# Operator Platform (OP) APIs

## Informational Webinar

Operator Platform API Group

02 December 2021

# Operator Platform APIs Webinar

| Item # | Agenda Title | Owner | Timing (GMT) |
|---|---|---|---|
| 1 | **Welcome** | Alex Harmand, OPAG Chair, Telefonica | 13:00-13:05 |
| 2 | **Operator Platform Group (OPG) overview** | Sandra Ondrusova, OPG Chair, CK Hutchison | 13:05-13:20 |
| 3 | **Operator Platform architecture** | Shamik Mishra, OPG Deputy Chair, Capgemini Engineering | 13:20-13:35 |
| 4 | **Operator Platform API Group (OPAG) overview** | Alexandre Harmand, OPAG Chair, Telefonica | 13:35-13:50 |
| 5 | **Review of SDO mapping**<br>**- Phase 2 conclusions**<br>**- Detailed mapping**<br>**- Next steps** | Miguel Armengol and Alex Harmand, OPAG Chair, Telefonica | 13:50-14:30 |
| 6 | **Q&A** | All | 14:30-15:00 |
| | **Meeting Close** | | 15:00 |

# Welcome

Operator Platform (OP) APIs webinar

Alexander Harmand, Head of Core and Service Platforms, Telefonica - GSMA OPAG Chair

02 Dec 2021

# Meeting objective

Through the Operator Platform Project the GSMA defined some key functionalities to enhance Edge capabilities.

- Smart Edge allocation, and selection to perform load deployment and access from the closest edge
- Edge federation to offer a multi domain Access to customer and enhance edge service under roaming scenarios
- Tight network integration to enhance mobility and user experience

Now that the architecture and main functionalities are defined, the GSMA shall ensure that the interfaces of the platforms are properly defined and referred to existing work in SDOs when available

The objective of this meeting is to share the level of coverage identified by the GSMA against current ETSI and 3GPP activities, possible overlaps and gaps that have to be solved to reach a proper standard definition of the platform

