

Multi-domain Network Virtualization

draft-bernardos-nfvrg-multidomain-02

Carlos J. Bernardos (*UC3M*)

Luis M. Contreras (*Telefónica*)

Ishan Vaishnavi (*Huawei*)

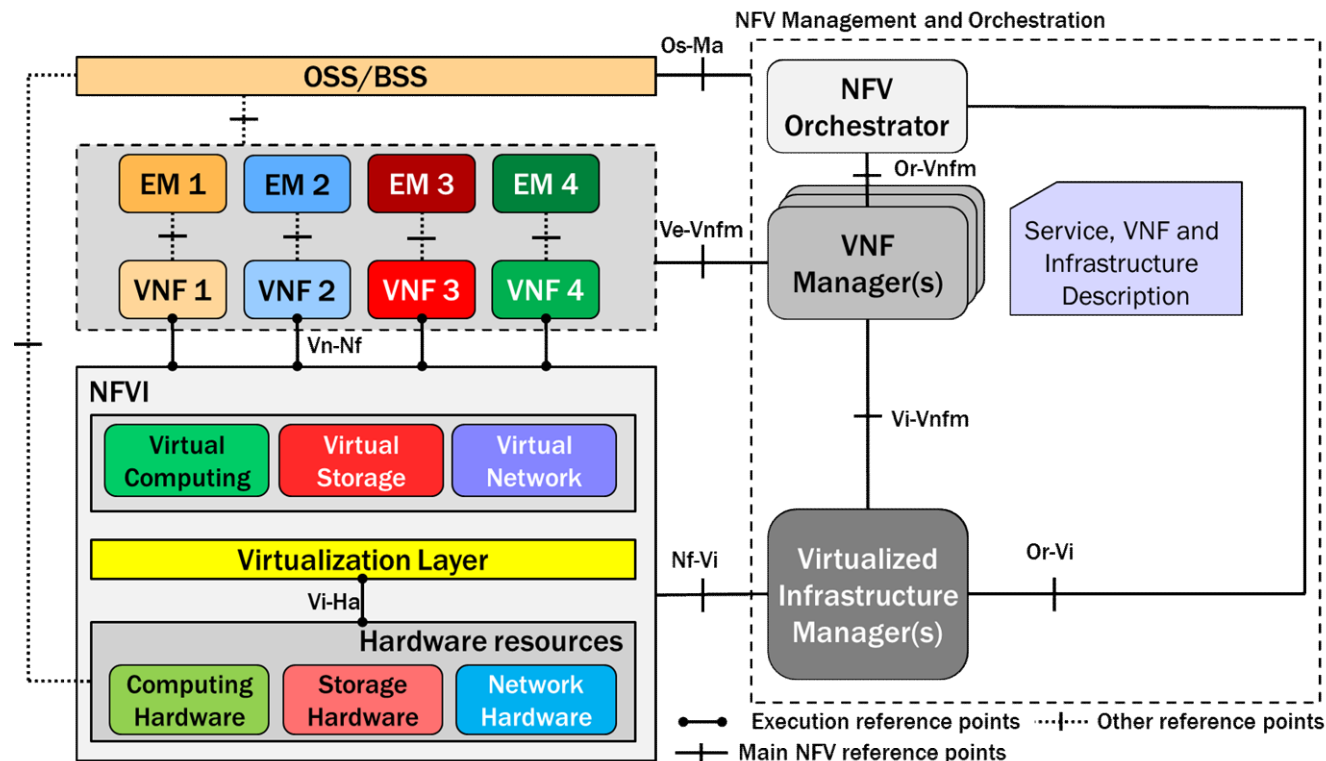
Róbert Szabó (*Ericsson Research*)

Chicago, NFV RG, March 2017

Rationale

- Network Function Virtualization has not been yet addressed in scenarios where multiple administrative domains are involved
 - Pure infrastructure scenario: usage of network, computing and storage resources of different administrative domains
 - More complex scenario: operation of network functions instantiated in different administrative domains
- Goal: to permit programmability, flexibility and automation, but also agile contracting of services (including VNFs)
 - Significant reduction of the time for provision when invoking and settling of services exceeding the border of a single administrative domain

