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   **Segment Routing IPv6 Mobile User Plane Architecture for Distributed
                         Mobility Management**
                 draft-mhkk-dmm-srv6mup-architecture-04

Abstract

   This document defines the Segment Routing IPv6 Mobile User Plane
   (SRv6 MUP) architecture for Distributed Mobility Management. The
   requirements for Distributed Mobility Management described in
   [RFC7333] can be satisfied by routing fashion.

   Mobile services are deployed over several parts of IP networks. A
   Segment Routing over IPv6 (SRv6) network can accommodate all, or part
   of those networks thanks to the large address space of IPv6 and the
   network programming capability described in [RFC8986].

   Segment Routing IPv6 Mobile User Plane Architecture can incorporate
   existing session based mobile networks. By leveraging SRv6 network
   programmability, mobile user plane can be integrated into the SRv6
   data plane. In that routing paradigm, session information between
   the entities of the mobile user plane is turned to routing
   information.

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1. Introduction

   Mobile services require IP connectivity for communication between the
   entities of mobile service architecture [RFC5213][TS.23501]. To
   provide the IP connectivity, Segment Routing (SR) [RFC8402]can be a
   candidate solution.

   In PMIPv6 [RFC5213], IP connectivity between LMA and MAG can be
   provided over SR networks, as well as LMA and Internet. In 3GPP 5G
   [TS.23501], IP connectivity for N3 interface between gNodeB(es) and
   UPFs can also be provided by SR, as well as for N6 interface between
   UPFs and DNs (Data Network).

   These IP connectivities may be covered by multiple SR networks, or
   just one SR network, depending on the size of the deployment. In the
   latter case, it is expected that the address space of the SR network
   should be large enough to cover a vast number of nodes, such as
   millions of base stations. For this reason, use of IPv6 for the SR
   dataplane looks sufficiently suitable.

   SRv6 is an instantiation of SR over IPv6 dataplane in which a single
   network can accommodate all entities of mobile services thanks to the
   huge available address space and network programming capability
   described in [RFC8986].

   Meanwhile, SRv6 network programmability enhances SRv6 dataplane to be
   integrated with mobile user plane [I-D.ietf-dmm-srv6-mobile-uplane].
   It will make an entire SRv6 network support the user plane in a very
   efficient distributed routing fashion.

   On the other hand, the requirements for Distributed Mobility
   Management (DMM) described in [RFC7333] can be satisfied by session
   management based solutions. [RFC8885] defines protocol extension to
   PMIPv6 for the DMM requirements. 3GPP 5G defines an architecture in
   which multiple session anchors can be added to one mobility session
   by the session management.

As a reminder, the user plane related requirements in [RFC7333] are
reproduced here:

REQ1: Distributed mobility management
        IP mobility, network access solutions, and forwarding
        solutions provided by DMM MUST enable traffic to avoid
        traversing a single mobility anchor far from the optimal
        route. It is noted that the requirement on distribution
        applies to the data plane only.

REQ3: IPv6 deployment
        DMM solutions SHOULD target IPv6 as the primary deployment
        environment and SHOULD NOT be tailored specifically to
        support IPv4, particularly in situations where private IPv4
        addresses and/or NATs are used.

REQ4: Existing mobility protocols
        A DMM solution MUST first consider reusing and extending IETF
        standard protocols before specifying new protocols.

REQ5: Coexistence with deployed networks/hosts and operability
across different networks
        A DMM solution may require loose, tight, or no integration
        into existing mobility protocols and host IP stacks.
        Regardless of the integration level, DMM implementations MUST
        be able to coexist with existing network deployments, end
        hosts, and routers that may or may not implement existing
        mobility protocols. Furthermore, a DMM solution SHOULD work
        across different networks, possibly operated as separate
        administrative domains, when the needed mobility management
        signaling, forwarding, and network access are allowed by the
        trust relationship between them.

This document defines the Segment Routing IPv6 Mobile User Plane
(SRv6 MUP) architecture for Distributed Mobility Management. SRv6
MUP is not a mobility management system itself, but an architecture
to integrate mobile user plane into the SRv6 data plane.

In this routing paradigm, session information from a mobility
management system will be transformed to routing information. It
means that mobile user plane specific nodes for the anchor or
intermediate points are no longer required. The user plane anchor
and intermediate functions can be supported by SR throughout an SR
domain (REQ1), not to mention that SRv6 MUP will naturally be
deployed over IPv6 networks (REQ3).