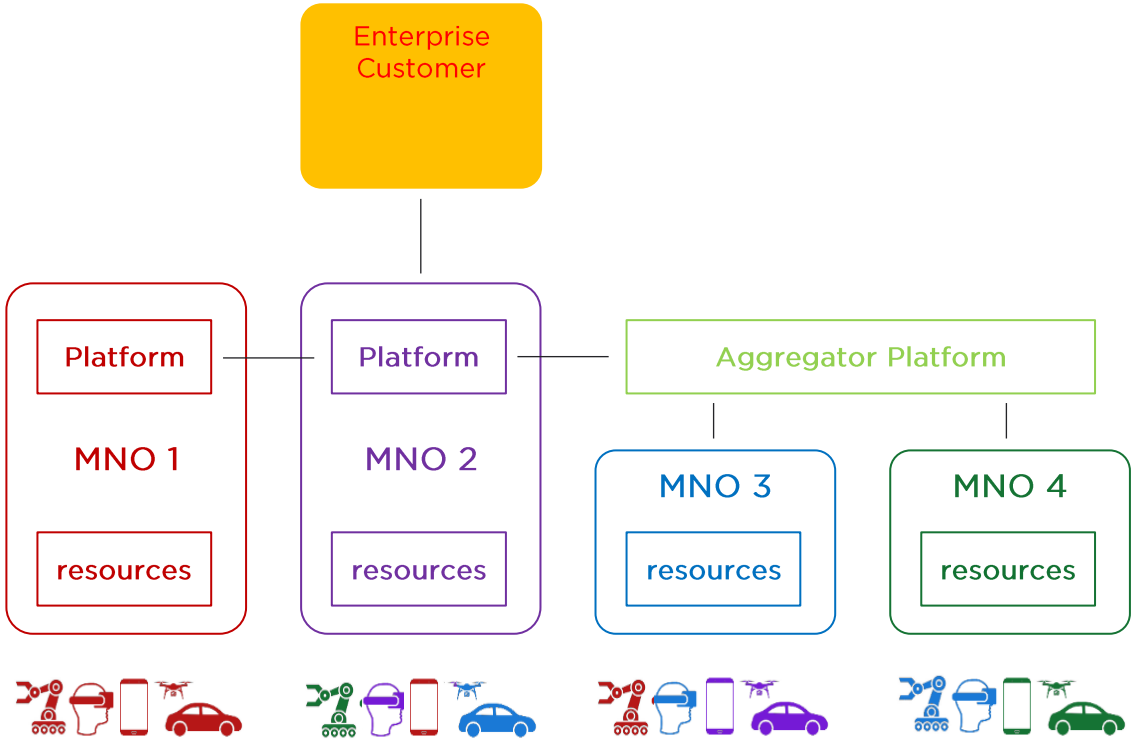
# Operator Platform Overview

Overview of Operator Platform Group (OPG) and initiative

Sandra Ondrusova, Technology Manager, CK Hutchison – GSMA OPG Chair

02 Dec 2021

# What is the Operator Platform (OP)?




- The OP exposes capabilities in the operator network to 3rd party providers
- Initial focus on edge compute
  - Edge is a critical enabler for 5G
  - many edge use cases will require mobility and sharing of resources
  - Will be extended with other capabilities later (e.g. NaaS, Network slicing)
- Advantages
  - interoperable: interfaces are aligned
  - Flexible: several approaches supported towards deployment
  - federated: one party's OP can provide access to capabilities managed by another

# What does OP mean for edge computing?
## The OP makes edge compute a true interoperable operator service

**Federation allows a party to connect to one OP and provide service to subscribers serviced by all federated OPs**

- i.e. extends geographic and user base that is offered
- Similar to e.g. voice call that can be set up to all interconnected parties
- Federation also requires alignment on the capabilities offered and thus results in a more uniform service
  - E.g. similar resource offerings rather than one operator offering GPU focussed compute in small regions and another storage focussed in larger zones

**Service in roaming and while mobile**

- Edge requires use of nearby compute resources
  - Most use cases don't make sense when using resources in home network
  - Compute resources assigned have to follow user as they move around
- Requires the integration with the network resources taking care of access and authentication
  - Those are integrated with the OP

**Connectivity between edge clouds of operators in the area**

- Can enable sharing of resources, e.g. to provide service in more sparsely populated areas
- Can enable use cases that require interaction between devices on different operators
  - E.g. automotive with different manufacturers using different operators
- Required for smooth handover between operators during cross-border mobility
- The OP can manage connectivity and charge application provider for usage
- Most use cases not included in MVP requirements yet because they're more long term due to other dependencies

# Who's in?

## 30+ Industry Partners

Google, aws, Microsoft, Ericsson, Nokia, Huawei, Capgemini, Mobiledge X, Hewlett Packard Enterprise, Juniper Networks, vmware, arl, intel, Qualcomm, Samsung

+18 others

## 40+ Operators

Deutsche Telekom, orange, BT, TIM, Telefónica, vodafone, 中国移动 China Mobile, China unicom 中国联通, KCI, verizon, AT&T, T-Mobile, NTT docomo, KDDI, kt, SK telecom, TELUS, TELSTRA

+25 others

## Key Fora partners

1. ETSI
2. 3GPP
3. Bridge Alliance (via TEC trials)
4. Linux Foundation

**Chair:** Sandra Ondrusova, CK Hutchison
**Deputy chair:** Shamik Mishra, Capgemini Engineering

75+ organisations
Over 180 in the Group
Average of 30-50 joining calls

# What does that translate to in terms of potential footprint? ~40%

Key markets
- North America
- Europe
- Asia
- Bridge Alliance

# Project structure

## Telco Edge Cloud (TEC) Forum

- Thought leadership
- Commercial focus
- Trials and POCs

## Operator Platform Group (OPG)

- Technical requirements development of Operator Platform
- Parent group of OPAG

## Operator Platform API Group (OPAG)

- Alignment on OP APIs fulfilling OP requirements
- Collaboration with and contribution to SDOs and Linux Foundation
- Subgroup of OPG

# Operator Platform development recap

- Phase 2 delivered first drop of requirements
- Phase 3 also focuses on API development and contribution to Linux Foundation: Project Camara

Phase 1

Phase 2

Phase 3


*Operator Platform Concept Whitepaper, Jan 2020*


*TEC: Edge Service Description and Commercial Principles Oct 2020*


*OPTEC Proposal Whitepaper v1 Oct 2020*


*OP Tech Requirements PRD Jun 21*


*OP Tech Requirements PRD Feb 22*

API development (collaboration with Linux Foundation)

