ODTN

- Open and Disaggregated Transport Networks -

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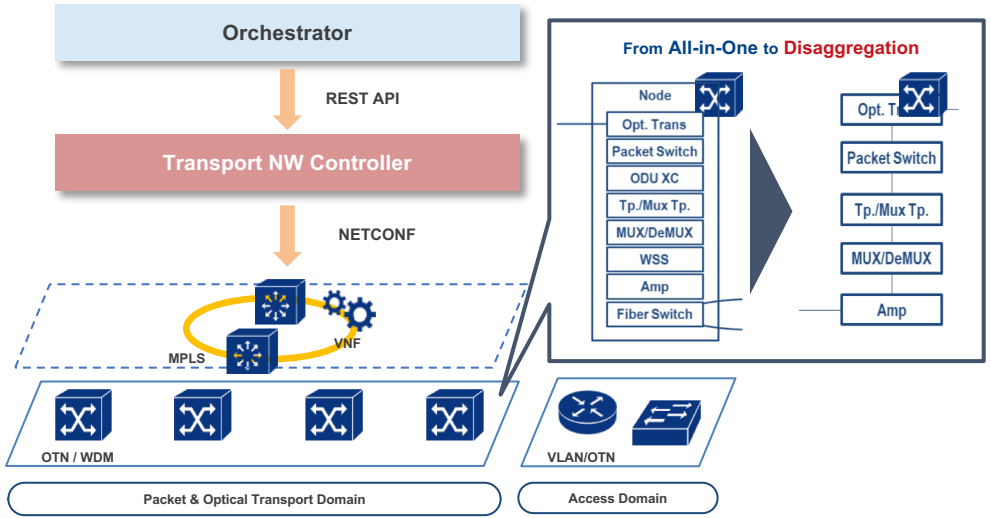
Agenda

- Technology Trends of Disaggregated Transport Networks
- Introduction of ODTN Project
  - Project Scope
  - Members & Teams
  - Schedule
  - Software Design
- Current Project Status & Next Steps

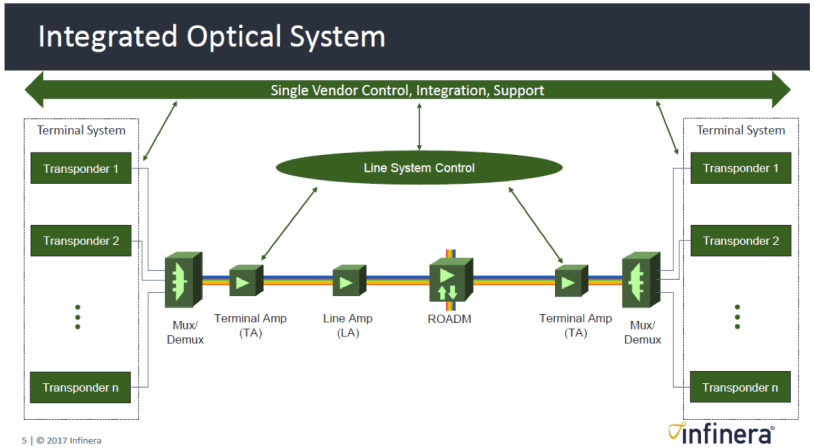
Technology Trends of Disaggregated Transport Networks

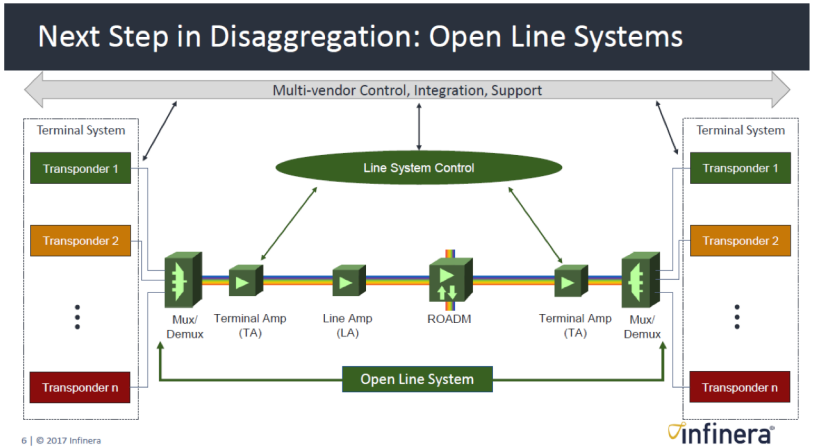
- **From All-in-One to Disaggregation**
  - Innovations and upgrades from “per all-in-one nodes” to “per each component”
  - Integration from “in hardware” to “in software”
- **Active Open communities for disaggregated transport networks**
  - Open Line Systems
  - OpenConfig
  - TAPI

