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NETWORK FUNCTIONS AS-A-SERVICE
OVER VIRTUALISED INFRASTRUCTURES

IETF 93 Prague

T-NOVA: Supporting Network Intent Through Automated Platform Aware VNF Deployment

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Scope

- **T-NOVA** is an EU-funded project, currently half way
 - NFVaaS
 - NFV Marketplace
- Purpose of this presentation: Tease for an alternative approach on Network-Intent for NFVRG.
 - Network Intent for NFV is focused on a more SDN approach
 - What about VNF specific intents?
 - Resource allocation and Automatic deployment, always in correlation to VNF specific needs.
- **Enhanced Platform Awareness (EPA)** has emerged to enable fine-grained matching of workloads to platform capabilities prior to the deployment of VNFs in a cloud environments.



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Problem Statement

- Current solution to Automatic VNF deployment: **ETSI VNF Descriptor (VNFD)**
 - Does not offer a complete VNF <-> VIM connection
- The gap needs to be bridged between resource abstraction and platform specific requirements.
 - Meet Customer **Requirements and SLAs**.
 - Providers usually overprovision resources.
 - **Intelligent Resource Mapping** is achieved through manual configuration.
- Network-Intent mainly describes **network behaviors** and **policies**.
- Proposal for '**Network Performance Intent**' in the context of supporting VNF deployments in a Telco cloud environment.

