

OSPFv3 نيوكت لاثم مادختسا

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عمدقمل

ىلع IPv6 ل (OSPF) ال وراسم رصقأ حتف نم 3 رادصال نيكمم ةيفي ك دنتسمل اذه حضوي ةهجاو.

ةيساسأل تابلطتم

تابلطتم

كيلي بجي، ةهجاو ىلع IPv6 ل OSPF نيكمم لبق:

- بجي، لاثم ل لبس ىلع IPv6 ةكبش ل اهطي طختو OSPF ةكبش ةيجي تارتسا لمكأ ال مأ ةبولطم ةددعتمل قطانم تانك اذا ام ررقت نأ كيلىل.
- (IP) تنرتنإل لوكتورب نم سداسل رادصال ل يداحأل شبل هيجوت نيكمم.
- ةهجاو ىلع IPv6 نيكمم مق.
- ل OSPF ىلع IPsec نامأل (API) نمأل ليصوتل ذخأم قيبطت جم انرب ةهجاو نيوكتب مق ريفشتل او ةقداصل نيكمم ل IPv6.

عمدختسمل تانوكمل

ةنيعم ةيدام تانوكم وجمارب تارادصال ىلع دنتسمل اذه رصتقي ال.

ةصاخ ةيلمعم ةئيب في ةدوجومل ةزهجال نم دنتسمل اذه في ةدراول تامولعمل عاشنإم تانك اذا. (يضا رتفا) حوسمم نيوكتب دنتسمل اذه في عمدختسمل ةزهجال عيمج تادب رمأ يال لم تحملا ريثاتل لكمهف نم دكأتف، ليغشتل دي قكتكبش.

تاحالطصال

[تاحالطصا ل وحتامولعمل نم ديزم ىلع لوصحلل ةينقتل Cisco تاحيملت تاحالطصا عجار](#)


```
ipv6 cef
!
interface GigabitEthernet0/0
no ip address
ipv6 address FD01:ABAB::/64 eui-64
ipv6 enable ipv6 ospf 1 area 2
ipv6 ospf network point-to-point ! ipv6 router ospf 1 router-id 10.3.3.3 area 2 stub !
```

ABR1 هجوم

```
ipv6 unicast-routing
ipv6 cef
!
interface GigabitEthernet1
no ip address
speed auto
ipv6 address FD03::1/124
ipv6 enable
ipv6 ospf 1 area 0
!
interface GigabitEthernet2
no ip address
ipv6 address FD02:ABAB::/64 eui-64
ipv6 enable
ipv6 ospf 1 area 2
ipv6 ospf network point-to-point ! ipv6 router ospf 1 router-id 10.1.1.1 area 2 stub no-summary !
```

ASBR هجوم

```
ipv6 unicast-routing
ipv6 cef
!
interface GigabitEthernet1
no ip address
ipv6 address FD03::2/124
ipv6 enable
ipv6 ospf 1 area 0
!
interface GigabitEthernet2
no ip address
ipv6 address FD03::1:1/124
ipv6 enable
ipv6 rip EXT enable
!
ipv6 router ospf 1
router-id 10.2.2.2
default-metric 25
redistribute rip EXT metric-type 1 include-connected
!
ipv6 router rip EXT
redistribute ospf 1 match internal external 1 external 2 include-connected
!
```

يخراخا هجوم

```
ipv6 unicast-routing
ipv6 cef ! interface Loopback0 no ip address ipv6 address FD04:ABAB::/64 eui-64 ipv6 enable ipv6 rip EXT enable
!
interface GigabitEthernet0/0
no ip address
ipv6 address FD03::1:2/124
ipv6 enable
ipv6 rip EXT enable
!
ipv6 router rip EXT
```

ةحصلا نم ققحتلا

ححص لكشب نيوكتلا لمع ديكأتل مسقلا اذه مدختسا

جَرخُم ليلحت ضرعل (OIT) جارخال مجرتم ةادأ مدختسا **show** رم اوأ ضعب جارخال مجرتم ةادأ مدعت **show** رمألا .

