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Current Trends in SDN

Elissa McCormick
Product Manager

“Think of it as a general language or an instruction set that lets me write a control program for the network rather than having to rewrite all of code on each individual router,” - *Scott Shenker, a Berkley*.”

Legacy networks are holding back the full-potential

"My network is complex and it takes months to deploy applications."

Too Complex

"Network is too static to respond to my applications ."

Too static

" I have to manually configure each and every switch for this new application ."

Too Manual

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SDN vision and strategy to enable agility & alignment

Agility

Alignment

SDN: Creating programmable networks that rapidly align to business applications

- Data center, campus & branch automation
- Open Standards ecosystem
- Reignite innovation
- Easily accessible marketplace

- Coexist with brownfield
- Platform for innovation
- Use-case led
- Automation and simplicity

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SDN Enterprise

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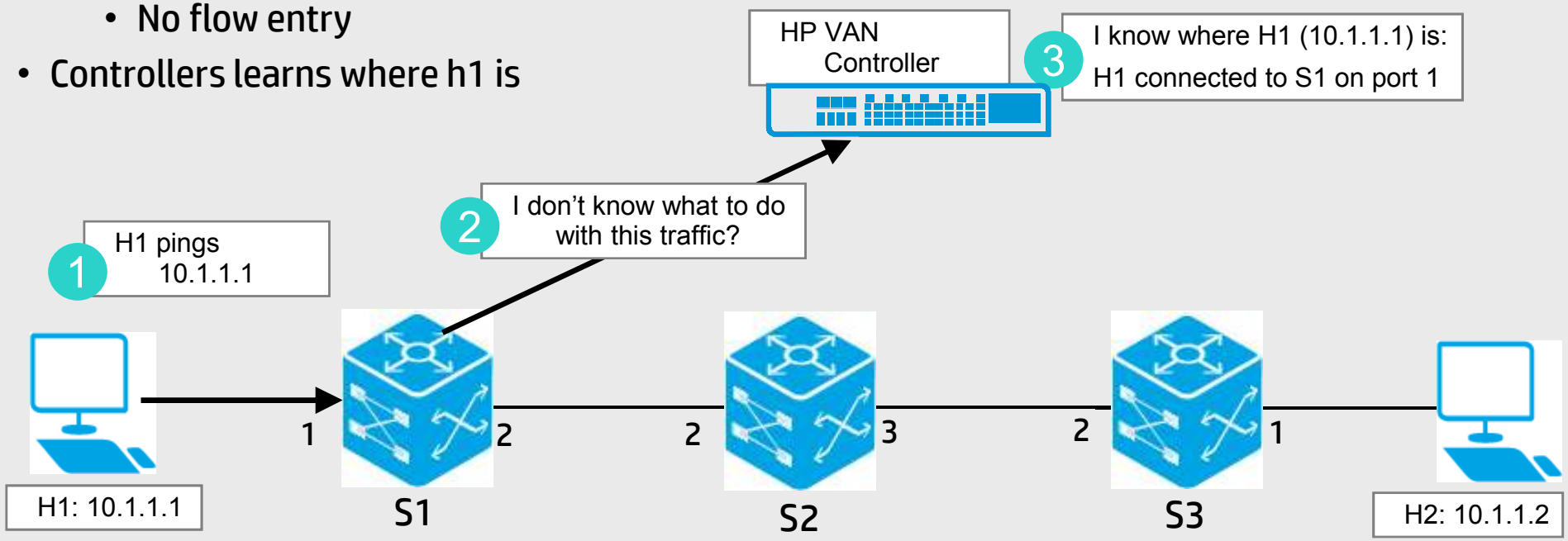
Pure OpenFlow

H1 pings H2

- Traffic sent to switch
- Switch forwards frame to controller
  - No flow entry
- Controllers learns where h1 is



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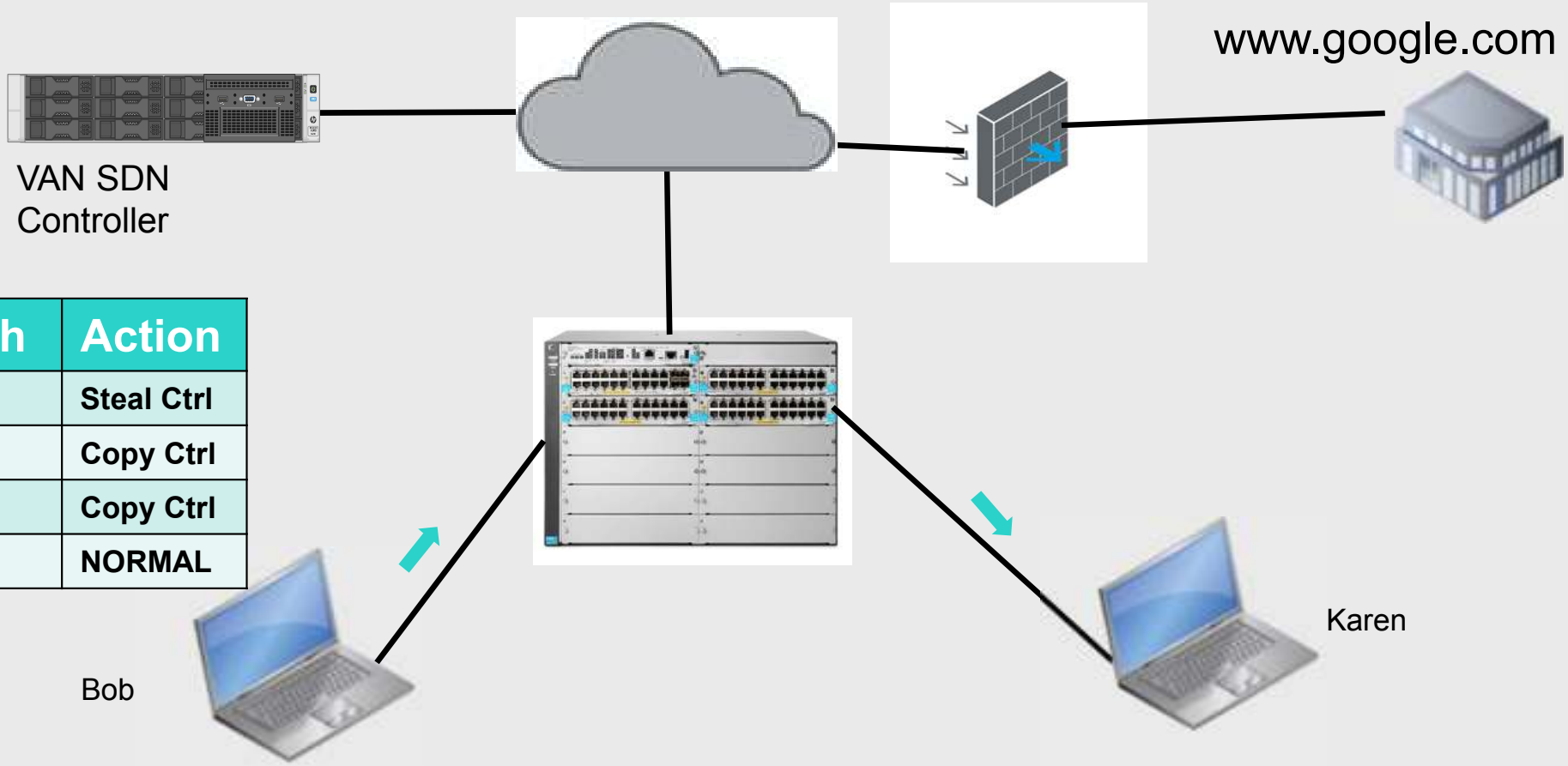
Hybrid Services – Add value today



