TAI Workshop

TAI: Background and history

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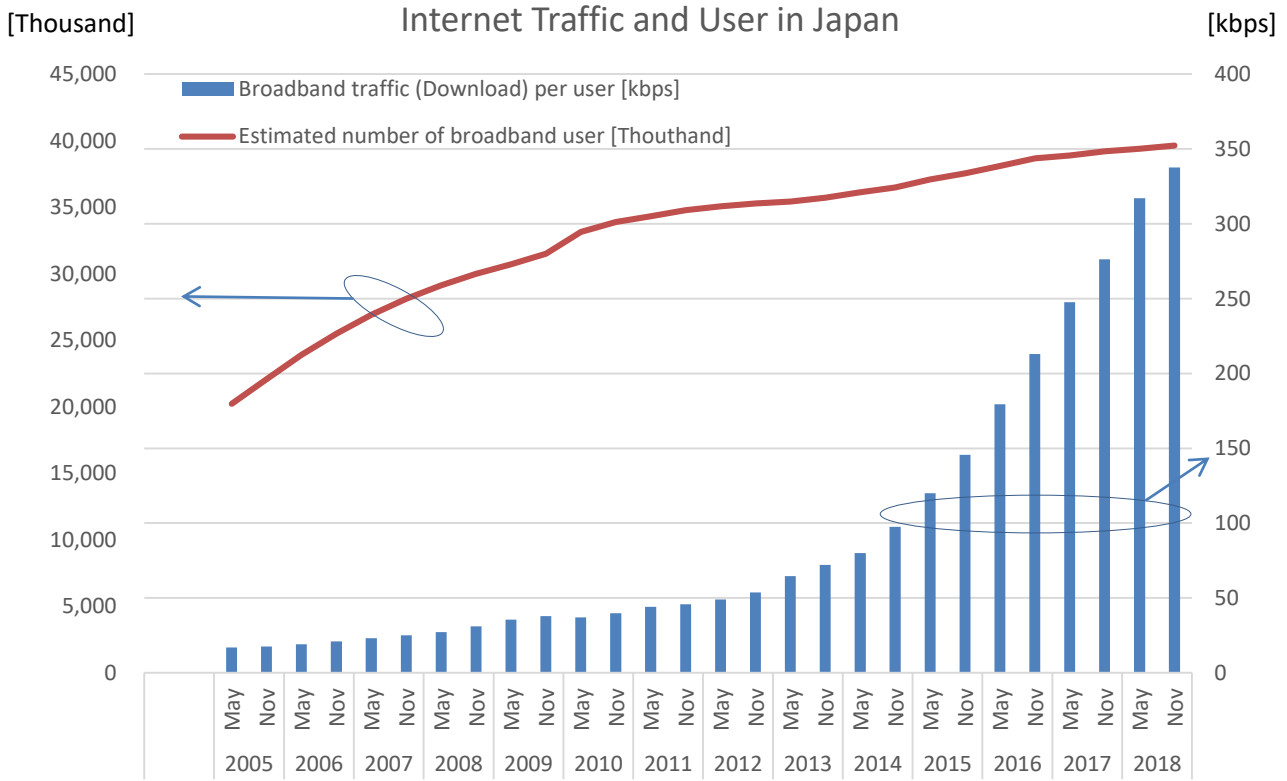
Growing Traffic Demand