etc…



Open Line Systems





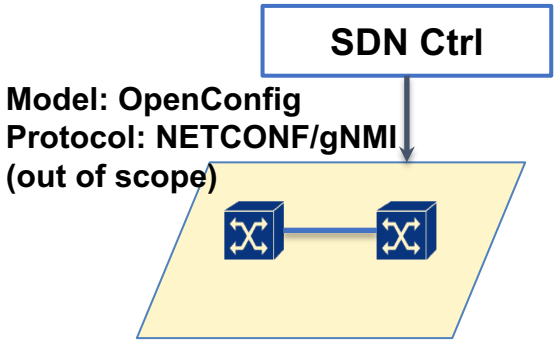
- Traditional optical line systems are integrated systems with a single vendor's transponder, mux/demux, amp, ROADM

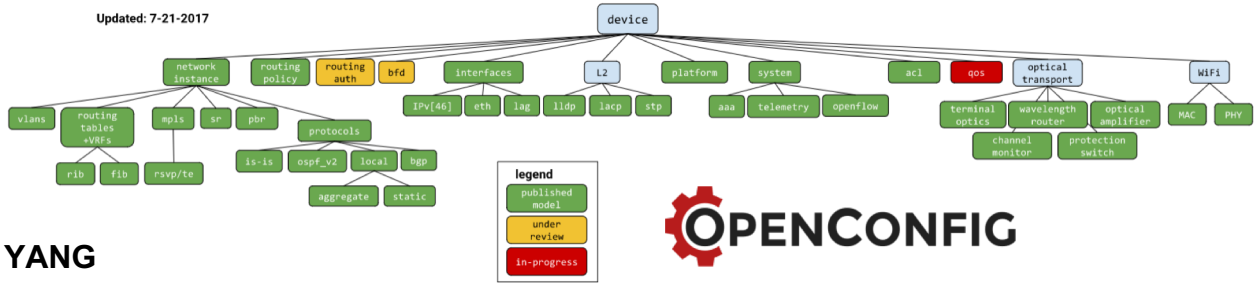
- Open Line Systems are disaggregated systems composed of multi-vendor transponders
- Possible to use preferred vendor's transponder every time of wavelenth expansion

OpenConfig

Google-Driven community to define vendor neutral data models for device configuration and telemetry

- Covering multiple layers (L1-L3)
- Out of scope: Data Plane interoperability, controller software & southbound protocol

