COMS Architectural Design Enablers & Artefacts -II
Network Slice Interconnection

https://tools.ietf.org/html/draft-defoy-coms-subnet-interconnection-03

https://tools.ietf.org/html/draft-homma-coms-slice-gateway-01

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Interconnection Concepts

NS Interconnection is needed to enable inter-domain and hierarchical management.

To describe a NS subnet, we augment a **NS YANG model**, which itself is based on the IETF network topology model.

A NS subnet cannot be activated in isolation – it must be interconnected with other subnets to form a composite subnet or an end-to-end slice.

- Otherwise a subnet has the characteristics of a network slice (e.g. connectivity, compute, storage resources, network functions, management entities).

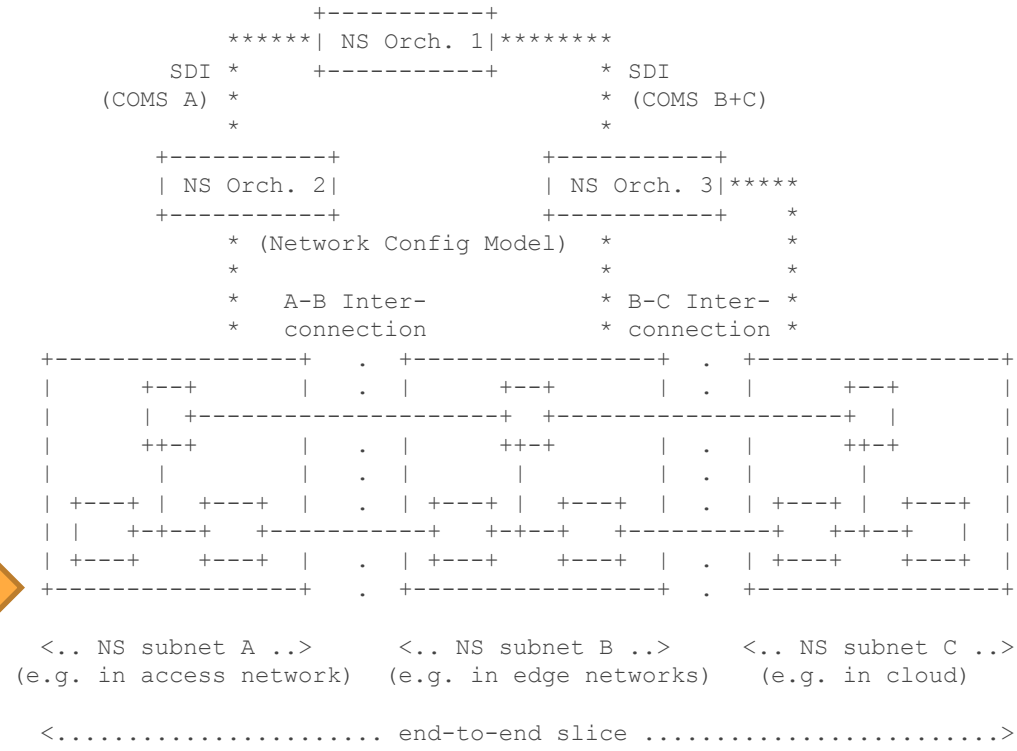
NS stitching is the operation consisting in creating a composite subnet or end-to-end slice from input NS subnets.

- Stitching may implement data plane interconnection using gateways or it may be abstracted away (i.e. using a simple node-to-node connection when possible).
- Stitching may occur at the time of NS subnet instantiation, or later.
- A stitching operation can:
  - produce a new composite model (of a NS subnet or end-to-end slice).
  - And/or update the input NS subnets with interconnection information.

Interconnection Scenarios

Usage scenarios include:

- Interconnection between NS subnets on different domains separated by a transport segment (which can be an adaptor or a NS subnet).
- Interconnection between “building blocks” NS subnets in a given domain (e.g. to scale up or down, to connect sub-domains using different techs).
- Hierarchical/recursive management of NS subnets.
- Sharing a NS subnet between multiple end-to-end network slices, for functions common to multiple slices (e.g. AMF in 5GC).



Interconnection Model Concepts

Interconnection anchors – represent interconnection points *prior* to the stitching operation.

➔ *Anchor termination points* inside *anchor nodes*

In general, anchor TP/nodes and cross-subnet links do not have a corresponding data plane instance.

Interconnection instances – represent interconnection points *after* the stitching operation.

➔ *Interconnection instance nodes and termination points* can represent abstract gateway function(s) between NS subnets, or direct links between nodes from different NS subnets.

