

# NFV Data Center Research - a call for participation

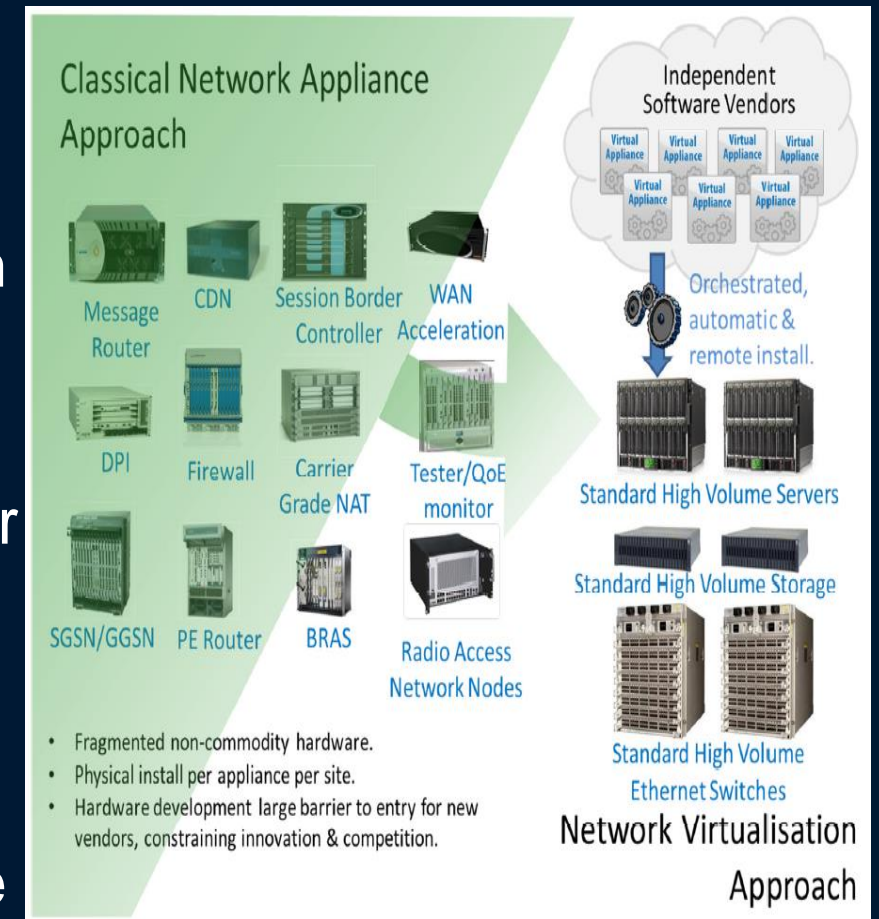
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# NFV Data Center Research

- Data centers will be deployed to deliver virtualized network functions
- Network functions can be processed in VMs in such data centers
- Migrating network functions to software executing on data centers can help reduce capex and opex for network operators and service providers
- Typical data center research has focused on compute, storage and energy constraints
- Data center performance research needs to explore network constraints as well



# Typical Use-cases – IaaS – Infrastructure as a Service

- IaaS service provider that owns data center resources can provide such services for different service providers
  - Resources need to be provisioned adequately for all service providers
- Can explore joint optimization along different resource constraint vectors to deliver IaaS
- Explore task elasticity / delay tolerance of workloads to optimally use resources
- Data center resource management needs to be performed dynamically as utilization of resources can vary dynamically