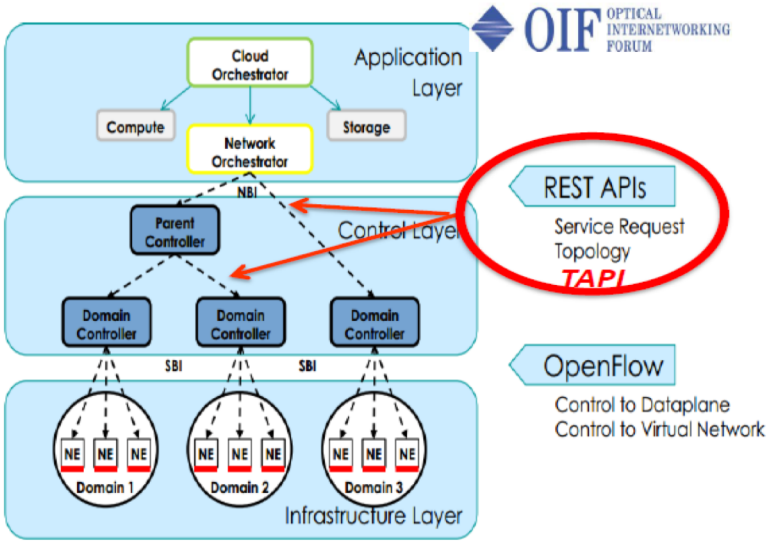




ONF TAPI

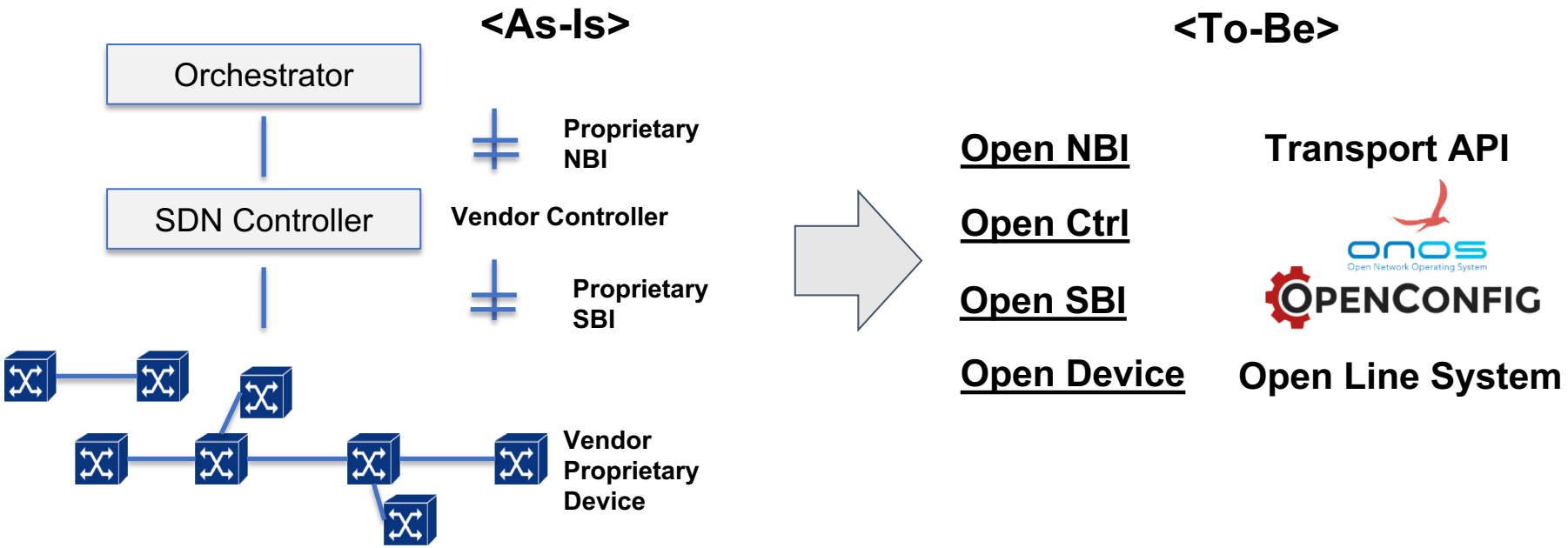
Transport API（TAPI）

ONF Driven API used for NBI of Transport Network Controllers



Towards Full Open Architecture with existing activities

Existing communities are focused on each specific target
No “Integrated Solution” in open source community
-> Build a reference implementation by using those communities outputs



ODTN Project

We have launched “ODTN (Open and Disaggregated Transport Networks)” Project with ONF and other companies to build a open reference implementation with open technologies