Match	Action
BDDP	Steal Ctrl
ARP	Copy Ctrl
DHCP	Copy Ctrl
☆	NORMAL

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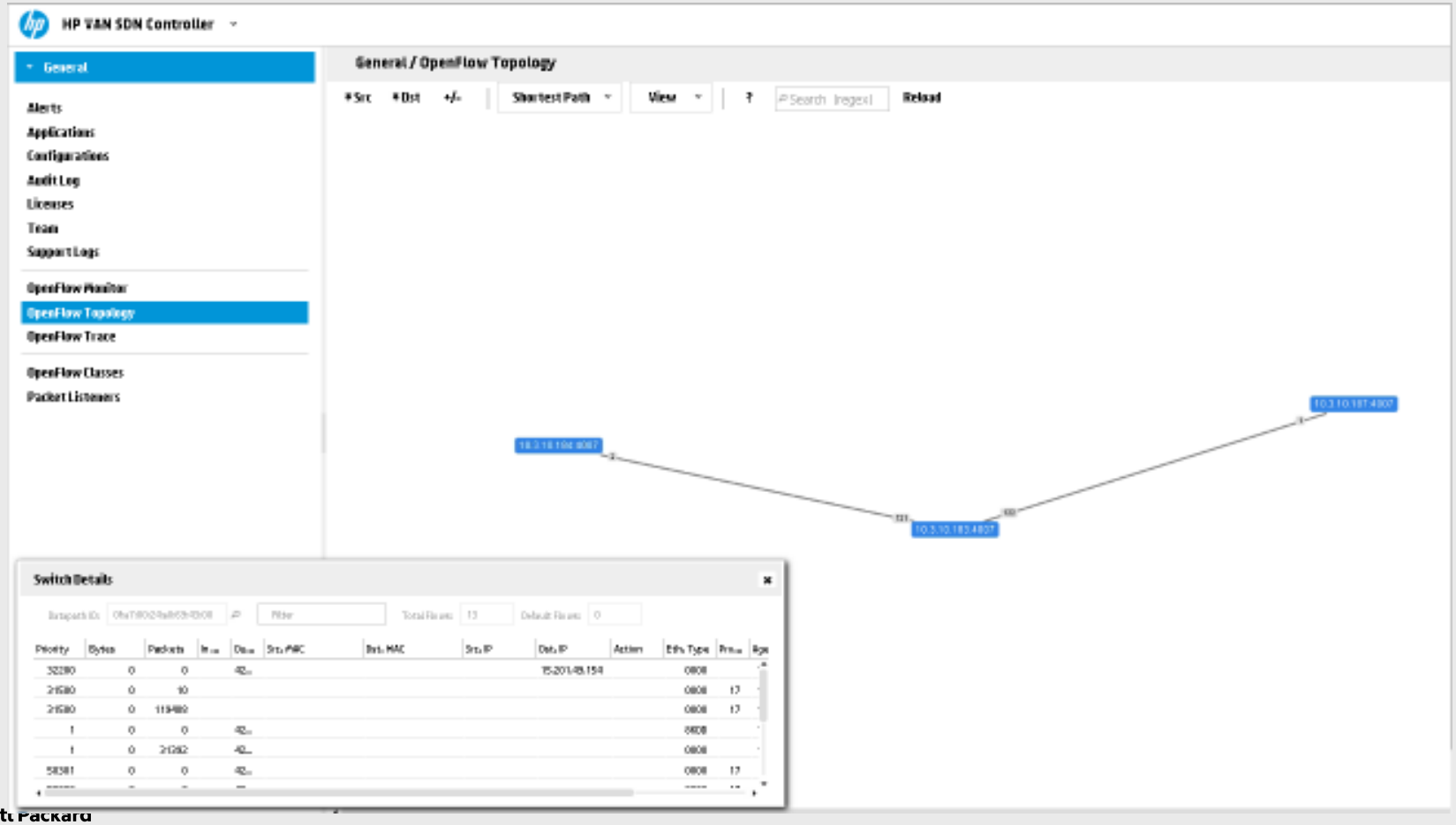
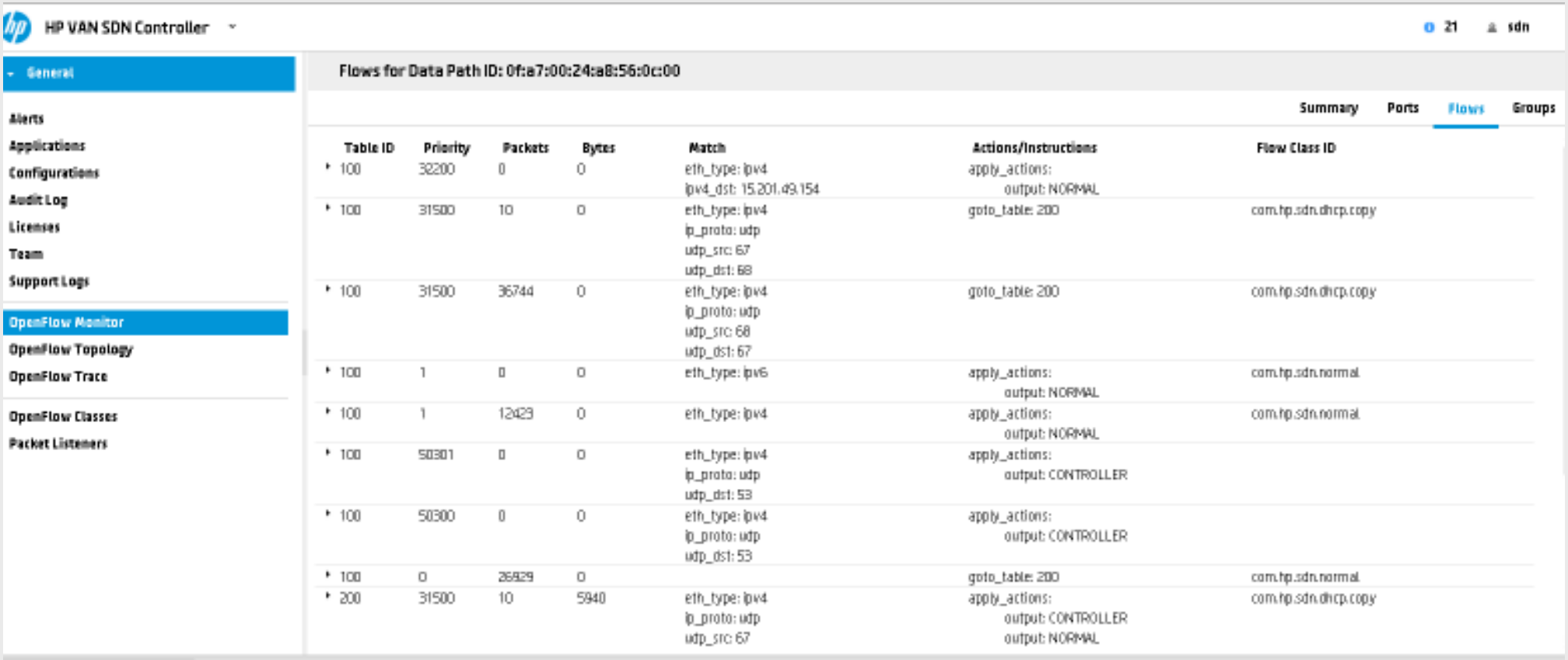
Topology


HP VAN SDN Controller
General
Alerts
Applications
Configurations
Audit Log
Licenses
Team
Support Logs
OpenFlow Monitor
OpenFlow Topology
OpenFlow Trace
OpenFlow Classes
Packet Listeners
General / OpenFlow Topology
Src
Dst
+/-
Shortest Path
View
?
Search (regex)
Reload
Switch Details
Priority
Bytes
Packets
Src MAC
Dst MAC
Src IP
Dst IP
Action
Eth Type

Open Flow Monitor Continued



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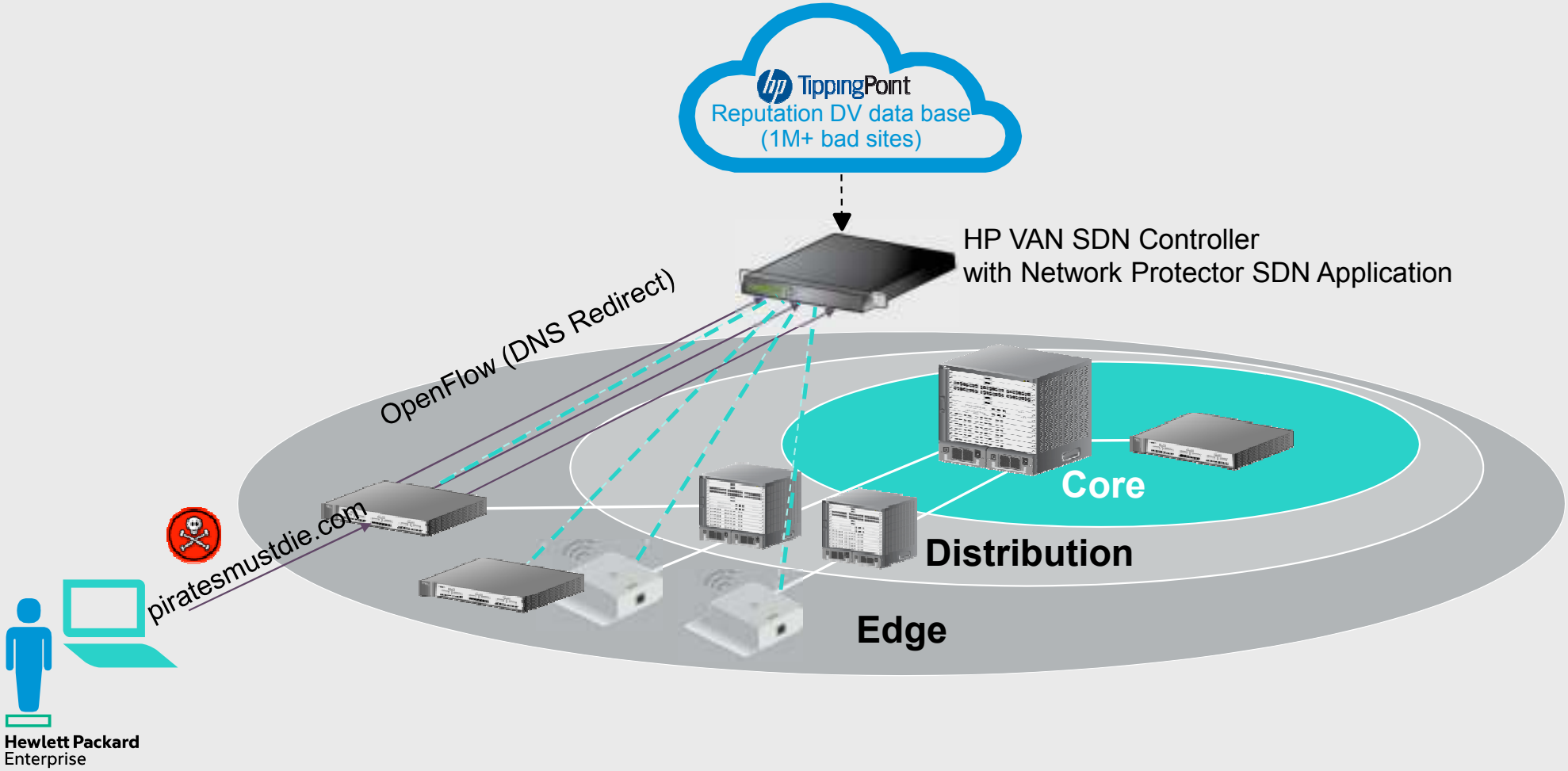
Enterprise SDN Apps