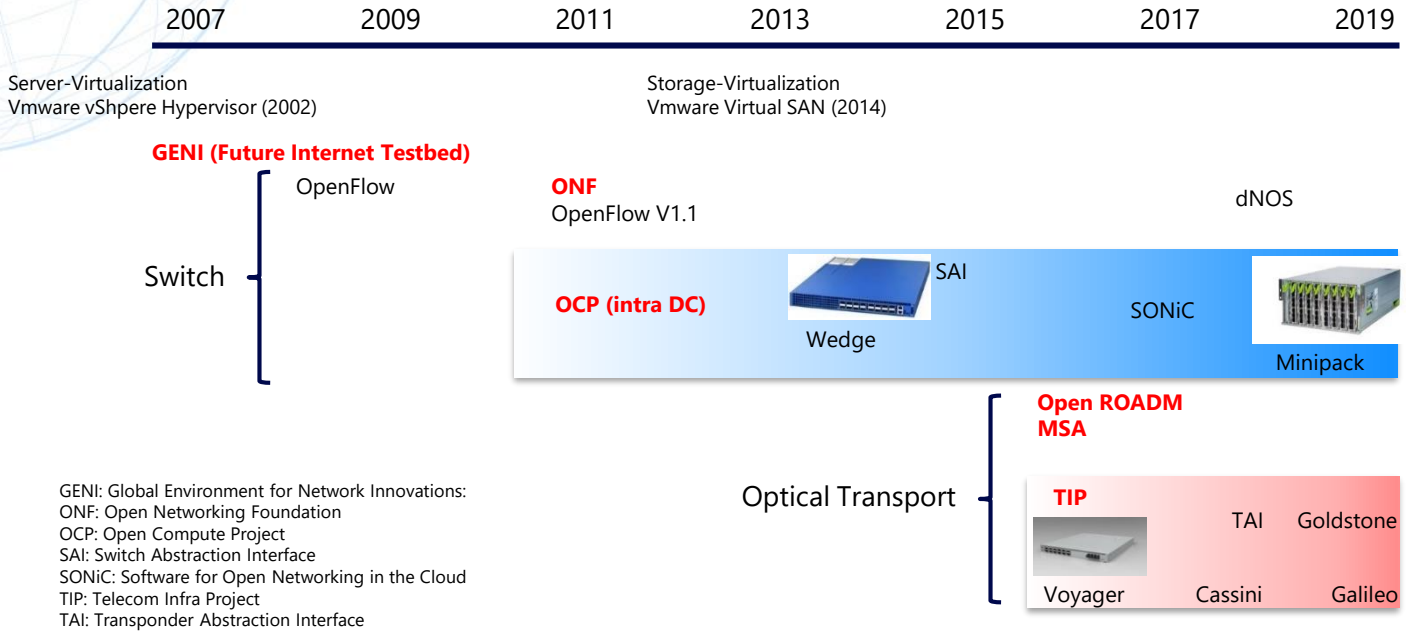
- The CAGR of internet traffic per user is more than 20%.
- The amount of user shows sign of leveling off.



SOURCE: Ministry of Internal Affairs and Communications, "Aggregation and Provisional Calculation of Internet Traffic in Japan"

Activity for open networking

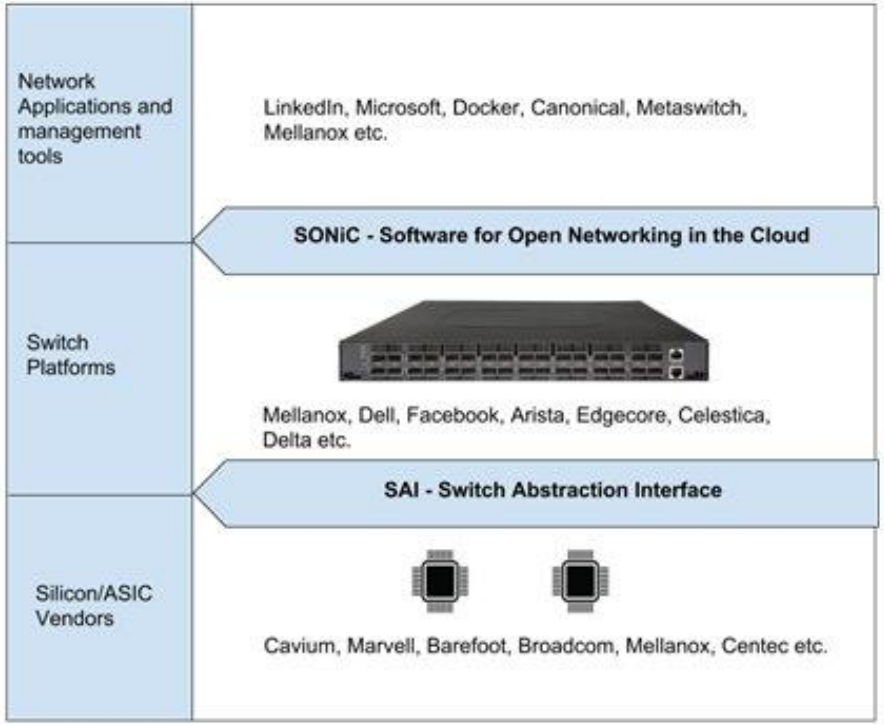
- GENI is leaded by the US computing community to realize flexible and agile network with hardware/software disaggregation.
- As a result of big ICPs and vendors continuing their activities through OCP, the market share of Whitebox switches has expanded to about 20%.
- The optical transport whitebox approach, including the major carriers, was launched in 2016.