SRv6 MUP architecture is independent from the mobility management
system. For the requirements (REQ4, 5), SRv6 MUP architecture is
designed to be pluggable user plane part of existing mobile service
architectures. Those existing architectures are for example defined
in [RFC5213], [TS.23501], or if any.

The level of SRv6 MUP integration for mobile networks running based
on the existing architecture will be varied and depending on the
level of SRv6 awareness of the control and user plane entities.

Specifying how to modify the existing architecture to integrate SRv6
MUP is out of scope of this document. What this document provides
for the existing architecture is an interface for SRv6 MUP which the
existing or future architectures can easily integrate.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
document are to be interpreted as described in RFC 2119 [RFC2119].

2. Terminology

MUP: Mobile User Plane

MUP Segment: Representation of mobile user plane segment

PE: Provider Edge node in an SR network

MUP Controller: Controller node for an SR network

UE: User Equipment, as per [TS.23501]

MN: Mobile Node, as per [RFC5213]

3. Architecture Overview

SRv6 MUP architecture defined in this document introduces new segment
types of MUP segment called "Direct segment", and "Interwork
Segment". An SR node of PE accommodates an Interwork Segment and/or
a Direct Segment. Figure 1 depicts the overview.

```
                     *    Mobility    *
                      * Management *
                       *  System  *
                        *........*
                            |
                     Session Information
                            |
              _____v_____
    _____          /          |MUP-C|           \          _____
   /       \        /           +-----+            \        /       \
  /Interwork\__    |                                 |  __/ Direct  \
  \ Segment /  \ |----+                         +----| /  \ Segment /
   _____/    \| PE |          SRv6           | PE |/    _____/
    _____     /|----+         Network         +----|\     _____
   /       \   / |                                 | \   /       \
  / Direct  \_/   \                                 /  \_/Interwork\
  \ Segment /      _____/     \ Segment /
   _____/                                              _____/
```
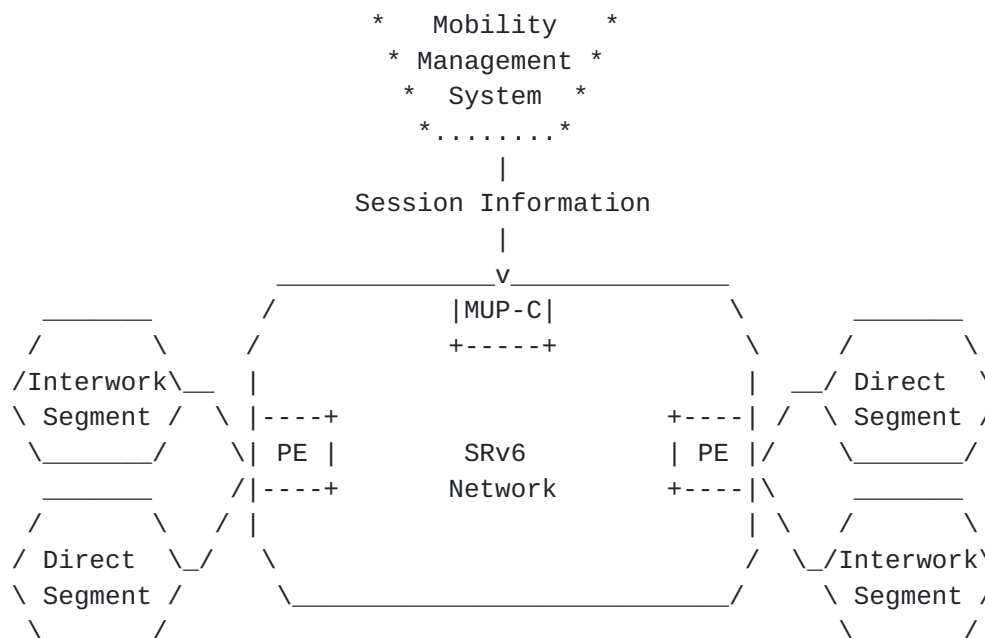
Figure 1: Overview of SRv6 MUP Architecture

This document also defines new routing information called "Segment
Discovery route" and "Session Transformed route". To carry these new
routing information, this architecture requires extending the
existing routing protocols. Any routing protocol can be used to
carry this information but this document recommends using BGP. Thus,
this document describes extensions on BGP as an example.