HP Network Protector SDN Application



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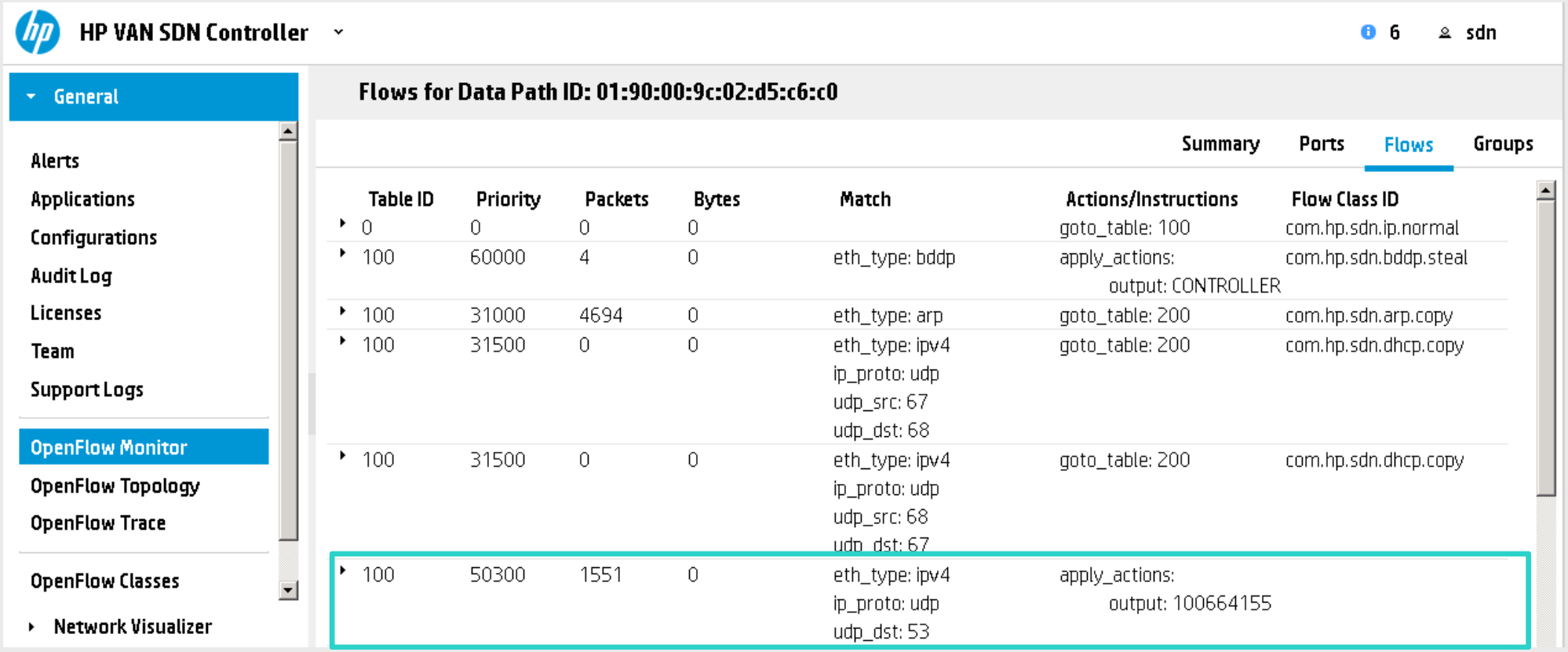
Under the hood



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Automating policy for enterprise networks

HP Network Optimizer SDN application

- Enhanced user experience
- Simplified policy deployment
- Dynamic traffic prioritization based on user/device
- Application integration ready

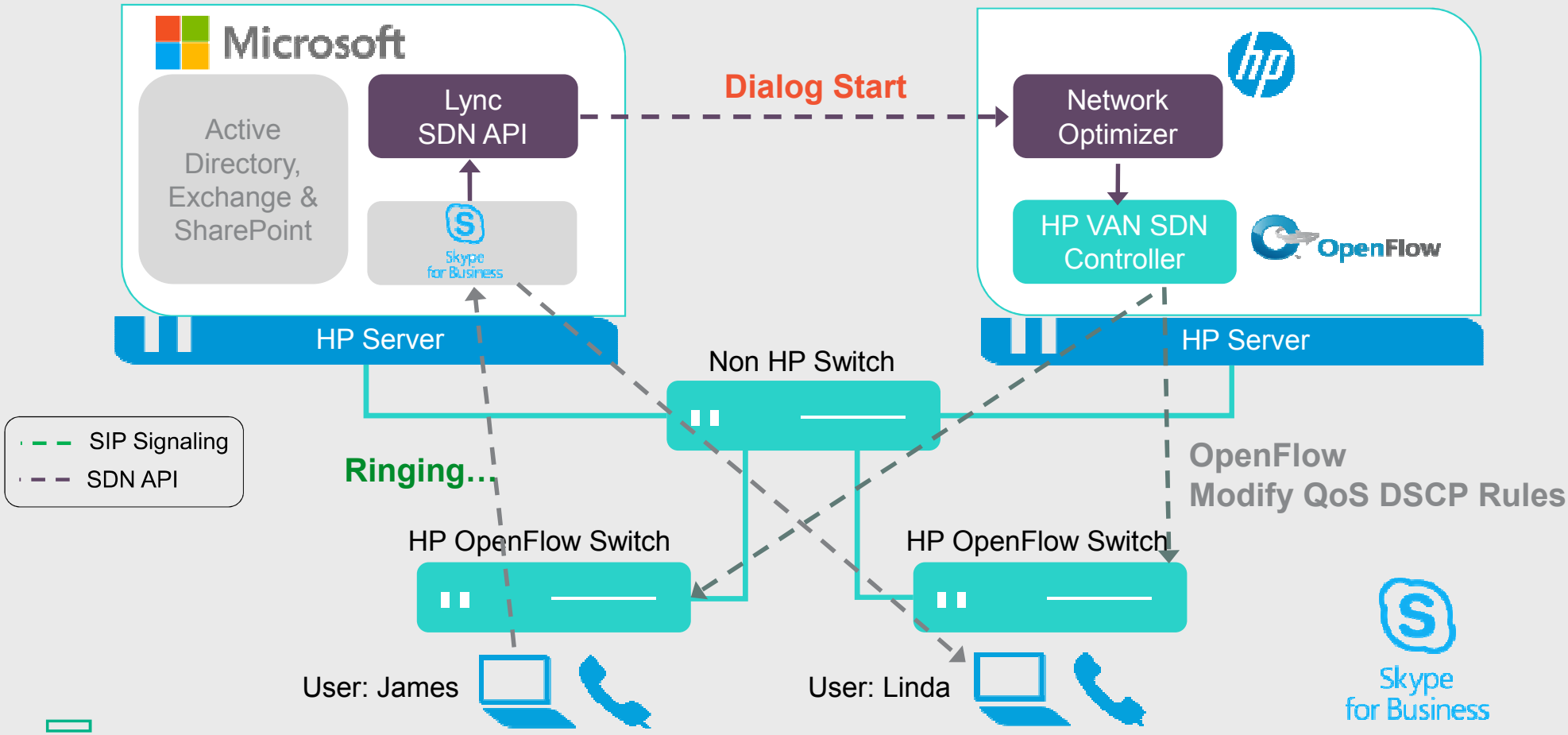
80% reduction in complexity[1]

270% improvement in call quality[1]

40% improvement in S4B quality [2]

1. Internal calculations
2. Dalton college case study

HP Network Optimizer SDN App– S4B



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Instant troubleshooting

HP Network Visualizer SDN application

- Solve help desk issues in a matter of seconds vs minutes
- Real-time visibility and diagnosis
- Simple & automated troubleshooting requiring low level network detail
- Proactively monitor the network to reduce the number of help desk issues

40X Cost saving for network diagnostics[1]

1 Internal calculations

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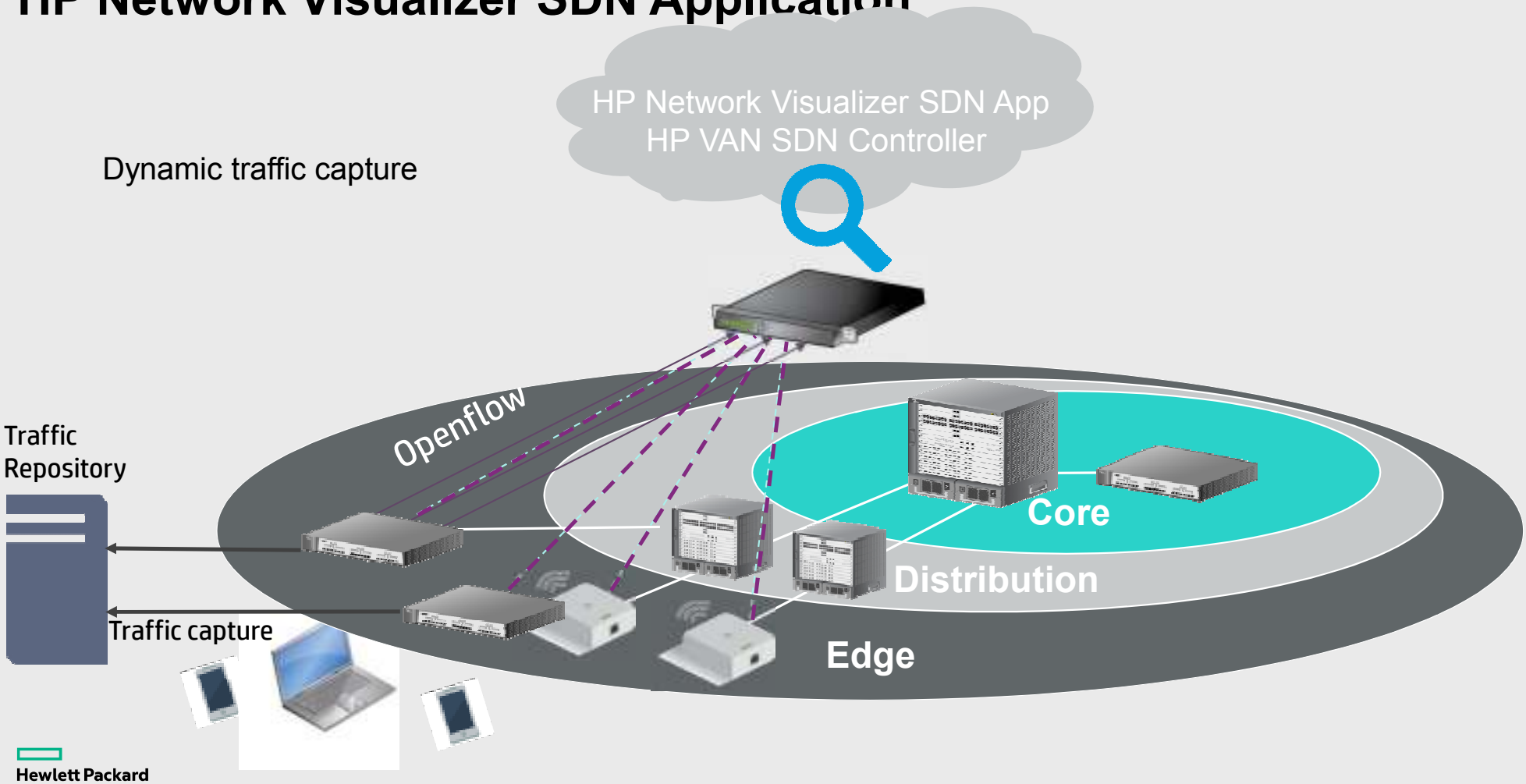
HP Network Visualizer SDN Application



