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ODTN and TIP Collaboration with Whitebox Transponder ‘Cassini’

2018.12.5
Hiroki Okui
NTT Communications

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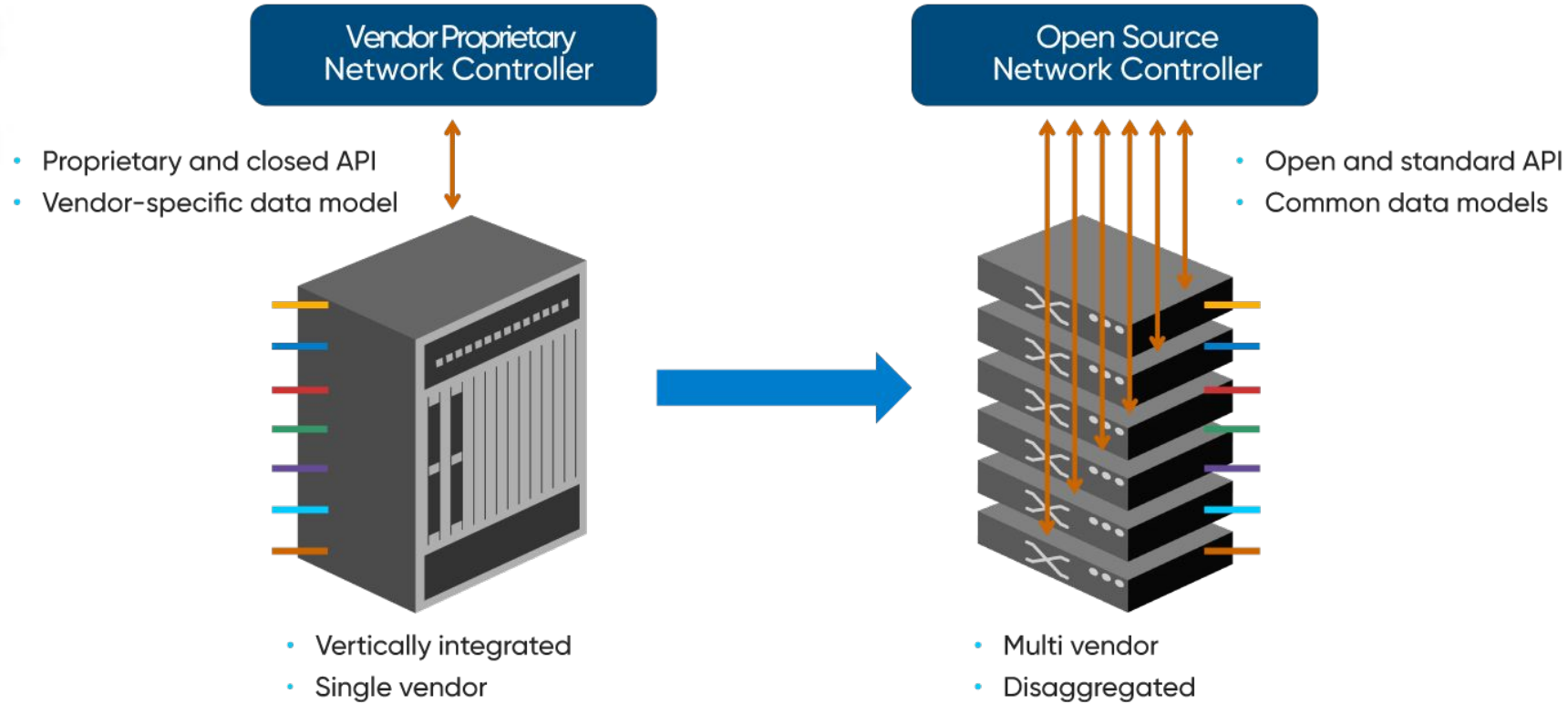
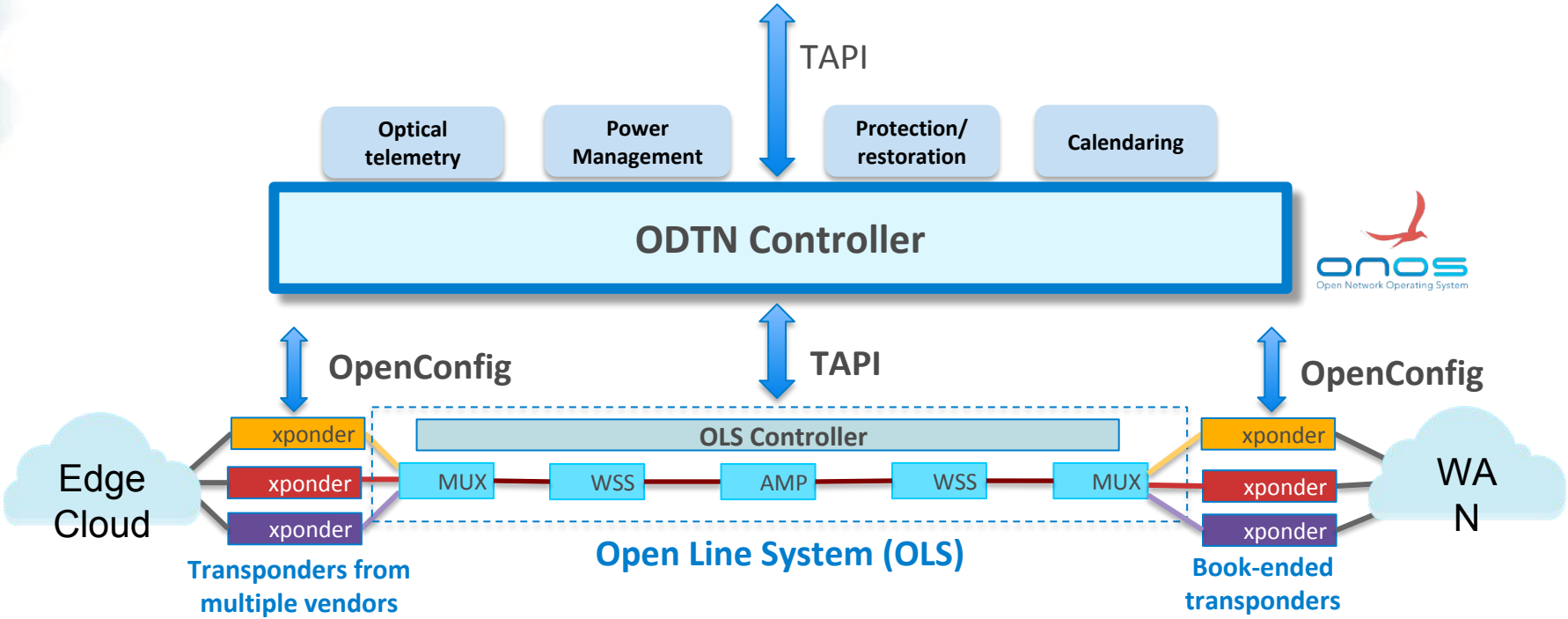
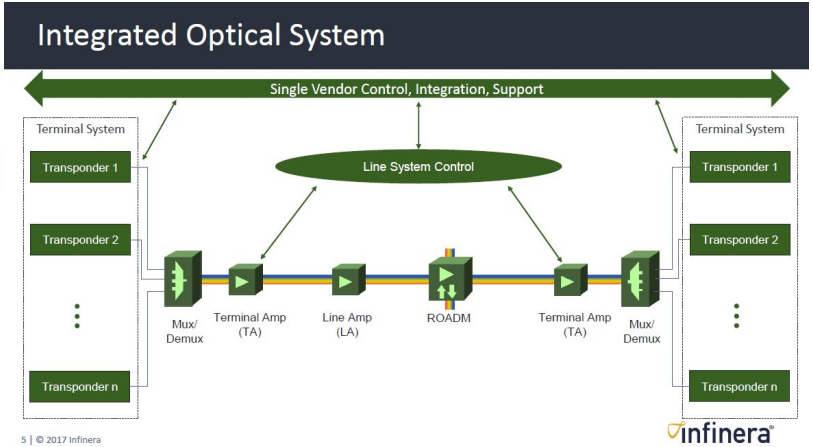
Disaggregated Transport Network

