Open Networking Summit 2013

Welcome to Tutorial on
SDN Market Opportunities

Senior Director of Market Development, Ciena

Responsible for SDN Marketing at Ciena

Involved in SDN for a few years
Chair ONF Market Education Committee

IP Infusion, Amdocs, Lucent Technologies, Alidian Networks, International Network Services

2013 ONS Tutorial 2: SDN Market Opportunities

An Overview of SDN

Marc Cohn, Chair ONF Market Education Committee/Ciena

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April 15, 2013

SDN Market Opportunities
Agenda- April 15, 2013 Morning

Welcome	9:00 – 9:05a	Marc Cohn ONF/Ciena
An Overview of SDN	9:05 – 9:45a	Marc Cohn ONF/Ciena
SDN Value Chain	9:45 – 10:30a	Jim Metzler Ashton Metzler
Break	10:30 – 10:45a	All
Multi-Vendor, Multi-Tenant Network Virtualization	10:45 – 11:30a	Roy Chua Wiretap Ventures
OpenFlow-based SDN for the Carriers	11:30a – 12:15p	Javier Benitez, Colt Chris Janz, Ciena
Lunch	12:15 – 1:45p	All

SDN Market Opportunities
Agenda- April 15, 2013 Afternoon

Session	Time	Presenters
OpenFlow/SDN for the Data Center	1:45 – 2:30p	Robert Jenkins, CloudSigma Nils Swart, Plexxi
OpenFlow/SDN for the Enterprise	2:30 – 3:15p	Michael Steineke, Edgenet Don Clark, NECAM
Break	3:15 – 3:30p	All
Sizing the Market	3:30 – 4:15p	Lee Doyle Doyle Associates
PANEL: State of SDN Moderator: Marc Cohn, ONF/Ciena	4:15 – 5:15p	Marc Cohn ONF/Ciena, Moderator Robert Jenkins, CloudSigma Javier Benitez, Colt Michael Steineke, Edgenet Matt Palmer, Wiretap Ventures
Closing Remarks/Final Questions	5:15 – 5:30p	Marc Cohn, ONF/Ciena

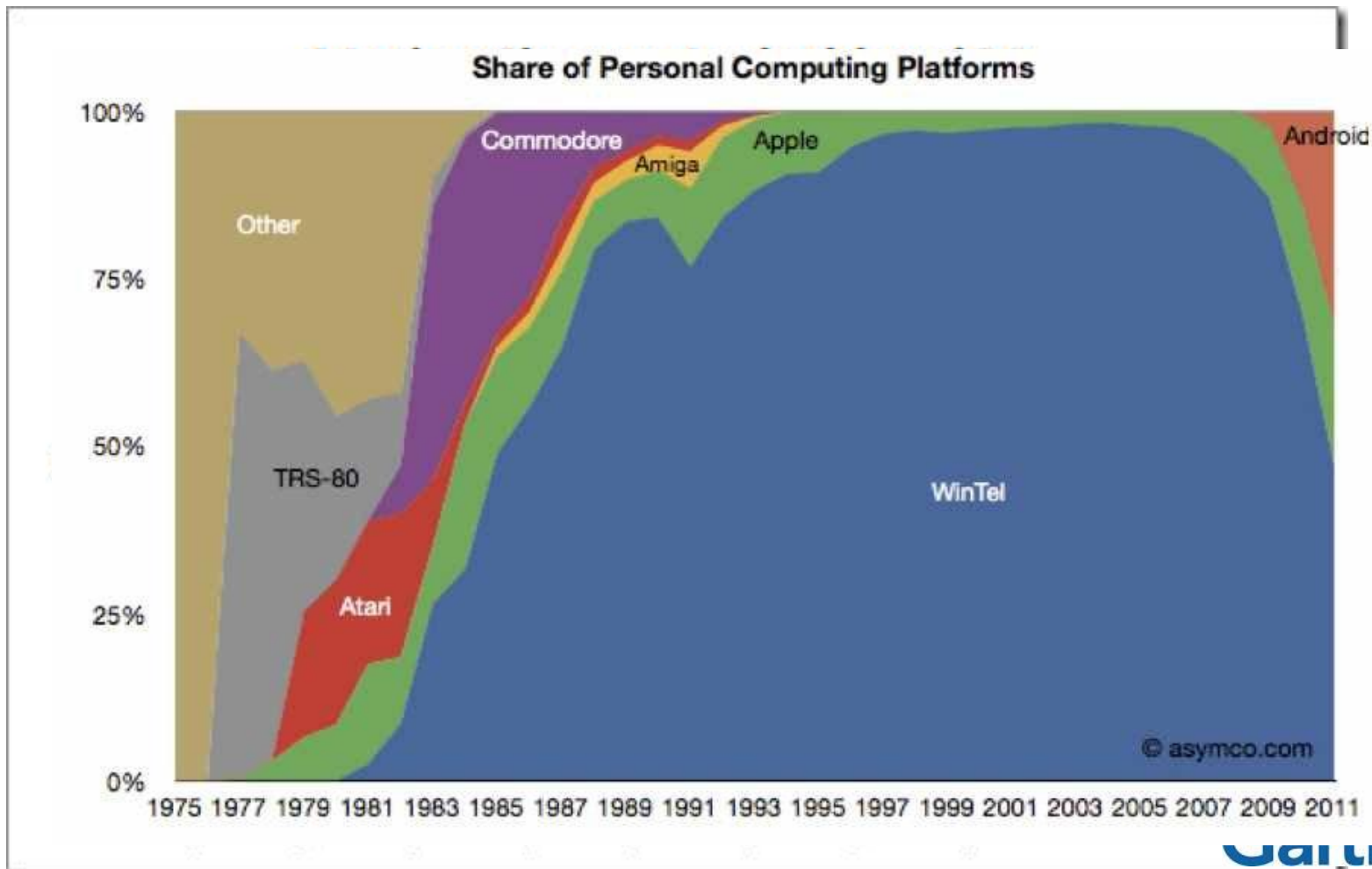# SDN Market Opportunities
Tutorial Objectives

- Rationalize the value proposition for SDN

- Share real-world use cases from early innovators

- Address the Data Center, Carrier, and Enterprise segments

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Software Defined Networking- 2013

- OpenFlow is shipping
  - 65+ OpenFlow products
  - 30 M OpenFlow-capable ports shipped
- Standards are maturing
  - Conformance Test program
- End-users are empowered
  - ONUG
  - NFV
- Carriers are onboard

- Software Defined Networking
  - Scalability Data Center Networks
  - Service Provider Data Networks
  - Streamlined and Dynamic, but Not a technology Nor a market
  - Standardized platform for Development of Novel Services
  - Still Don't Know
  - Something to Do NOW!