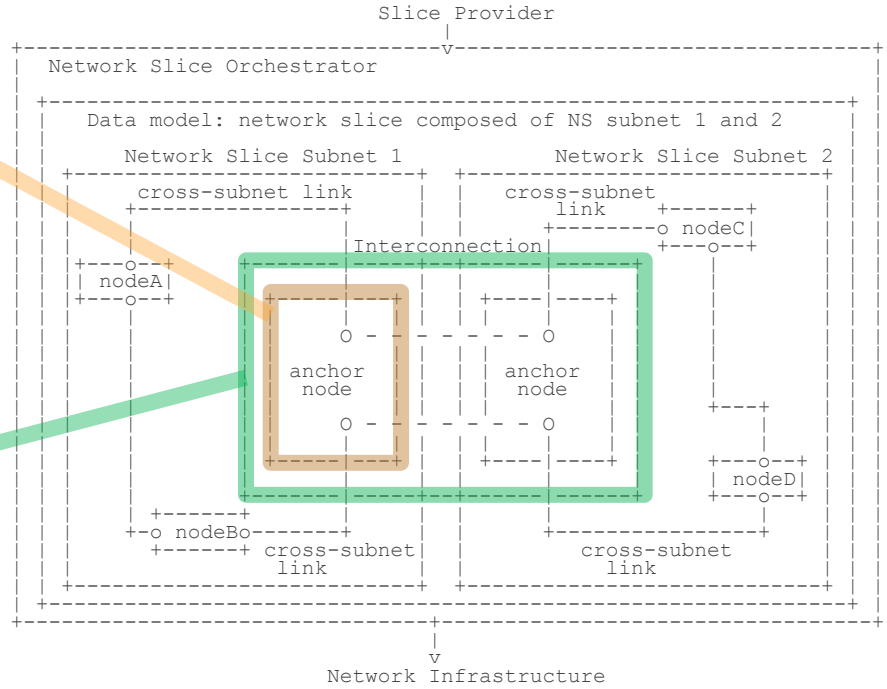


Figure: interconnection management model concepts

Conclusion & Further Work on Interconnection Model

- A NS interconnection model based on subnets enables managing slices across multiple administrative domains and across multiple underlying technologies.
- It enables unified hierarchical management for network slicing within same/multiple domains and with same/multiple underlying technologies.

Questions related to future work:

- What parameters should be used to configure anchors in NS subnet models?
  - Starting point: matching labels, hints for logically or physically locating data plane anchors, desired type of interconnection, etc.
- What information is relevant to represent interconnection instances in NS models?
  - Starting point: interconnection type, status, location, service assurance information, etc.
- What should be visible to the NS operator? To the NS tenant?
- What type of operations should be supported?
  - Stitching, NF transfer between subnets, sharing of NS subnets, etc.

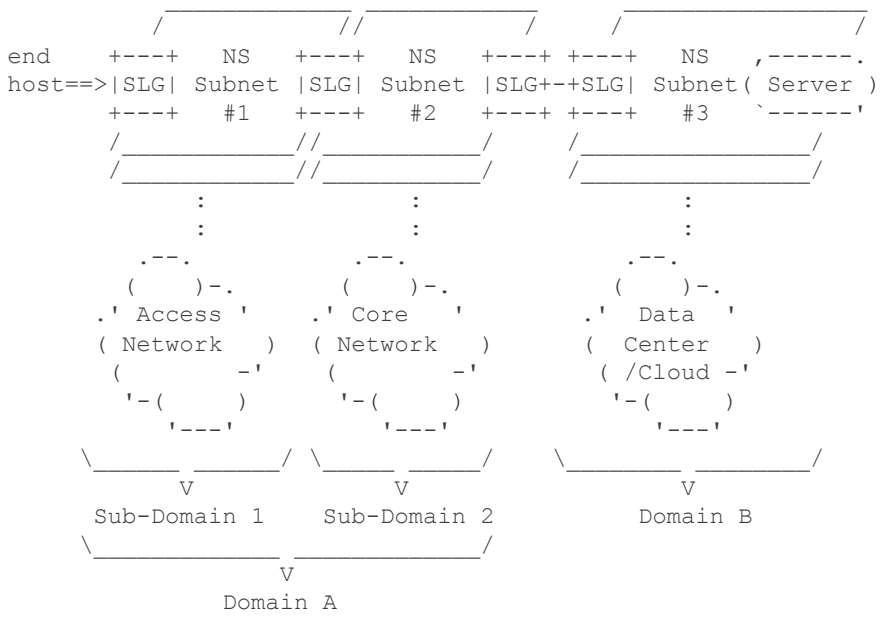
Slice Gateway Function

Slice Gateway Function – a function (or group of functions) that connects NS subnets. It can also connect NS subnets to non-sliced networks or end hosts (i.e. it's an edge function as well).

Composed of existing technologies (we are NOT providing/defining new technologies).

Functions of an SLG may include:

- Identification/ classification of customer and service traffic,
- Transport/forwarding/service chaining, isolation/encapsulation, address resolution/routing, translation between technologies/encapsulations,
- Access control, QoS policy enforcement,
- Fault and performance monitoring for underlay and overlay networks.



Conclusion & Further Work on Interconnection Gateway

- Slice gateway functions are needed to extend network slices beyond a single domain or beyond a single underlying technology.
- Studying these gateways will help understand which interconnection functions need to be managed by NS operators and tenants, and which parameters are relevant.
- This is part of a bottom-up design process, which complements the top-down input from network operators (more or design process in another BoF presentation).

Questions related to future work:

- Which gateway functions should be made visible to NS operators or tenants?
  - E.g. performance and faults monitoring.
- What are possible underlying network realizations of such a gateway?
- How to modularize management of gateway functions to adapt to different needs and underlying technologies?
  - E.g. we could define several gateway “profiles” that each can be implemented by different groups of underlying technologies.