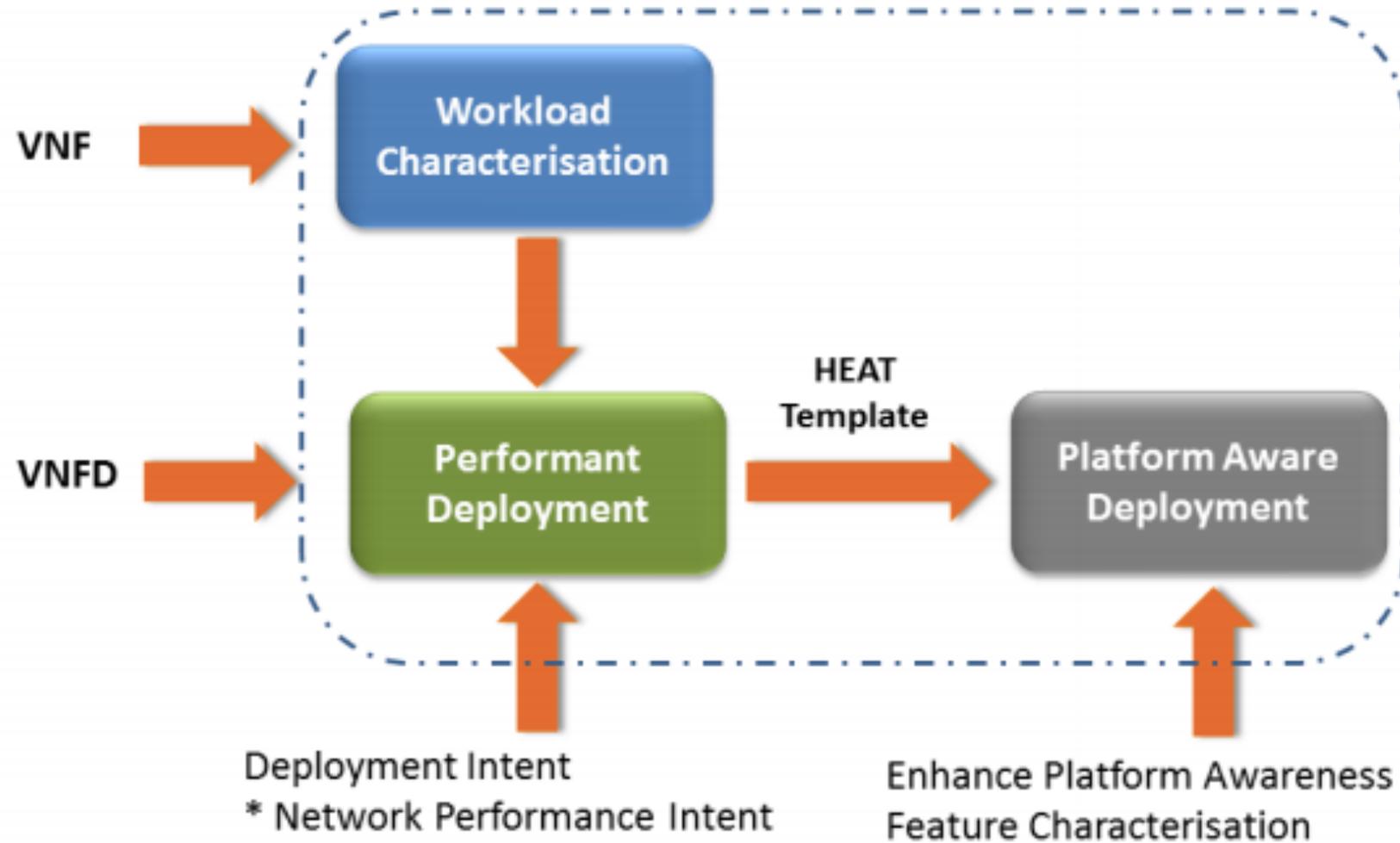


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T-NOVA EPA Architecture



Proposed Framework

- Experimental tests on a virtual Traffic Classifier (vTC) test case.
- The collected data is analyzed using a **machine learning** approach to identify relationships between the **types** and **quantity** of resource allocations and VNF performance.
- A **decision tree** is generated which relates specific **performance characteristics** such as **network throughput** to various combinations of **resource allocations** to achieve **different levels of performance**.
- The decision tree can then be encoded for use by an **Orchestrator** to optimize the allocation of specific resources during **automated deployments**.
- Finally **EPA** is used to identify the location of a **host** which has the necessary resources.
- Current solution to Automatic VNF deployment: ETSI VNF Descriptor (VNFD)

