The NFV Move in Network Function/Service/… Chaining/Graph/…
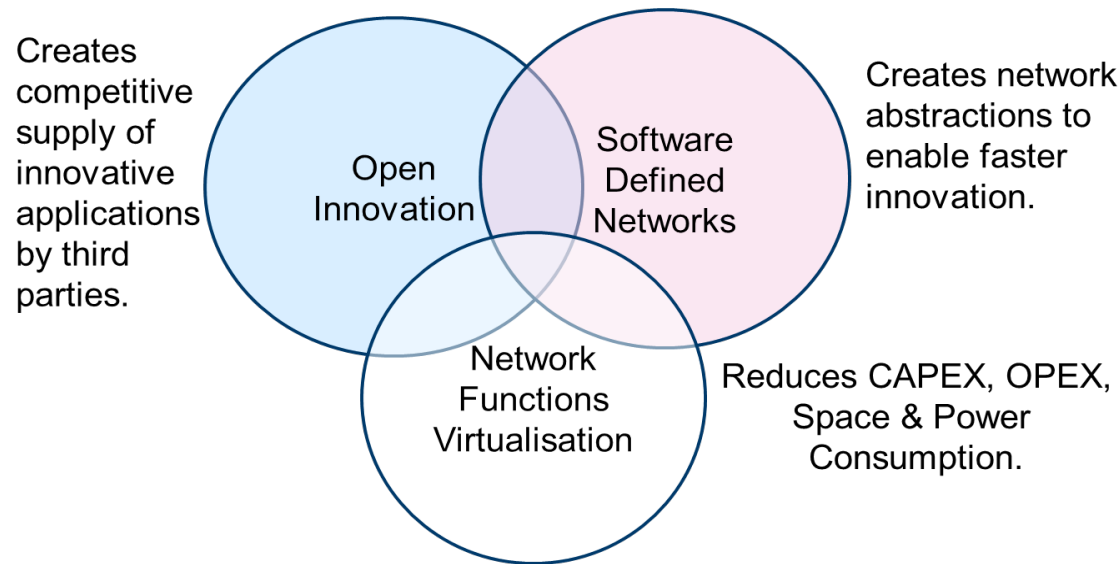
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Network Function Virtualization

- Network Functions Virtualisation is about implementing network functions in software - that today run on proprietary hardware - leveraging (high volume) standard servers and IT virtualization
- Supports multi-versioning and multi-tenancy of network functions
  - Allows use of a single physical platform for different applications, users and tenants
- Enables new ways to implement resilience, service assurance, test & diagnostics and security surveillance
- Facilitates innovation towards new network functions and services that are only practical in a pure software network environment
- Applicable to any data plane and control plane functions, (fixed or mobile networks)
- Opportunities for pure software players
- New methods for interlinking virtualized services & functions
- NFV aims to ultimately transform the way network operators architect and operate their networks
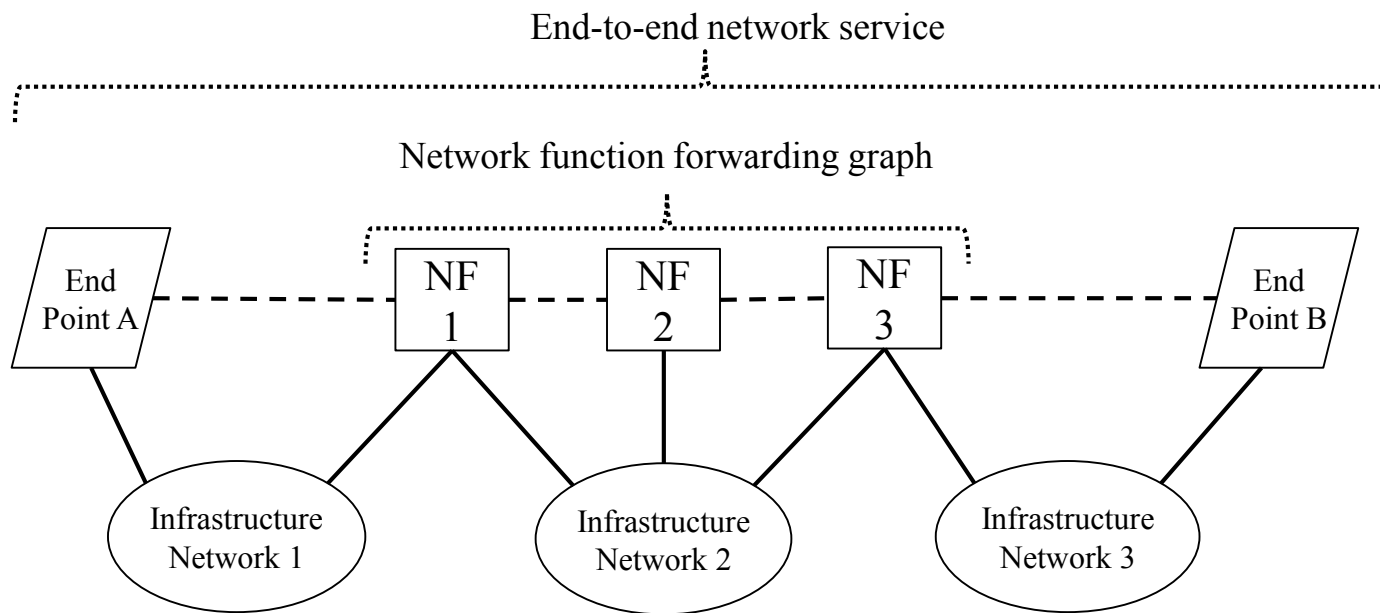 - Change will be incremental

