Mobility Aware Transport Network Slicing for 5G

draft-ietf-dmm-tn-aware-mobility-20

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Clarification of details in section 3 rev 17 -> 18

3.3. Slice Mapping using UDP Source Port Number

When a 3GPP user plane function (5G-AN, UPF) and IP transport PE are on different nodes or separated across a network, the PE router needs to have the means by which to classify the IP packet from 3GPP entity based on some header information. In [RFC9543] terminology, this is a scenario where there is an AC between the 3GPP entity (customer edge) and the SDP (Service Demarcation Point) in the IP transport network (provider edge). The AC is provisioned between a 3GPP user plane node (i.e., gNB, UPF) in, for example, a data center, to a PE router that serves as the service demarcation point for the transport network slice.

Prior to PDU session setup, the IP transport network and 3GPP user plane nodes are provisioned with the necessary information for mapping the slices. The PE router in IP transport network is provisioned to map all packets arriving on a layer 3 attachment circuit (GTP-U), i.e., a UDP source port number/range to corresponding [RFC9543] slice characteristics as shown in Section 4. 3GPP user plane nodes (gNB, UPF) are provisioned with GTP transport interface information parameters in [TS.28.541-3GPP] for an S-NSSAI. The YANG model extensions for layer 3 GTP bearers are defined in Section 5. The model for the layer 3 GTP bearer in Section 5 inherits the attachment circuit from [I-D.ietf-opsawg-teas-attachment-circuit].

During PDU session setup, the 5G control plane configures parameters to setup the user plane for the PDU session across F1-U, N3 and N9 interfaces. They include the S-NSSAI and corresponding EP_Transport information which contains the IP address interface of the GTP-U destination and the connectionPointID with attachment circuit information. The 3GPP user plane node can now associate the provisioned slice and EP_transport to that signaled for the PDU session. The YANG model for an attachment circuit with UDP source port number/range is defined in Section 5.

When a 3GPP user plane function (5G-AN, UPF) and IP transport PE are on different nodes or separated across a network, the PE router needs to have the means by which to classify the IP packet from 3GPP entity based on some header information. In [RFC9543] terminology, this is a scenario where there is an AC between the 3GPP entity (customer edge) and the SDP (Service Demarcation Point) in the IP transport network (provider edge). The AC may, for example, be between a UPF in a data center to a (provider edge) router that serves as the service demarcation point for the transport network slice. The identification information is provisioned between the 5G provider and IP transport network and corresponding information should be carried in each IP packet on the F1-U, N3, N9 interface. For IP transport edge nodes to inspect the transport context information efficiently, it should be carried in an IP header field that is easy to inspect. It may be noted that the F1-U, N3 and N9 interfaces in 5GS are IP interfaces. This is illustrated in Figure 3.

Comment on procedures in section 3 – text updated.

Relation between S-NSSAI and EP_Transport, how the description in section 3 relates to YANG model in section 5.

Revision from rev 18 -> 19

Section 1/Introduction

This document describes a potential way to map user plane packets of a 3GPP PDU session identified by a 3GPP slice (S-NSSAI) to an IETF Network Slice Service as defined in [RFC9543]. Extensions to attachment circuit as a service to support a layer 3 GTP-U (or UDP encapsulated GTP) bearer as an attachment circuit is described in Section 3.3 and Section 5. UDP source port ranges in transport network underlays for slice mapping is described in Section 4. It is not the purpose of this document to standardize or constrain the implementation of slicing or user plane functionality in 3GPP.

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Section 3/Mapping of 3GPP Slice to Transport Network Slices

When a 3GPP user plane function (5G-AN, UPF) and IP transport PE are on different nodes or separated across a network, the PE router needs to have the means by which to classify the IP packet from 3GPP entity based on some header information. In [RFC9543] terminology, this is a scenario where there is an AC between the 3GPP entity (customer edge) and the SDP (Service Demarcation Point) in the IP transport network (provider edge). The AC is provisioned between a 3GPP user plane node (i.e., gNB, UPF) in, for example, a data center, to a PE router that serves as the service demarcation point for the transport network slice. The following paragraphs provide an outline of operations in a 5G system prior to PDU session setup, and during PDU session setup in mapping 3GPP slice to IETF transport slice. It should be noted that outlines of 3GPP procedures below and data structures in Figure 3 are only to illustrate the concepts in the use of YANG model extensions for layer 3 GTP bearers in Section 5. It is not the purpose of this document to standardize or otherwise constrain the implementation of slicing and user plane functionality in 3GPP.

When a 3GPP user plane function (5G-AN, UPF) and IP transport PE are on different nodes or separated across a network, the PE router needs to have the means by which to classify the IP packet from 3GPP entity based on some header information. In [RFC9543] terminology, this is a scenario where there is an AC between the 3GPP entity (customer edge) and the SDP (Service Demarcation Point) in the IP transport network (provider edge). The AC is provisioned between a 3GPP user plane node (i.e., gNB, UPF) in, for example, a data center, to a PE router that serves as the service demarcation point for the transport network slice.

Comment section 3 procedures and 3GPP TS 28.541.

Resolution was to add text similar to how this was resolved in TEAS slicing drafts and 3GPP implementation.

Registration/maintenance of YANG module

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8. IANA Considerations

   IANA is requested to register the following URI in the "ns"
   subregistry within the "IETF XML Registry" [RFC3688]:

      URI: urn:ietf:params:xml:ns:yang:ietf-ac-udp-tunnel
      Registrant Contact: The IESG. Chunduri, et al.
      XML: N/A; the requested URI is an XML namespace.

   IANA is requested to register the following YANG module in the "YANG
   Module Names" subregistry [RFC6020] within the "YANG parameters"
   registry.

      Name: ietf-ac-udp-tunnel
      Maintained by IANA? N
      Namespace: urn:ietf:params:xml:ns:yang:ietf-ac-udp-tunnel
      Prefix: ac-udp-tunnel
      Reference: RFC XXXX
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RFC 8407bis snippets:
2.  Terminology & Notation Conventions
    . .. .  .
   The following terms are used throughout this document:

   IANA-maintained module:  A YANG module that is maintained by IANA and
      has an IANA registry associated with it (e.g., "iana-tunnel-type"
      [RFC8675] or "iana-pseudowire-types" [RFC9291]).

      Once an IANA-maintained module is initialized, new values are not
      directly added to the module.  These values are instead added to
      the companion registry.

   IETF module:  A YANG module that is published by the IETF and that is
      not maintained by IANA.
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Summary

All comments have been resolved:

- Discussion/ resolution to keep draft as Informational.
- Comments and resolution with updates to section 3 procedures.
- Comments and resolution on YANG model not maintained by IANA.

Thank you all for the detailed reviews/comments!