The Value of Openess

Share of Personal Computing Platforms

Tutorial Contributors

Analysts

End-Users

OEMs

You!
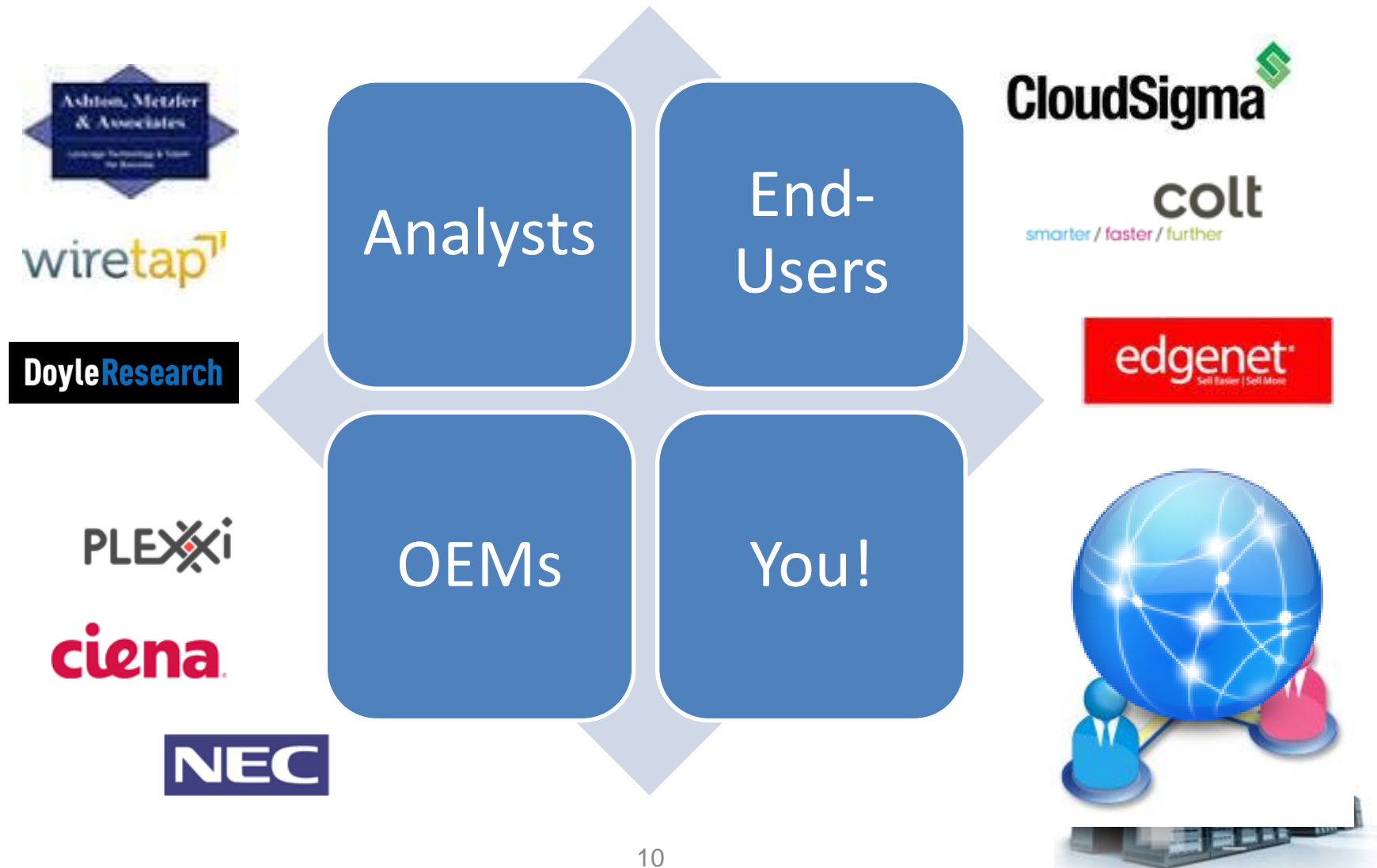
2013 ONS Tutorial 2: SDN Market Opportunities

