Configure BGP Global IPv6 over SRv6

Contents

Introduction

This document describes the control-plane flow when applying encapsulation Segment Routing over IPv6 (SRv6) to BGP IPv6 unicast session.

Background Information

See the Segment Routing Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 24.1.x, 24.2.x, 24.3.x, 24.4.xfor additional information.

Topology

The topology used in this document is depicted in Figure 1. The SRv6 domain consists of three routers, all of which are operating on Cisco IOS-XR. The SRv6 underlay infrastructure is implemented using IS-IS with uSID SRv6. BGP IPv6 unicast peering is established between routers R1 and R3, while router R2 does not participate in BGP and functions as a P-router in this configuration. The Loopback 6 interface on both R1 and R3 represents an IPv6 prefix that must be exchanged between the two BGP IPv6 unicast peers.

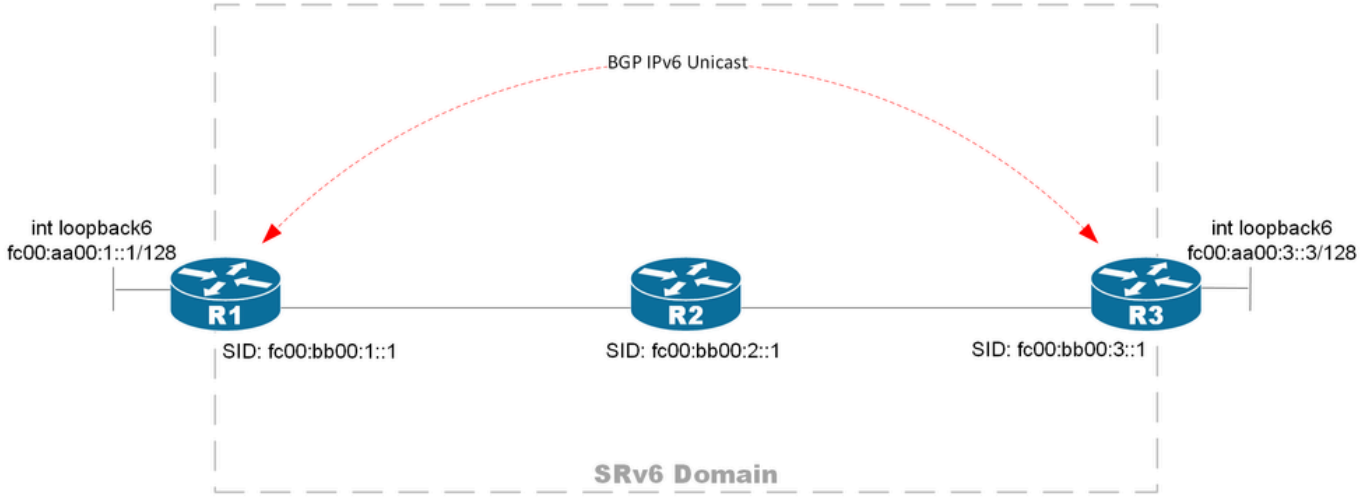

Figure 1. Topology diagram of BGP ipv6 unicast over SRv6

SRv6 Configuration

This section shows configuration of all three SRv6 routers. Router R2 includes only the SRv6 configuration, as it does not participate in BGP.

Router R1 Configuration

Router R1 is part of the SRv6 domain with a locator of fc00:bb00:1::/48. It also functions as a BGP IPv6 unicast router, originating the local prefix fc00:aa00:1::1/128. Additionally, it establishes BGP IPv6 unicast peering with Router R3 over the SRv6 infrastructure. The configuration highlighted in bold serves as the starting point for debugging the control flow described in this document and is the sole trigger used throughout.

<#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
   !
```

Router R2 Configuration

Router R2 is part of the SRv6 domain with a locator of fc00:bb00:2::/48. It does not participate in BGP and functions as a P-router within this topology.

```
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
   !
```

Router R3 Configuration

Router R3 is part of the SRv6 domain with a locator of fc00:bb00:3::/48. It has BGP IPv6 unicast peering with Router R1, and both exchange the IPv6 prefixes of its Loopback 6 interfaces.

