



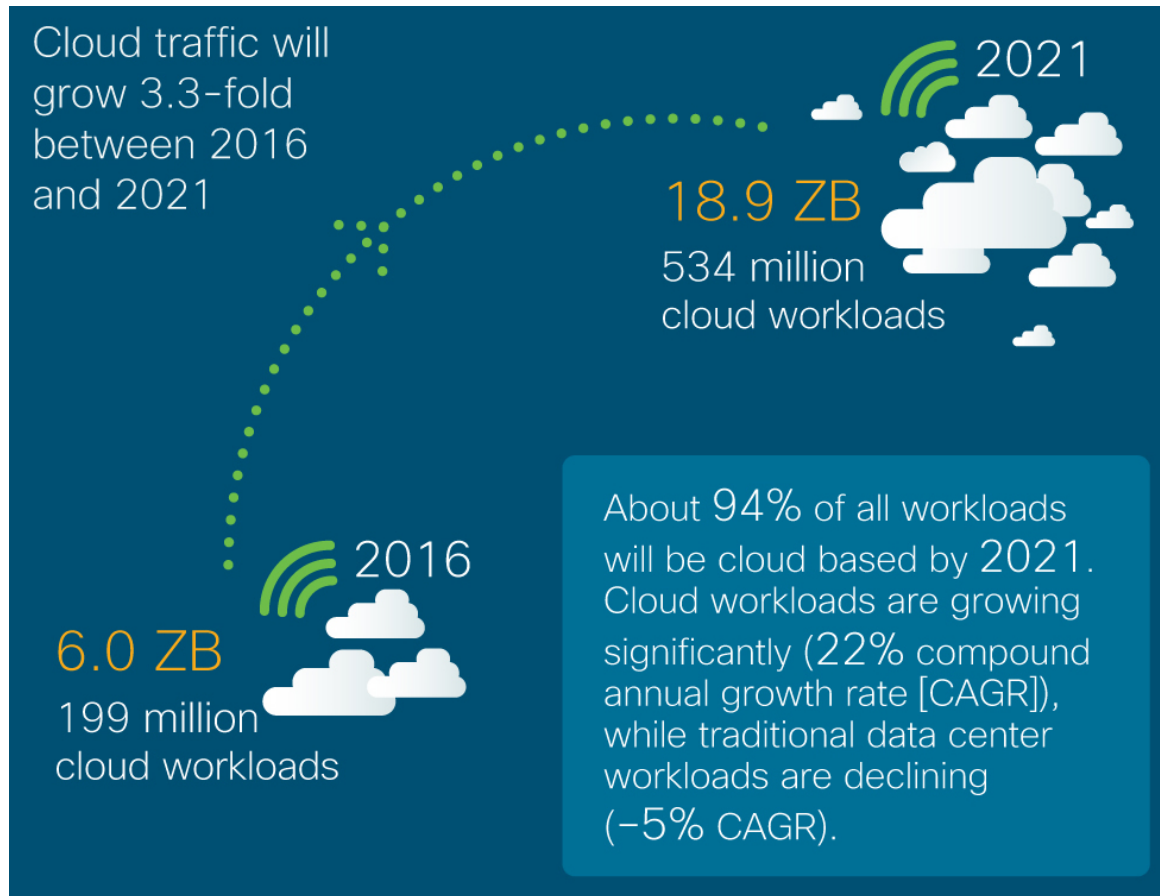
Security, Flexibility and Scalability in NG optical networks

Francesco Fucelli

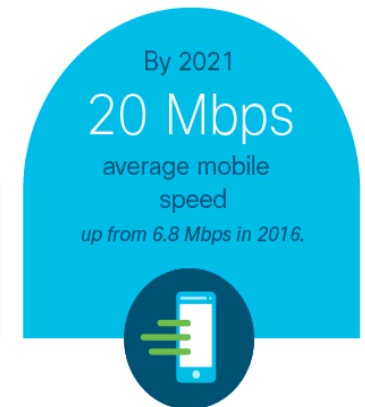
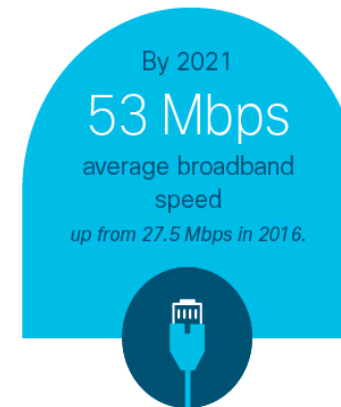
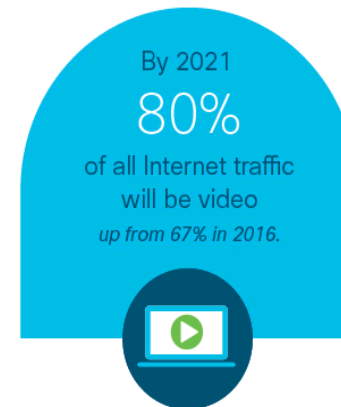
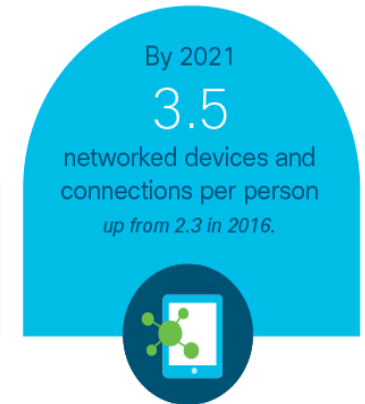
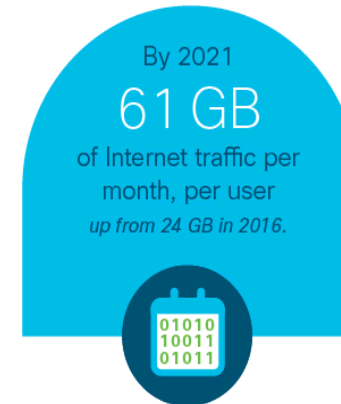
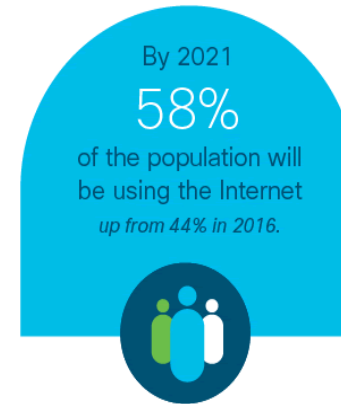
09.05.2018



