

ASA: Esempio di configurazione e risoluzione dei problemi del relay DHCPv6

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Introduzione

Nel documento viene descritto come configurare un'appliance Cisco Adaptive Security (ASA) come agente di inoltro DHCPv6 e vengono inoltre descritte alcune procedure di risoluzione dei problemi di base. Sul codice ASA versione 9.0 e successive, l'appliance ASA supporta

Prerequisiti

Requisiti

Cisco raccomanda la conoscenza dei seguenti argomenti:

- Concetti di base di IPv6
- Meccanismo di indirizzamento IPv6
- Flusso di pacchetti DHCPv6
- Concetti sull'inoltro DHCP

Componenti usati

Il riferimento delle informazioni contenute in questo documento è ASA 5500 versione 9.1.2.

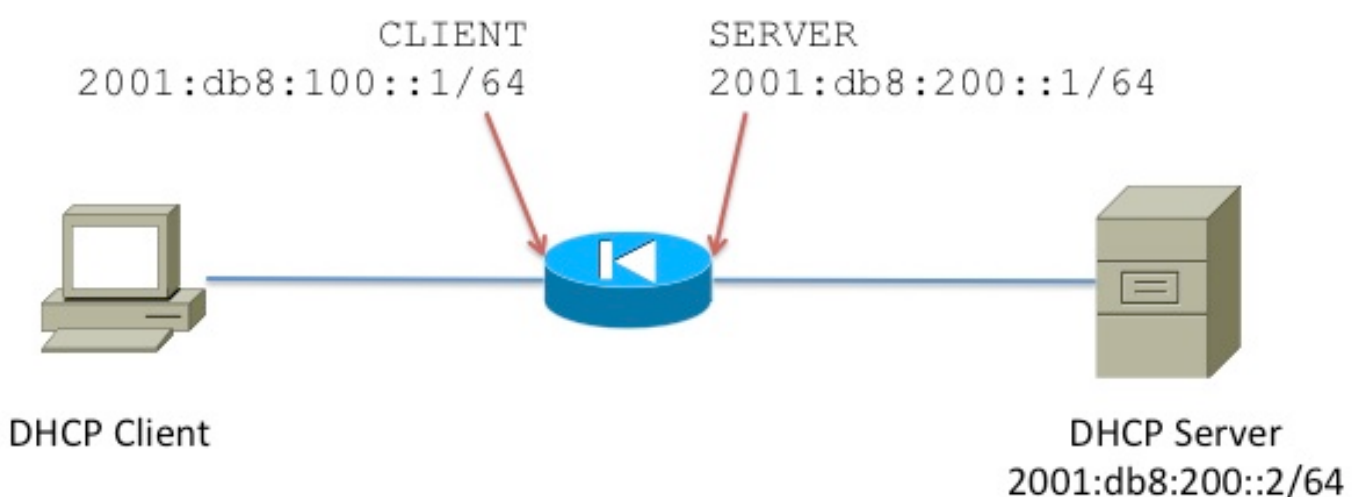
Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

DHCPv6 stateful e DHCPv6 stateless

Se si conosce il diverso metodo di allocazione degli indirizzi in IPv6, è possibile comprendere il funzionamento della funzionalità di inoltro DHCPv6 sull'appliance ASA. Per un'introduzione alla configurazione automatica degli indirizzi senza stato (SLAAC, Stateless Address Autoconfiguration) e DHCPv6, vedere [Assegnazione degli indirizzi dinamici in IPv6 tramite SLAAC e DHCP](#).

Esempio di rete

In questa configurazione di esempio viene descritto come configurare l'ASA come agente di inoltro DHCPv6. In questa configurazione, **CLIENT** è l'interfaccia a cui è connesso il client IPv6. **SERVER** è l'interfaccia tramite la quale il server DHCPv6 **2001:db8:200::2/64** è raggiungibile.



Tipi di messaggio DHCPv6 e DHCPv4

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

Inoltro DHCPv6 senza stato

Configurazione

Di seguito è riportata la configurazione base per la configurazione del relay DHCPv6 senza stato sull'appliance ASA:

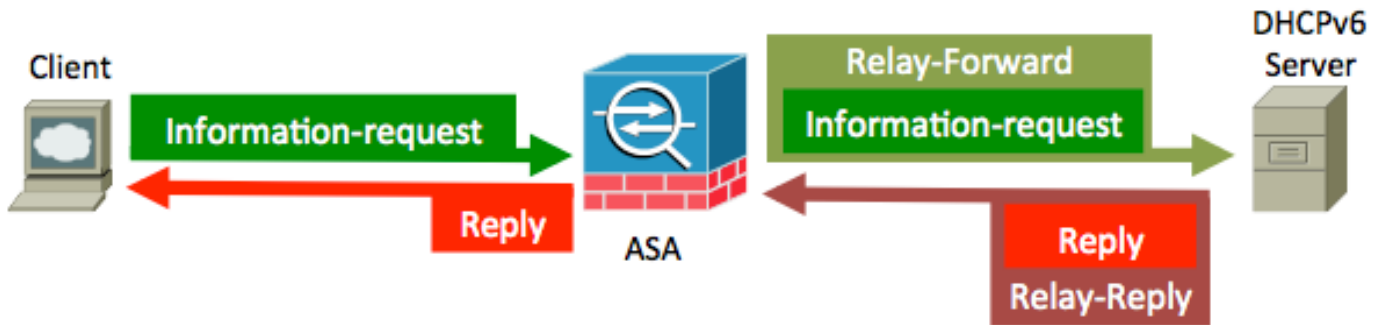
```
interface GigabitEthernet0/1
 nameif CLIENT
 security-level 100
 ipv6 address 2001:db8:100::1/64
 ipv6 enable
 ipv6 nd other-config-flag
!
interface GigabitEthernet0/0
 nameif SERVER
 security-level 0
 ipv6 address 2001:db8:200:1/64
 ipv6 enable
!
ipv6 dhcprelay server 2001:db8:200:2 inside
ipv6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

Flusso dei pacchetti

Con DHCPv6 senza stato, il flusso del pacchetto dal client è il seguente:



L'ASA intercetta questi pacchetti e li incapsula nel formato di inoltramento DHCP:



Verifica

Debug

Se si abilita **debug ipv6 dhcprelay** ed **debug ipv6 dhcp**, l'output corrispondente verrà stampato sullo schermo. Questo output viene generato da uno scenario di lavoro:

```
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
```

Nel pacchetto di richiesta INFORMATION-REQUEST, il client richiede solo **DNS-Server** e **Domain**, il che è previsto poiché il client è configurato per DHCPv6 senza stato.

Fotografie di Wireshark

Richiesta client DHCP

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)
[Source SA MAC: c4:71:fe:93:b5:1a (c4:71:fe:93:b5:1a)]
Destination: ff02::1:2 (ff02::1:2)
[Source GeoIP: Unknown]
[Destination GeoIP: Unknown]
User Datagram Protocol, Src Port: dhcpv6-client (546), Dst Port: dhcpv6-server (547)
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)
  
```

Src. Address field set to link-local IPv6 address assigned to the sending interface.

Dst. Address set to link-local scope all-routers Multicast address (FF02::2).

UDP ports used for DHCPv6.

Requested options.

Richiesta DHCP inoltrata da ASA

No.	Time	Source	Destination	Protocol	Length	Identification	Info
1	0.000000	2001:db8:200::1	2001:db8:200::2	DHCPv6	146		Relay-Forward L: 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)
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: 0bf3c3adf0008000200000001000a00030001c471fe93b516...
  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)
  
```

Ports used for DHCPv6 Relay

Risposta DHCP dal server

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

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: 67	
Value: 07fc3adf0002000a00030001002414a33c940001000a0003...	
DHCPv6	
Message type: Reply (7)	
Transaction ID: 0xfc3adf	
Server Identifier	
Option: Server Identifier (2)	
Length: 10	
Value: 00030001002414a33c94	
DUID: 00030001002414a33c94	
DUID Type: link-layer address (3)	
Hardware type: Ethernet (1)	
Link-layer address: 00:24:14:a3:3c:94	
Client Identifier	
Option: DNS recursive name server (23)	
Length: 16	
Value: 20010db81000000000000000000000000001	
DNS server address: 2001:db8:1000::1 (2001:db8:1000::1)	DNS Server Provided by DHCPv6 Server
Option: Domain Search List (24)	
Length: 11	
Value: 05636973636f03636f6d00	
DNS Domain Search List	Domain name
Domain: cisco.com	

Risposta inoltrata al client

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

Internet Protocol Version 6, Src: fe80::219:7ff:fe24:2e44 (fe80::219:7ff:fe24:2e44), Dst: fe80::c671:feff:fe93:b51a (fe80::c671:feff:fe93:b51a)	
User Datagram Protocol, Src Port: dhcpv6-server (547), Dst Port: dhcpv6-client (546) Ports used to reply clients	
DHCPv6	
Message type: Reply (7)	
Transaction ID: 0xfc3adf	
Server Identifier	
Option: Server Identifier (2)	
Length: 10	
Value: 00030001002414a33c94	
DUID: 00030001002414a33c94	
DUID Type: link-layer address (3)	
Hardware type: Ethernet (1)	
Link-layer address: 00:24:14:a3:3c:94	
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: DNS recursive name server (23)	
Length: 16	
Value: 20010db81000000000000000000000000001	
DNS server address: 2001:db8:1000::1 (2001:db8:1000::1)	Information forwarded to client
Option: Domain Search List (24)	
Length: 11	
Value: 05636973636f03636f6d00	
DNS Domain Search List	
Domain: cisco.com	

DHCPv6 stateful

Configurazione

Di seguito è riportata la configurazione base per la configurazione del relay DHCPv6 stateful sull'appliance ASA:

```
interface GigabitEthernet0/1
  nameif CLIENT
  security-level 100
ipv6 address 2001:db8:100::1/64
  ipv6 enable
!
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

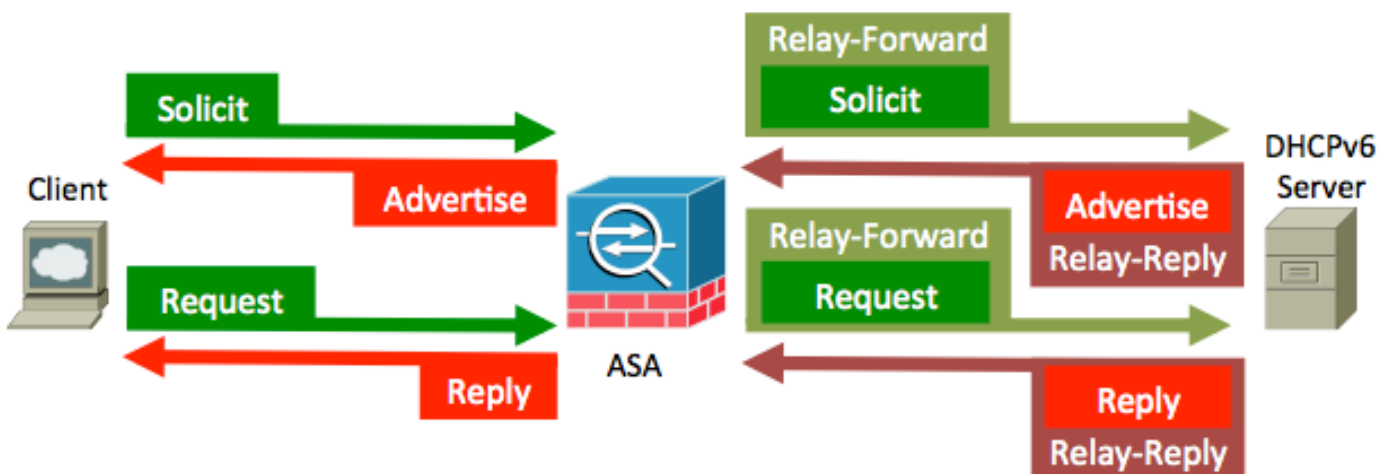
```

Flusso dei pacchetti

Con DHCPv6 con stato, il flusso di pacchetto dal client è il seguente:



L'ASA intercetta questi pacchetti e li incapsula nel formato di inoltro DHCP:



Verifica

Debug