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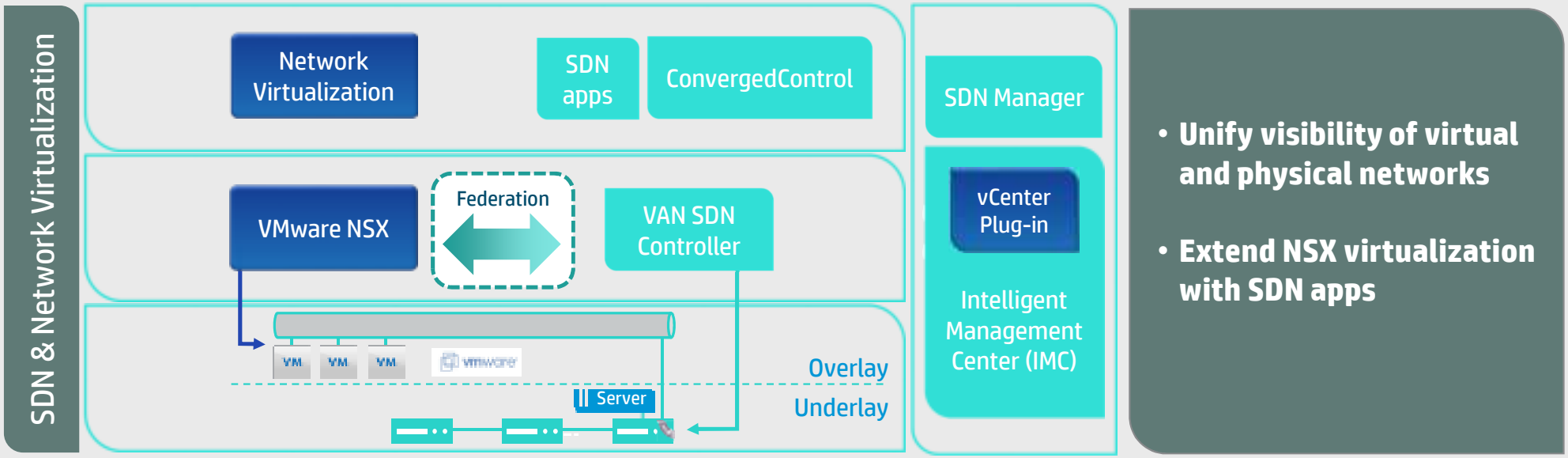
Interesting Projects

Controller Federation

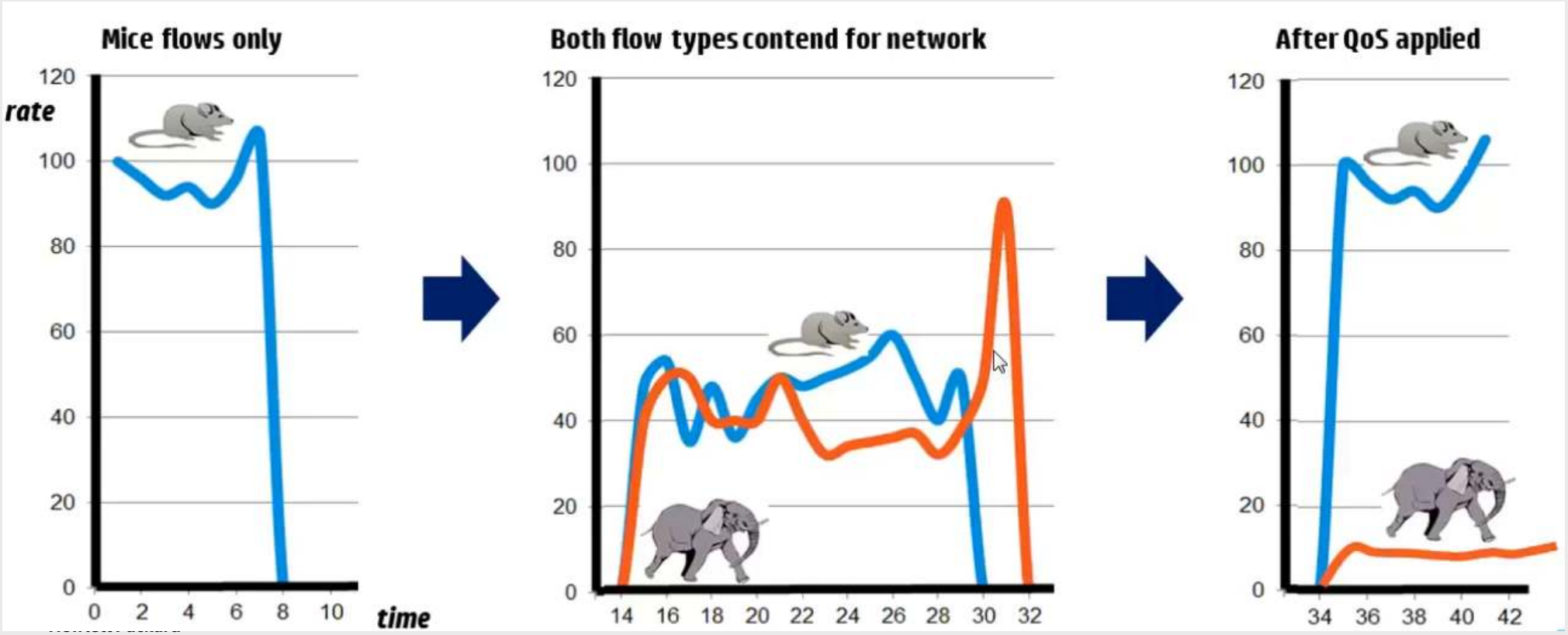
HPE and VMWare -- Open, interoperable solution unifying physical and virtual



https://www.youtube.com/watch?v=NcQq1Og_d9s

Technical Proof Point - Underlay & Overlay Control

– Elephant Flow Quality of Service

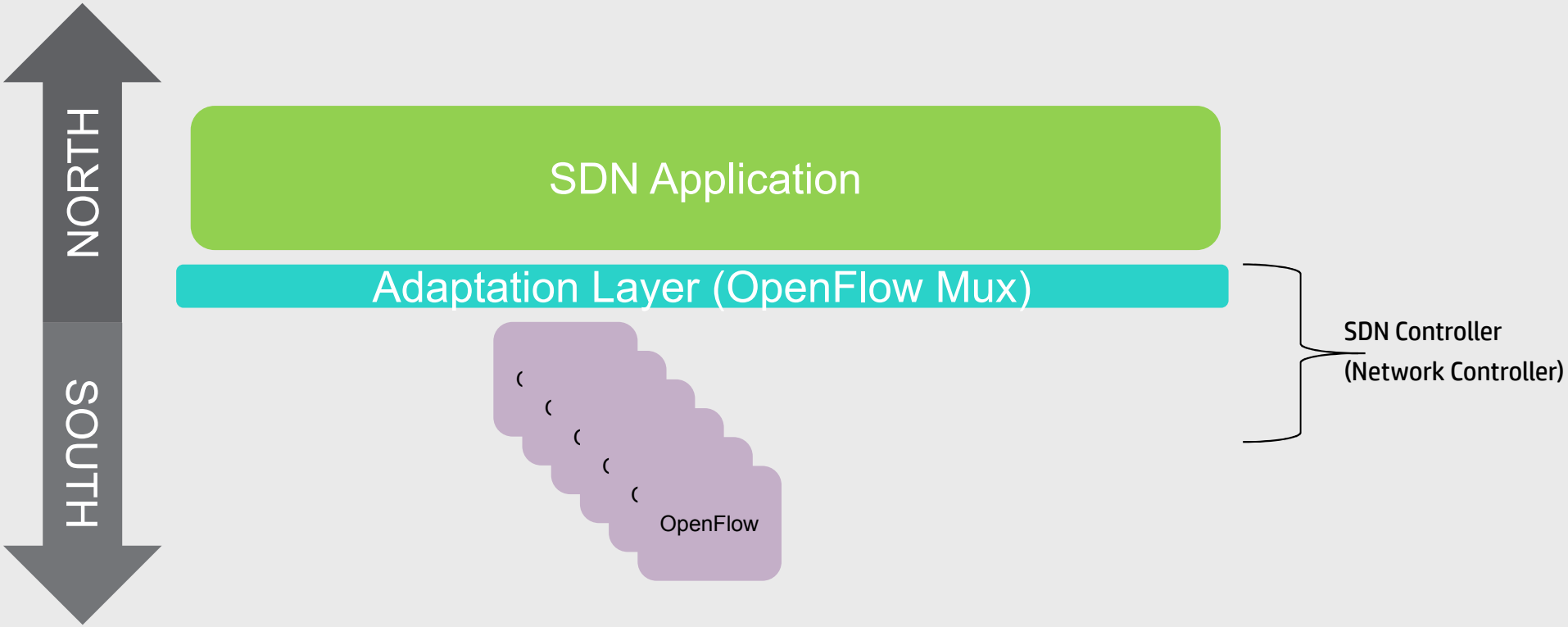


https://blogs.vmware.com/networkvirtualization/2014/02/elephant-flow-mitigation.html