The digital transformation



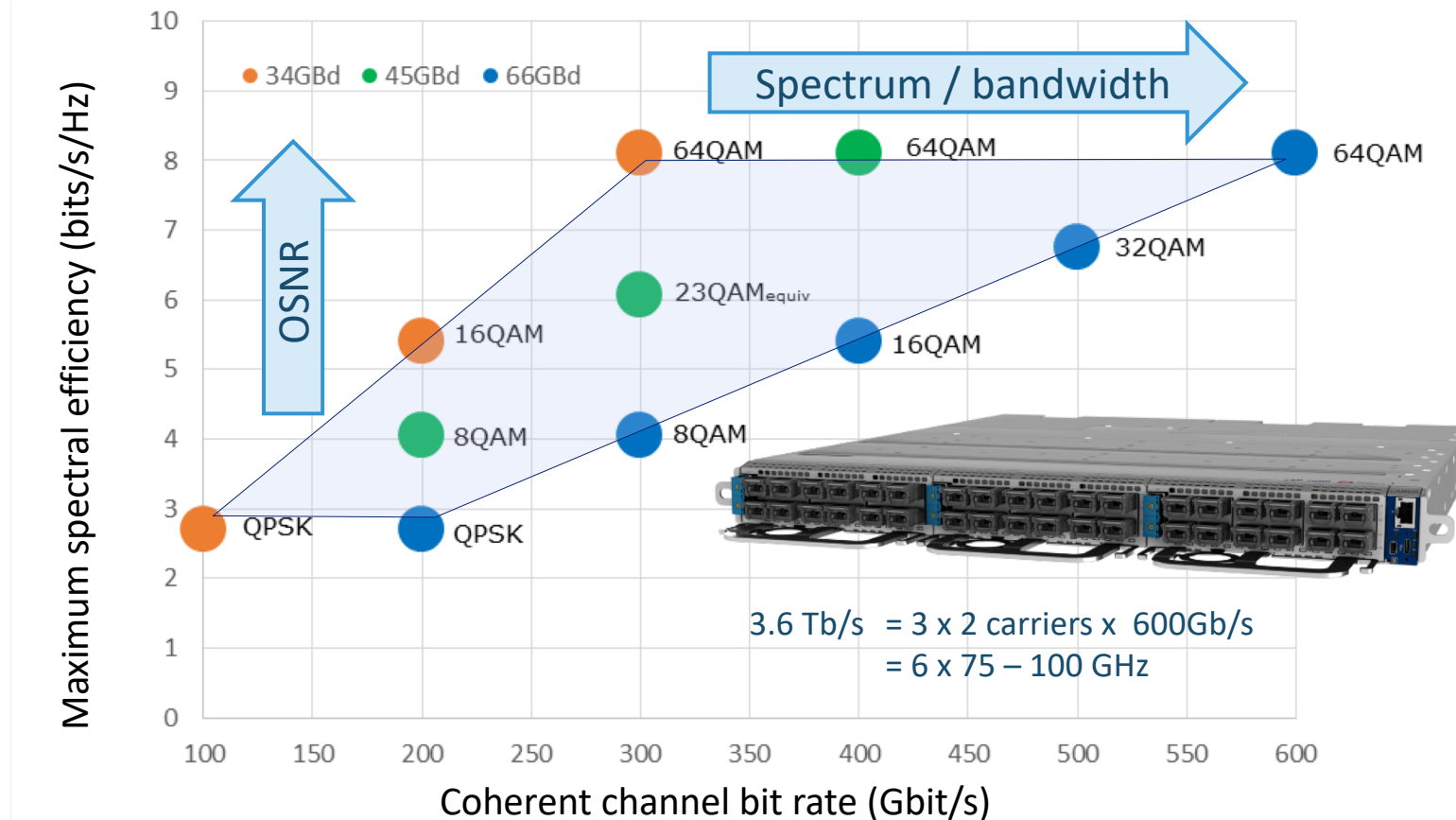
Source: CISCO VNI report, 2017



Flexibility and Scalability of Optical Networks

Software defined optics

Unprecedented network flexibility



Configure constellation & baud rate for selected data rate

- 100-600G
- 50G steps

Optimize for given channel

- based on receive OSNR & spectral shaping due to ROADMs cascades

OSNR performance increasingly critical, flexible spectrum mandatory

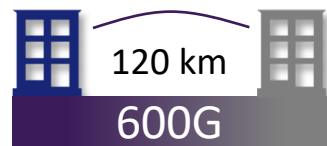
Versatile System Reach – from LH to Metro