4. Mobile User Plane Segment

This document defines two new types of Mobile User Plane (MUP)
segment. A MUP segment represents a network segment consisting of a
mobile service. The MUP segment can be created by a PE which
provides connectivity for the mobile user plane.

Direct Segment is a type of MUP segment that provides connectivity
between MUP segments through the SRv6 network. Interwork Segment is
another type of MUP segment. It provides connectivity between a user
plane protocol of existing or future mobile service architecture and
other MUP segments through the SRv6 networks.

An SRv6 SID (Segment Identifier) can represents a MUP segment. The
SID can be any behavior defined in [RFC8986],
[I-D.ietf-dmm-srv6-mobile-uplane], or any other extensions for
further use cases. The behavior of the MUP segment will be chosen by
the role of the representing MUP segment.

For example, in case of a PE interfaces to 5G user plane on the
access side defined as "N3" in [TS.23501], the PE accommodates the N3
network as Interwork Segment in a routing instance and then the
behavior of created segment SID by the PE will be "End.M.GTP4.E", or
"End.M.GTP6.E". In this case, the PE may associate the SID to the
routing instance for the N3 access network (N3RAN).

Another example here is that a PE interfaces to 5G DN on the core
side defined as "N6" in [TS.23501], the PE accommodates the N6
network in a routing instance as Direct Segment and then the behavior
of the created segment SID by the PE will be "End.DT4", "End.DT6", or
"End.DT2". In this case, the PE may associate the SID to the routing
instance for the N6 data network (N6DN).

5. Distribution of Mobile User Plane Segment Information

Distribution of MUP segment information can be done by advertising
routing information with the MUP segment for mobile service. A PE
distributes MUP segment information when a MUP segment is connected
to the PE.

A MUP Segment Discovery route is routing information that associates
the MUP segment with network reachability. This document defines the
basic discovery route types, Direct Segment Discovery route, and
Interwork Segment Discovery route. Other types of segment discovery
route may be mobile service architecture specific. Defining the
architecture specific network reachability is out of scope of this
document and it will be specified in another document.

5.1. Direct Segment Discovery Route

When a PE accommodates a network through an interface or a routing
instance as a Direct Segment, the PE advertises the corresponding
Direct Segment Discovery route for the interface or the routing
instance. The Direct Segment Discovery route includes an address of
the PE in the network reachability information with an extended
community indicating the corresponding Direct Segment, and SID of the
routing instance to the SR domain.

For example in 3GPP 5G specific case, an PE may connect to N6
interface on a DN side, an MUP Segment Discovery route for the DN
will be advertised with an address of the PE, corresponding SID and
Direct Segment extended community to the routing instance for the DN
from the PE.

When a PE receives a Direct Segment Discovery route from other PEs,
the PE keeps the received Direct Segment Discovery route in the RIB.
The PE uses the received Direct Segment Discovery route to resolve

Type 2 session transformed routes reachability, described in
Section 6.2. If the Direct Segment Discovery route resolves
reachability for the endpoints, and match the Direct Segment extended
community of the Type 2 session transformed routes, the PE updates
the FIB entry for the Type 2 session transformed route with the SID
of the matched Direct Segment Discovery route.

5.2. Interwork Segment Discovery Route

When a PE accommodates a network through an interface or a routing
instance for the user plane protocol of the mobile service
architecture as an Interwork Segment, the PE advertises the
corresponding Interwork Segment Discovery route with the prefixes of
the Interwork Segment and the corresponding SID of the prefixes to
the SR domain.

For example in 3GPP 5G specific case, an Interwork Segment Discovery
route for N3 network accommodating RAN will be incorporated in an
N3RAN segment discovery route associated with a RAN segment SID.

When a PE receives a Interwork Segment Discovery route, the PE keeps
the received Interwork Segment Discovery routes in the RIB. The PE
uses the received Interwork Segment Discovery routes to resolve the
reachability for remote endpoint of Type 1 session transformed
routes, described in Section 6.1. If the Interwork Segment Discovery
route resolves the reachability for Type 1 session transformed
routes, the PE updates the FIB entry for the prefix of Type 1 session
transformed route with the SID of the matched MUP segment discovery
route.

