Seamless Virtual Network

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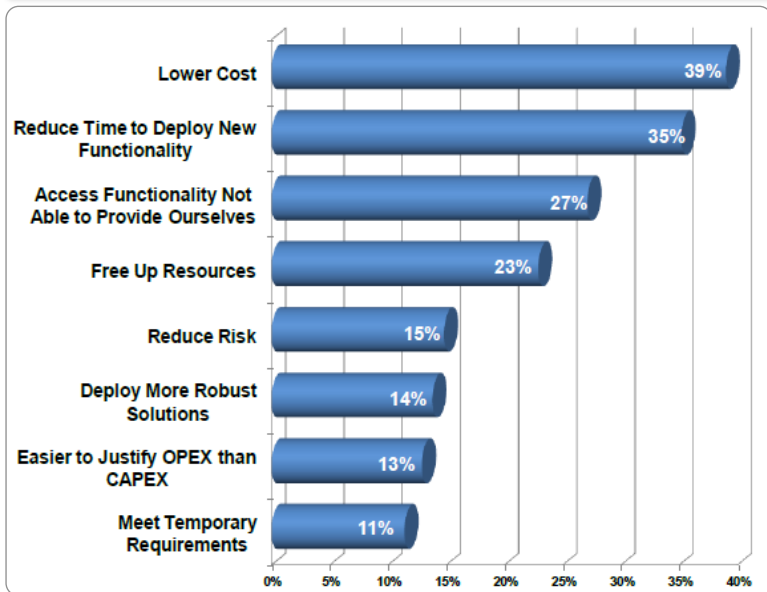
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Agenda

- Motivation

- Virtual Cloud Network Challenges

- Seamless Virtual Network

- Summary

Cloud Networking

Why Cloud Computing

Data from Webtorials "The 2011 Cloud Networking Report"

Cloud Computing demand Flexible Networks

- High speed access from a large number of servers
- Changes in the traffic model

➡ **Scalable**

- Large scale VM migration
- Efficient resource utilization

➡ **Virtualized**

- IP and SAN convergence

➡ **Converged**

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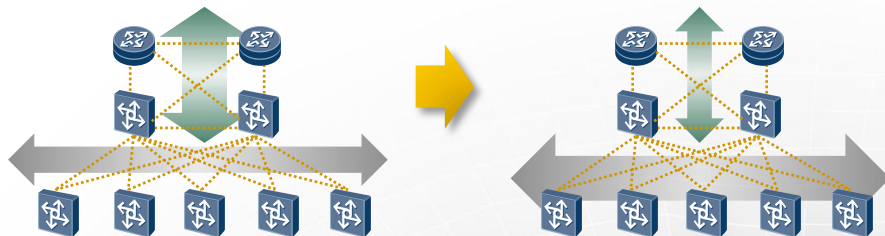
Changing Traffic Models

Communication between servers requires a non-blocking network

- Parallel computing, 3D rendering, and search services require collaboration between server clusters, resulting in a large amount of east-to-west traffic.

- VMs need to synchronize a large amount of data in real time to support flexible deployment and dynamic migration.

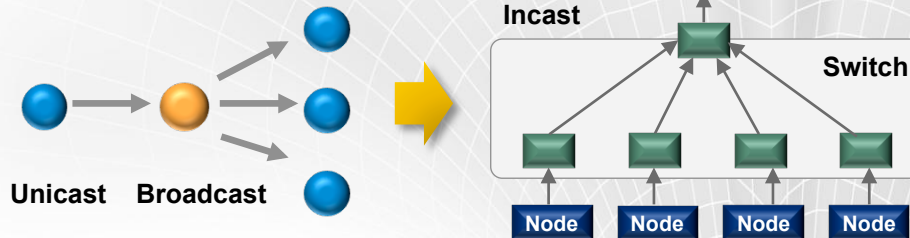## Incast model requires a dynamically deployable large buffer

- In collaborative computing, multiple nodes in a cluster send TCP data to the master node simultaneously.

- This multipoint-to-point communication causes traffic bursts and congests the network.
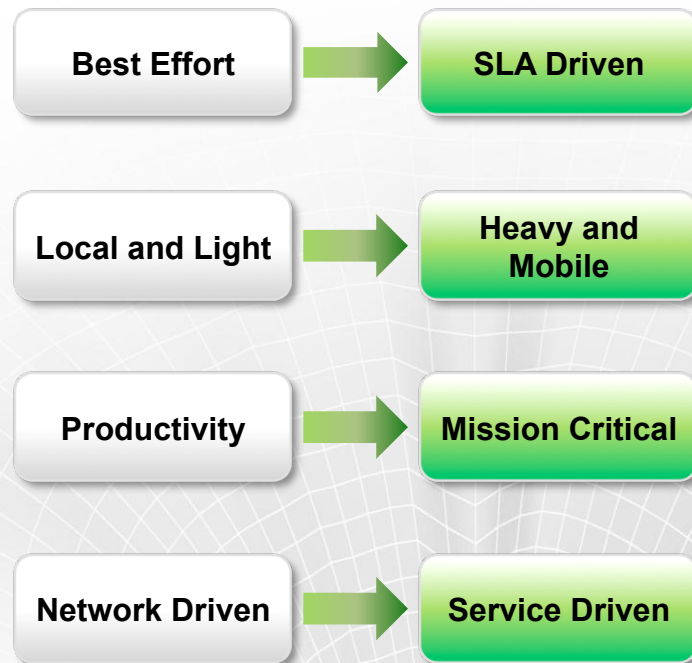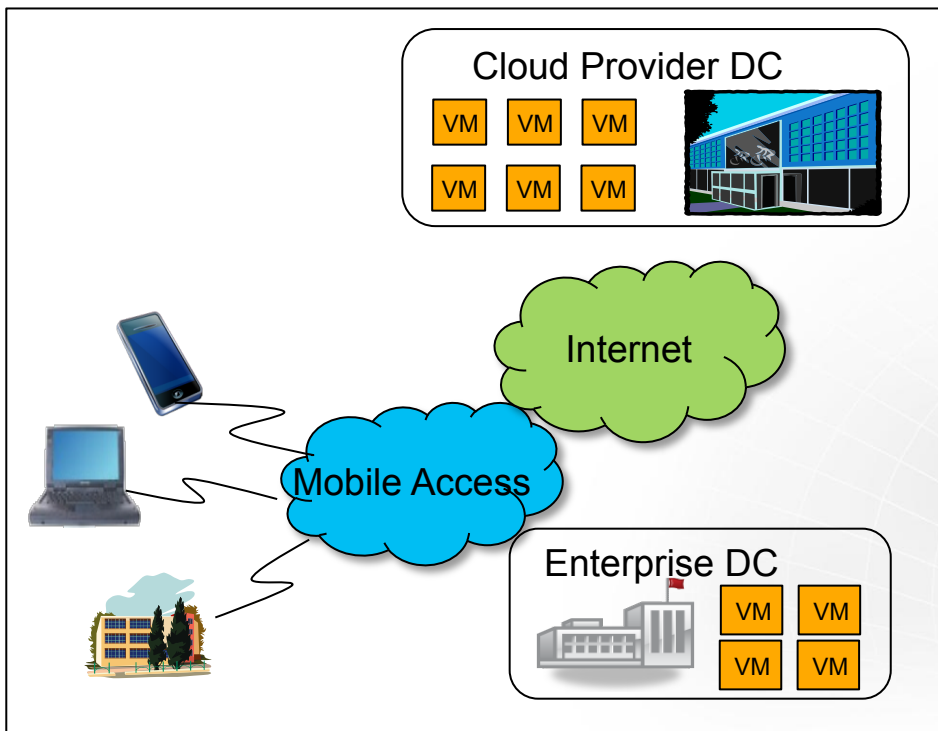
East-to-West Traffic