What’s Next

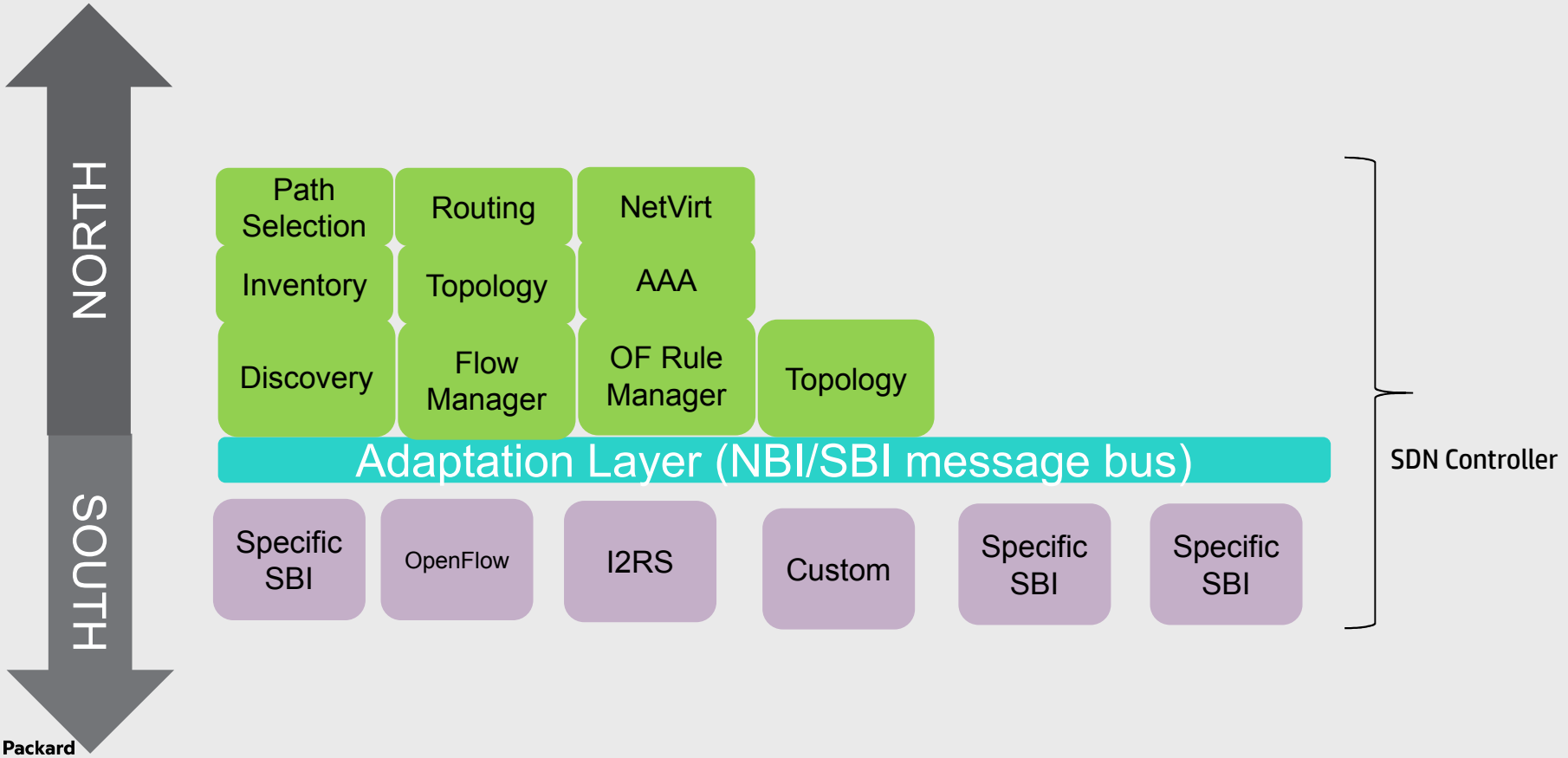
SDN 1.X

OpenFlow == Assembly Language, switch is a flow table.



SDN 2.0 - SDK

Allow Software Engineers to program the network, Way too late to try to standardize



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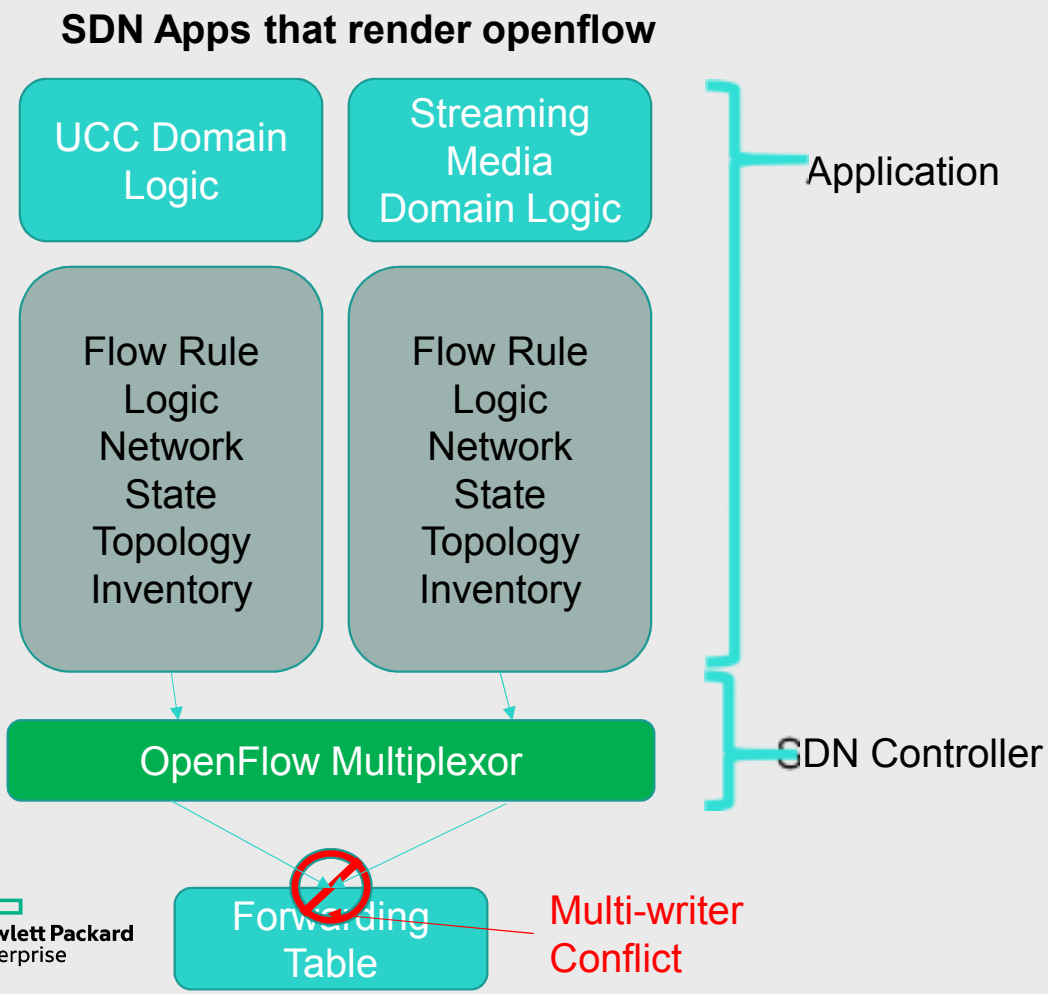
Solving the Multi-Writer Problem



