Network Virtualization

By,

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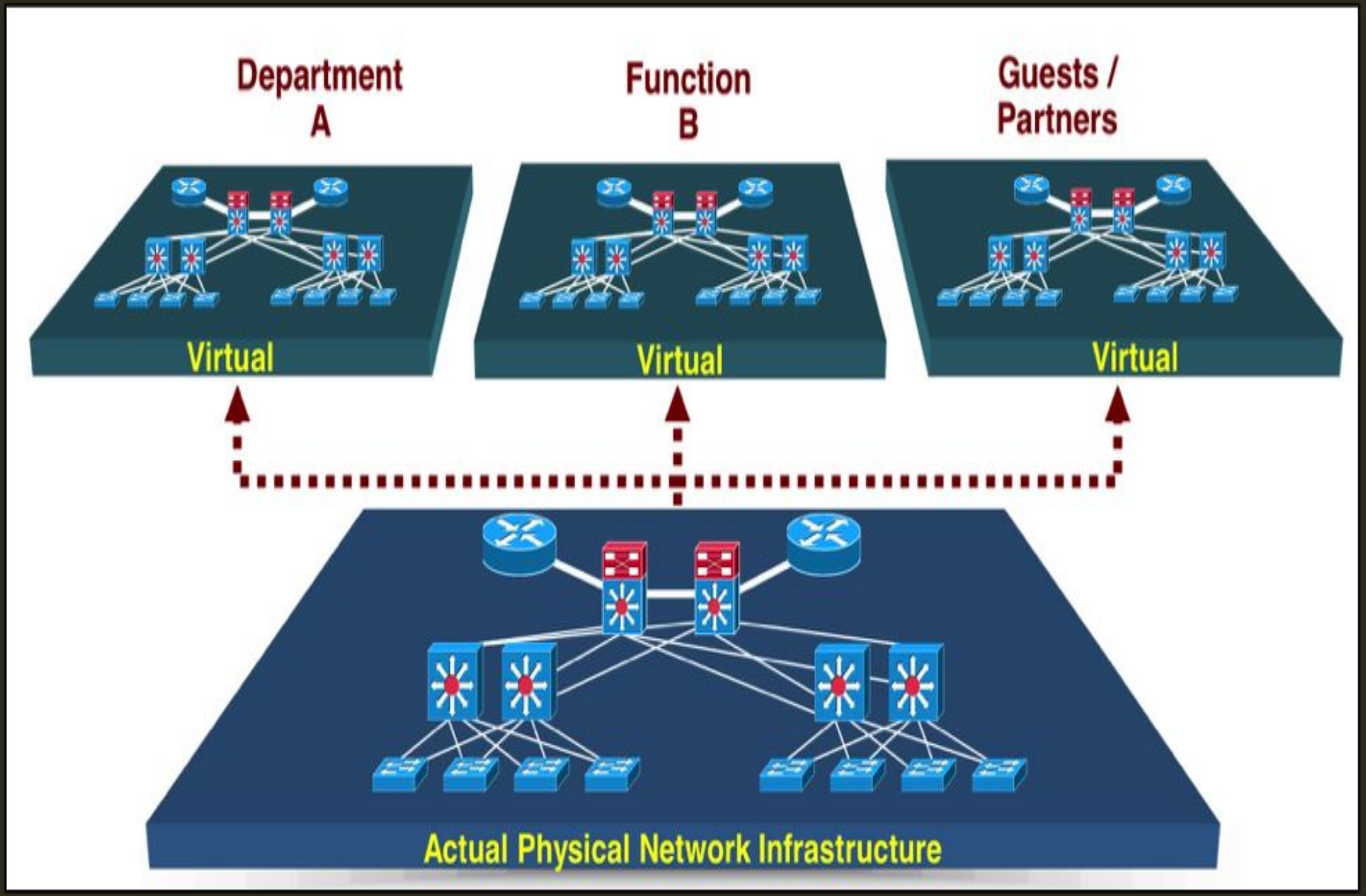
Network Virtualization ?

- It is the process of combining hardware and software network resources and functionality into a single, software-based administrative entity.
- Creating multiple virtual networks on a physical network.
- Each virtual network has a illusion as it is running as a physical network.
- Virtualizing a network divides the bandwidth into independent channels.


Department A
Function B
Guests / Partners
Virtual
Virtual
Virtual
Actual Physical Network Infrastructure

Need for network virtualization

- Service consolidation

Some services have minimum performance requirement or higher priority.