```
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

```

Fotografie di Wireshark

SOLLECITAZIONE (1)

Un client DHCPv6 invia un messaggio di sollecitazione per individuare i server DHCPv6.

The image shows a Wireshark capture of a DHCPv6 SOLICIT message. The packet list pane shows three packets: a SOLICIT (114 bytes), an ADVERTISE (177 bytes), and a REQUEST (156 bytes). The packet details pane is expanded to show the DHCPv6 client sending a sollicit message. Key fields include:

- Message type:** sollicit (1)
- 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 explain the significance of these fields: "Ports used between clients and Relay Agent (ASA)", "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."

L'ASA trasmette il messaggio Sollecitazione.

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 (00:24:14:a3:3c:98), Dst: Cisco_a3:3c:98 (00:24:14:a3:3c:98)

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: 012601390002000a00030001002414a33c940001000a0003...

DHCPv6

Message type: solicit (1)

Transaction ID: 0x260139

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

Interface-Id

PUBBLICITÀ (2)

Un server invia un messaggio di annuncio per indicare che è disponibile per il servizio DHCP, in risposta a un messaggio di sollecitazione ricevuto da un client.

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 (00:24:14:a3:3c:98), Dst: Cisco_a3:3c:98 (00:24:14:a3:3c:98)

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: 00:24:14:a3:3c:94
- 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: 20010db80300000048ae5f5d8290e926ffffffffffffffffffff
 - 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: 0563697363f0363f6d00
 - DNS Domain Search List
 - Domain: cisco.com **Domain Name Provided**

Interface-Id

RICHIESTA (3)

Un client invia un messaggio di richiesta per richiedere parametri di configurazione, che includono indirizzi IP o prefissi delegati, da un server specifico.

The image shows a Wireshark packet capture of a DHCPv6 Request message. The packet list pane shows three packets: a Solicit message, an Advertise message, and the selected Request message. The packet details pane for the Request message shows the following structure:

- Message type: Request (3)
- Transaction ID: 0x2609aa
- Elapsed time: Option: Elapsed time (8), Length: 2, Value: 0000, Elapsed-time: 0 ms
- Client Identifier: Option Request (6), Length: 4, Value: 00170018
- 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), Length: 40, Value: 000400010000000000000000000000005001820010db803000000...
- IA Address: Option: IA Address (5), Length: 24, Value: 20010db803000000048ae5f5d8290e926ffffffffffffffff, 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.

RISPOSTA (7)

Un server invia un messaggio di risposta contenente gli indirizzi assegnati e i parametri di configurazione in risposta a un messaggio di sollecitazione, richiesta, rinnovo o riassociazione ricevuto da un client. Un server invia un messaggio di risposta contenente parametri di configurazione in risposta a un messaggio di richiesta di informazioni. Un server invia un messaggio di risposta in risposta a un messaggio di conferma che conferma o nega che gli indirizzi assegnati al client siano appropriati per il collegamento a cui il client è connesso. Un server invia un messaggio di risposta per confermare la ricezione di un messaggio di rilascio o rifiuto.

The image shows a Wireshark packet capture of a DHCPv6 Reply message. The packet list pane shows four packets: a Solicit message, an Advertise message, a Request message, and the selected Reply message. The packet details pane for the Reply message 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), Length: 40, Value: 000400010000a8c000010e000005001820010db803000000...
- IA Address: Option: IA Address (5), Length: 24, Value: 20010db803000000048ae5f5d8290e926ffffffffffffffff, 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), Length: 16, Value: 20010db81000000000000000000000001, DNS server address: 2001:db8:1000::1 (2001:db8:1000::1)
- Domain Search List: Option: Domain Search List (24), Length: 11, Value: 05636973636f03636fd00, DNS Domain Search List, Domain: cisco.com

Risoluzione dei problemi

Confermare la connettività con il server DHCPv6.

```
ciscoasa# show ipv6 neighbor
```

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

Confermare di ricevere pacchetti dal client quando richiede un indirizzo IPv6. Il pacchetto inviato dal client dipenderà dalle impostazioni di assegnazione degli indirizzi, ovvero con conservazione dello stato e senza conservazione dello stato.

Quando il client avvia il processo DHCPv6, invia un messaggio di richiesta router per rilevare la presenza di router IPv6 sul collegamento. Invia un messaggio di richiesta router multicast per richiedere ai router IPv6 di rispondere. Nell'intestazione Ethernet del messaggio di richiesta del router vengono visualizzati questi campi:

- Il campo Indirizzo di origine indica l'indirizzo MAC dell'host che richiede l'indirizzo IPv6.
- Il campo Indirizzo di destinazione è impostato su 33-33-00-00-00-02.

Questi campi vengono visualizzati nell'intestazione IPv6 del messaggio Richiesta router.

- Il campo Indirizzo di origine è impostato su un indirizzo IPv6 locale del collegamento assegnato all'interfaccia di invio o sull'indirizzo IPv6 non specificato (::).
- Il campo Indirizzo di destinazione è impostato sull'indirizzo multicast all-routers dell'ambito locale al collegamento (FF02::2).
- Il campo Limite hop è impostato su 255.

In Response, i router IPv6 inviano messaggi di annuncio router non richiesti Il messaggio di annuncio router contiene le informazioni richieste dagli host per determinare i prefissi di collegamento, l'MTU (Maximum Transmission Unit) del collegamento e route specifiche.

```
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.
```

Output inoltro DHCP

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

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

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

Nota: Il binding viene eliminato dall'ASA dopo un breve periodo. Questa condizione viene rilevata in `debug ipv6 dhcprelay`.

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

Indirizzi release

I client possono rilasciare l'indirizzo assegnato DHCPv6 dopo averlo utilizzato per la rete. Nella sezione successiva viene illustrato l'output di debug associato al rilascio dell'indirizzo in DHCPv6 con stato.

Debug

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

Informazioni correlate

[Informazioni sulle diverse opzioni DHCP](#)

[Esempio di configurazione dell'inoltro DHCP ASA](#)

[Configurazione dell'ASA per il passaggio del traffico IPv6](#)

[Esempio di acquisizione di pacchetti ASA con CLI e configurazione ASDM](#)