The received Interwork Segment Discovery routes MUST be used only to
resolve reachability for the remote endpoints of Type 1 session
transformed routes. The connectivity among the routing instances for
Interwork Segments may be advertised as VPN routes. This is to avoid
forwarding entries to the prefixes of Interwork Segment mingled in
the other type of routing instance. A PE may discard the received
Interwork segment discovery route if the Route Target extended
communities of the route does not meet the PE's import policy.

6. Distribution of Session Transformed Route

SRv6 MUP architecture defines two types of session transformed route.

6.1. Type 1 Session Transformed Route

First type route, called Type 1 Session Transformed route, encodes IP prefix(es) for a UE or MN in a BGP MP-NLRI attribute with associated session information of the tunnel endpoint identifier on the access side. The MUP controller advertises the Type 1 Session Transformed route with the Route Target extended communities for the UE or MN to the SR domain.

A PE may receive the Type 1 Session Transformed routes from the MUP Controller in the SR domain. The PE may keep the received Type 1 Session Transformed routes advertised from the MUP Controller. The receiving PE will perform the importing of the received Type 1 Session Transformed routes in the configured routing instances based on the Route Target extended communities. A PE may discard the received Type 1 Session Transformed route if the PE fails to import the route based on the Route Target extended communities.

6.2. Type 2 Session Transformed Route

Second type route, called Type 2 Session Transformed route, encodes the tunnel endpoint identifier of the session on the core side in a BGP MP-NLRI attribute with the nature of tunnel decapsulation. Longest match algorithm for the prefix in this type of session transformed route should be applicable to aggregate the routes for scale. The MUP controller advertises the Type 2 Session Transformed route with the Route Target and Direct Segment extended communities for the endpoint to the SR domain.

A PE may receive the Type 2 Session Transformed routes from the MUP Controller in the SR domain. The PE may keep the received Type 2 Session Transformed routes advertised from the MUP Controller. The receiving PE will perform the importing of the received Type 2 Session Transformed routes in the configured routing instances based on the Route Target extended communities. A PE may discard the received Type 2 Session Transformed route if the PE fails to import the route based on the Route Target extended communities.

6.3. MUP Controller

A MUP controller provides an API. A consumer of the API inputs session information for a UE or a MN from mobility management system. The MUP controller transforms the received session information to routing information and will advertise the session transformed routes with the corresponding extended communities to the SR domain.

The received session information is expected to include the UE or MN
IP prefix(es), tunnel endpoint identifiers for both ends, and any
other attributes for the mobile networks. For example in a 3GPP 5G
specific case, the tunnel endpoint identifier will be a pair of the
F-TEIDs on both the N3 access side (RAN) and core side (UPF).

7. Illustration

This section illustrates possible SRv6 MUP deployments. 3GPP 5G is
an example mobile service for the deployment cases in this section.

7.1. SRv6 Network Accommodating Existing Mobile Network Services

Figure 2 shows how SRv6 networks can accommodate existing mobile
network service before enabling SRv6 MUP. The PEs S1, S2, and S3
compose an SR network. A routing instance is configured to each
network of the mobile service. N6DN in S1 and S2 are providing
connectivity to edge servers and the Internet respectively.

VRF (Virtual Routing Forwarding) is the routing instance to
accommodate MUP segments in this section. All example cases in this
section follow the typical routing policy control using the BGP
extended community described in [RFC4360] and [RFC4684]

```
   __ N3   /-----------+-----+------------\
  /  \RAN /            |MUP-C|             \
 / V/v\_  |            +-----+             | N6   __
 \    / \ |----+                        +----| DN  /  \
  \__/   \| S1 |                        | S2 |----/W/w \
   __    /|----+                        +----|    \    /
  /  \__/ |            +----+                |     \__/
 / E/e\N6 \            | S3 |                /
 \    /DN  \-----------+----+------------/
  \__/              N3UPF  /\ N6UPF
                     X/x /  \ Y/y
                      +-----+
                      | UPF |
                      +-----+
```
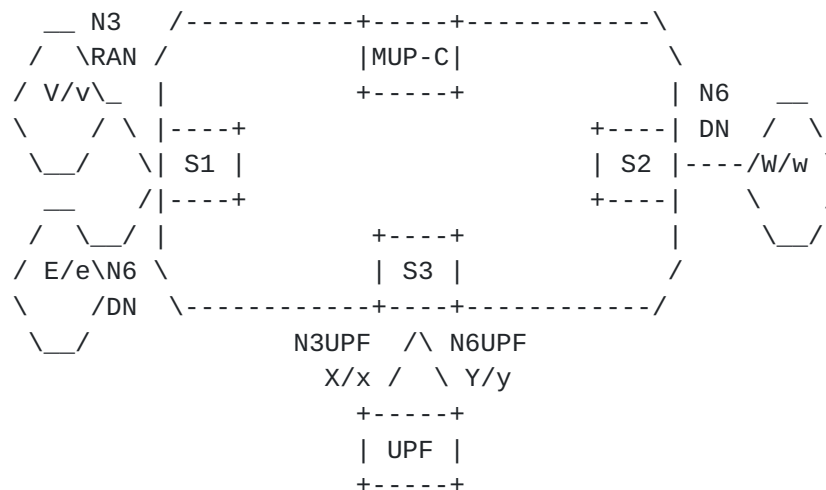
                         Figure 2