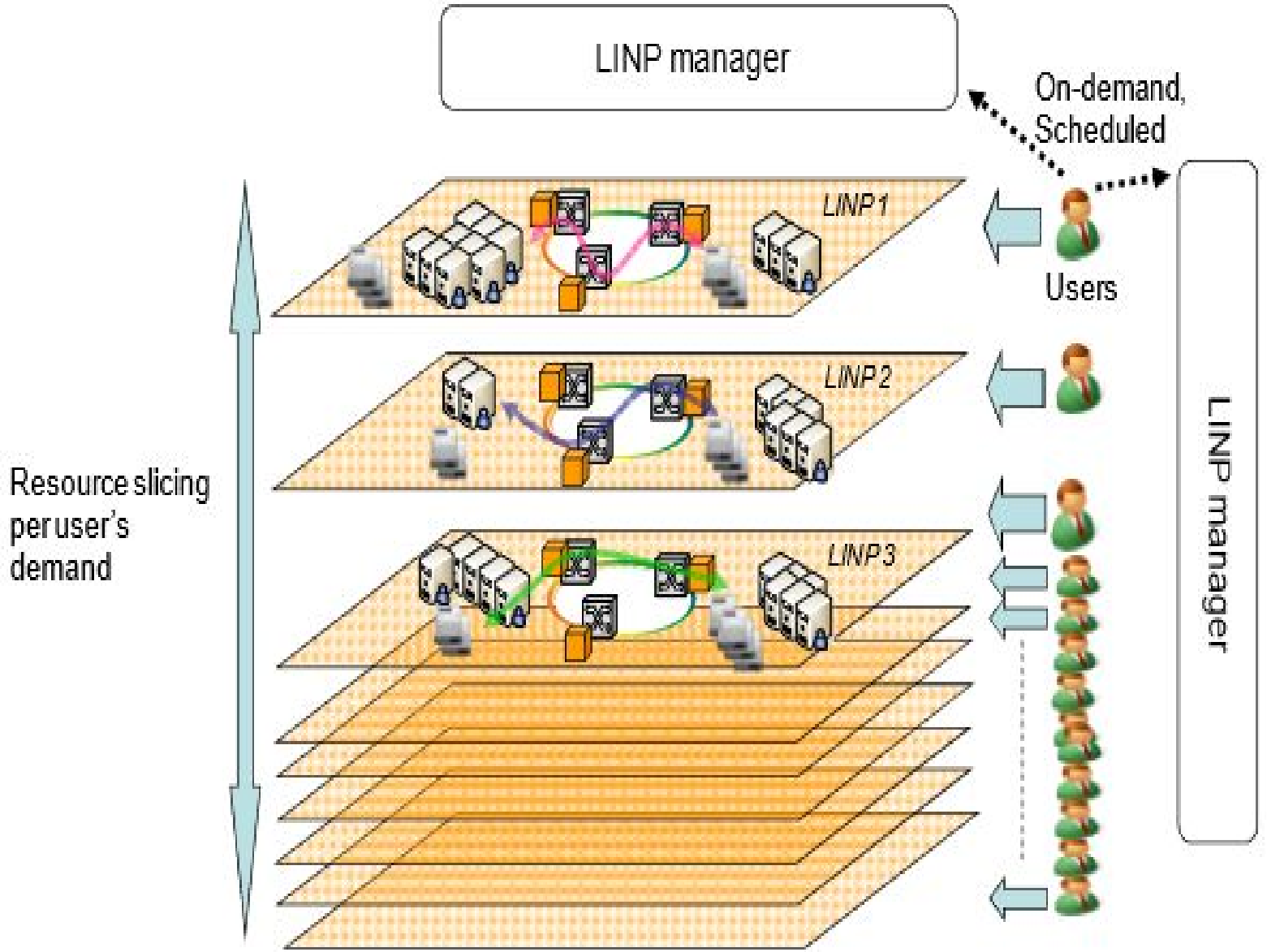
- Host consolidation

Users expect minimum performance level per virtual host.

- Network infrastructure

Network functions need high throughput, scalability and seperation.

Architecture of Network Virtualization



Features Of Network Virtualization

- Partitioning: Network virtualization allows creation of multiple logical network with a programmable control plane.
- Isolation : there is no interference among the virtual networks.
- Abstraction : Network abstraction allows hiding the underlying characteristics of network elements .
- Aggregation : Provide high performance resources for users by logically aggregating multiple resources into single resource

Network virtualization is categorized as

- External network virtualization: combination of multiple networks or parts of networks into a virtual unit.

- Internal network virtualization**:** Provides network-like functionality to software containers on a single network server.

