



Scalability and multitenancy issues in network slicing



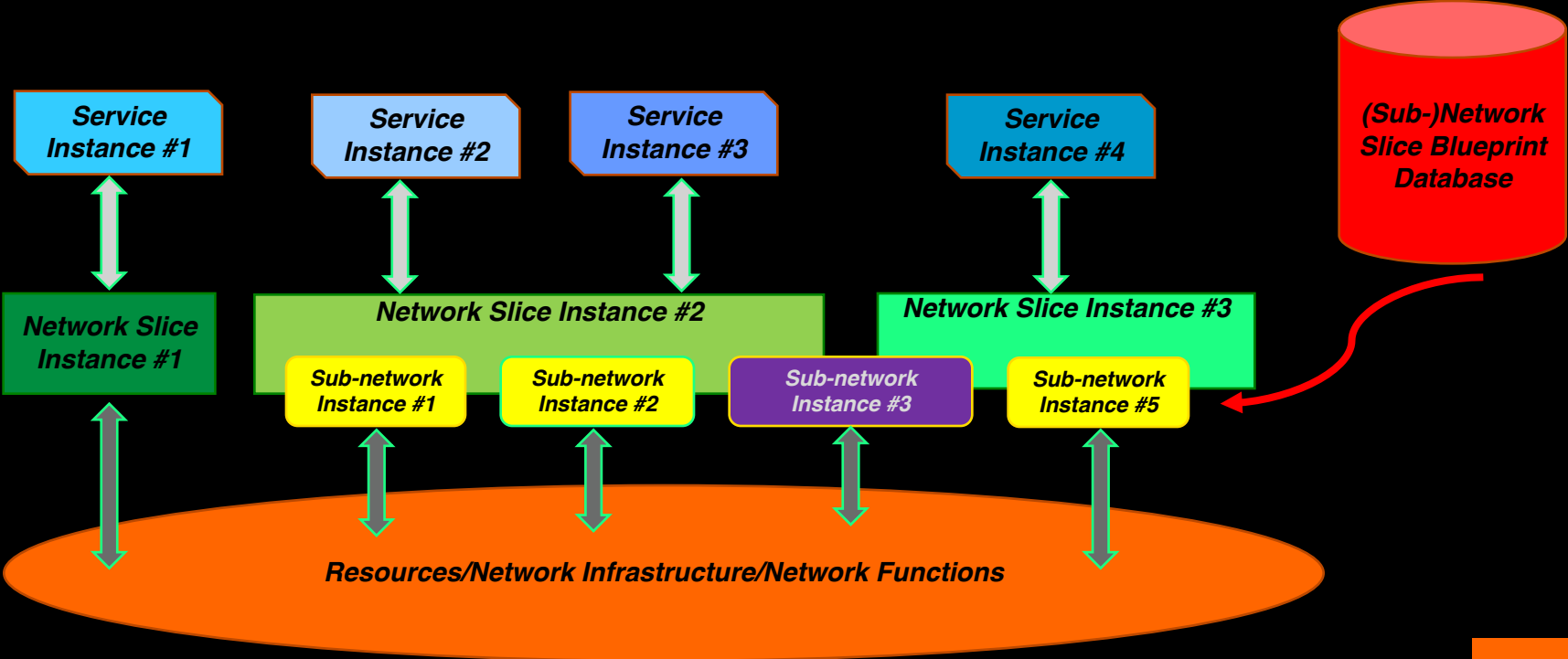
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Introduction

- **Scalability of network slicing seems not to be addressed properly yet**
- **Network slices come with the promise of tenant oriented networks**
 - **What tenants should be able to do with slices?**
 - **Is the multitenancy a serious issue for current approaches?**