The following routing instances are configured:

* N3RAN in S1

      - export route V/v with route-target (RT) community C1

      - import routes which have route-target (RT) community C1 and C2

* N6DN in S1

    - export route E/e with RT C4

    - import routes which have RT C3 and C4

* N6DN in S2

    - export route W/w with RT C4

    - import routes which have RT C3 and C4

* N3UPF in S3

    - export route X/x with RT C2

    - import routes which have RT C1

* N6UPF in S3

    - export route Y/y with RT C3

    - import routes which have RT C4

Note: The above configurations are just to provide typical IP
      connectivity for 3GPP 5G. When the above configurations have
      been done, each endpoint in V/v and X/x can communicate through
      S1 and S3, but they can not communicate with nodes in E/e, W/w
      and Y/y.

7.2. SRv6 MUP PE Deployment at All SR Domain Edges

Here, the PEs S1, S2 and S3 are configured to enable SRv6 MUP as
follows:

* S1

    - advertises Interwork type discovery route: V/v with SID S1::

    - set S1:: behavior End.M.GTP4.E or End.M.GTP6.E

* S1

    - advertise Direct type discovery route: MUP Direct Segment
      community D1 and SID S1:1::

    - set S1:1:: behavior End.DT4 or End.DT6 for the N6DN in S1

   * S2

      - advertise Direct type route: MUP Direct Segment community D1
         and SID S2::

      - set S2:: behavior End.DT4 or End.DT6 for the N6DN in S2

   S1 adopts the local N6DN to prioritize the closer segment for the
   same Direct Segment. Another PE may adopt D1 from S2, if the PE has
   no local N6DN for D1 and closer to S2 than S1.

```
                               U1
                               |
      U/u                      v
        \__  N3   /-----------+-----+------------\
        /  \RAN /             |MUP-C|             \
       / V/v\_  |             +-----+              | N6    __
       \    / \ |----+                       +----| DN   /  \
        \__/   \| S1 |                       | S2 |----/W/w \
         __    /|----+                       +----|     \    /
        / \__/ |             +----+               |      \__/
       / E/e\N6 \            | S3 |              /
       \    /DN  \-----------+----+------------/
        \__/               N3UPF  /\ N6UPF
                           X/x /  \ Y/y
                          +-----+
                          | UPF |
                          +-----+
```
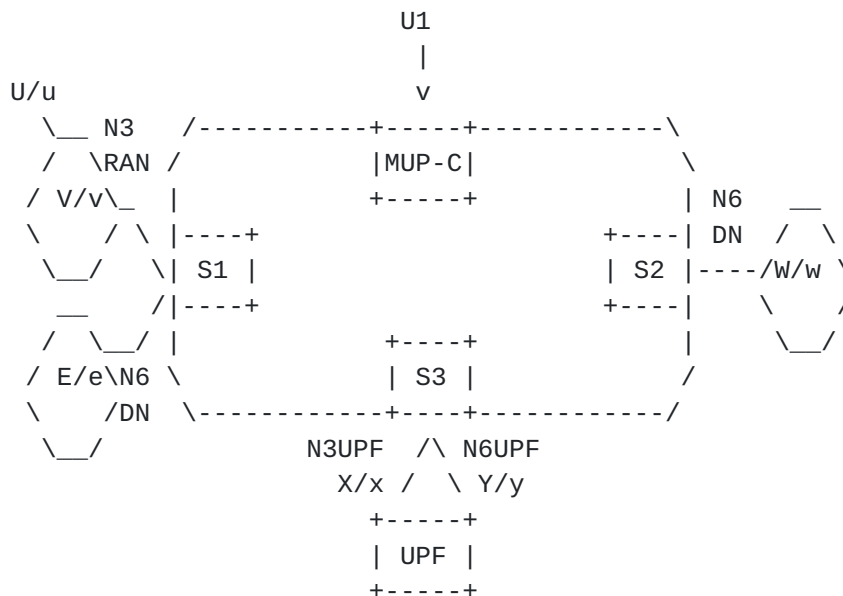
                              Figure 3

