TeraFlow SDN by ETSI

Network automation for Telco Edge Cloud with TeraFlowSDN

Håkon Lønsethagen, Telenor

ETSI SDG TFS Vice-Chair

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Today's key topics

The big picture

Evolved Network Automation Framework needed

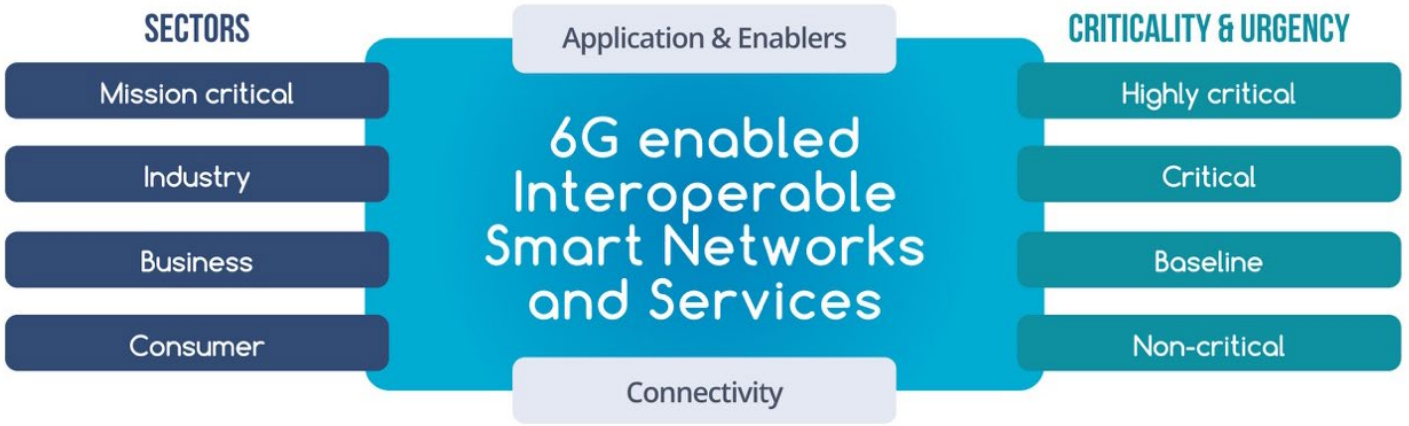
TeraFlowSDN as a key enabler

Sensitivity: Internal

A vision for 6G enabled services and interoperable smart networks

WHITE PAPER
EUROPEAN VISION FOR THE 6G NETWORK ECOSYSTEM

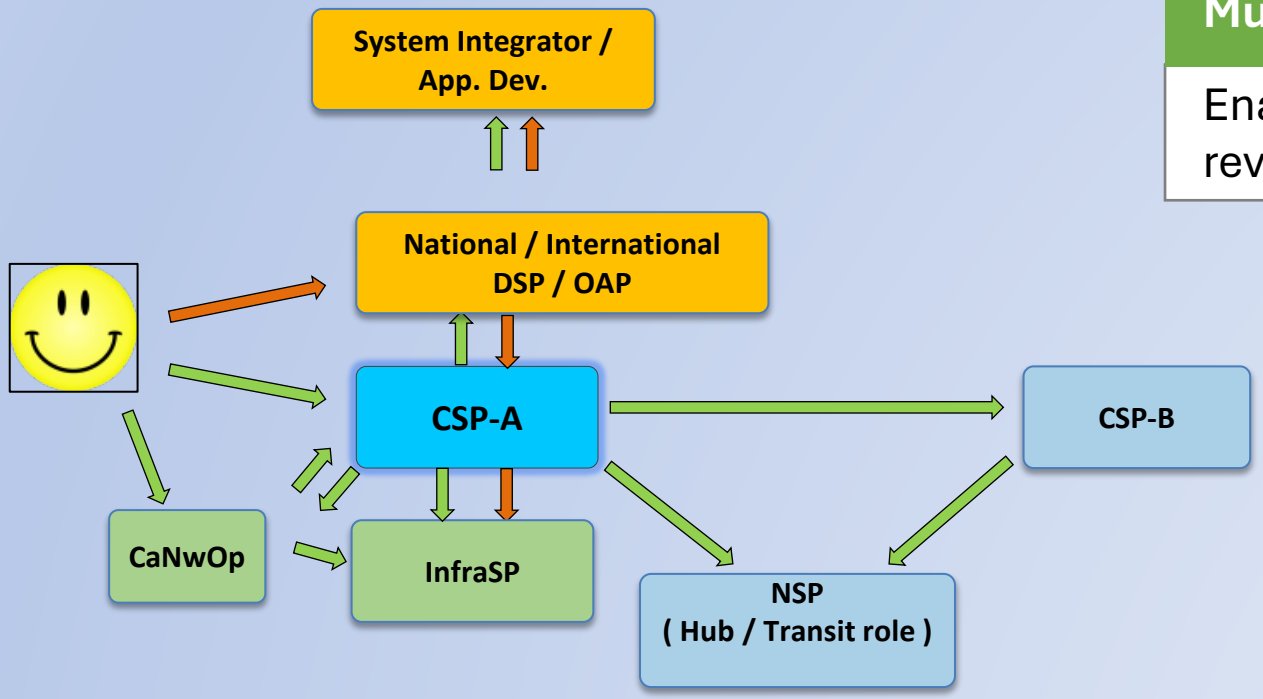
6G SNS IA VISION WG WHITE PAPER (November 2024)
- https://6g-ia.eu/plans-papers/



Harmonization across interoperable smart networks and services

Resilient Collaborative Networks and Services

