TMForum & Camara Collaboration Update

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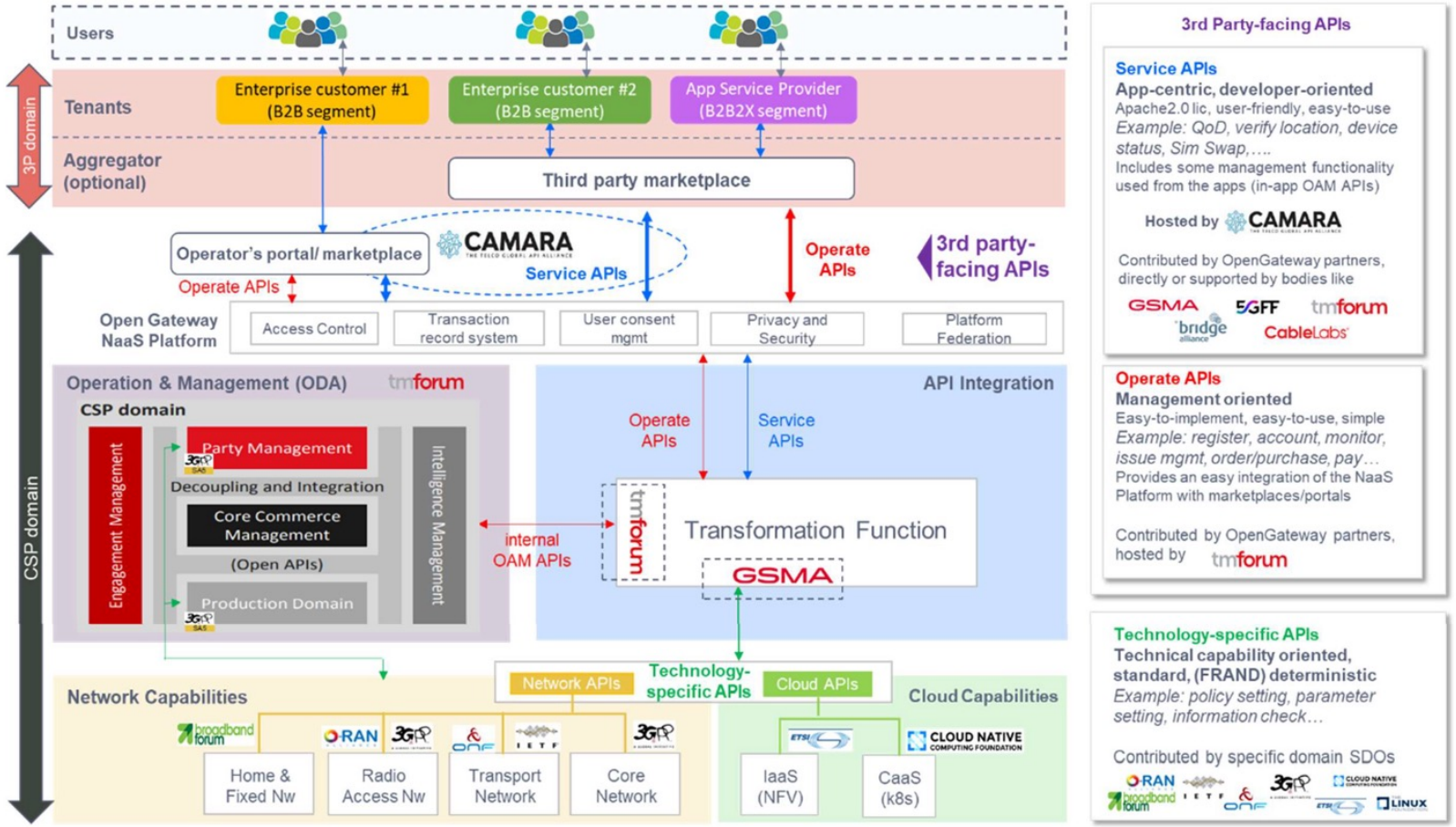
May 2024

tmforum

TMF and Camara collaboration

Explore Network uscecases with TMFOperate APIs and Camara APIs



3rd Party-facing APIs

Service APIs
App-centric, developer-oriented
Apache2.0 lic, user-friendly, easy-to-use
Example: QoD, verify location, device status, Sim Swap,….
Includes some management functionality used from the apps (in-app OAM APIs)

