Configurare BGP Global IPv6 su SRv6

Sommario

Introduzione

In questo documento viene descritto il flusso del control plane quando si applica il routing del segmento di incapsulamento su IPv6 (SRv6) a una sessione unicast IPv6 BGP.

Premesse

Per ulteriori informazioni, vedere la guida alla configurazione del routing dei segmenti per i router Cisco ASR serie 9000, IOS XR release 24.1.x, 24.2.x, 24.3.x, 24.4.xx.

Topologia

La topologia utilizzata in questo documento è illustrata nella Figura 1. Il dominio SRv6 è costituito da tre router, tutti operanti su Cisco IOS-XR. L'infrastruttura di underlay SRv6 viene implementata utilizzando IS-IS con uSID SRv6. Il peering unicast BGP IPv6 viene stabilito tra i router R1 e R3, mentre il router R2 non partecipa al BGP e funziona come router P in questa configurazione. L'interfaccia di loopback 6 su R1 e R3 rappresenta un prefisso IPv6 che deve essere scambiato tra i due peer unicast IPv6 BGP.

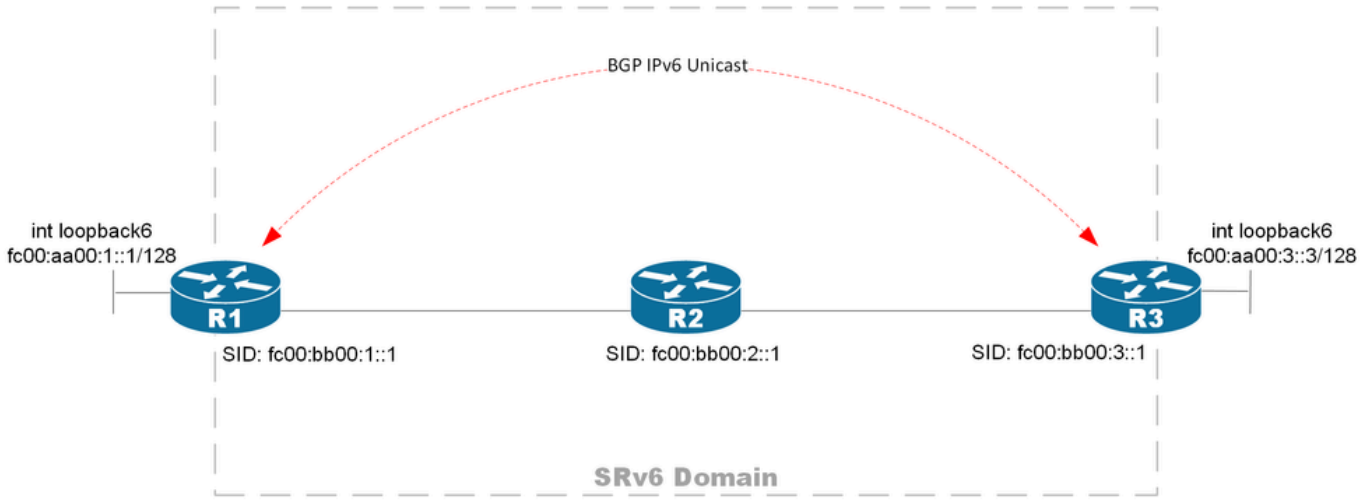

Figura 1. Diagramma topologico di BGP ipv6 unicast su SRv6

Configurazione SRv6

In questa sezione viene illustrata la configurazione dei tre router SRv6. Il router R2 include solo la configurazione SRv6, in quanto non partecipa a BGP.

Configurazione router R1

Il router R1 fa parte del dominio SRv6 con un localizzatore fc00:bb00:1::/48. Funziona anche come router unicast BGP IPv6, originando il prefisso locale fc00:aa00:1::1/128. Inoltre, stabilisce il peer unicast BGP IPv6 con il router R3 sull'infrastruttura SRv6. La configurazione evidenziata in grassetto costituisce il punto di partenza per il debug del flusso di controllo descritto in questo documento ed è l'unico trigger utilizzato in.

<#root>

```
interface Loopback0
 ipv4 address 10.0.0.1 255.255.255.255
 ipv6 address fc00:bb00:1::1/128
!
interface Loopback6
 ipv6 address fc00:aa00:1::1/128
!
interface TenGigE0/0/0/8
 ipv6 enable
!
router isis 1
 is-type level-1
 net 49.0000.0000.0001.00
 address-family ipv6 unicast
  metric-style wide
  segment-routing srv6
   locator MAIN
   !
  !
 !
 interface TenGigE0/0/0/8
  point-to-point
```

```
  address-family ipv6 unicast
  !
 !
!
router bgp 1
 bgp router-id 10.0.0.1
 segment-routing srv6
  locator MAIN
 !
 address-family ipv6 unicast
  segment-routing srv6
   locator MAIN
   alloc mode per-vrf
  !
  network fc00:aa00:1::1/128
 !
 neighbor fc00:bb00:3::1
  remote-as 1
  update-source Loopback0
  address-family ipv6 unicast
```

encapsulation-type srv6

```
  !
 !
segment-routing
 srv6
  encapsulation
   source-address fc00:bb00:1::1
  !
  locators
   locator MAIN
    micro-segment behavior unode psp-usd
    prefix fc00:bb00:1::/48
   !
```

Configurazione router R2

Il router R2 fa parte del dominio SRv6 con un localizzatore fc00:bb00:2::/48. Non partecipa al BGP e funziona come router P all'interno di questa topologia.

```
interface Loopback0
 ipv4 address 10.0.0.2 255.255.255.255
 ipv6 address fc00:bb00:2::1/128
!
interface TenGigE0/0/0/0
 description TO R1
 ipv6 enable
!
interface TenGigE0/0/0/1
 description TO R2
 ipv6 enable
!
router isis 1
 is-type level-1
 net 49.0000.0000.0002.00
```

```
 address-family ipv6 unicast
  metric-style wide
  segment-routing srv6
   locator MAIN
   !
  !
 !
 interface TenGigE0/0/0/0
  point-to-point
  address-family ipv6 unicast
  !
 !
 interface TenGigE0/0/0/1
  point-to-point
  address-family ipv6 unicast
  !
 !
!
segment-routing
 srv6
  encapsulation
   source-address fc00:bb00:2::1
  !
  locators
   locator MAIN
    micro-segment behavior unode psp-usd
    prefix fc00:bb00:2::/48
   !
```

Configurazione router R3

Il router R3 fa parte del dominio SRv6 con un localizzatore fc00:bb00:3::/48. È dotato di peer unicast IPv6 BGP con il router R1 ed entrambi scambiano i prefissi IPv6 delle relative interfacce Loopback 6.

```
interface Loopback0
 ipv4 address 10.0.0.3 255.255.255.255
 ipv6 address fc00:bb00:3::1/128
!
interface Loopback6
 ipv6 address fc00:aa00:3::3/128
!
interface TenGigE0/0/0/1
 description TO R2
 ipv6 enable
!
router isis 1
 is-type level-1
 net 49.0000.0000.0003.00
 address-family ipv6 unicast
  metric-style wide
  segment-routing srv6
   locator MAIN
   !
  !
 !
```

```
 interface TenGigE0/0/0/1
  point-to-point
  address-family ipv6 unicast
  !
 !
!
router bgp 1
 bgp router-id 10.0.0.3
 segment-routing srv6
  locator MAIN
 !
 address-family ipv6 unicast
  segment-routing srv6
   locator MAIN
   alloc mode per-vrf
  !
  network fc00:aa00:3::3/128
 !
 neighbor fc00:bb00:1::1
  remote-as 1
  update-source Loopback0
  address-family ipv6 unicast
   encapsulation-type srv6
  !
 !
segment-routing
 srv6
  encapsulation
   source-address fc00:bb00:3::1
  !
  locators
   locator MAIN
    micro-segment behavior unode psp-usd
    prefix fc00:bb00:3::/48
   !
  !
 !
!
```

Flusso di segnalazione del SID SRv6

Nell'infrastruttura SRv6 sottostante, ogni router dispone di informazioni sullo stato del collegamento in tutta la topologia, che pubblicizzano il proprio localizzatore SRv6 tramite il protocollo ISIS dello stato del collegamento. Il database ISIS su R1 mostra il localizzatore di tutti i router che fanno parte del dominio SRv6.