```
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
   !
  !
 !
!
```

Signalling Flow of SRv6 SID

In underlay SRv6 infrastructure, each router has link state information throughout the topology, which each one advertise its SRv6 locator via link-state ISIS protocol. The ISIS database on R1 shows the locator of all router participating in SRv6 domain.

<#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
```

This SRv6 implementation supports Global Routing Table (GRT) traffic overlay. When the Global BGP IPv6 unicast overlay service is enabled on both R1 and R3, each router generates a new service SID. This service SID is associated with the default VRF and utilizes the Endpoint behavior uDT6 in this scenario. This service SID must be exchanged between BGP IPv6 unicast peers to enable SRv6 forwarding between the two BGP peers. The upcoming section outlines the steps of the BGP signaling flow, starting from the trigger execution (enabling encapsulation-type srv6) to the point where SRv6 forwarding is programmed on Router R3.

1. State Prior to Enabling Encapsulation of SRv6

Before enabling SRv6 encapsulation on the IPv6 unicast SAFI for the BGP peer, Router R1 must have BGP IPv6 prefixes with assigned service SIDs. This occurs when 'segment-routing srv6' is enabled under the IPv6 unicast global SAFI on R1. The output shows the local SID fc00:bb00:1:e002:: is assigned to all prefixes under 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
```

This service SID is programmed locally by sid_mgr process on R1 which has Endpoint behavior as uDT6 that is associated with default vrf and owned by bgp. This simply means whenever the R1 receive packet

with destination address matches with service SID fc00:bb00:1:e002:: and it is the last segment, the R1 must decapsulate the header and submit the decapsulated packet to FIB lookup of IPv6 default vrf table. This is according to RFC8986 which list all SRv6 Endpoint behavior. Notice the output where it shows the sid_mgr create the service SID fc00:bb00:1:e002:: and pass this information to RIB and eventually 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
```

Since R1 has not enabled the SRv6 encapsulation under its BGP ipv6 unicast peer, R1 advertise these prefixes toward R3 without SRv6 TLV in BGP update, eventhough R1 has locally assigned local SIDs.

<#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:
```

Router R3 receive the update from router R1 without SID. R3 install the prefixes receive from R1 to its RIB

and FIB table without an SRv6 header.

```
<#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. Enable Encapsulation SRv6

Enabling SRv6 encapsulation causes R1 to send a BGP Update message to its peer with attribute type 40, which is used in Segment Routing to advertise a BGP prefix with a specific Segment Routing Identifier (SID). Router R1 sends the UPDATE to R3 for the IPv6 prefix fc00:bb00:3::1 (Step 1) with the associated SID fc00:bb00:1:e002::. Upon receiving the UPDATE, Router R3 updates its BGP IPv6 unicast table (Step 2)and subsequently updates its RIB and FIB tables (Step 3). The figure 2 illustrates the BGP signaling flow along with the corresponding steps.

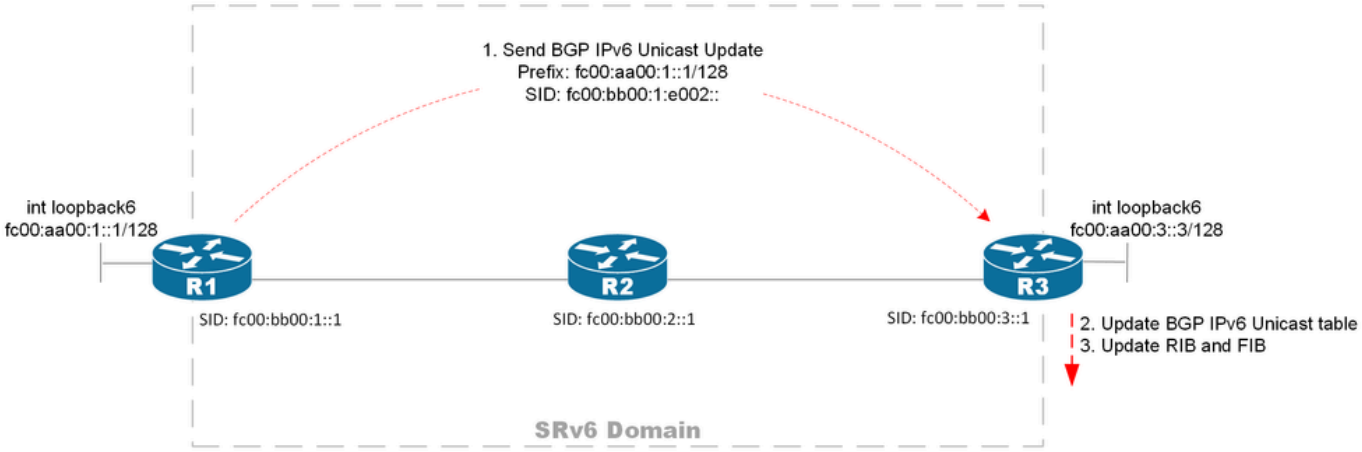

Figure 2. BGP signalling flow after enabling encapsulation srv6

The output displays the BGP debug log immediately after enabling SRv6 encapsulation on the R3 peer, showing that R1 sends a BGP Update message to 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
```

The output displays the BGP trace entry on 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
```