Long Haul: Maximum distance



Regional: maximum capacity per fiber

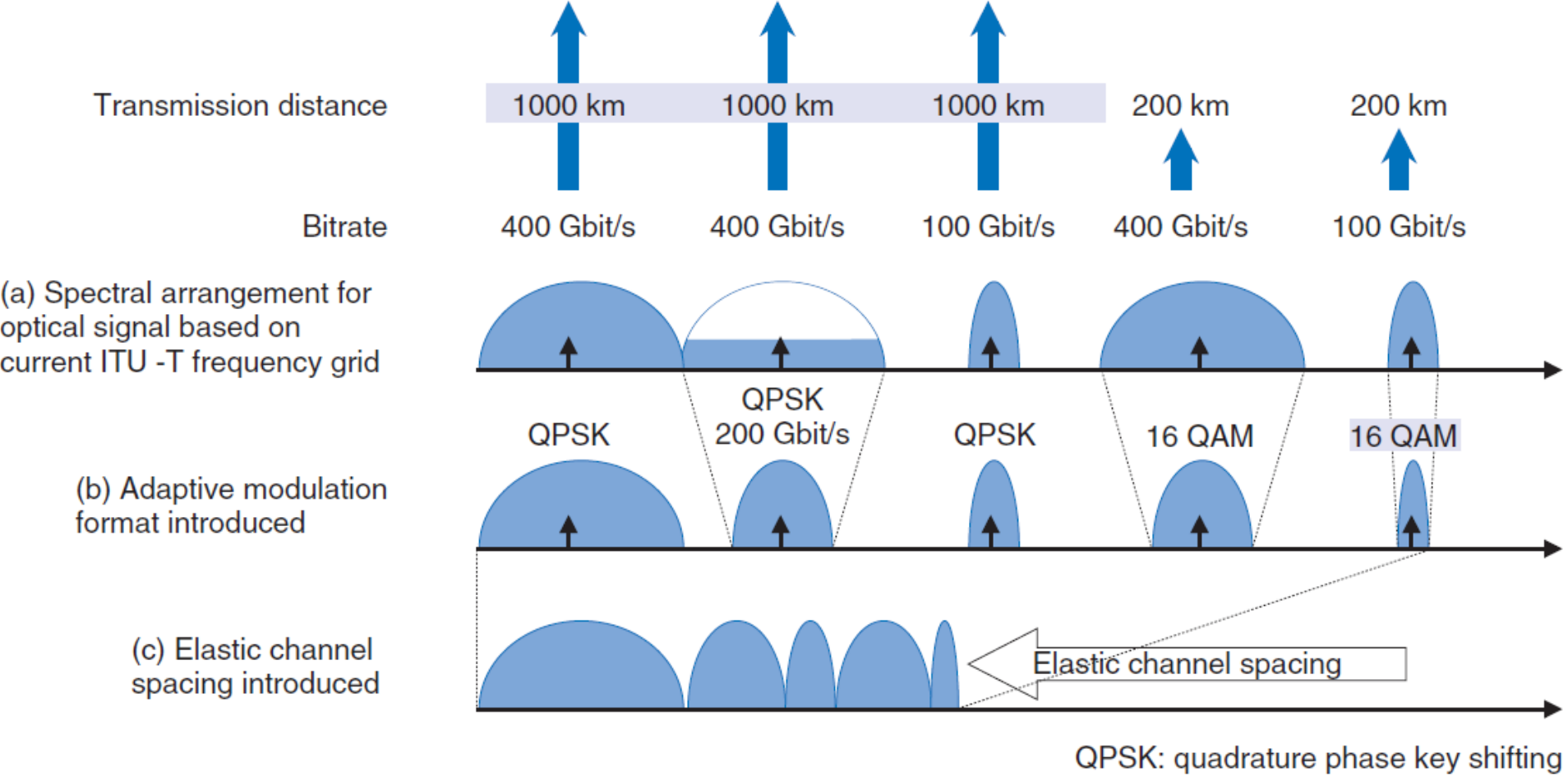


Metro: fiber capacity



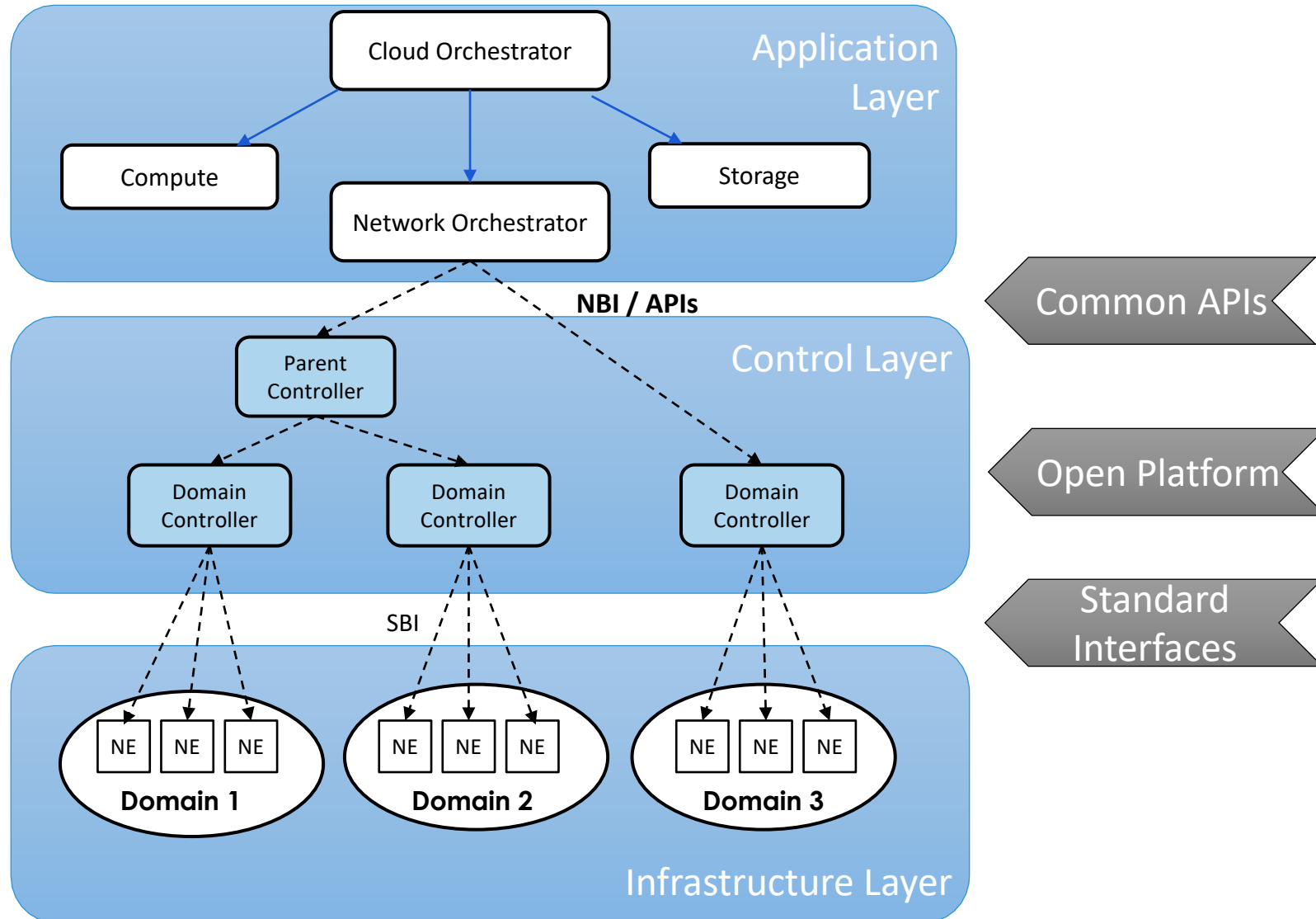
Optimizing flexible reach vs capacity

Elastic Channel Spacing – Flex Grid