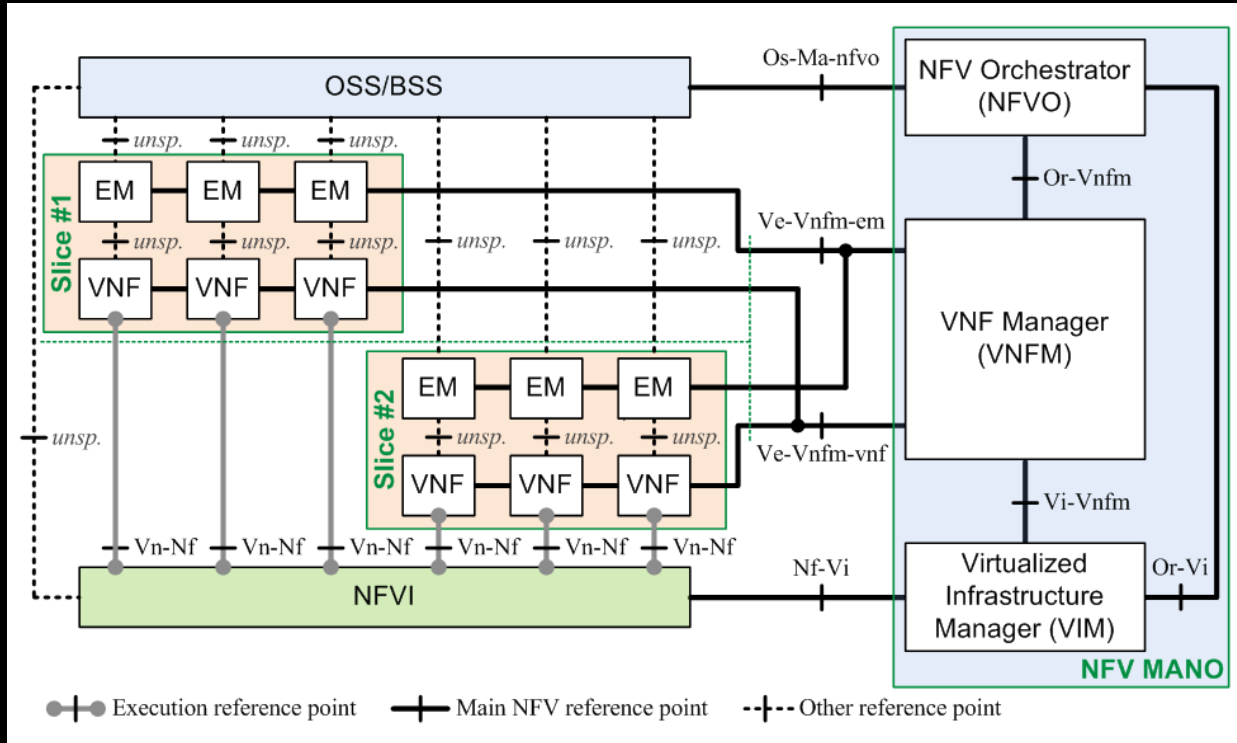
Network slicing according to NGMN (01/2016)