Project members（As of 2018.4.20）

Service Providers

NTT Communications, COMCAST, Telefónica, TIM, China unicom中国联通

Tier 1 Vendors

NEC, NOKIA, OPLINK a molex company, ZTE

Tier 2 Vendors

ADVA Optical Networking, ciena, CoAdna, Coriant, LUMENTUM, infinera

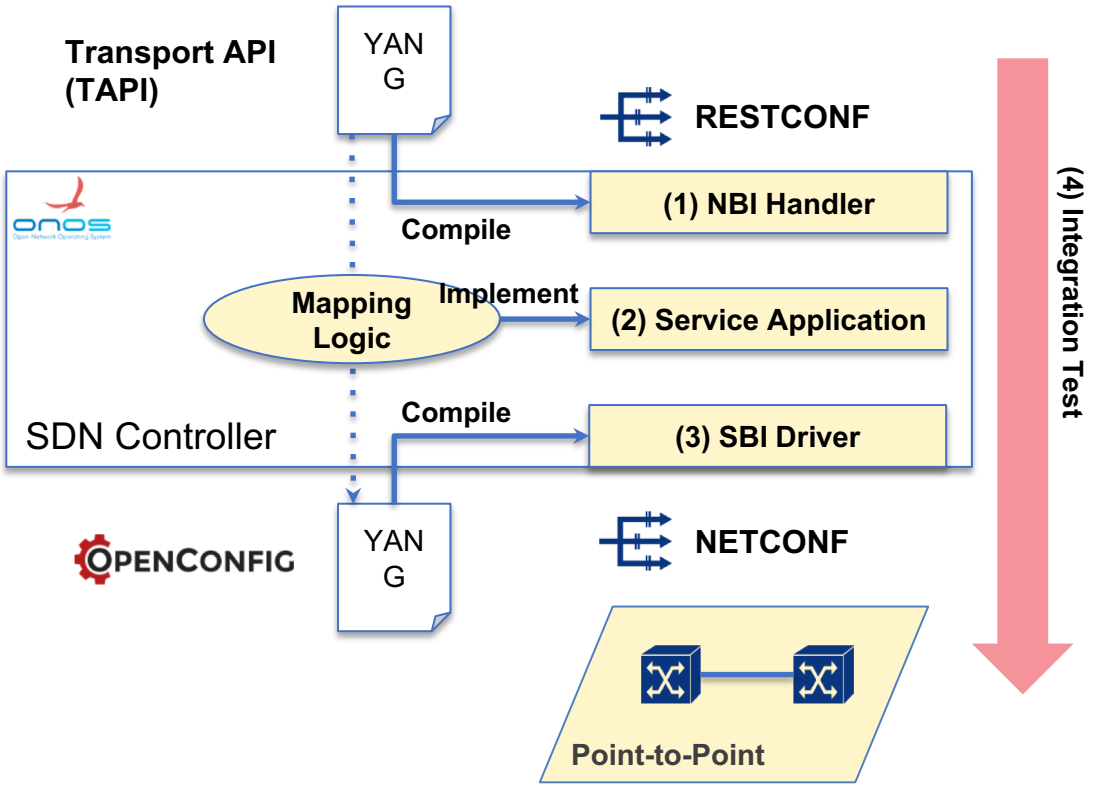
Component	Reference Architecture
NBI	TAPI
Open Source Controller	ONOS
Common Data Model	OPENCONFIG
Data Model Language	YANG
Open Protocol	NETCONF
Innovative Device	OLS / Disaggregation, Open ROADM

Project Members

Project Purpose and Charter

- Bring eco-system together to
  - Build reference implementation using open source and open standards
  - Do lab and field trials
- Consisting of three phases
  - Plan/Retrospective meetings for each phase
- Kick-off with 3 leading service providers, 8 vendors (as of Jan 2018)

Project Scope



(1) NBI Handler

Compile YANG based service model

Provide TAPI based NBI

(2) Service Application

Implement Java code to map TAPI to OpenConfig

(3) SBI Driver

Compile YANG based device model

Configure device with OpenConfig model

(4) Integration & Test

Phase 1: Point-to-Point Open Line System with Open APIs

Goal

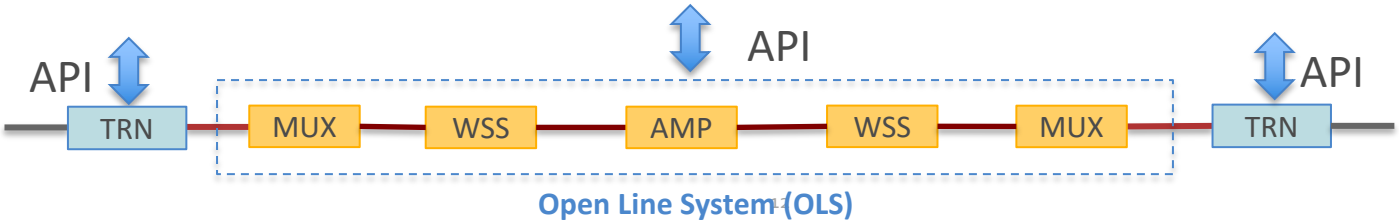
- Integrate ONOS and OLS devices with a simple P-to-P topology by using open API (TAPI / OpenConfig)
- Build and verify the reference implementation for P-to-P use case
- Identify problems to be solved for the phase 2