Source: Innovative Future Optical Transport Network Technologies - Toshio Morioka†, Masahiko Jinno, Hidehiko Takara, Hirokazu Kubota

Transport SDN Architecture

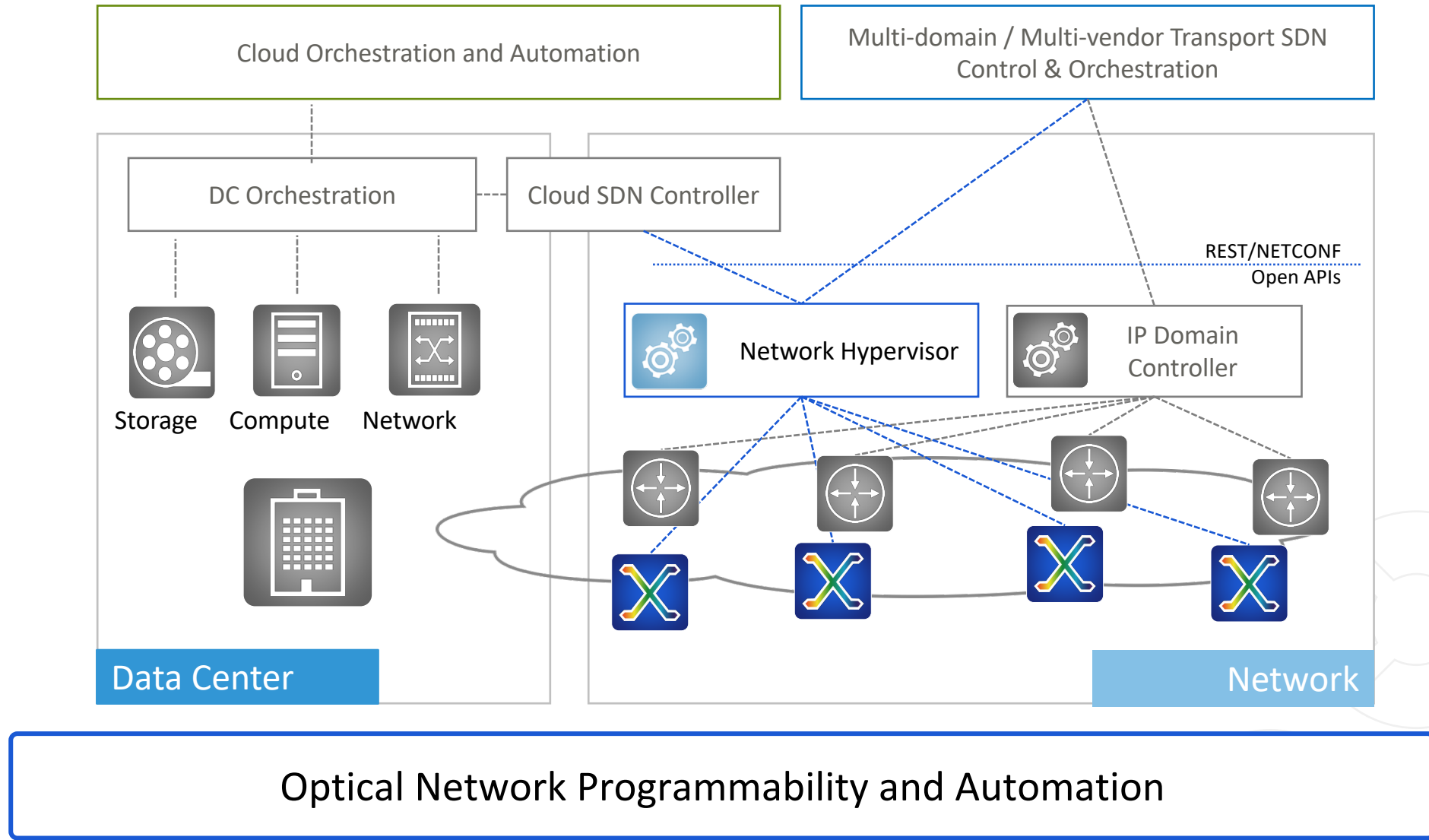


- Diverse applications
 - Planning, optimization, services, etc.