   Now, session information U1 is put to a MUP Controller, MUP-C, and
   MUP-C is configured to transform U1 to the routes as follows:

   * MUP-C

      - attach the MUP Direct Segment ID D1 and RT C3 to the DN in U1

      - transforms UE's prefix U/u, the F-TEID on access side (gNB) and
         QFI in U1 to the Type 1 session transformed route for the
         prefix U/u with the F-TEID, the QFI, and RT C3

      - transforms F-TEID on core side (UPF) X in U1 to the Type 2
         session transformed route for X with MUP segment-ID D1 and RT
         C2

Then N3RAN and N6DN import route X and U/u respectively. S1 and S2
resolves U/u's remote endpoint with V/v and then install SID S1:: for
U/u in FIB. S1:: will not appear in the packet from E/e to U/u over
the wire.

As S1 adopts local N6DN for D1, N3RAN in S1 decapsulates GTP-U
packets from V/v to X and then lookup the inner packets from U/u in
N6DN after the decapsulation.

Note: When the above configurations have been done, SRv6 MUP is
       applied only to the packets from/to U/u. Each endpoint in U/u,
       W/w and E/e can communicate through S1 and S2. The rest of
       traffic from/to other UEs go through the usual 3GPP 5G user
       plane path using UPF via S3.

7.3. Adding Direct Segment with New SRv6 MUP PE

Another case shown in Figure 4 is that S4 joins the SR network and
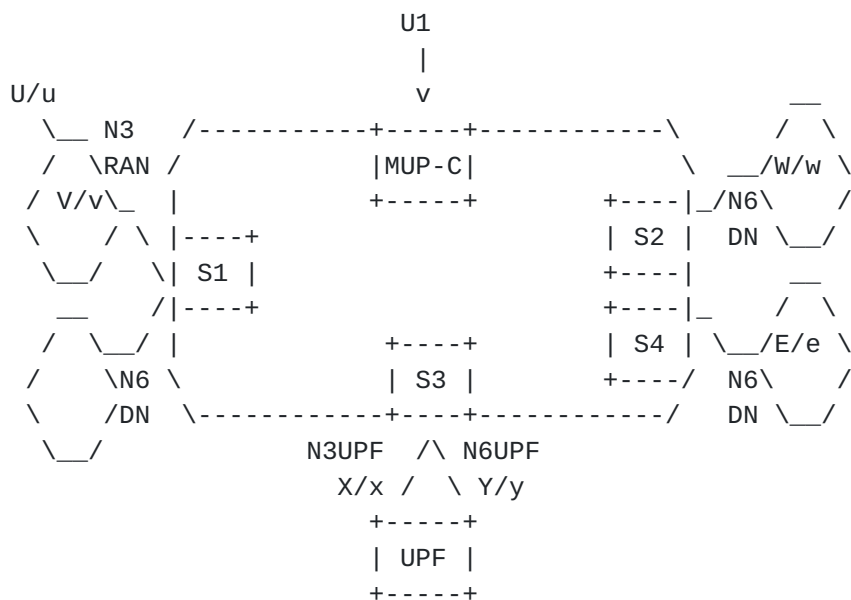accommodates edge servers in the N6DN in S4.

```
                               U1
                               |
         U/u                   v                    __
          \__  N3   /-----------+-----+------------\      /   \
          /   \RAN /            |MUP-C|             \   __/W/w \
         / V/v\_   |            +-----+          +----|_/N6\     /
         \     / \ |----+                        | S2 |   DN \__/
          \__/    \| S1 |                        +----|     __
           __      /|----+                       +----|_    /  \
          /  \__/  |            +----+            | S4 | \__/E/e \
         /    \N6  \            | S3 |            +----/  N6\    /
         \    /DN   \-----------+----+-----------/    DN \__/
          \__/              N3UPF  /\ N6UPF
                             X/x /  \ Y/y
                              +-----+
                              | UPF |
                              +-----+
```