NFV reference framework

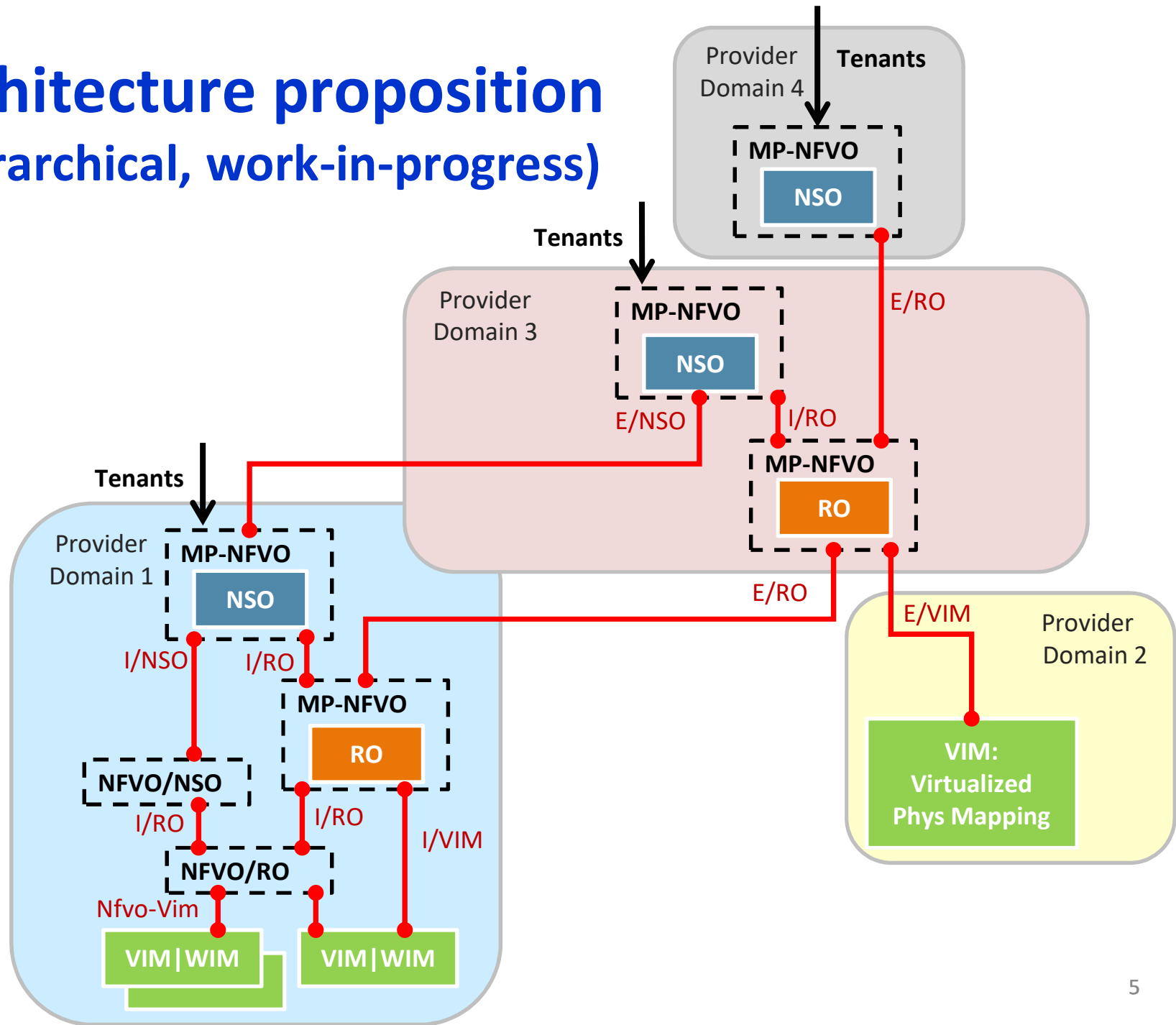


- Multi-domain interfaces not present in original ETSI NFV architecture
- A “VNF composition across multiple administrative domains” Use Case recently approved to be included in the NFV001 use cases document
- IFA028 Work Item on multi-domain has also recently started

Multi-domain Problem Statement

- Availability of different infrastructure environments pertaining to distinct administrative domains
 - In consequence, being operated and managed by distinct providers
- There are no established mechanisms for providing access to multi-domain environments in an standardized way
 - E.g., to facilitate portability among NFVI PoPs independently of the owner of such infrastructure
- A solution is needed to deal with both multi-operator and (single operator) multi-domain problem

