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How to slice network, a slicing for the IETF

Key issue of network slicing for the IETF

Hannu Flinck

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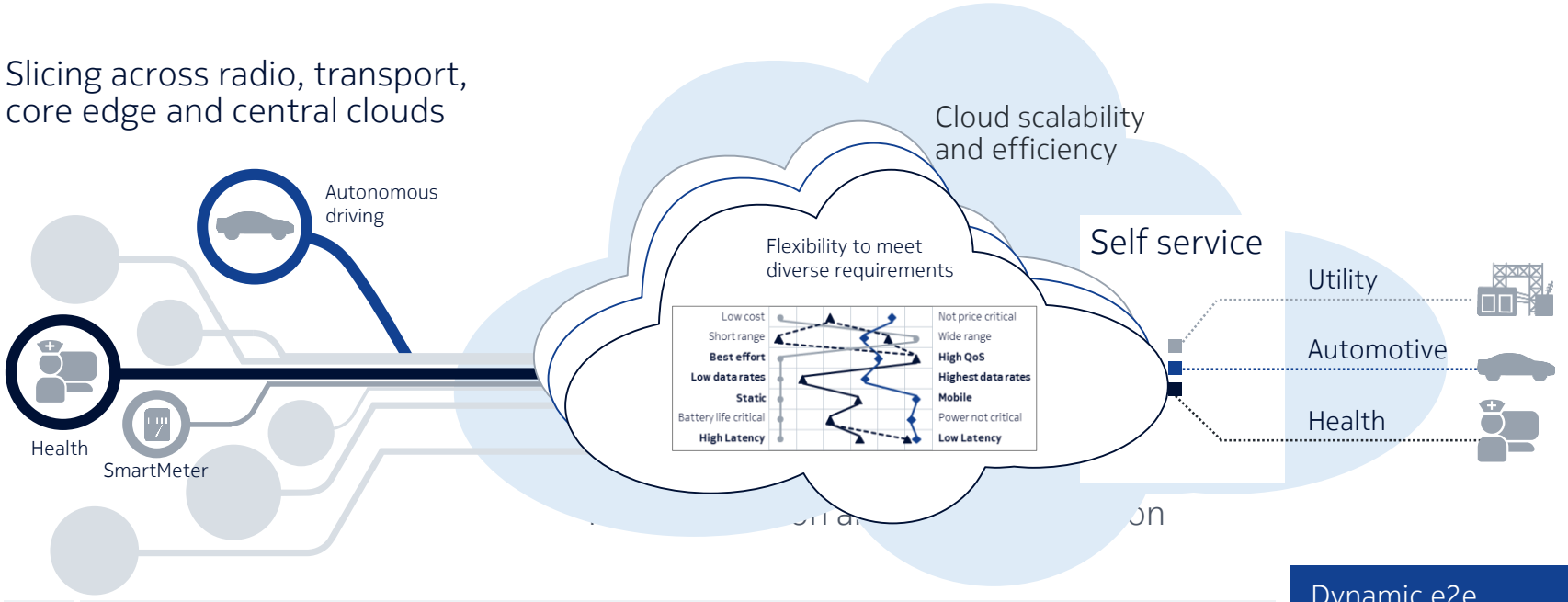
Agenda

- Motivation for Network Slicing
- Network Slicing work ongoing in various SDOs and research projects
- Key topics Network Slicing for the IETF
- Slice management