<#root>

```
RP/0/RSP0/CPU0:R1#
```

show isis database verbose R1 | include SRv6 Locator

```
  SRv6 Locator:   MT (IPv6 Unicast)
```

fc00:bb00:1::/48

```
 D:0 Metric: 1 Algorithm: 0
```

```
RP/0/RSP0/CPU0:R1#
show isis database verbose R2 | include SRv6 Locator
  SRv6 Locator:   MT (IPv6 Unicast)
fc00:bb00:2::/48
 D:0 Metric: 0 Algorithm: 0
RP/0/RSP0/CPU0:R1#
show isis database verbose R3 | include SRv6 Locator
  SRv6 Locator:   MT (IPv6 Unicast)
fc00:bb00:3::/48
 D:0 Metric: 1 Algorithm: 0
```

Questa implementazione di SRv6 supporta la sovrimpressione del traffico della tabella di routing globale (GRT, Global Routing Table). Quando il servizio di overlay unicast BGP IPv6 globale è abilitato sia su R1 che su R3, ogni router genera un nuovo SID del servizio. Questo SID del servizio è associato al VRF predefinito e utilizza il comportamento dell'endpoint uDT6 in questo scenario. Questo SID del servizio deve essere scambiato tra peer unicast IPv6 BGP per abilitare l'inoltro SRv6 tra i due peer BGP. La prossima sezione descrive i passaggi del flusso di segnalazione BGP, a partire dall'esecuzione del trigger (attivazione del tipo di incapsulamento srv6) fino al punto in cui l'inoltro SRv6 viene programmato sul router R3.

1. Stato prima di abilitare l'incapsulamento di SRv6

Prima di abilitare l'incapsulamento SRv6 nell'interfaccia SAFI unicast IPv6 per il peer BGP, il router R1 deve disporre di prefissi IPv6 BGP con SID del servizio assegnati. Questo si verifica quando 'segment-routing srv6' è abilitato in IPv6 unicast global SAFI su R1. L'output mostra il SID locale fc00:bb00:1:e002:: è assegnato a tutti i prefissi in BGP ipv6 unicast.

<#root>

```
RP/0/RSP0/CPU0:R1#
show bgp ipv6 unicast local-sids


BGP router identifier 10.0.0.1, local AS number 1
BGP generic scan interval 60 secs
Non-stop routing is enabled
BGP table state: Active
Table ID: 0xe0800000   RD version: 7
BGP table nexthop route policy:
BGP main routing table version 7
BGP NSR Initial initsync version 7 (Reached)
BGP NSR/ISSU Sync-Group versions 0/0
BGP scan interval 60 secs
```

```
Status codes: s suppressed, d damped, h history, * valid, > best
              i - internal, r RIB-failure, S stale, N Nexthop-discard
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network            Local Sid                                  Alloc mode   Locator
*> fc00:aa00:1::1/128 fc00:bb00:1:e002::                         per-vrf       MAIN
*>ifc00:aa00:3::3/128 NO SRv6 Sid                                -            -

Processed 2 prefixes, 2 paths
```

Questo SID del servizio è programmato localmente dal processo sid_mgr in R1, il cui comportamento dell'endpoint è uDT6, associato al file vrf predefinito e di proprietà di bgp. Questo significa semplicemente che ogni volta che il pacchetto di ricezione R1 con indirizzo di destinazione corrisponde al SID del servizio fc00:bb00:1:e002:: E rappresenta l'ultimo segmento, R1 deve decapsulare l'intestazione e inviare il pacchetto decapsulato alla ricerca FIB della tabella vrf predefinita IPv6. In base alla RFC 8986, in cui sono elencati tutti i comportamenti degli endpoint SRv6. Si noti l'output in cui viene mostrato il sid_mgr per creare il servizio SID fc00:bb00:1:e002:: e passate queste informazioni a RIB ed eventualmente FIB.

<#root>

```
RP/0/RSP0/CPU0:R1#
```

show segment-routing srv6 sid all

```
*** Locator: 'MAIN' ***

SID                         Behavior          Context                           Owner               Sta
--------------------------  ----------------  --------------------------------  ------------------  ---
fc00:bb00:1::               uN (PSP/USD)      'default':1                       sidmgr              InU
fc00:bb00:1:e001::          uA (PSP/USD)      [Te0/0/0/8, Link-Local]:0         isis-1              InU
```

fc00:bb00:1:e002::   uDT6   'default'   bgp-1

```
               InUse  Y

RP/0/RSP0/CPU0:R1#
```

show segment-routing srv6 sid fc00:bb00:1:e002:: internal

```
*** Locator: 'MAIN' ***

SID                         Behavior          Context                           Owner               Sta
--------------------------  ----------------  --------------------------------  ------------------  ---
```

fc00:bb00:1:e002::

```
          uDT6              'default'                         bgp-1               InUse  Y
  SID Function: 0xe002
  SID context: { table-id=0xe0800000 ('default':IPv6/Unicast) }
    App data: [0000000000000000]
  Locator: 'MAIN'
  Allocation type: Dynamic
  Owner List:
     1) Name: bgp-1, Client-ID: 32, Proto-ID: 8, Node-ID: 0, Locator-ID: 5 ()
  Refcount: 1
```

```
  Flags: 0x0 ()
  Chkpt Obj ID: 0x2f60
  TI Object:
    Type: Entry
    Ptr: 0x140160285526000, Producer ID: 0
    Flags:
      Generic:  0x0 ()
      Specific: 0x0 ()
    Modified: Fri Jun 27 16:27:05 EST 2025 (2d01h ago)
  Created: Jun 27 16:17:40.796 (2d01h ago)
  Event history:
    SIDMGR-OPCODE-EVENT-CLASS
    Total entries : 4
    +--------------------------------+---------------------+------+
    | Event                          |     Time Stamp      | S, M |
    +--------------------------------+---------------------+------+
    | object create                  | Jun 27 16:17:40.864 | 1, 0 |
    | object delete                  | Jun 27 16:27:04.320 | 1, 1 |
    | object modify                  | Jun 27 16:27:04.320 | 0, 1 |
    | object refcount decrement      | Jun 27 16:27:04.320 | 0, 1 |
    +--------------------------------+---------------------+------+
RP/0/RSP0/CPU0:R1#
```

show route ipv6 fc00:bb00:1:e002:: detail

```
Routing entry for
```

fc00:bb00:1:e002::/64

```
  Known via
```

"local-srv6 bgp-1"

```
, distance 0, metric 0,
```

SRv6 Endpoint uDT6

```
, SRv6 Format f3216
  Installed Jun 27 16:27:06.040 for 2d01h
  Routing Descriptor Blocks
    directly connected
      Route metric is 0
      Label: None
      Tunnel ID: None
      Binding Label: None
      Extended communities count: 0
      NHID: 0x0 (Ref: 0)
  Route version is 0x15 (21)
  No local label
  IP Precedence: Not Set
  QoS Group ID: Not Set
  Flow-tag: Not Set
  Fwd-class: Not Set
  Route Priority: RIB_PRIORITY_LOCAL (3) SVD Type RIB_SVD_TYPE_LOCAL
  Download Priority 0, Download Version 3140327
  No advertising protos.

RP/0/RSP0/CPU0:R1#
```

show cef ipv6 fc00:bb00:1:e002::

```
fc00:bb00:1:e002::/64, version 3140327,
```