GENI: Global Environment for Network Innovations:
ONF: Open Networking Foundation
OCP: Open Compute Project
SAI: Switch Abstraction Interface
SONiC: Software for Open Networking in the Cloud
TIP: Telecom Infra Project
TAI: Transponder Abstraction Interface

A Horizontal specialization example in data center

- The “SAI,” a common interface for switch ASICs, which decouple software from hardware in packet switching platform.
  - Shorter Development cycle, lower the barrier for newcomers
  - Allowing operator to adopt their preferred platform, NOS and OSS



Source: https://www.design-reuse.com/articles/44519/switch-abstraction-interface-sai.html

Example: Major OSS

Linux: operating system

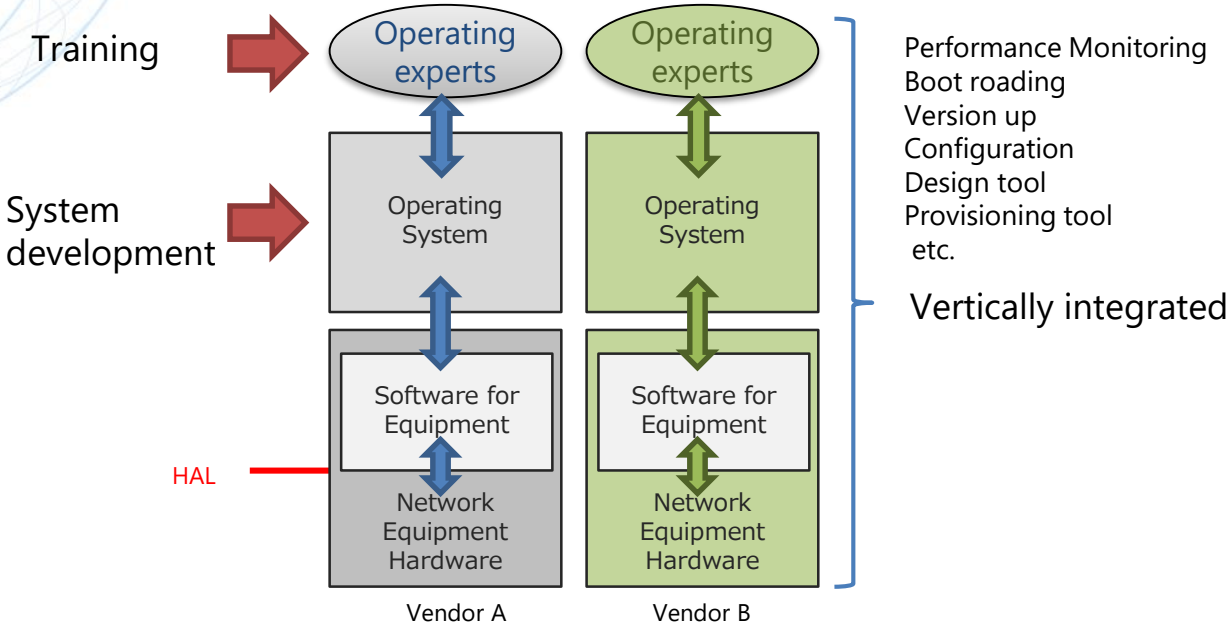
FRR: an IP routing protocol suite for Linux and Unix platforms

docker: OS-level virtualization to deliver software in packages called containers

onie: an open source "install environment", that acts as an enhanced boot loader

Outstanding issues of optical transport

Spending huge training cost and system development cost for network operation vendor by vendor.

