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Interconnecting Network Slice Subnets
draft-defoy-coms-subnet-interconnection-00

Abstract

This document aims to define a network slice subnet as a general concept, and to augment a baseline network slice model with attributes that describe interconnections between network slice subnets.

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[1.](#) Introduction

Network Slicing enables creating end-to-end partitioned virtual networks, including compute and storage resources, to deploy services with diverse requirements over the same infrastructure.

[[I-D.geng-coms-problem-statement](#)] describes a problem statement for supervised heterogeneous network slicing, enabling users to deploy network slices including connectivity, computing and storage components.

Nevertheless, defining and managing a network slice (NS) end-to-end does not always have to be done directly: it may be convenient to define and manage subsets of NS components. The concept of network slice subnet is defined originally in [[NGMN Network Slicing](#)], though we only need to retain its definition in the most general form: network slice subnet instances are comprised of network, compute and storage resources, but cannot be operated in isolation as a complete network slice. They must be interconnected with other NS subnets to form a complete, end-to-end network slice. To summarize: a NS subnet can be seen as a network slice with unconnected links. The term network slice segments has also occasionally been used to designate NS subnets. Use cases for using NS subnets include managing multi-domain network slices, or even within one domain, isolate management and maintenance of different portions of a network slice.

A model for network slicing is currently being defined in [[I-D.qiang-coms-netslicing-information-model](#)]. One question we would like to address is how to augment this base model to describe interconnections between NS subnets. The base model is not technology specific, and therefore the description of interconnections should not be either. Moreover, such an augmentation should both enable describing the intent for interconnection, as well as describing actual interconnections once NS subnets have been stitched together.

1.1. Terminology

Network slicing related terminology used in this document should be interpreted as described in [[I-D.geng-coms-problem-statement](#)].

Note: in this text we refer to termination points, as defined in [[I-D.ietf-i2rs-yang-network-topo](#)], while a similar concept is called "port" in [[I-D.qiang-coms-netslicing-information-model](#)]. Terminology will be adjusted as needed later on.

2. Interconnection Concepts

The general goal of an interconnection between 2 NS subnets is to have links established between nodes from both subnets. A secondary goal is to keep NS subnet descriptions isolated from each other (to some extent that is still to be defined). This relative isolation will contribute to simplify and decentralize management, as well as enabling operations such as substituting a subnet with another, etc.

As described in Figure 1, we can represent a network slice subnet as a network slice that also has one or more logical nodes, which terminate (at logical termination points) links that need to be interconnected with external nodes (cross-subnet links).

During a stitching operation, logical termination points from both NS subnets can be paired together into an interconnection point. When implemented at the infrastructure layer, this interconnection point may be either implemented as a gateway, or abstracted away, in which case nodes from both NS subnets end up being directly interconnected between each other. In any cases, interconnected links will need to have compatible QoS attributes.