# Phase 3 topic development

- Limited scope due to proximity to MWC 22, 5 topics prioritised, several in backlog

| Topic | Topic owner / Contributors |
|---|---|
| **Seamless service continuity** when users move to a different network.<br>• The detailed impact of service access by devices that are attached to networks other than their home network (e.g. roaming, Wi-Fi, etc.) on the various interfaces and functions of the OP)<br>• Ensure that OP covers all the connectivity models, including e.g. WiFi | CapGemini / Optare<br><br>Ericsson, GS Labs, Huawei, China Unicom, Verizon, NTT Docomo, KDDI, BT, Telefonica, Telus, CapGemini, Optare, Hutchison, MobiledgeX, GSMA, Dell, BT |
| Exposure of operator **network capabilities beyond edge** resources (e.g. Network as a Service features offering improved QoS on network access) | MobiledgeX<br>Huawei, Verizon, NTT Docomo, KDDI, CapGemini, Optare, BT, Telefonica, ORI, MobiledgeX, Nokia, Hutchison, GSMA |
| **Detailed requirements** on the Capability Exposure Role | Intel<br>Dell, GS Labs, Huawei, MobiledgeX, NTT Docomo, CapGemini, KDDI, Optare, Telefonica, Nokia, GSMA |
| Describe **Session connectivity models** in separate chapter (e.g. 2.2.7.x) and related requirements for OP | Ericsson<br>Telus, GS Labs, Optare, BT, GSMA |
| The handling of **non-SIM devices**. | GS Labs<br>BT, Telefonica, GSMA |

# Phase 3 of OPG work


- Develop all 5 topics and publish new version of GSMA PRD OP.02 - Operator Platform Telco Edge Requirements
- Start of OPAG and open source activity with Linux Foundation
- Collaboration with SDOs on mapping