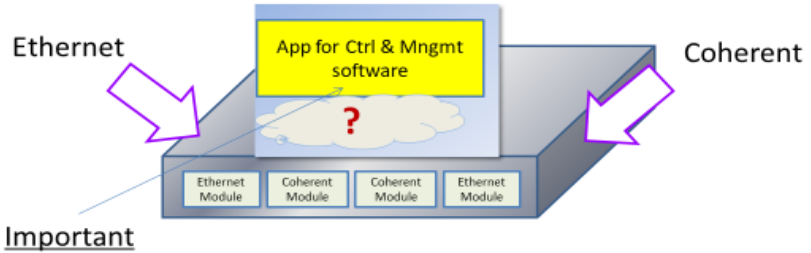


Idea in the early stage

Challenge in system integration with coherent module

- Issue in digital coherent technology
  - ✓ Complexity in system integration and configurations related optical engineering parameters in physical layer.

Users want coherent module to be as easy as Ethernet module for ZR region



Important

- Common management interface for coherent PHY and Ethernet PHY
- Physical layer abstraction

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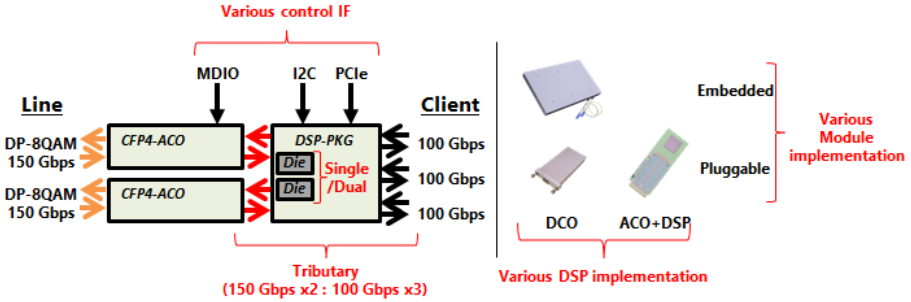
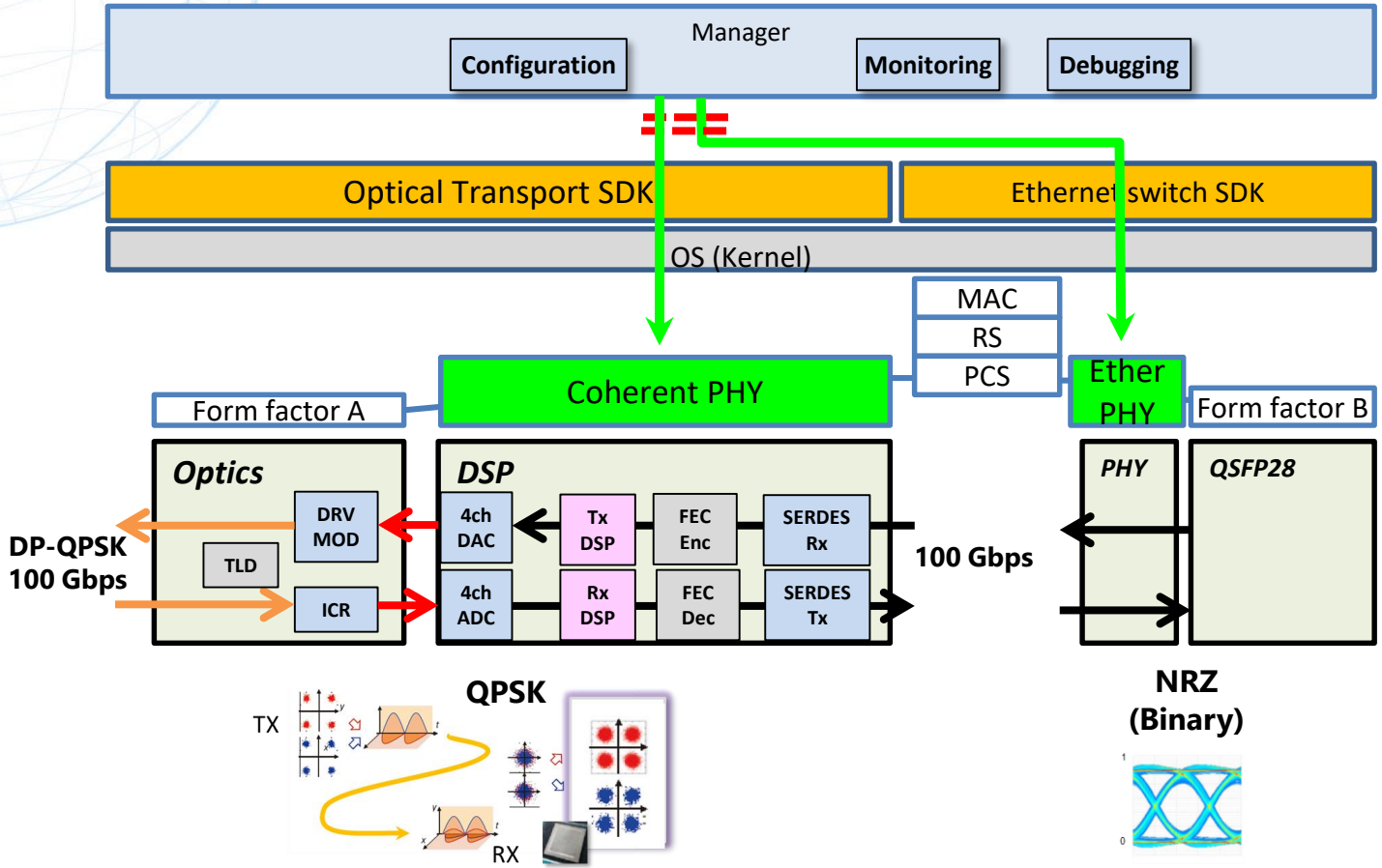