هجوملاب ةصاخلا (LSDB) طابترالا ةلاح تانايب ةدعاق **show ipv6 ospf database** رمألا ضرعي

تامولعمو Cisco تاودأ ىلا لوصول نيلاجسمل Cisco يمدختسمل طقف نكمي: ةظالم
ةيلخاد

```
Stub_Router#show ipv6 ospf database
```

```
OSPFv3 Router with ID (10.3.3.3) (Process ID 1)
```

Router Link States (Area 2)

ADV Router	Age	Seq#	Fragment ID	Link count	Bits
10.1.1.1	5	0x8000000F	0	1	B
10.3.3.3	38	0x8000000E	0	1	None

Inter Area Prefix Link States (Area 2)

ADV Router	Age	Seq#	Prefix
10.1.1.1	5	0x80000002	::/0

Link (Type-8) Link States (Area 2)

ADV Router	Age	Seq#	Link ID	Interface
10.1.1.1	5	0x8000000A	8	Gi0/0
10.3.3.3	292	0x80000005	2	Gi0/0

Intra Area Prefix Link States (Area 2)

ADV Router	Age	Seq#	Link ID	Ref-lstyp	Ref-LSID
10.1.1.1	5	0x8000000B	0	0x2001	0
10.3.3.3	548	0x80000002	0	0x2001	0

هجوملا عاشنإ متي شي هجوملل LSA تاكبش **show ipv6 ospf database router** رمألا ضرعي
وأ ناوعلال لوح تامولعم يهجوملل (LSA) لوصول يهجوملل مئاقول لمحتال .هلأبق تساو
ةئدابلا.

```
Stub_Router#show ipv6 ospf database router
```

```
OSPFv3 Router with ID (10.3.3.3) (Process ID 1)
```

Router Link States (Area 2)

```
Routing Bit Set on this LSA
LS age: 141
Options: (V6-Bit, R-Bit, DC-Bit)
LS Type: Router Links
Link State ID: 0
Advertising Router: 10.1.1.1
LS Seq Number: 8000000F
Checksum: 0x9C2C
```

Length: 40
Area Border Router
Number of Links: 1

Link connected to: another Router (point-to-point)
Link Metric: 1
Local Interface ID: 8
Neighbor Interface ID: 2
Neighbor Router ID: 10.3.3.3

LS age: 174
Options: (V6-Bit, R-Bit, DC-Bit)
LS Type: Router Links
Link State ID: 0
Advertising Router: 10.3.3.3
LS Seq Number: 8000000E
Checksum: 0xBBF
Length: 40
Number of Links: 1

Link connected to: another Router (point-to-point)
Link Metric: 1
Local Interface ID: 2
Neighbor Interface ID: 8
Neighbor Router ID: 10.1.1.1

هذه تب تادحو ىل ع يوتحي تاراخي ل قح LSA تاكبش لمحت

- هي جوتلا باسح ي ف طابترالال/هجوملا مادختسا ب جي ناك اذا ام ىل ا ريشي—تب V6
- اطشن اهجوم ئشنملا ناك اذا ام ىل ا ريشي وهو "هجوملا تب ةدحو" يه هذه —R bit
- ب لطلال ةرئادل هجوملا ةجلاعم ىل ا ريشي—تب DC

لمحت طابترالالاب ةصاخلا لSA تاكبش نأ [show ipv6 ospf data link self-originate](#) رمألا حضوي طابترالالاب ةصاخ نيوانع

```
Stub_Router#show ipv6 ospf database link self-originate
```

```
OSPFv3 Router with ID (10.3.3.3) (Process ID 1)
```

```
Link (Type-8) Link States (Area 2)
```

```
LS age: 650  
Options: (V6-Bit, R-Bit, DC-Bit)  
LS Type: Link-LSA (Interface: GigabitEthernet0/0)  
Link State ID: 2 (Interface ID)  
Advertising Router: 10.3.3.3  
LS Seq Number: 80000005  
Checksum: 0x8578  
Length: 56  
Router Priority: 1  
Link Local Address: FE80::5054:FF:FE00:3A  
Number of Prefixes: 1  
Prefix Address: FD01:ABAB::  
Prefix Length: 64, Options: None
```

