

# SDN & NFV: Driving The Information-Powered Network Operator

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**make** [transformation] **possible**

# A challenging landscape for network operators

## Business challenges

- Shift to consumption-driven model
- OTTs own revenues, networks own costs

## Operational challenges

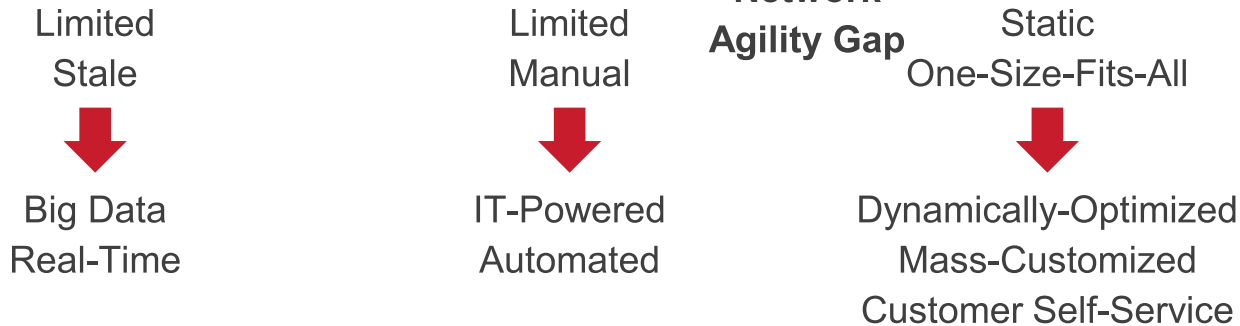
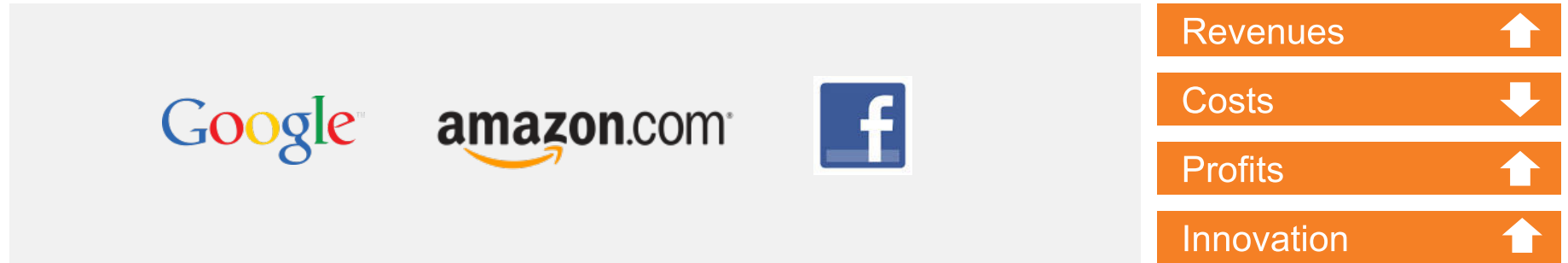
- Supporting on-demand & self-service
- Reducing capex & opex growth

## For network operators

- Rivals in the value chain are software-powered
- Solutions to operational challenges lie in software

**Assertion: software is the key**

# Speed-of-software businesses are information powered



# SDN & NFV: what are they really all about?



## A partial picture

- Move network control plane to software (SDN)
- Shift data plane hardware to COTS (NFV)

