OPEN POSSIBILITIES.

FBOSS Experience in Onboarding a Second Silicon Vendor
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FBOSS

- **Facebook Open Switching System (FBOSS)**
- Meta’s software stack for controlling/managing network switches deployed in Meta’s Datacenters
- One of the largest services in Meta in terms of the number of instances deployed
Hardware

OPEN POSSIBILITIES.
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Hardware

• 16 x QSFP-DD: 400G/200G/100G ports
• 32 x QSFP56: 200GE/100GE ports or 2*50GE/4*25GE/4*10GE breakout ports
• RS232 console port to BMC
• OOB GE management port
• USB 2.0 compatible: Support for OCP debug card
• System Controller Module (SCM)
• Power Plane: AC/DC or DC/DC PEM
• Fans: Four 80mm x 80mm x 80mm counter-rotating fan-trays
Hardware: The Journey

- Goal: Design and build a switch that is 100% interchangeable with Wedge400
- Cisco gave a series of instructional classes
- ODM engagement: Celestica has been an outstanding partner
- Hardware Development:
  - EVT phase proceeded rapidly and then Covid lockdowns occurred mid-DVT
  - Critical for onboarding a second vendor, Cisco was (and is) a true partner and provided excellent training and support throughout the life cycle of the program development
  - Cisco participated in initial on site hardware bringup and debug
  - There were relatively few hardware related issues. No post DVT HW spin
  - The project transitioned from PVT to MP in June, 2021
FBOSS Software Architecture

NETWORKING

FBOSS

Vendor SDK

Vendor ASIC

OPEN POSSIBILITIES.
FBOSS + SAI

• SAI
  ○ Switch Abstraction Interface
  ○ Project under Open Compute Project (OCP)
  ○ Open source API to control forwarding elements
  ○ Vendor independent
• FBOSS SAI based implementation:
  ○ HwSwitch: multiple ASICs, ASIC vendors
  ○ Easy to onboard newer ASICs
  ○ Open source contributions
    ■ FBOSS is open source
    ■ Meta contributes to SAI spec
Software - SDK Integration

- Difference in tool chains and other external dependencies
- Integrating the SDK into Meta infrastructure is a challenge
  - ~3 - 4 weeks during initial phase
  - ~2 days to integrate now.
- Several SDK drops to attain feature parity
- SDK release cadence of 2 weeks
Software - Validating functionality

- Existing tests were vendor dependent
- Ported ~1000 tests to a vendor agnostic framework
  - The same tests run on sai platforms and non-sai platforms.
  - Automated to run every day on all platforms
  - Performs warmboot
- Validated asic functionalities like ECMP, QOS, Hashing, Port Up/Down, ACL, Buffers, Schedulers
- Worked with vendor to ensure every release enables more tests
Software - FBOSS Open Source

- ~90% of FBOSS code is open sourced
- Feature Development was done in parallel for FBOSS and Vendor
- Vendor can build and run the hw tests to validate theasic functionality
- Gating factor before making a new SDK release
Software - Tooling

Several tools have to be developed and updated in order to onboard a newasic.

- **Push tooling**: Tools that are used to deploy the binary in the fleet should be aware of the 2nd asic.
- **Kernel module installer**: Kernel module has to be installed and deployed across the fleet
- **Chip specific Configuration Generation**: Vendor specific configuration has to be generated
- **Test infrastructure**: In order to run hardware tests on sai platforms, test infrastructure needs to be updated.
Software - Challenges

● **Different vendors using different SAI version**
  ○ Hard to force a vendor to be on a particular SAI version
  ○ Currently, FBOSS uses the header files provided by the vendors

● **SAI Extensions:**
  ○ Functionality diverge between vendors. For eg, LED
    ■ Generic attributes, propose it to the SAI community.
    ■ Specific attributes, use SAI extension.
Cisco Silicon One Portfolio

One Architecture. Multiple Devices. No Compromise.
Cisco Silicon One Q200L Powering Wedge 400C

One Architecture. Multiple Devices. No Compromise.
Cisco Silicon One Q200 Family

- **Higher bandwidth**
- **P4 Programmable**
- **Optional Deep Buffer**
  - Q200 – DCI, WAN Network
  - Q200L – Web Scale Data Center Network
Cisco Silicon One Foundation

IOS-XR
Platform Specific API 1

Industry NOS N
Platform Specific API N

Cisco Silicon One SDK

Cisco Silicon One Device
Cisco Silicon One Foundation

IOS-XR
Platform Specific API 1

Industry NOS N
Platform Specific API N

SONiC

FBOSS

SAI

Cisco Silicon One SDK

Cisco Silicon One Device
Cisco Silicon One Success Elements

- Exceptional teamwork across Facebook, Cisco and ODM vendor
- Continuous issue tracking with rapid closure
- Joint world class engineering talent
**Cisco Silicon One Across The Network**

- One Architecture
- One SDK
- One Forwarding Code
- One Form-Factor
- One Design
- One Network
- One Experience

Without Compromise

**OPEN POSSIBILITIES.**
Call to Action

- SAI Spec revisions should not break warm-boot
  - e.g. enum re numbering has broken warm-boot in the past.
- SAI Spec enhancements
  - Faster turnaround
Thank you!