راسملا لسري ABR1 هجوم نإف، Stub-ةمات ةقطنم ىل ا يم تني Stub هجوملا نأل ارطن طقف Stub هجوم ىل ا يضارثفالا

Stub_Router#show ipv6 route

IPv6 Routing Table - default - 5 entries

Codes: C - Connected, L - Local, S - Static, U - Per-user Static route

B - BGP, HA - Home Agent, MR - Mobile Router, R - RIP

H - NHRP, I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea

IS - ISIS summary, D - EIGRP, EX - EIGRP external, NM - NEMO

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

RL - RPL, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1

OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2

la - LISP alt, lr - LISP site-registrations, ld - LISP dyn-eid

lA - LISP away, a - Application

OI ::/0 [110/2] via FE80::5054:FF:FE00:15, GigabitEthernet0/0

C FD01:ABAB::/64 [0/0]

via GigabitEthernet0/0, directly connected

L FD01:ABAB::5054:FF:FE00:3A/128 [0/0]

via GigabitEthernet0/0, receive

O FD02:ABAB::/64 [110/2]

via FE80::5054:FF:FE00:15, GigabitEthernet0/0

L FF00::/8 [0/0]

via Null0, receive

ةقطنم لا دودح هجوم وه ABR1 هجوم

ABR1#show ipv6 ospf

Routing Process "ospfv3 1" with ID 10.1.1.1

Supports NSSA (compatible with RFC 3101)

Supports Database Exchange Summary List Optimization (RFC 5243)

Event-log enabled, Maximum number of events: 1000, Mode: cyclic

It is an area border router

Router is not originating router-LSAs with maximum metric

Initial SPF schedule delay 50 msec

Minimum hold time between two consecutive SPF's 200 msec

Maximum wait time between two consecutive SPF's 5000 msec

Initial LSA throttle delay 50 msec

Minimum hold time for LSA throttle 200 msec

Maximum wait time for LSA throttle 5000 msec

Minimum LSA arrival 100 msec

LSA group pacing timer 240 secs

Interface flood pacing timer 33 msec

Retransmission pacing timer 66 msec

Retransmission limit dc 24 non-dc 24

EXCHANGE/LOADING adjacency limit: initial 300, process maximum 300

Number of external LSA 2. Checksum Sum 0x011699

Number of areas in this router is 2. 1 normal 1 stub 0 nssa

Graceful restart helper support enabled

Reference bandwidth unit is 100 mbps

RFC1583 compatibility enabled

Area BACKBONE(0)

Number of interfaces in this area is 1

SPF algorithm executed 17 times

Number of LSA 8. Checksum Sum 0x05579B

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0

Flood list length 0

Area 2

Number of interfaces in this area is 1

It is a stub area, no summary LSA in this area

Generates stub default route with cost 1

SPF algorithm executed 20 times

Number of LSA 7. Checksum Sum 0x0380EA

Number of DCbitless LSA 0

Number of indication LSA 0

Number of DoNotAge LSA 0
Flood list length 0

ASBR. هجوم نم (RIP تاراسم) ةيجراخ تاراسم ABR1 هجوم ىقلى

ABR1#show ipv6 route

```
IPv6 Routing Table - default - 8 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, RL - RPL, O - OSPF Intra, OI - OSPF Inter
       OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
       ON2 - OSPF NSSA ext 2, la - LISP alt, lr - LISP site-registrations
       ld - LISP dyn-eid, la - LISP away, le - LISP extranet-policy
       lp - LISP publications, a - Application, m - OMP
O  FD01:ABAB::/64 [110/2]
   via FE80::5054:FF:FE00:3A, GigabitEthernet2
C  FD02:ABAB::/64 [0/0]
   via GigabitEthernet2, directly connected
L  FD02:ABAB::5054:FF:FE00:15/128 [0/0]
   via GigabitEthernet2, receive
C  FD03::/124 [0/0]
   via GigabitEthernet1, directly connected
L  FD03::1/128 [0/0]
   via GigabitEthernet1, receive
OE1 FD03::1:0/124 [110/26] via FE80::5054:FF:FE00:3E, GigabitEthernet1 OE1 FD04:ABAB::/64
[110/26] via FE80::5054:FF:FE00:3E, GigabitEthernet1
L  FF00::/8 [0/0]
   via Null0, receive
```