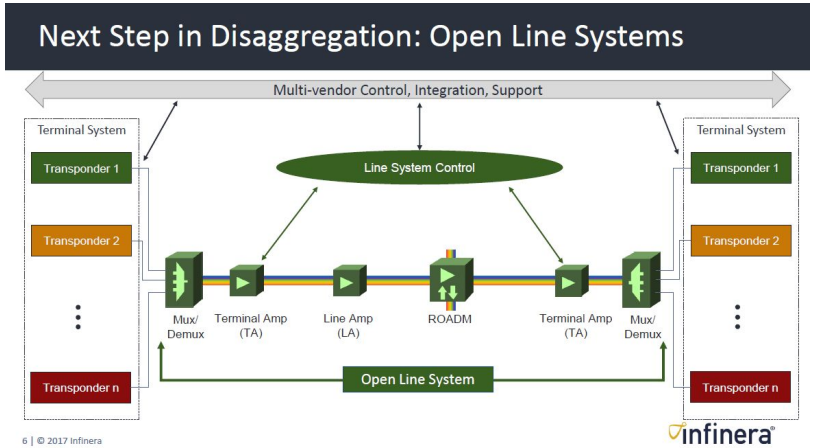


ODTN (Open Disaggregated Transport Network)



Open Line Systems

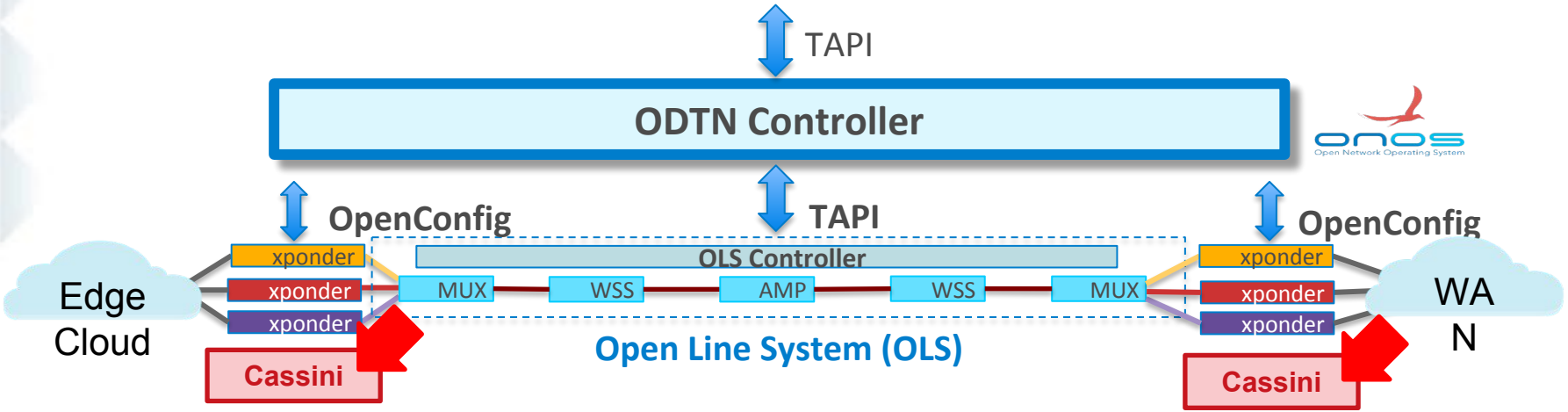


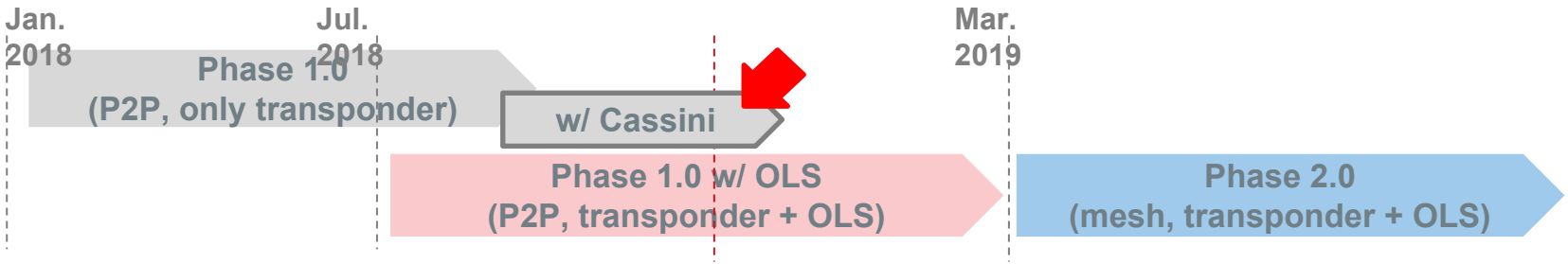


- Traditional optical line systems are integrated systems with a single vendor's transponder, mux/demux, amp, ROADM