An Overview of Software Defined Networking
Marc Cohn, Chair ONF Market Education Committee
Senior Director, Market Development, Ciena
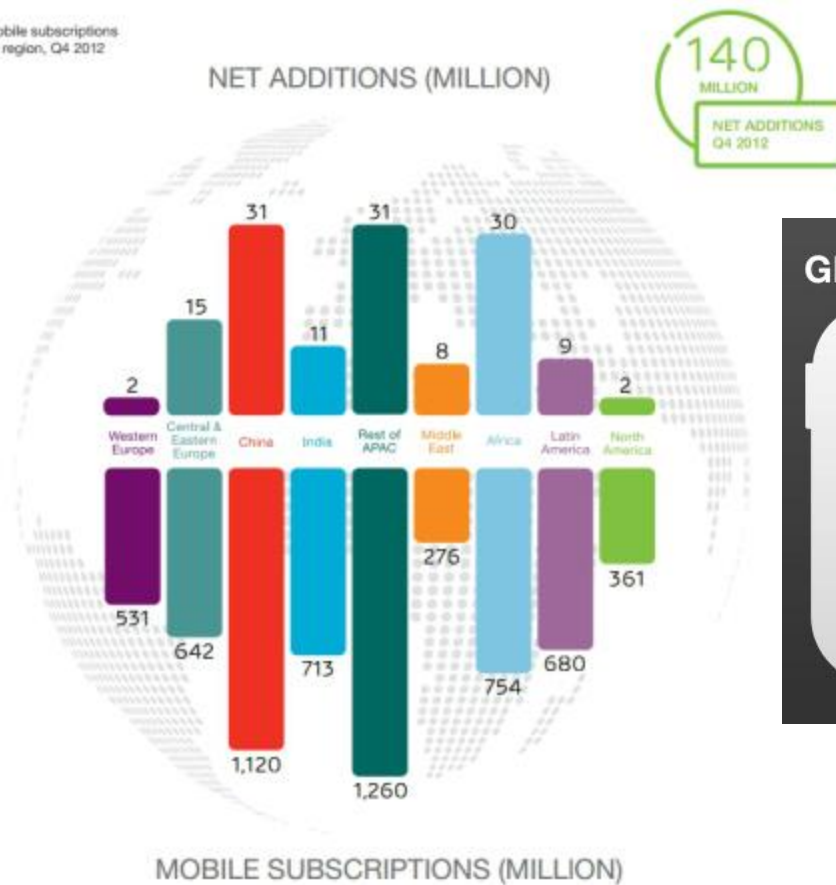
mcohn@ciena.com
April 15, 2013

An Overview of SDN

- Provide a high-level summary of SDN, OpenFlow, and the role of the ONF

- Offer a reference point for the tutorial presentations

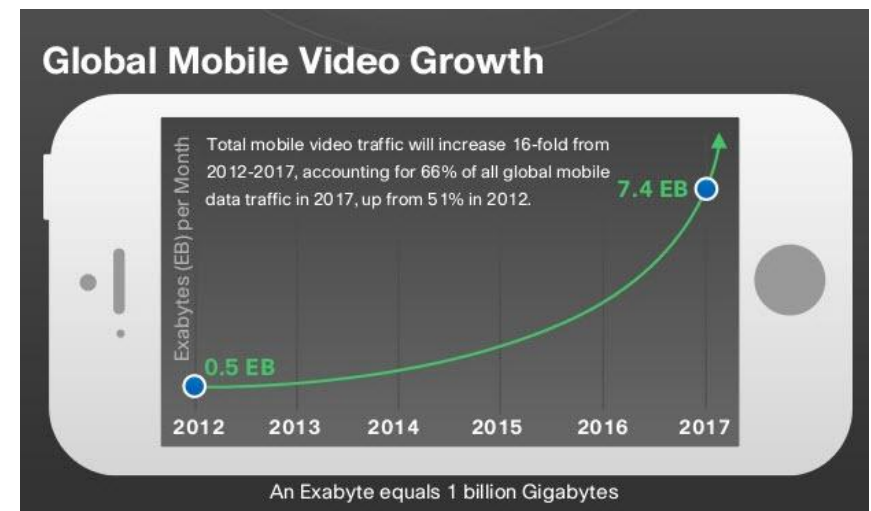- Examine the motivations and use cases behind SDN

Mobile data is exploding!

Figure 1: Mobile subscriptions by region, Q4 2012

NET ADDITIONS (MILLION)

140 MILLION — NET ADDITIONS Q4 2012

Western Europe	Central & Eastern Europe	China	India	Rest of APAC	Middle East	Africa	Latin America	North America
2	15	31	11	31	8	30	9	2
531	642	1,120	713	1,260	276	754	680	361

MOBILE SUBSCRIPTIONS (MILLION)

Source: Ericsson (February 2013)

Global Mobile Video Growth

Total mobile video traffic will increase 16-fold from 2012-2017, accounting for 66% of all global mobile data traffic in 2017, up from 51% in 2012.

Exabytes (EB) per Month

0.5 EB (2012) → 7.4 EB (2017)

2012 2013 2014 2015 2016 2017

An Exabyte equals 1 billion Gigabytes

Cloud Momentum

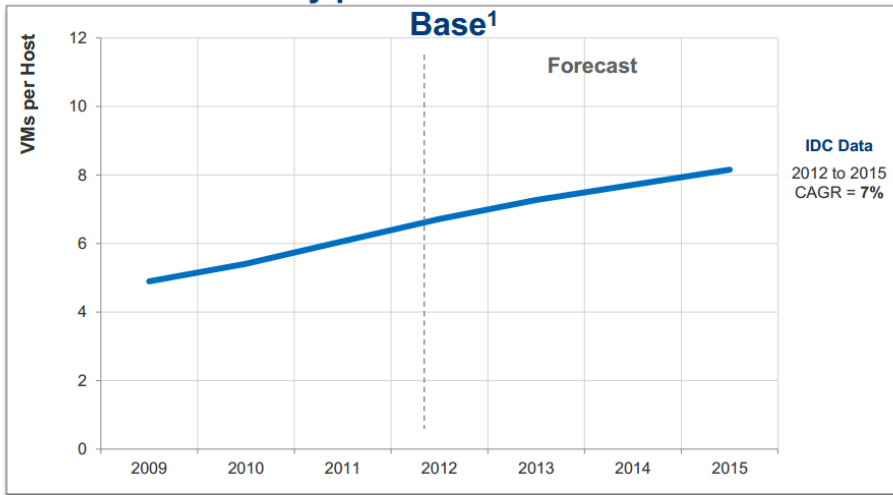Public Cloud Services Market and Annual Growth Rate, 2010-2016