Hosted by CAMARA

Contributed by OpenGateway partners, directly or supported by bodies like

GSMA 5GFF tmforum bridge alliance CableLabs

Operate APIs
Management oriented
Easy-to-implement, easy-to-use, simple
Example: register, account, monitor, issue mgmt, order/purchase, pay…
Provides an easy integration of the NaaS Platform with marketplaces/portals

Contributed by OpenGateway partners, hosted by tmforum

Technology-specific APIs
Technical capability oriented, standard, (FRAND) deterministic
Example: policy setting, parameter setting, information check…

Contributed by specific domain SDOs

RAN broadband forum IETF ONF 3GPP CLOUD NATIVE ETSI LINUX

- Successfully built the Reference Architecture**IG1318 TM Forum and CAMARA APIs for telco standardized service exposure v1.1.0**
- Operate API development group under TMForum
- Catalysts to explore e2e UC

TMF and Camara collaboration | Usecases

B2B Customer Onboarding

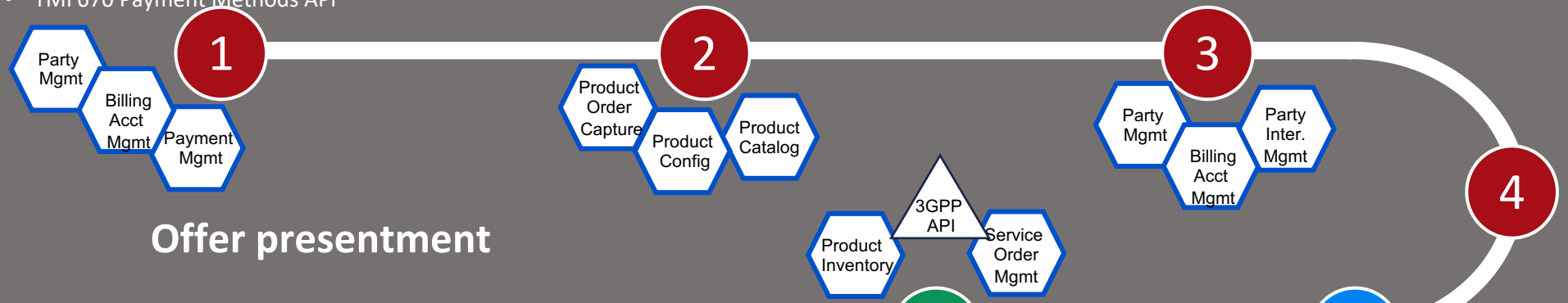
- TMF632 Party Management API
- TMF629 Customer Management API
- TMF666 Account Management API
- TMF670 Payment Methods API

B2B Customer Base PO Ordering

- TMF663 Shopping Cart Management API
- TMF622 Product Ordering API

B2B Partner Onboarding

- TMF632 Party Management API
- TMF668 Partnership Management API
- TMF669 Party Role Management API
- TMF666 Account Management API



Offer presentment

B2B Partner Agreement

- TMF620 Product Catalog Management API
- TMF651 Agreement Management API

Product Catalog, Party Inter. Mgmt

User Eligibility check

- TMF679 Product Offering Qualification API
- TMF637 Product Inventory Management API
- 3GPP: Event Exposure (Cell Coverage)

Customer App Subscription

Product Order

- TMF622 Product Ordering API

Product Order Capture

Connectivity Boost

- 3GPP: AF Session with QoS
- Camara : QoD
- TMF640 Service Activation & Configuration
- TMF702 Resource Activation & Configuration

Service Activation, Resource Activation, 3GPP API, CAMARA QoD API

Product use

Service Usage, Product Usage Mgmt

Revenue Sharing

Product Rating, Billing Invoice Mgmt

CSP Relevant Use-case

CSP Non-Relevant Use-case

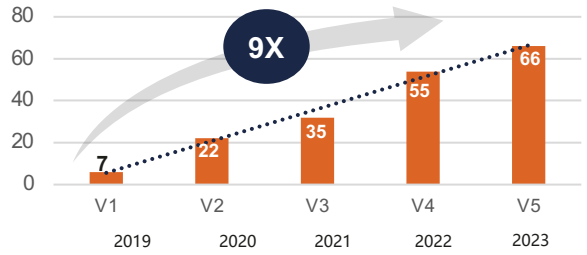
*APIs to be confirmed through the study

*Consent for on-behalf actions assumed as predefined on agreements

Autonomous Network – TMF overview

TM Forum starts Autonomous Networks Levels assessment, GenAI workstream, Self-healing domains