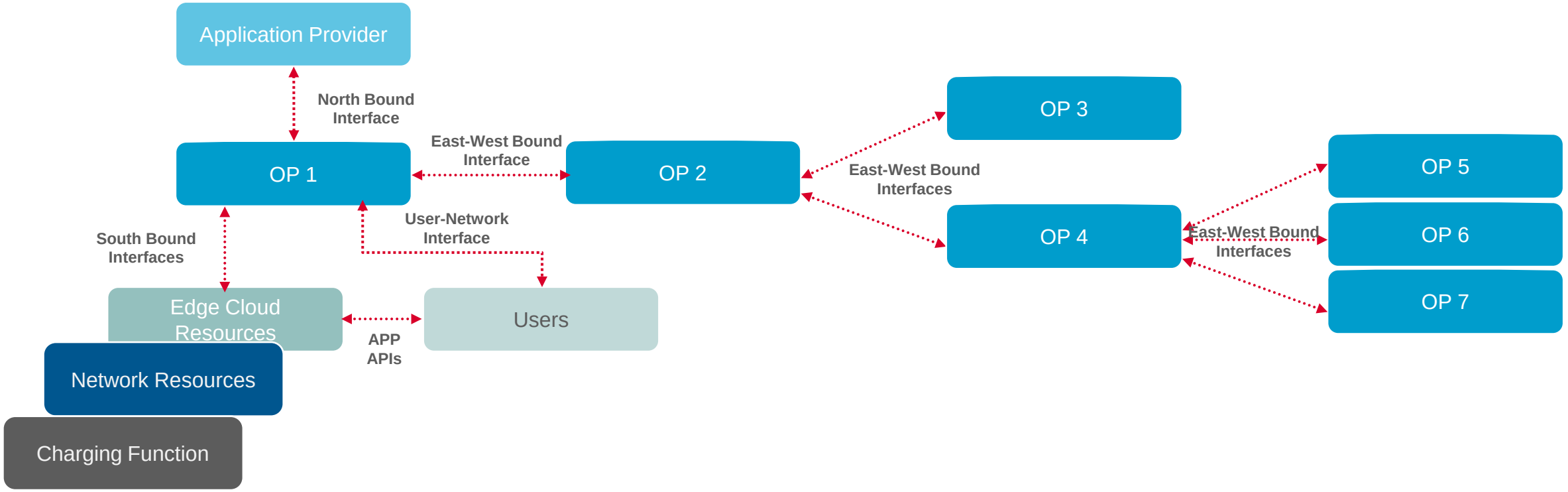
# Operator Platform architecture

Deep dive

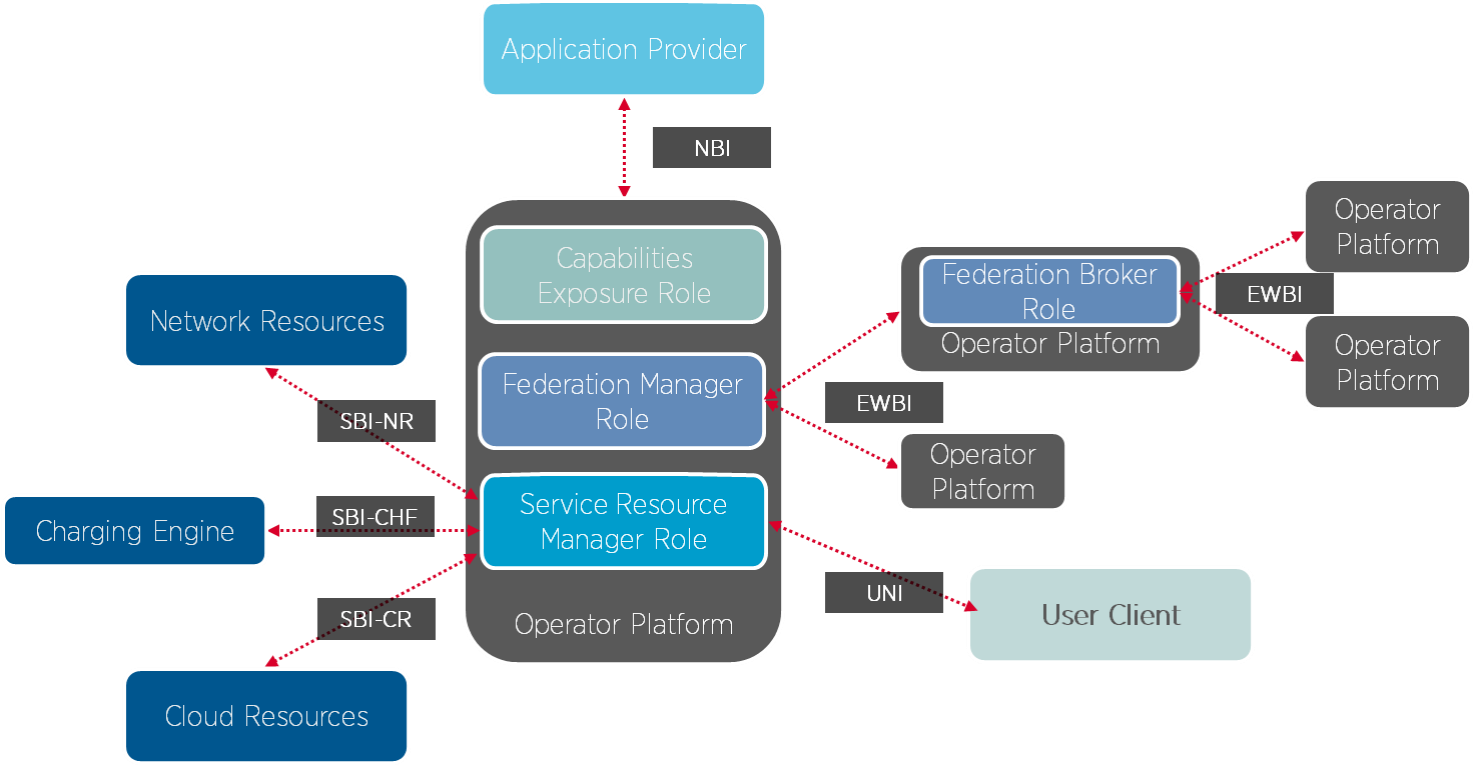
Shamik Mishra, VP and CTO of Connectivity at Capgemini Engineering – OPG Deputy Chair

2 Dec 2021

# Architectural approach



# Detailed architecture




- Notes:
- Focus is on Operator Platform
  - Other interfaces relevant for edge have not been covered (yet?)
    - E.g. interfaces edge resources offer to application and interfaces between edge resources/cloudlets
  - SBI-CR defined as flexible to fit in with different orchestration solutions used in networks
  - Also on device interfaces covered

