

Unifying Carrier and Cloud Networks: Problem Statement and Challenges

[draft-unify-nfvrg-challenges](#)

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Motivation

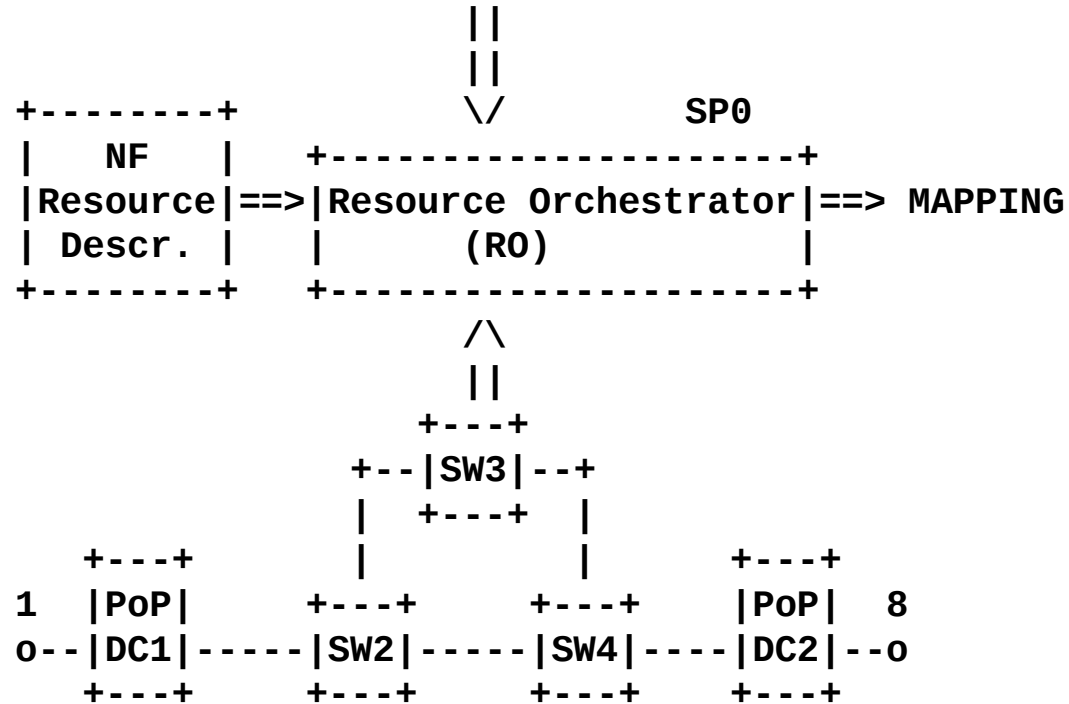
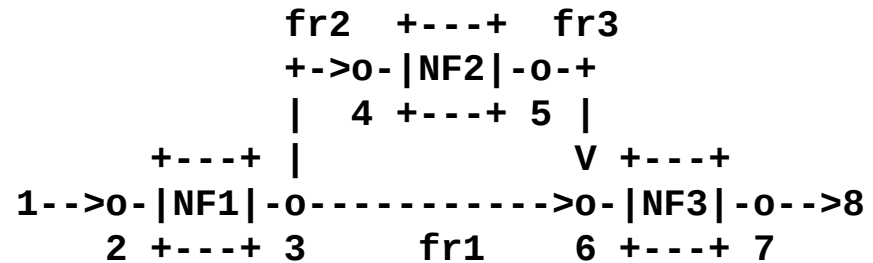
- Compute domains have internal networking
 - multi-level virtualization of compute, storage and network domains
- Argument for
 - Joint software and network programmatic interface
 - Recursion for automation of resource orchestration
 - see [draft-unify-nfvrg-recursive-programming](#)

New in -01

- **Challenges section**
 - Orchestration
 - Resource description
 - Dependencies (de-composition)
 - Elastic VNF (see [draft-zu-nfvrg-elasticity-vnf](#))
 - Measurement and analytics (see also [draft-unify-nfvrg-devops](#))

Orchestration

- Combined compute and network abstraction
- Recursion



Legend:

Switch (SW)

Compute Node (CN)

PoP DC = SW + CN

[---SP1---][-----SP2-----][---SP3---]
[-----SP0-----]

Resource description

- “Arbitrary” resource descriptions are hard to standardize
- Heterogeneous hardware
 - Logical compute core is not enough
 - from random number generators, AES hw acceleration
 - Networking
 - Hardware acceleration, support for complex functions
 - Can VNF type X run with a QoS spec?
- But QoS is service specific
 - May a control function to the VNF user plane (within a VNF Forwarding Graph) need to express the service specific QoS?