Gartner predicted that east to west traffic will account for 80% of the total traffic in a data center by 2014
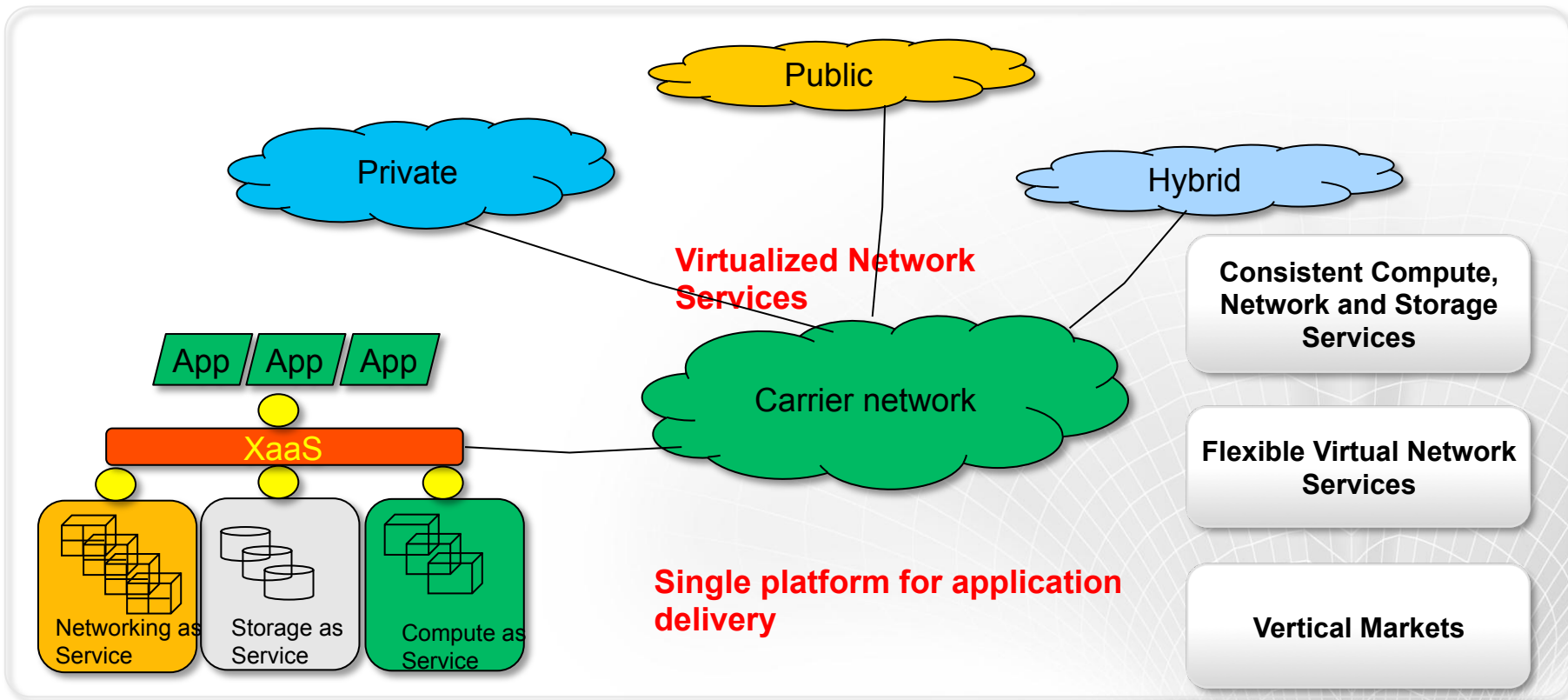
Incast Model

Unicast Broadcast

Parent
Incast
Switch
Node Node Node Node

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Service delivery: Changing Requirements

Best Effort	→	SLA Driven
Local and Light	→	Heavy and Mobile
Productivity	→	Mission Critical
Network Driven	→	Service Driven

Diagram labels: Cloud Provider DC, VM, Internet, Mobile Access, Enterprise DC, VM

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New Carrier Business Opportunities

Public

Private

Hybrid

Virtualized Network Services

App App App

XaaS

Carrier network

Consistent Compute, Network and Storage Services

Flexible Virtual Network Services

Networking as Service

Storage as Service

Compute as Service

Single platform for application delivery

Vertical Markets

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Interconnect Challenges

Carrier DC

Open Platform Services (OPS)