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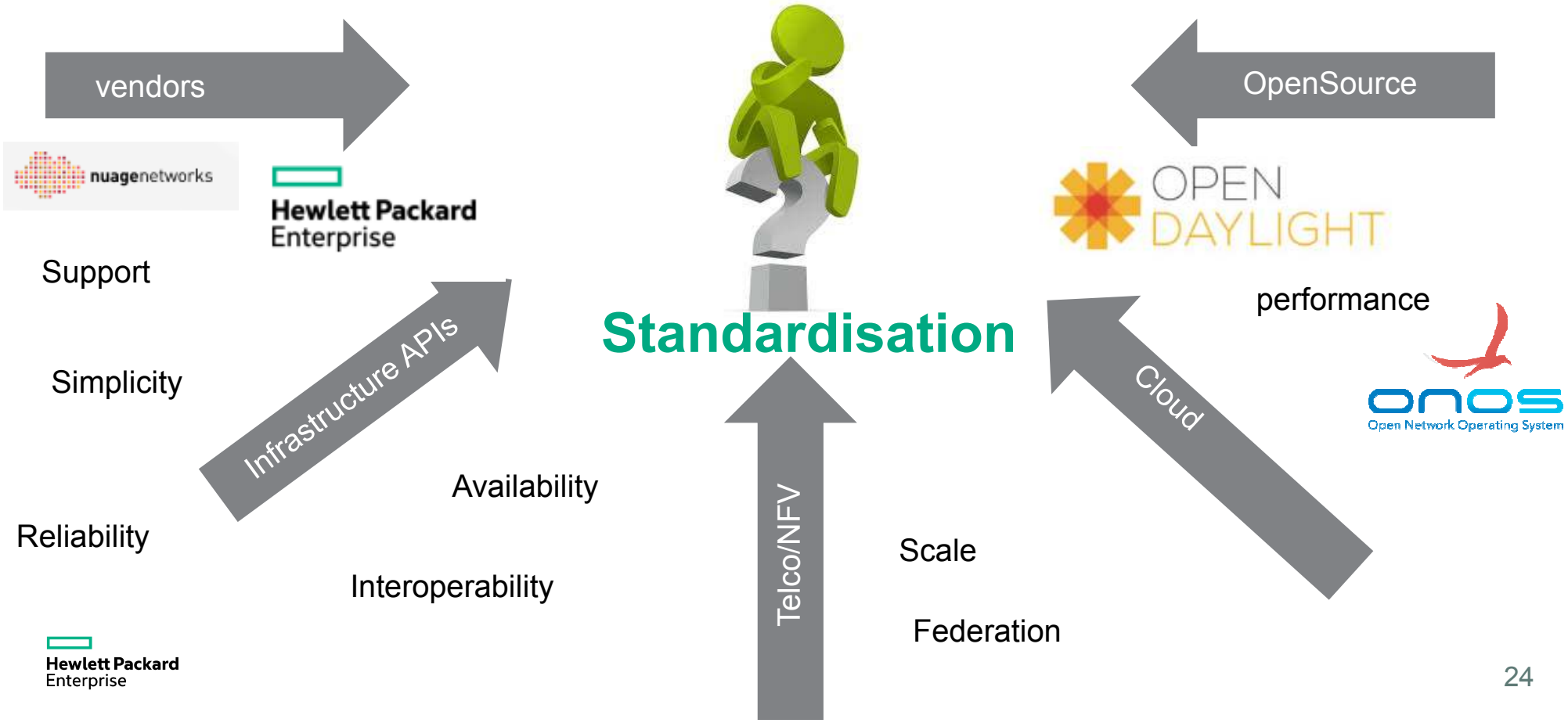
Evolution of SDN

Controller less, Single Controller, Multi controller



Project Boulder - Intent

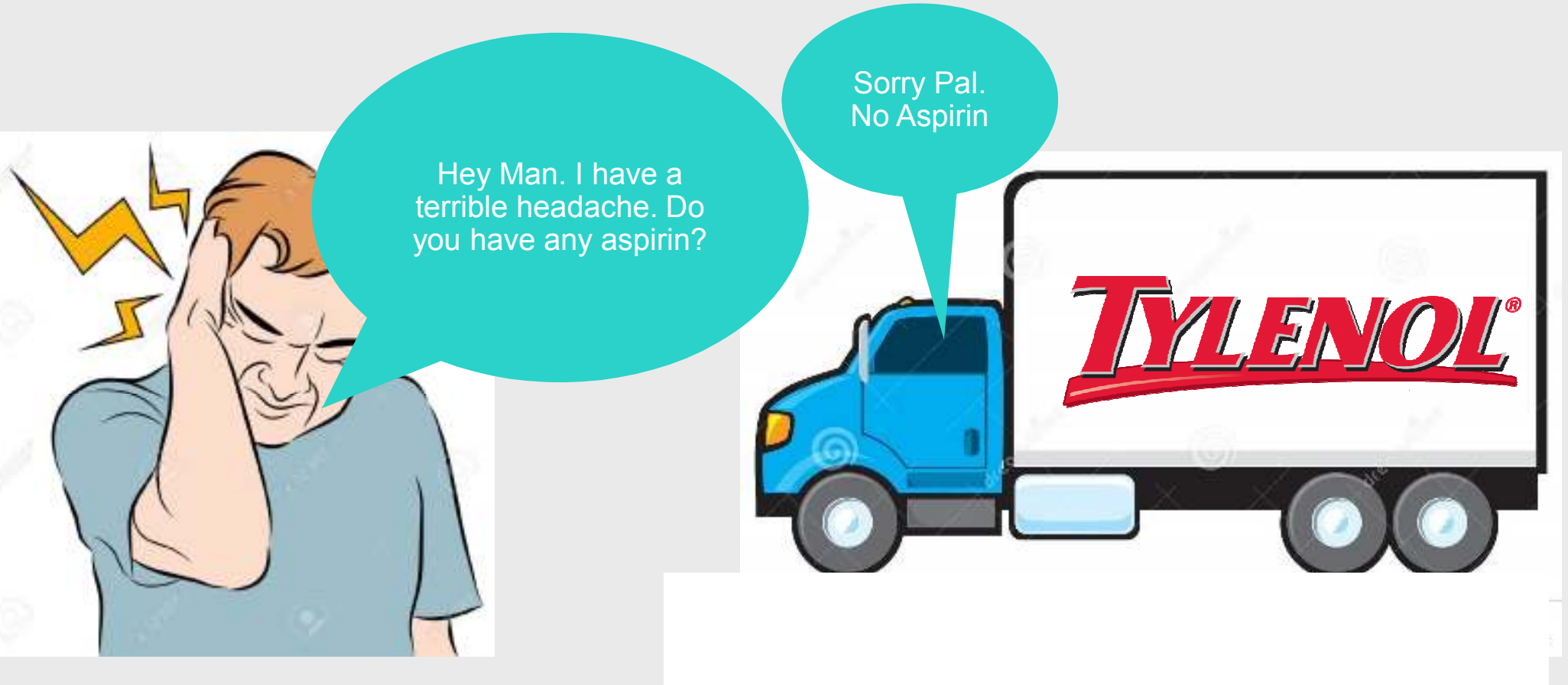
- Intent-based portability across different controller platform solutions.
- Providing a layer that shields application developers from all of the specifics of controller implementations,
- Encouraging the development of an ecosystem across different domains of the network.
- Boulder can work closely with other open source ecosystem parts include OpenDaylight, ONOS, and OpenStack.
- HP (Dave Lemrow) chairman of the northbound Interface Working Group in the ONF and on the technical steering committees of OpenDaylight and OPNFV
- opensourcesdn.org repository

"Don't tell me what to do. Tell me what you need."

Intent Defined and Positioned

–Intent: “what”, not “how”
–Intent as the “universal language”
–Intent is *dynamic*, but *invariant* in expression
–Intent is *portable*
–Intent is *compose-able*
–Intent is scale-able
–Intent brings *context*
–Intent has a small attack surface.

Over-prescription yields fewer solution choices



Intent versus Prescription

Intent

–What I want, not how to do it

–Portable, independent of protocol, vendor, media, etc.

–“I want my headache to stop”

–“Bob is allowed to access the internet”

–“Please cut my lawn”

–Use only secure transit networks

Prescription

–How to do it (Commands, rules, settings)

–Non-portable, dependent on protocol, vendor, media, etc.

–“Give me two aspirin”

–“Send packets matching this 5-tuple out port 11”

–“Take mower out of truck, fill gas and oil, pull starter cord, push onto lawn, …”

–Don’t send packets across network X or Y

Further Defining Intent: Intent + Mappings = Recipe

Intent Mappings (Not Portable)

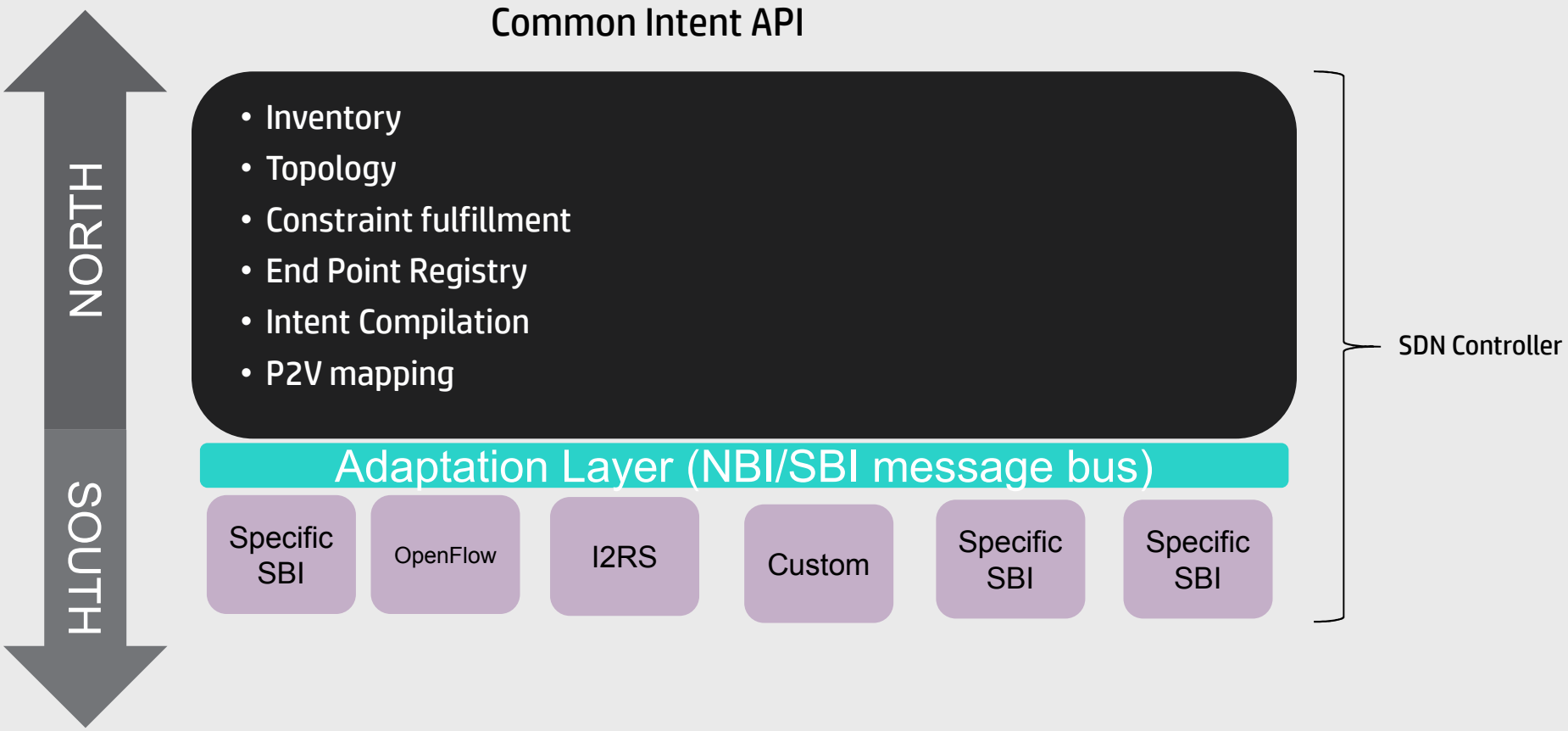
- Devices
- Protocols
- Vendors
- Interfaces
- Addresses
- OSI Layers
- Locations
- 5-tuples
- 12-typles
- Physical interfaces

