5G E2E Network Slice Mapping

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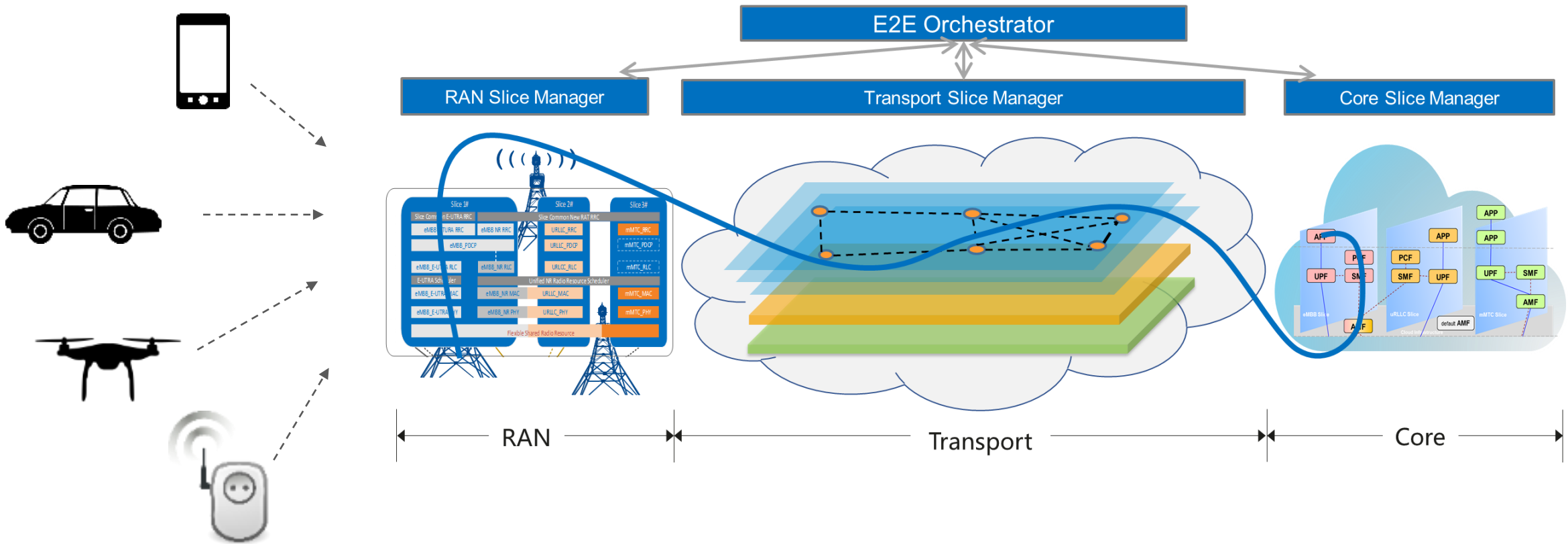
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IETF 107 Interim Meeting
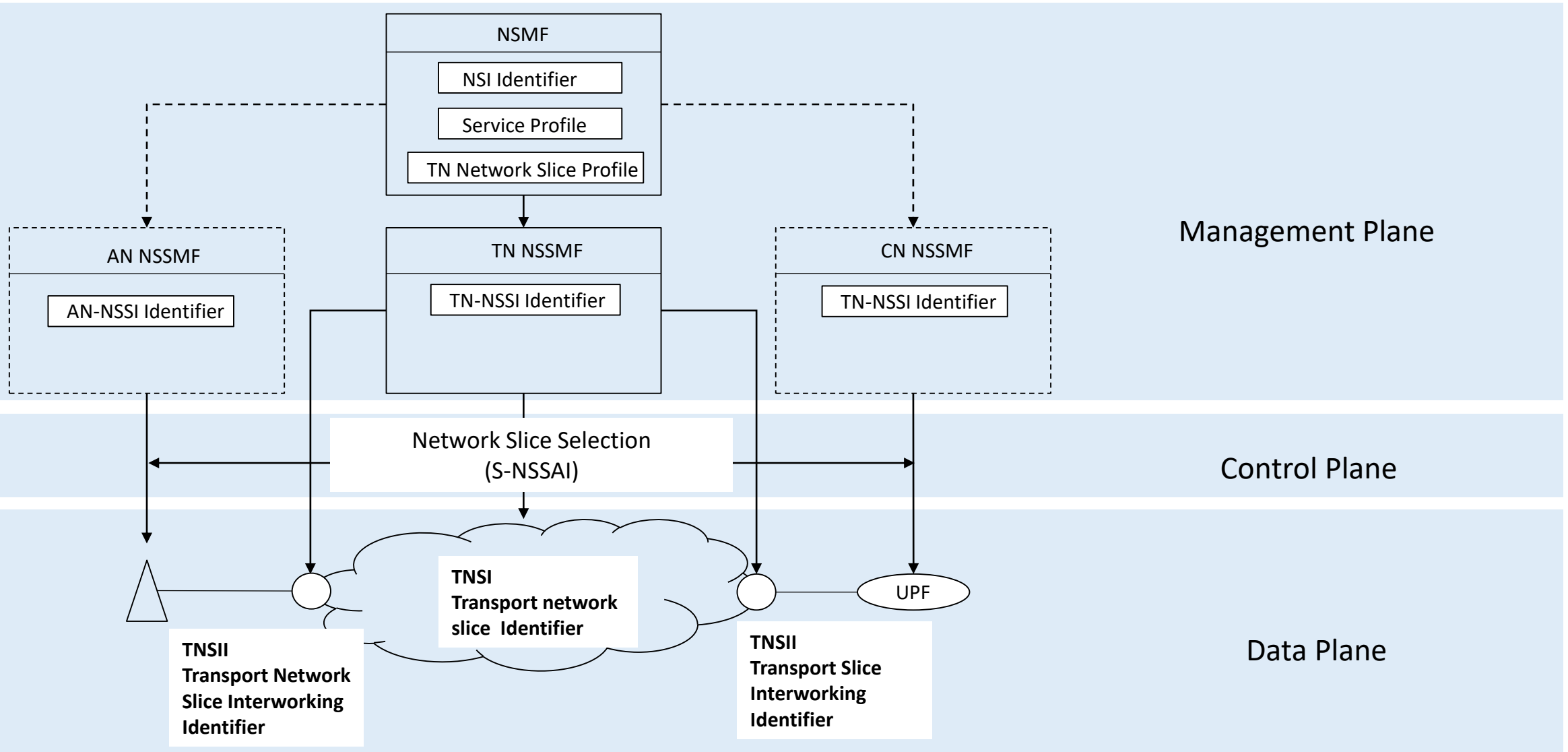
5G E2E Network Slicing