- Open Line Systems are disaggregated systems composed of multi-vendor transponders
- Possible to use preferred vendor's transponder every time of wavelenth expansion

Target of this presentation

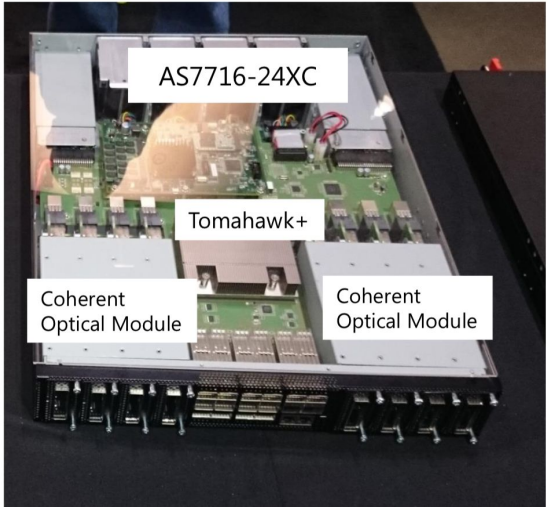




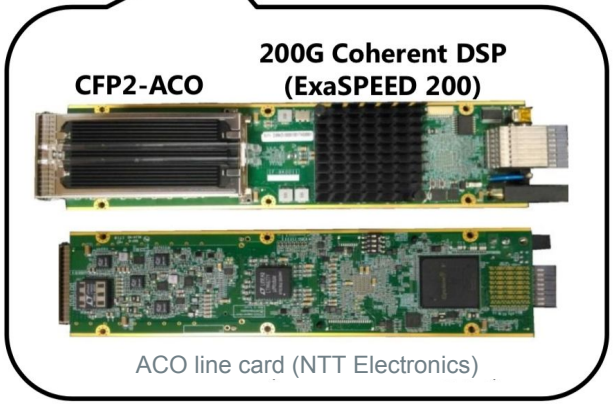
Cassini & TAI

Whitebox packet transponder “Cassini”

- Broadcom Tomahawk+ ASIC(3.2T)
- 100Gbit/s QSFP28 x16
- 200Gbit/s CFP2-ACO x8



Edge-corE NETWORKS

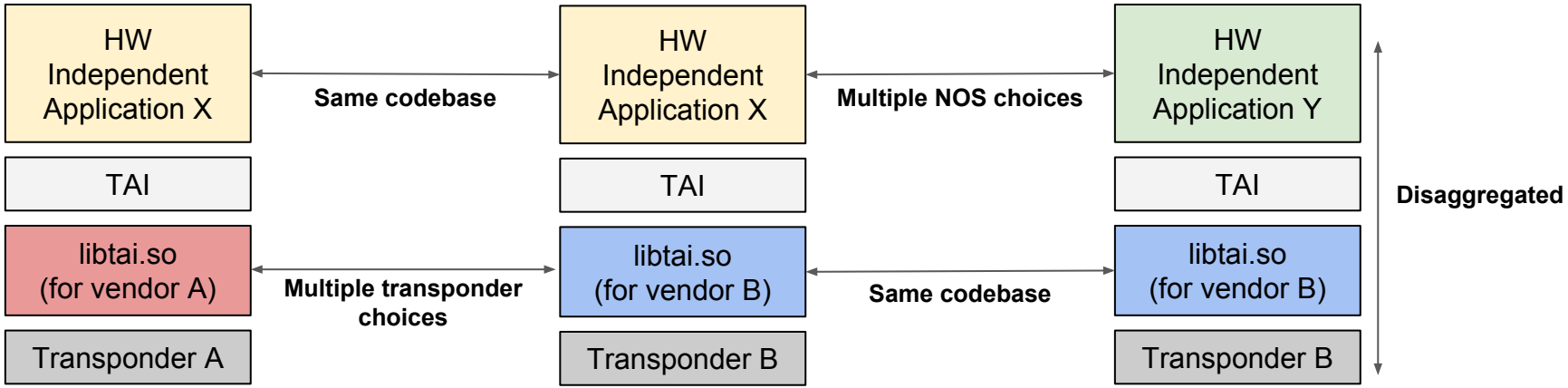


ACO line card (NTT Electronics)