- Common framework
- Multi-vendor NW SW
 - Routing, Resiliency

- Standard, programmatic interfaces across layers
- Open/common device data models

SDN Cloud Architecture

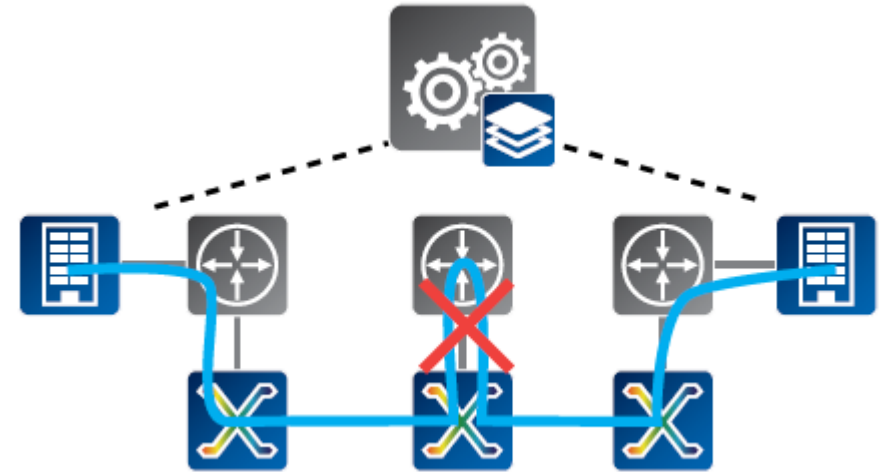


SDN use cases examples

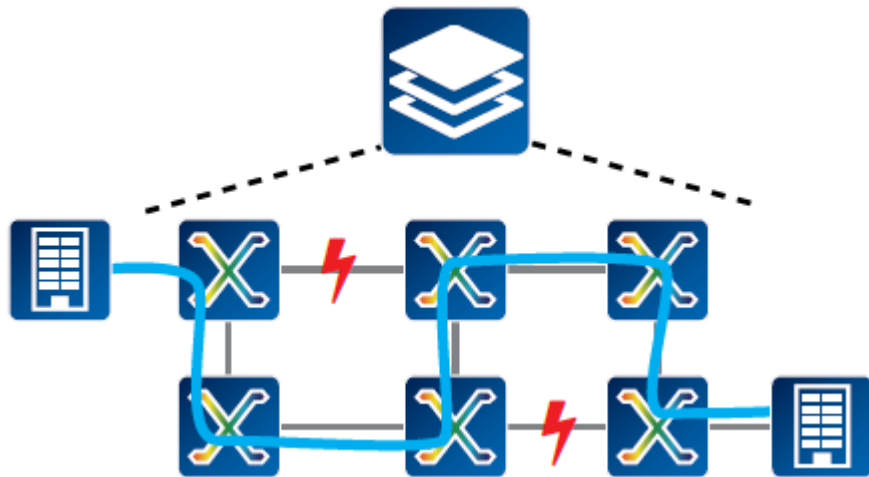
SDN-Controlled Resource Sharing Time



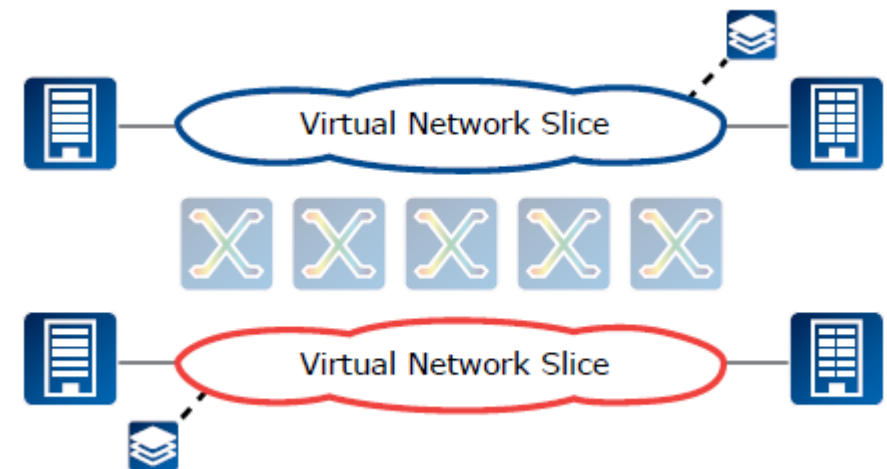
Improving resource utilization



IP Offloading



Improving service availability



Self provisioning bandwidth

SDN use cases examples

Bandwidth Calendaring

- Traffic in data centers “follows the sun”
- Scheduled backups requiring temporary bandwidth



Cloud Bursting

- Temporary “outsourcing” of local applications in periods of high load (e.g. sale)
- Distribution of huge data (e.g. distribution of high-quality 4K films to many cinemas)



Workload Balancing

- Balancing in case of unexpected load (e.g. on newsfeed servers with headline event)
- Distributed defense of DDOS attack

