# Pica8 & The Quilt Co-Hosting Webcast on Cutting-Edge OpenFlow/SDN Opportunities Optimized for the Research & Education Community

**Hosts:**

   The Quilt: Jen Leasure

   Pica8:    Steve Garrison

**Speakers:**

   Pica8:    David Liu, architect

   Quilt:    Bill Owens, NYSERNet

# Agenda

- **Pica8**

- **Research & Education Focus**

- SDN & OpenFlow

# The Company

## Overview

**Market Position:**
- Open, flexible & adaptive Ethernet switches

**Locations:**
- Headquartered in Palo Alto, Silicon Valley
- R&D facilities in Beijing, China
- Sales & Support offices worldwide

## Vision

*To deliver innovative open, standards-based Ethernet switching and Software Defined Network (SDN) solutions that enable customers to transform their data center infrastructure, becoming more flexible, adaptive and cost effective.*

## Highlights

- Nearly 100 customers worldwide, including Fortune100s, Global Carriers, Leading Labs & Portals
- Leadership in OpenFlow / Open-vSwitch support
- Founded in 2009, venture backed
- Experienced, best-in-class management team

## Open Switch OS & OpenFlow



## 1st to Deliver an Open, Hardware Independent Switching Platform

# Pica8's Focus

**Research & Education**
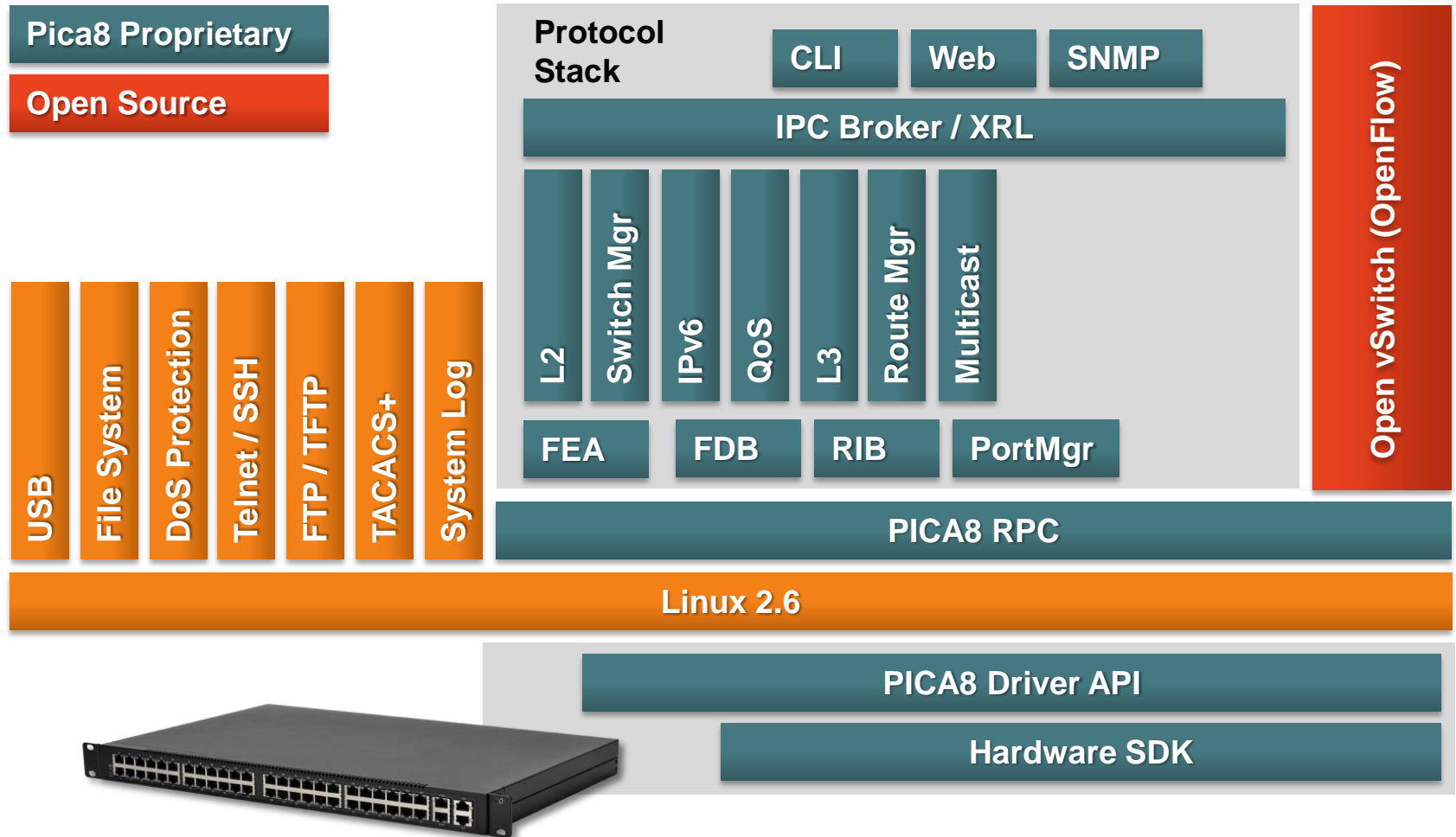
**Hyper Scale Data Centers**

# Agenda

- Pica8

- Research & Education Focus

- **SDN & OpenFlow**

# Pica8 OS (PicOS) Architecture



**Pica8 Proprietary**

**Open Source**

**Protocol Stack**

CLI | Web | SNMP

**IPC Broker / XRL**

L2 | Switch Mgr | IPv6 | QoS | L3 | Route Mgr | Multicast

FEA | FDB | RIB | PortMgr

USB | File System | DoS Protection | Telnet / SSH | FTP / TFTP | TACACS+ | System Log