NTT

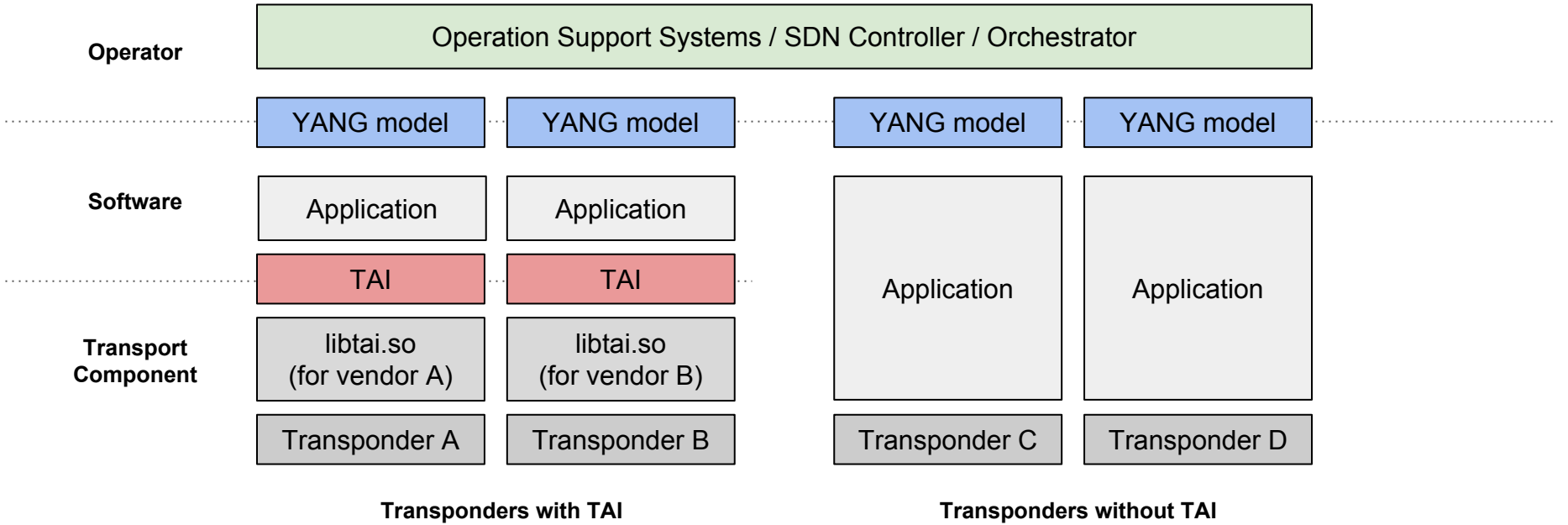
What is TAI?

- TAI is an interface between optical transponders and system software
- Allows system software to operate with any TAI-compliant transponders
- Allows transponders to operate in any system which supports TAI
- By decoupling the transponders from the rest of the system, it allows each to innovate independently
- Available here:
  - https://github.com/Telecominfraproject/oopt-tai
  - https://github.com/Telecominfraproject/oopt-tai-implementations



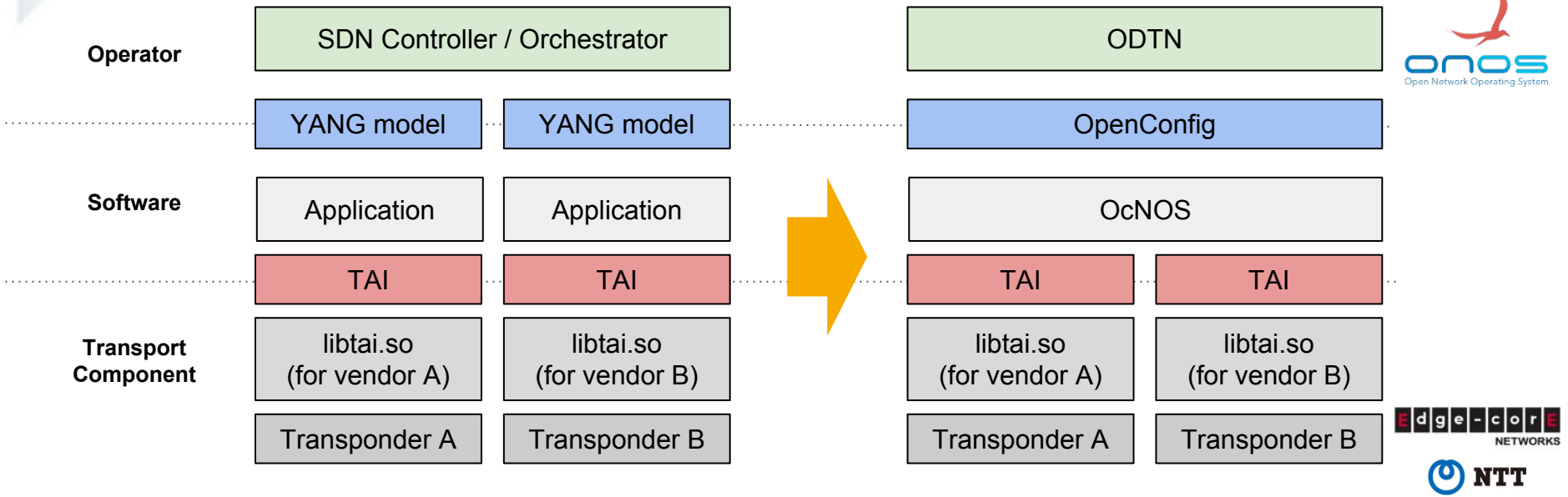
What is not TAI?

- TAI is not an API for operators like YANG models
- TAI is not trying to become a de jure standard or standardization body



Collaboration with ODTN

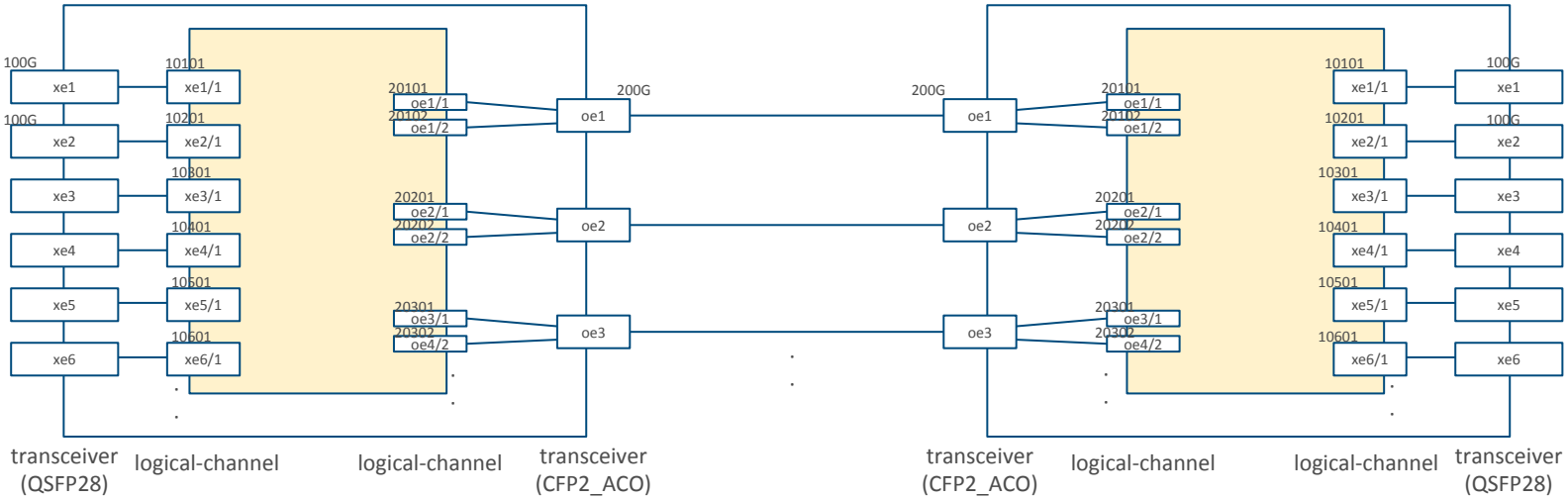
- Provision through OpenConfig common model
- IP Infusion provides OpenConfig NBI interface to us with OcNOS (Thanks!)