- Orchestration and slice management

Network Slicing | Optimized service delivery for heterogeneous use cases

Multiple independent instances on one physical network



10,000 x	>10 Gbps	100 Mbps	<1 ms	10-100 x	ultra low	10 years

Dynamic e2e network slicing

*5G Novel Radio Multiservice adaptive network Architecture

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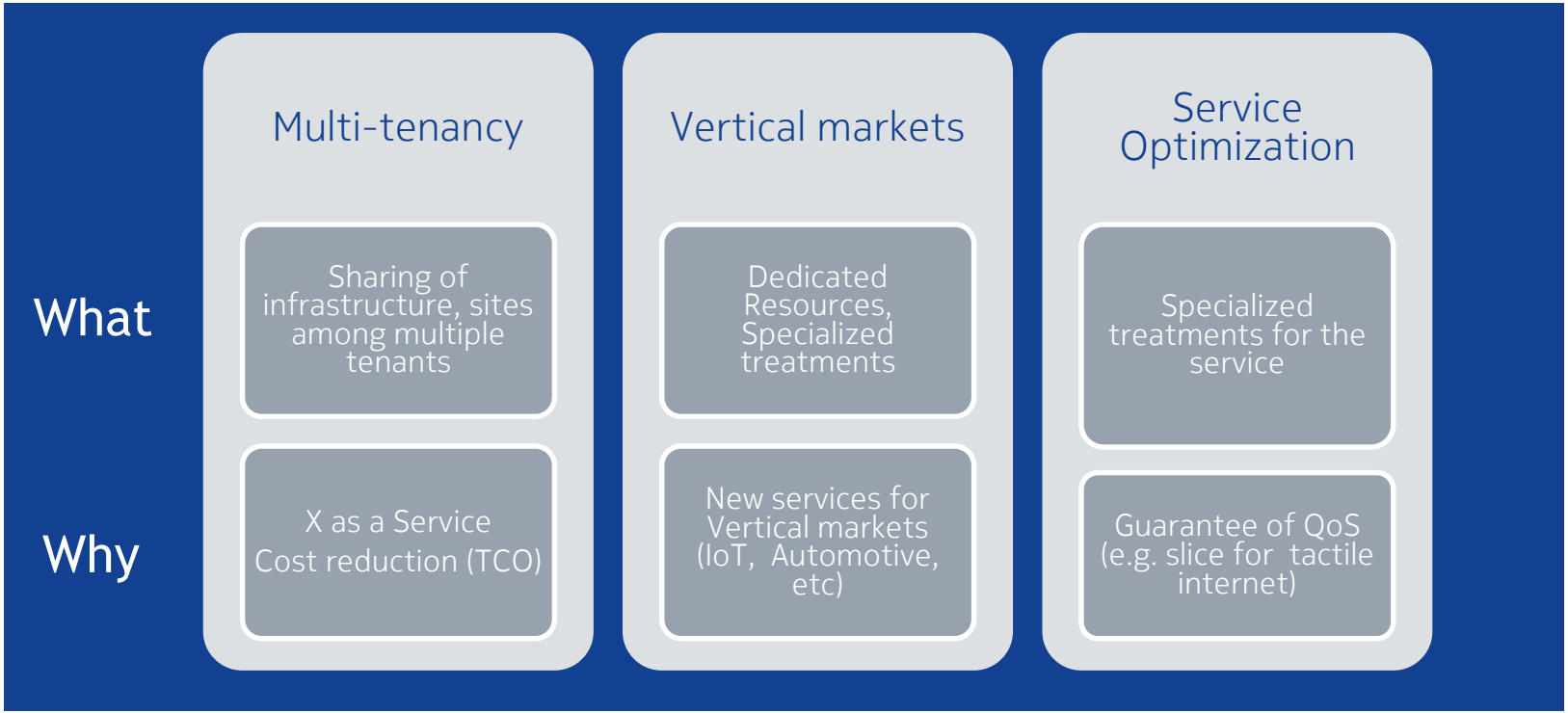
Motivation for Network Slicing



Network slicing and slice management

Network Slicing is B2B concept across multiple administrative domains

End to end network slicing

- Service concept to share network infrastructure to create a number of dedicated (virtualized) networks.
- Combines a set of infrastructure resources and network functions, management applications and business applications that is required to deliver network slices to different parties.
- Multi-tenancy and multi-domain needs to be supported.

Slice management refers to the set of applications that are required to automate the life-cycle of network slices.

Network Slicing work ongoing in various SDOs and research projects

- NGMN WS1 and NMWO.
- 3GPP SA1: SMARTER: TS 22.261 (approval 03.2017).
- 3GPP SA2: TR 23.799 Study Item, key issue#1 ‘Network Slicing’, TS: 23.501 and 23.502.
- 3GPP SA5 : TR 28.801 SI ‚Management & Orchestration of Network Slicing‘.
- 3GPP RAN: 3GPP RAN: TR38.801 (RAN3), TR38.804 (RAN2)
- Transport is not in the scope of 3GPP:
  - 3GPP SA5 seeks guidance on the cooperation with external bodies on Transport Network slicing management. This natural area for the IETF to work on.
- ETSI-NFV.
- TM Forum: Customer Facing Service and Resource Facing Service.
- ONF Technical Recommendation TR-526, entitled Applying SDN Architecture to 5G Slicing.