Dependencies (de-composition)

- Application layer, e.g., TOSCA
- Cloud: complex function into dependencies, e.g., Chef recipes
- Is there a dependency (decomposition) abstraction suitable **to drive resource orchestration** between application layer descriptions (like TOSCA) and cloud specific installations (like Chef recipes)?

Elastic VNF

- VNF Pool for VNF scale out/in
- Multiple Network Function Virtualization Infrastructure Points of Presence (NFVI-PoPs)
- VNF does not scale alone but is part of a VNF-FG
 - End to end SLAs to be met
 - VNF-FG scaling considering networking resources
 - Joint orchestration
 - see [draft-zu-nfvrg-elasticity-vnf](#)

Measurement and analytics

- Compute domain VNF benchmarking
- Network domain benchmarking
- See also [draft-unify-nfvrg-devops](#)

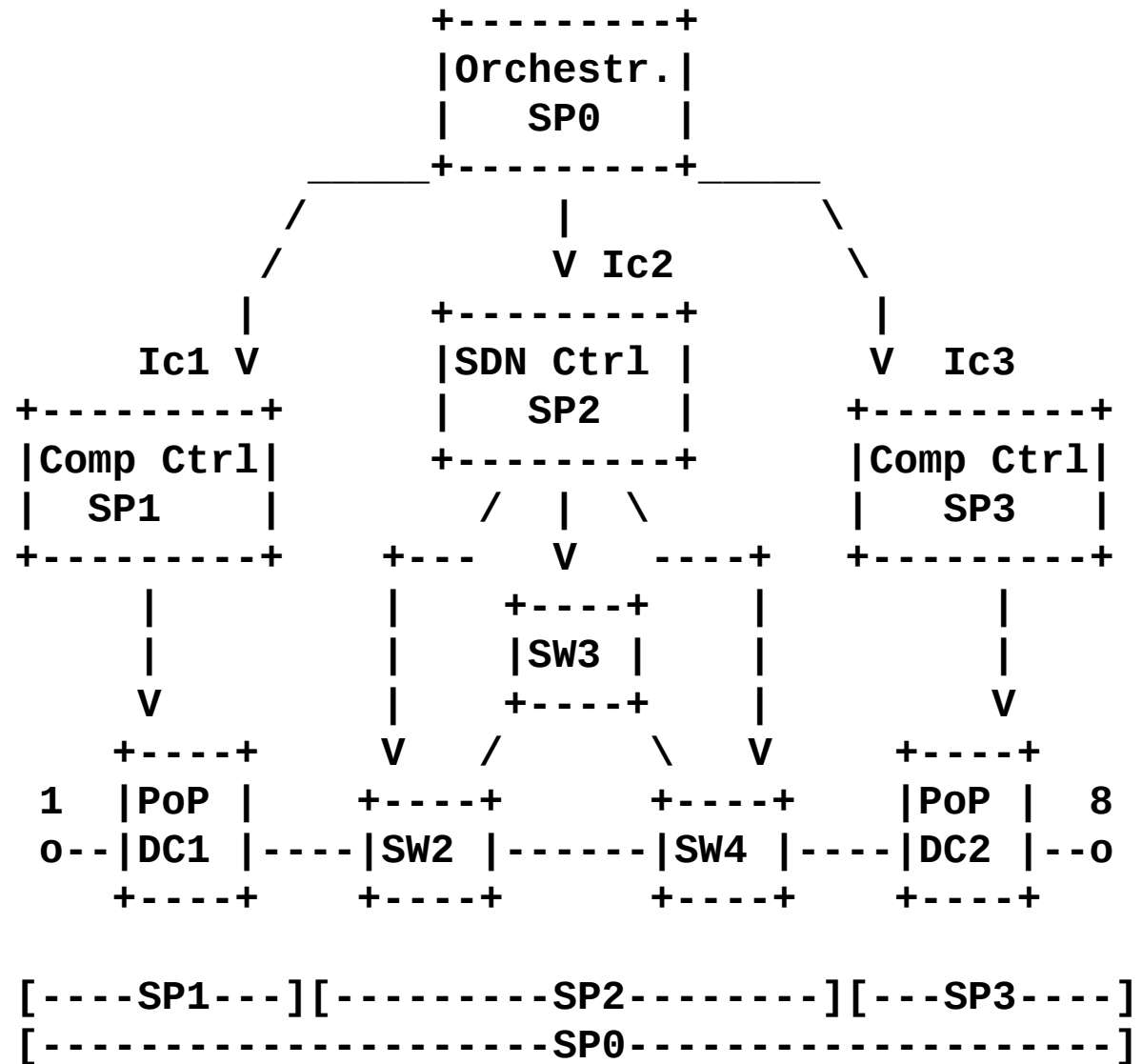
Summary

- Problem statement
- Extended challenges
 - Orchestration
 - Resource description
 - Dependencies (de-composition)
 - Elastic VNF (see [draft-zu-nfvrg-elasticity-vnf](#))
 - Measurement and analytics (also [draft-unify-nfvrg-devops](#))
- References
 - [draft-unify-nfvrg-challenges](#)
 - [UNIFYing carrier and cloud networks: mixing SDN and NFV](#)
 - www.fp7-unify.eu