لالخ نم RIP ةكبش ب هلى صوت متي. ةكبش للى تاذلا ماطنلا دودح هجوم وه ASBR هجوم
0/0 ةىلس لىس لىس تال ةهاولا

ASBR#show ipv6 ospf

```
Routing Process "ospfv3 1" with ID 10.2.2.2
Supports NSSA (compatible with RFC 3101)
Supports Database Exchange Summary List Optimization (RFC 5243)
Event-log enabled, Maximum number of events: 1000, Mode: cyclic
It is an autonomous system boundary router
Redistributing External Routes (with default metric 25) from,
  rip EXT with metric-type 1 include-connected
Router is not originating router-LSAs with maximum metric
Initial SPF schedule delay 50 msec
Minimum hold time between two consecutive SPFs 200 msec
Maximum wait time between two consecutive SPFs 5000 msec
Initial LSA throttle delay 50 msec
Minimum hold time for LSA throttle 200 msec
Maximum wait time for LSA throttle 5000 msec
Minimum LSA arrival 100 msec
LSA group pacing timer 240 secs
Interface flood pacing timer 33 msec
Retransmission pacing timer 66 msec
Retransmission limit dc 24 non-dc 24
EXCHANGE/LOADING adjacency limit: initial 300, process maximum 300
Number of external LSA 2. Checksum Sum 0x011699
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Graceful restart helper support enabled
Reference bandwidth unit is 100 mbps
RFC1583 compatibility enabled
```

Area BACKBONE(0)

Number of interfaces in this area is 1

```
SPF algorithm executed 10 times
Number of LSA 8. Checksum Sum 0x05579B
Number of DCbitless LSA 0
Number of indication LSA 0
Number of DoNotAge LSA 0
Flood list length 0
```

ASBR#show ipv6 rip

```
RIP process "EXT", port 521, multicast-group FF02::9, pid 678
Administrative distance is 120. Maximum paths is 16
Updates every 30 seconds, expire after 180
Holddown lasts 0 seconds, garbage collect after 120
Split horizon is on; poison reverse is off
Default routes are not generated
Periodic updates 267, trigger updates 11
Full Advertisement 1, Delayed Events 0
```

Interfaces:

GigabitEthernet2

Redistribution:

```
Redistributing protocol ospf 1 with transparent metric (internal, external 1 & 2, ) include-
connected
```