- 5GPPP: 5G NORMA (e2e Network Slicing), METIS II (RAN Slicing)
- 5GPPP PII: 5G MonARCH, SEMA5, others

5G NORMA in a nutshell
EU funded R&D project within 5GPPP Initiative, aiming on building consensus on E2E mobile network architecture and rapid implementation
Duration : July 1st, 2015 – Dec 31st, 2017

Connect to 5G NORMA
Webpage: https://5gnorma.5g-ppp.eu/
Twitter: 5G NORMA project @5G_NORMA
5GPPP: https://5g-ppp.eu/
Contact 5G NORMA
5G-NORMA-Contact@5g-ppp.eu

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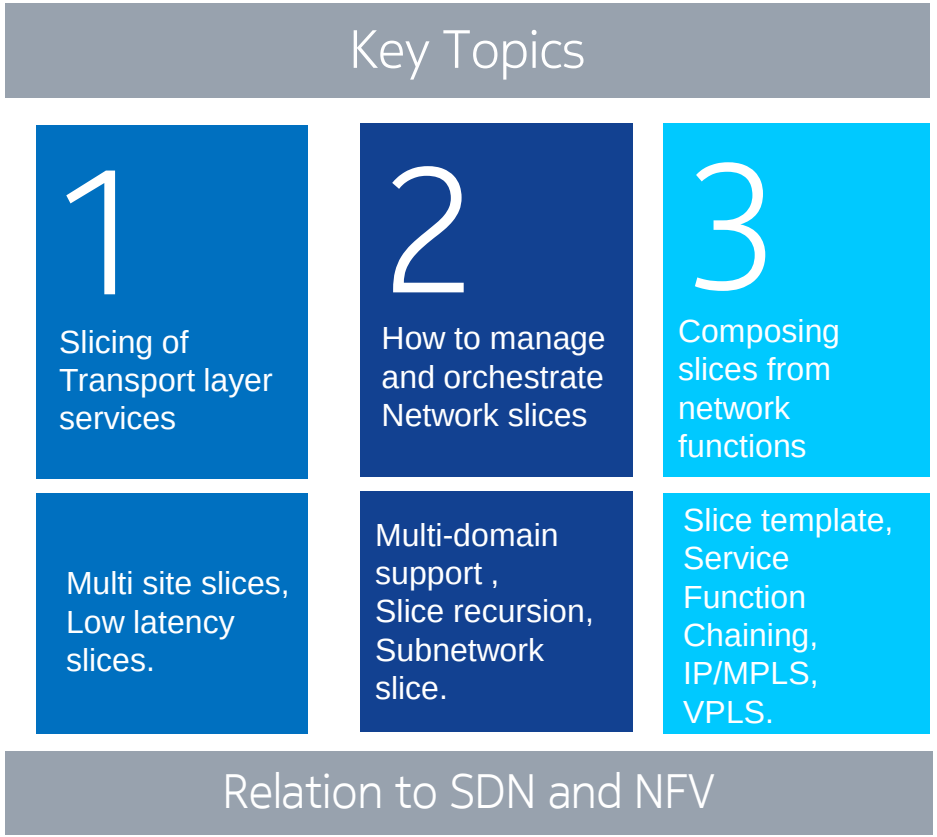
Key topics Network Slicing for the IETF



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Potential transport use cases building on top of IETF specifications

Multi-site slice use case?

- Can be based for example to multisite EVPN/RFC 7209/RFC7432.
- The EVPN multihoming enables to connect a customer site to two or more PE devices to provide redundant connections.
- However, to qualify as a network slice the EVPN should be associated with network functions (e.g. caching, Load Balancers, Session Border Controller) and means to customize and manage them by a tenant => slice management .
- Side note: 3GPP core and RAN cases not likely to need multi-site slicing.

Low latency slice use case?