5G E2E Network Slice Identification

Network slice related identifiers in management plane, control plane and data(user) plane play an important role in end-to-end network slice mapping.

- **NSI** : Network Slice Instance, end-to-end network slice defined in ***management plane*** [3GPP TS23501];

- **NSSI**: Network Slice Subnet Instance, network slice defined in subnet's ***management plane*** , e,g,. AN NSSI, CN NSSI [3GPP TS2850];

- **TN-NSSI:** Transport Network Slice Instance, network slice defined in transport network's ***management plane*** . The concept of TN-NSSI follows the terminologies defined in 3GPP.

- **S-NSSAI:** Single Network Slice Selection Assistance Information, end-to-end network slice identifier in ***control plane*** [3GPP TS23501];

- **TNSII:** Transport Network Slice Interworking Identifier, network slice identifier which is used for mapping end-to-end network slice into transport network slice in ***data plane***. TNSII is a concept introduced by this document.

- **TNSI:** Transport Network Slice Identifier, transport network slice identifier in ***data plane.*** TNSI is a concept introduced by this document, which is used inside transport network.

5G E2E Network Slicing Overview

NSMF

NSI Identifier

Service Profile

TN Network Slice Profile

AN NSSMF

AN-NSSI Identifier

TN NSSMF

TN-NSSI Identifier

CN NSSMF

TN-NSSI Identifier

Management Plane

Network Slice Selection
(S-NSSAI)

