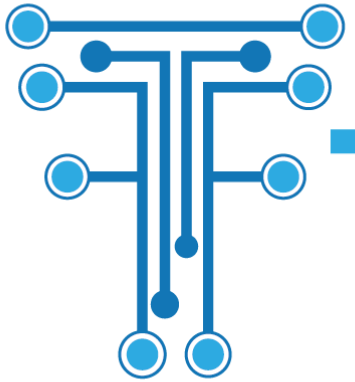

TeraFlow

Operator requirements and use cases for automated networking

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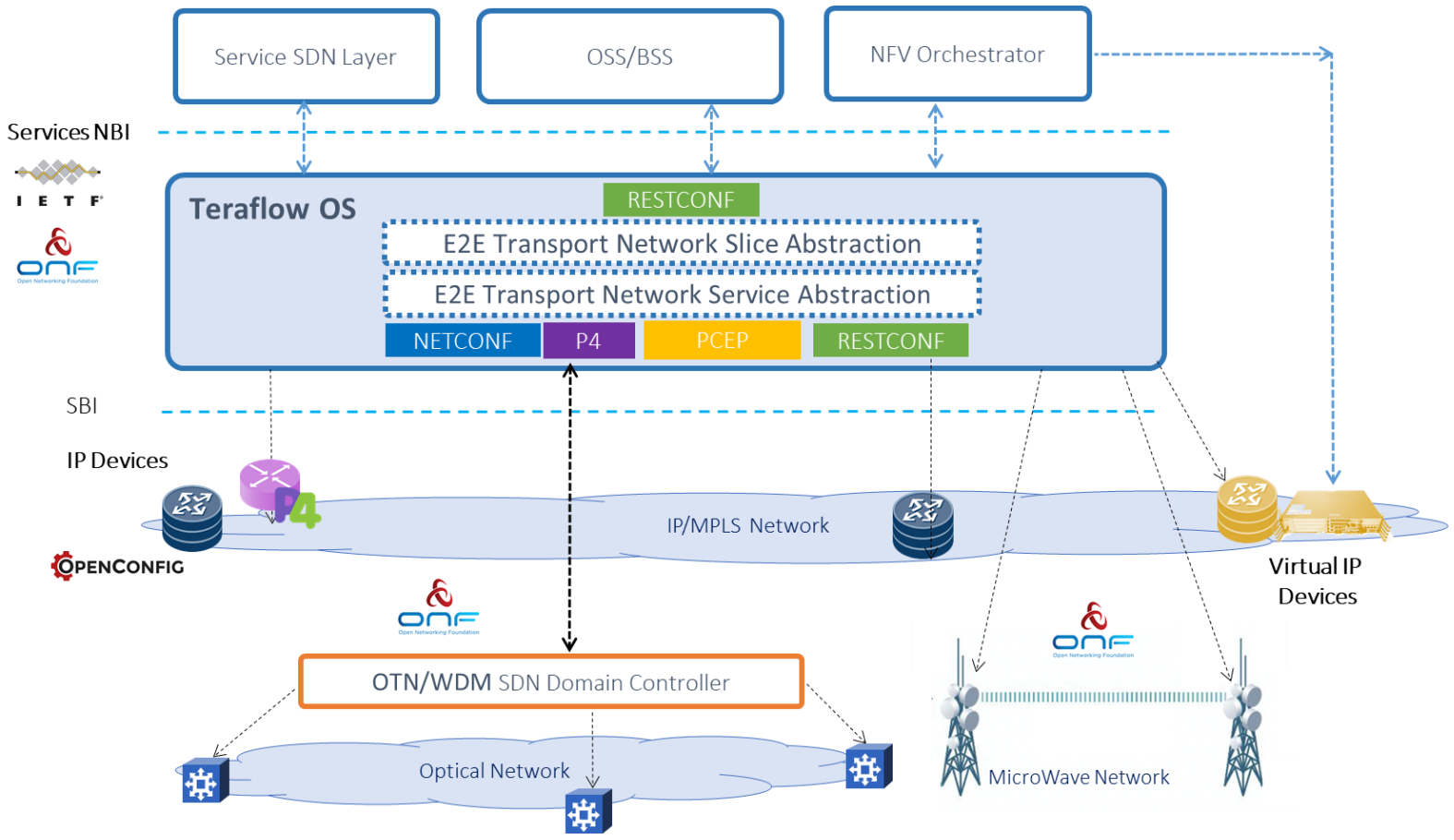
Telefónica