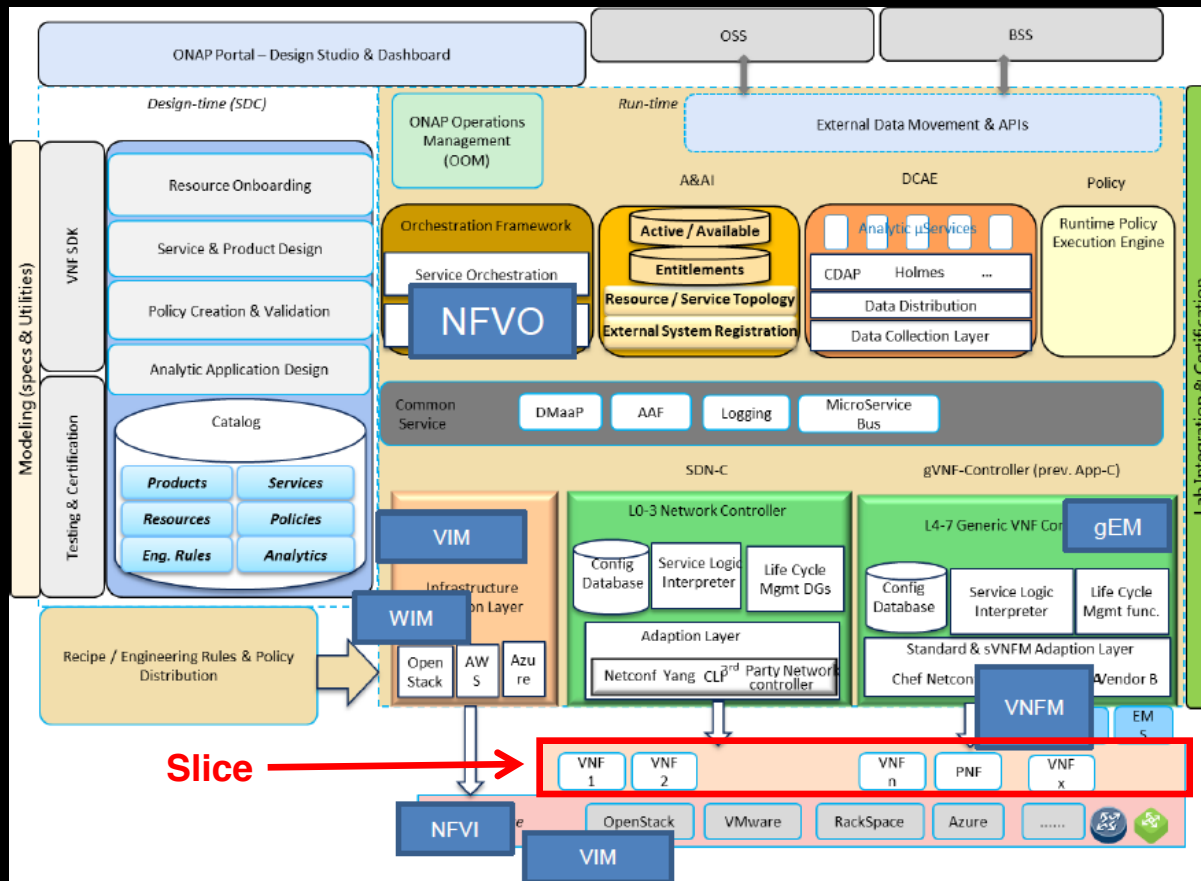
Uncertainties related to network slicing

- **Number:** the number of slice can be huge
- **Longevity:** Some slices may stay for years, some others can live several hours only
- **Complexity:** some slices may have several NFs only, whereas others may have several hundred NFs. NFs can differ significantly in complexity
- **Span:** some slices can be local only, whereas other ones will be distributed over wide area
- **Provisioning time:** for some slices (SoD) the provisioning time can be critical
- **Service capabilities:** some slices will be bound with a single service, whereas other may serve multiple services with separate lifecycle management

Network slicing and ETSI NFV MANO



ONAP



Network slicing scalability

- **So far, centralized approaches for both slice provisioning and runtime management are proposed**
- **Slices *per se* do not participate in management and/or orchestration – all such functions are external to them. More slices, more scalability issues**

Can we improve network slicing scalability?

- We may split a slice into administrative/orchestration domains and provide their (horizontal) stitching using local blueprints, some limitations are imposed
- We may build slices as a combination of common (always present) and slice-dedicated functions – a kind of (sub-)slice vertical stitching
- We may keep some VNFs frozen (VNF-Pool)
- We may implement the **In-slice Management** concept by adding to each slice its management functions (also important in terms of multitenancy)
 - Can we use autonomic/cognitive management for that purpose?
- We can (can we?) add some MANO components to a slice
 - Can we add full MANO to a slice?