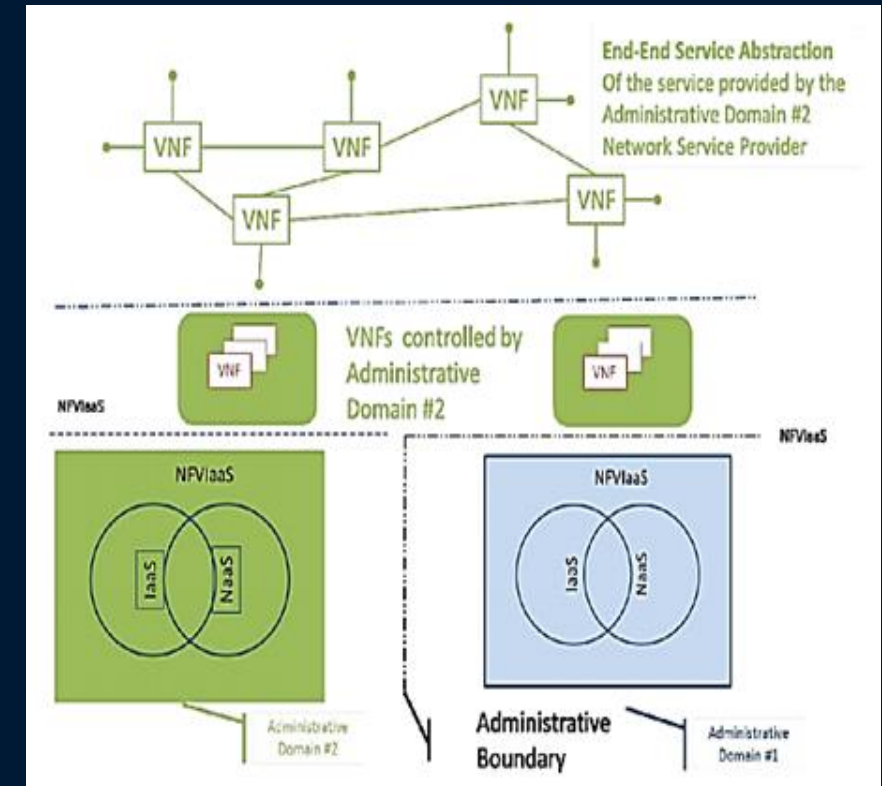
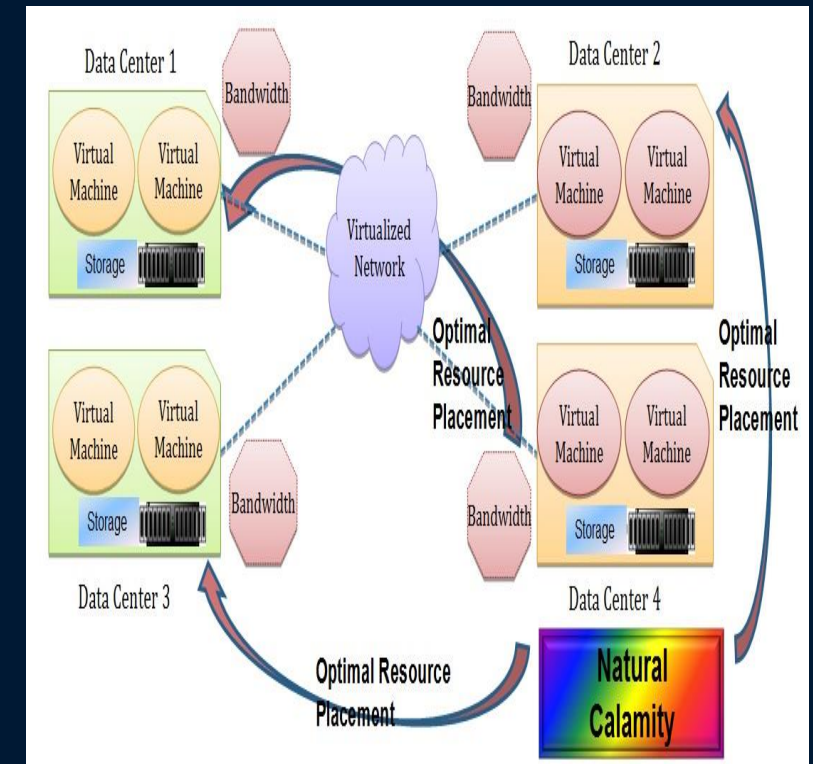


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## Typical Use-cases – Disaster management

- The IaaS use-case talked about the dynamic variation of the utilization of resources
- In the case of a disaster, the capacity of the resources in the system can itself vary due to the occurrence and nature of the disaster
  - Capacity related to Compute, Storage, Energy availability, Network bandwidth/availability, can vary dynamically
- This requires the system to adapt dynamically to the available capacity as the system recovers over time
- Prioritization of utilization or resources, and migration of VMs need to be performed based on available capacity



## Typical use-cases – Content Delivery Networks

- VMs implementing CDN capabilities (vCDNs) can be deployed that can optimize delivery of viral content
- In addition to utilizing local storage for content, and reducing network bandwidth requirements by delivering content to multiple users, the number of VM resources can be optimized as a function of time to optimize for energy
- Dynamic information sharing related to viral content is useful for more efficient utilization of data center resources for vCDN support