Device Components

- Transponder
- OLS: mux/demux, in-line amplifier

Term

- Jan 2018 - Aug 2018 (8 months)
  - Phase 1.0 (transponder only): Jan 2018 – April 2018
  - Phase 1.5 (transponder + OLS): May 2018 – August 2018



Phase 2: Mesh Metro ROADM with Open APIs

Goal

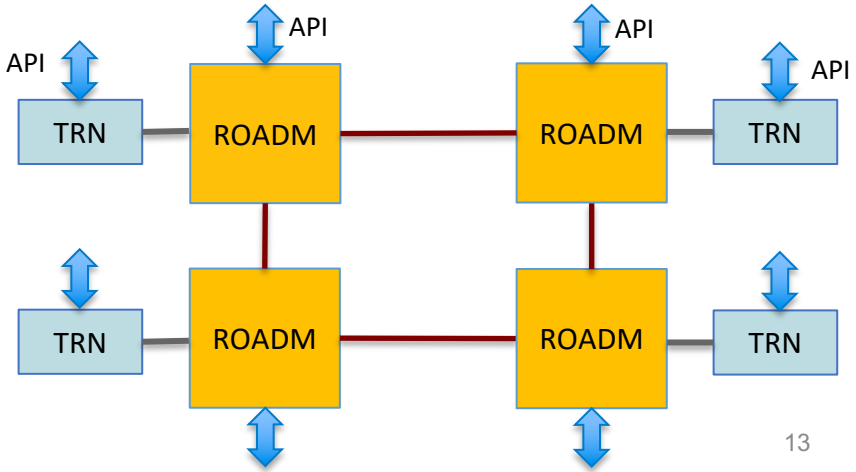
- Integrate ONOS and ROADM devices with a partial mesh topology by using open APIs
- Build and verify the reference implementation metro ROADM use case
- Identify problems to be solved for the phase 3

Device Components

- Transponder
- ROADM

Term

- Sep 2018 – April 2019



Phase 3: Full Disaggregated ROADM with Open APIs

Goal

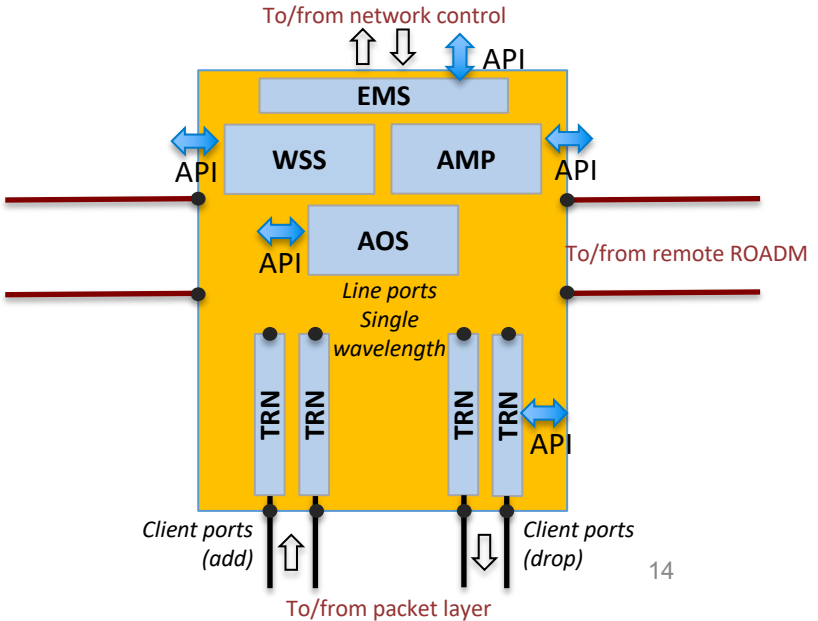
- Integrate ONOS and disaggregated optical components by using open APIs
- Verify the reference implementation that works certainly for disaggregated ROADM use case
- Identify problems to be solved toward production