The decoded BGP UPDATE message shows the attribute type 40 and TLV Type 5, which contain the service SID 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)
```

.

The complete decoded BGP UPDATE message is as follows:

```
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:    0x00020110FC00BB0000010000000000000000000010080FC00AA0000010000000000000000000001

    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:    0x0500220001001E00FC00BB000001E002000000000000000000003E000100062010100000000

    BGP Prefix-SID:
    Type:         5 (0x05) - SRv6 L3 Service
    Length:         34 - 0x0022
    Value:         0x0001001E00FC00BB000001E002000000000000000000003E000100062010100000000
    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 Receives the BGP Update and Installs it in BGP IPv6 Unicast Table

Router R3 receives a BGP update from R1, which can be observed by enabling BGP debugging on R3. The received BGP update packet must match the one sent by R1, as shown in the debug output.

```
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 ta
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
```

Router R3 generates a BGP trace corresponding to the update processing from R1, which ultimately results in R3 updating its BGP IPv6 unicast table. This update, which contains BGP attribute type 40, involves installing the received SIDs along with the associated BGP IPv6 unicast prefixes from 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 install the RIB and FIB

Eventually R3 install the RIB and FIB to complete the signalling process. R3 then act as SRv6 Headend with SID list fc00:bb00:1:e002::. This ingress R1 acts as SRv6 Headend with Encapsulation in an SR Policy, abbreviated as H.Encaps (RFC 8986, section 5.1). This behavior encapsulates the packet in an IPv6 header, imposing a segment list and adding SRH if needed. In this case, there is no need for adding SRH as there is only one segment only. The packet is going to be sent with destination address fc00:bb00:1:e002::, which is the service SID on R1 with behavior 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
```

The figure 4 show the packet format when router R3 (fc00:aa00:3::3) ping R1 (fc00:aa00:1::1).

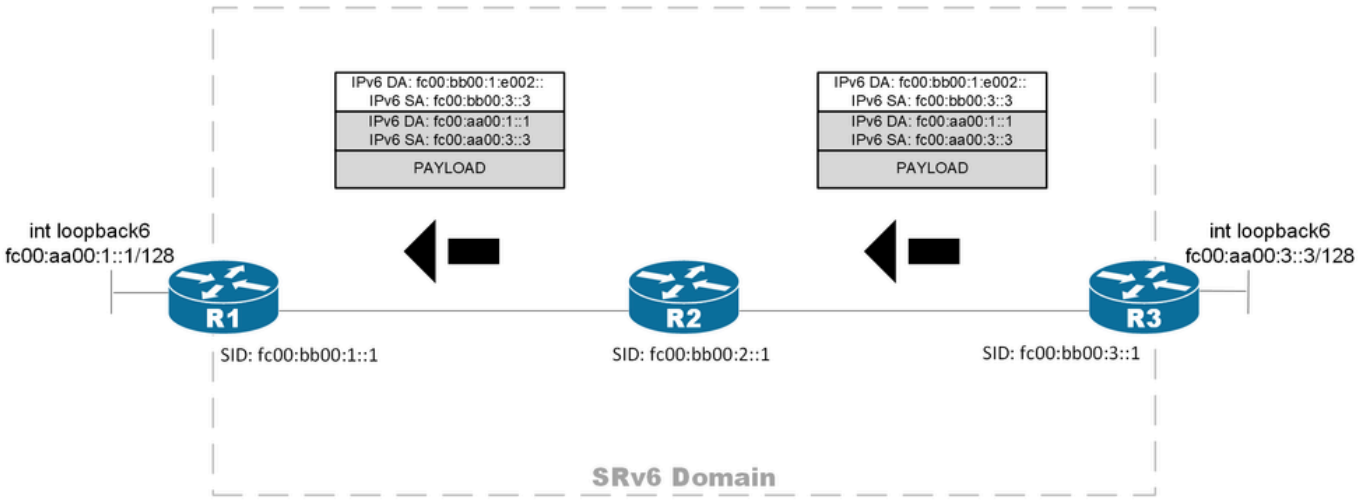

Figure 4. Packet processing along the path of BGP IPv6 Unicast over SRv6