AN industry is booming



51+ leading partners signed AN Manifesto

AN

AN maturity levels
Reference architecture
Effectiveness indicators

Intent

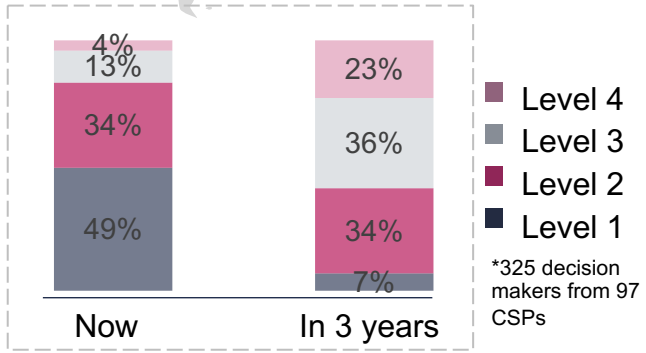
TM Forum Intent ontology
Intent lifecycle management
Intent management API
Intent common model

Closed Loop

Closed loop AI models
Implementation architecture
Automation APIs

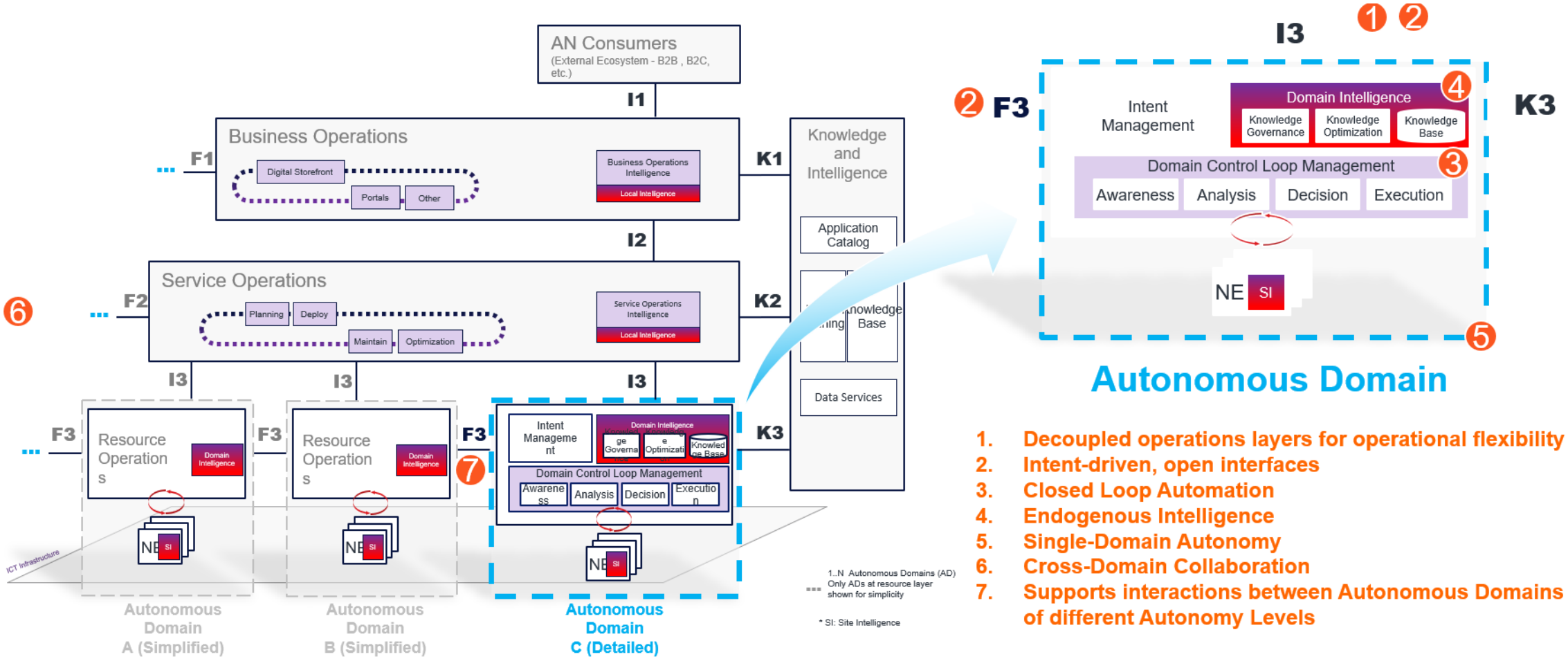
Big Ambitions to reach L3/L4

60% CSPs expect to reach L3/4 in 3 years
14 leading CSPs state commitment for L4 between 2025-2027