**Open vSwitch (OpenFlow)**

**PICA8 RPC**

**Linux 2.6**

**PICA8 Driver API**
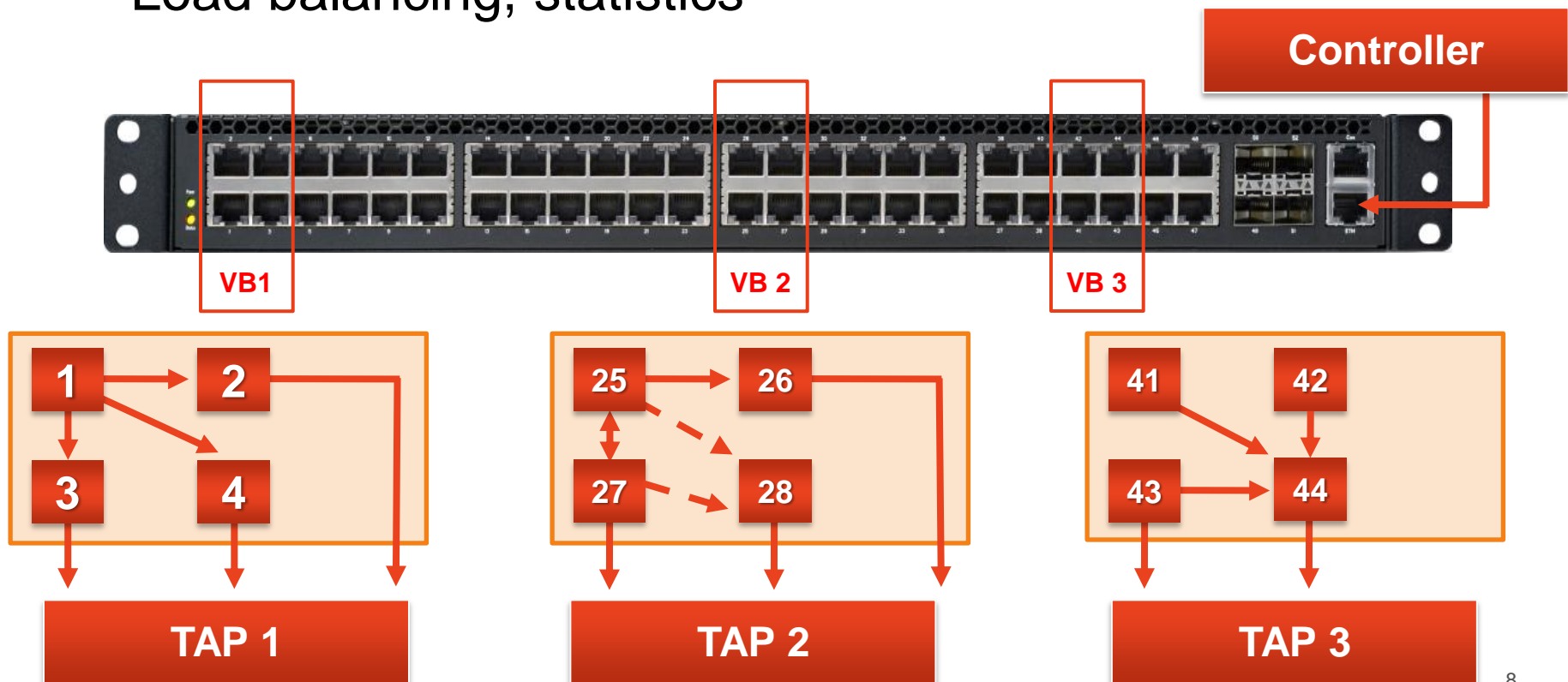
**Hardware SDK**

# Open vSwitch/ OpenFlow Overview

- Latest release: R1.6.1

- Support OpenFlow v1.0 and v1.2

- ASIC limitations:
  - P-3290/3295: 2000 IPv4 and 1000 IPv6 flows based on 15 tuple match TCAM configuration
  - P3780/3920: 1000 IPv4 flows. IPv6 not supported
  - TCAM could be reconfigured to maximize the number of entries
  - SET action support subset of Layer 3 header fields