NGON 2023, 1/06/2023

This project has received funding from the European Union's H2020 research and innovation programme under the grant agreement No. 101015857

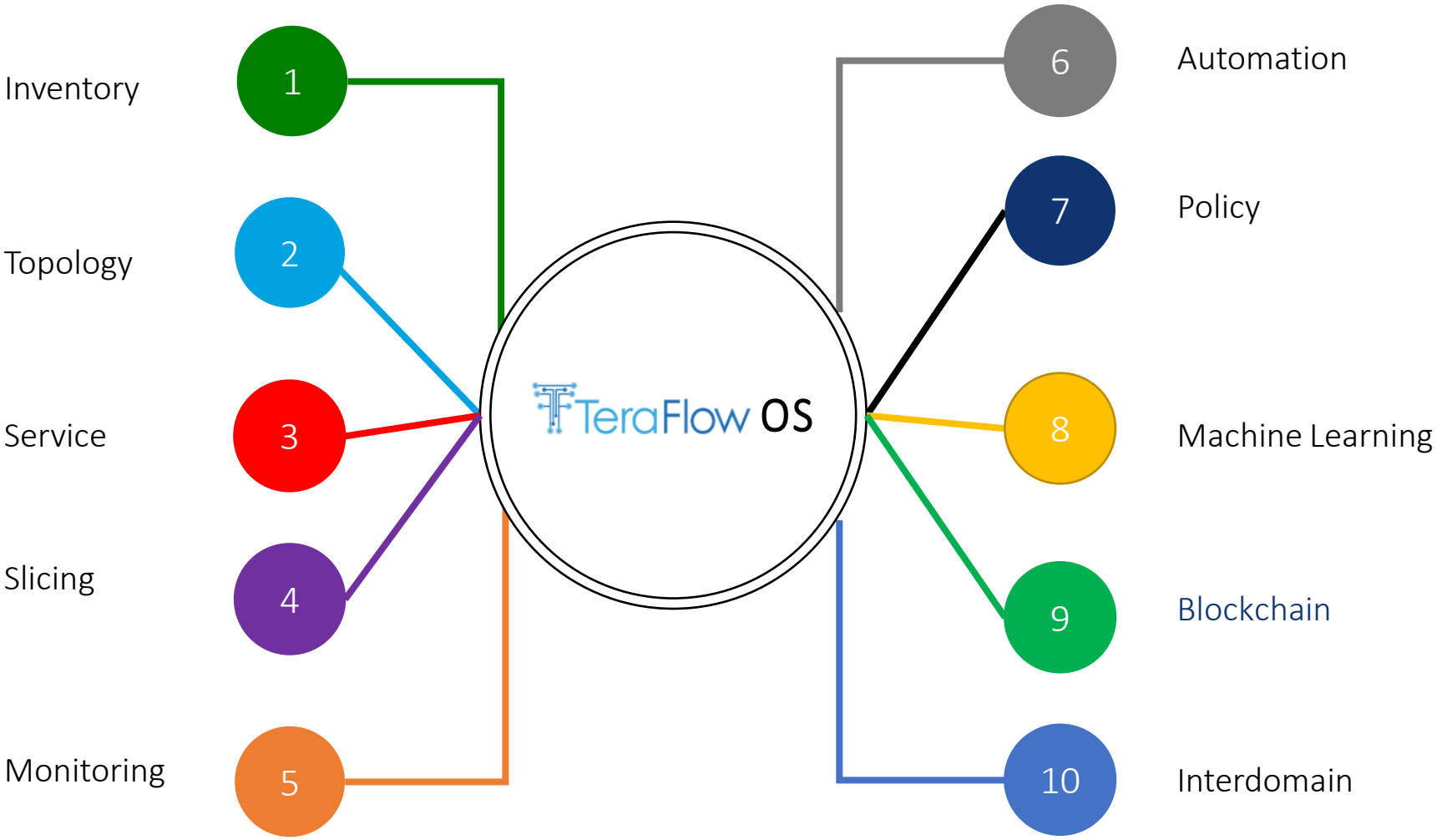
5G PPP

First Step: Open and Standard interfaces



- Vendor agnostic Transport SDN
- Service NBI enabling abstraction and open network programmability
- Multivendor device configuration based on standard SBIs