VNC App

VNC Service

PNC   PNC   PNC

virtual network

OpenStack   Cloud Provider DC

VM VM VM
VM VM VM

OpenStack   Cloud Provider DC

VM VM VM
VM VM VM

Open Platform Services

Network Orchestration

Virtual Network as a Service

Interconnection

SLA's

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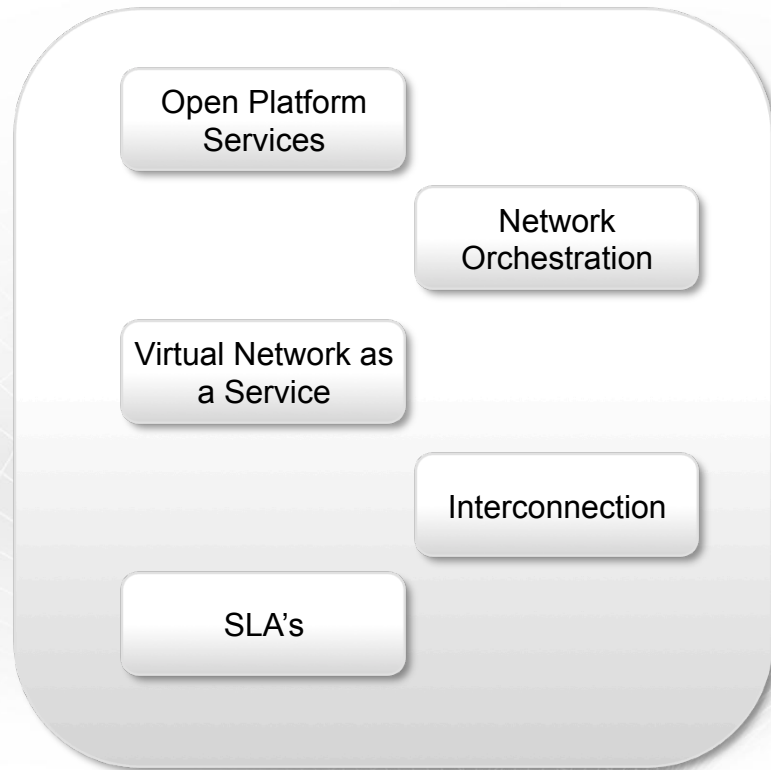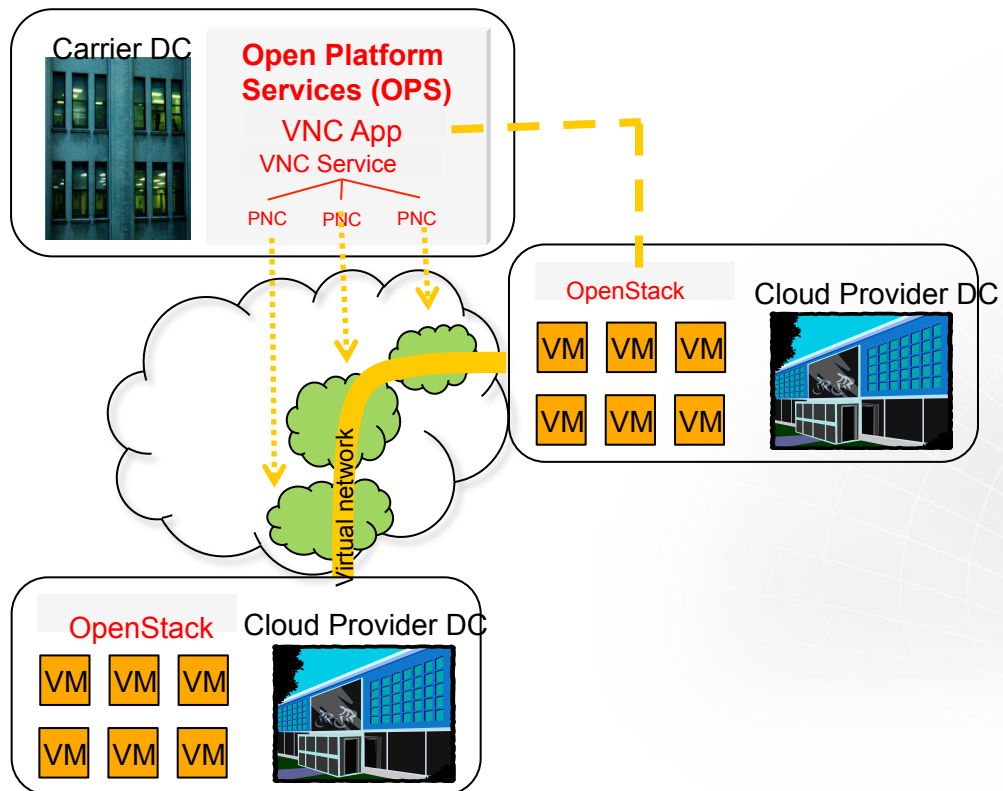
Efficient Bandwidth Utilization