Control Plane

TNSI
Transport network
slice Identifier

UPF

Data Plane

TNSII
Transport Network
Slice Interworking
Identifier

TNSII
Transport Slice
Interworking
Identifier

NSMF: Network Slice Management Function **NSSMF:** Network Slice Subnet Management Function
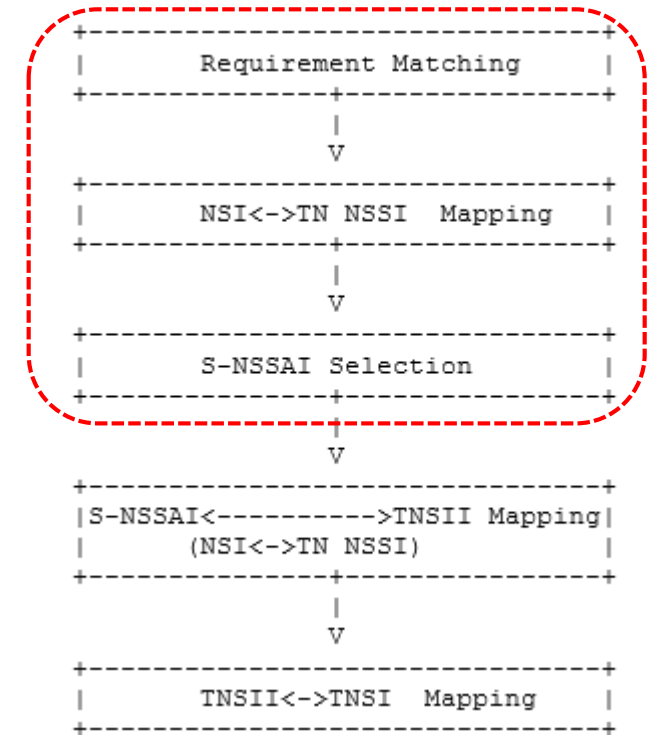
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5G E2E Network Slice Mapping Procedure

In the management plane:

1. NSMF receives network slice request from CSMF.

2. NSMF split the NSI requirements to each NSSI (including AN NSSI, CN NSSI and TN NSSI).

3. NSMF sends transport network slice requirement to TN NSSMF.

4. TN NSSMF allocates TN NSSI and sends the result to NSMF.

5. NSMF acquires the mapping relationship between NSI Identifier and TN NSSI Identifier.

6. NSMF matains the mapping relationship between NSI and S-NSSAI and the mapping relationship between TN NSSI and TNSII, which could be used to set up mapping relationship between S-NSSAI and TNSII.

```
+------------------------------+
|      Requirement Matching    |
+--------------+---------------+
               |
               V
+------------------------------+
|      NSI<->TN NSSI  Mapping   |
+--------------+---------------+
               |
               V
+------------------------------+
|      S-NSSAI Selection        |
+--------------+---------------+
               |
               V
+------------------------------+
|S-NSSAI<----------->TNSII Mapping|
|        (NSI<->TN NSSI)         |
+--------------+---------------+
               |
               V
+------------------------------+
|      TNSII<->TNSI  Mapping     |
+------------------------------+
```
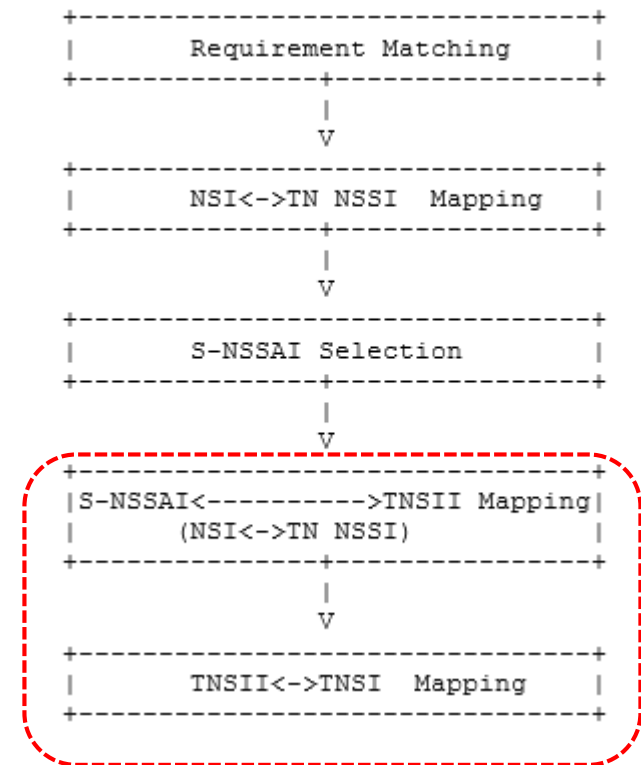
NSMF: Network Slice Management Function
NSSMF: Network Slice Subnet Management Function
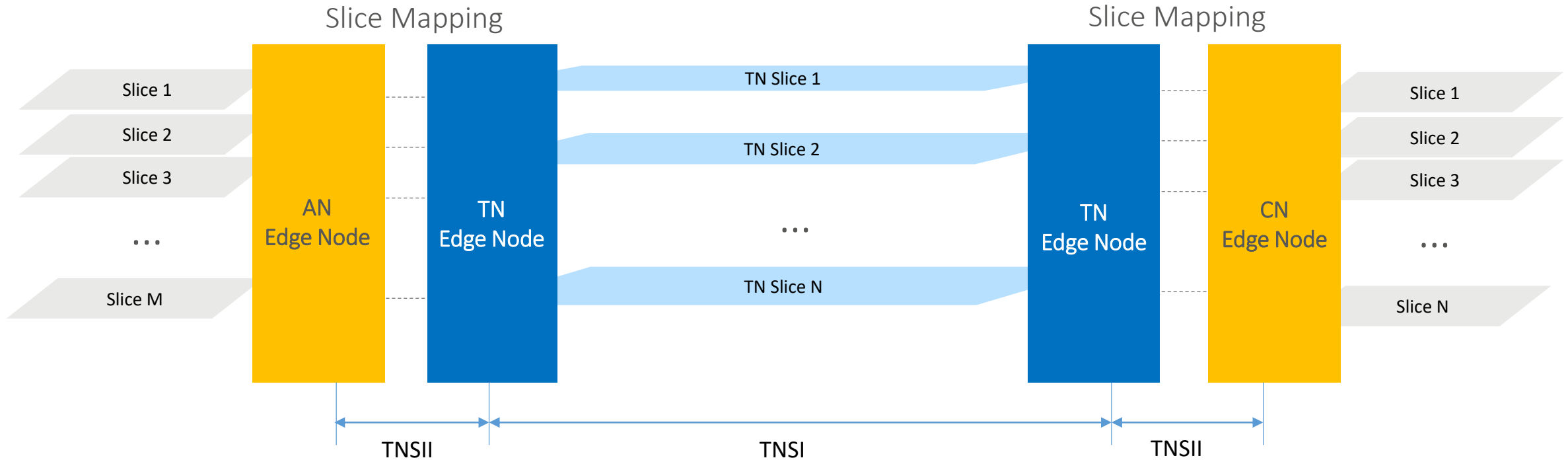
5G E2E Network Slice Mapping Procedure-cont.