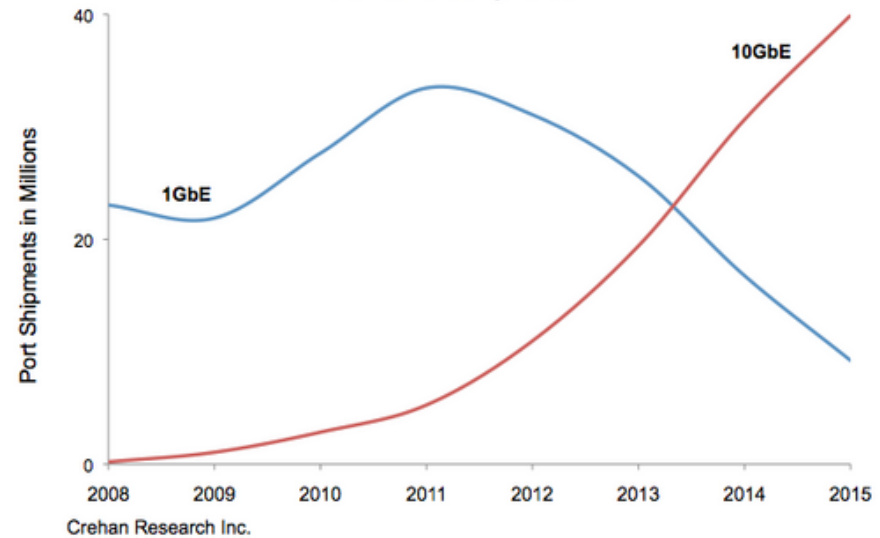Source: Gartner (February 2013)

Technological Advancements

VM Density per Host Server in Installed Base[1]

Source(s): IDC Annual Virtualization Forecast-2012
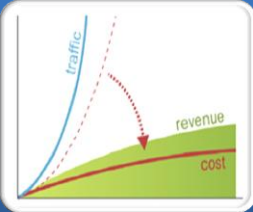[1] Installed Base totals assumes 5 year refresh

Ethernet Port Shipments

Crehan Research Inc.

Growing VM Density
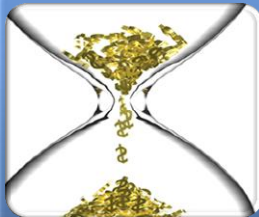
Higher bandwidths

15

Why a new network architecture is needed?
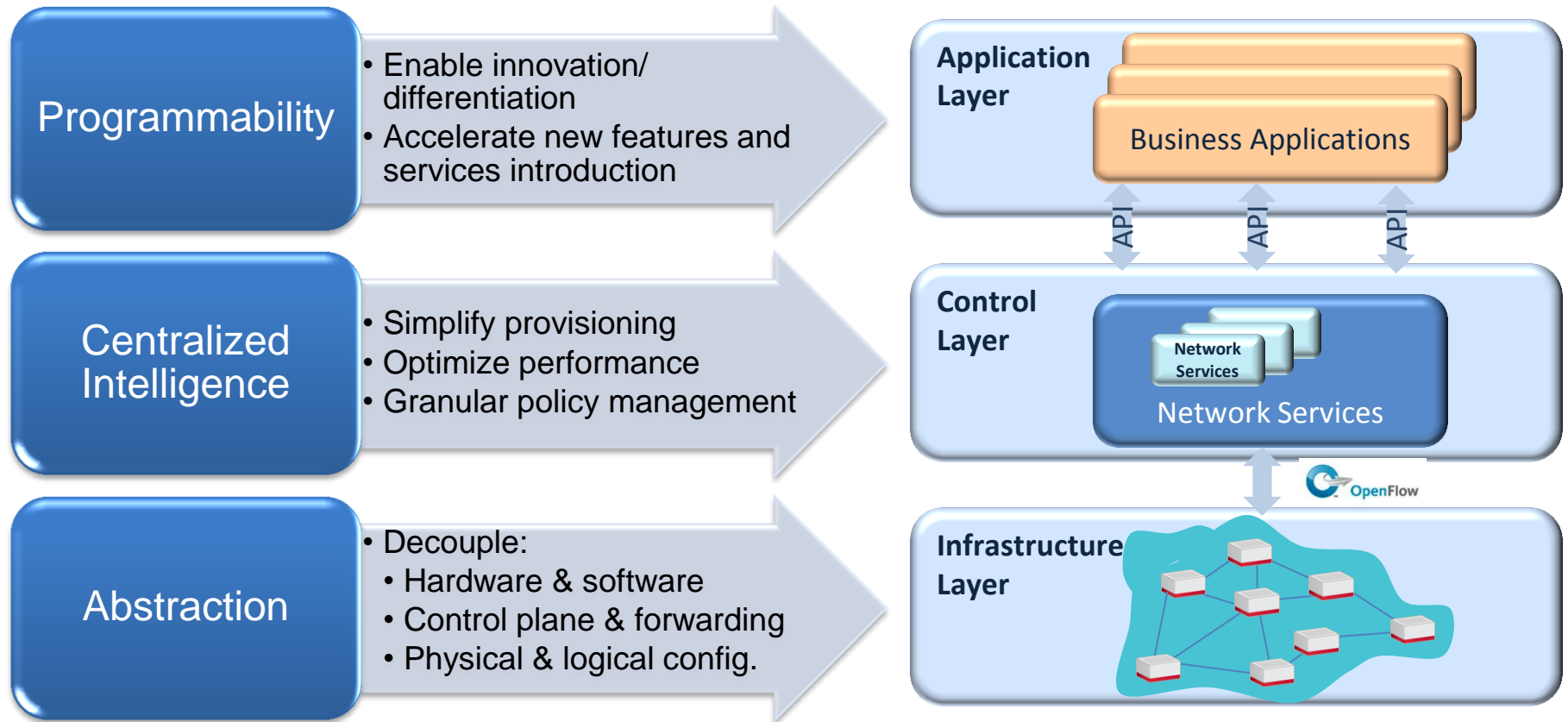
Not Cost-Effective
- CAPEX
- OPEX