SRv6 Endpoint uDT6

```
, internal 0x1000001 0x0 (ptr 0x7bb98f54) [1], 0x400 (0x7ba7cfa0), 0x0 (0x7a90d290)
 Updated Jun 27 16:27:06.043
 Prefix Len 64, traffic index 0, precedence n/a, priority 0
  gateway array (0x78e92608) reference count 3, flags 0x0, source rib (7), 0 backups
                [4 type 3 flags 0x8401 (0x78f35598) ext 0x0 (0x0)]
  LW-LDI[type=3, refc=1, ptr=0x7ba7cfa0, sh-ldi=0x78f35598]
  gateway array update type-time 1 Jun 26 15:54:48.345
 LDI Update time Jun 26 15:54:48.349
 LW-LDI-TS Jun 27 16:17:42.533
 Accounting: Disabled
   via ::/128, 0 dependencies, weight 0, class 0 [flags 0x0]
    path-idx 0 NHID 0x0 [0x781b61e8 0x0]
    next hop ::/128

    Load distribution: 0 (refcount 4)

    Hash  OK  Interface                 Address
    0     Y   recursive                 Lookup in table
```

Poiché R1 non ha abilitato l'incapsulamento SRv6 nel peer unicast BGP ipv6, R1 annuncia questi prefissi a R3 senza TLV SRv6 nell'aggiornamento BGP, anche se R1 ha assegnato SID locali.

<#root>

```
RP/0/RSP0/CPU0:R1#
```

show bgp ipv6 unicast

```
BGP router identifier 10.0.0.1, local AS number 1
BGP generic scan interval 60 secs
Non-stop routing is enabled
BGP table state: Active
Table ID: 0xe0800000   RD version: 7
BGP table nexthop route policy:
BGP main routing table version 7
BGP NSR Initial initsync version 7 (Reached)
BGP NSR/ISSU Sync-Group versions 0/0
BGP scan interval 60 secs

Status codes: s suppressed, d damped, h history, * valid, > best
              i - internal, r RIB-failure, S stale, N Nexthop-discard
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network            Next Hop            Metric LocPrf Weight Path
*> fc00:aa00:1::1/128 ::                       0         32768 i
*>ifc00:aa00:3::3/128 fc00:bb00:3::1           0    100      0 i

Processed 2 prefixes, 2 paths

RP/0/RSP0/CPU0:R1#
```

show bgp ipv6 unicast advertised neighbor fc00:bb00:3::1

```
fc00:aa00:1::1/128 is advertised to fc00:bb00:3::1
```

```
  Path info:
    neighbor: Local           neighbor router id: 10.0.0.1
    valid  local  best
Received Path ID 0, Local Path ID 1, version 4
  Attributes after inbound policy was applied:
    next hop: ::
    MET ORG AS
    origin: IGP  metric: 0
    aspath:
  Attributes after outbound policy was applied:
    next hop: fc00:bb00:1::1
    MET ORG AS
    origin: IGP  metric: 0
    aspath:
```

Il router R3 riceve l'aggiornamento dal router R1 senza SID. R3 installa i prefissi ricevuti da R1 nella relativa tabella RIB e FIB senza un'intestazione SRv6.

<#root>

```
RP/0/RSP0/CPU0:R3#
```

show bgp ipv6 unicast received-sids

```
BGP router identifier 10.0.0.3, local AS number 1
BGP generic scan interval 60 secs
Non-stop routing is enabled
BGP table state: Active
Table ID: 0xe0800000   RD version: 44
BGP table nexthop route policy:
BGP main routing table version 44
BGP NSR Initial initsync version 6 (Reached)
BGP NSR/ISSU Sync-Group versions 0/0
BGP scan interval 60 secs

Status codes: s suppressed, d damped, h history, * valid, > best
              i - internal, r RIB-failure, S stale, N Nexthop-discard
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network            Next Hop                            Received Sid
*>ifc00:aa00:1::1/128 fc00:bb00:1::1                      NO SRv6 Sid
*> fc00:aa00:3::3/128 ::                                  NO SRv6 Sid

Processed 2 prefixes, 2 paths

RP/0/RSP0/CPU0:R3#
```

show route ipv6 unicast fc00:aa00:1::1/128 detail

```
Routing entry for fc00:aa00:1::1/128
  Known via "bgp 1", distance 200, metric 0, type internal
  Installed Jun  8 17:34:24.126 for 00:12:38
  Routing Descriptor Blocks
    fc00:bb00:1::1, from fc00:bb00:1::1
      Route metric is 0
      Label: None
```

```
      Tunnel ID: None
      Binding Label: None
      Extended communities count: 0
      NHID: 0x0 (Ref: 0)
      Path Grouping ID: 1
  Route version is 0x1d (29)
  No local label
  IP Precedence: Not Set
  QoS Group ID: Not Set
  Flow-tag: Not Set
  Fwd-class: Not Set
  Route Priority: RIB_PRIORITY_RECURSIVE (12) SVD Type RIB_SVD_TYPE_LOCAL
  Download Priority 4, Download Version 162
  No advertising protos.

RP/0/RSP0/CPU0:R3#
```

show cef ipv6 fc00:aa00:1::1/128

```
fc00:aa00:1::1/128, version 162, internal 0x5000001 0x40 (ptr 0x7941f0f4) [1], 0x0 (0x0), 0x0 (0x0)
 Updated Jun  8 17:34:24.128
 Prefix Len 128, traffic index 0, precedence n/a, priority 4
  gateway array (0x78eac518) reference count 1, flags 0x2010, source rib (7), 0 backups
                [1 type 3 flags 0x48441 (0x78f4f538) ext 0x0 (0x0)]
  LW-LDI[type=0, refc=0, ptr=0x0, sh-ldi=0x0]
  gateway array update type-time 1 Jun  8 17:34:24.129
 LDI Update time Jun  8 17:34:24.129

  Level 1 - Load distribution: 0
  [0] via fc00:bb00:1::1/128, recursive

 Accounting: Disabled
   via fc00:bb00:1::1/128, 5 dependencies, recursive [flags 0x6000]
    path-idx 0 NHID 0x0 [0x7941edb4 0x0]
    next hop fc00:bb00:1::1/128 via fc00:bb00:1::/48

    Load distribution: 0 (refcount 1)

    Hash  OK  Interface                 Address
    0     Y   TenGigE0/0/0/1            remote
```

2. Abilitare l'incapsulamento SRv6

L'abilitazione dell'incapsulamento SRv6 comporta l'invio da parte di R1 di un messaggio di aggiornamento BGP al peer con attributo di tipo 40, utilizzato nel routing dei segmenti per annunciare un prefisso BGP con un SID (Segment Routing Identifier) specifico. Il router R1 invia l'aggiornamento a R3 per il prefisso IPv6 fc00:bb00:3:1 (passaggio 1) con il SID associato fc00:bb00:1:e002::. Dopo aver ricevuto l'istruzione UPDATE, il router R3 aggiorna la tabella unicast BGP IPv6 (passaggio 2) e successivamente le tabelle RIB e FIB (passaggio 3). La figura 2 illustra il flusso del segnale BGP e le fasi corrispondenti.