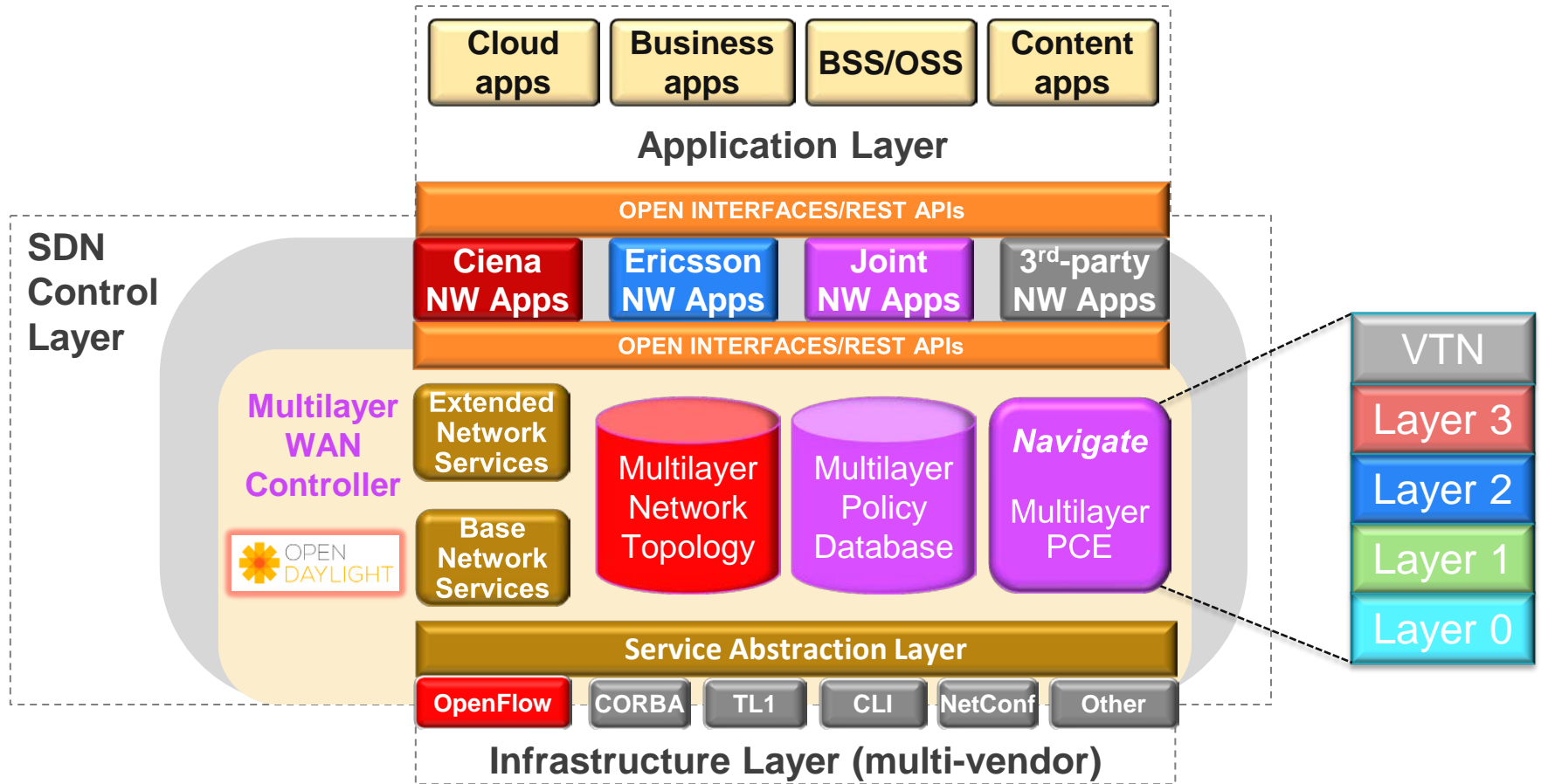
## The bigger picture

- Create an information-powered *decision plane* in software
- To drive a programmable data plane in hardware

## Decision plane

- Enables on-demand & self-service operations at scale
- Enables capex & opex compression: operations science meets automation