Towards a Multi-Service Platform Business Model



Multi-Stakeholder Platform Ecosystem

Enabling incentive compatible BMs and revenue sharing across stakeholders

Common denominators across:

Social
State and Government
Industry
Business
Consumer

Money flows

- DSP oriented
- CSP oriented

CaNwOp – Campus Network Operator (NPN)
InfraSP – Infrastructure Service Provider

DSP – Digital Service Provider
OAP – Online Application Provider
CSP – Communication Service Provider
NSP – Network Service Provider
NPN – Non-Public Network

Sensitivity: Internal

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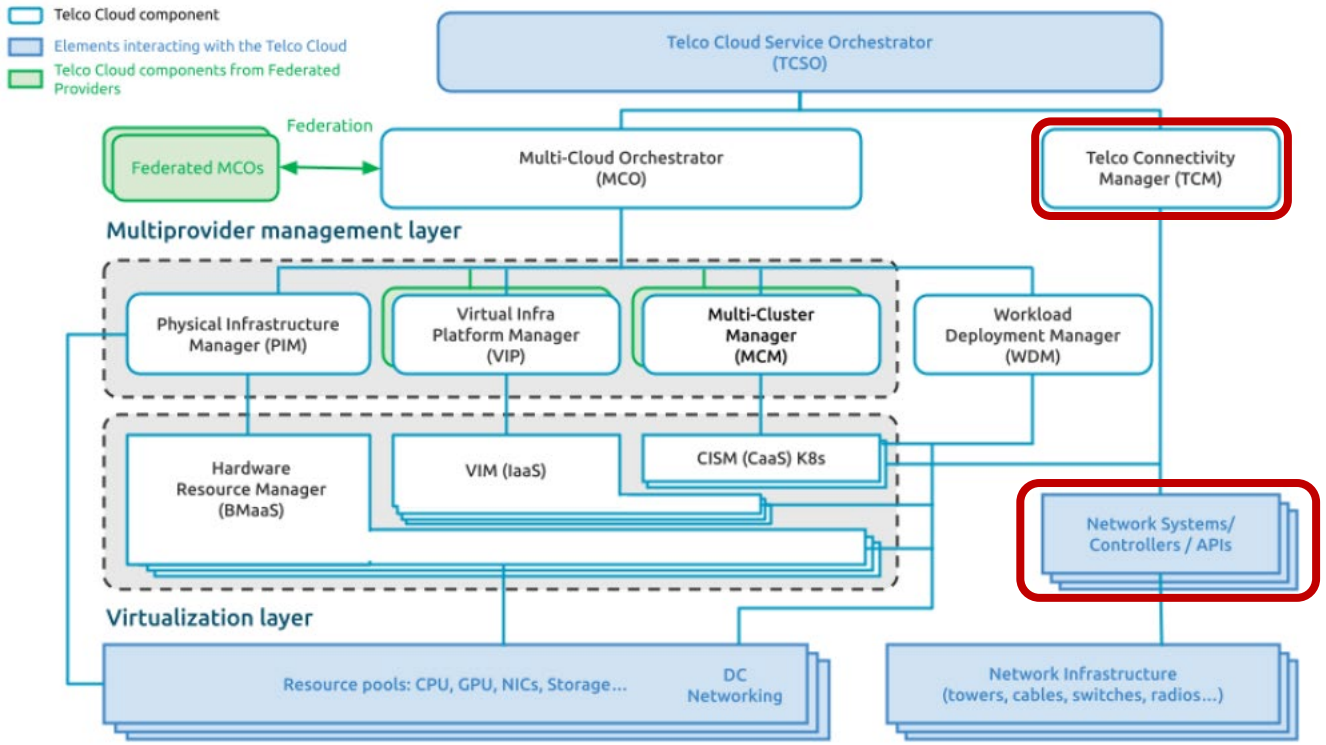
Properties of Evolved Network Automation Framework