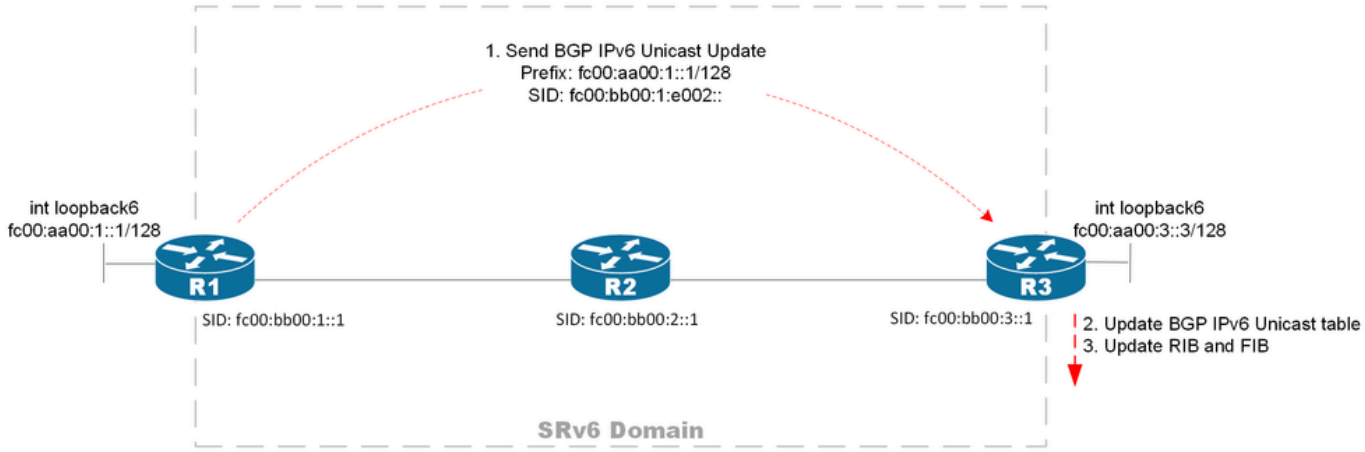

Figura 2. Flusso di segnalazione BGP dopo l'abilitazione dell'incapsulamento srv6

L'output visualizza il log di debug BGP subito dopo l'abilitazione dell'incapsulamento SRv6 sul peer R3, mostrando che R1 invia un messaggio di aggiornamento BGP a R3:

```
router bgp 1
 neighbor fc00:bb00:3::1
  address-family ipv6 unicast
   encapsulation-type srv6
  !
 !
!
end

RP/0/RSP0/CPU0:R1(config)#commit
bgp[1100]: [default-upd] (ip6u): Added reference to table TBL:default (2/1) refcount 9
bgp[1100]: [default-upd] (ip6u): Created update group for table TBL:default (2/1), index 0.3 neighbor f
bgp[1100]: [default-upd] (ip6u): Removed neighbor fc00:bb00:3::1 from update group 0.2 for IPv6 Unicast
bgp[1100]: [default-upd] (ip6u): Removing neighbor fc00:bb00:3::1 from update filter-group 0.2 in IPv6
bgp[1100]: [default-upd]: Enqueue Wdw: Nbr:fc00:bb00:3::1(5) Wdw:0 Del:0 Pending:0 RefreshPending:0
bgp[1100]: [default-upd]: Deleting filter-group 0.2 in TBL:default (2/1) refcount 2
bgp[1100]: [default-upd] (ip6u): Deleted update group 0.2
bgp[1100]: [default-upd] (ip6u): Added reference to table TBL:default (2/1) refcount 10
bgp[1100]: [default-upd]: Compute RT set for vrf default neighbor fc00:bb00:3::1 from old filter-group
bgp[1100]: [default-upd]: Allocating filter-group 0.3in TBL:default (2/1)
bgp[1100]: [default-upd] (ip6u): Added reference to table TBL:default (2/1) refcount 11
bgp[1100]: [default-upd] (ip6u): Adding vrf default neighbor fc00:bb00:3::1 to new filter-group 0.3 in
bgp[1100]: [default-upd] (ip6u): Added vrf default neighbor fc00:bb00:3::1 to update filter-group 0.3 i
bgp[1100]: [default-upd] (ip6u): Added neighbor fc00:bb00:3::1 to update sub-group 0.1 in IPv6 Unicast
bgp[1100]: [default-upd] (ip6u): Started updgrp timer for updgrp 0.3:: delay=0.010, delaytype=0
bgp[1100]: [default-upd] (ip6u): Removed reference to Table TBL:default (2/1) refcount 9
bgp[1100]: [default-upd] (ip6u): Starting updgen walk for updgrp 0.3:: targetver=27:  tblver=27, labelv
bgp[1100]: [default-upd] (ip6u): Computing updates for update sub-group 0.1 (Regular)
bgp[1100]: [default-upd] (ip6u): bgp_srv6_execute_sid_alloc_mode_policy: Use default SRv6 alloc mode pe
bgp[1100]: [default-upd]: table-attr walk for table TBL:default (2/1), resume version 0, subgrp version
bgp[1100]: [default-upd] (ip6u): process UPDATE for: tbl=TBL:default (2/1), afi=5: ug=0.3, (Regular), p
bgp[1100]: [default-upd] (ip6u): Ran 'internal' policy '(null)', result 'TRUE', ptr 0x7f4584005f30, use
bgp[1100]: [default-upd] (ip6u):     : tbl=TBL:default (2/1), afi=5: ug=0.3, sg=0.1, ugfl=0x00104183: n
bgp[1100]: [default-upd] (ip6u):     <NH&LABEL-SEL>: tbl=TBL:default (2/1), afi=5: ug=0.3, sg=0.1, ugfl
bgp[1100]: [default-upd] (ip6u):     <nh&label-sel>::: labselectdo=1, labselectdone=0, updlab=1048577(0
bgp[1100]: [default-upd]: Comm-lib: Assigned ID (0x1d000008) for elem-type PREFIX_SID SRV6_L3SVC
bgp[1100]: [default-upd]: Comm-lib: Assigned ID (0x900000c) for elem-type Attribute
bgp[1100]: [default-upd] (ip6u): Permit UPDATE to filter-group 0.3 (Regular, pelem Regular) for fc00:aa
```

```
bgp[1100]: [default-upd] (ip6u): Sending UPDATE message(0x0x7f4589fd4ba4) to sub-group 0.1 (Regular, pe
bgp[1100]: [default-upd] (ip6u): origin i, path , metric 0, localpref 100, Prefix-SID attribute 0x05002
bgp[1100]: [default-upd] (ip6u): Created msg elem 0x0x7f4589e3afc8 (pointing to message 0x0x7f4589fd4ba
bgp[1100]: [default-upd] (ip6u): process UPDATE for: tbl=TBL:default (2/1), afi=5: ug=0.3, (Regular), p
bgp[1100]: [default-upd] (ip6u): No unreachable (not advertising to sender: fc00:bb00:3::1) sent to sub
bgp[1100]: [default-upd] (ip6u): Generated 1 updates for update sub-group 0.1 (average size = 126 bytes
bgp[1100]: [default-upd] (ip6u): Updates replicated to neighbor fc00:bb00:3::1
bgp[1100]: [default-iowt]: fc00:bb00:3::1 send UPDATE length (incl. header) 126
bgp[1100]: [default-iowt]: Send message dump for fc00:bb00:3::1:
bgp[1100]: [default-iowt]: ffff ffff ffff ffff ffff ffff ffff ffff
bgp[1100]: [default-iowt]: 007e 0200 0000 6790 0e00 2600 0201 10fc
bgp[1100]: [default-iowt]: 00bb 0000 0100 0000 0000 0000 0000 0100
bgp[1100]: [default-iowt]: 80fc 00aa 0000 0100 0000 0000 0000 0000
bgp[1100]: [default-iowt]: 0140 0101 0040 0200 8004 0400 0000 0040
bgp[1100]: [default-iowt]: 0504 0000 0064 c028 2505 0022 0001 001e
bgp[1100]: [default-iowt]: 00fc 00bb 0000 01e0 0200 0000 0000 0000
bgp[1100]: [default-iowt]: 0000 003e 0001 0006 2010 1000 0000
bgp[1100]: [default-iowt]: bgp_io_nbr_add_version: New ver: nbr=fc00:bb00:3::1, io_wr_txsn=58992, acksn
bgp[1100]: [default-iowt]: bgp_io_nbr_derive_acked_version: nbr=fc00:bb00:3::1, io_wr_txsn=58992, acksn
bgp[1100]: [default-iowt]: fc00:bb00:3::1 (afi:4) advancedpeer_acked_version to 10refresh peer acked ve
bgp[1100]: [default-iowt]: fc00:bb00:3::1 (afi:5) received ack for version 27
bgp[1100]: [default-iowt]: bgp_write_list_tonet: IO_SENDMSG: nbr=fc00:bb00:3::1, fd=530: total=1, send-
bgp[1100]: [default-iowt] (ip6u): Deleting msg elem 0x0x7f4589e3afc8 (message 0x0x7f4589fd4ba4), for fi
bgp[1100]: [default-iowt] (ip6u): Deleting message 0x0x7f4589fd4ba4, from subgroup 0.1
bgp[1100]: [default-iowt]: Keepalive timer started for fc00:bb00:3::1(loc 10): last 529293 this 529308
bgp[1100]: [default-iowt]: bgp write for afi 4 for neighbor fc00:bb00:3::1 (fd 530)
bgp[1100]: [default-iowt]: bgp write for afi 5 for neighbor fc00:bb00:3::1 (fd 530)
bgp[1100]: [default-iowt]: bgp_io_nbr_derive_acked_version: nbr=fc00:bb00:3::1, io_wr_txsn=58992, acksn
bgp[1100]: [default-iowt]: fc00:bb00:3::1 (afi:4) advancedpeer_acked_version to 10refresh peer acked ve
bgp[1100]: [default-iowt]: fc00:bb00:3::1 (afi:5) advancedpeer_acked_version to 27refresh peer acked ve
bgp[1100]: [default-iowt]: bgp_io_write_nbr_ver_timer_process: nbr_ver_timer handler: Walk complete: nb
```