Use cases

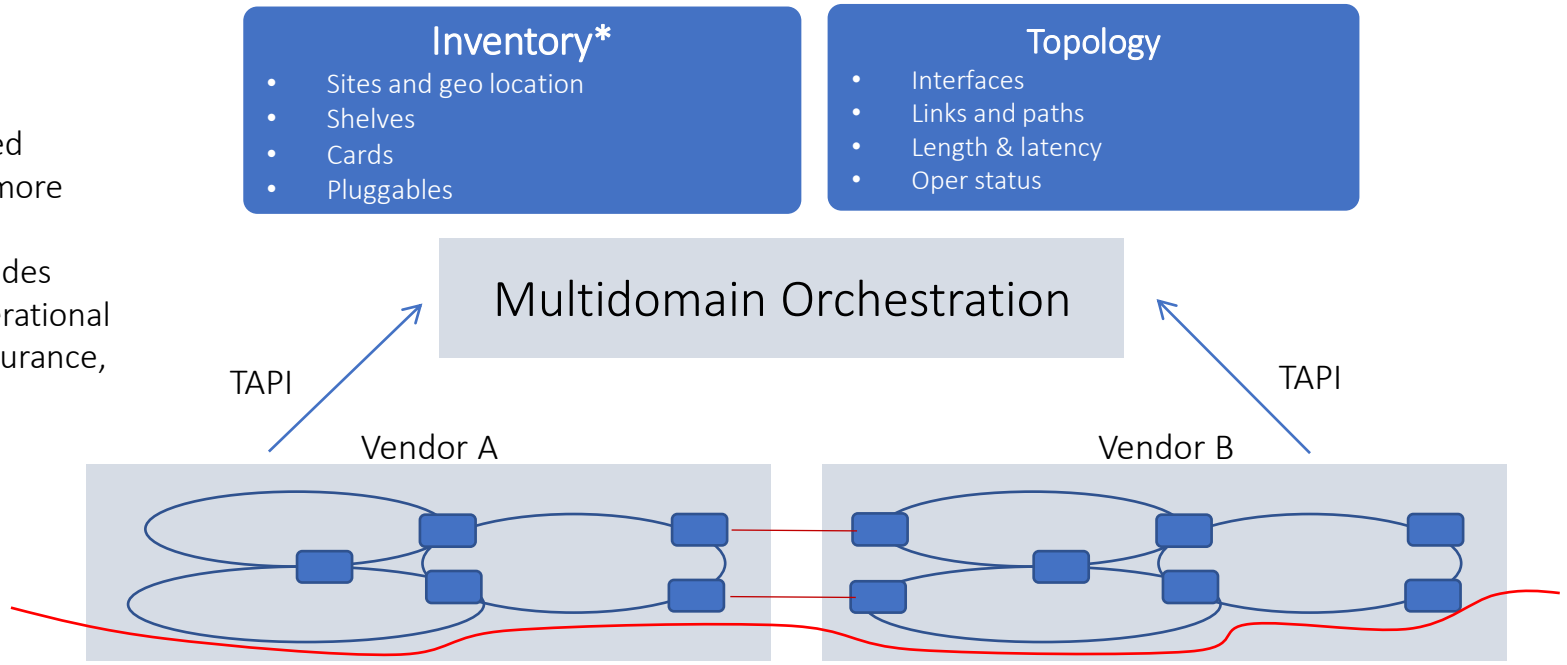

Inventory
1
Topology
2
Service
3
Slicing
4
Monitoring
5
TeraFlow OS
6
Automation
7
Policy
8
Machine Learning
9
Blockchain
10
Interdomain