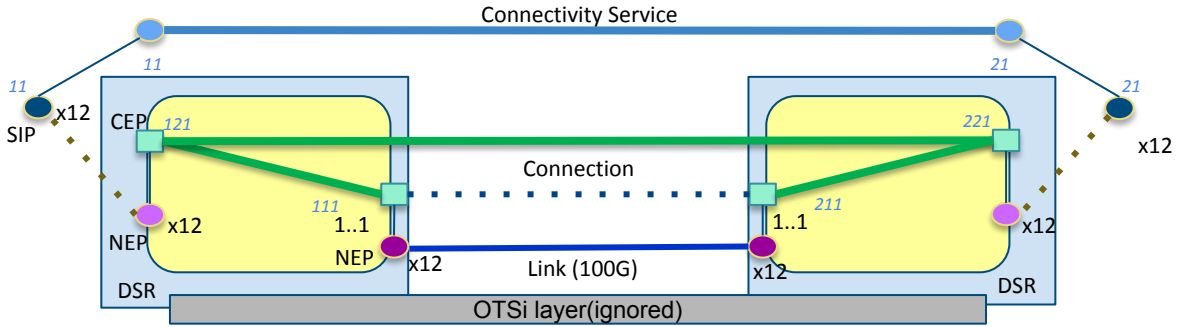
Development & Test

Device setup and TAPI representation

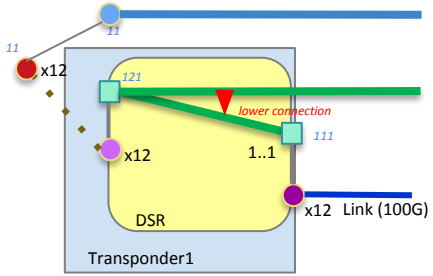
Cassini

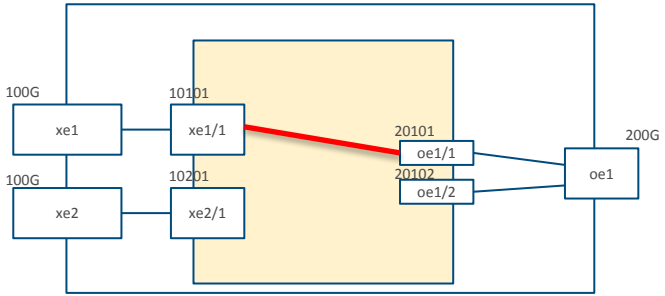


TAPI



Mapping from TAPI to OpenConfig





tapi-sample-step2-intermediate.xml

```
<connection xmlns="urn:onf:otcc:yang:tapi-connectivity">
  <uuid>00000000-0000-3000-0001-111000000000</uuid>
  <connection-end-point>
    <topology-id>...-100000000000</topology-id>
    <node-id>...-100000000000</node-id>
    <owned-node-edge-point-id>...-121000000000</owned-node-edge-point-id>
    <connection-end-point-id>...-121000000000</connection-end-point-id>
  </connection-end-point>
  <connection-end-point>
    <topology-id>...-100000000000</topology-id>
    <node-id>...-100000000000</node-id>
    <owned-node-edge-point-id>...-111000000000</owned-node-edge-point-id>
    <connection-end-point-id>...-111000000000</connection-end-point-id>
  </connection-end-point>
  <layer-protocol-name>DSR</layer-protocol-name>
</connection>
```

client side

line side

sbi-openconfig-sample-infinera.xml

```
<logical-channels>
  <channel>
    <logical-channel-assignments>
      <assignment>
        <index>10101</index>
        <config>
          <index>10101</index>
          <assignment-type>LOGICAL_CHANNEL</assignment-type>
          <logical-channel>20101</logical-channel>
          <allocation>100.0</allocation>
        </config>
      </assignment>
    </logical-channel-assignments>
  </channel>
```

Model-driven controller in ONOS: DCS

- Subsystem to support NETCONF/YANG ecosystem
- Launched in 2016 and has been developed to realize model-driven ctrl.

Configuration still critical

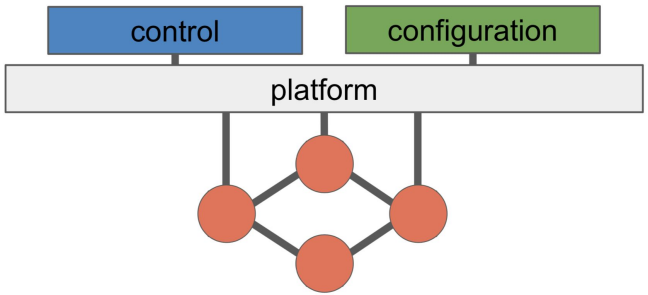
- Dynamic (re)configur
  - networks still need to b
  - if nothing else, configur
- Configuration even m
  - devices may expose onl

