::219:7ff:fe24:2e44
dst fe80::c671:feff:fe93:b51a (CLIENT)
type REPLY(7), xid 3180815
option SERVERID(2), len 10
  00030001002414a33c94
option CLIENTID(1), len 10
  00030001c471fe93b516
option STATUS-CODE(13), len 9
  status code SUCCESS(0)
  status message: SUCCESS
```


Zugehörige Informationen

[Verschiedene DHCP-Optionen](#)

[Konfigurationsbeispiel für ASA DHCP-Relay](#)

[Konfigurieren der ASA für die Weiterleitung von IPv6-Datenverkehr](#)

[ASA-Paketerfassung mit CLI- und ASDM-Konfigurationsbeispiel](#)