In the control plane and data plane:

7. When a PDU session is set up between AN and CN, an S-NSSAI is selected for the PDU session in mobile network.

8. The AN/CN edge nodes encapsulate the packet using the TNSII according to the S-NSSAI. *

9. The edge node of transport network parses the TNSII in the packet and maps the packet to a transport network slice. It may encapsulate the TNSI into the packet.

10. The nodes in transport network forward the packet inside the corresponding transport network slice based on TNSI.

```
+----------------------------------+
|        Requirement Matching      |
+----------------+-----------------+
                 |
                 V
+----------------------------------+
|       NSI<->TN NSSI  Mapping     |
+----------------+-----------------+
                 |
                 V
+----------------------------------+
|         S-NSSAI Selection        |
+----------------+-----------------+
                 |
                 V
+----------------------------------+
|S-NSSAI<---------->TNSII Mapping  |
|         (NSI<->TN NSSI)          |
+----------------+-----------------+
                 |
                 V
+----------------------------------+
|      TNSII<->TNSI  Mapping       |
+----------------------------------+
```

* Network Slice could also be differentiated by physical interface, if different network slices are transported through different interface;

TNSII Data Plane Options

Options for TNSII:

- Layer 2: VLAN ID;

- Layer 3: DSCP, IP DA, SRv6, IPv6 Extension Headers, MPLS label;

- Upper Layer: UDP source port;

Motivation of the Document

- Informational track

- Give guidance for SPs to deploy 5G E2E Network Slicing

- Promote cooperation between IETF and 3GPP in the topic of E2E Network Slicing

- Help to discover whether there are gaps in implementing E2E Network Slice Mapping

What is the next?

- Find a proper home for this draft

- Collect more feedback from WG and operators

- Revise the draft based on the comments

Thank you and Be Safe

Backup

```
                AN/CN                    |                   TN
Management   +--------+                  |              +--------+
Plane        |  NSI   |<--------|-------->|  TN NSSI |
             +--------+                  |              +--------+
                  |                      |                   |
                  |                      |                   |
                  |                      |                   |
Control    +-----V-----+                 |     +----------+----------+
Plane      | S-NSSAI  |                  |     |                     |
           +----------+                  |     |                     |
                  |                      |     |                     |
                  |                    +----V----+          +----V----+
        +---------->|  TNSII  |<-------->|  TNSI  |
                                      |  /Port  |<-------->|        |
User                                +--------+          +--------+
Plane                                    |
```