Intent (Portable)

- Relationships between end point groups
- Labels (to lookup in mapping service)
- Intent verbs (allow, redirect, block)
- Intent constraints (QoS, isolation, safe-DNS, DDOS-safe)

SDN 3.0 – Intent API driven Black Box

Greenfield, Allow millions to “program the network”



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Intent is where the battle for ‘de facto’ API will be fought

Huge interest in vendor and operator communities

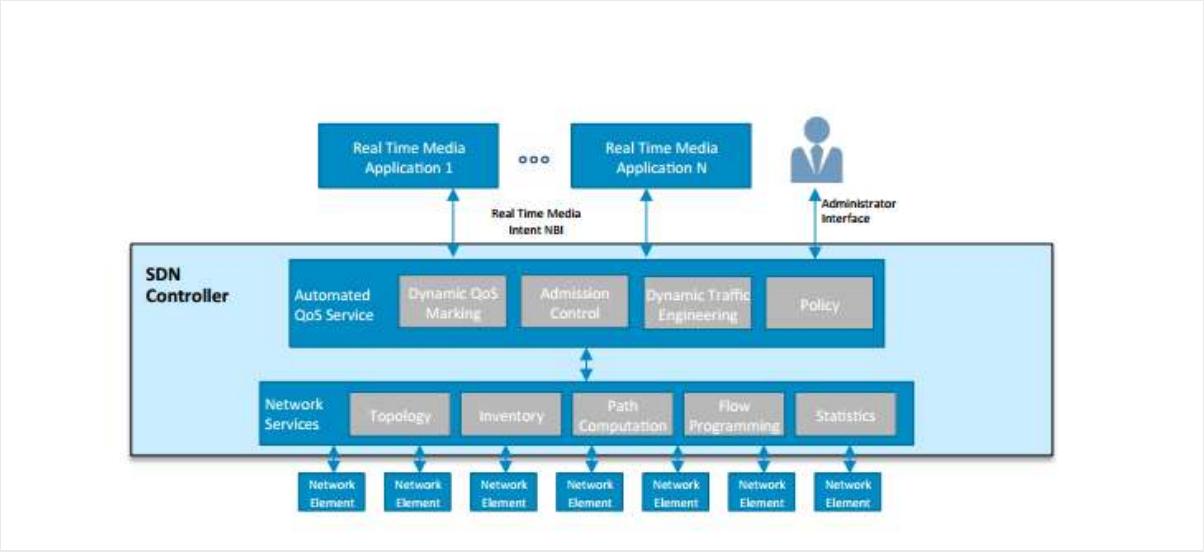
- Intent Value Proposition
  - Ease of Use
  - Portability
  - Composability
  - Scalability
- End of vendor lock era.
- Intent is a greenfield. Other NBI’s already diverged.
- Risk of gaming system
  - Lock in a syntax that favors my product design

Project Aspen- automation in interactive media communications

- Real-time media applications, programming the network.
- Leveraging different modules to provide 360 feedback loop
- Align to Boulder framework
- Develop committee to drive innovation

Microsoft SDN API + HP Network Optimizer

Aspen - QoS



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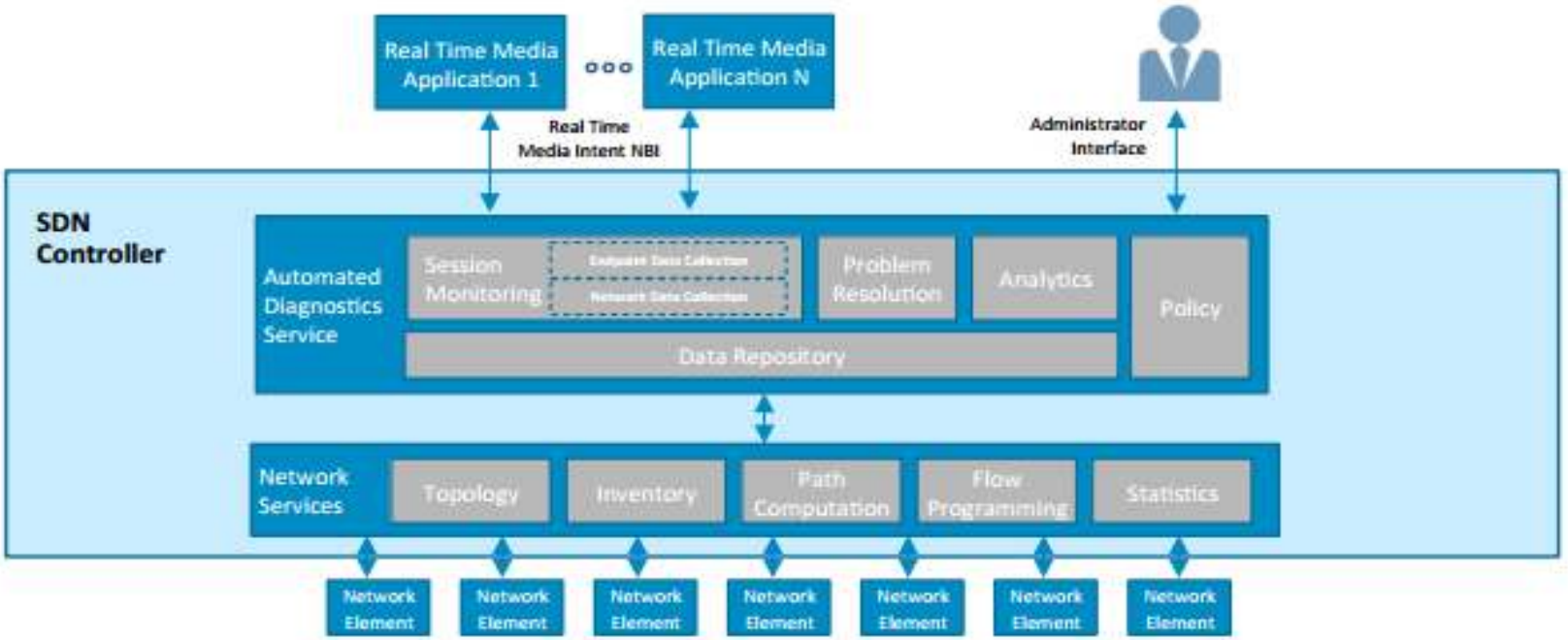
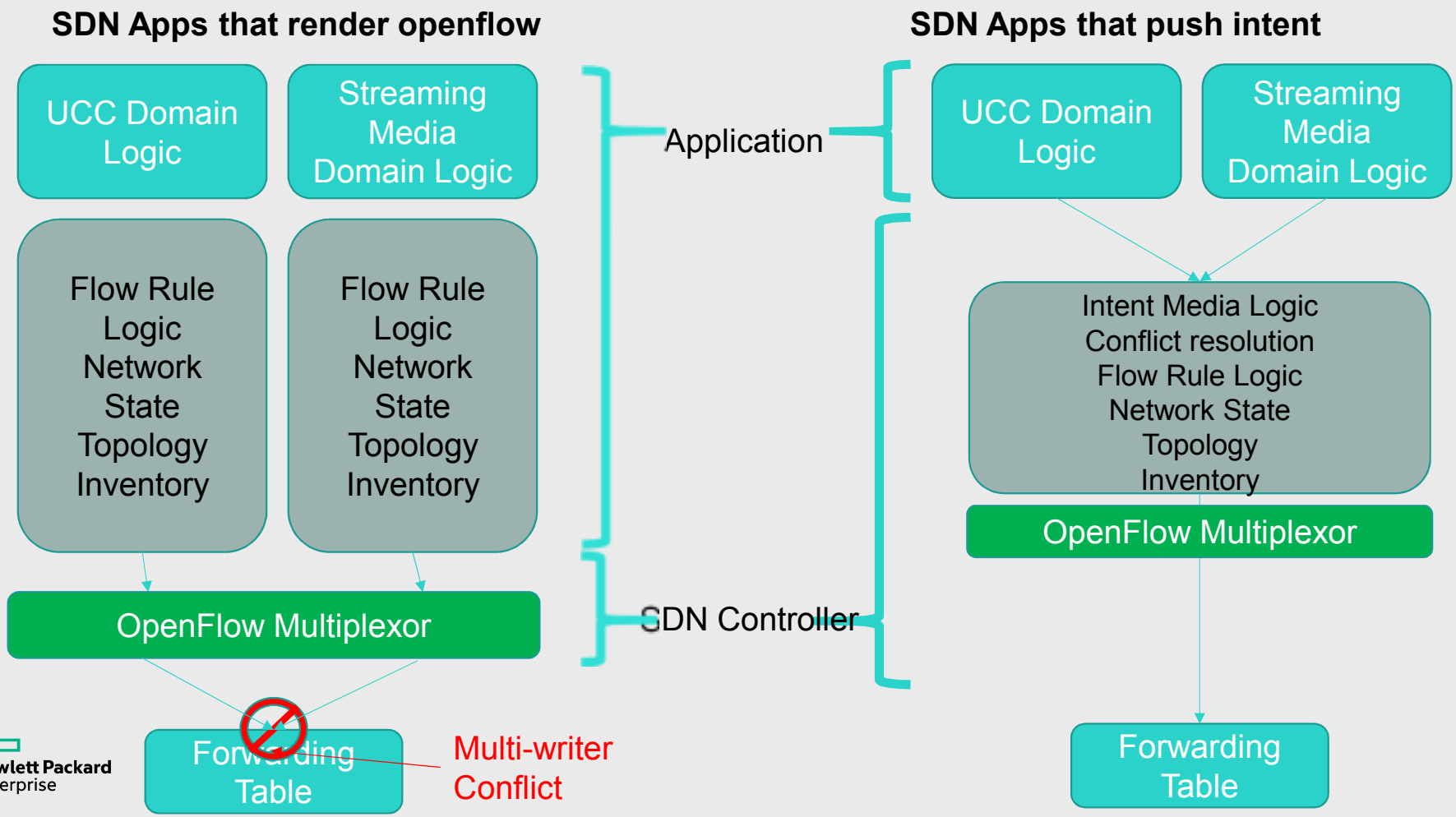
Aspen - Diagnostics