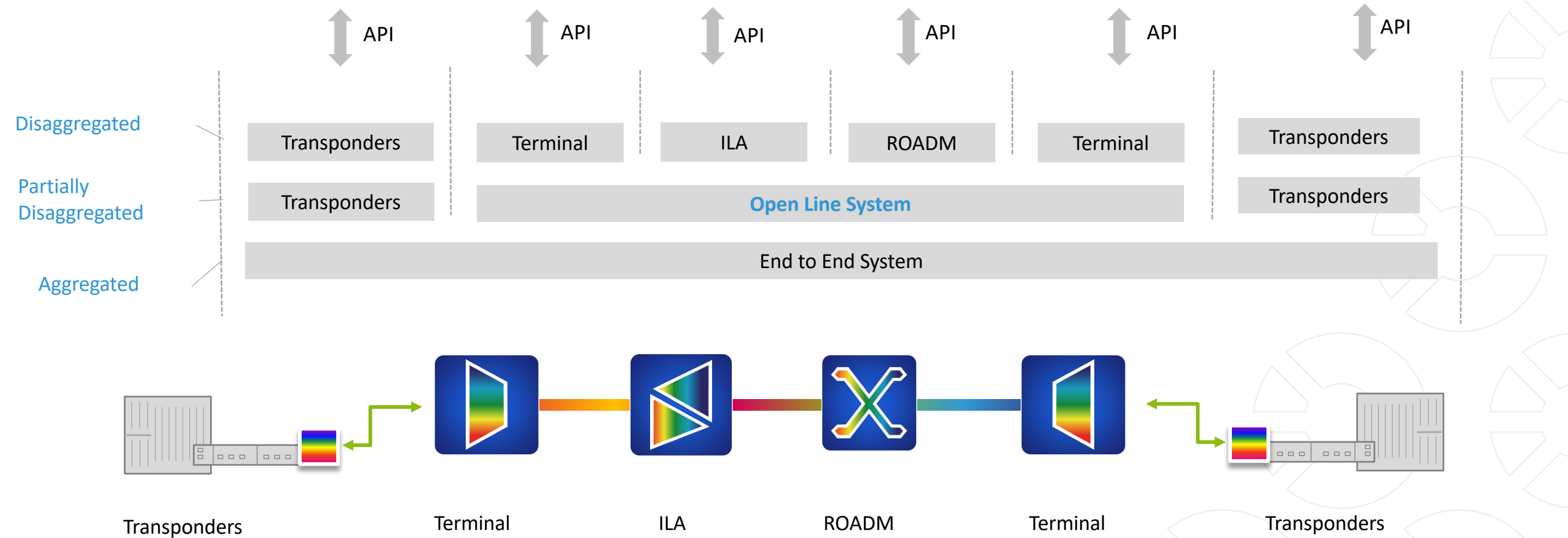


Secure Multi-Tenancy

- Provides tenants with power to re-connect their assigned ports
- In-house automation (allows IP group to request bandwidth on WDM network on demand)

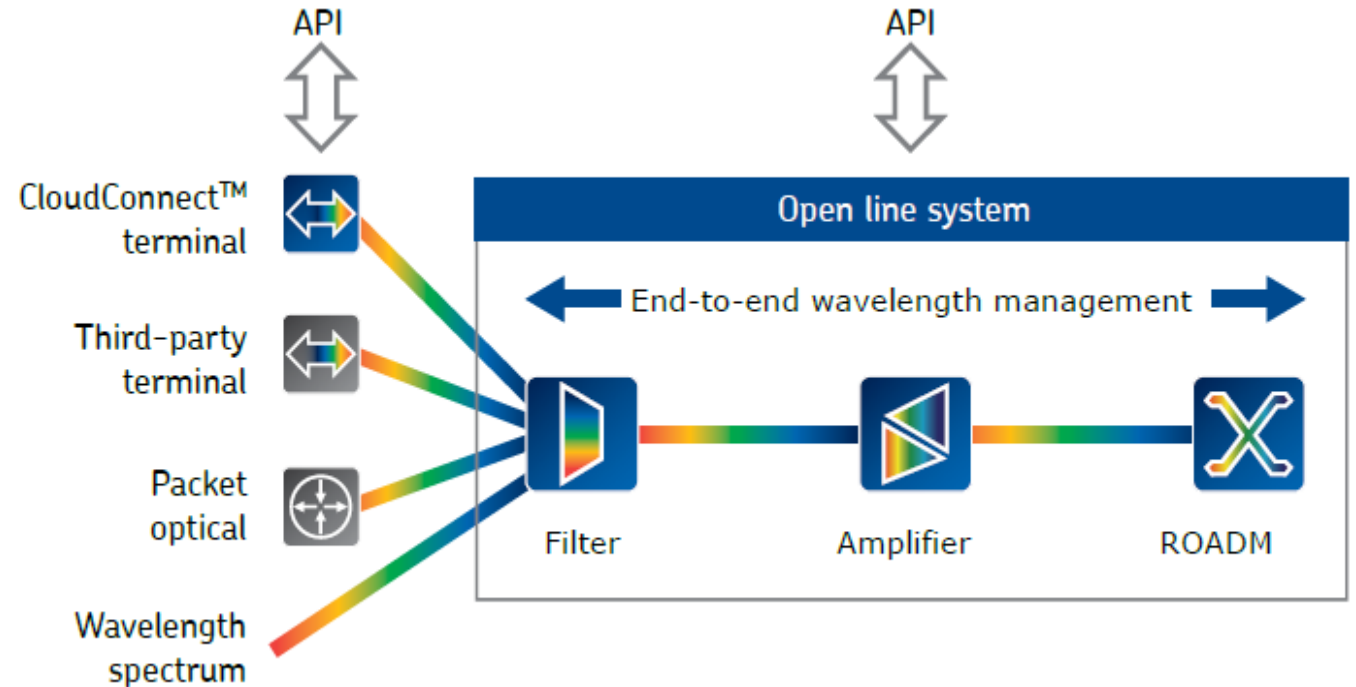


Innovation through disaggregation



Optical Open Line System objectives

- Financial benefits
- Choice, no vendor lock-in
- Innovation
- Interoperability and flexibility
- Software control and coordination



Security



What about your data streams?

When you transport information from A to B...

How valuable is your information to you?

**What is the damage in reputation and cost to you
IF the information ends up in the wrong hands?**

in Industry, Finance, Government, Health Care...



Easy insurance: Encrypt your data transmission!

Data center environment & security

...and what about the fiber connection?