# Open control systems: leveraging OpenDaylight

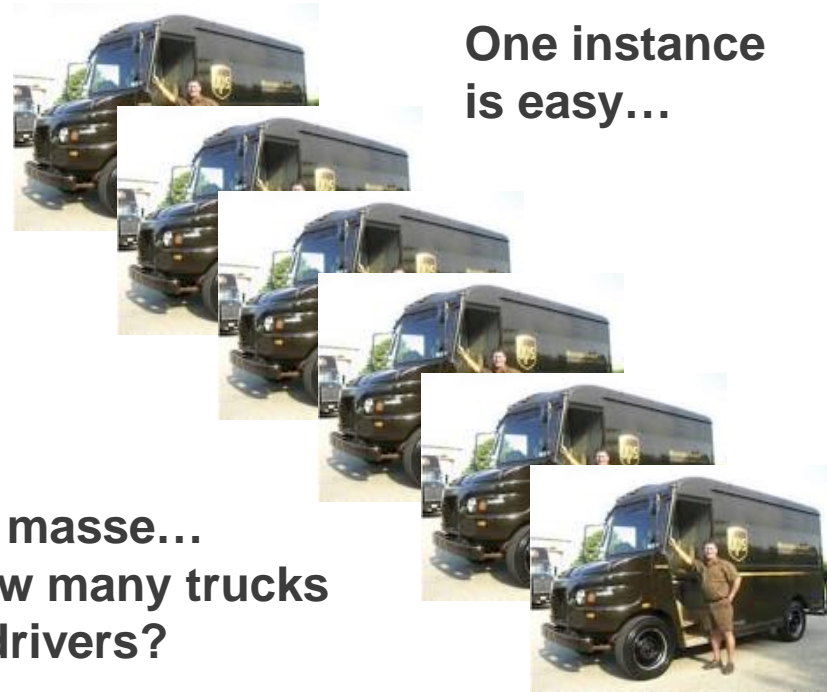


## Multilayer WAN Controller

- Built on the OpenDaylight open framework & platform
- Support a variety of southbound interfaces
- Provides network services via NBIs for SP and 3<sup>rd</sup> party app development

Information + policy + analytics = ... on-demand connectivity

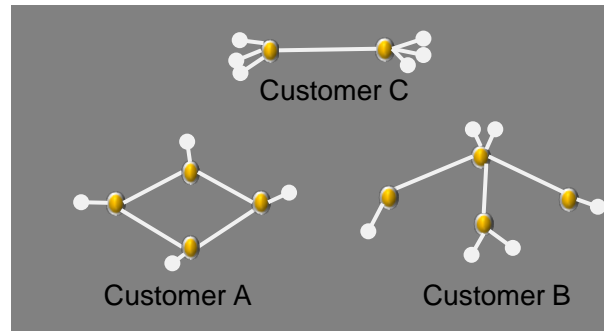
Wait ... isn't on-demand connectivity easy? (just service APIs, etc.)



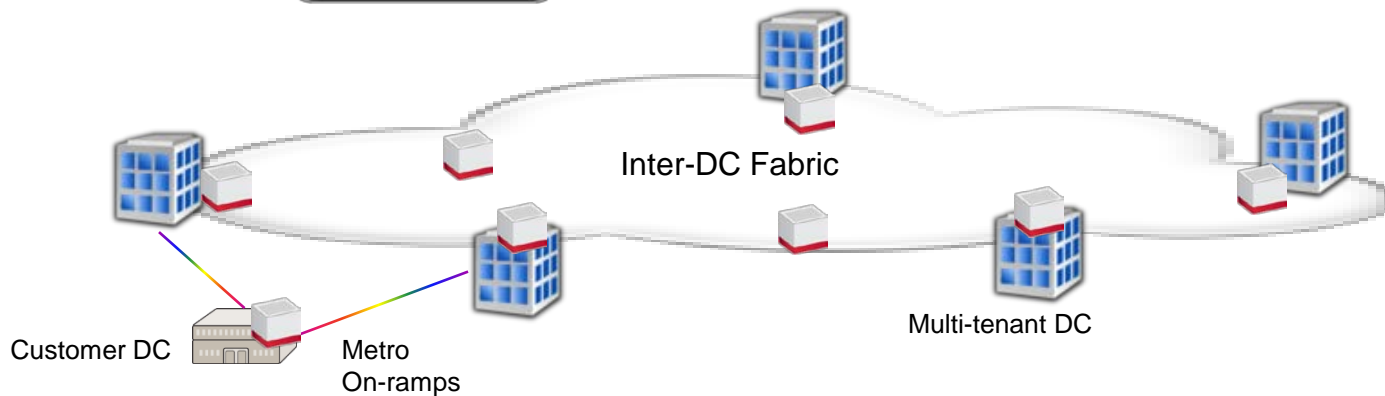
*At-scale & assured* on-demand is a decision plane problem

Of course the result should be easy to “consume” ...