The NFV Group

Creates competitive supply of innovative applications by third parties.

Creates network abstractions to enable faster innovation.

Open Innovation

Software Defined Networks

Network Functions Virtualisation

Reduces CAPEX, OPEX, Space & Power Consumption.

- Global operators-initiated Industry Specification Group (ISG) under the auspices of ETSI
  - > 100 members
- Open membership
  - ETSI members sign the "Member Agreement"
  - Non-ETSI members sign the "Participant Agreement"
- Operates by consensus (formal voting only when required)
- Deliverables: White papers addressing challenges and operator requirements, as input to standardisation bodies
- Face-to-face meetings quarterly

NF Forwarding Graphs

- An end-to-end network service can be defined as a forwarding graph of network functions and end points/terminals

  - "What" an operator provides to customers.

End-to-end network service

Network function forwarding graph

| End Point A | NF 1 | NF 2 | NF 3 | End Point B |

Infrastructure Network 1

Infrastructure Network 2

Infrastructure Network 3

NFV Forwarding Graphs

- **Efficiency**. Compute resources assigned to function and network capacity sized to current load and shareable across functions.

- **Resiliency**. In some cases, backup function and network capacity can be shared

- **Agility**. Shorter deployment intervals for upgrades and new features since functions are software based

- **Expressiveness**. Virtualised switching functions and/or configuration of VNFs can implement forwarding graphs in a more straightforward and efficient manner.

- **Flexibility**. Reduce configuration complexity. Support new service and business models: deployments in other operator's network, third-party datacenters…