Service Configuration

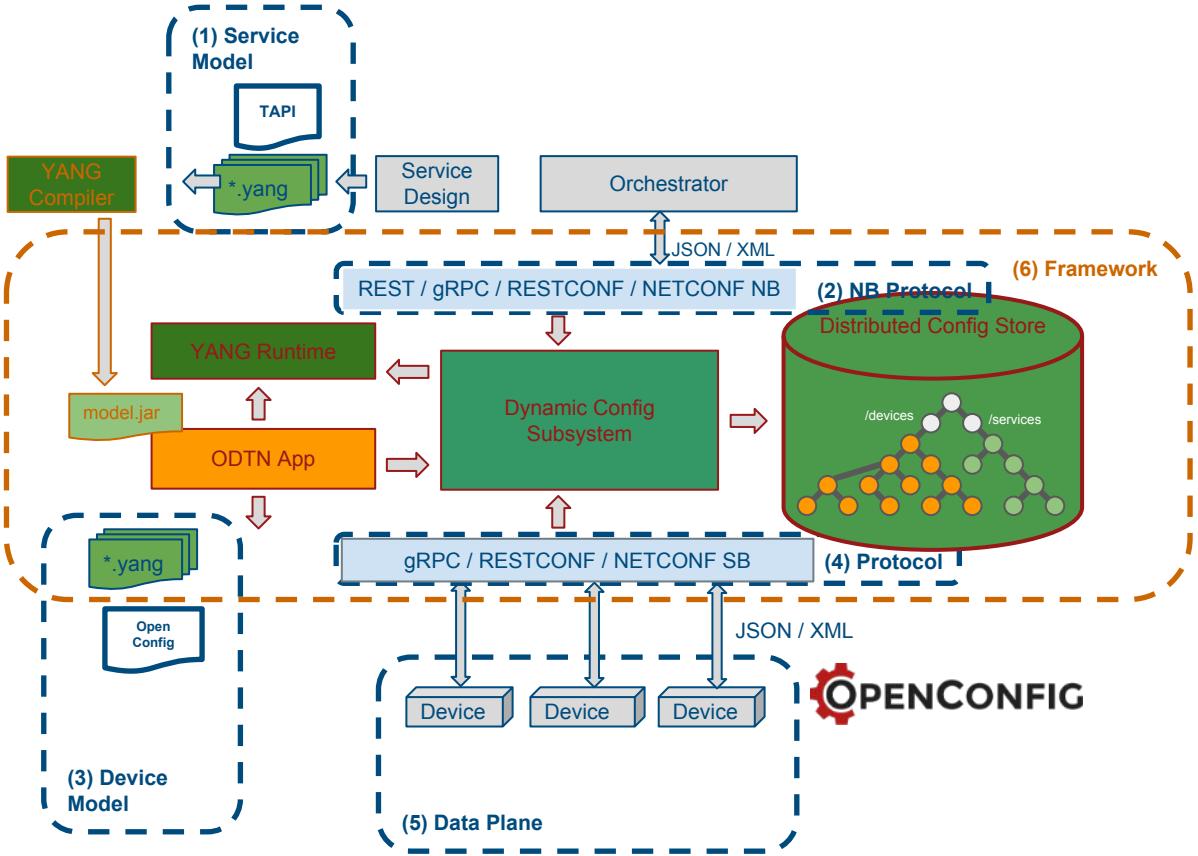
- Operators want to create &
  - do this with agility and minimal
  - create automated ways to instan
- Services comprise *both* conf
  - e.g. setting-up lambdas and setti
  - e.g. provision NFV service chains

Control and Configuration

- Operators need a resilient and scalable platform capable of *both* control and configuration



ODTN Implementation



Framework:

- ONOS YANG compiler, runtime
- Dynamic config subsystems

Features:

- NBI(RESTCONF) auto-generation
- SBI(NETCONF) auto-generation
- Java library which enable easy implementation of Service Application
- Distributed config store of NBI service configuration and device configuration

Test Result

- Made all component work together successfully
  - Mapping between OpenAPIs: TAPI => OpenConfig => TAI
  - Got confidence that Cassini/OcNOS/TAI are promising devices/NOS/API as transport whitebox
- Still work in progress
  - Some features of TAI are not implemented as of now
  - Exposed configurations are limited as well
  - Will be able to have a full capability of TAI in a year
- Some critical issues are found in DCS
  - Should be addressed from its design
  - Good requirement for next DCS

Takeaways

- ODTN and TIP collaboration
- ODTN and Cassini is a good starting point to realize whitebox transponder/controller
- Come and join us!

