SDN LANDSCAPE AND CHALLENGES

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Challenge... Navigate well

THE HYPE...
AND THIS IS NOT EVEN THE TOP OF THE CURVE...

Figure 1. Hype Cycle for Networking and Communications, 2011

Source: Gartner (August 2011)
DEFINITION(S)

› No agreed definition… ONF is most authentic

+1

“SDN is a concept which allows networking behaviour to be defined via software tools that enable easy modification – as opposed to behaviour that is fixed by the design of networking equipment.”

› Some recurring components
  - Decoupling control and data plane aka split architecture
  - Centralized controller
  - Programmability and APIs
  - Open interfaces
  - External applications
  - Virtualization
Mapping SDN

Challenge… Functions of the SDN controller vs. NMS

Programming

Box SDK

Controller SW
Software Defined Networking
3rd party Apps
Switching APIs
Blurred boundary

Customization

Scripting

NMS/OSS
Speed
Automation

On-device “distributed”
Network-wide “centralized”
TECHNOLOGY EVOLUTION MODEL

- Switching/routing
- Aggregation & Metro Transport
- Data Center Networking
- IP Edge
- Subscriber aware forwarding/processing

Gap
Challenge… Will SDN indeed transform the carrier segment?

TECHNOLOGY EVOLUTION MODEL

Complex edge processing and various appliances

“Simple” transport switches and P routers

VMware Buys Nicira for $1.26B

Switching/routing

SDN

Data Center Networking

Time

Illustration
Challenge… Will we have one controller platform for all these?

APPLICATION AREAS

- Virtualization of aggregation network
- Network support for cloud
- Virtualization: cloud management
- MOBILE
- RESIDENTIAL
- Home Gateway control
- Multi-layer packet & optical transport
- Policy-based flow steering at edge
Challenge… Will new open-source initiatives get industry traction?

CONTROLLER “UNIVERSE”

› Open source controllers
  – NOX/POX
  – Trema
  – Beacon
  – Floodlight
  – Maestro
  – Ryu
  – FlowER
  – Mirage
  – Jaxon

› Single purpose controllers
  – SNAC
  – RouteFlow
  – FlowVisor
  – OpenRoads
  – FlowScale
  – Hedera
  – NDDI/OESS

› Commercial controllers
  – ONIX
  – Helios
  – ProgrammableFlow
  – CPlane OpenTransit

…others

Not a complete list!
Challenge… Right level of split which functions should remain distributed?

SPLIT ARCHITECTURE

- Connectivity check
- 50ms protection
- Control network maintenance
  ...
Programmability

- How to utilize SDN for new services
- Where/what is the NorthBound API?

- Network abstraction model?
- Generic Controller or use-case specific?
- Reusability of components?

- DP programmability?
- How much flexibility is needed?
  → OF Future?
- Can we go with generic chipsets?

Challenge... Tools, “languages”, components, chipsets...
SUMMARY

› It is not just virtualization…

› Split between CP and DP: OAM and thin control layer

› How we program the network and what flexibility is needed
  – Both controller and forwarding sides

› Need a migration strategy
  – From legacy to SDN and to interwork with legacy

› Align controller initiatives to leverage scale

› Need experience from live network trials
  – SDN fits best to DevOps model