*325 decision makers from 97 CSPs

TMF Autonomous Network reference architecture



1. **Decoupled operations layers for operational flexibility**
2. **Intent-driven, open interfaces**
3. **Closed Loop Automation**
4. **Endogenous Intelligence**
5. **Single-Domain Autonomy**
6. **Cross-Domain Collaboration**
7. **Supports interactions between Autonomous Domains of different Autonomy Levels**

AN Levels Taxonomy (IG1252)

Level	Typical characteristics	Interface requirements	Interface requirements description
Level 0-Manual management	Offline manual implementation	Manual operation interface	The interface shall be called manually by the upper layer.
Level 1-Assisted management	Manual implementation, online recording	Event reporting interface	The system shall respond to requirements for online recording and record the event reporting.
Level 2-Partial autonomous network	Automation driven by statically configured rules	Rule configuration interface	The system shall respond to requirements for static rules and support corresponding rules configuration capabilities.
Level 3-Conditional autonomous network	Automation implementation driven by dynamically programmable policies	Policy design and configuration	The system shall respond to requirements for dynamically programmable rules (policies) and support corresponding design and configuration capabilities.
Level 4-High autonomous network	Automatic implementation driven by AI assisted (if needed) knowledge, with continuous learning and rapid evolution.	AI Model management	The system shall respond to requirements for rules/policies generation, and provide corresponding local adaptation, model training and inference capabilities, with continuous learning and rapid evolution.
Level 5-Full autonomous network	Automatic implementation capable of self-evolution and adapting to changes.	Knowledge Closed loop management	Corresponding to autonomous evolution, knowledge (rules, policies, etc.) and AI/ML models are automatically generated based on AI deep learning, without human interference. The system shall respond to the closed-loop management requirements for knowledge and AI models.

AN Levels Assessment Pilot Study

Objectives

- Assess the feasibility of global comparison of operator AN Levels
- Prototype a methodology for comparing AN Levels
- Pilot assessment includes fault management for RAN and Core

Feb-24	Establish the pilot as a work activity within the TM Forum AN Project ✓
Mar-24	Sign up operator participants* ✓
	Provide a prototype Levels Evaluation Tool to participants ✓
	Jointly agree the questionnaire and populate the Evaluation Tool ✓
Apr-24	Participants carry out self-assessment of AN Levels
May-24	Participants analyze results and draw conclusions
Jun-24	Publish conclusions in time for DTW (18-20 June 2024, Copenhagen)

Confirmed Operator Participants

- AIS
- Elisa
- Globe Telecom
- MTN South Africa
- Orange
- Telefónica
- Saudi Telecom Company
- Telecom Argentina
- Telkomsel

Building the UC MAP with our members

Self-healing domains/closed loop – new work stream

Next Generation of OSS

IoT

Service Assurance

- Core Network, Wireless Network quality optimisation
- IP Network quality optimisation
- Radio Network Optimisation