Device Components

- Transponder, WSS, AMP, AOS, etc. (details TBD)

Term

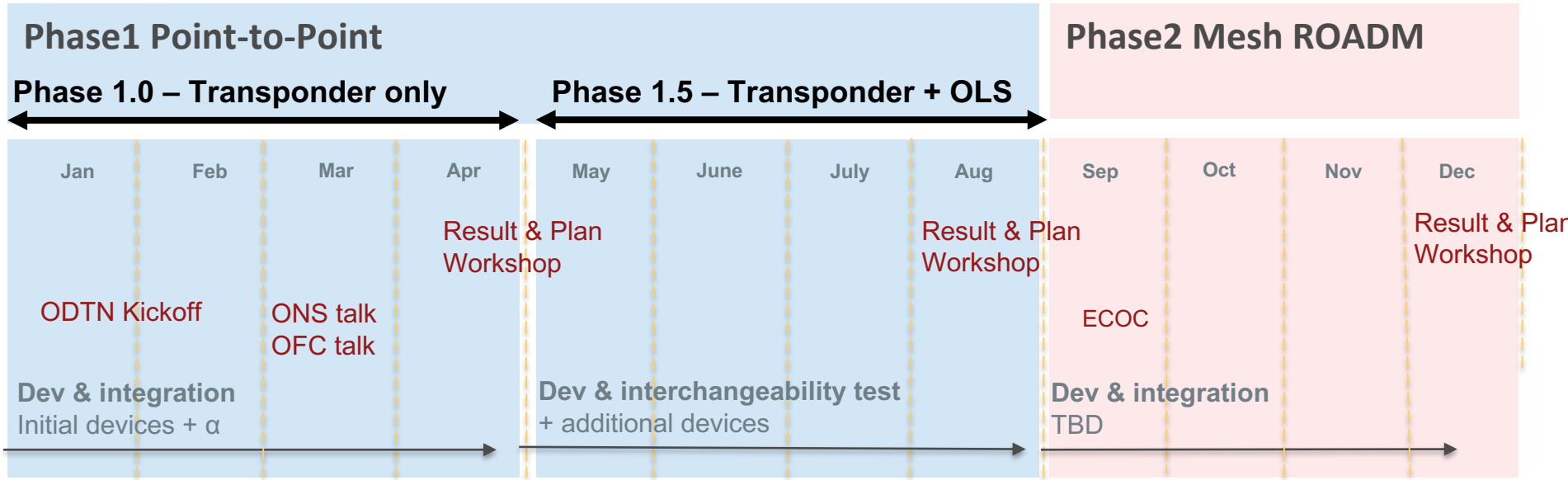
- May 2019 - Dec 2019



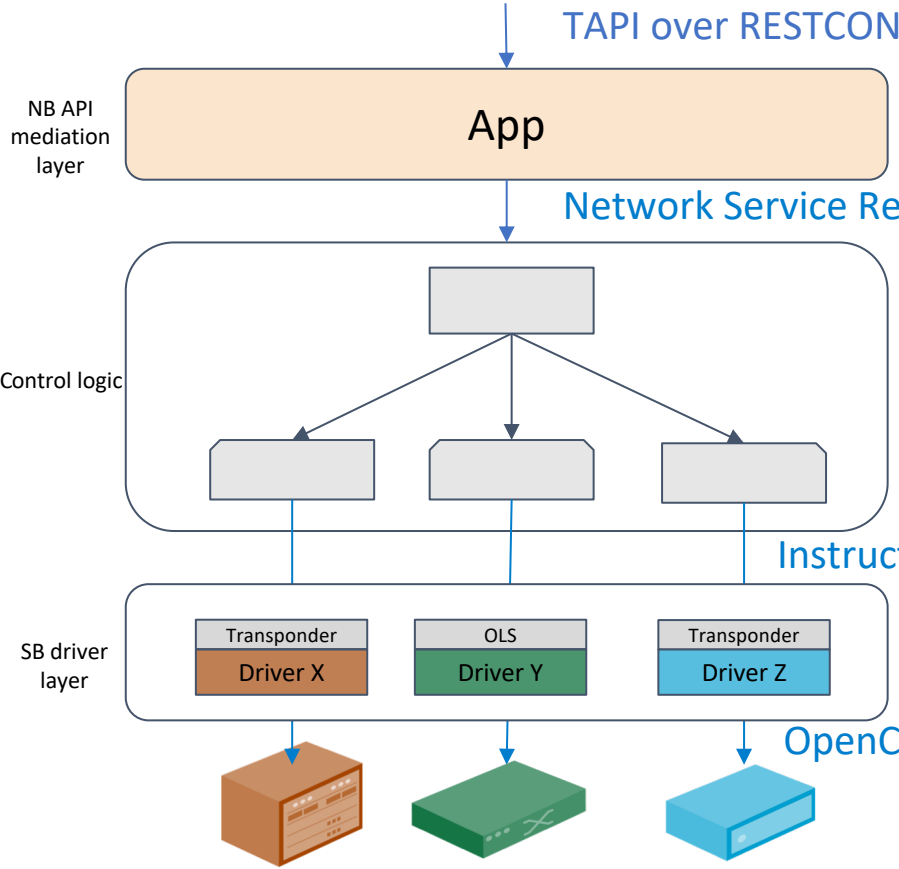
Project Teams

Team	Active Members
Project Steering	Comcast, NTT Com (Project Chair), Telefonica, 1 vendor, ONF
Use Case	Ciena, Comcast, Coriant, NEC, NTT Com(lead), Nokia, Telefonica, TIM etc
Software Development	CTTC, NEC (lead), Nokia, Oplink, ZTE etc
Infrastructure (not formed yet)	TBD - formed for each service provider lab
Testing (not formed yet)	TBD - work closely with SW Development Team