Key Challenges

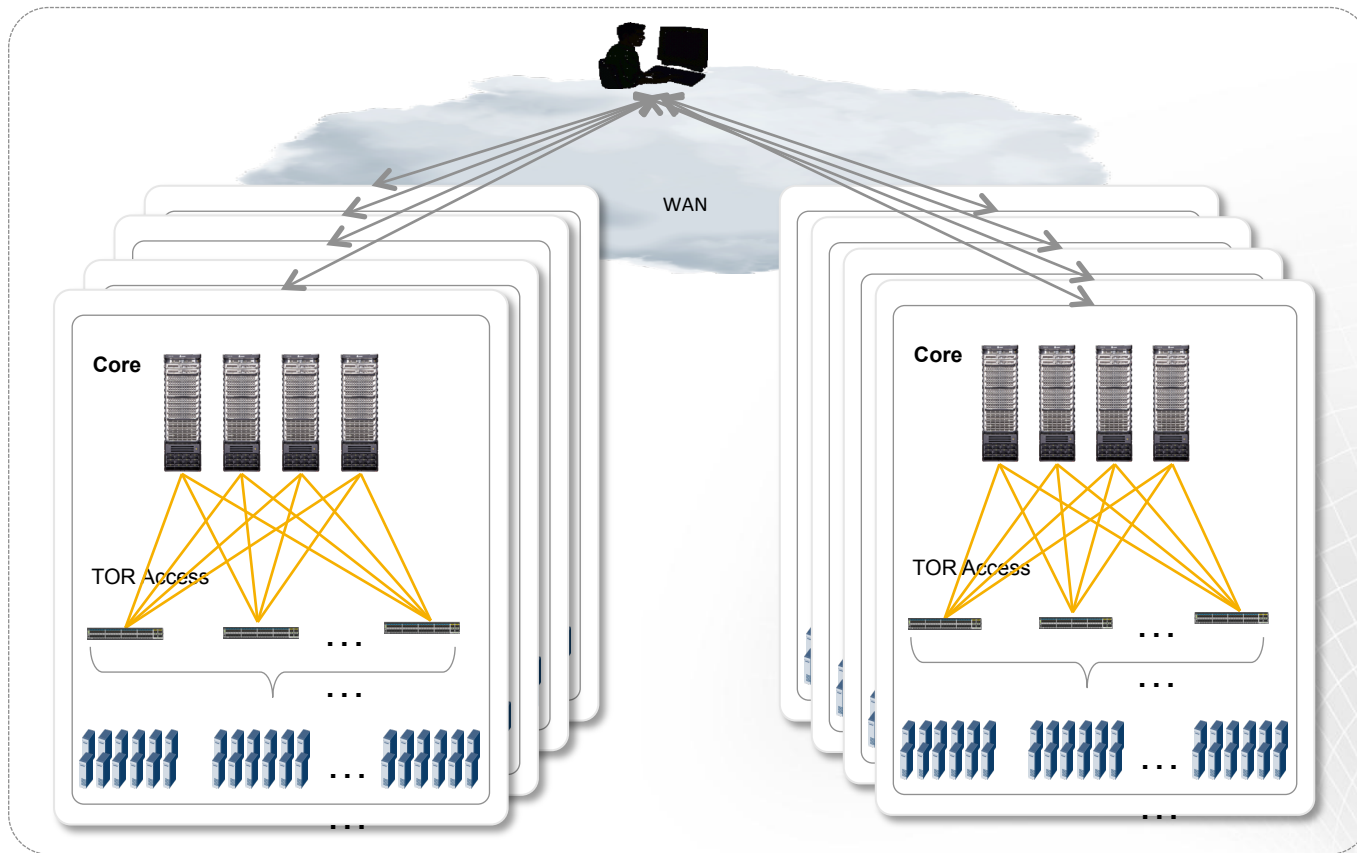- Utilization and optimization of bandwidth
- Usage of all available paths
- Optimal resource usage
- Efficient host to host forwarding
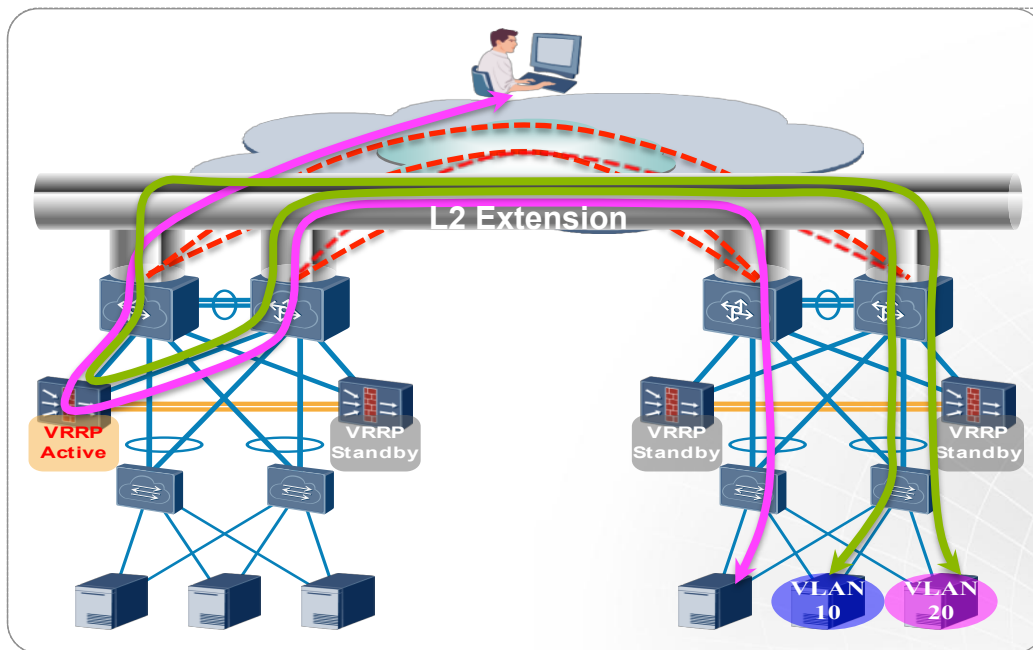
Unified OAM and Orchestration

Key Challenges

Orchestration and management of large scale resources

Optimization of resource usage
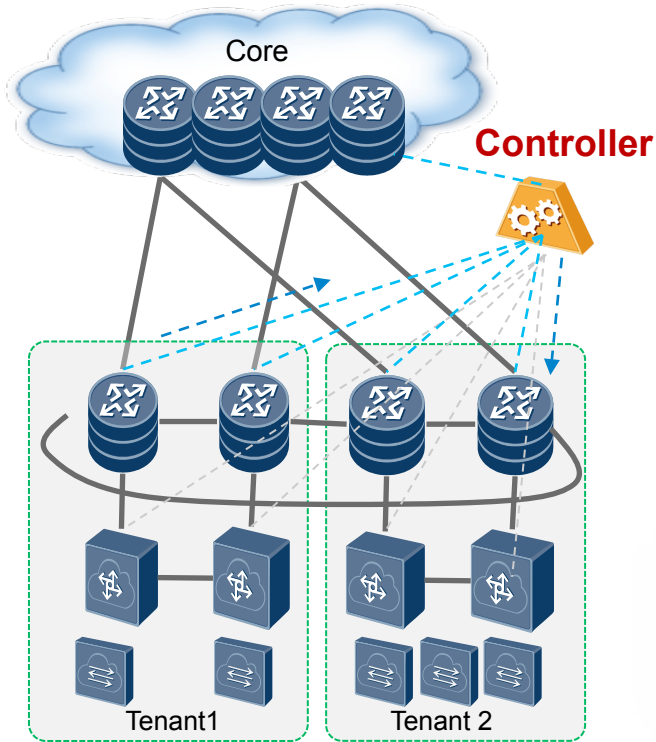
Detection and Diagnosing the problem

Ability to roll out new services

Seamless integration

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What is Seamless Virtual Network