- Edge requires distributed, multi timescale closed loops (RAN ↔ Edge ↔ Cloud)
- Local analytics & AI must run near the data;
  centralized NWDAF alone is insufficient
- Intent must be delegated and assured, even under partial and constrained connectivity
- End to end slice automation converges at the edge
- Driven by exposure and APIs the policies must be enforced locally and consistently
- Integrated security principles, supply chain transparency
  (SBOM/AI BOM) and autonomy
- Energy optimization embedded inside the edge closed loops

Sensitivity: Internal

There are many different Edge – Cloud network architectures…



Source: Telco Cloud Reference Architecture, European Alliance for Industrial Data, Edge and Cloud.

A vendor-neutral, open reference architecture for building and operating a distributed cloud - edge continuum that supports 5G/6G telecom services and applications

Core Principles

- Open & interoperable, multi-provider and multi-technology
- Cloud-native first, future-proof (containers, VMs, bare metal)
- Distributed & scalable from edge to central cloud
- Secure-by-design, sustainable, and sovereignty-aligned

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Building the Foundation for Autonomous Telco Connectivity Manager

TeraFlow SDN

Programmable

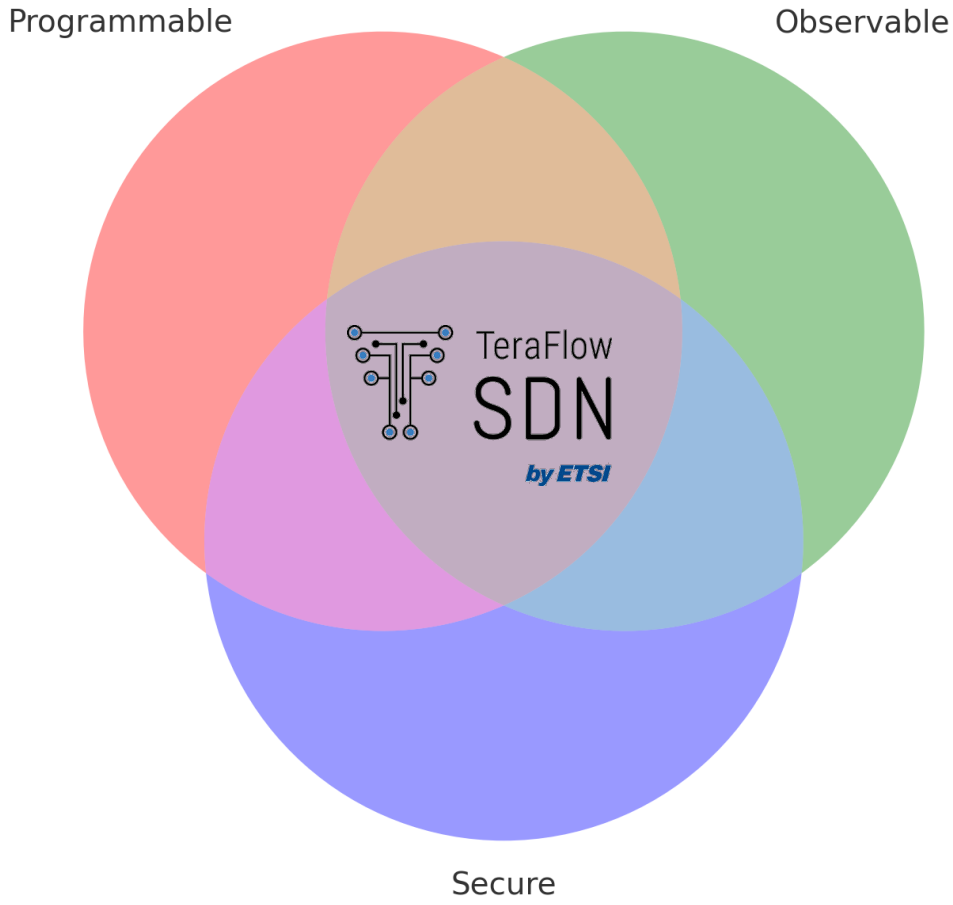
- Support for flexible automation and policy-driven control.

Observable

- Enhanced telemetry and real-time network visibility.

Secure

- Integration of quantum-safe security mechanisms and energy-aware slicing.



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Sensitivity: Internal

TeraFlowSDN is a key enabler for network automation

Release 6 available!

Network Operators need AUTOMATION

AUTOMATION means SOFTWARIZATION

NETWORKS are complex. Need to handle multiple equipment and domains

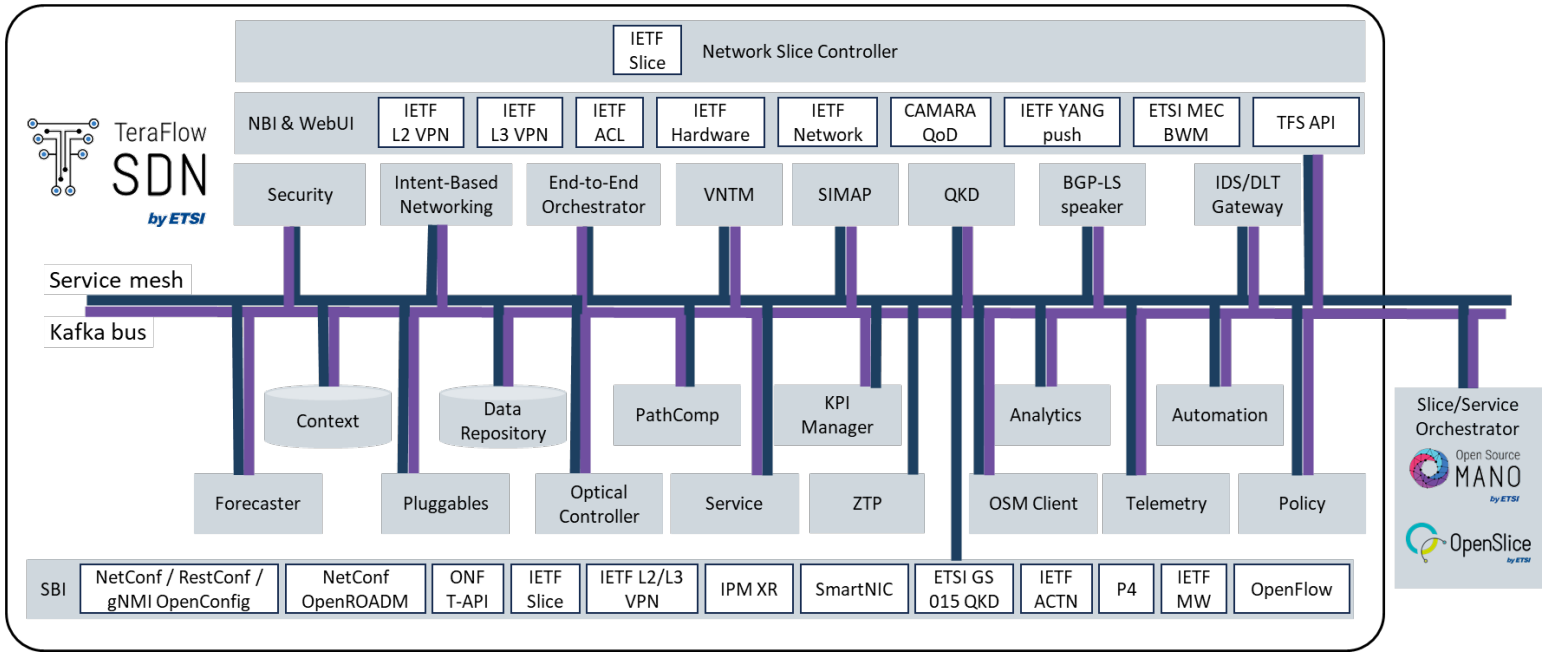
Specific domain-solutions to automate the network