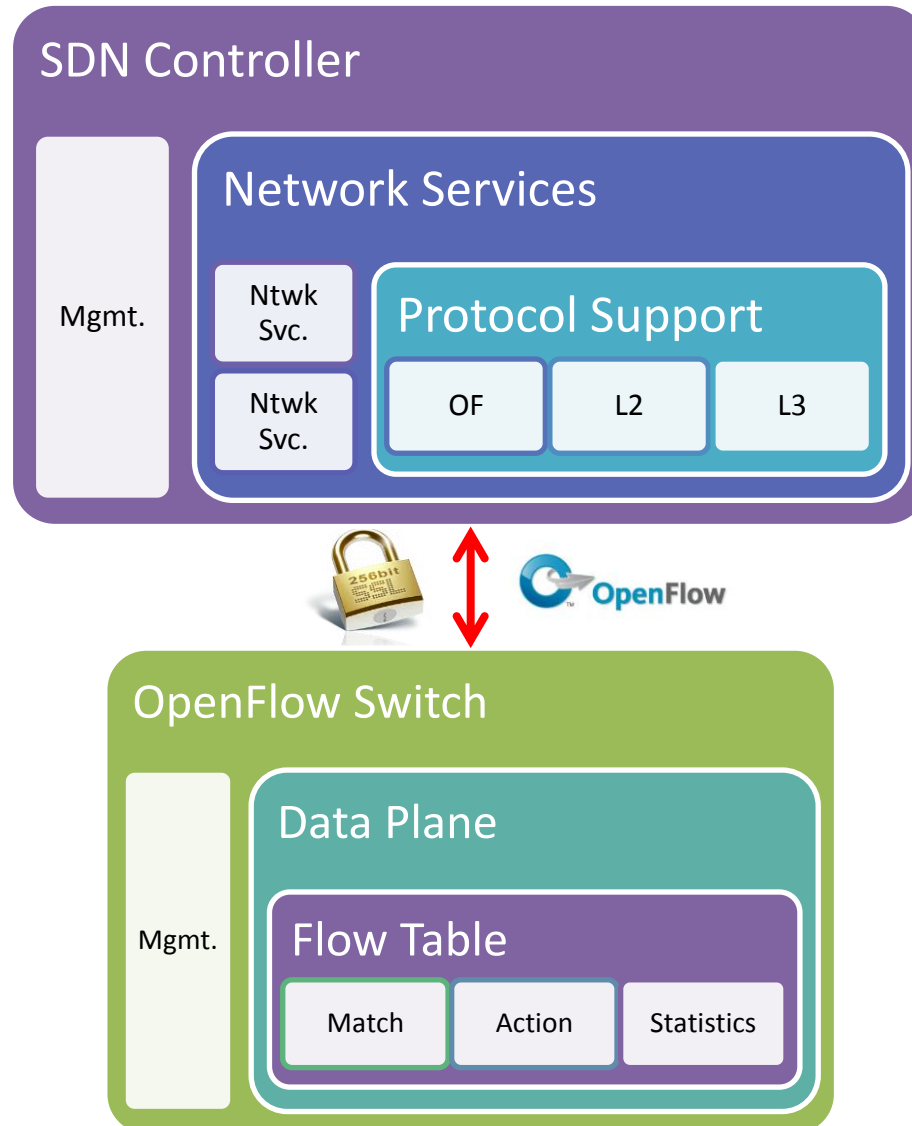**Not Agile Enough**
- Time-to-market
- Rapid service provisioning