Architecture proposition (hierarchical, work-in-progress)

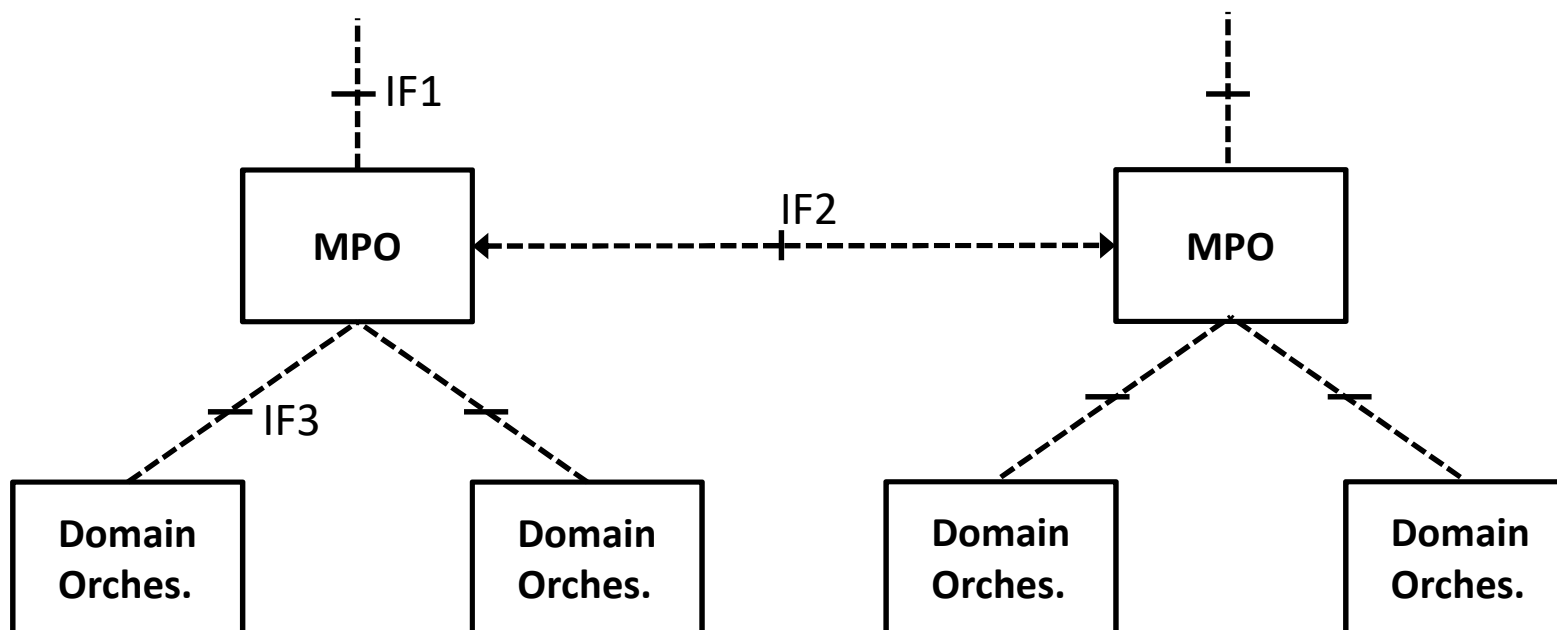


Virtualization and Control for Multi-Provider Multi-Domain

- Multi-domain different from single-domain
 - Single-domain:
 - The orchestrator is aware of the entire topology and resource availability within its domain
 - The orchestrator has complete control over the resources
 - Multi-domain:
 - Solutions required to enable the exchange of relevant information across orchestrators
 - This Exchange needs to be standardized