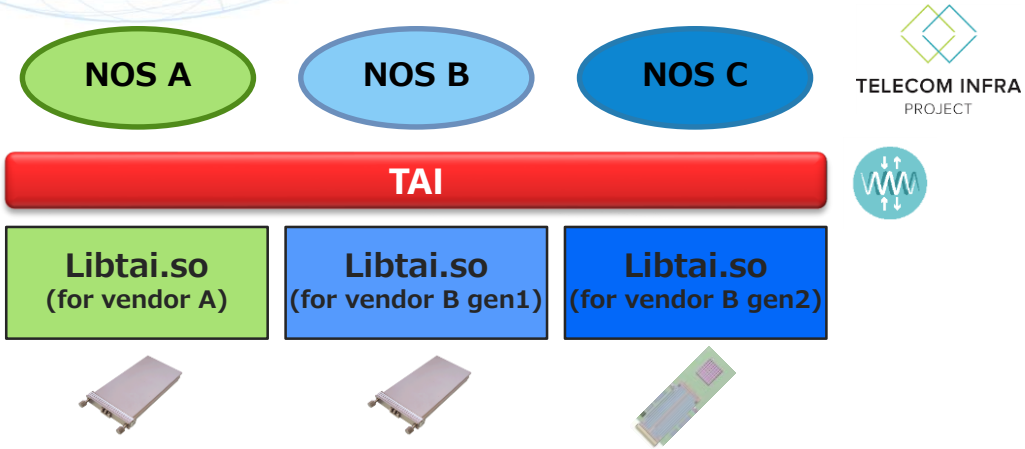
Whitebox packet transponder architecture