Open Cloud Fabric

Traffic Steering

Resource Utilization & Management

Virtualization

Service Oriented Networks

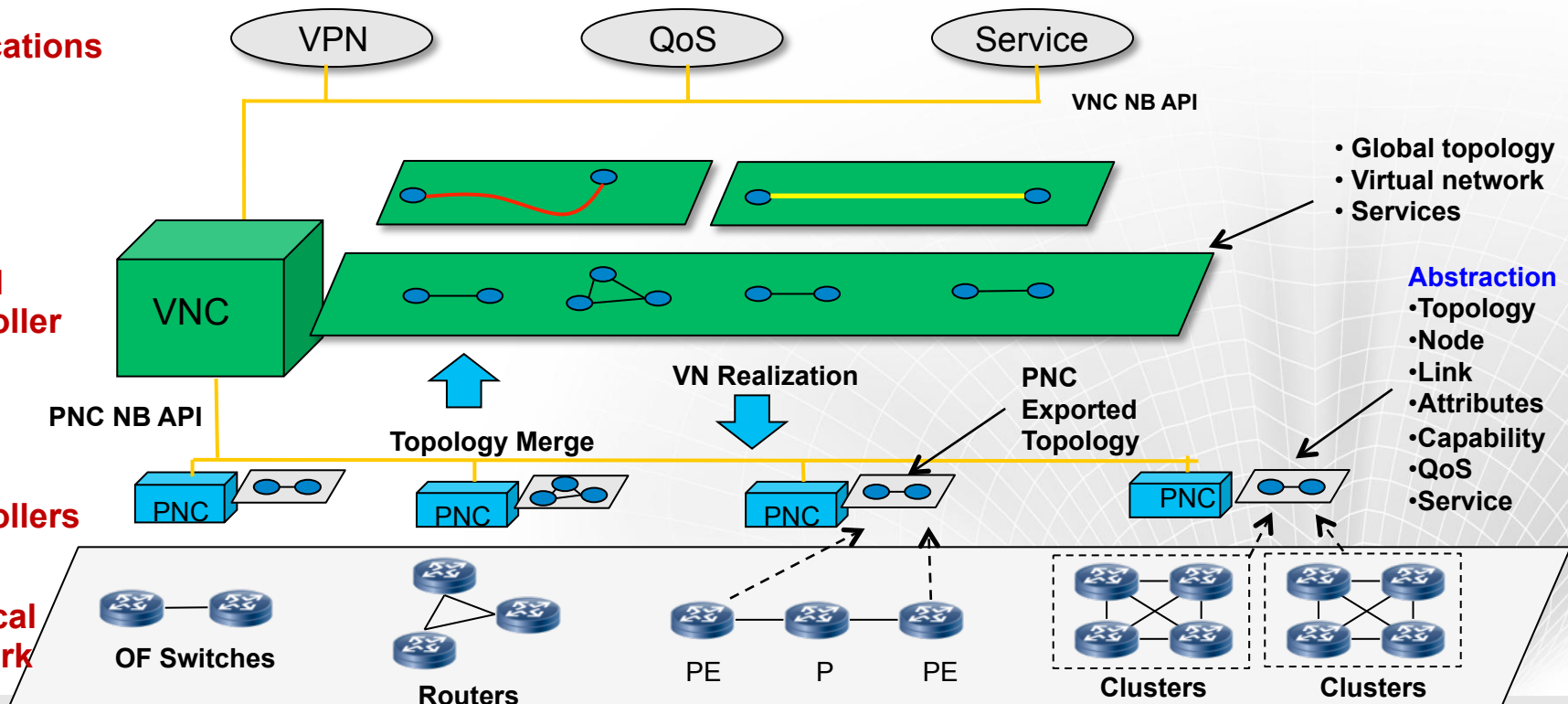Quality of Service

Network Orchestration and OAM

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Seamless Architecture

Traffic Steering with SVN

Traffic Matrix

T11	1G	10G	1G	2G
T21	1G	10G		
T31	2G	20G	1G	

Path Constraints

Tenant	Constraint	BW	Link Utilization
T1	N1Outlet	10G	<60%
T2	163	N1Outlet	10	-
	CN2	N2Outlet	20	<60%