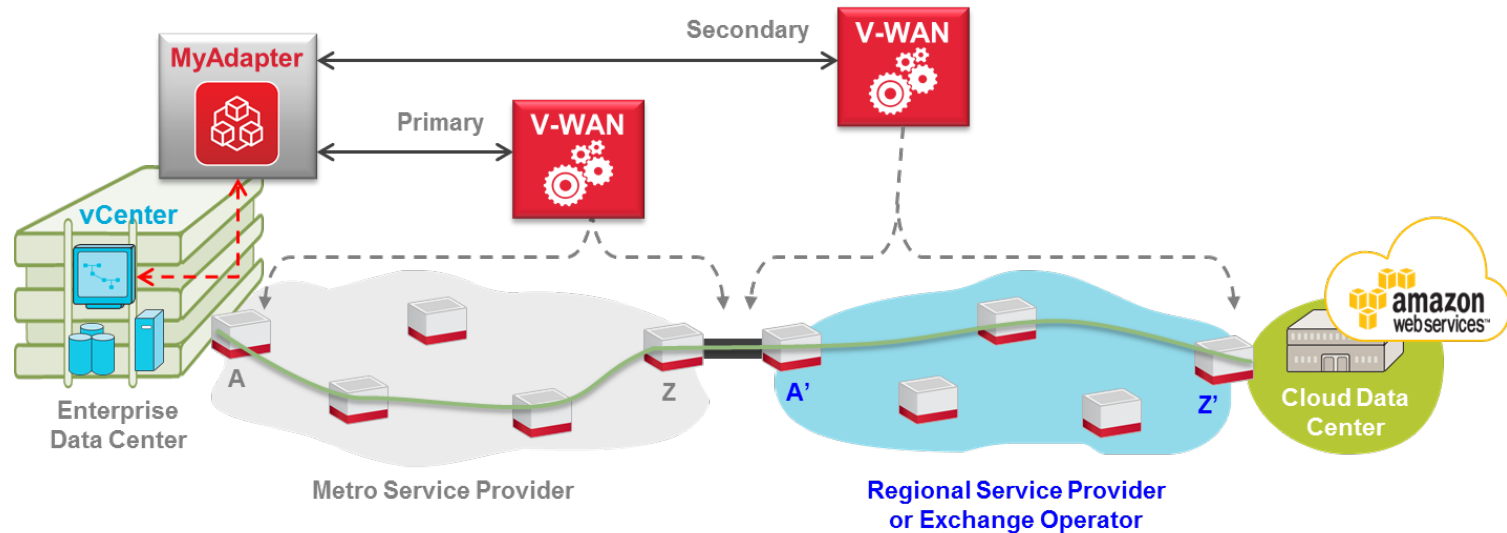
# Information + policy + analytics = ... on-demand NaaS



- V-WAN
- MyPortal
- MyAdapter
- MyPerformance
- MyAccounting
- MyAnalytics



# On-demand cloud bursting... in an open cloud provider market



## MyAdapter in enterprise DC

- Enables enterprise to connect to multiple cloud providers without dedicated connections – even to those not connected to their local metro provider
- Detects e.g., vMotion or *VM Import to EC2* events
- Orchestrates on-demand connections bridged across two networks