TAI architecture

For Operators: freedom of choice, individual hardware and software

For NOS vendors: removing complexity of hardware



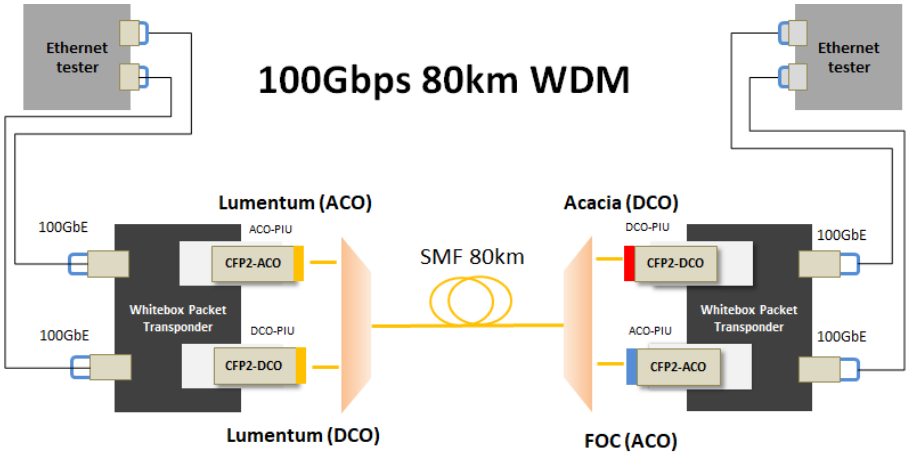
For Hardware vendors: removing development redundancy among vendors without disclosing their own differentiating technologies.

	Vendor A	Vendor B	Vendor C
Frequency range [THz]	191.75-196.05	191.15-196.1	191.3-196.1
Number of TL	2	1	1

- Architecture
- Business model
- Automatic operation scheme
- Cost Reduction

Q&A

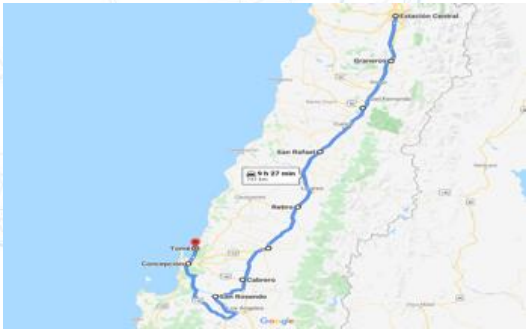
ACO/DCO multivendor interoperability demo @OFC2019



Cassini Deployments & Lab Trials

NTT

Packet Optical Network in Chile



- Multi-city ISP (internet, voice, IPTV)
- Expanding countrywide backbone capacity
- 40+ Cassini deployed with 200 Gbps optical links
- Distance between nodes: 80-100 km
- Faster roll out of new services

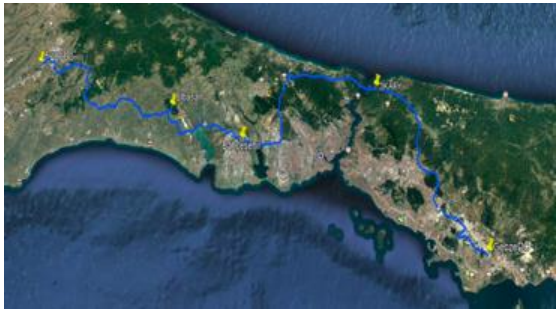
IN PRODUCTION

Packet Optical Network in Burkina Faso, Africa

- 200 km network connectivity between Ouagadougou & Dakola
- First 200 Gbps link extending ISP capacity in Burkina Faso
- Land-locked country, with limited access to transit network connections

IN PRODUCTION

Field Tests in Turkey



- First successful Open Networking field trial in Turkey over 248 km
- Delivering speed and capacity for 5G
- Cassini nodes connecting Data Centers
- Extensive TIP lab testing

Field Tested