                         Figure 4

The following routing instances are configured:

*   N3RAN in S1 (same with the previous case)

    -   export route V/v with RT C1

    -   import routes which have RT C1 and C2

*   N6DN in S1

    -   export no route

    -   import routes which have RT C4

*   N6DN in S2 (same with the previous case)

    -   export route W/w with RT C4

    -   import routes which have RT C3 and C4

*   N3UPF in S3 (same with the previous case)

    -   export route X/x with RT C2

    -   import routes which have RT C1

*   N6UPF in S3 (same with the previous case)

    -   export route Y/y with RT C3

    -   import routes which have RT C4

*   N6DN in S4

    -   export route E/e with RT C4

    -   import routes which have RT C3 and C4

Here, the PEs are configured to enable SRv6 MUP as following:

*   S1 (same with the previous case)

    -   advertises Interwork type route: V/v with SID S1::

    -   set S1:: behavior End.M.GTP4.E or End.M.GTP6.E

*   S1

    -   advertise Direct type route: MUP Direct Segment community D1
        for the local N6DN

    -   set S1:1:: behavior End.DT4 or End.DT6 for the N6DN in S1

*   S2 (same with the previous case)

      - advertise Direct type route: MUP Direct Segment community D1
        and SID S2::

      - set S2:: behavior End.DT4 or End.DT6 for the N6DN in S2

   * S4

      - advertise Direct type route: MUP Direct Segment community D2
        and SID S4::

      - set S4:: behavior End.DT4 or End.DT6 for the N6DN in S4

   As in the previous case, S1 adopts the local N6DN for D1 as long as
   S1 prioritizes the closer segment for the same MUP Direct Segment.
   The Direct type route from S4 for D2 with SID S4:: will be kept in
   S1.

   * MUP-C (same with the previous case)

      - attach the MUP Direct Segment ID D1 and RT C3 to the DN in U1

      - transforms UE's prefix U/u, the F-TEID on access side (gNB) and
        QFI in U1 to the Type 1 session transformed route for the
        prefix U/u with the F-TEID, the QFI, and RT C3

      - transforms F-TEID on core side (UPF) X in U1 to the Type 2
        session transformed route for X with MUP Direct Segment
        community D1 and RT C2

   Then N3RAN and N6DN import route X and U/u respectively. S2 and S4
   resolve U/u's remote endpoint with V/v and then install SID S1:: for
   U/u in FIB.

   As in the previous case, S1 adopts local N6DN for D1, N3RAN in S1
   decapsulates GTP-U packets from V/v to X and then lookup the inner
   packets from U/u in N6DN after the decapsulation.

   For D2 on the other hand, no corresponding N6DN existed in S1.
   However, E/e with RT C4 from S4 is imported into N6DN in S1 as a VPN
   route, E/e is reachable from U/u via N6DN for D1 in S1.

   If a session U1' includes the DN corresponding to D2, MUP-C
   advertises Type 2 session transformed route X' with MUP Direct
   Segment community D2, and then N3RAN in S1 instantiates H.M.GTP4.D or
   End.M.GTP6.D for X with S4:: as the last SID in the received Direct
   type route from S4.

   Note: When the above configurations have been done, SRv6 MUP is

applied only to the packets from/to U/u. Each endpoint in U/u,
W/w and E/e can communicate through S1, S2 and S4. The rest of
traffic from/to other UEs go through the usual 3GPP 5G user
plane path using UPF via S3.