Multitenancy issues

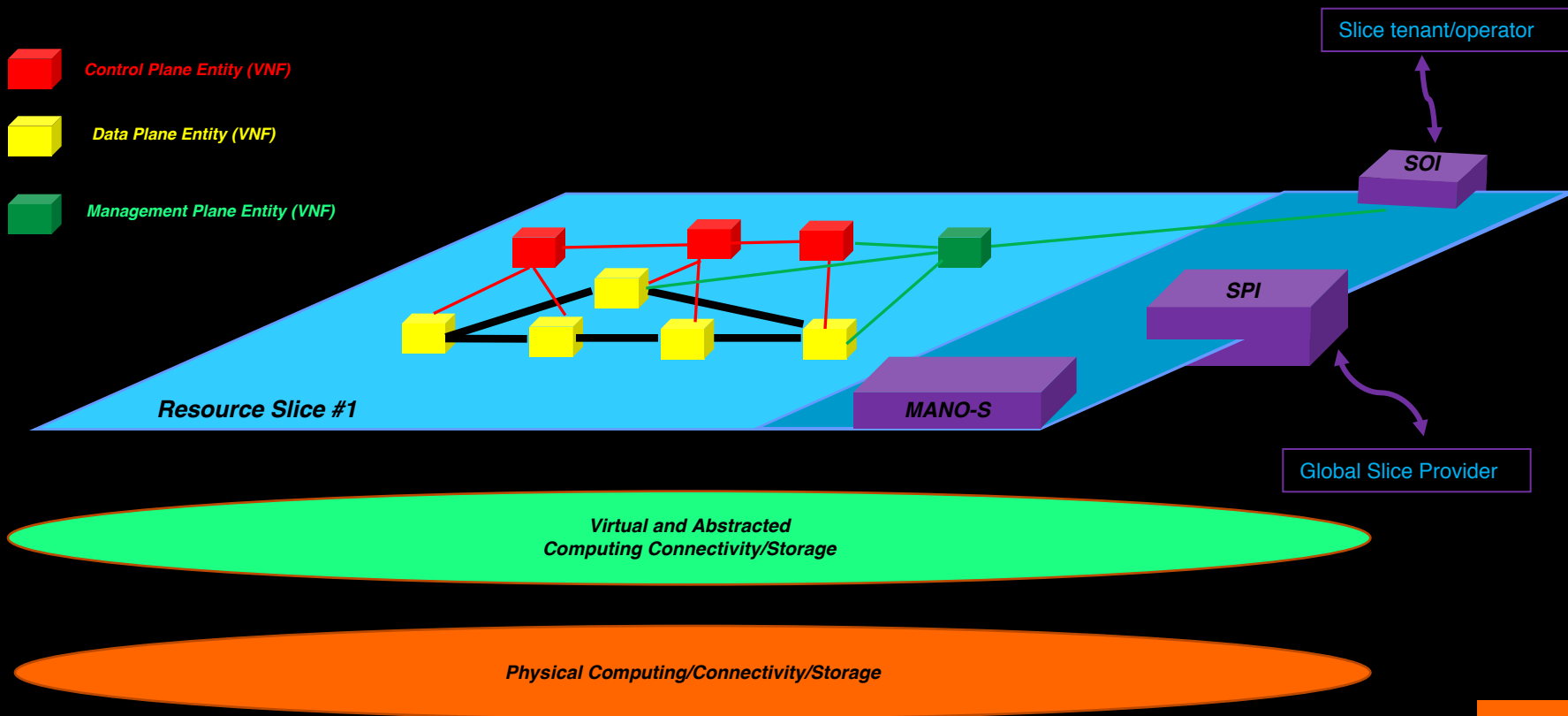
- **We want slices to be created for verticals, as service-tailored, isolated networking solutions that share the same infrastructure. Each vertical will – in a sense – operate its network slice (KPI, configuration)**
 - Is the centralized solution ready for that?
- **Should we expose a management interface to each slice tenant?**
 - If so, the In-Slice Management should be lightweight, intent-based, automated (cognitive/autonomic)
- **Should we provide MANOaaS to slice tenants?**