Tenants Table

Tenant	Level	IP
T1	N	210.10.1.1
T2	VIP	210.11.1.1

Core

5 Data Analytics

OSS

2 BGP Routes

Controller

TE Path Computation **3**

1 Enable Add-path

4 Tenant Routes Forwarding based on Source (Tenant) + Destination IP

0

Tenant1

Tenant 2

Source IP

Tenant Classify

Tenant 1

Tenant 1 FIB

Tenant 2 FIB

Tenant 2
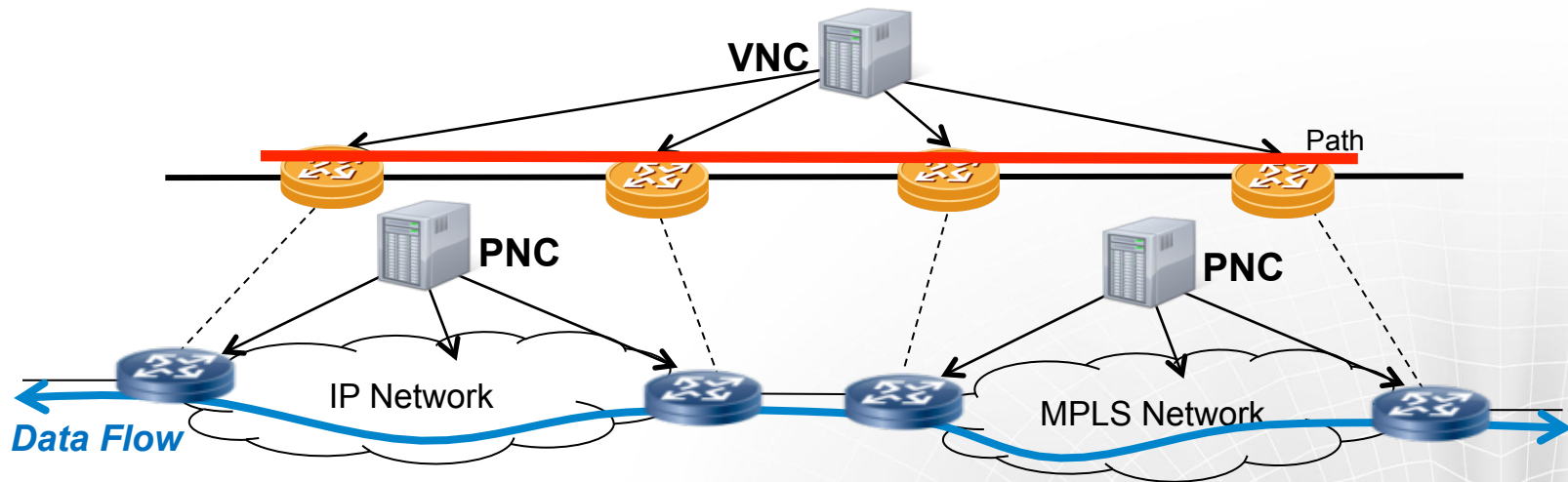