7.4. Collapsed SRv6 MUP PE Deployment

In this case only S1 enables SRv6 MUP in a collapsed fashion. S2 and
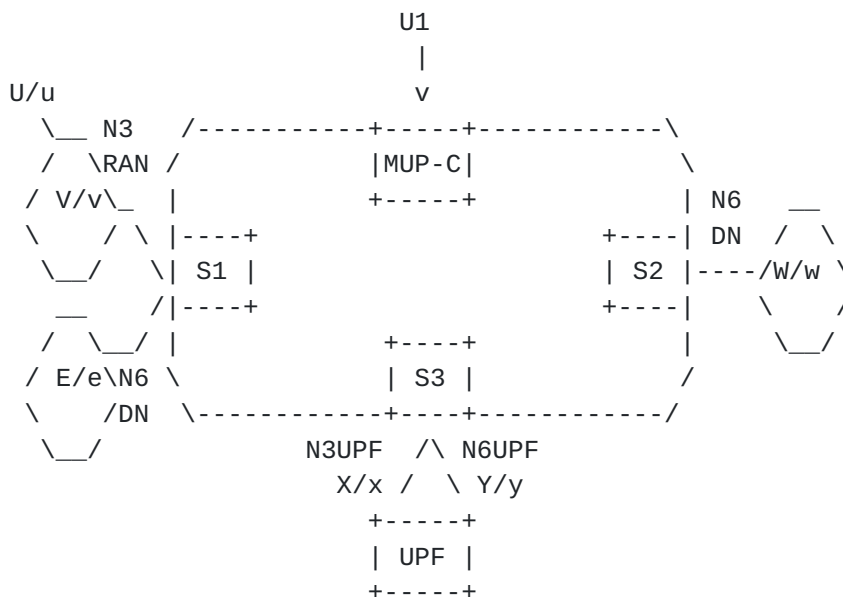S3 are L3VPN PEs without SRv6 MUP capability.

```
                                  U1
                                  |
           U/u                    v
             \__ N3    /-----------+-----+------------\
             /   \RAN /            |MUP-C|             \
            / V/v\_   |            +-----+             | N6    __
            \     / \ |----+                     +----| DN   /  \
             \__/   \| S1 |                      | S2 |----/W/w \
              __     /|----+                     +----|     \     /
             /  \__/ |           +----+              |      \__/
            / E/e\N6 \           | S3 |             /
            \     /DN  \------------+----+------------/
             \__/              N3UPF  /\ N6UPF
                               X/x /  \ Y/y
                               +-----+
                               | UPF |
                               +-----+
```

                            Figure 5

The difference between the previous case in Section 7.1 for the
routing instance configuration is following:

* N6DN in S1

   - export route E/e with RT C4

   - import routes which have RT C3, C4 and C5

Here, S1 is configured to enable SRv6 MUP and S2 as an L3VPN PE is
configured as follows:

* S1

   - may not advertise Interwork type discovery route for V/v

   - may not advertise Direct type discovery route with MUP Direct
      Segment community D1 and S1:1::

      - set S1:1:: behavior End.DT4 or End.DT6 for the N6DN in S1

   * S2

      - set S2:: behavior End.DT4 or End.DT6 for the N6DN in S2

   Now, session information U1 is added to the MUP Controller, MUP-C,
   and MUP-C and S1 is configured to transform U1 to the routes as
   follows:

   * MUP-C

      - attach the MUP Direct Segment ID D1 and RT C5 to the DN in U1

      - transforms UE's prefix U/u, the F-TEID on access side (gNB) and
         QFI in U1 to the Type 1 session transformed route for the
         prefix U/u with the F-TEID, the QFI, and RT C5

      - transforms F-TEID on core side (UPF) X in U1 to the Type 2
         session transformed route for X with MUP Direct Segment
         community D1 and RT C2

   * S1

      - advertises U/u as an L3VPN route with RT C4 and SID S1:1::,
         when the Type 1 session transformed route is imported into the
         N6DN

   Then the N3RAN and N6DN import route X and U/u respectively. S1
   resolves U/u's remote endpoint with V/v and then create the
   corresponding GTP encap entry for U/u into the N3RAN FIB. S2 will
   create a regular L3VPN routing entry for U/u with SID S1:1:: in the
   N6DN when S2 imports the L3VPN route with RT C4 for U/u advertised
   from S1.

   As S1 adopts local N6DN for D1, N3RAN in S1 decapsulates GTP-U
   packets from V/v to X and then lookup the inner packets from U/u in
   N6DN after the decapsulation.

   Note: When the above configurations have been done, SRv6 MUP is
          applied only to the packets from/to U/u. Each endpoint in U/u,
          W/w and E/e can communicate through S1 and S2. The rest of
          traffic from/to other UEs go through the usual 3GPP 5G user
          plane path using UPF via S3.

8. IANA Considerations

   This memo includes no request to IANA.

9. Security Considerations

   TBD.

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