L'output visualizza la voce di traccia BGP su R1:

```
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:7799: trying to find update group for nbr fc00:bb00:3
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:6752: created update group for table TBL:default (2/1
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:2039: Filter-group op (Filter-group Rm Nbr) Tbl/Nbr(A
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:1501: Filter-group op (Delete) Tbl/Nbr(TBL:default (2
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:6798: Delete update group for table TBL:default (2/1)
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:2181: Filter-group op (Filter-group Compute Nbr RT) T
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:1411: Filter-group op (Alloc) Tbl/Nbr(TBL:default (2/
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:2725: Filter-group op (Filter-group Add Nbr new) Tbl/
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:2751: created filtergrp 3 for vrf default nbr fc00:bb
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:4473: Created subgrp:1(0x840070a0) refr:0 for nbr fc0
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:6935: added vrf default nbr fc00:bb00:3::1 to update
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:3088: TBL:default (2/1) free subgrp SG:2 subgrp:0x840
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:1316: Update gen Start bit operation Filtergrp delete
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:11342: Updgen - TBL:default (2/1) UG: 0.3 SG: 0.1 msg
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:11344: Updgen - pfx: [tot]  adv/wdn/sup/skp/be[2] 1/0
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:11351: Updgen - fpx: wdn/skp[0/0] ver: 0 -> 27 res ve
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:4009: Updgen - UG: 3 FG: 3 afi:5 msg: 1 ver -> 27
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t32561 [UPD]:4011: pfx: adv/wdn/sup/skp 1/0/0/1
default-bgp/spkr-tr2-common 0/RSP0/CPU0 t32558 [COMMON]:638: vrf default nbr fc00:bb00:3::1, set peer a
default-bgp/spkr-tr2-gen 0/RSP0/CPU0 t32501 [GEN]:617: vrf default nbr 2000:0:0:1::1, old state 1, new
```

Il messaggio BGP UPDATE decodificato mostra il tipo di attributo 40 e il tipo TLV 5, che contengono il SID del servizio fc00:bb00:1:e002::.

Attribute

```
ATTRIBUTE FLAG:         0xC0
ATTRIBUTE FLAG binary:  11000000
        Bit 0, the Optional bit, is 1 so this is an optional attribute
        Bit 1, the Transitive bit, is 1 so this is a transitive attribute
        Bit 2, the Partial bit, is not set
        Bit 3, the Extended Length Bit, is 0 so the length field is 1 byte
        The lower-order four bits of the Attribute Flag are unused and are set to 0000

ATTRIBUTE TYPE:         0x28    - 40
ATTRIBUTE LENGTH:       0x25    - 37 bytes
ATTRIBUTE CONTENT:      0x0500220001001E00FC00BB000001E00200000000000000000000003E0001000620101000000

        BGP Prefix-SID:
        Type:            5 (0x05) - SRv6 L3 Service
        Length:          34 - 0x0022
        Value:           0x0001001E00FC00BB000001E00200000000000000000000003E0001000620101000000
        Reserved:        0x00
        Sub Type:        1 (0x01)
        Sub Length:      30 (0x001E)
        SRv6 SID = FC00:BB00:0001:E002:0000:0000:0000:0000
        SID Flags:       0 (0x00)
        Endpoint Behavior:       62 (0x003E)
        Reserved2 :      0 (0x00)
        SRv6 SID Optional Type:  1 (0x01)
        SRv6 SID Optional Len:   6 (0x0006)
        SRv6 SID Optional Value:         35253360001024 (0x201010000000)
```

.