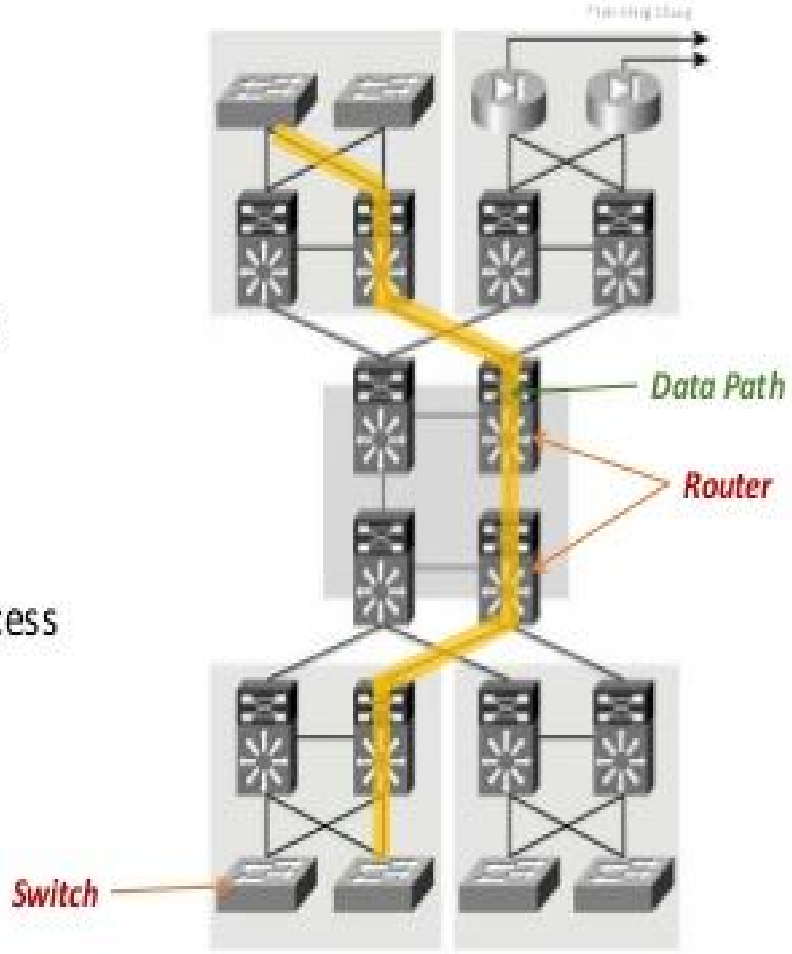
Network Virtualization is composed of two technologies

- NFV: It is an initiative to virtualize the network services and for designing, deploying and managing the network services

- SDN: It allows network administrators to manage network services through abstraction of higher-level functionality

Objects of network virtualization

- Device virtualization
  - Virtualize physical devices (nodes) in the network
    - **Data** Plane virtualization
    - **Control** Plane virtualization
    - **Management** Plane virtualization
- Data path virtualization
  - Virtualize **communication** path between network access points
    - **Links** virtualization



Advantages of network virtualization

- Infrastructure utilization:

Virtual network is shared between many different users or purposes and thus reduces infrastructure and energy cost

- Scalability:

Easy to extend resources in need, Administrator can dynamically create or delete resources.

- Agility:

Enables automation of network services establishment

- Security:

Increase data traffic isolation and user segmentation

Virtual network should work with firewall software

Problem that Network Virtualization Solves

- Slicing the network

For private, public and hybrid cloud

Flexible network configuration

- Stretching the network

Across the racks within datacenter

Exchange of data b/w private and hybrid cloud

- Automation and orchestration

Coordination across all the resources including network, storage and compute

Goals of Network Virtualization

- Flexibility: topologies ,routing and forwarding architecture, independent configuration.
- Managebilty :separate policy and mechanism
- Scalability :maximize number of co-existing virtual networks
- Security and isolation :isolate both the logical networks and the resources.
- Heterogenity :support for different technologies
- Programmability :programmable routers

Drawbacks of Network Virtualization

- Problem in transaction between virtualized and physical network.
- Security issues.
- Limited racks and Virtual switches manageability problem.

Conclusion

Network virtualization technology has evolved from virtual local area networks (VLANs), VPN, active programmable networks, and overlay networks.

Network virtualization comes with plenty of benefits such as cost savings, rapid provisioning and scalability.

Products such as VMware vShield, vSphere vNetwork switches and Cisco Systems Nexus 1000V are involved in creating virtual networks

Thank you