Use cases for automated optical networking

- Optical - Multi-domain Inventory and Topology Discovery
- Partial Optical disaggregation
- IPoDWDM automation
- Optical Slicing
- Multilayer planning and optimization
- Cybersecurity

Optical - Multi-domain Inventory and Topology Discovery

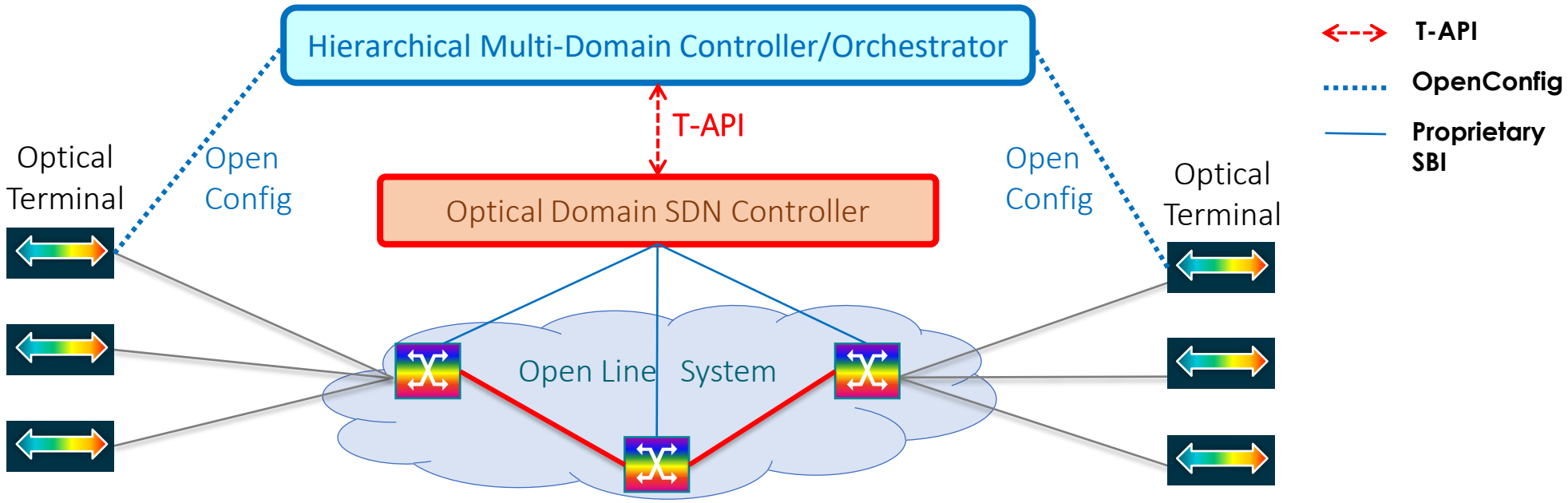
* It dos not replace a centralized inventory system which hodls more functions like stock control, design&assign, etc. yet, it provides reliable active inventory to operational processes like provisioning, assurance, maintenance



UC ID	Use Cases	Category
0a	Use case 0a: Context & Service Interface Points discovery (synchronous mode)	Discovery
0b	Use case 0b: Topology discovery (synchronous mode)	Discovery
0c	Use case 0c: Connectivity Service discovery (synchronous mode)	Discovery
4a	Use case 4a: Introduction of references to external inventory model.	Inventory
4b	Use case 4b: Complete Inventory model for NBI Interface	Inventory