Il messaggio BGP UPDATE decodificato completo è il seguente:

```
Message #1 - 126 bytes

FF FF FF FF  FF FF FF FF  FF FF FF FF  FF FF FF FF
00 7E 02 00  00 00 67 90  0E 00 26 00  02 01 10 FC
00 BB 00 00  01 00 00 00  00 00 00 00  00 00 01 00
80 FC 00 AA  00 00 01 00  00 00 00 00  00 00 00 00
01 40 01 01  00 40 02 00  80 04 04 00  00 00 00 40
05 04 00 00  00 64 C0 28  25 05 00 22  00 01 00 1E
00 FC 00 BB  00 00 01 E0  02 00 00 00  00 00 00 00
00 00 00 3E  00 01 00 06  20 10 10 00  00 00



BGP Marker:    0xFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
BGP Length:    0x007E    - 126 bytes
BGP Type:    0x02    - UPDATE

UPDATE
UNFEASIBLE ROUTES LENGTH:    0x0000    - 0 bytes
TOTAL PATH ATTRIBUTES LENGTH:    0x0067    - 103 bytes

Attribute

ATTRIBUTE FLAG:        0x90
ATTRIBUTE FLAG binary:    10010000
```

```
    Bit 0, the Optional bit, is 1 so this is an optional attribute
    Bit 1, the Transitive bit, is 0 so this is a non-transitive attribute
    Bit 2, the Partial bit, is not set
    Bit 3, the Extended Length Bit, is 1 so the length field is 2 bytes
    The lower-order four bits of the Attribute Flag are unused and are set to 0000

ATTRIBUTE TYPE:        0x0E    - 14
ATTRIBUTE LENGTH:    0x0026    - 38 bytes
ATTRIBUTE CONTENT:    0x00020110FC00BB0000010000000000000000000010080FC00AA00000100000000000000000001

    AFI:        2 (0x0002)
    Sub AFI:    1 (0x01)
    NEXTHOP Length:    16 (0x10) bytes
    NEXTHOP:    FC00:BB00:0001:0000:0000:0000:0000:0001
    Numb of SNPAs:    0 (0x00)


    NLRI Length:     128 bits    (0x80)
    MP_REACH_NLRI:     FC00:AA00:0001:0000:0000:0000:0000:0001/128    (0xFC00AA0000010000000000000000000

Attribute

ATTRIBUTE FLAG:        0x40
ATTRIBUTE FLAG binary:    01000000
    Bit 0, the Optional bit, is 0 so this is a well-known attribute
    Bit 1, the Transitive bit, is 1 so this is a transitive attribute
    Bit 2, the Partial bit, is not set
    Bit 3, the Extended Length Bit, is 0 so the length field is 1 byte
    The lower-order four bits of the Attribute Flag are unused and are set to 0000

ATTRIBUTE TYPE:        0x01    - 1
ATTRIBUTE LENGTH:    0x01    - 1 bytes
ATTRIBUTE CONTENT:    0x00    - IGP

Attribute

ATTRIBUTE FLAG:        0x40
ATTRIBUTE FLAG binary:    01000000
    Bit 0, the Optional bit, is 0 so this is a well-known attribute
    Bit 1, the Transitive bit, is 1 so this is a transitive attribute
    Bit 2, the Partial bit, is not set
    Bit 3, the Extended Length Bit, is 0 so the length field is 1 byte
    The lower-order four bits of the Attribute Flag are unused and are set to 0000

ATTRIBUTE TYPE:        0x02    - 2
ATTRIBUTE LENGTH:    0x00    - 0 bytes

Attribute

ATTRIBUTE FLAG:        0x80
ATTRIBUTE FLAG binary:    10000000
    Bit 0, the Optional bit, is 1 so this is an optional attribute
```

```
    Bit 1, the Transitive bit, is 0 so this is a non-transitive attribute
    Bit 2, the Partial bit, is not set
    Bit 3, the Extended Length Bit, is 0 so the length field is 1 byte
    The lower-order four bits of the Attribute Flag are unused and are set to 0000

ATTRIBUTE TYPE:        0x04    - 4
ATTRIBUTE LENGTH:    0x04    - 4 bytes
ATTRIBUTE CONTENT:    0x00000000    - 0




Attribute

ATTRIBUTE FLAG:        0x40
ATTRIBUTE FLAG binary:    01000000
    Bit 0, the Optional bit, is 0 so this is a well-known attribute
    Bit 1, the Transitive bit, is 1 so this is a transitive attribute
    Bit 2, the Partial bit, is not set
    Bit 3, the Extended Length Bit, is 0 so the length field is 1 byte
    The lower-order four bits of the Attribute Flag are unused and are set to 0000

ATTRIBUTE TYPE:        0x05    - 5
ATTRIBUTE LENGTH:    0x04    - 4 bytes
ATTRIBUTE CONTENT:    0x00000064    - 100




Attribute

ATTRIBUTE FLAG:        0xC0
ATTRIBUTE FLAG binary:    11000000
    Bit 0, the Optional bit, is 1 so this is an optional attribute
    Bit 1, the Transitive bit, is 1 so this is a transitive attribute
    Bit 2, the Partial bit, is not set
    Bit 3, the Extended Length Bit, is 0 so the length field is 1 byte
    The lower-order four bits of the Attribute Flag are unused and are set to 0000

ATTRIBUTE TYPE:        0x28    - 40
ATTRIBUTE LENGTH:    0x25    - 37 bytes
ATTRIBUTE CONTENT:    0x0500220001001E00FC00BB000001E002000000000000000000000003E00010006201010000000

    BGP Prefix-SID:
    Type:         5 (0x05) - SRv6 L3 Service
    Length:         34 - 0x0022
    Value:         0x0001001E00FC00BB000001E002000000000000000000000003E00010006201010000000
    Reserved:     0x00
    Sub Type:     1 (0x01)
    Sub Length:     30 (0x001E)
    SRv6 SID = FC00:BB00:0001:E002:0000:0000:0000:0000
    SID Flags:     0 (0x00)
    Endpoint Behavior:     62 (0x003E)
    Reserved2 :     0 (0x00)
    SRv6 SID Optional Type:     1 (0x01)
    SRv6 SID Optional Len:     6 (0x0006)
    SRv6 SID Optional Value:     35253360001024 (0x201010000000)



NLRI
NLRI LENGTH:    UPDATE Length - 23 - TOTAL PATH ATTRIBUTES LENGTH - UNFEASIBLE ROUTES LENGTH
```

```
NLRI LENGTH:    126 - 23 - 103 - 0
NLRI LENGTH:    0 bytes
```