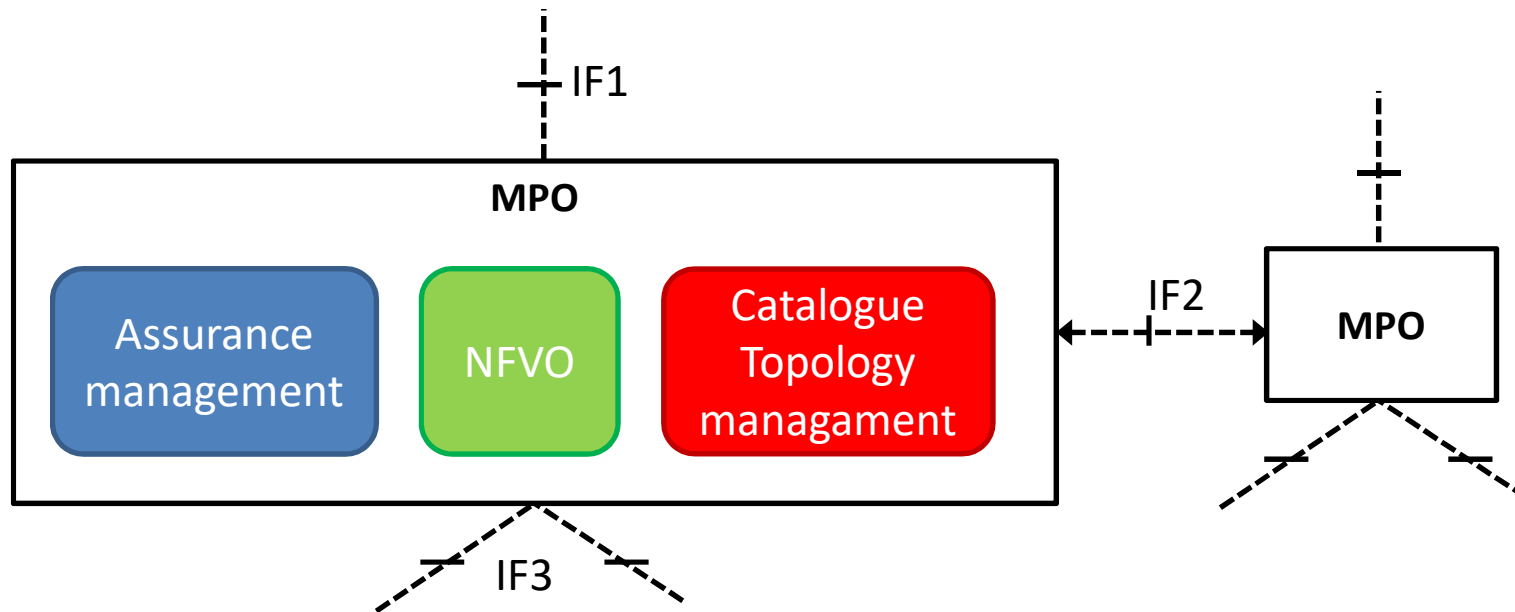
Virtualization and Control for Multi-Provider Multi-Domain

- Multi-provider orchestrator (MPO) exposes 3 interfaces:
 - IF1 to the tenant
 - IF2 to other multi-provider orchestrators
 - IF3 to individual domain orchestrators



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Functional split of MPO Interfaces

Foreseen functional needs

- -S → Service request
- -C → Catalogues
- -F → Life cycle management
- -RT → Resource/Topology
- -RC → Resource/Control
- -Mon → Monitoring

New functional needs could be identified through on-going work

Interface specification

- IF1
 - IF1-S: MPO exposes a northbound sub-interface through which a customer sends the initial request for services
 - It handles command and control functions to instantiate network services. Such functions include requesting the instantiation and interconnection of Network Functions (NFs)
 - IF1-C: used to expose available services to customers
- IF2
 - IF2-S: perform similar operations than IF1-s, between MPOs of different administrative domains
 - IF1-C: used to expose available services to other MPOs
 - IF2-R: used to keep an updated global view of the underlying infrastructure topology exposed by domain orchestrators

Interface specification (cont'd)

- IF2 (cont'd)
 - IF2-S: perform similar operations than IF1-S, between MPOs of different administrative domains
 - IF1-C: used to expose available services to other MPOs
 - IF2-R: used to keep an updated global view of the underlying infrastructure topology exposed by domain orchestrators
 - Resource orchestration related interfaces:
 - IF2-RC: resource control
 - IF2-RT: resource topology
 - IF2-Rmon: resource monitoring
- IF3
 - IF3-R, IF3-RC, IF3-RT and IF3-Rmon: analogous to IF2-* but between the MPO and underlying domain orchestrators