Tenant n

Tenant n FIB

Mis-Match

Default FIB

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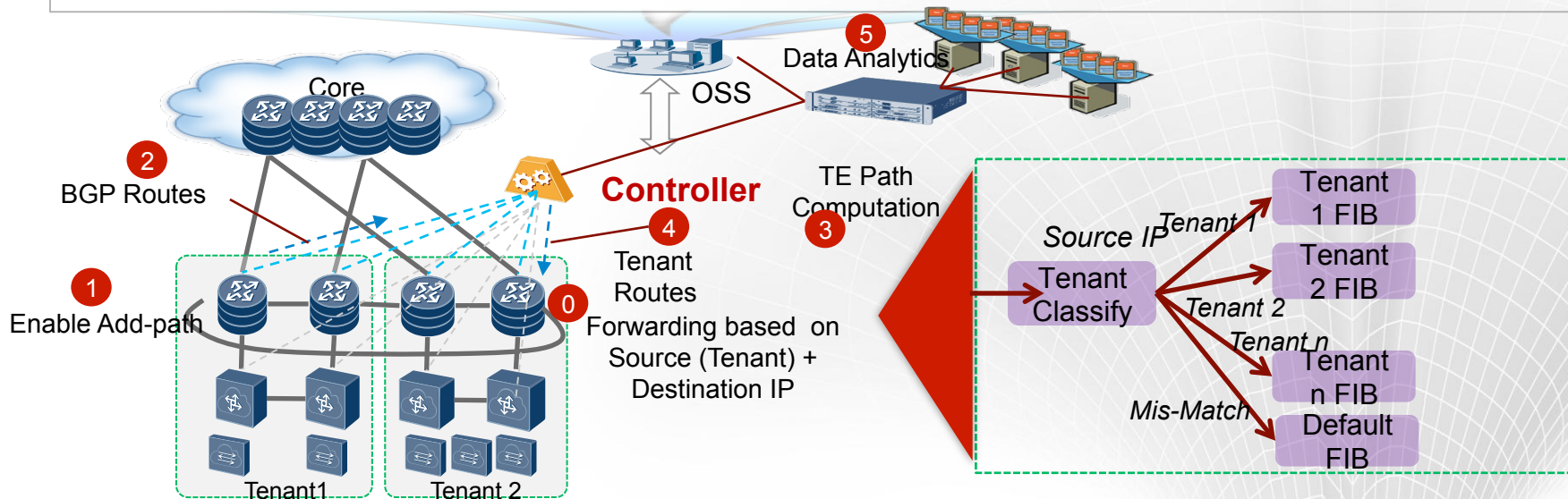
Virtualization of Physical Resources within SVN
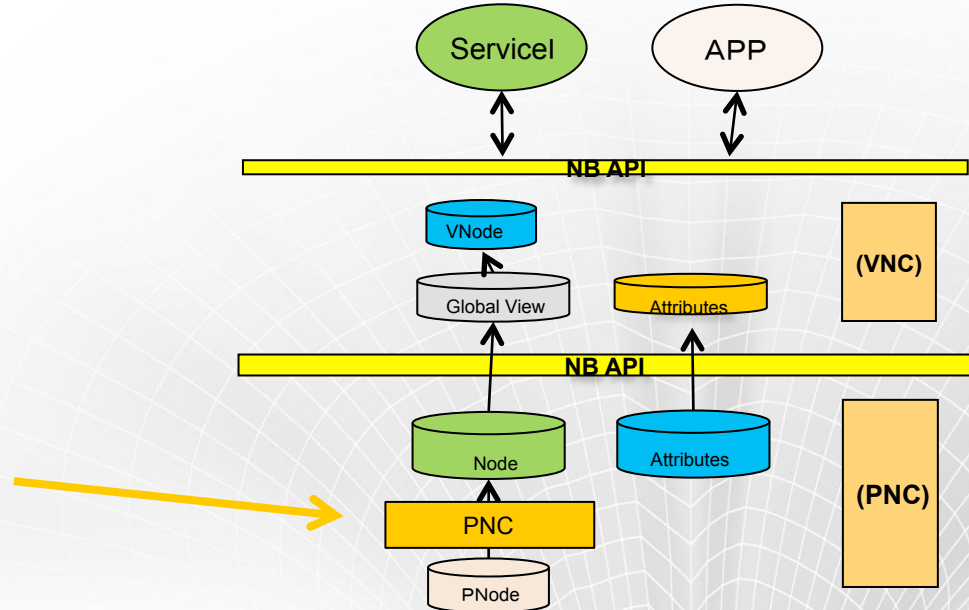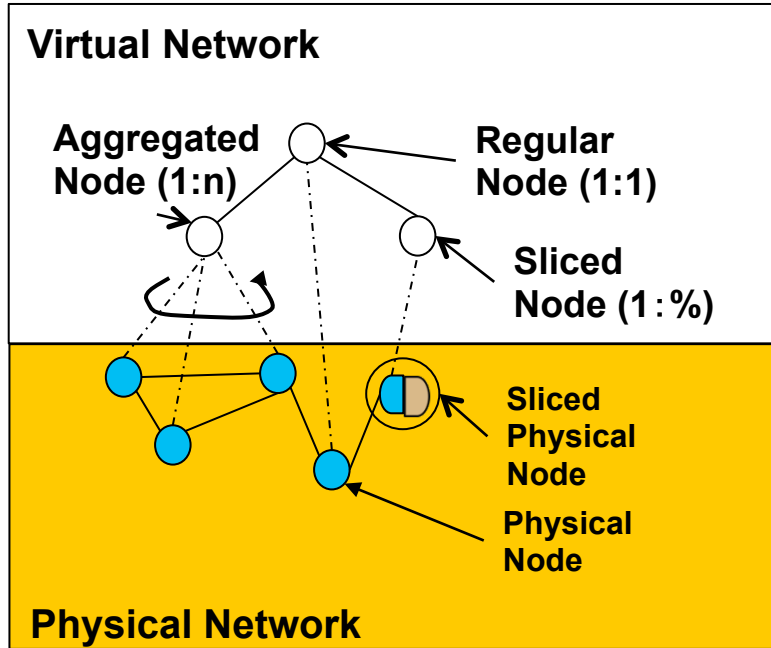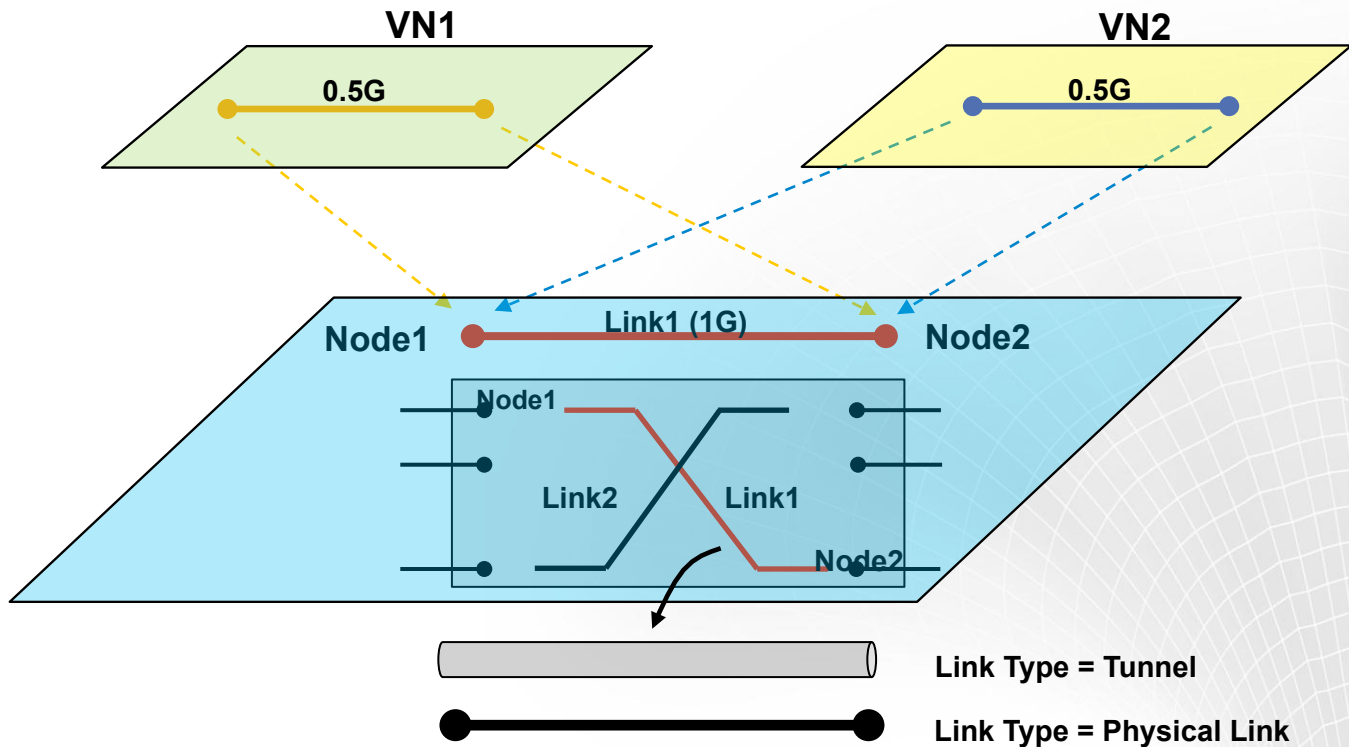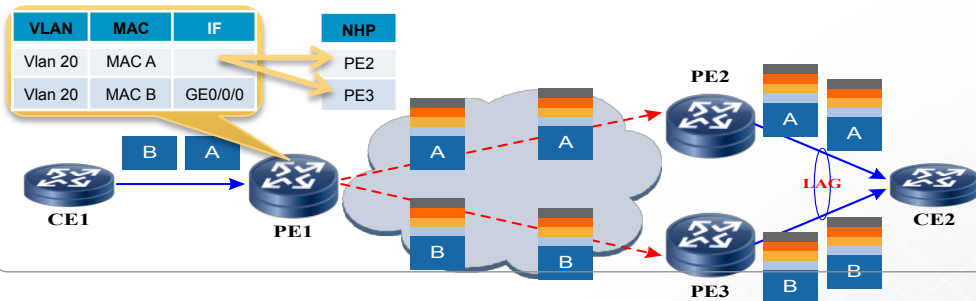
SVN Data Forwarding