3. R3 riceve l'aggiornamento BGP e lo installa nella tabella Unicast BGP IPv6

Il router R3 riceve un aggiornamento BGP da R1, che può essere osservato abilitando il debug BGP su R3. Il pacchetto di aggiornamento BGP ricevuto deve corrispondere a quello inviato da R1, come mostrato nell'output di debug.

```
bgp[1100]: [default-rtr]: UPDATE from fc00:bb00:1::1 contains nh fc00:bb00:1::1/128, gw_afi 5, flags 0x
bgp[1100]: [default-rtr]: NH-Validate-Create: addr=fc00:bb00:1::1/128, len=16, nlriafi=5, nbr=fc00:bb00
bgp[1100]: [default-rtr]: --bgp4_rcv_attributes--: END: nbr=fc00:bb00:1::1:: msg=0x0x7fc420108bdc/126,
bgp[1100]: [default-rtr]: Comm-lib: Assigned ID (0x1d0000ac) for elem-type PREFIX_SID SRV6_L3SVC
bgp[1100]: [default-rtr]: Comm-lib: Assigned ID (0x90000de) for elem-type Attribute
bgp[1100]: [default-rtr] (ip6u): Received UPDATE from fc00:bb00:1::1 with attributes:
bgp[1100]: [default-rtr] (ip6u): nexthop fc00:bb00:1::1/128, origin i, localpref 100, metric 0
bgp[1100]: [default-rtr] (ip6u): Received prefix fc00:aa00:1::1/128 (path ID: none) from fc00:bb00:1::1
bgp[1100]: [default-rtr] (ip6u): Handling OCRIB attrs while relacing path 0x7fc3e1be61d8. Old oc attr (
bgp[1100]: [default-rtr]: bgp_bmp_table_path_update_cb: Operation: 0x1, Inbound Post-Policy Route Mon i
bgp[1100]: [default-rtr] (ip6u): Done modify path (old tlv size=0 new tlv size=0) for net=fc00:aa00:1::
bgp[1100]: [default-rtr]: bgp_set_path_metric:8712 afi 5 net fc00:aa00:1::1/128 path 0x7fc3e1be61d8 nh
bgp[1100]: [default-rtr] (ip6u): bestpath: (full bp 1) start for net=fc00:aa00:1::1/128, nver=2000371,
bgp[1100]: [default-rtr] (ip6u): bestpath: (full 1) calculated for net=fc00:aa00:1::1/128, nver=2000371
bgp[1100]: [default-rtr] (ip6u): bestpath: change for net=fc00:aa00:1::1/128, nver=2000371, nfl=0x00003
bgp[1100]: [default-rtr] (ip6u): bestpath: update flags for net=fc00:aa00:1::1/128, nver=2000371, nfl=0
bgp[1100]: [default-rtr] (ip6u): bestpath: modified path: net=fc00:aa00:1::1/128, nver=2000371, nfl=0x0
bgp[1100]: [default-rtr] (ip6u): bgp_srv6_get_alloc_mode_locator_from_policy: Use default SRv6 alloc mo
bgp[1100]: [default-rtr] (ip6u): bestpath: complete for net=fc00:aa00:1::1/128, nver=2000371, nfl=0x000
bgp[1100]: [default-rtr]: Received UPDATE from fc00:bb00:1::1 (length incl. header = 126)
bgp[1100]: [default-rtr]: Receive message dump for fc00:bb00:1::1:
bgp[1100]: [default-rtr]: ffff ffff ffff ffff ffff ffff ffff ffff
bgp[1100]: [default-rtr]: 007e 0200 0000 6790 0e00 2600 0201 10fc
bgp[1100]: [default-rtr]: 00bb 0000 0100 0000 0000 0000 0000 0100
bgp[1100]: [default-rtr]: 80fc 00aa 0000 0100 0000 0000 0000 0000
bgp[1100]: [default-rtr]: 0140 0101 0040 0200 8004 0400 0000 0040
bgp[1100]: [default-rtr]: 0504 0000 0064 c028 2505 0022 0001 001e
bgp[1100]: [default-rtr]: 00fc 00bb 0000 01e0 0200 0000 0000 0000
bgp[1100]: [default-rtr]: 0000 003e 0001 0006 2010 1000 0000
bgp[1100]: [default-rtr]: Enabling read from: fc00:bb00:1::1 readset: 1 msgcount: 0
bgp[1100]: [default-iowt]: bgp write for afi 4 for neighbor fc00:bb00:1::1 (fd 516)
bgp[1100]: [default-iowt]: bgp write for afi 5 for neighbor fc00:bb00:1::1 (fd 516)
bgp[1100]: [default-impt] (ip6u): START import walk from 2000371 to 2000372 skip_walk 1
bgp[1100]: [default-rib2] (ip6u): RIB thread triggered for versioned walk: current version 2000371, ack
bgp[1100]: [default-rib2] (ip6u): RNH rib opaque update for (IPv6 Unicast)
bgp[1100]: [default-rib2] (ip6u): RIB thread triggered for RNH walk for nh table(IPv6 Unicast): current
bgp[1100]: [default-lbl] (ip6u): Label update triggered: current version 2000371, target version 200037
bgp[1100]: [default-lbl]: Table: TBL:default (2/1) bgp_label_srv6_sid_config_release: label_sid_need_ev
bgp[1100]: [default-lbl]: uSID WLIB allocation is (LIB Default)
bgp[1100]: [default-lbl]: Table: TBL:default (2/1) bgp_label_thread_walk_type: rd:0x7fc3e1efbf30(ALLzer
bgp[1100]: [default-lbl] (ip6u): rd:0x7fc3e1efbf30 sid_walk:1 label_walk:0
bgp[1100]: [default-lbl]: uSID WLIB allocation is (LIB Default)
bgp[1100]: [default-upd] (vpn4u): Started updgrp timer for updgrp 0.1:: delay=0.010, delaytype=0
bgp[1100]: [default-lbl] (ip6u): SRv6 SID process for net: TBL:default (2/1)fc00:aa00:1::1/128(SID N) e
bgp[1100]: [default-lbl] (ip6u): SRv6 SID process for net: TBL:default (2/1)fc00:aa00:1::1/128 point 1
bgp[1100]: [default-lbl]: uSID WLIB allocation is (LIB Default)
bgp[1100]: [default-lbl] (ip6u): Label update run from 2000371 target label version 2000372, rib versio
```

```
bgp[1100]: [default-lbl] (ip6u): Wake up rib thread, label version 2000372, rib version 2000371, bgp tab
bgp[1100]: [default-rib2] (ip6u): RIB thread triggered for versioned walk: current version 2000371, ack
bgp[1100]: [default-rib2] (ip6u): RNH rib opaque update for (IPv6 Unicast)
bgp[1100]: [default-rib2] (ip6u): RIB thread triggered for RNH walk for nh table(IPv6 Unicast): current
bgp[1100]: [default-rib2] (ip6u): Rib Batch-buf Route ADD: table=TBL:default (2/1), tableid=0xe0800000,
bgp[1100]: [default-rib2] (ip6u): Revise route batch: installing fc00:aa00:1::1/128 with next hop fc00:
bgp[1100]: [default-rib2] (ip6u): [0]: Rib Batch-buf Path ADD: table=TBL:default (2/1), net=fc00:aa00:1
bgp[1100]: [default-rib2] (ip6u): Sending convergence info for IPv6 Unicast - not converged, version: 0
bgp[1100]: [default-upd] (ip6u): Started updgrp timer for updgrp 0.1:: delay=0.010, delaytype=0
bgp[1100]: [default-rib2] (ip6u): vrf default: RIB update run to 2000372: installed 0, modified 1, skip
bgp[1100]: [default-rib2] (ip6u): RIB thread finished versioned walk: table version 2000372, acked tabl
bgp[1100]: [default-upd] (vpn4u): Starting updgen walk for updgrp 0.1:: targetver=463:  tblver=463, lab
bgp[1100]: [default-upd] (ip6u): Starting updgen walk for updgrp 0.1:: targetver=2000372:  tblver=20003
bgp[1100]: [default-upd] (ip6u): Computing updates for update sub-group 0.1 (Regular)
bgp[1100]: [default-upd] (ip6u): bgp_srv6_execute_sid_alloc_mode_policy: Use default SRv6 alloc mode pe
bgp[1100]: [default-upd]: table-attr walk for table TBL:default (2/1), resume version 0, subgrp version
bgp[1100]: [default-upd] (ip6u): process UPDATE for: tbl=TBL:default (2/1), afi=5: ug=0.1, (Regular), p
bgp[1100]: [default-upd] (ip6u): No unreachable (not advertising to sender: fc00:bb00:1::1) sent to sub
```

Il router R3 genera una traccia BGP corrispondente all'elaborazione dell'aggiornamento da R1, che determina l'aggiornamento della tabella unicast BGP IPv6 in R3. Questo aggiornamento, che contiene l'attributo BGP di tipo 40, prevede l'installazione dei SID ricevuti insieme ai prefissi unicast IPv6 BGP associati da R1.

```
RP/0/RSP0/CPU0:R3#show bgp trace
default-bgp/spkr-tr2-imp 0/RSP0/CPU0 t16100 [IMPORT]:6661: Skipping Import walk: import ver 2000371 -> 
default-bgp/spkr-tr2-rib 0/RSP0/CPU0 t30391 [RIB]:17177: RIB walk for afi IPv6 Unicast: target version 
default-bgp/spkr-tr2-label 0/RSP0/CPU0 t16061 [LABEL]:8505: label walk afi:IPv6 Unicast, lbl ver 200037
default-bgp/spkr-tr2-label 0/RSP0/CPU0 t16061 [LABEL]:8510: label walk afi:IPv6 Unicast, lbl ver 200037
default-bgp/spkr-tr2-rib 0/RSP0/CPU0 t30391 [RIB]:17177: RIB walk for afi IPv6 Unicast: target version 
default-bgp/spkr-tr2-rib 0/RSP0/CPU0 t30391 [RIB]:14681: send converge to RIB, afi IPv6 Unicast, tablei
default-bgp/spkr-tr2-rib 0/RSP0/CPU0 t30391 [RIB]:15892: RIB(default:v6u): ver 2000371 -> 2000372 :pfx 
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t16101 [UPD]:11342: Updgen - TBL:default (2/1) UG: 0.1 SG: 0.1 msg
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t16101 [UPD]:11344: Updgen - pfx: [tot]  adv/wdn/sup/skp/be[1] 0/0/
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t16101 [UPD]:11351: Updgen - fpx: wdn/skp[0/0] ver: 2000371 -> 200
default-bgp/spkr-tr2-common 0/RSP0/CPU0 t16101 [COMMON]:3628: vrf default nbr fc00:bb00:1::1, set peer 
default-bgp/spkr-tr2-upd 0/RSP0/CPU0 t16101 [UPD]:11663: Updgen - Skip EoR for Tbl:(TBL:default (2/1)) 
```