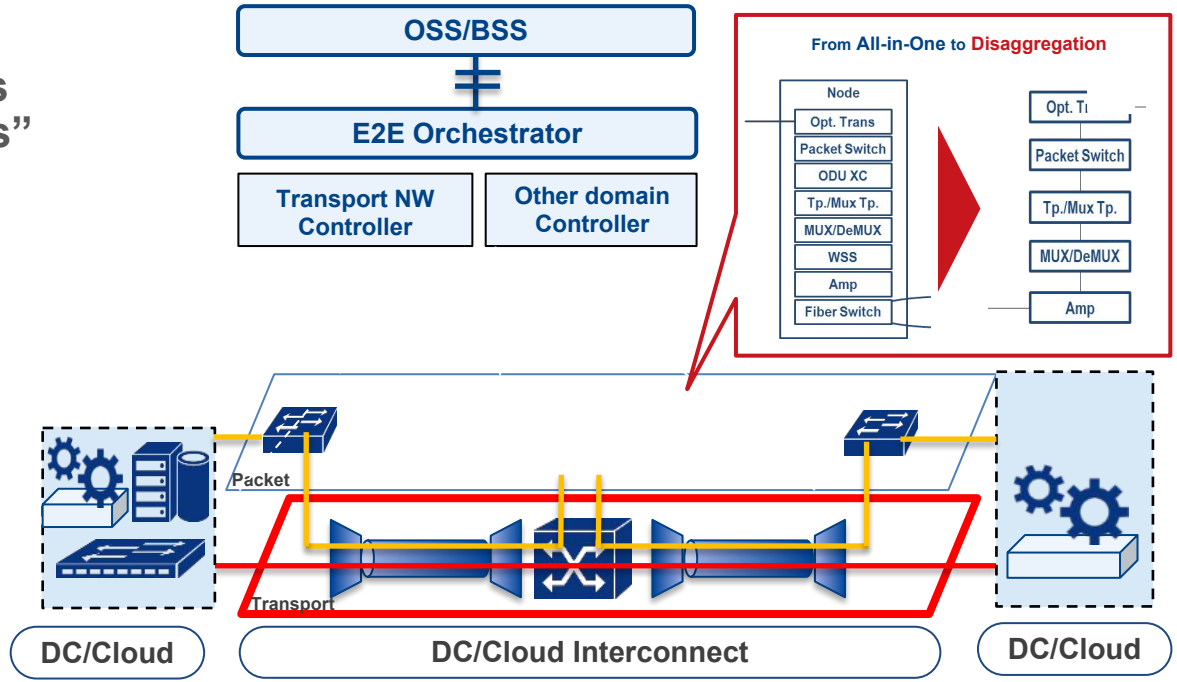
Thank you

Backup Slides

Our Expectation for Disaggregated Transport Networks

- Flexibility and agility
  - Integration from “in hardware” to “in software”
  - Innovations and upgrades from “per all-in-one nodes” to “per each component”

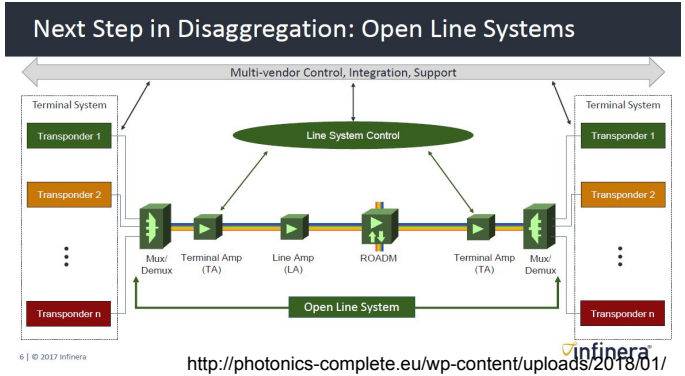
- Target Domain
  - metropolitan
  - DC/Cloud Interconnect



Open Communities Efforts

Open Line Systems

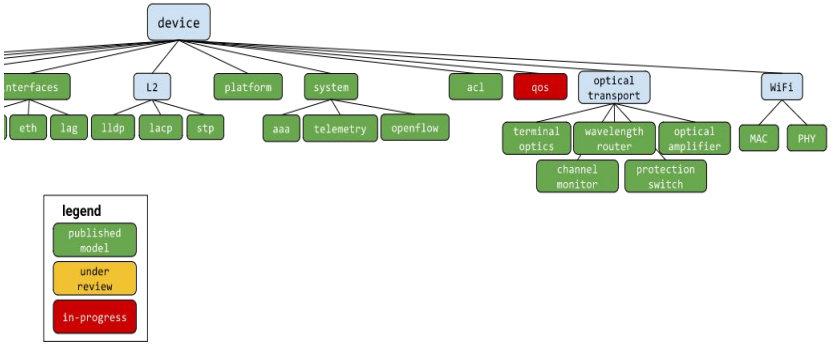
TELECOM INFRA PROJECT



http://photonics-complete.eu/wp-content/uploads/2018/01/

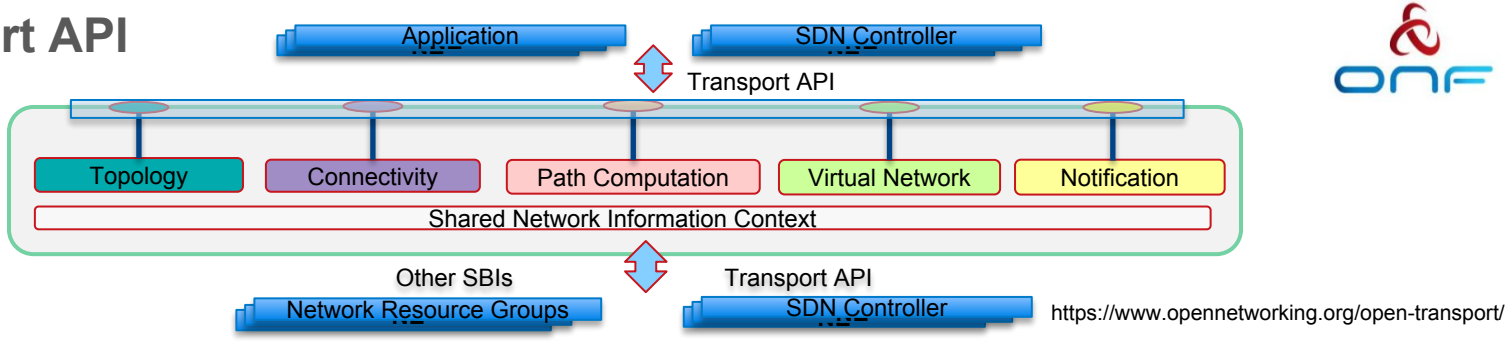
OpenConfig

Google



http://www.openconfig.net/projects/models/

Transport API

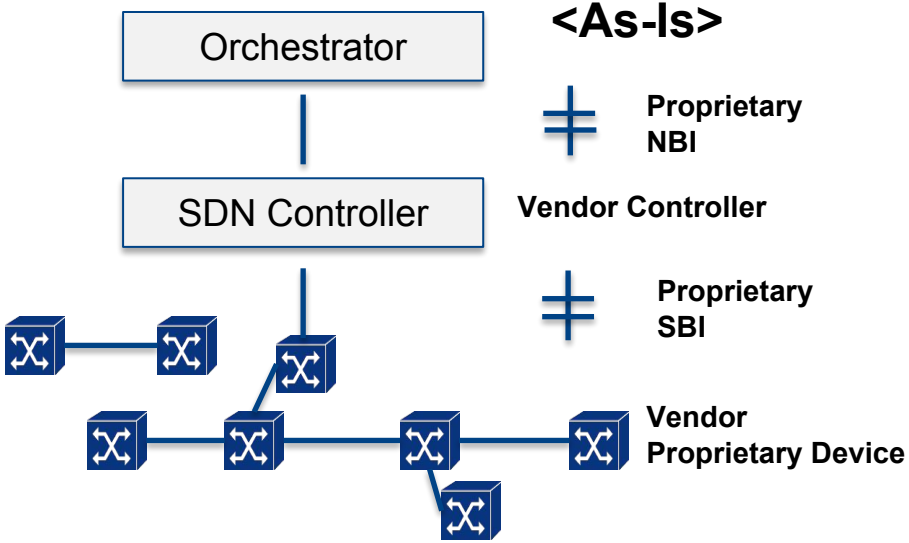


https://www.opennetworking.org/open-transport/

Towards Full Open Architecture

- Existing communities are focused on each specific target
- No “Integrated Solution” in open source community