Next steps

- Validate the architecture by implementation and experimentation
 - 5GEx PoCs and Sandbox
 - Prototyped MPO to be available as Open Source
- Continue evolving the architecture definition
 - Updates to interface (IF1, IF2, IF3) specification
- Gather feedback from the group

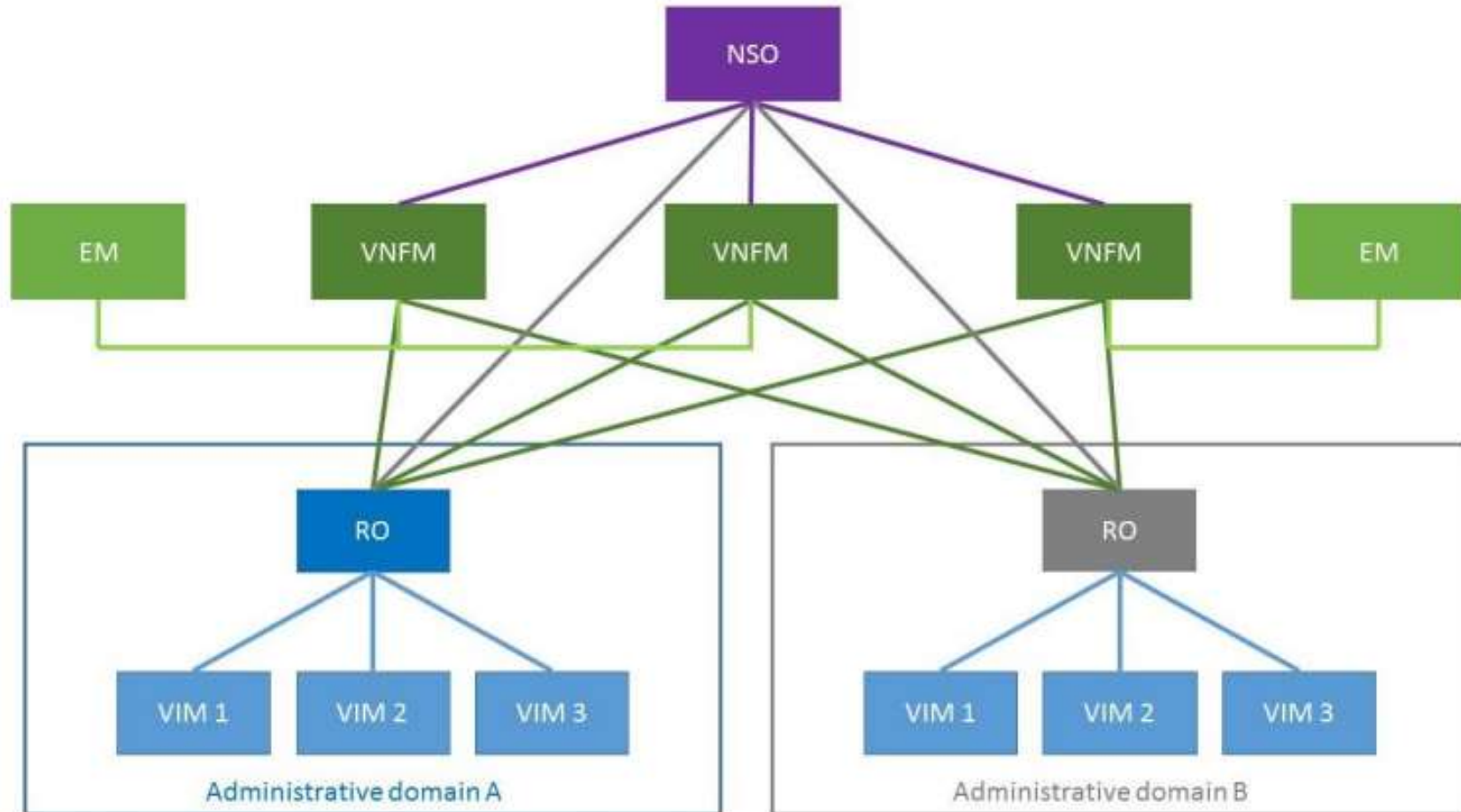
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<http://www.5gex.eu>