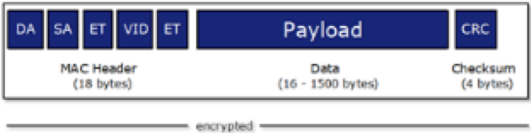
There are multiple ways to access fiber

High speed encryption modes

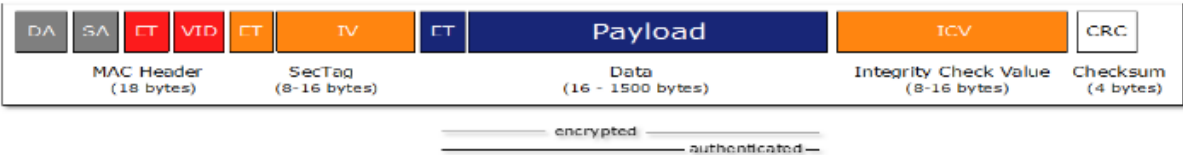


- Point-to-point
- Protocol and I/F agnostic (Ethernet, FC, IB, Sonet/SDH)
- Integrated solution with lowest latency

Bulk mode (0 Bytes)



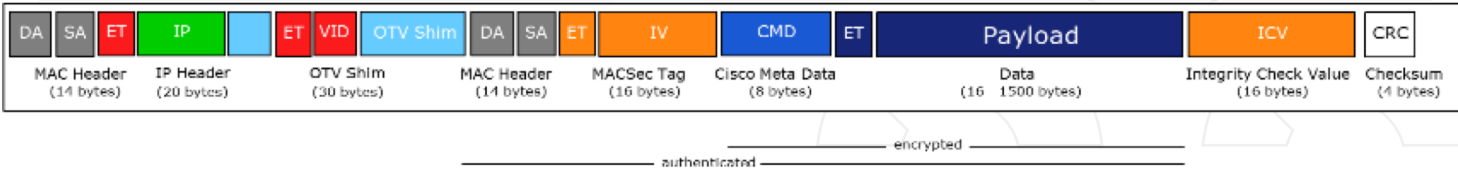
MacSec +32 Bytes



Cisco TrustSec +40 Bytes



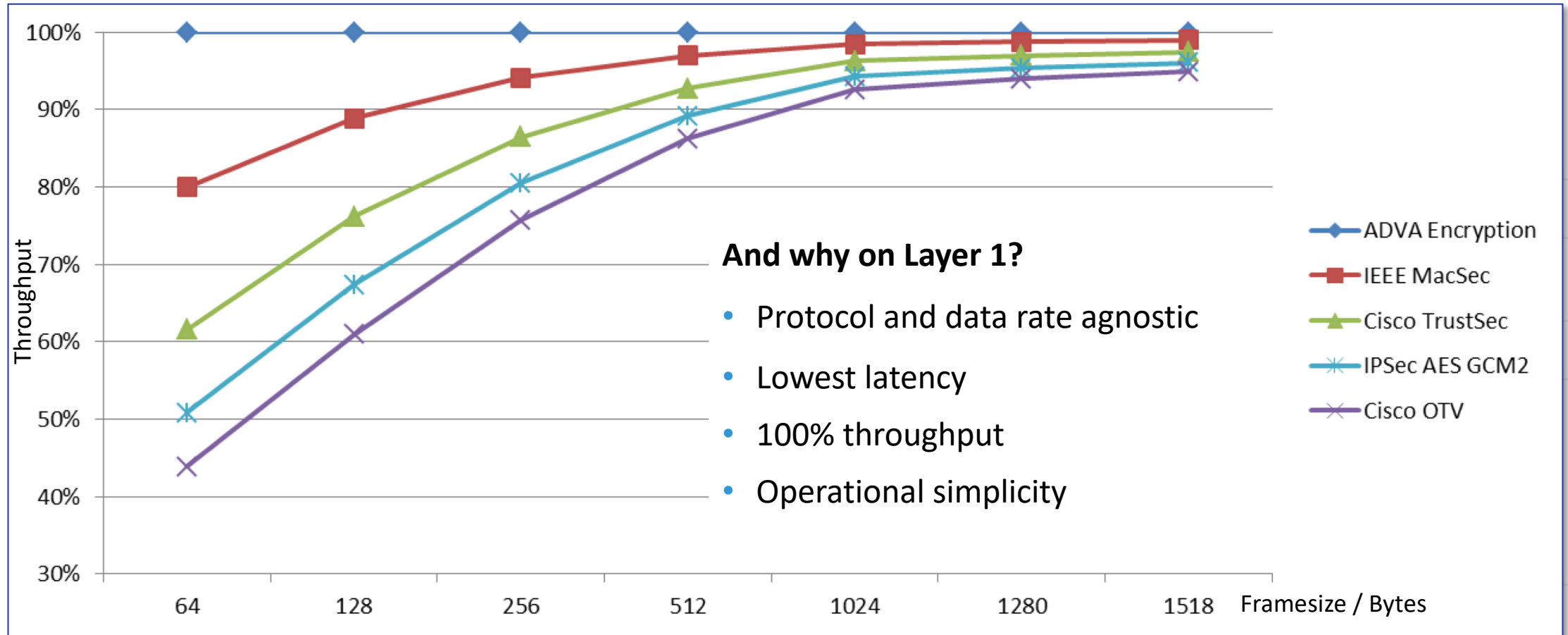
Cisco Overlay Transport Virtualization (OTV) +82 Bytes



- Hop-by-hop only
- Ethernet only
- Overhead creates latency and throughput issues
- Huge overhead
- IP VPN services
- Cisco Nexus

Encryption performance

Comparison of maximum throughput



“

Cloud and mobility are radically transforming our connected world. Virtualization and software are keys to differentiated solutions, but hardware will remain strategically important.