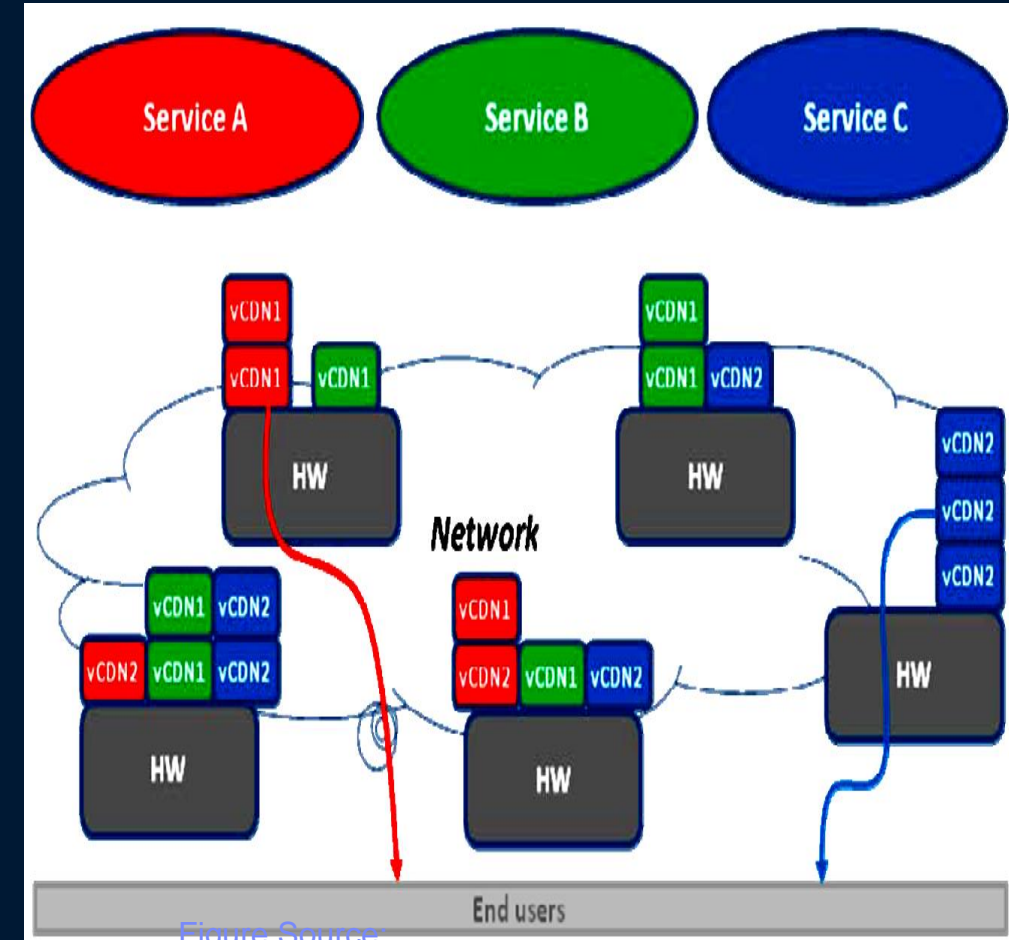


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## Open Interfaces for Dynamic Information Exchange

- Different components in NFV data centers and across such data centers utilize components from different vendors
- For optimal utilization of resources in such systems, open interfaces are desirable to exchange information regarding resource availability
- Resources constraints can be specified using policies or dynamic information exchanges between different components in the system
- Resource management solutions for placement and scheduling can be designed based on policies to begin with, along with further optimization based on dynamic variation and information exchange via open interfaces

## Collaborative call for participation

- Both academia and industry folks need to come together to foster such research and technology developments
- A new research group nfvrgr is being formed in the IRTF to pursue this area
- We request researchers to join together and participate in exploring and developing this area further
  - <http://trac.tools.ietf.org/group/irtf/trac/wiki/nfvrg>
  - <https://www.ietf.org/mailman/listinfo/nfvrg>
  - Chairs – Ram Krishnan (Brocade), Dilip Krishnaswamy (IBM Research), Diego Lopez (Telefonica)
  - First meeting at IETF meeting in Toronto
  - <http://www.ietf.org/meeting/90/index.html>
- NFV Data Center research will bring new dimensions to data center research problems - please join the fun!

## Key Collaborators (in alphabetical order of last name)

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Hidetoshi Yokota, KDDI



Thank you!

Questions?