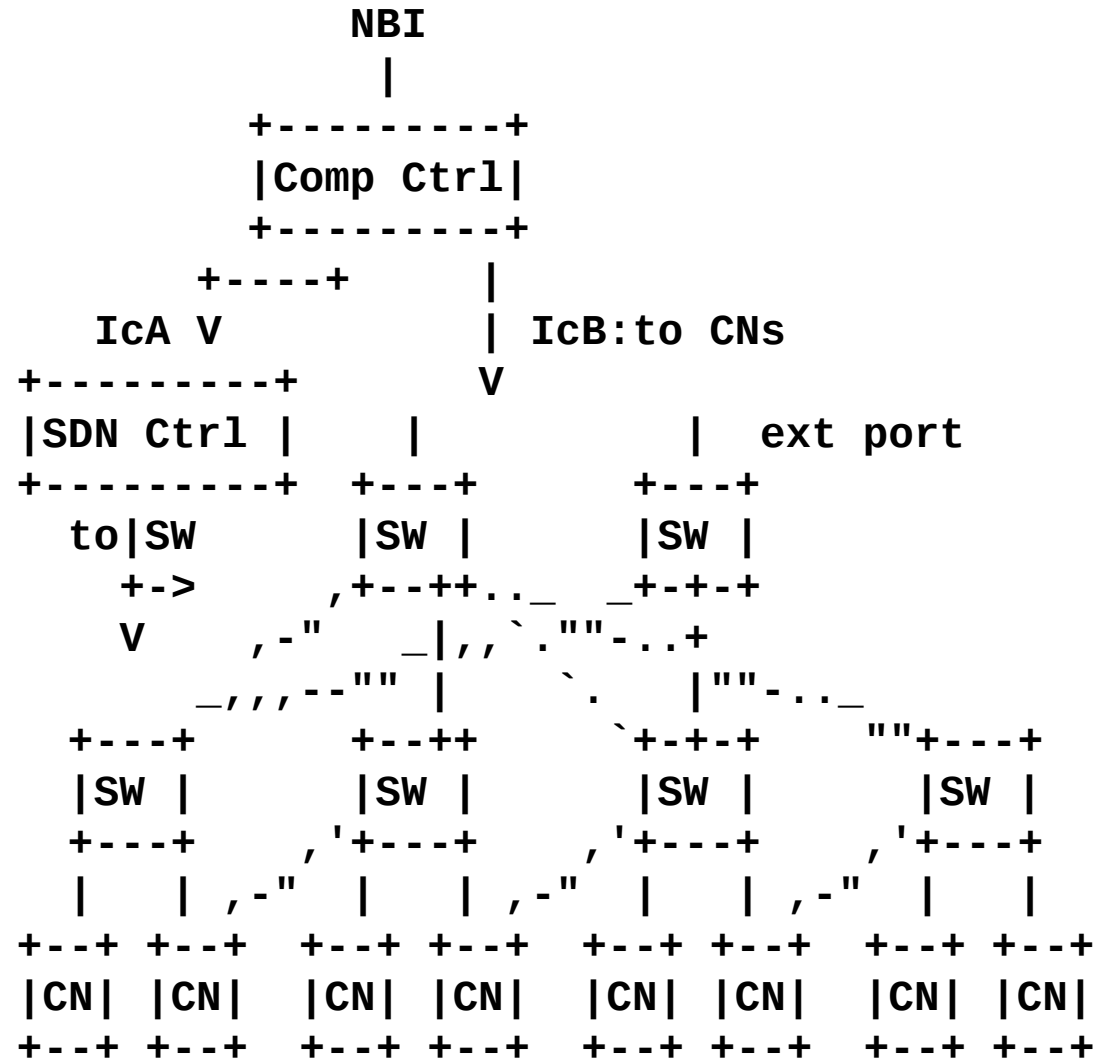
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Backup slides

Software **and** Network?



PoP DC



Switch (SW)
Compute Node (CN)

Compute Node

```
+--+ +--+ +--+ +--+
|V|  |V|  |V|  |V|
|N|  |N|  |N|  |N|
|F|  |F|  |F|  |F|
+--+ +--+ +--+ +--+
|    /    /    |
+----+ +----+ +----+
|LSI| |LSI| |LSI|
+----+ +----+ +----+
|    /    |
+----+      +----+
|NIC|      |NIC|
+----+      +----+
|          |
```

Logical Switch Instance (LSI)