Schedule


Phase1 Point-to-Point
Phase2 Mesh ROADM
Phase 1.0 – Transponder only
Phase 1.5 – Transponder + OLS
Jan
Feb
Mar
Apr
May
June
July
Aug
Sep
Oct
Nov
Dec
Result & Plan Workshop
Result & Plan Workshop
Result & Plan Workshop
ODTN Kickoff
ONS talk
OFC talk
ECOC
Dev & integration
Initial devices + α
Dev & interchangeability test
+ additional devices
Dev & integration
TBD

High Level Design



Protocol handling
Understand semantics of request

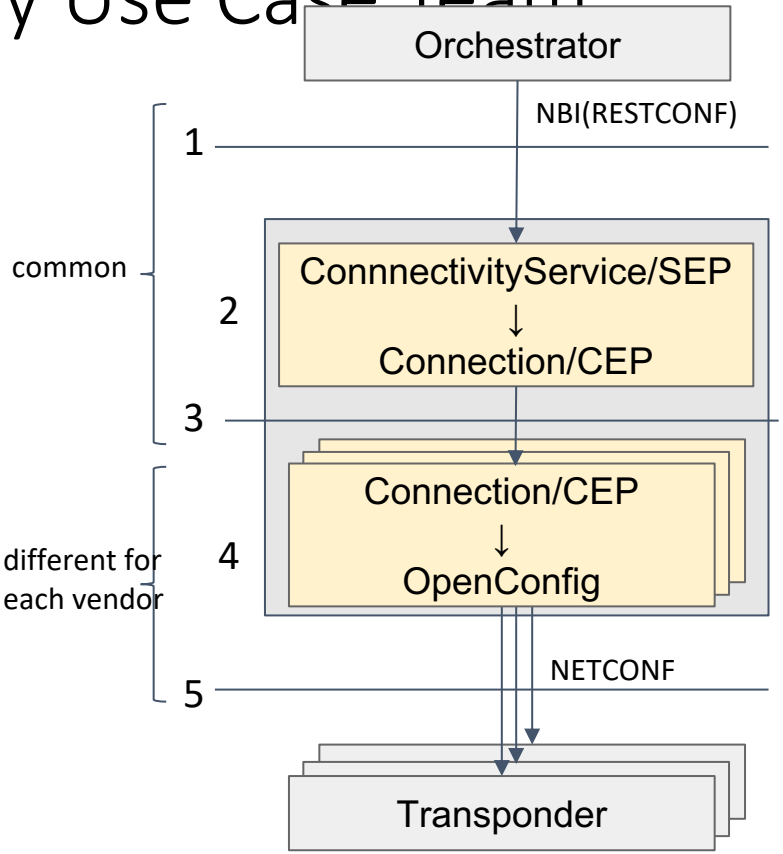
Solves constrained path
Manage resources
Generate device control and configuration