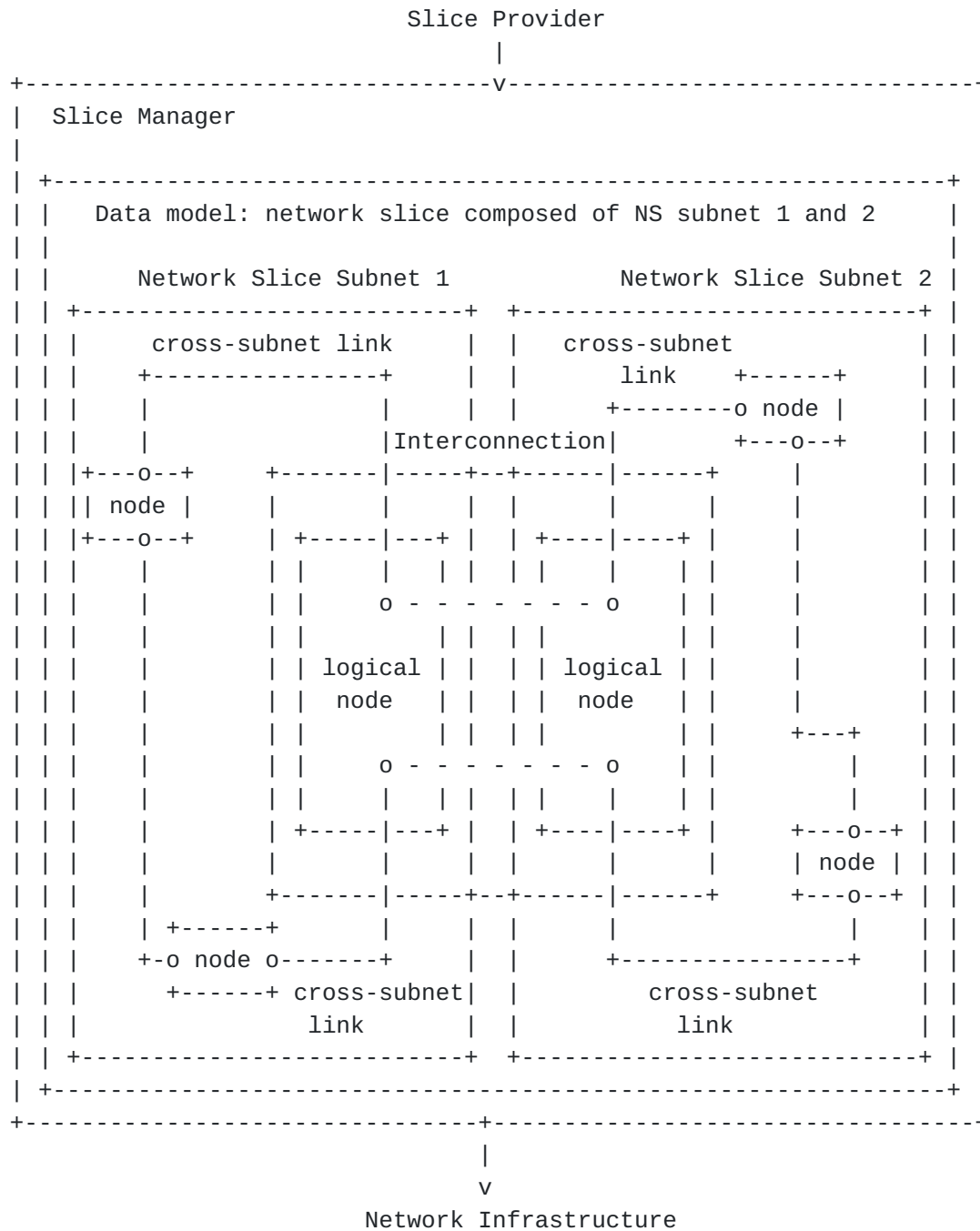


Figure 1: Network Slice Subnets Interconnection

Network slice interconnection information in data models can be used for different related purposes:

- o Anchoring interconnections at logical termination points: a NS subnet model should specify which link termination points are the "network slice subnet boundaries" that need to be interconnected.

- o Programming interconnections: a NS provider may set attributes in a NS subnet model to configure the interconnection with another NS subnet.
- o Describing the state of interconnection (once NS subnets are interconnected).

3. Information Model

A fairly minimal way to represent an interconnection is:

- o To represent an interconnection anchor in a subnet: a logical termination point in this subnet.
- o To program or represent an interconnection between subnets: a pair of logical termination points, one in each subnet.

Some form of grouping of logical termination points (for example, in logical nodes) may tell the NS manager to treat those termination points as a single unit for placement, implementation, etc.

Additional information may be useful to complement the description of an interconnections. Some attributes may be useful to describe an interconnection point anchor, while others may be useful to program or represent the state of an interconnection. For example, logical termination points may be associated with information that facilitates placement or stitching operations. Future work should determine what type of information would be useful to specify or represent a NS interconnection.

4. Operations

Stitching may occur when network slice subnets are initially instantiated, or later after instantiation.

5. Security Considerations

Access control mechanisms for managing network slices can likely be reused for network slice subnets, since their models should be similar to each other.

Stitching 2 NS subnets together may be subject to some form of authorization by a NS tenant.

6. Next Steps

The present draft investigates one aspect of a non-technology specific representation of a network slice. It may therefore be part of the larger discussion on the need for such a representation.

Beyond this, next steps can include the following:

- o Discussing the definition and need for NS subnets. Is "NS with unconnected links" an adequate simple definition? Is there an agreement on the use cases? Should NS subnet interconnection be standardized?
- o Assuming there is some interest in this, further work is needed to better understand what attributes and operations are needed, and how to integrate them in a baseline NS model.

7. IANA Considerations

This document has no actions for IANA.

8. Informative References

[I-D.geng-coms-problem-statement]

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