”

Brian Protiva, ADVA co-founder and CEO



Thank you

ffucelli@advaoptical.com

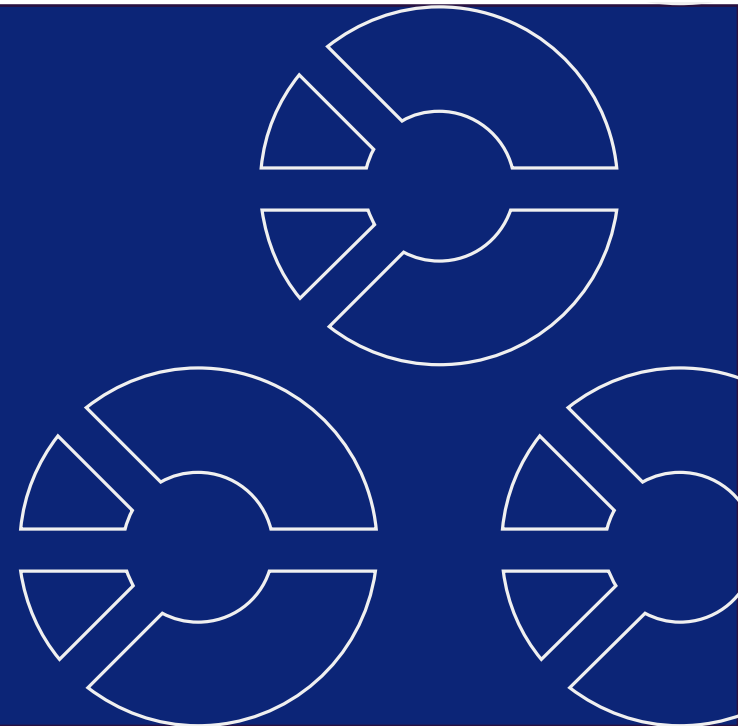


IMPORTANT NOTICE

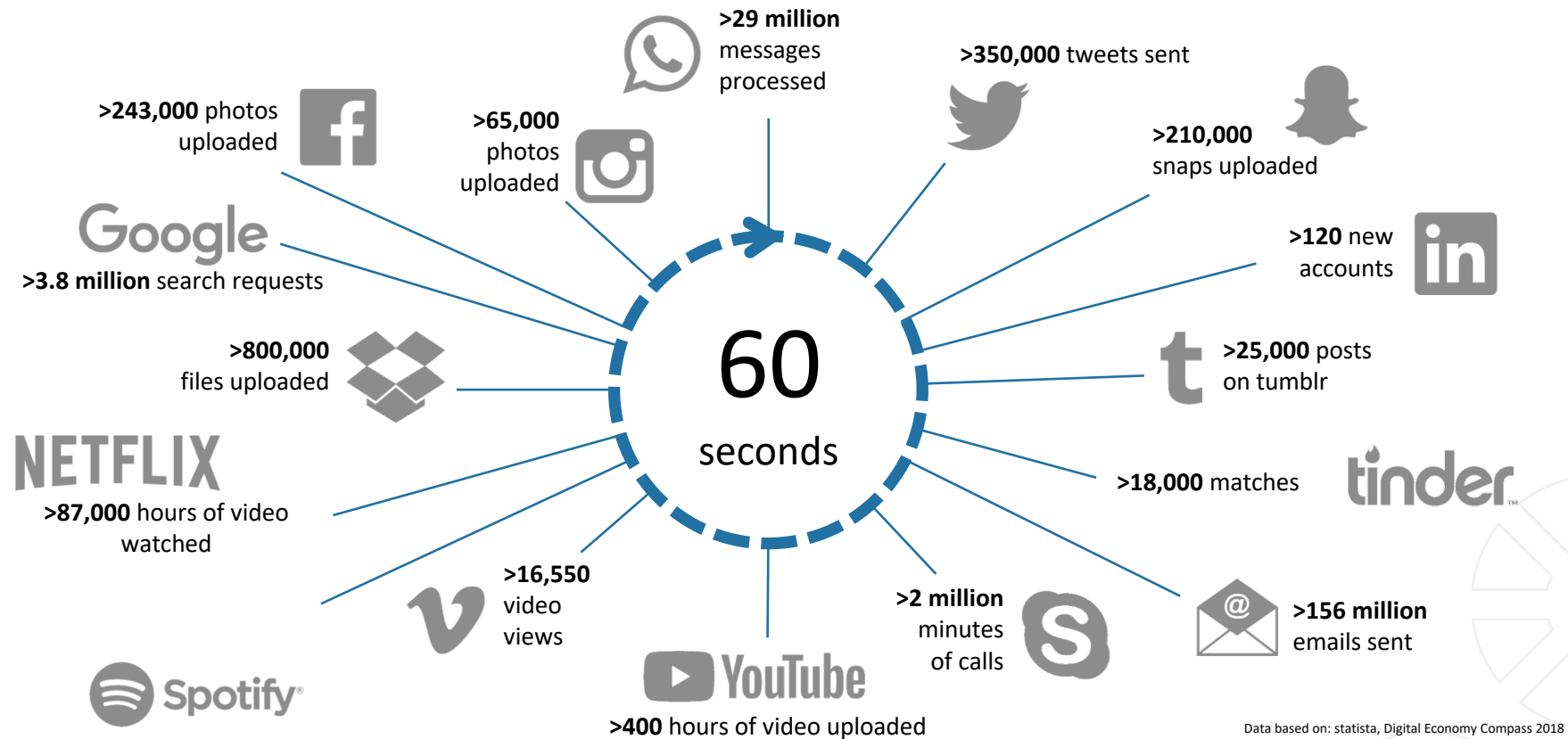
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One minute online in 2017



Data based on: statista, Digital Economy Compass 2018

Delivering cloud-native connectivity

Capacity

CloudConnect™
DCI networking



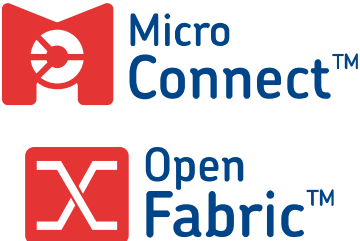
Performance

Service assurance and
precise synchronization



Intelligence

Openness and elasticity
by SDN control



Efficiency

Automation and programmability
for the self-driving network



Security

ConnectGuard™ encryption
of data in motion



Scalability

Ensemble virtualization
and NFV hosting