Map imposed semantics to commands that device understands

Model Definition work by Use Case Team

(0. Scope Clarification and TAPI Model Selection)

1. TAPI NBI Selection
2. TAPI Parameter Mapping
   (ConnectivityService/SEP -> Connection/CEP)
3. TAPI Parameter Selection (Connection/CEP)
   mapped to SB
4. Parameter Mapping
   from TAPI (Connection/CEP) to OpenConfig
   (different for each vendor)
5. OpenConfig SB Model Selection
   (different for each vendor)

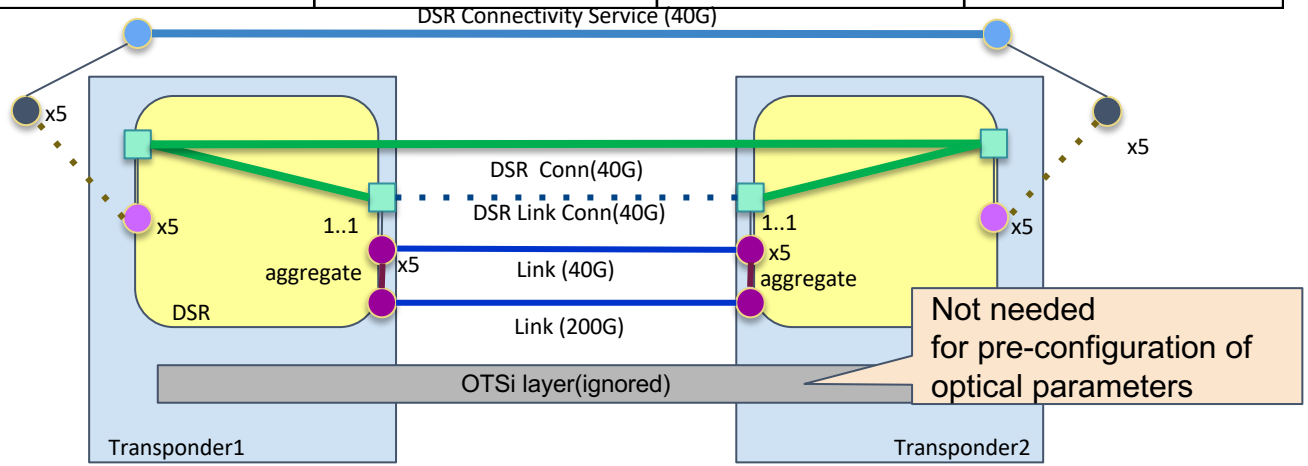


Model Discussion slide in Use Case Team

...e for Phase 1.0

		Configured Parameters	TAPI	OpenConfig	How to configure
Must be done in advance	step 0	Topology Transponder, Fiber, Link ports, Client ports (for Phase1.0)	Link, Node, NEP, SIP	n/a	via API (for Provider) or Auto-generated (e.g. using show cmd or LLDP)
	step 1	Optical parameters Frequency, Modulation, Power, FEC, etc?	~~OTSi layer (+OTN?)~~ ~~Connection/CEP~~ **not used for phase 1.0**	Optical parameters for line ports	via API (for Provider)
Configurable w/ OrangeBox	step 2	Connection between line port and client port	DSR layer Connection/CEP ConnectivityService/SEP	Port mapping between line and client	via NBI (for Client)

TAPI Model for phase 1.0



Current Status & Next Steps

- TAPI & OpenConfig model definitions for phase 1.0
- Software development in progress
- 2 vendors' transponders to be tested for the phase 1.0
  - Nokia
  - Infinera
- F-2-F Meeting planned in May
  - Agenda
    - Phase 1.0 summary
    - Phase 1.5 planning
    - Any other discussions (TBD)
  - Location
    - ONF Office in Menlo Park, California
    - To be announced soon...

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