Solving the Multi-Writer Problem



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Supporting Application Development

HPE SDN App Store

60%[1]
Lower costs

90%[1]
Shorter time to Service

100%
Standards-based and open

50
Switches SDN-enabled

[1] Based on Internal Study

... and enterprise ready

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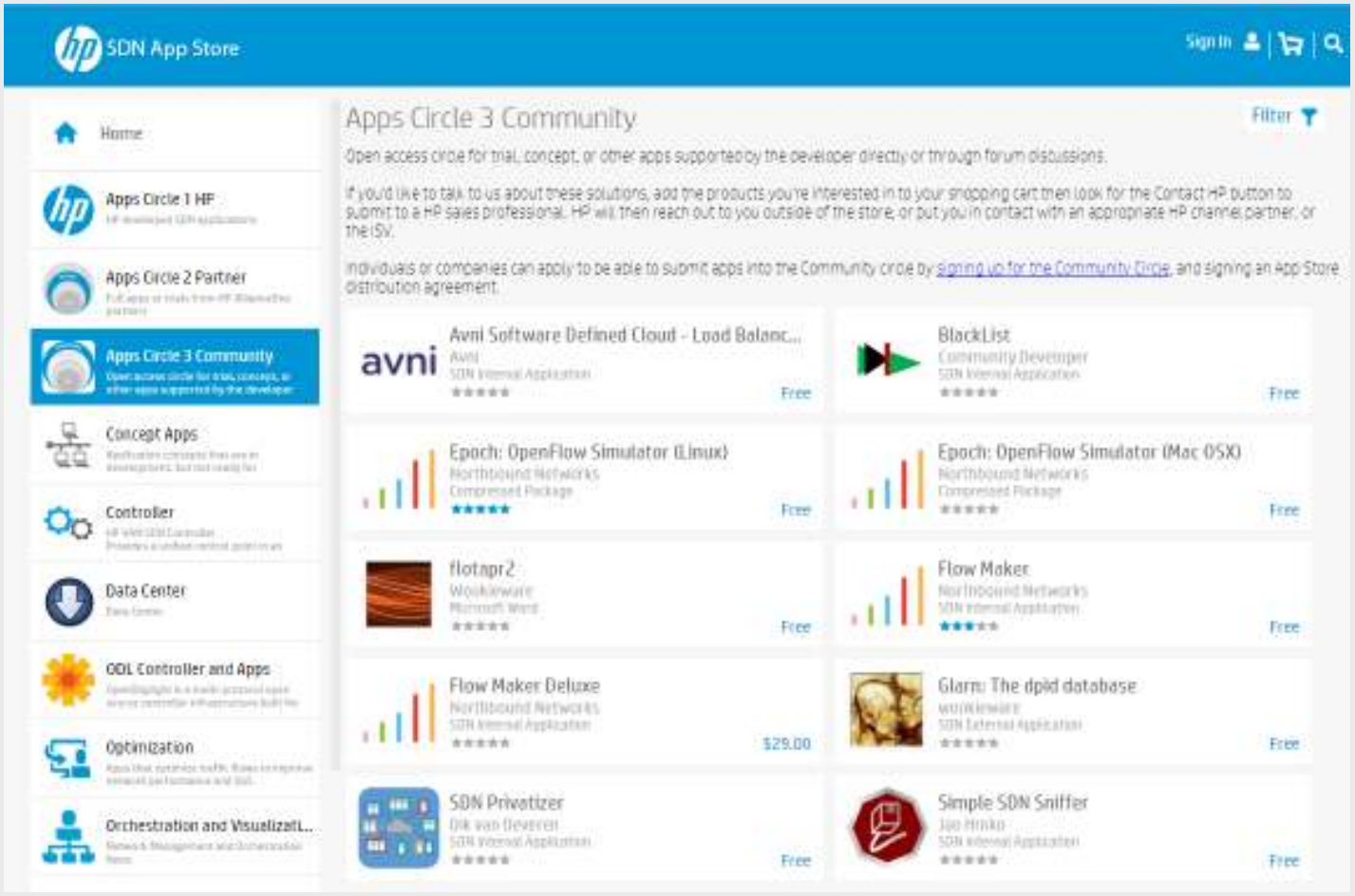
https://hpn.hpwsportal.com/catalog.html#/Home/Show



We've accelerated our innovation over the last year

Over 30 million SDN-ready ports

HP SDN Controller:
7500+ downloads

Customers and development partners

Number of available APIs: 100+

JAVA/ REST/ PYTHON

Curated Apps:

3 HP and 19 Partner

BlueCat, F5, Riverbed, …

Protector, Optimizer, Visualizer

HP SDK Kit:
5000+ downloads

5 Developer events globally

Ecosystem Partners: 30+

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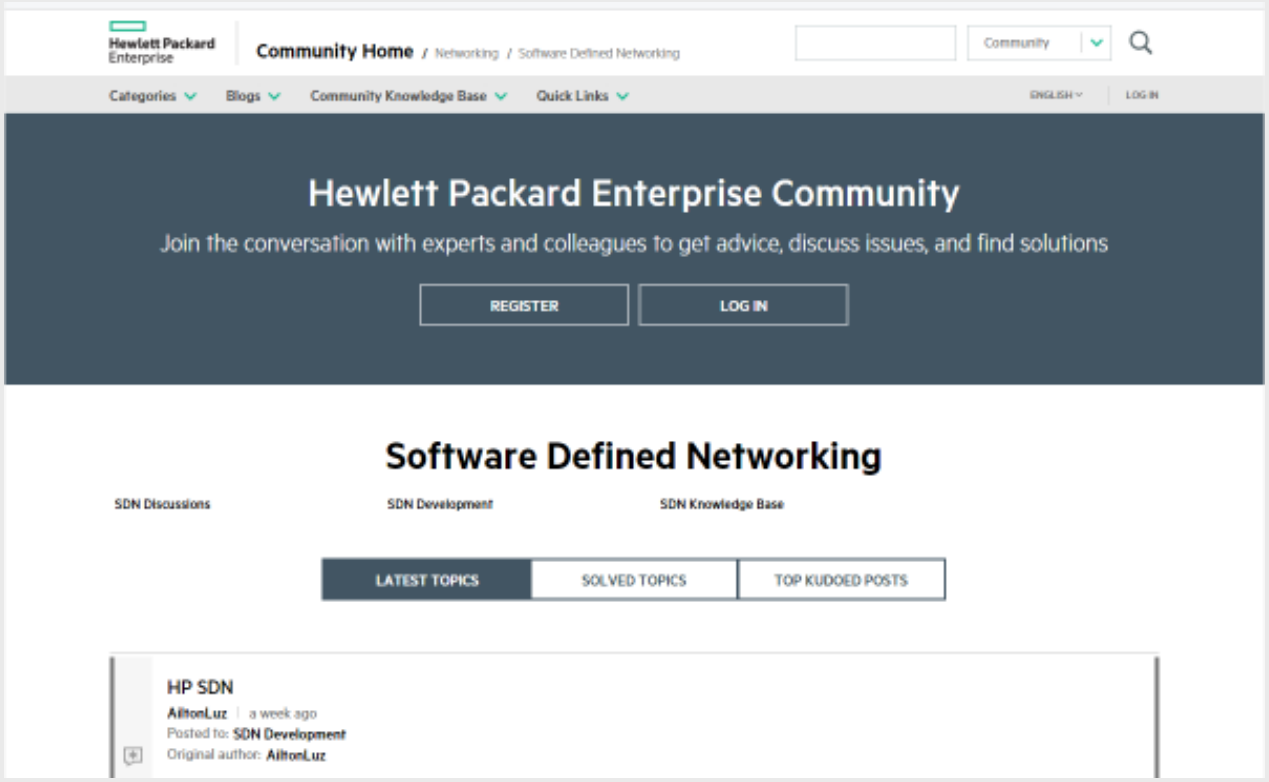
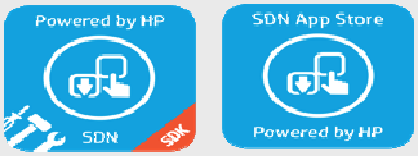
… and we're just getting started

SDN Development Community



http://community.hpe.com/t5/Software-Defined-Networking/ct-p/software-defined-networking

Accelerate innovation with partners



93 SDN Members

21 SDN Apps

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Thank you