- DetNet use cases in https://tools.ietf.org/html/draft-ietf-detnet-use-cases-11
- For example Cellular Radio Networks (section 6 of detnet-use cases) complemented with
- Mobile edge computing bringing processing closer to the edge
- Different domains: access, transport and core network segments

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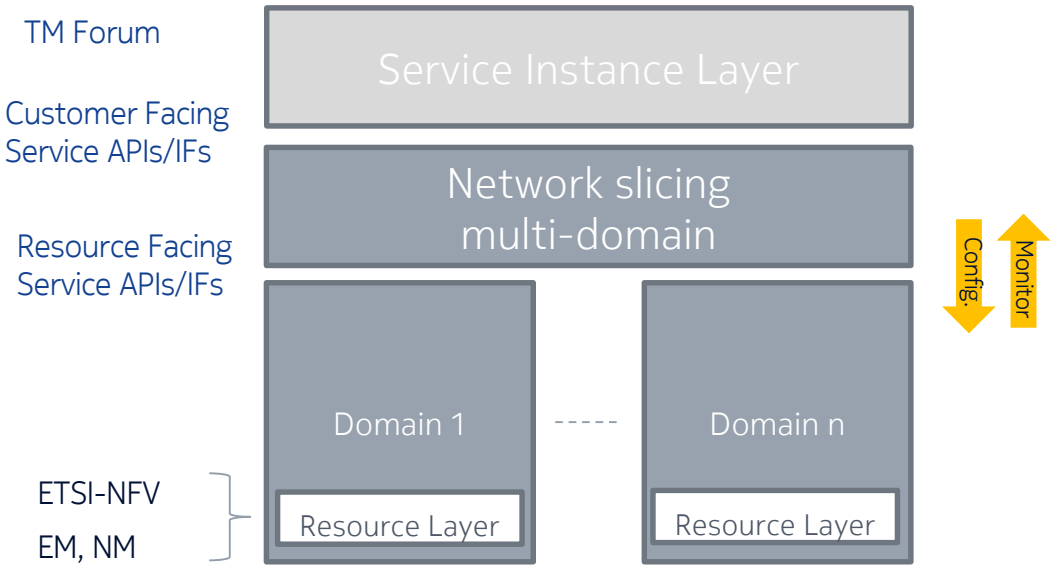
Network slicing in multi domain



Ngmn definition:

- Network slicing concept consists of 3 layers:
  1. Service Instance Layer,
  2. Network Slice Instance Layer, and
  3. Resource layer.

- A Network Slice Instance may be composed of Sub-network Instances, which as a special case may be shared by multiple network slice instances
- How much control is given to the tenants (slice consumers)?

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3GPP: Study on management and orchestration of network slicing for next generation network. TR 28.801

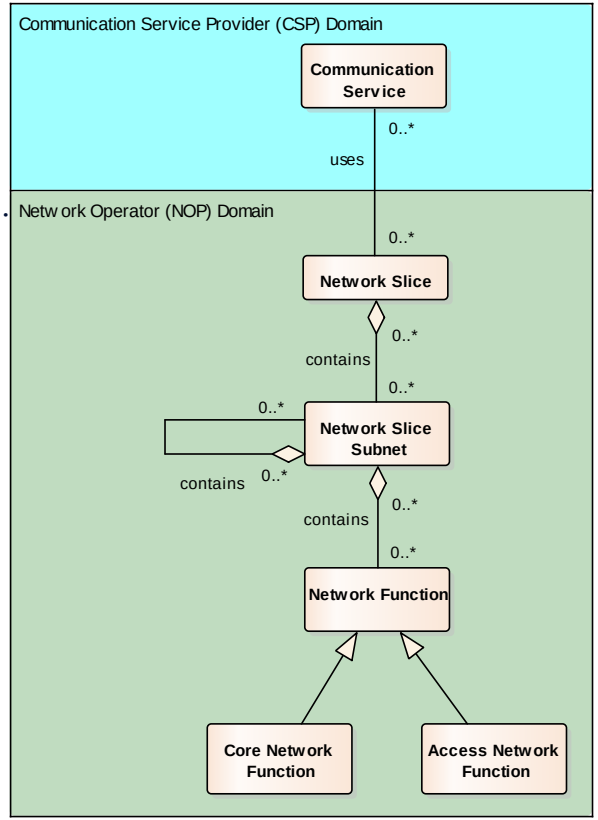
Network slice

A network slice instance may be fully or partly, logically and/or physically, isolated from another network slice instance.