- **Transparent underlying physical network topology**
- **Virtual Network Topology aware path configuration**
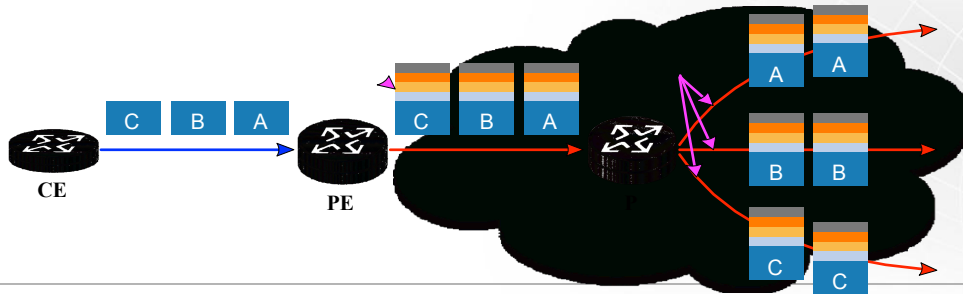- **Orchestration of Physical and Virtual network resources**

Quality of Service within SVN
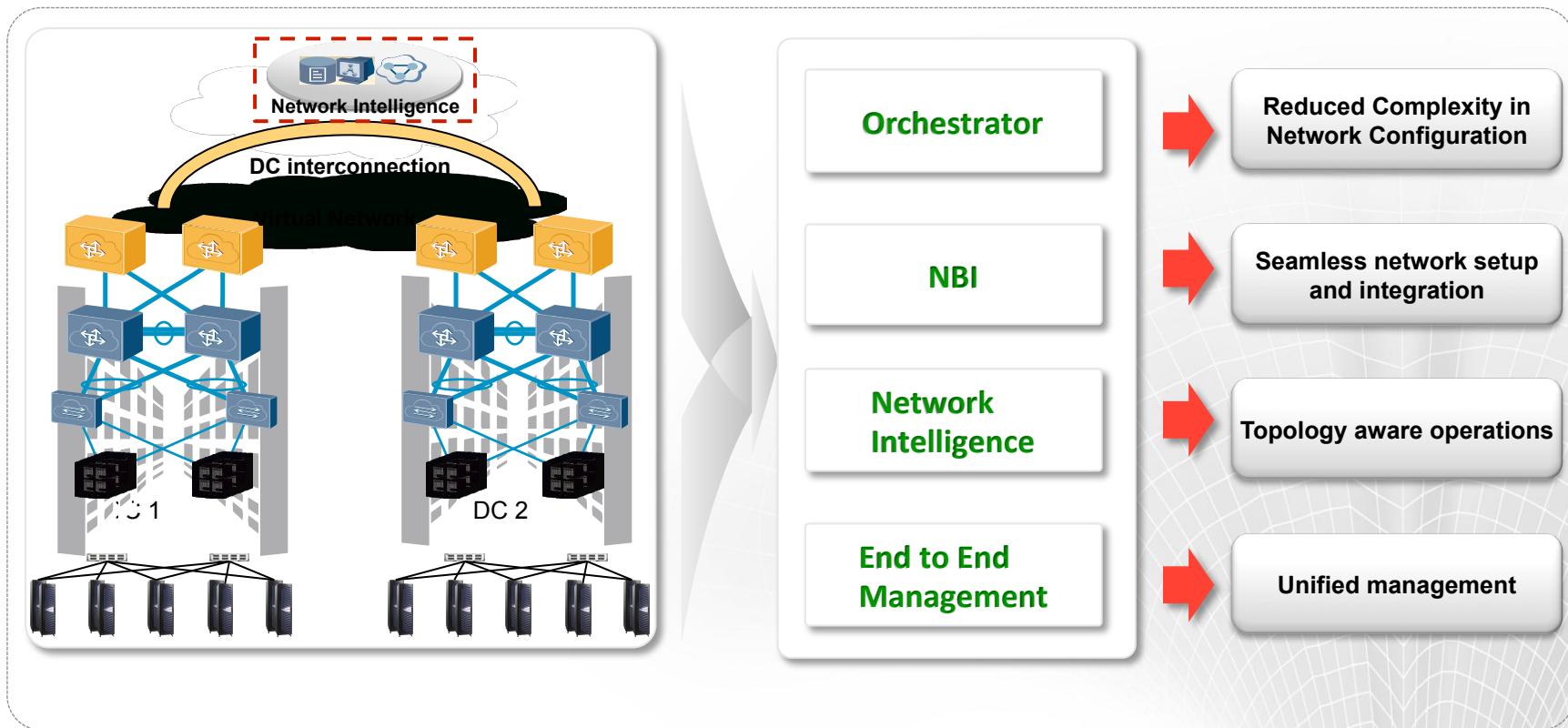
Bandwidth Utilization

- Flow Analytics
- Load-balanced paths.
- Improved link utilization

- Packet forwarding based on "MAC in UDP" Encoding
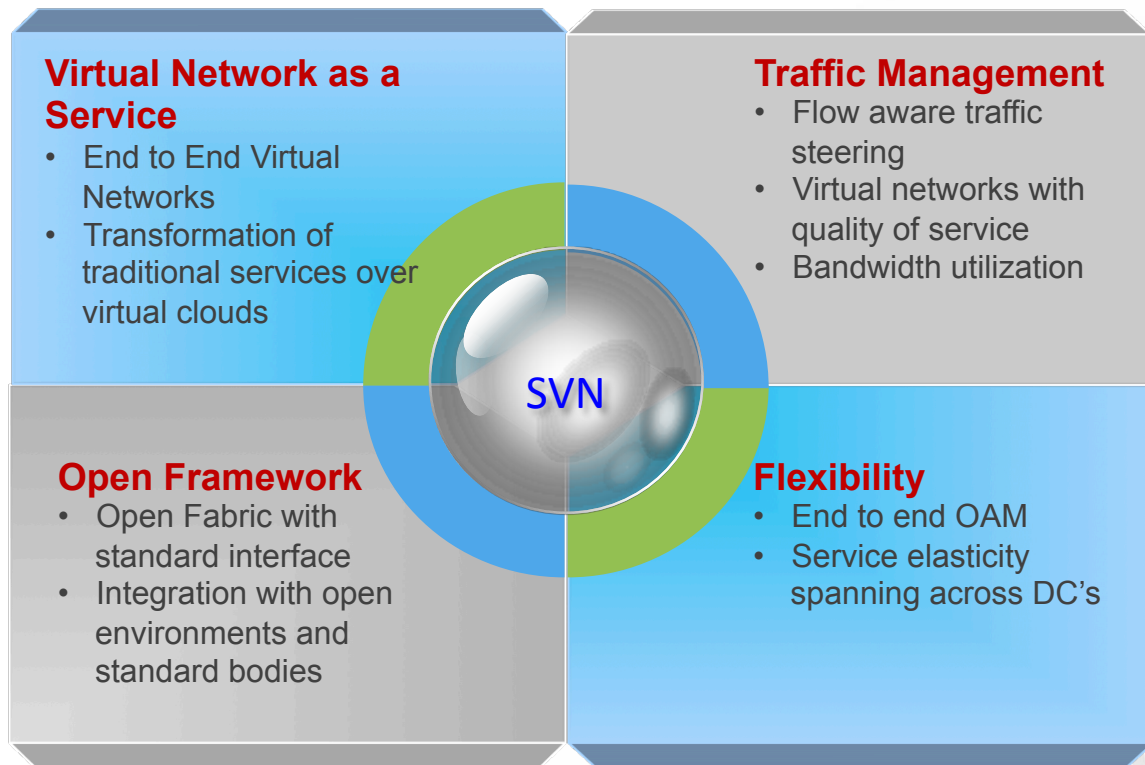- Support equal-route load-balance, improved link utilization

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Simplified O&M within SVN

Network Intelligence

DC interconnection

Virtual Network

DC 1

DC 2

Orchestrator	**Reduced Complexity in Network Configuration**
NBI	**Seamless network setup and integration**
Network Intelligence	**Topology aware operations**
End to End Management	**Unified management**

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SVN Benefits Summary

Virtual Network as a Service
- End to End Virtual Networks
- Transformation of traditional services over virtual clouds

Traffic Management
- Flow aware traffic steering
- Virtual networks with quality of service
- Bandwidth utilization

SVN

Open Framework
- Open Fabric with standard interface
- Integration with open environments and standard bodies

Flexibility
- End to end OAM
- Service elasticity spanning across DC's

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Thank you!

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