BACKUP SLIDES

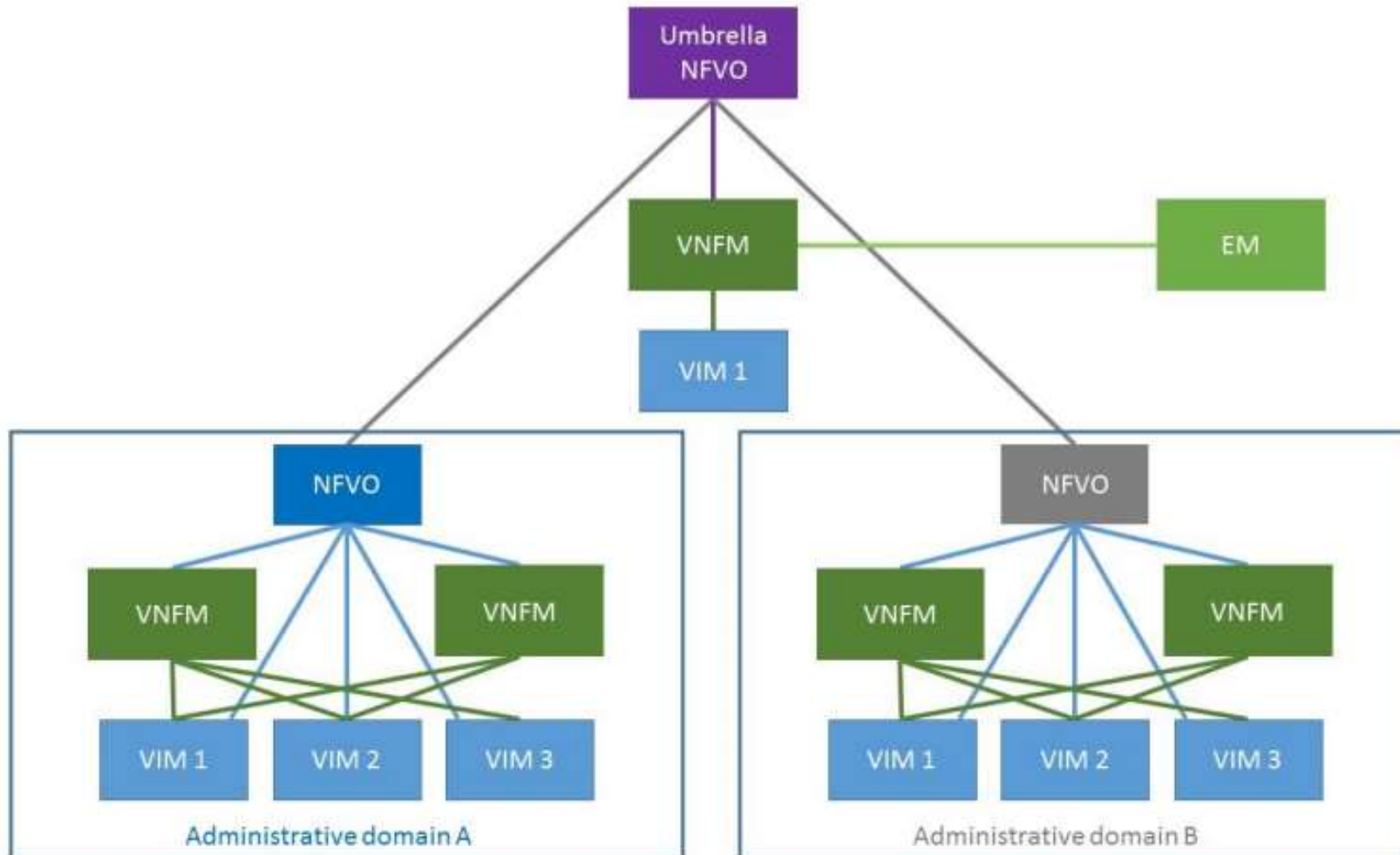
Multi-domain arch approaches: ETSI NFV



Infrastructure provided using multiple administrative domains.