Troubleshooting,O&M Networks

- Incident Management
- NOC

FW Management

SD-WAN

Home BB service assurance

Evolve the Service Management APIs*

CSP ask: *UC of how TMF Open API and Camara API can work together

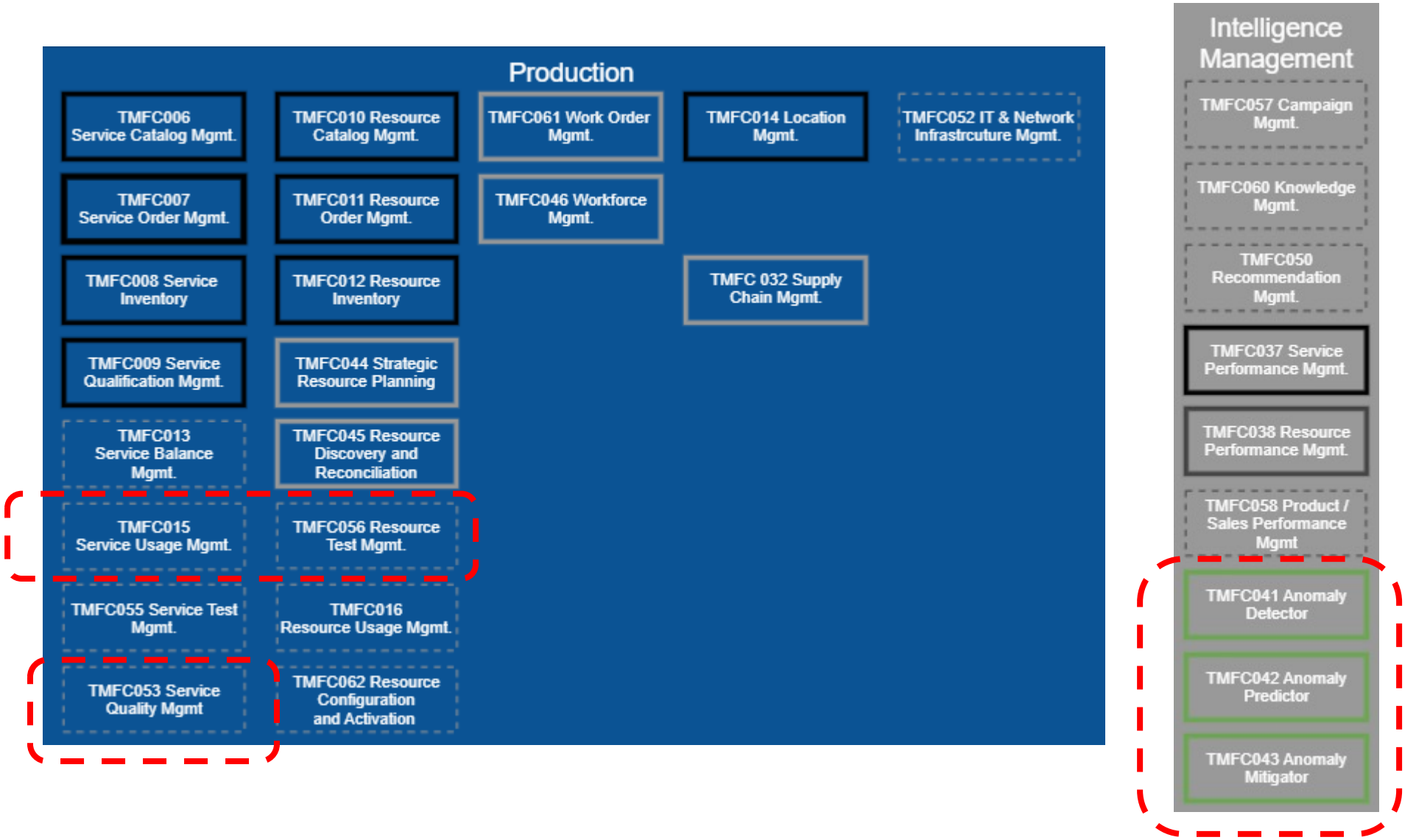

thank
you

Self-healing Domains

Categories	Sub-categories
Self-serving	**Self-planning/capability delivery:** Provides the customization (DIY) capabilities of network/ICT service planning, design and deployment **Self-ordering:** Provides the online, digitalized and/or one-click ordering capabilities of network/ ICT services **Self-marketing:** Provides the automated marketing activities for general and/or personalized campaign/promotion **Self-configuring:** As new network elements are added, they are automatically recognized, provisioned and configured in the network
Self-fulfilling	**Self-organizing:** Provides the collaboration of business/service/resource intent delivery on demand **Self-managing:** Provides the orchestration of business/service/resource intent delivery on demand **Self-governing:** Provides the governance of business/service/resource intent delivery on demand
Self-assuring	**Self-monitoring/reporting:** Provides the automatic, continuous monitoring and alerting in real time **Self-healing:** Provides the recovery of SLAs e.g. performance, availability and security recovery in real time and so that the network may build predictive failure models, which are then combined with automated processes that are capable of altering network configurations to avoid failure condition **Self-optimizing:** Provides the real time optimization of SLA e.g. performance, availability and security **Self-defending:** Behavioral analytics models can be built to identify network element behavior that is abnormal and could indicate a compromised component. Automated process could then sandbox the suspect network element for further analysis and remediation or even roll back to the last known good configuration.