→ Build a reference implementation by using those communities outputs



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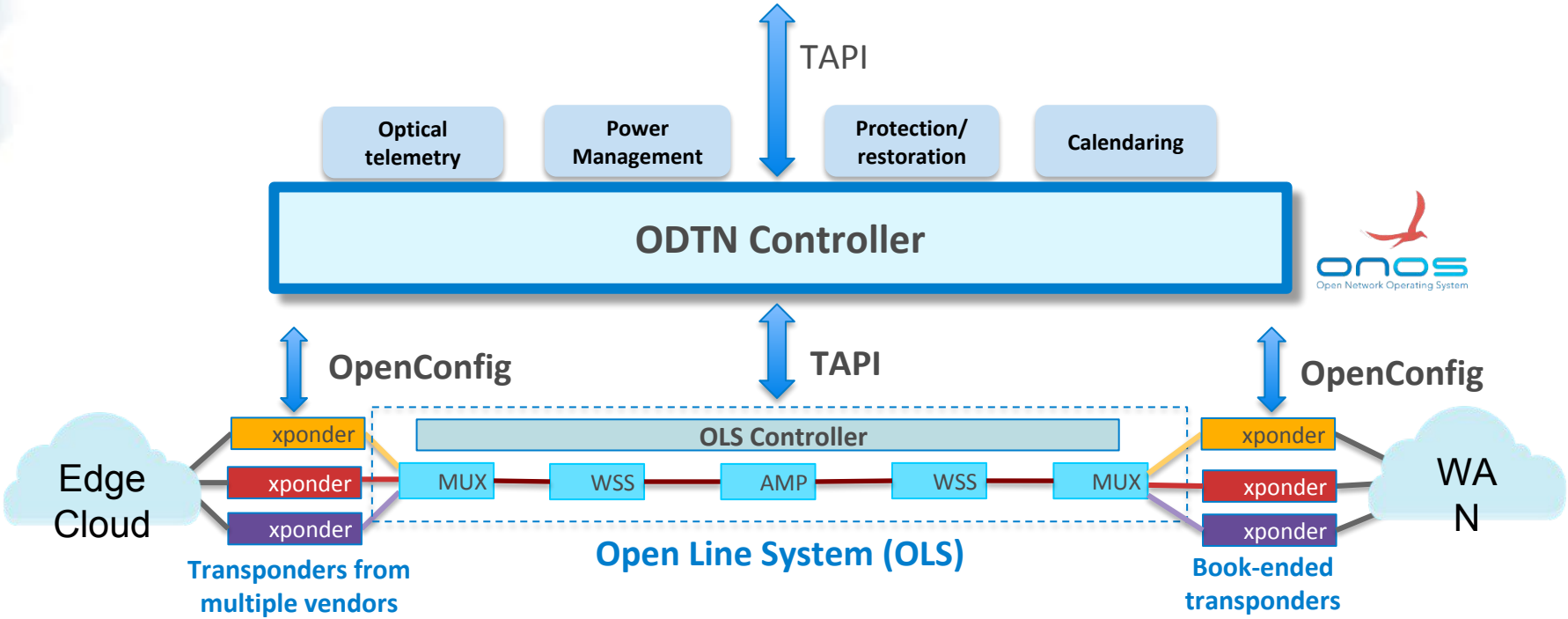


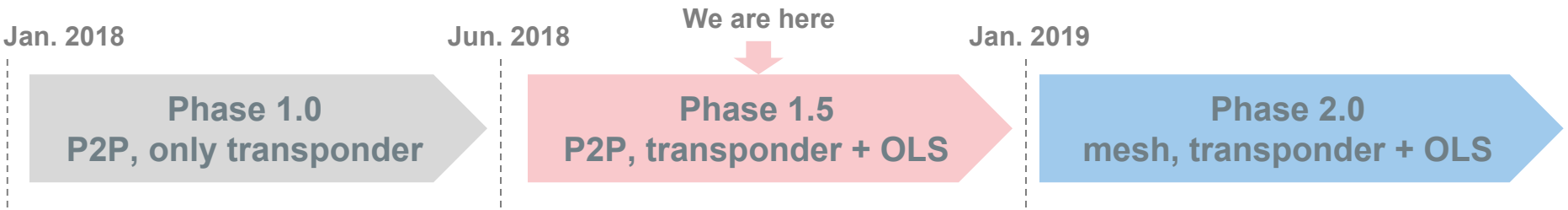
ODTN Members

- 5 operators

- 12 vendors

Current progress and next step

- Current progress
  - Implementation and testing for Transponder provisioning with OpenConfig: Done
  - Design OLS and optical media layer provisioning with latest TAPI and OpenConfig: On going
- Next step
  - Implement path and config computation feature with leveraging onos optical-intent
  - Design mesh solution towards Phase 2.0



Challenges

- The journey to Software Integration of multi-vendor dis-aggregated devices is long and difficult
  - Lots of features to be realized among multi-vendor devices
  - Discovery, path computation, power control, protection, monitoring, etc..
- Common Open API is needed
  - TAPI is the most possible candidate, but there are some missing parts from the software integration perspective
  - ODTN is collaborating with OTCC/TAPI and growing into each other
- Multi-device transaction and config state management features are needed
  - But there are no candidates in current Open SDN controllers
  - Now considering to implement these features in ONOS