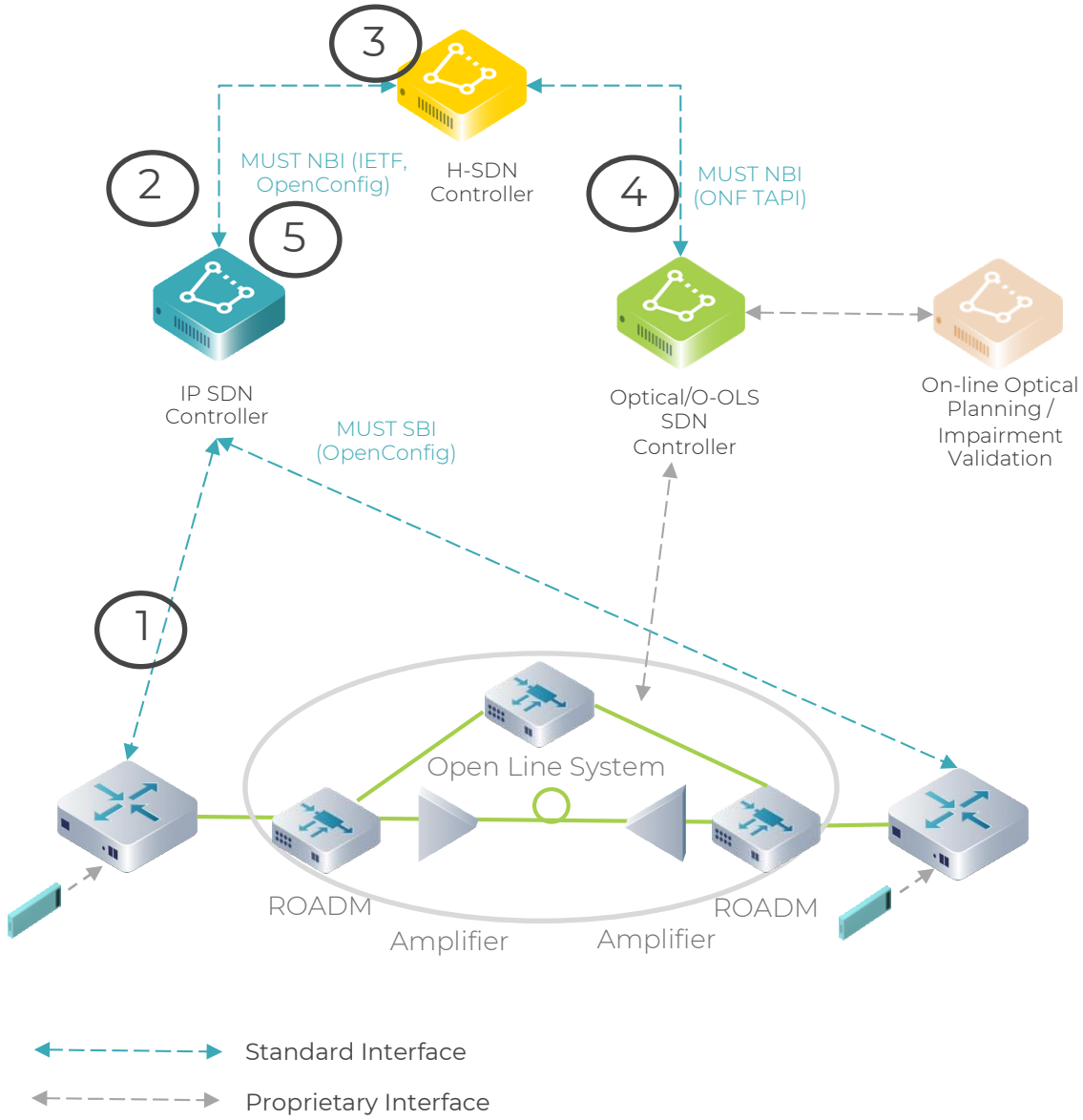
Partial Optical disaggregation

- Separation of the Open Terminal and Open Line System
- Automated control of disaggregated channels with open interfaces
- Already in production networks