The General Picture
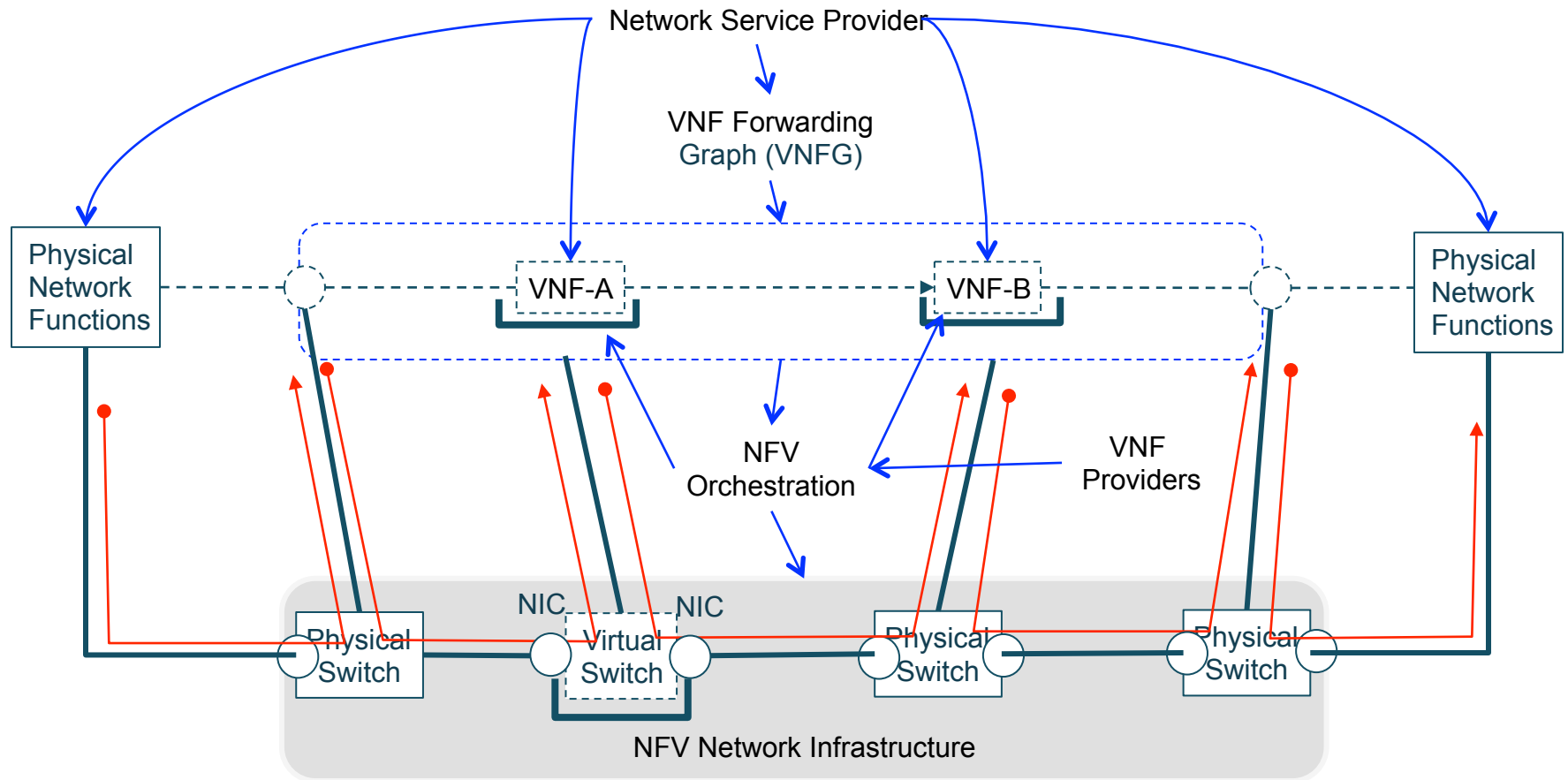
The Challenges

- Migration and coexistence of virtualized and non-virtualized NFs
  - Orchestration
  - Management
  - Interfacing
- Means for specifying the attributes of a VNFG
  - Measurement methods to validate these
- Means for specifying the attributes of each VNF contribution to the overall VNFG
  - Measurement, testing, and/or validation methods to validate these
- Mechanisms needed to implement resilient VNFGs
- Aspects involving multiple administrative domains in terms of operation, interworking, and migration

The Concluding Trinity

- NFV intends to bring the advantages of virtualization into network functions

- Network Service Chaining (VNFG in NFV jargon) is key for the NFV service model

- NFV does not intend to build standards on its own, but to provide input and requirements to standards bodies

So here we are…

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