Not Oriented Towards Services
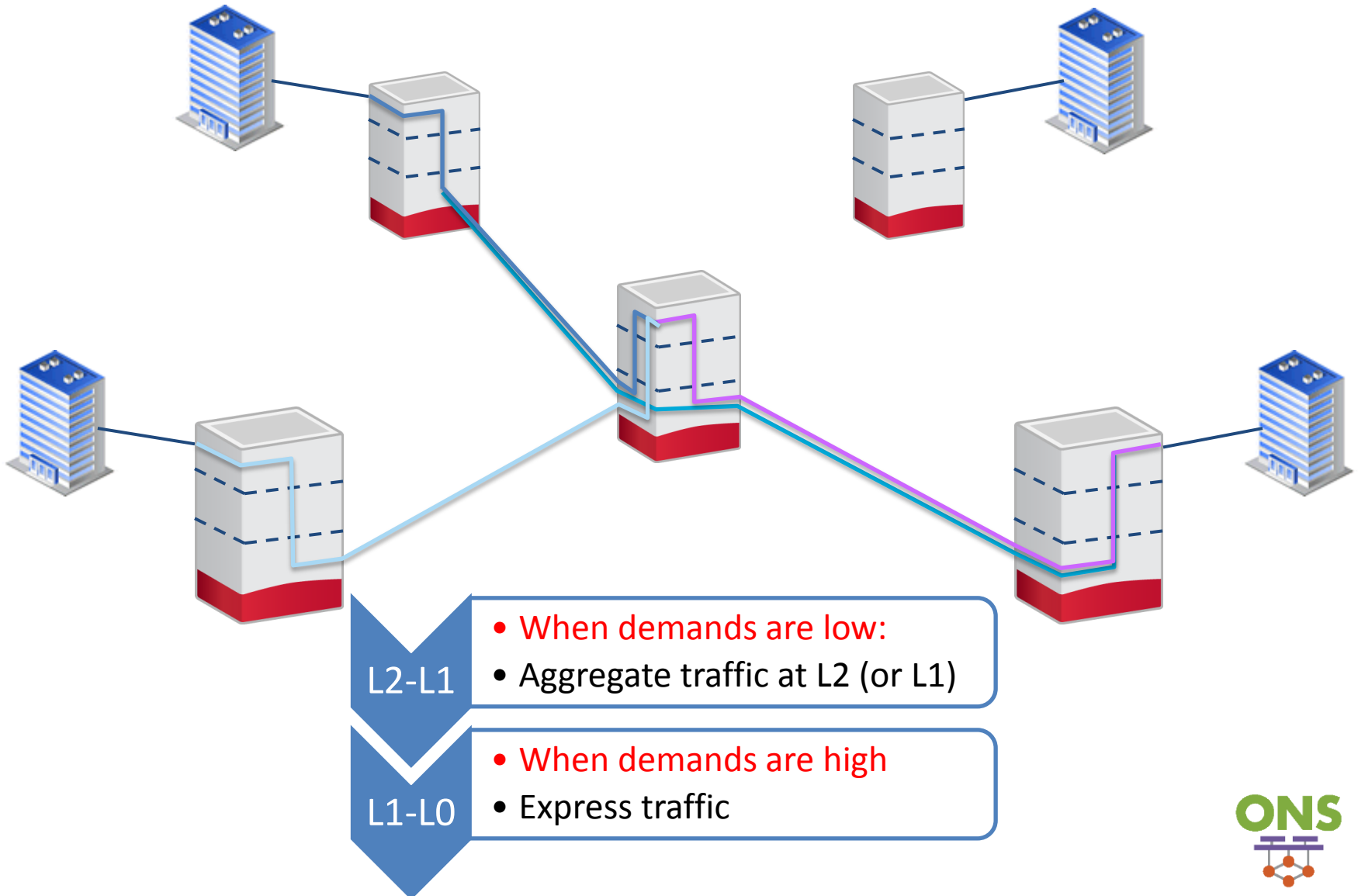- Static configuration
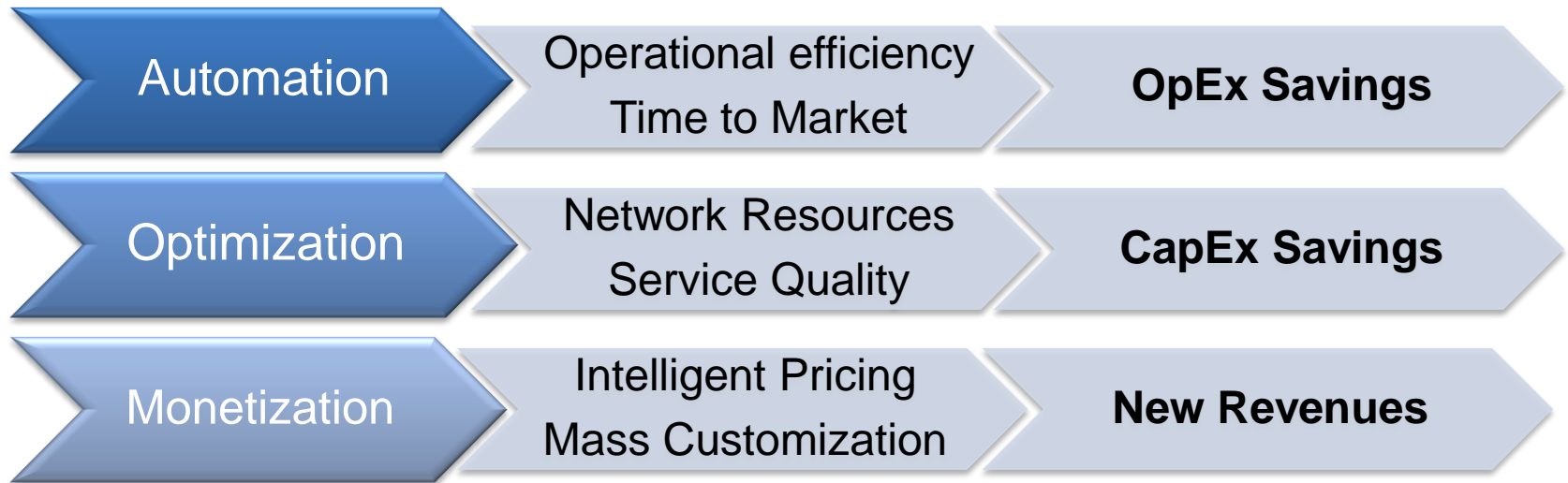- Static traffic patterns and policy

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SDN architecture

Programmability
- Enable innovation/ differentiation
- Accelerate new features and services introduction

Centralized Intelligence
- Simplify provisioning
- Optimize performance
- Granular policy management

Abstraction
- Decouple:
  - Hardware & software
  - Control plane & forwarding
  - Physical & logical config.

Application Layer

Business Applications

API   API   API

Control Layer

Network Services

Network Services

OpenFlow

Infrastructure Layer

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Introduction to OpenFlow

Benefits of Multi-Layer

L2-L1
- When demands are low:
- Aggregate traffic at L2 (or L1)

L1-L0
- When demands are high
- Express traffic

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SDN value proposition

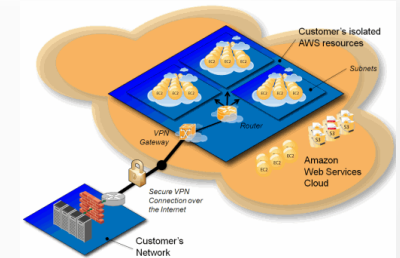|		
Automation	Operational efficiency Time to Market	**OpEx Savings**
Optimization	Network Resources Service Quality	**CapEx Savings**
Monetization	Intelligent Pricing Mass Customization	**New Revenues**

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Where SDN achieves value in the Data Center

VM Mobility Domain Isolation
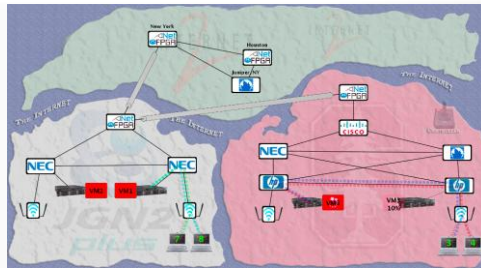
Virtualization