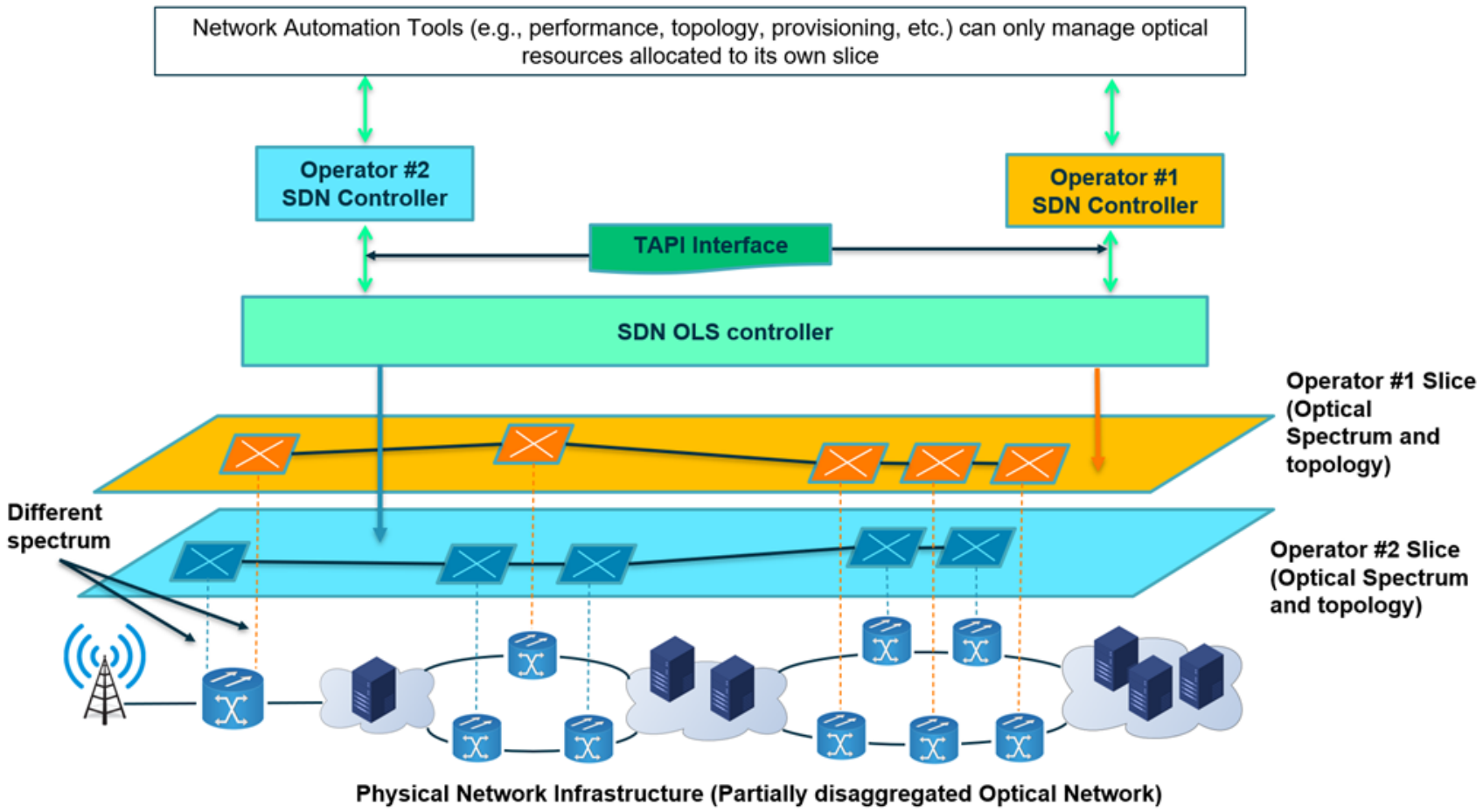
IPoDWDM Automation

- Current management and SDN architectures deployed must be compatible with the introduction of the IPoDWDM paradigm shift.
- The SDN solutions foreseen must rely on standard an open interfaces.
- Out of sync problem
- Full management (provisioning, performance monitoring, troubleshooting, alarms, and inventory) of coherent pluggable in IP/MPLS routers over existing optical OLS networks (brownfield scenarios.