- OpenFlow v1.2 feature compliance matrix
  - See matrix for supported V1.2 features
  - LAG & Group Tables to be supported in coming releases
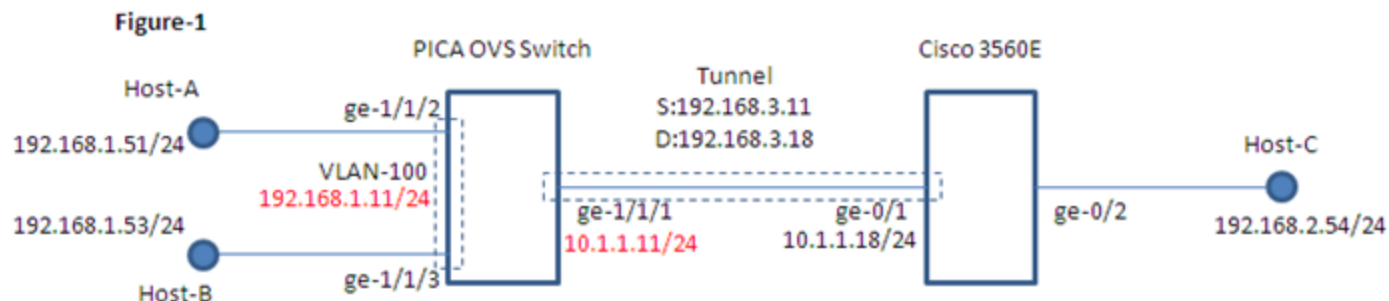  - Comments on compliance matrix are welcome

# SDN Use Case: Network TAP

- Centralized or distributed controllers (via in-band)
- Switch virtualization
- Multicasting, mirroring, aggregation, filtering
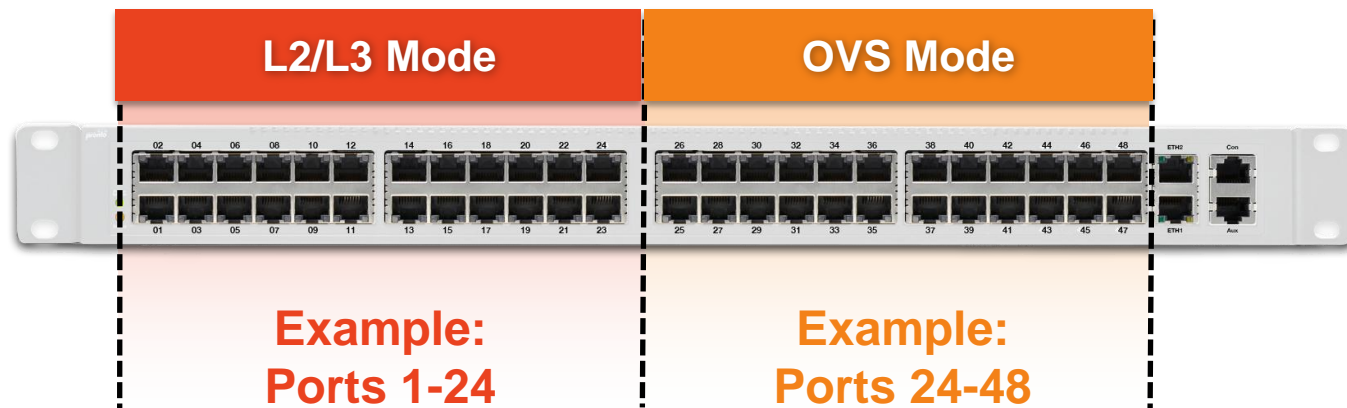- Load balancing, statistics

# SDN Use Case: GRE Tunnel

- **GRE virtual port, starting at port # 91**
  - Create bridge for ge-1/1/1 to ge-1/1/3
  - ovs-vsctl --db=tcp:w.x.y.z:port add-port br0 gre1 -- set Interface gre1 type=pca8_gre options:remote_ip =10.1.1.18  options:local_ip=10.1.1.11 options :vlan=1 options:src_mac=… options:dst_mac=0… options:egress_port=ge-1/1/1
  - ovs-ofctl add-flow br0 in_1port=2,dl_vlan=100,actions=output:91
  - ovs-ofctl add-flow br0 in_port=1,ip,nw_dst=192.168.1.51,actions=mod_dl_src:…, mod_dl_dst:…,output:2
  - Configure ARP forwarding for Host A and B for bridge

**Figure-1**

Host-A
192.168.1.51/24

ge-1/1/2

PICA OVS Switch

Tunnel
S:192.168.3.11
D:192.168.3.18

Cisco 3560E

Host-C
192.168.2.54/24

VLAN-100
192.168.1.11/24

192.168.1.53/24

ge-1/1/1
10.1.1.11/24

ge-0/1
10.1.1.18/24

ge-0/2

Host-B

ge-1/1/3

**Host-B**

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# Hybrid Mode:
# Two Ships in the Night

- OpenFlow and L2/L3 pipelines coexist on same port

- The pipelines are separated by VLANs

- No internal data path between the 2 pipelines

- Support for OpenFlow v 1.0 only

- Multiple controllers

| L2/L3 Mode | OVS Mode |
|:---:|:---:|



**Example:
Ports 1-24**    **Example:
Ports 24-48**

**Thank You**

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