Horizontal scaling
- It has microservice-based architecture

Handle massive data streams
- Ingest, process and analyze data in real-time

Auto-scalable and resilience
- Kubernetes based deployment makes it auto-scalable and resilient

Flexible and easy deployment
- Containerization makes it flexible across edge, core and cloud domains



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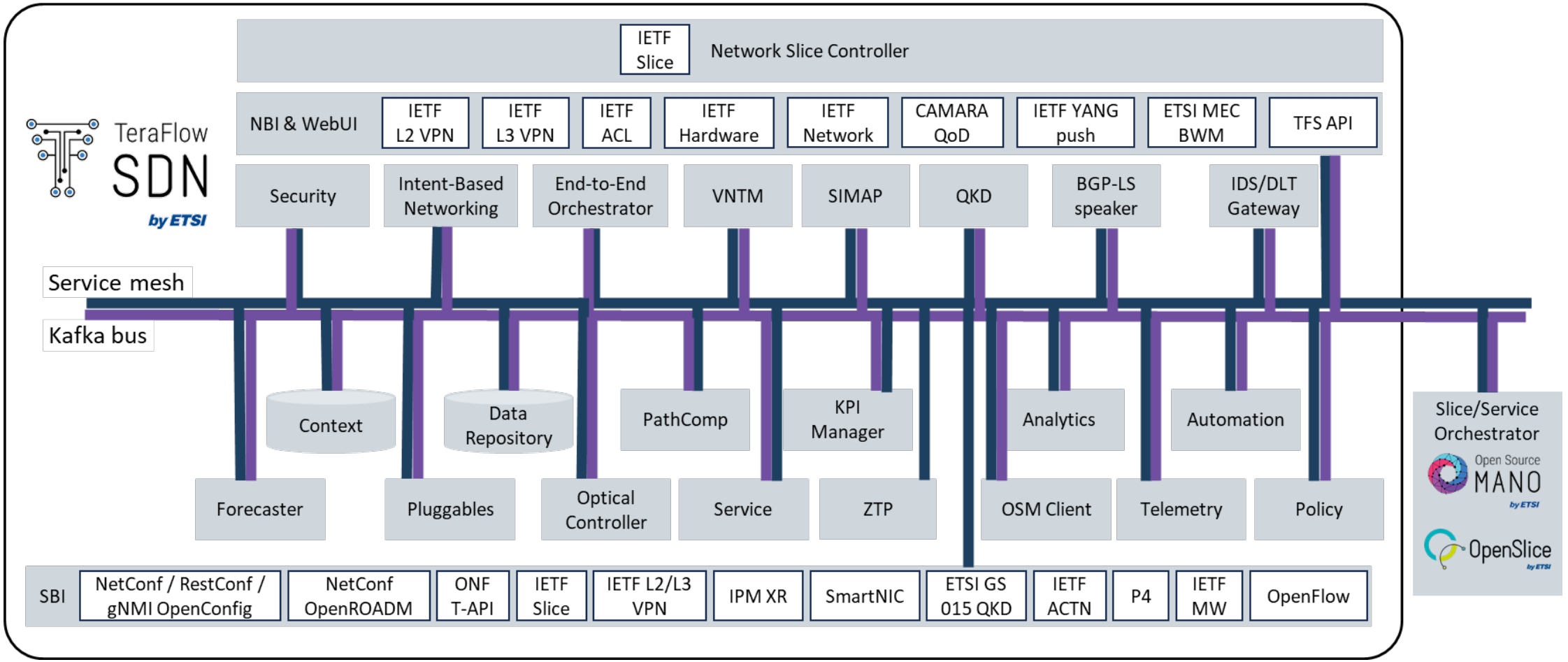
TeraFlowSDN high-level architecture