- New project: Self-Healing Domain Solutions
  - Architecture patterns
  - Components & APIs
  - Usecase Map

ODA Components and TMF Open APIs to manage and operate Network Resources



TMF currently has 60+ APIs, of which 12 are resource-related and 4 are strongly related to network resources

- Resource Function Activation (664)
- Resource Activation (702)
- Intent Management (921)
- Resource Inventory(639)

There is only one resource-related API(Resource Inventory) with the largest download volume in the API Dashboard.

Open API Journeys

ODA for Networks

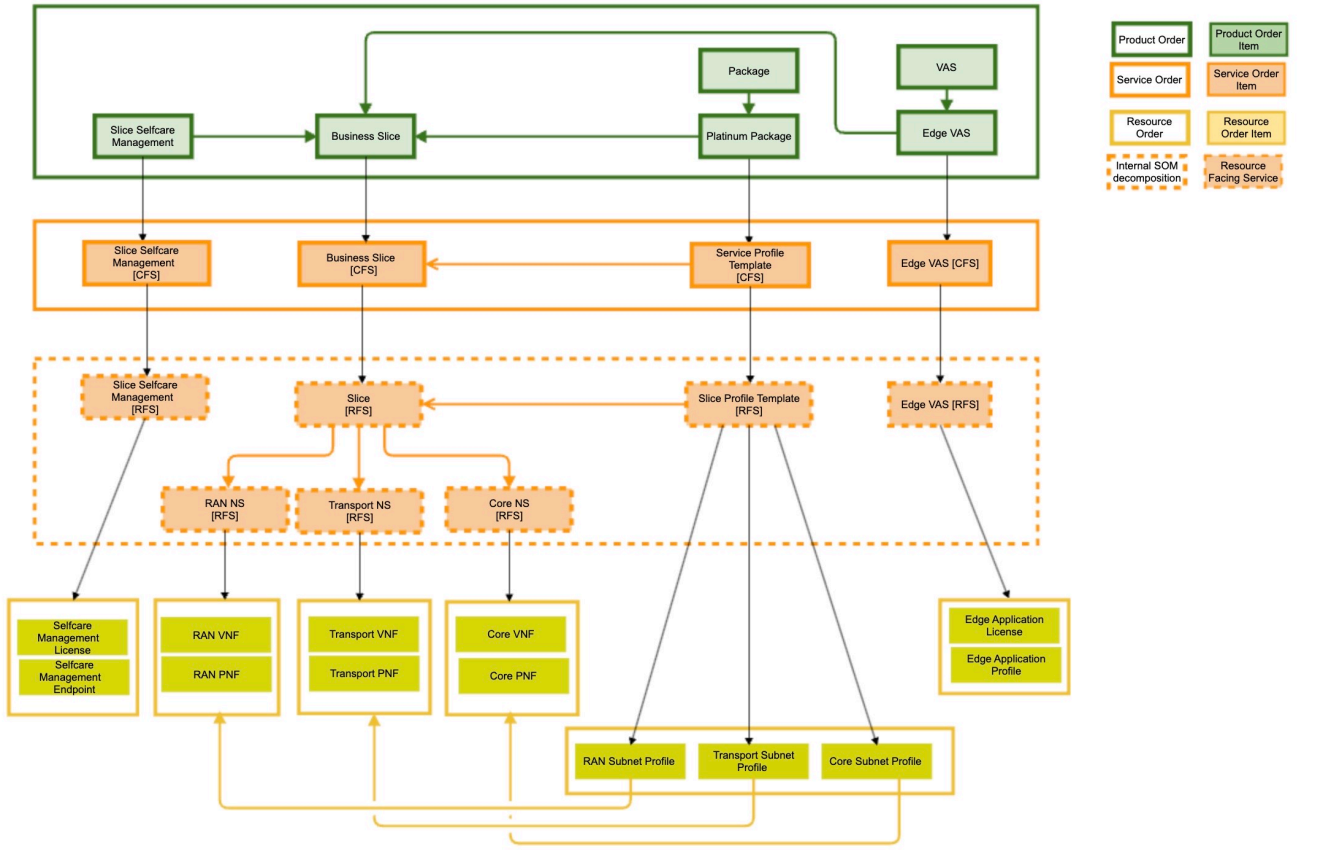
Dynamic view of ODA Functional Architecture (to be progressively extended in next versions to the global Order to Cash process)

Usage of TMF Open APIs (leveraging TMF Open APIs v4)

A draft list of ODA macro-components, represented as vertical lines in the sequence diagrams

Two possible ways of distributing processes and macro-components and TMF API orchestration