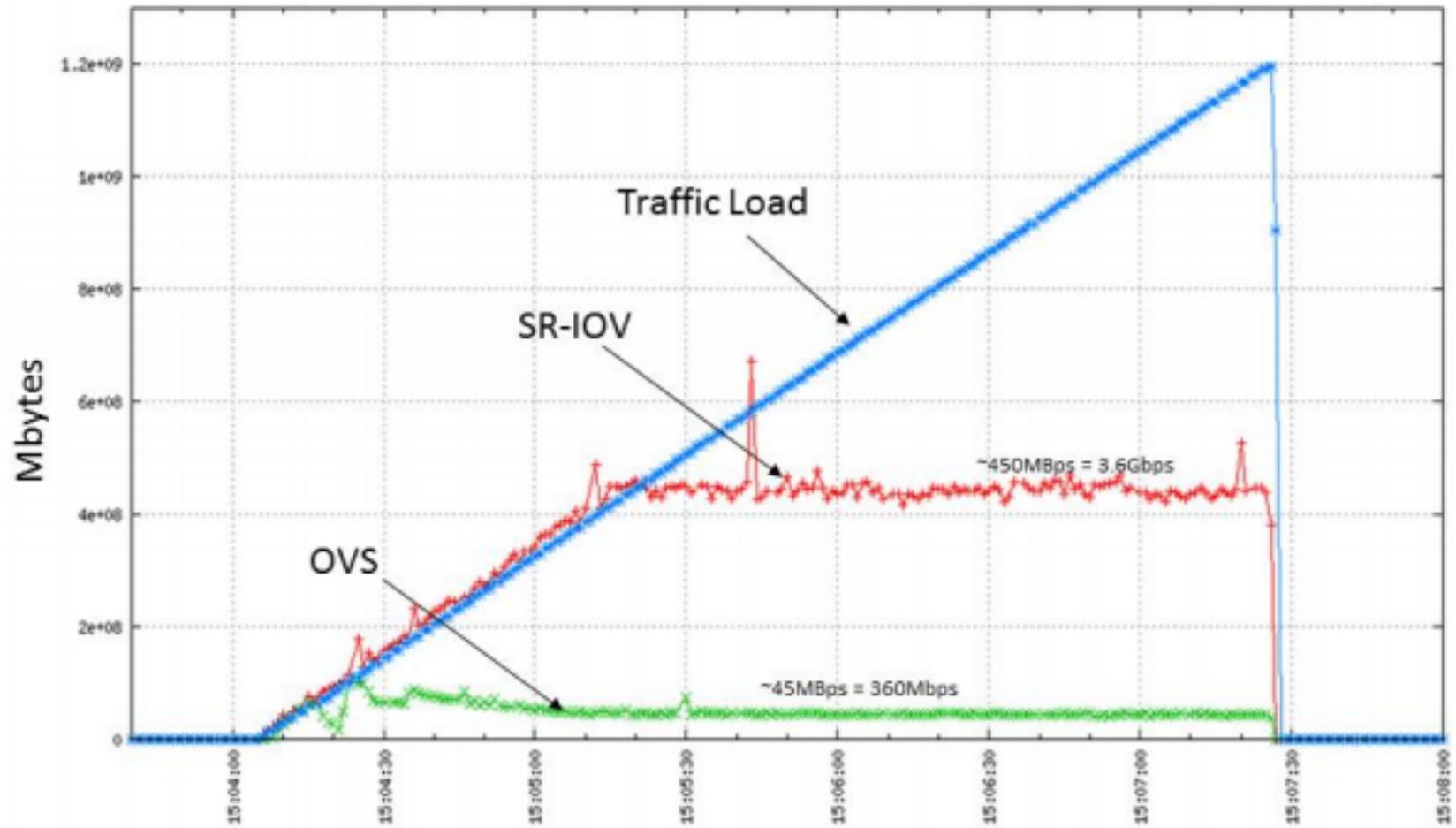


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Workload Data



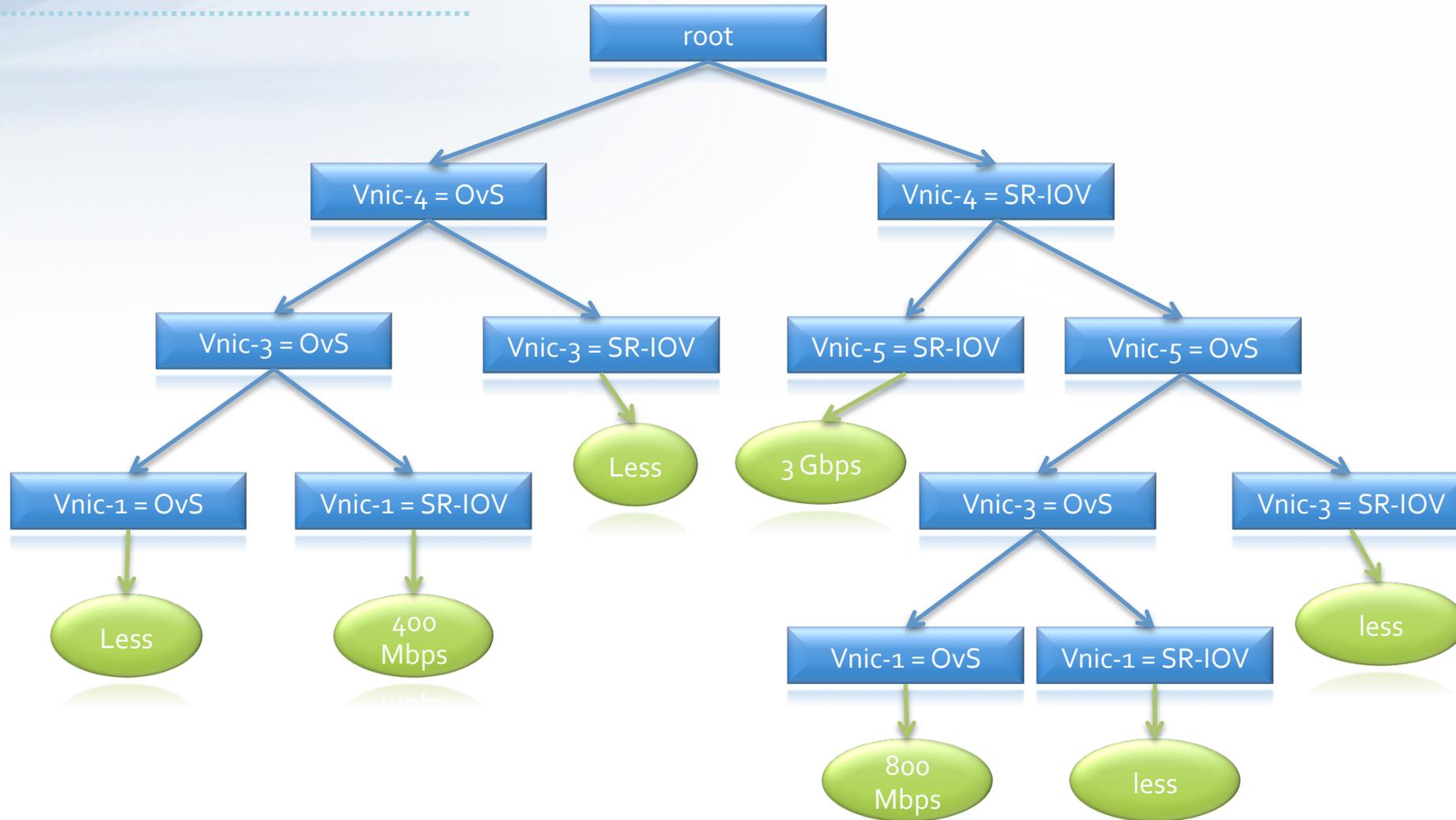
Machine Learning Algorithm

For each sample:

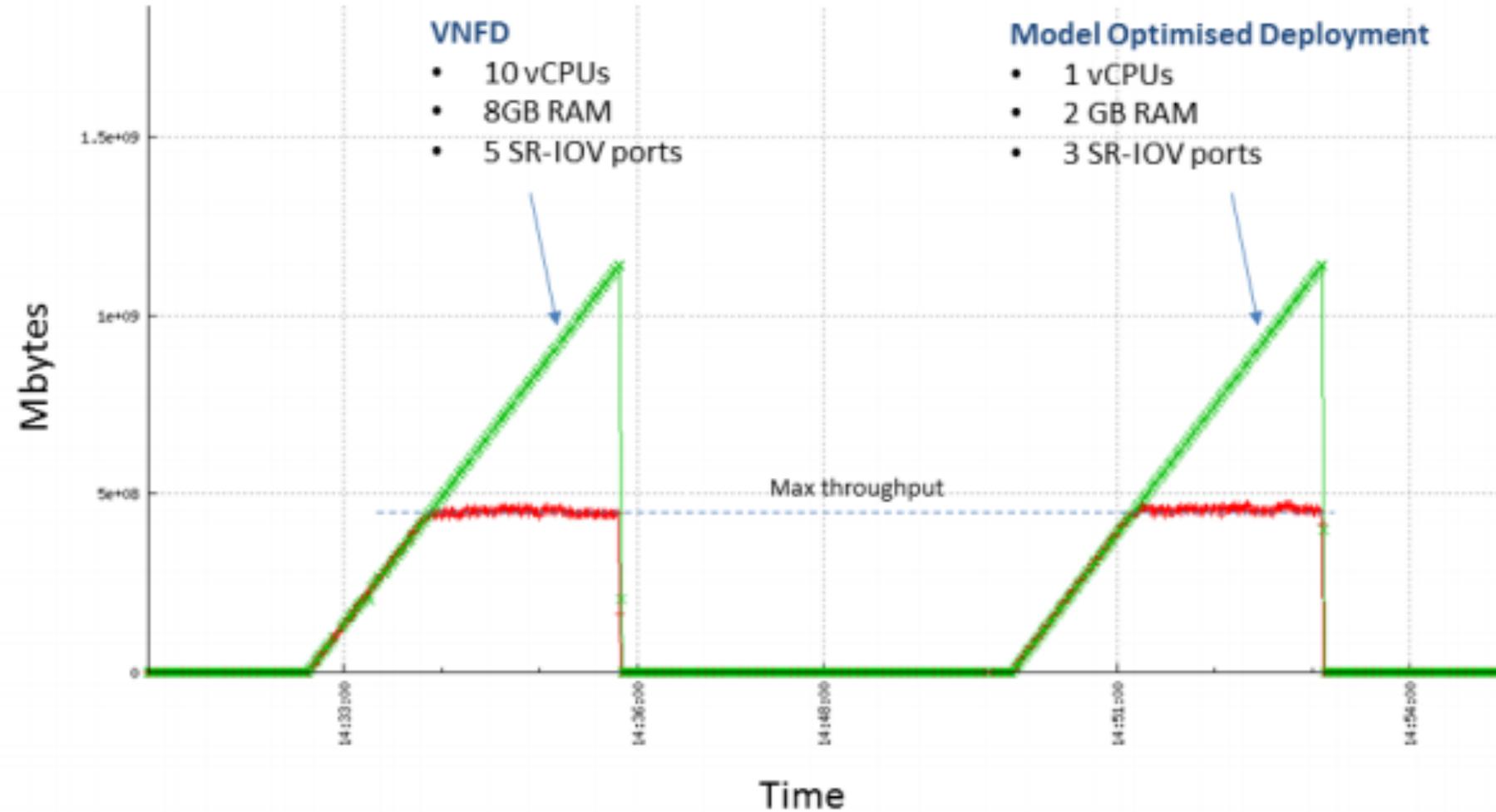
- **T** is the throughput for of the VNF;
- **N** is the number of variables taken into account by the analysis (in this case is 2 because the variables are the vCPUs and the RAM);
- **w_i** is a weight assigned to each resource by a service provider (the sum of all w_i is equal to 1);
- **R_i** is the number of units of resource i allocated in the configuration (this is subject of a min/max normalization with respect the resource with higher value, which in this case is RAM).

$$E = \frac{T}{\sum_{i=1}^N (w_i \cdot R_i)}$$

Decision Tree – Bottom-Up



EPA Deployment Results



Conclusion

- Optimized Deployment achieves same results, but with **significant savings on resource allocation**.
- **Machine Learning** enhances the automatic deployment of VNFs in complex (SR-IOV, DPDK) environment.
 - Multiple input types improve the system's intelligence.
- The VNFD is the current industry approach to approach automated deployment:
 - No account for resource under-utilization
 - Limitation from an Orchestration Perspective
 - Does not cover sufficiently EPA issues (SR-IOV, DPDK, etc.)
- SFC still remains to be properly addressed and how EPA interferes with it.



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Next steps

- Comments and feedback are more than welcome!
- Propose an Internet-Draft on NFVRG
- Further experiments with more technologies.
- Aim for a complete automated functional framework ETSI compliant and industry friendly.



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Thank You !
Questions ?

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