From: ETSI GS NFV-IFA 009 V1.1.1 (2016-07)

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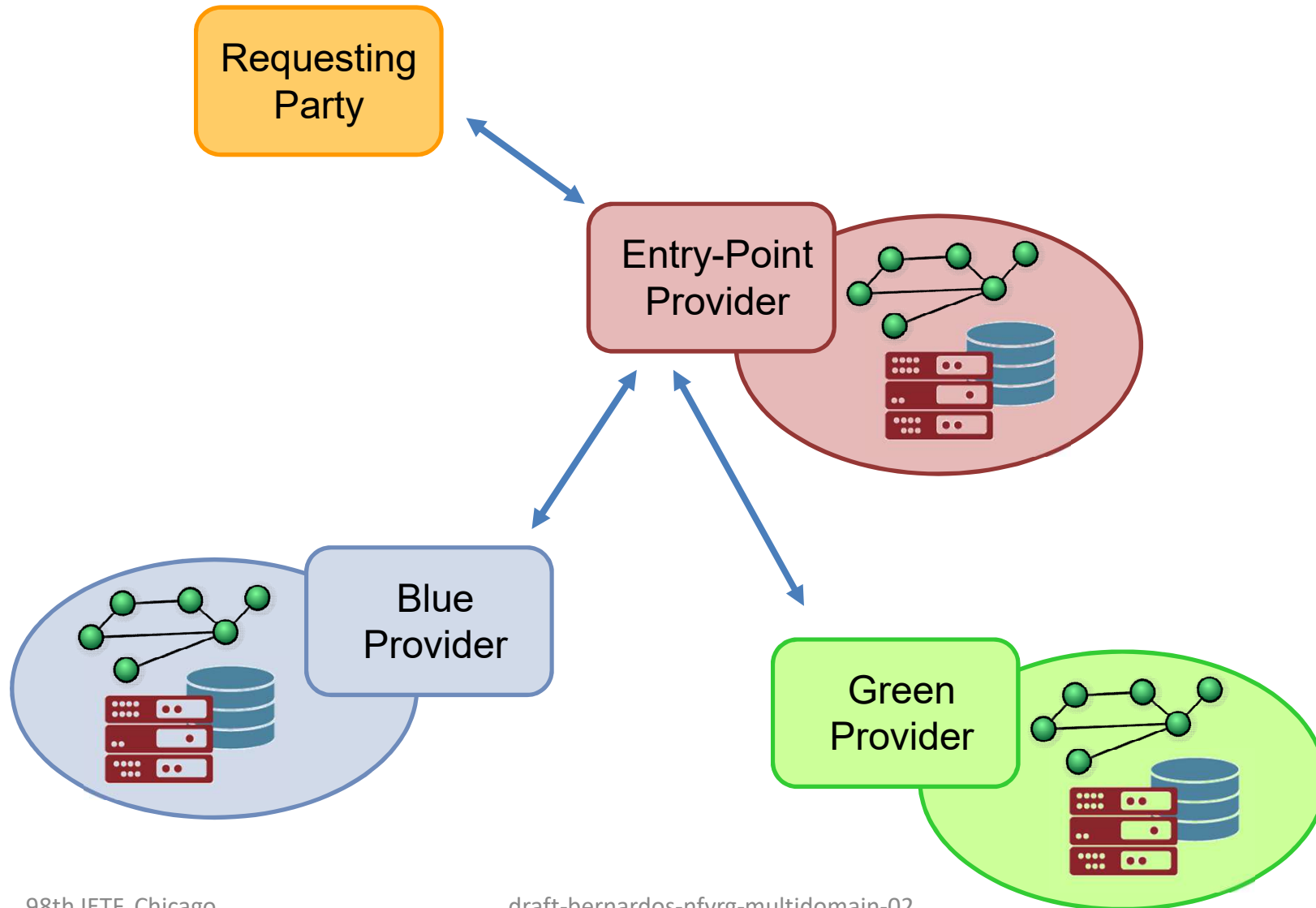


Network services provided using multiple administrative domains.
From: ETSI GS NFV-IFA 009 V1.1.1 (2016-07)

Multi-domain approaches

- Hierarchical
 - The provider facing the customer as a single entry point for the service request will maintain relationships with other providers in order to complete the service.
 - The Entry-Point Provider (EPP) will produce the service split among parties, ensuring adequate levels of coordination to offer the service as provided by a single domain to the customer.
- Cascading
 - The EPP partially satisfies the service request but complements the service by using resources external to its own domain.
 - The EPP will trade such resources with some other provider's offering capabilities at disposal of external domains.

Hierarchical



Cascading