اهحال صإو ءاطخأل فاشك تسإ

اهحال صإو نيوك تال ءاطخأ فاشك تسال مسقلا اذه مدخت سا

debug رم اوأ مادخت سا لبق حي حصت ال رم اوأ لوح ة مهم تامول عم يلإ عجرا : ةظحال م

debug ipv6

OSPFv3 1 عون ال نم بيحرت ال لئاسر لسري هنإف، يلوأل ا هجوم ال يل ع OSPFv3 نيكمت درجم ب موق ي هنإف، ABR1 هجوم نم بيحرت ال مزح ملتسي نأ درجم ب. FF02::5 ددعت مل ثبل نا ونع يلإ DBD مزح لاسر ا يف أدبي مثة يوناث ال/ة يسا ال ةقال ال لوح ضوافت ل اب

```
Stub_Router#debug ipv6 ospf events
```

```
Stub_Router#debug ipv6 ospf packet
```

```
Stub_Router#debug ipv6 ospf adj
```

```
*Mar 8 17:47:01.324: OSPFv3-1-IPv6 PAK : Gi0/0: OUT: FE80::5054:FF:FE00:3A->FF02::5: ver:3 type:1 len:36 rid:10.3.3.3
area:0.0.0.2 chksum:A0F9 inst:0 *Mar 8 17:47:03.307: OSPFv3-1-IPv6 PAK : Gi0/0: IN: FE80::5054:FF:FE00:15->FF02::5: ver:3
type:1 len:36 rid:10.1.1.1 area:0.0.0.2 chksum:A31C inst:0 *Mar 8 17:47:03.308: OSPFv3-1-IPv6 ADJ Gi0/0: Added 10.1.1.1 to nbr
list *Mar 8 17:47:03.308: OSPFv3-1-IPv6 PAK : Gi0/0: OUT: FE80::5054:FF:FE00:3A->FE80::5054:FF:FE00:15: ver:3 type:1
len:40 rid:10.3.3.3 area:0.0.0.2 chksum:470D inst:0 *Mar 8 17:47:03.320: OSPFv3-1-IPv6 PAK : Gi0/0: IN:
FE80::5054:FF:FE00:15->FE80::5054:FF:FE00:3A: ver:3 type:1 len:40 rid:10.1.1.1 area:0.0.0.2 chksum:4707 inst:0 *Mar 8
17:47:03.321: OSPFv3-1-IPv6 ADJ Gi0/0: 2 Way Communication to 10.1.1.1, state 2WAY *Mar 8 17:47:03.321: OSPFv3-1-IPv6
ADJ Gi0/0: Nbr 10.1.1.1: Prepare dbase exchange *Mar 8 17:47:03.322: OSPFv3-1-IPv6 ADJ Gi0/0: Send DBD to 10.1.1.1
seq 0x983C9C0 opt 0x11 flag 0x7 len 28
*Mar 8 17:47:03.322: OSPFv3-1-IPv6 PAK : Gi0/0: OUT: FE80::5054:FF:FE00:3A-
>FE80::5054:FF:FE00:15: ver:3 type:2 len:28 rid:10.3.3.3 area:0.0.0.2 chksum:7A33 inst:0
*Mar 8 17:47:03.328: OSPFv3-1-IPv6 PAK : Gi0/0: IN: FE80::5054:FF:FE00:15-
>FE80::5054:FF:FE00:3A: ver:3 type:2 len:148 rid:10.1.1.1 area:0.0.0.2 chksum:141A inst:0
*Mar 8 17:47:03.329: OSPFv3-1-IPv6 ADJ Gi0/0: Rcv DBD from 10.1.1.1 seq 0x983C9C0 opt 0x11
flag 0x2 len 148 mtu 1500 state EXSTART
*Mar 8 17:47:03.330: OSPFv3-1-IPv6 ADJ Gi0/0: NBR Negotiation Done. We are the MASTER
*Mar 8 17:47:03.330: OSPFv3-1-IPv6 ADJ Gi0/0: Nbr 10.1.1.1: Summary list built, size 7
*Mar 8 17:47:03.331: OSPFv3-1-IPv6 ADJ Gi0/0: Send DBD to 10.1.1.1 seq 0x983C9C1 opt 0x11
flag 0x1 len 128
*Mar 8 17:47:03.331: OSPFv3-1-IPv6 PAK : Gi0/0: OUT: FE80::5054:FF:FE00:3A-
>FE80::5054:FF:FE00:15: ver:3 type:2 len:128 rid:10.3.3.3 area:0.0.0.2 chksum:F771 inst:0
```



```
*Mar 8 17:47:03.334: OSPFv3-1-IPv6 PAK : Gi0/0: IN: FE80::5054:FF:FE00:15-
>FE80::5054:FF:FE00:3A: ver:3 type:3 len:64 rid:10.1.1.1 area:0.0.0.2 chksum:C6FA inst:0
*Mar 8 17:47:03.335: OSPFv3-1-IPv6 PAK : Gi0/0: IN: FE80::5054:FF:FE00:15-
>FE80::5054:FF:FE00:3A: ver:3 type:2 len:28 rid:10.1.1.1 area:0.0.0.2 chksum:7C3D inst:0
```