Span Public and Private Data Centers

Hybrid Clouds

Multiple customers share services
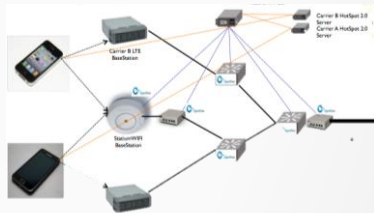

Network As A Service
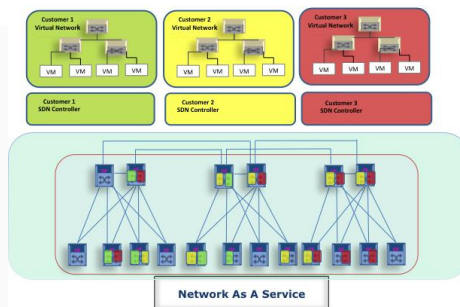
Multi-Tenancy

Improved visibility & management
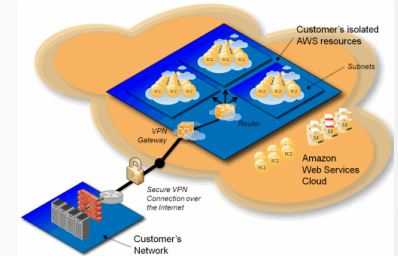

Disaster Recovery

Where SDN achieves value in the Carrier Network

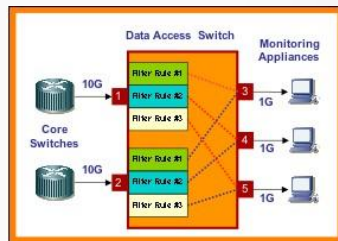**Seamless Roaming for 3G/4G/WIFI**

Mobile Edge

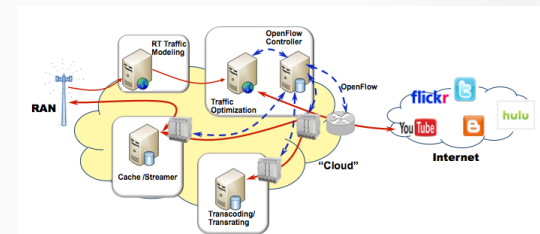**Span Public and Private Clouds**

Service Migration to Cloud

Automated provisioning Centralized network view

**Service Monitoring**

Content Delivery Services

Traffic Steering

Network Function Virtualization

- Carrier-led initiative to virtualize networking software
  - AT&T, BT, NTT, Telefonica, Verizon, etc.
- Intend to define an extensible architecture that can be tailored
- European Telecommuni-cations Standards Institute Industry Specification Group (ETSI ISG)
- ISG will not produce standards, but influence SDOs (Standards Development Organizations)
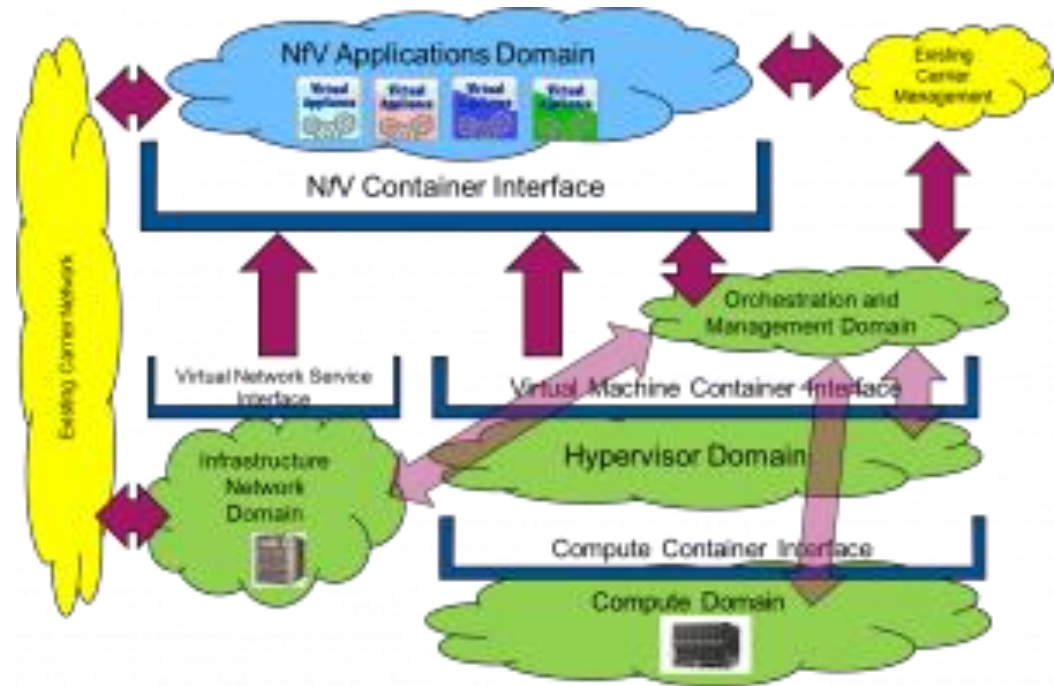
Baseline Network Function Virtualization Architecture

Source: DRAFT: Architecture of the NFV- Discussion Document
(Contributed by Andy Reid, BT, Jan. 9, 2013)

Open Networking Foundation

- Industry organization dedicated to the development, standardization, and promotion of Software Defined Networking.

- Founded in 2011 (23 founding members)

- Driven by end-users!

- 90+ members- Who's who in networking!

- Driven by end-users
  - Enterprise IT, Network Operators, Carriers
  - Board of Directors may only be end-users

- Standards developed by those closest to implementation
  - Open
  - Interoperable

  Based on real-world implementations

ONF- Guiding Principles

- ## Driven by end-users
  - Enterprise IT, Network Operators, Carriers
  - Board of Directors may only be end-users

- ## Standards developed by those closest to implementation
  - Open
  - Interoperable
  - Based on real-world implementations