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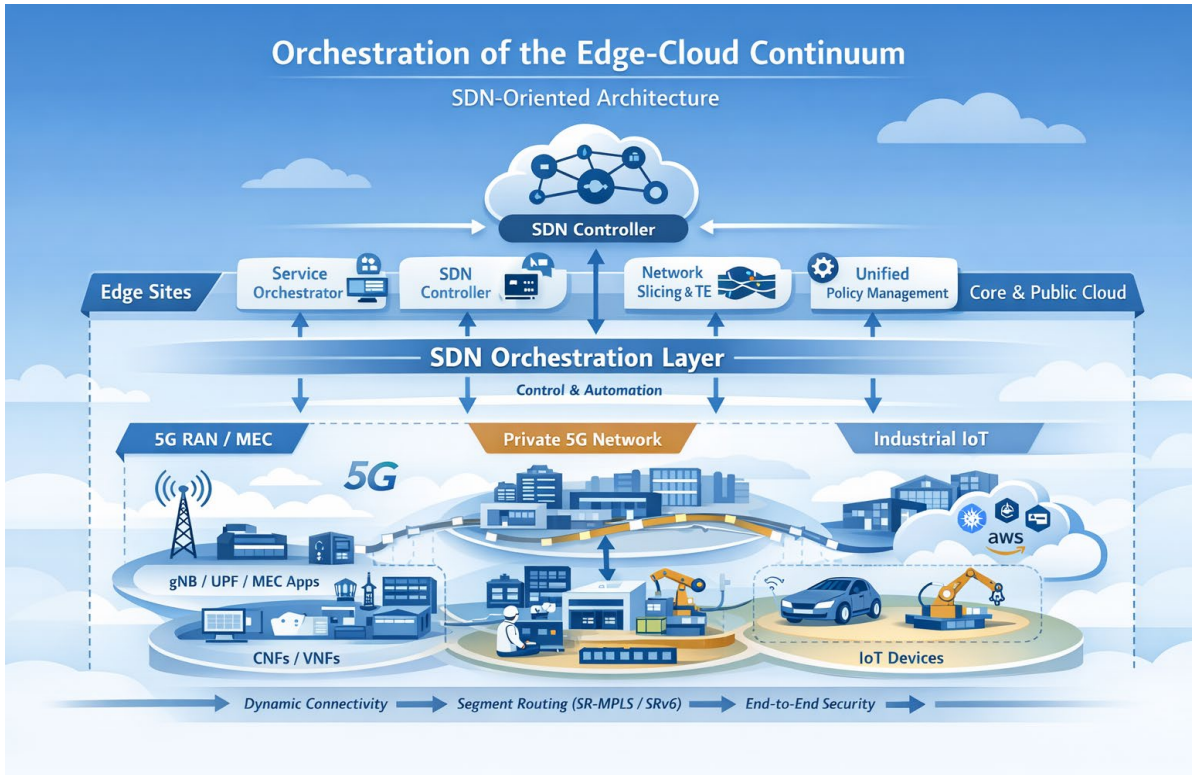
Positioned for the to Edge – Cloud continuum

TeraFlow SDN

Addressing the Telco Connectivity Manager (TCM*)

- Managing the service function chain
- By the requests from the TCSO (or any other system or GUI), to manage
  a) the connectivity between workloads that will enable the service delivery and
  b) the connectivity from the service user to the workloads implementing the service front-end



(*) See Telco Cloud Reference Architecture, European Alliance for Industrial Data, Edge and Cloud.