- The Network Slice Instance is defined by a Network Slice Template.
- Instance-specific policies and configurations are required when creating a Network Slice Instance.
- Network characteristics examples are ultra-low-latency, ultra-reliability etc.

Sub-network slice

- The life cycle of a network slice subnet instance is independent of the life cycle of a network slice instance(s) served by the network slice subnet instance
- A network slice subnet instance may contain other network slice subnet instances.



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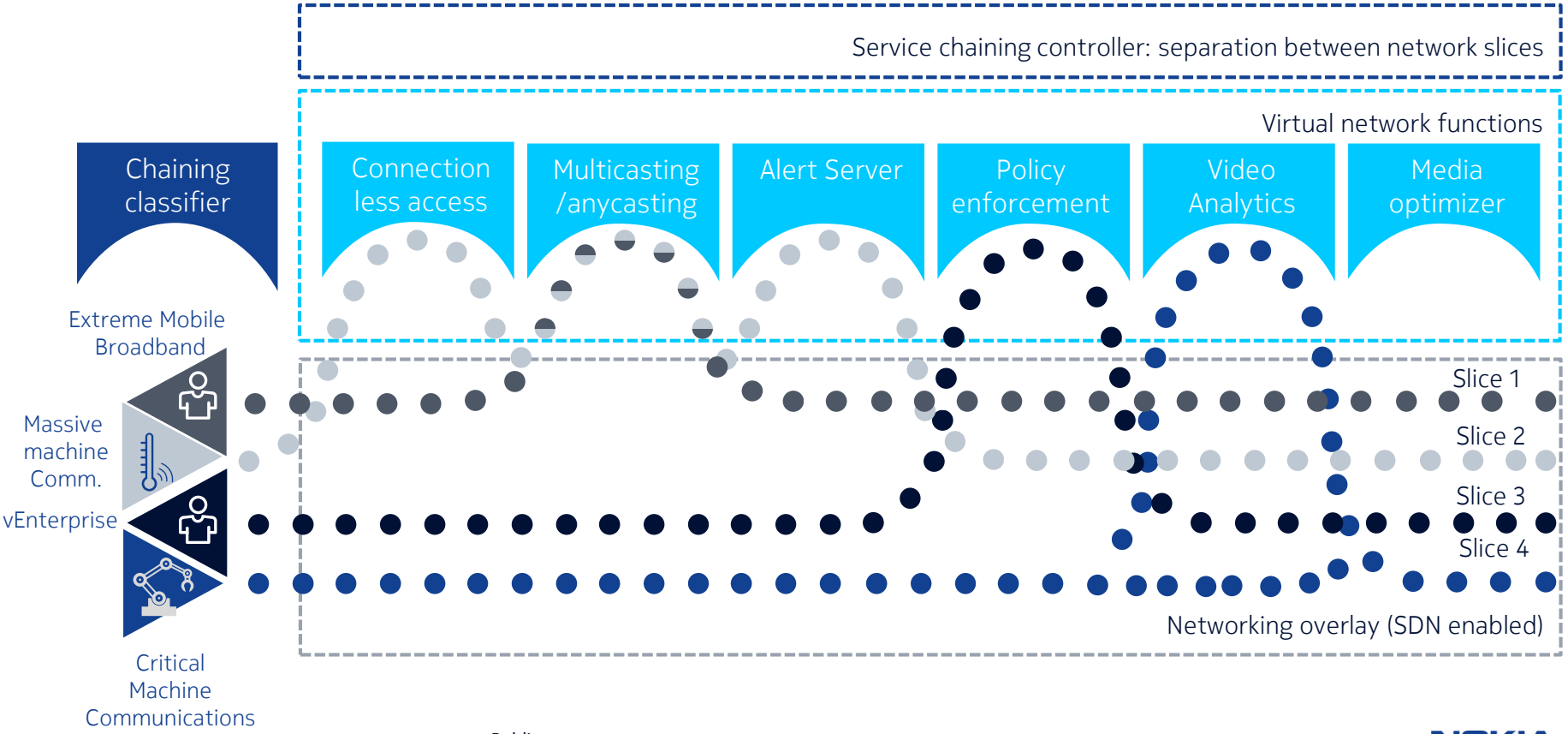
Composing a slice as service chain of network functions



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