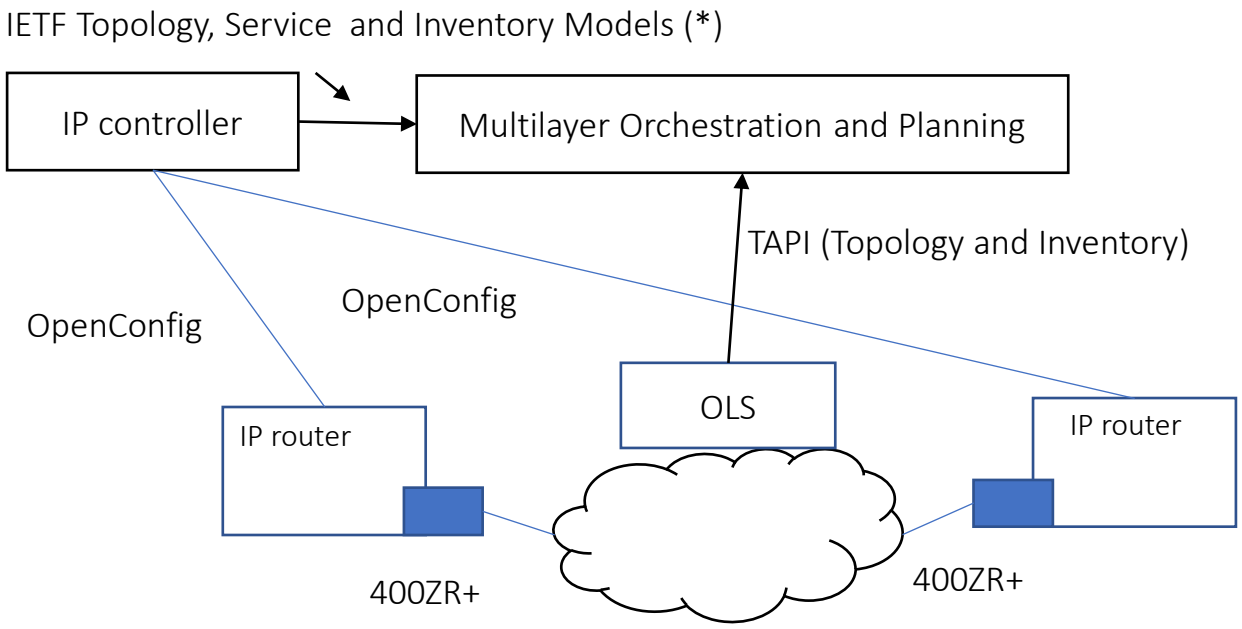
https://telecominfraproject.com/wp-content/uploads/TIP_OOPT_MANTRA_IP_over_DWDM_Whitepaper-Final-Version3.pdf