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Interfaces Supported

NBIs [1]:

- TFS API
- ETSI MEC Bandwidth Management API
- IETF L2-VPN Service Delivery [RFC8466]
- IETF L3-VPN Service Delivery [RFC8299]
- IETF Network Topology [RFC8345]
- IETF Network Slice Service [draft]

SBIs [2]:

- Emulated
- NetConf/OpenConfig
- gNMI/OpenConfig
- ONF Transport API
- P4
- Infinera IPM XR
- IETF L2-VPN Service Delivery [RFC8466]
- IETF ACTN (basic support)
- Optical TFS
- MicroWave [ONF TR-352]

(1) https://labs.etsi.org/rep/tfs/controller/-/wikis/6.-Supported-NBIs
(2) https://labs.etsi.org/rep/tfs/controller/-/wikis/5.-Supported-SBIs-and-Network-Elements

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Collaboration with other communities

TeraFlow SDN

- Open-source software

Open Source MANO by ETSI

OpenSlice by ETSI

OpenCAPIF by ETSI

- Standard Defining Organizations

ETSI
- ISG MEC
- ISG F5G
- ISG ZSM

IETF
- TEAS (ACTN)
- CCAMP

ONF / THE LINUX FOUNDATION
- Transport API
- P4

- Industry Organizations

TELECOM INFRA PROJECT

OPENCONFIG

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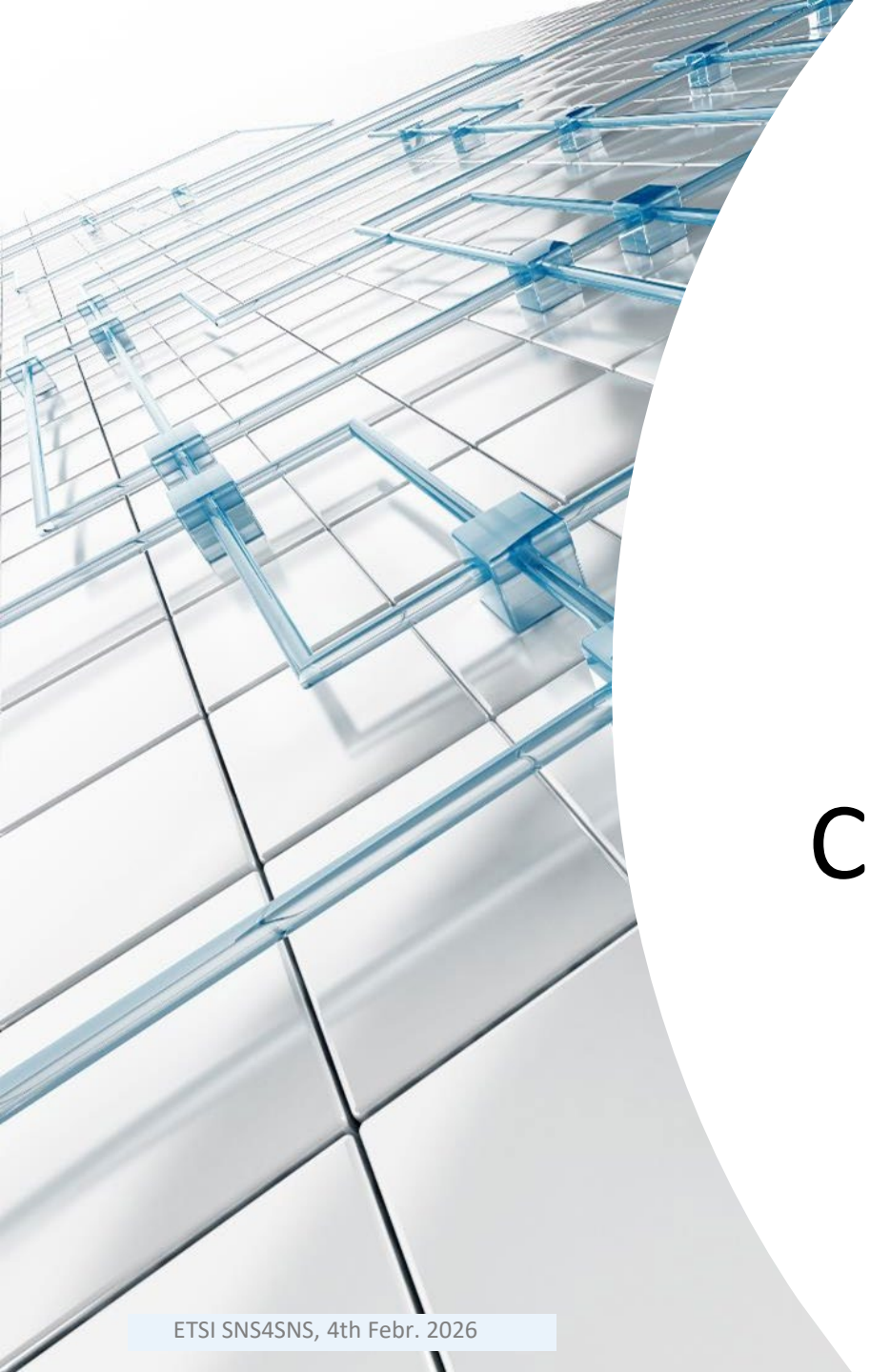