ثي دحتو (LS REQ) طابترالال ةلاح بلط لئاسر لاسراب تاهجوملا موقت، DBD مزح لدابت درجمب
ة، بقاعت م ال LS UPD و LS REQ لئاسر دعب. اهبة صاخال LSDB عاشن ال (LS UPD) طابترالال ةلاح
Hello. مزح لدابت ي تاهجوملا رمتست، لملك ال ال ةلاح ل لصت ام دنعو

Stub_Router#

```
*Mar 8 17:47:03.337: OSPFv3-1-IPv6 ADJ Gi0/0: Rcv LS REQ from 10.1.1.1 length 64 LSA count 4
*Mar 8 17:47:03.337: OSPFv3-1-IPv6 ADJ Gi0/0: Send LS UPD to FE80::5054:FF:FE00:15 length 172
LSA count 4
*Mar 8 17:47:03.338: OSPFv3-1-IPv6 PAK : Gi0/0: OUT: FE80::5054:FF:FE00:3A-
>FE80::5054:FF:FE00:15: ver:3 type:4 len:172 rid:10.3.3.3 area:0.0.0.2 chksum:D2CE inst:0
*Mar 8 17:47:03.339: OSPFv3-1-IPv6 ADJ Gi0/0: Rcv DBD from 10.1.1.1 seq 0x983C9C1 opt 0x11
flag 0x0 len 28 mtu 1500 state EXCHANGE
*Mar 8 17:47:03.339: OSPFv3-1-IPv6 ADJ Gi0/0: Exchange Done with 10.1.1.1 *Mar 8 17:47:03.340:
OSPFv3-1-IPv6 ADJ Gi0/0: Send LS REQ to 10.1.1.1 length 40
*Mar 8 17:47:03.340: OSPFv3-1-IPv6 PAK : Gi0/0: OUT: FE80::5054:FF:FE00:3A-
>FE80::5054:FF:FE00:15: ver:3 type:3 len:40 rid:10.3.3.3 area:0.0.0.2 chksum:FD46 inst:0
*Mar 8 17:47:03.343: OSPFv3-1-IPv6 PAK : Gi0/0: IN: FE80::5054:FF:FE00:15-
>FE80::5054:FF:FE00:3A: ver:3 type:4 len:72 rid:10.1.1.1 area:0.0.0.2 chksum:825E inst:0
*Mar 8 17:47:03.345: OSPFv3-1-IPv6 ADJ Gi0/0: Rcv LS UPD from Nbr ID 10.1.1.1 length 72 LSA
count 2
*Mar 8 17:47:03.345: OSPFv3-1-IPv6 ADJ Gi0/0: Synchronized with 10.1.1.1, state FULL
*Mar 8 17:47:03.346: %OSPFv3-5-ADJCHG: Process 1, Nbr 10.1.1.1 on GigabitEthernet0/0 from
LOADING to FULL, Loading Done
```

ةلص تاذا تامولعم

- [6 رادصلال IP ةينقت معد \(IPv6\)](#)
- [الوأسم رصقأ حتف لوكوتورب ةينقت معد \(OSPF\)](#)
- [نم تاليزن تلالاو ةينقتلال معدللا Cisco](#)

ةمچرتل هذه ل و ح

ةلأل تاي نقتل ن م ة و مچ م ادخت ساب دن تسم ل ا اذ ه Cisco ت مچرت
م ل ا ل ا ا ن ا ع مچ م ف ن م دخت س م ل م عد و ت م م م دقت ل ة م ش ب ل و
م ك ة ق م ق د ن و ك ت ن ل ة مچرت ل ض ف ا ن ا ة ظ ح ا ل م م چ ر م . ة ص ا خ ل م ه ت غ ل ب
Cisco مچرت م ا م د ق م م ا ت ل ا ة م ف ا ر ت ح ا ل ا ة مچرت ل ا م ل ا ح ل ا و ه
ل ا م ا د ا د ع و چ ر ل ا ب م ص و ت و ت ا مچرت ل ا ه ذ ه ة ق د ن ع ا ه ت م ل و ئ س م Cisco
Systems م (ر ف و ت م ط ب ا ر ل ا) م ل ص ا ل ا م م ل م چ ن ل ا دن ت س م ل ا