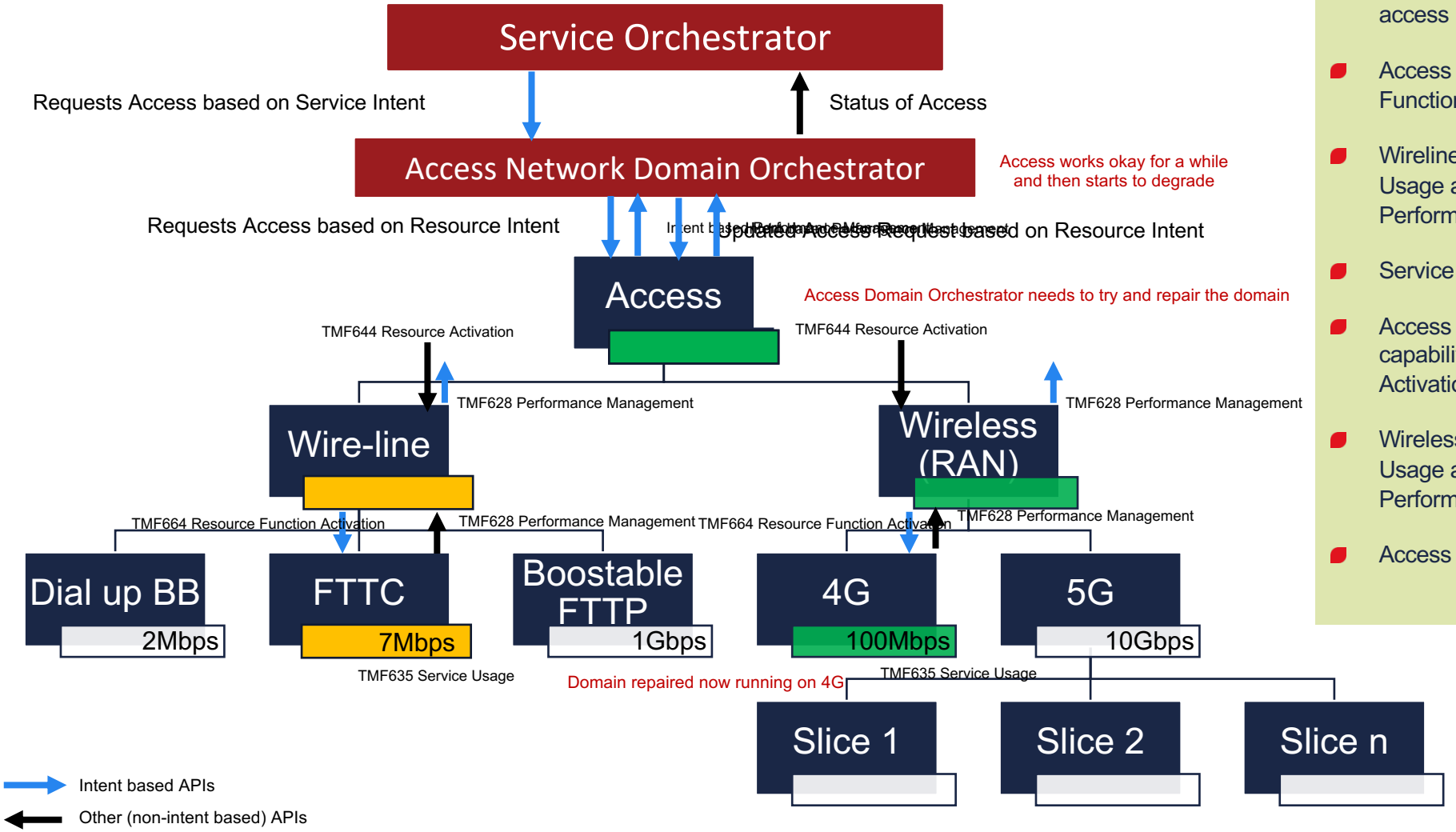
- A: Using the concept of BFF, in charge of process orchestration and TM Forum API orchestration
- B: Using TMF 701 Process Flow API to decouple front-ends and process layers