TeraFlow SDN

Concluding remarks

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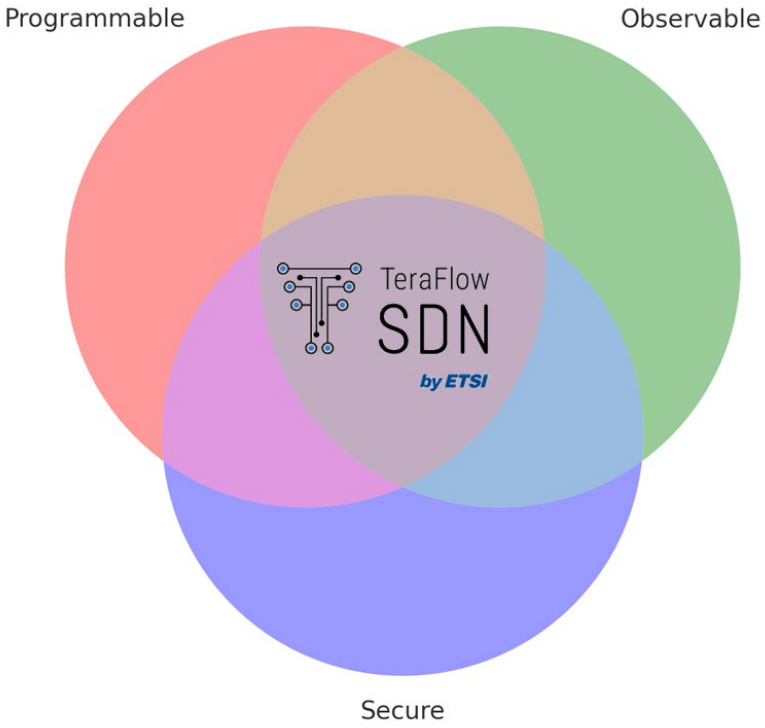
Concluding remarks

- TeraFlowSDN forms the **basis for an Evolved Network Automation Framework**
- An intelligence layer enabled by TeraFlowSDN will permit to **fully exploit Telco edge cloud evolution** through programmatic interfaces
- TeraFlowSDN enables advance reconfiguration capabilities to **flexibly support Network for AI** cases
- **Virtuous circle** of innovation leveraging a reference implementation **for fast prototyping and feedback to standardization**



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Thank You!

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