Network slicing with in-slice Management and Orchestration

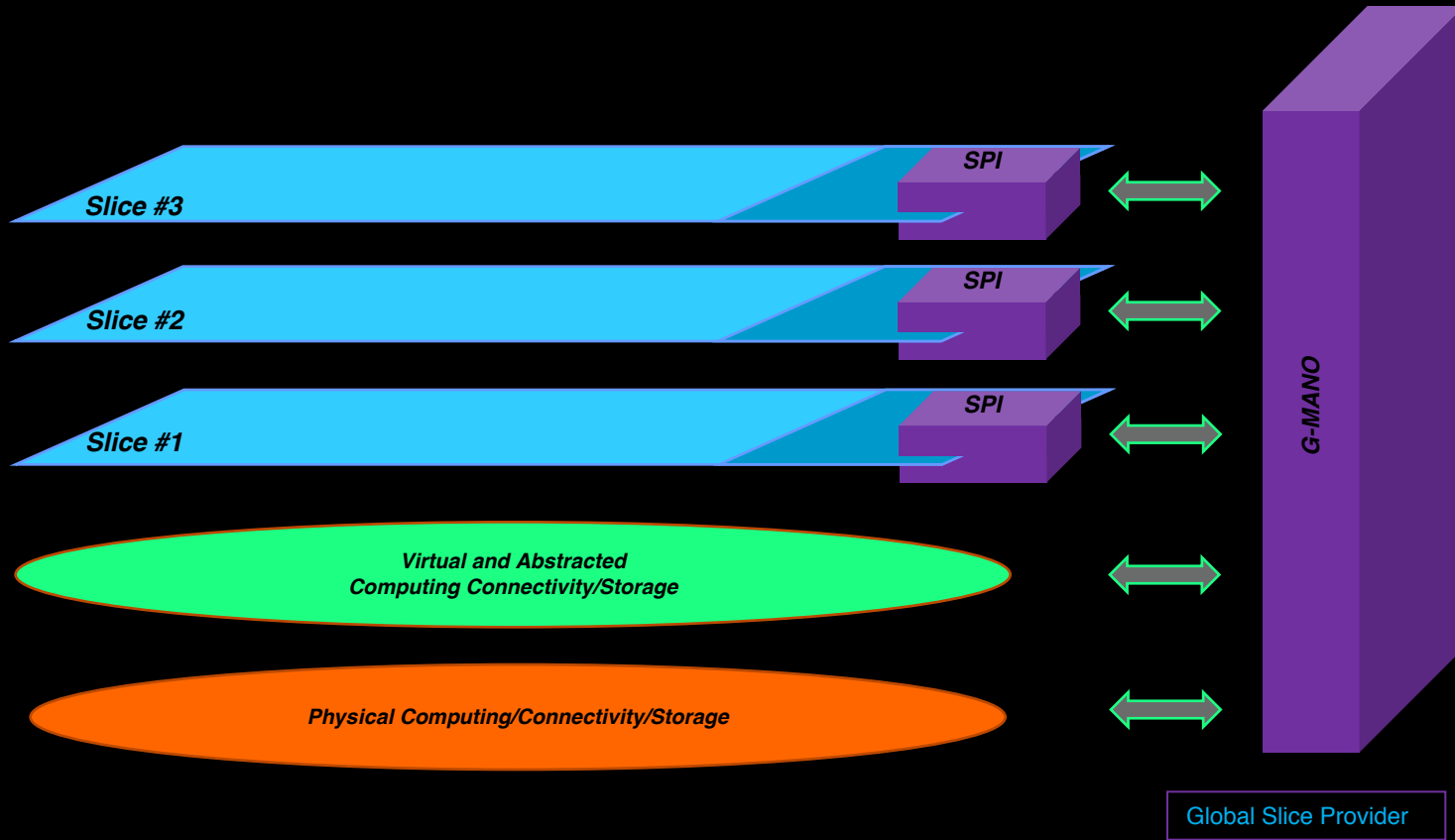
 Control Plane Entity (VNF)

 Data Plane Entity (VNF)

 Management Plane Entity (VNF)



In-Slice Orchestration and Management



Conclusions

- **The existing centralized approaches to network slice management and orchestration raise some issues**
- **No single management & orchestration solution can be applied to all kind of slices – distribution of orchestration and management functions can be slice category dependent – but it has to be done!**
- **In-slice, automated management is a solution of choice to cope with scalability and multitenancy**

Thank you!



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