IG 1228 - UseCase Flow Confluence Page

Network Management

Repairing Access using a cross-domain orchestrator



Sequence of operational control

- Service Orchestrator controls and manages the Domains – requests access based on Service Intent
- Access Domain includes Wire-line (fixed) and Wireless access
- Access Domain Orchestrator actions TMF664 Resource Function Activation for Wireline FTTC
- Wireline FTTC starts working, generating TMF635 Service Usage and reporting on its performance using TMF628 Performance Management
- Service runs Okay for a while, but then starts to degrade
- Access Domain Orchestrator knows it has a 4G access capability available so actions a new TMF644 Resource Activation for Wireless 4G
- Wireless 4G starts working, generating TMF635 Service Usage and reporting on its performance using TMF628 Performance Management
- Access Domain Orchestrator stops the Wire-line access

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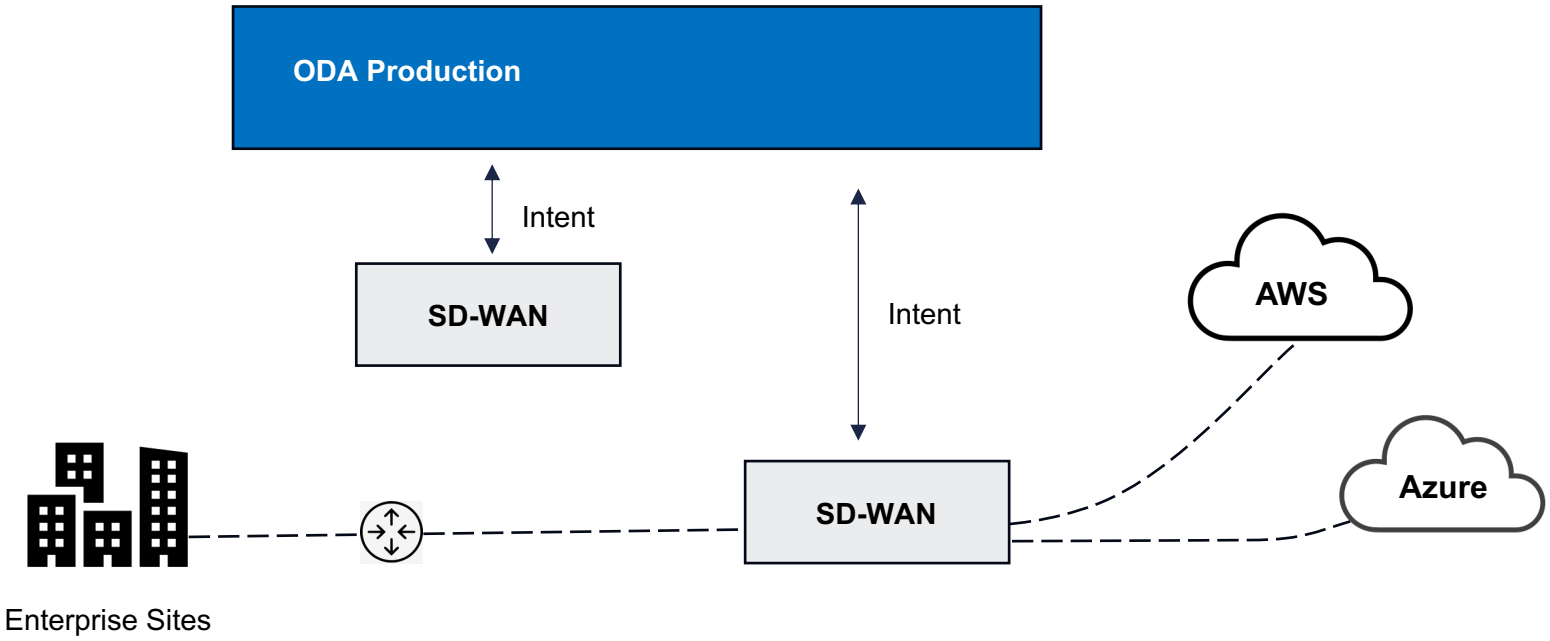
Use Case - Network service Self-healing

- The Operator offers a Software Defined Cloud Interconnect (SDCI) service with points of presence in various regions.
- The Operator's SDCI uses multivendor SD-WAN and virtual routers to connect sites to cloud infrastructure.
- There has been an unexpected decrease in bandwidth for numerous subscribers in one of the regions.



TR 313 "Architecture options for Integration with Resource Technology-Specific Domains"

- This guide is meant to help CSPs understand different architecture patterns and choices within the ODA Production Network Resource Operational Domains.

- The guide covers key changes in Network Service and Resource Layers, along with operational practices outlined by other SDO groups.

https://projects.tmforum.org/wiki/pages/viewpage.action?pageId=286103795