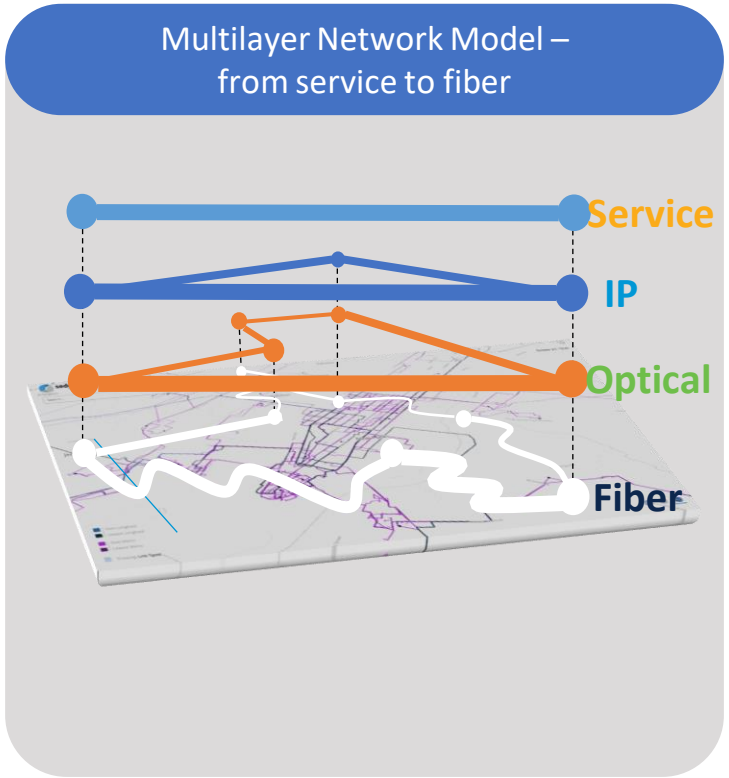
Optical Slicing

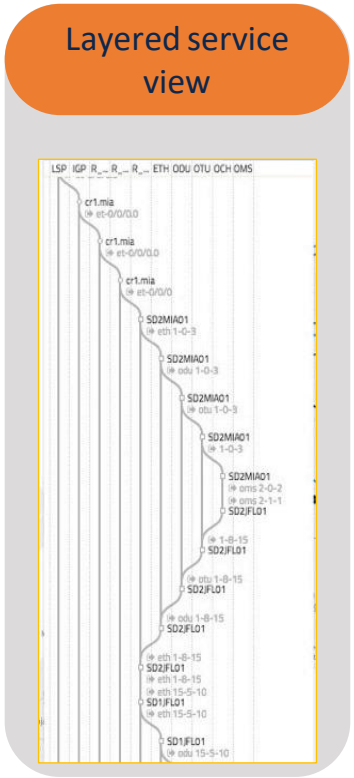


IP and Optical Topology and Inventory Discovery

Multilayer “Read Only” use case, basis for multilayer planning
IP and optical controllers are providing an abstracted topology and inventory view through Open APIs (TAPI and IETF)

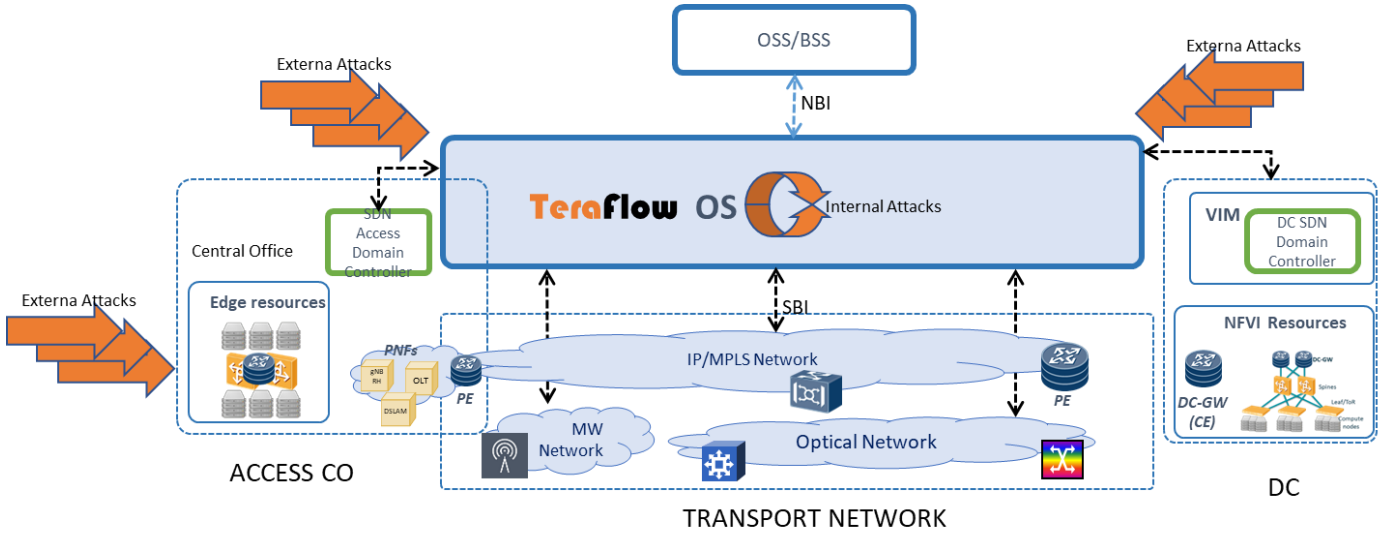






(*) IETF RFC8466: Layer 2 Virtual Private Network Service Delivery
IETF RFC9291: Network Data Model for Layer 2 VPNs

Cybersecurity



- A hybrid central and Edge ML architecture to benefit scalability and decrease latency problems
- Machine Learning (ML) to detect attacks at the optical, network and transport layers
- Protection against sophisticated attacks targeting ML components (adversarial networks)
- Reduce ML complexity using AutoML techniques

Conclusions

- Open and standard interfaces are enabling a wide variety of automation use cases in multivendor networks

- Network programmability is key to optimize network resources for new service demands and applications

Acknowledgement

This work is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement TeraFlow No 101015857.