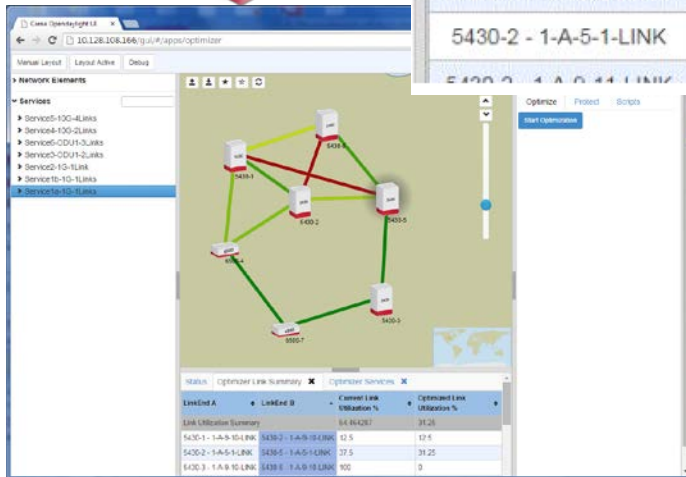


# Information + policy + analytics = ... network optimization



Optimize

Link Utilization Summary		Current Link Utilization %	Optimized Link Utilization %
5430-1 - 1-A-9-10-LINK	5430-2 - 1-A-9-10-LINK	0	100
5430-1 - 1-A-9-11-LINK	6500-4 - OTU2-Link-10509	100	0
5430-1 - 1-A-9-9-LINK	5430-6 - 1-A-9-9-LINK	12.5	12.5
5430-2 - 1-A-5-1-LINK	5430-5 - 1-A-5-1-LINK	31.25	31.25
5430-3 - 1-A-9-10-LINK	5430-3 - 1-A-9-10-LINK	100	0



# Now what about adaptation of business models?

## On-demand

- Enterprise trend toward ITaaS
- Network performance-on-demand: dynamic self-service

## A business model gap

- With dynamic self-service comes an expectation of pay-as-you-eat
- But providers still have to invest in infrastructure up front: an investment risk and timing gap

## Closing the business model gap: NFV helps

- “Consignment” models close the gap for providers ... they owe when and as they earn ... but problematic for vendors
- NFV may support “virtual consignment” models more palatable for vendors: but still issues to resolve

**These kinds of issues are moving to front and center**

# Agility Matrix: enabling Pay-As-You-Earn with NFV



## VNF MARKET

**BROCADE**

**CERTES**  
NETWORKS

**SPIRENT**

**BlackRidge**  
TECHNOLOGY

**silver peak**

vRouter  
TCP Cloaking Security  
Encryption  
WAN Optimization  
Performance Testing

High-demand virtual functions,  
assembled in cloud catalog  
Fast TTM with low TCO: quickly  
integrated, managed operational system  
Profitable Pay-As-You-Earn operations

## DIRECTOR

**openstack**

**ETSI**

Usage

License

OSS/BSS  
API

End-to-end virtual functions  
management: orchestration, download,  
distribution to hosts  
On-the-fly, per-instance licensing &  
metered retail usage  
Dynamic virtual appliance configuration  
and management

## HOSTS

Network

Carrier Cloud  
DC/CO

Enterprise

Multiple deployment options: X86 server,  
cloud, on-premise, CO, DC

# Agility Matrix – how consumption-based operation works

**BROCADE**

**BlackRidge  
TECHNOLOGY**

**CERTES  
NETWORKS**

**SPIRENT**

**silver peak™**

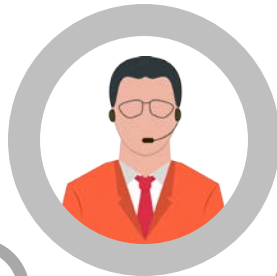
**VNF MARKET**

**4**

Director generates post-paid charging data records; VNF Market invoices provider and pays VNF vendor: Pay-As-You-Earn

**1**

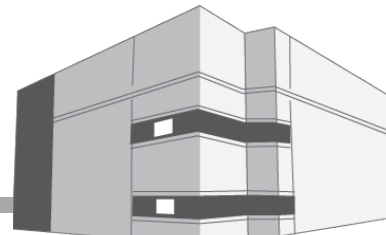
I click the VNF I need from the service catalog



**3**

My VNF is up and running!

**DIRECTOR**



Service Provider

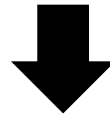
**HOST**

**2**

Director delivers the VNF to Host in the service path, generating license instance

The center of gravity is shifting

**Software-Defined Networking**



**Software-Defined Networking**

**Control Plane + Information & Policy + Analytics = Decision Plane**

## SDN & NFV: software for a consumption-driven world

**make** [transformation] **possible**