ONF organizational structure
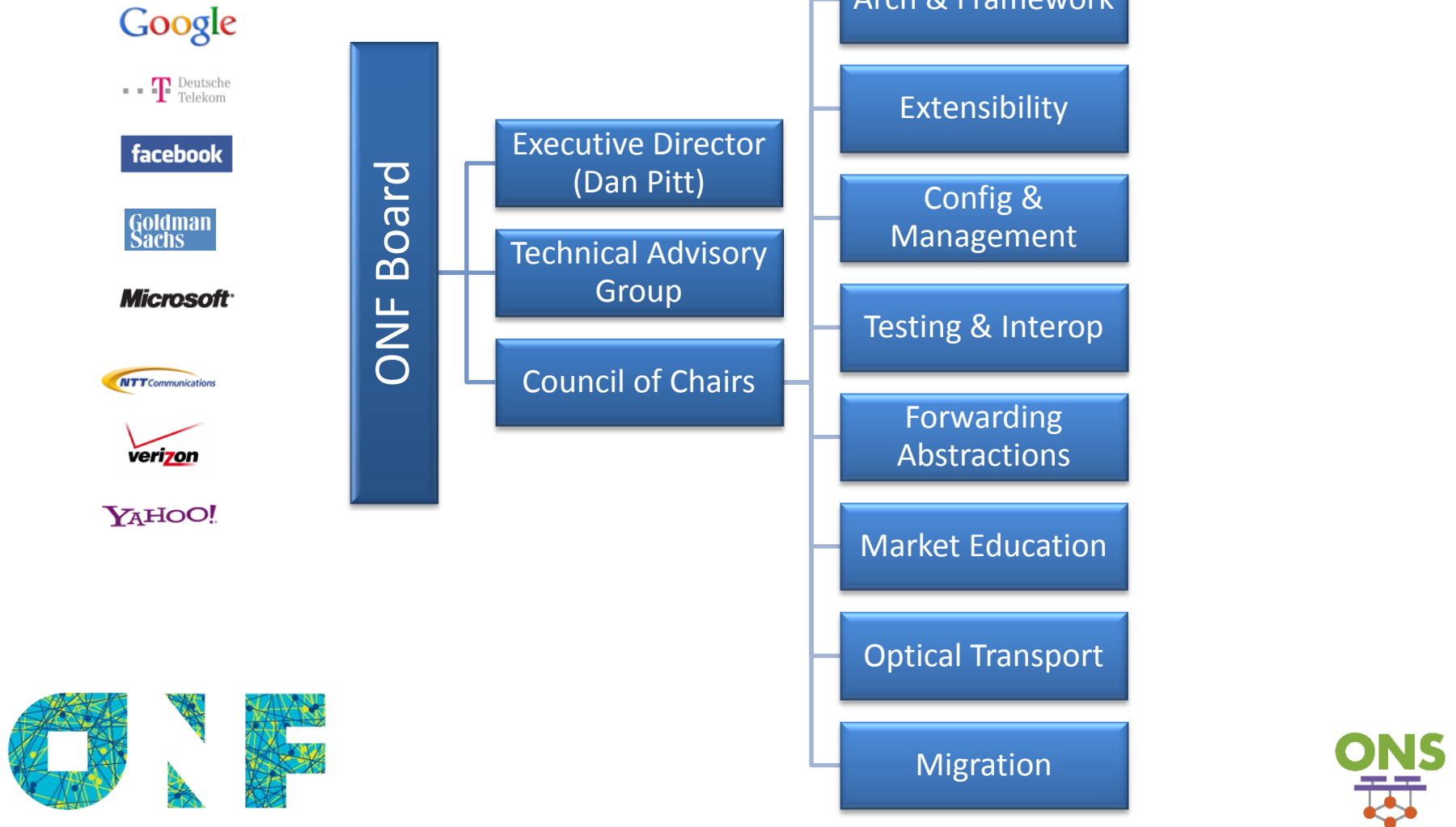
ONF Members

(March, 2013)

- 6Wind
- A10 Networks
- ADVA Optical
- Alcatel-Lucent
- Aricent
- Argela/Turk Telekom
- Big Switch Networks
- Broadcom
- Brocade
- Centec Networks
- Ceragon
- China Mobile
- Ciena
- Cisco
- Citrix
- CohesiveFT
- Colt
- CompTIA
- Cyan Optics
- Dell/Force10
- Deutsche Telekom
- Ericsson
- ETRI
- Extreme Networks

- F5 Networks/ LineRate Systems
- Facebook
- France Telecom Orange
- Freescale Semi
- Fujitsu
- Gigamon
- Google
- Goldman Sachs
- Hitachi
- HP
- Huawei
- IBM
- Infinera
- Infoblox
- Intel
- Intune Networks
- IP Infusion
- Ixia
- Juniper Networks
- KDDI
- Korea Telecom
- Lancope

- Level3 Comms
- LSI
- Luxoft
- Marvell
- Mellanox
- Metaswitch Networks
- Microsoft
- Midokura
- NCL Comms K.K.
- NEC
- Netgear
- Netronome
- Netscout Systems
- Nokia Siemens Netw.
- NoviFlow
- Oracle
- Overture Networks
- NTT Communications
- Pica8
- Plexxi
- Qosmos
- Radware
- Riverbed Technology

- Samsung
- SK Telecom
- Spirent
- Sunbay AG
- Swisscom
- Tail-f Systems
- Tekelec
- Telecom Italia
- Telefonica
- Tencent
- Texas Instruments
- Thales
- Tiera
- Transmode
- TW Telecom
- Vello Systems
- Verisign
- Verizon
- VMware/Nicira
- Xpliant
- Yahoo!
- ZTE

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For additional information

- Open Networking Foundation
  www.opennetworking.org
- SDN Central
  www.sdncentral.com

- ONF Publications
  - SDN/OpenFlow White Paper
    - [Software Defined Networking- The New Norm for Networks (Apr 13, 2012)](Software Defined Networking- The New Norm for Networks)
  - Solution Briefs
    - [How OpenFlow-Based SDN Transforms Private Cloud (Nov. 27, 2012)](How OpenFlow-Based SDN Transforms Private Cloud)
    - [OpenFlow-Enabled Hybrid Cloud Services Connect Enterprise and Service Provider Data Centers (Nov. 13, 2012)](OpenFlow-Enabled Hybrid Cloud Services Connect Enterprise and Service Provider Data Centers)
    - [OpenFlow-Enabled Cloud Backbone Networks Create Global Provider Data Centers (Nov. 14, 2012)](OpenFlow-Enabled Cloud Backbone Networks Create Global Provider Data Centers)

Summary

- Software Defined Networking
  - Enabling a wave of innovation
  - Bending the cost curve
  - Accelerating new services
  - The future of networking

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Thank You

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www.ciena.com

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