<#root>

```
RP/0/RSP0/CPU0:R3#
```

show bgp ipv6 unicast received-sids

```
BGP router identifier 10.0.0.3, local AS number 1
BGP generic scan interval 60 secs
Non-stop routing is enabled
BGP table state: Active
Table ID: 0xe0800000   RD version: 46
BGP table nexthop route policy:
BGP main routing table version 46
BGP NSR Initial initsync version 6 (Reached)
BGP NSR/ISSU Sync-Group versions 0/0
```

```
BGP scan interval 60 secs

Status codes: s suppressed, d damped, h history, * valid, > best
              i - internal, r RIB-failure, S stale, N Nexthop-discard
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network            Next Hop                              Received Sid
*>ifc00:aa00:1::1/128 fc00:bb00:1::1
```

fc00:bb00:1:e002::

```
*> fc00:aa00:3::3/128 ::                                    NO SRv6 Sid

Processed 2 prefixes, 2 paths
```

4. R3 installare RIB e FIB

Alla fine R3 installa RIB e FIB per completare il processo di segnalazione. R3 quindi funge da headend SRv6 con elenco SID fc00:bb00:1:e002::. Questo ingresso R1 funge da headend SRv6 con incapsulamento in una policy SR, abbreviato come H.Encaps (RFC 8986, sezione 5.1). Questo comportamento incapsula il pacchetto in un'intestazione IPv6, imponendo un elenco di segmenti e aggiungendo SRH se necessario. In questo caso, non è necessario aggiungere il protocollo SRH in quanto esiste un solo segmento. Il pacchetto verrà inviato con l'indirizzo di destinazione fc00:bb00:1:e002::, che è il SID del servizio in R1 con comportamento SRv6 Endpoint UDT6.

<#root>

```
RP/0/RSP0/CPU0:R3#
```

show route ipv6 fc00:aa00:1::1/128 detail

```
Routing entry for fc00:aa00:1::1/128
  Known via "bgp 1", distance 200, metric 0, type internal
  Installed Jun  8 17:52:31.546 for 00:53:55
  Routing Descriptor Blocks
    fc00:bb00:1::1, from fc00:bb00:1::1
      Route metric is 0
      Label: None
      Tunnel ID: None
      Binding Label: None
      Extended communities count: 0
      NHID: 0x0 (Ref: 0)
      Path Grouping ID: 1
```

SRv6 Headend: H.Encaps.Red [f3216], SID-list {fc00:bb00:1:e002::}

```
  Route version is 0x1f (31)
  No local label
  IP Precedence: Not Set
  QoS Group ID: Not Set
  Flow-tag: Not Set
  Fwd-class: Not Set
  Route Priority: RIB_PRIORITY_RECURSIVE (12) SVD Type RIB_SVD_TYPE_LOCAL
  Download Priority 4, Download Version 166
```

```
  No advertising protos.

RP/0/RSP0/CPU0:R3#
```

`show cef ipv6 fc00:aa00:1::1/128`

```
fc00:aa00:1::1/128, version 166,
```

`SRv6 Headend`

```
, internal 0x5000001 0x40 (ptr 0x7941f0f4) [1], 0x0 (0x0), 0x0 (0x7ad58368)
 Updated Jun  8 17:52:31.551
 Prefix Len 128, traffic index 0, precedence n/a, priority 4
  gateway array (0x78eac428) reference count 1, flags 0x2010, source rib (7), 0 backups
                [1 type 3 flags 0x48441 (0x78f4f4d8) ext 0x0 (0x0)]
  LW-LDI[type=0, refc=0, ptr=0x0, sh-ldi=0x0]
  gateway array update type-time 1 Jun  8 17:52:31.551
 LDI Update time Jun  8 17:52:31.551

  Level 1 - Load distribution: 0
  [0] via fc00:bb00:1::/128, recursive

 Accounting: Disabled
   via fc00:bb00:1::/128, 5 dependencies, recursive [flags 0x6000]
    path-idx 0 NHID 0x0 [0x7941edb4 0x0]
    next hop fc00:bb00:1::/128 via fc00:bb00:1::/48
```

`SRv6 H.Encaps.Red SID-list {fc00:bb00:1:e002::}`

```
    Load distribution: 0 (refcount 1)

    Hash  OK  Interface                 Address
    0     Y   TenGigE0/0/0/1            remote
```

Nella figura 4 viene mostrato il formato del pacchetto quando il router R3 (fc00:aa00:3:3) esegue il ping di R1 (fc00:aa00:1:1).

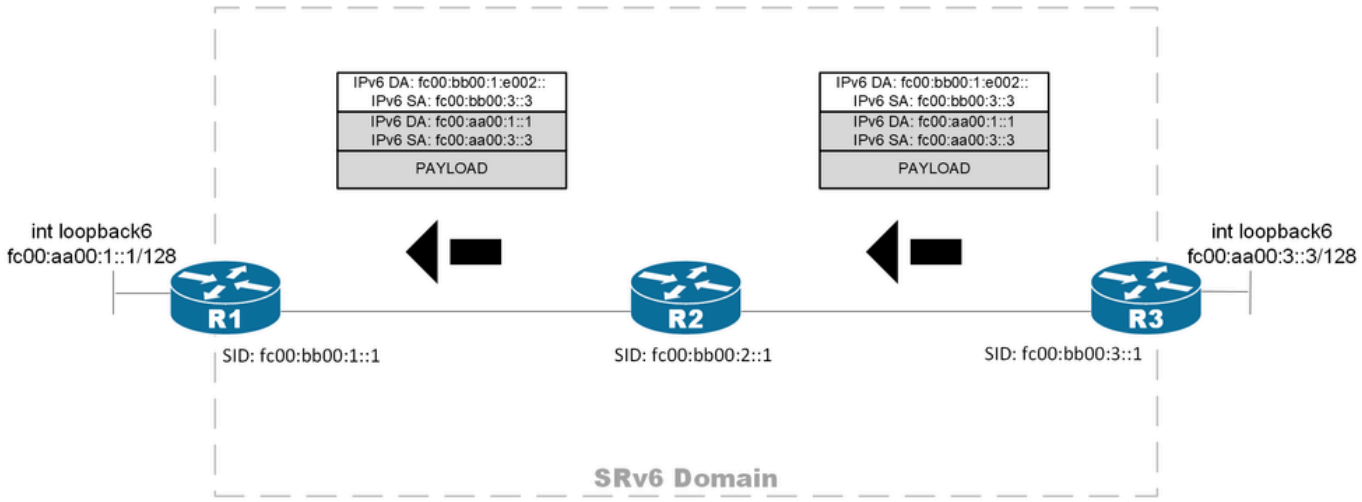

Figura 4. Elaborazione dei pacchetti lungo il percorso di BGP IPv6 Unicast su SRv6

Informazioni su questa traduzione

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