Transport Slice Intent
draft-contreras-nmrg-transport-slice-intent-00

Abstract

   Slicing at the transport network is expected to be offered as part of
   end-to-end network slices, fostered by the introducion of new
   services such as 5G. This document explores the usage of intent
   machanisms for requesting transport slices.

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1. Introduction

Network slicing is emerging as the future model for service offering
in telecom operator networks. Conceptually, network slicing provides
a customer with an apparent dedicated network built on top of logical
(i.e. virtual) and/or physical functions and resources supported by a
shared infrastructure, the one from the telecom operator.

The concept of network slicing has been largely fostered by the
advent of 5G services which are expected to be deployed on top of
different kind of slices, each built to support specific
characteristics (extreme low latency, high bandwidth, etc).

As part of an end-to-end network slice it is expected to have a
number of transport network slices providing the necessary
connectivity to the rest of components of the end-to-end slice, e.g.,
mobile packet core slice.

For a definition of transport slice refer to
[I-D.nsdt-teas-transport-slice-definition]. The following paragraph
is directly taken from it: "A transport slice is built based on a
request from a higher operations system. The interface to higher
operations systems should express the needed connectivity in a
technology-agnostic way, and slice customers do not need to recognize
concrete configurations based on the technologies (e.g being more
declarative than imperative). The request to instantiate a transport
slice is represented with some indicators such as SLO, and
technologies are selected and managed accordingly."

In consequence, it seems very convenient to apply the intent-based
mechanisms for the provision of transport network slices, providing

the adequate level of abstraction towards the transport network
control and management artifacts.

This document works on that direction by leveraging on current
industry trends in the definition of end-to-end network slices. The
final objective is to describe intents that can flexibly declare the
operational aspects and goals of a transport network slice, meaning
that the customer could declare what kind of transport slice is
needed and not how to achieve the goals of the transport slice.

2. Transport slice intent

As stated in [I-D.irtf-nmrg-ibn-concepts-definitions], "Intent is a
higher-level declarative policy that operates at the level of a
network and services it provides, not individual devices. It is used
to define outcomes and high-level operational goals, without the need
to enumerate specific events, conditions, and actions".

When applied to transport networks, this implies that an intent for
transport slices should provide the necessary abstraction with
respect to implementation details, including the final devices (or
resources) involved, and be focused on the characteristics and
performance expectations related to it.

With that intent it can be expected that the intent-based system can
fulfill and assure the requested transport network slice, triggering
initial configurations at the time of initial provisioning and
corrective actions during the transport slice lifetime.

3. Foundation of transport slice intents

The industrial interest around 5G is accelerating network deployments
and operational changes.

With this respect, the GSMA is developing a universal blueprint that
can be used by any vertical customer to order the deployment of a
network slice instance (NSI) based on a specific set of service
requirements. Such a blueprint is a network slice descriptor called
Generic Slice Template (GST) [GSMA]. The GST contains multiple
attributes that can be used to characterize a network slice. A
particular template filled with values generates a specific Network
Slice Type(NEST).

Such templates refer to the end-to-end network slice, including the
transport part. Despite some of the values could not have
applicability for the transport network, others do. An analysis of
relevant attributes is performed in [I-D.contreras-teas-slice-nbi].

According to 3GPP propositions [TS28.541] an upper 3GPP Management
System interacts with the transport network for establishing the
necessary slices at the transport level. Such interaction can be
expected to happen using the transport slice intents here described
to an intent-based system (IBS) in the transport network part. Then,
according to the intent lifecycle in
[I-D.irtf-nmrg-ibn-concepts-definitions], the IBS, after recognizing
the intent, will proceed to translate it in order to interact with a
transport slice controller by using a NBI as proposed in
[I-D.contreras-teas-slice-nbi].

4. Mechanisms for translating transport slice intents

This section describes approaches for implementing mechanisms able to
translate transport slice intents.

4.1. Translation approaches and interaction with the upper systems

A suite of mechanisms will be required and can be used for the
translation of the user's intent into a transport slice. NLP
(Natural Language Processing) approaches are needed for enabling the
expression of requirements in high level terms, and for conducting a
first analysis towards lower-level network requirements/resources.
The goal would be to identify and classify the answers for as many
fields as possible from the Generic Slice Template (GST), based on
the free text / speech provided by the user. As it is highly
unlikely that the minimum set of fields to properly define a
transport slice (geo-temporal characteristics, performance
characteristics, SLA properties) will be fulfilled in this first
step, a follow up two-step approach will have to be implemented.

o The minimum missing fields from the GST have to be identified and
   appropriate questions have to be generated (e.g. based on a pool
   of available questions corelated with each field, or based on AI
   approaches)

o An iterative interrogation phase will be initiated towards the
   user using the previously generated questions, until the user
   provides all the missing information

Interaction with the user and higher-up systems can potentially be
further improved by utilizing Machine learning techniques.

4.2. Intent-based system suite

A combination of deterministic or stochastic computation approaches
will be needed, in order to consolidate on the set of devices,
technologies and resources to be used. Deterministic approaches will

rely on mathematical models and respective algorithms. Stochastic
approaches will rely on technologies like machine learning. Their
goal will be to learn from experience, so as to optimize future
decisions from the viewpoint of speed and reliability. The target of
learning will be related to the service behavior and to the
anticipated network status in the area and time period of the service
provision.

5. Security Considerations

   To be done.

6. IANA Considerations

   This draft does not include any IANA considerations

7. References

[GSMA]   "Generic Network Slice Template, version 2.0", NG.116 ,
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            Resource Model (NRM); Stage 2 and stage 3 (Release 16)
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Contributors

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