# Roles

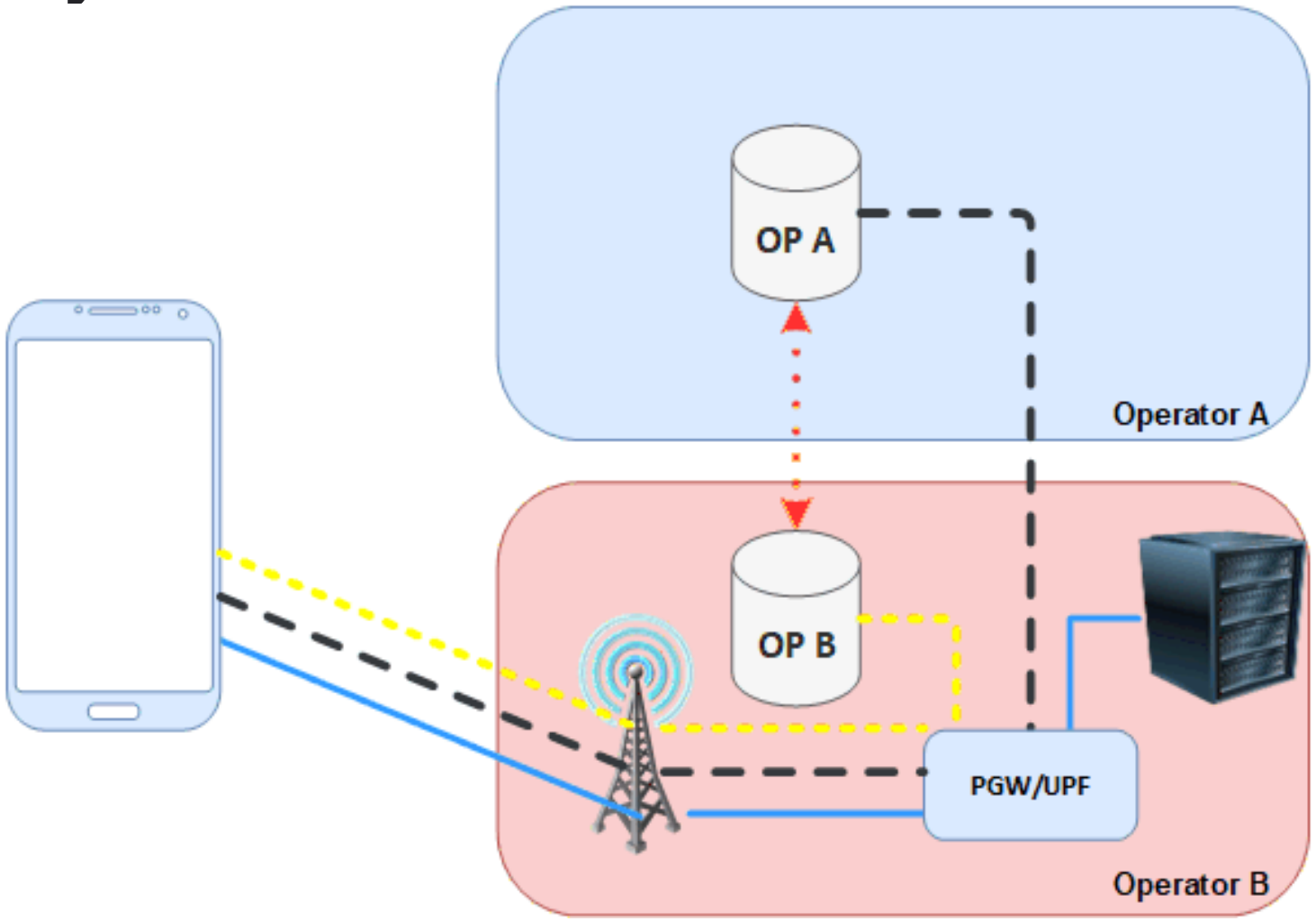
- Capability Exposure role:
  - responsible for exposing the capabilities of the OP towards the Application Providers
- Service Resource Manager Role
  - responsible for managing Cloud and Network resources from the Edge Cloud(s) via the SBI and UNI interface
- Federation Broker and Federation Manager Roles
  - responsible for interfacing with other OPs via the East-West Bound Interface

# Federation

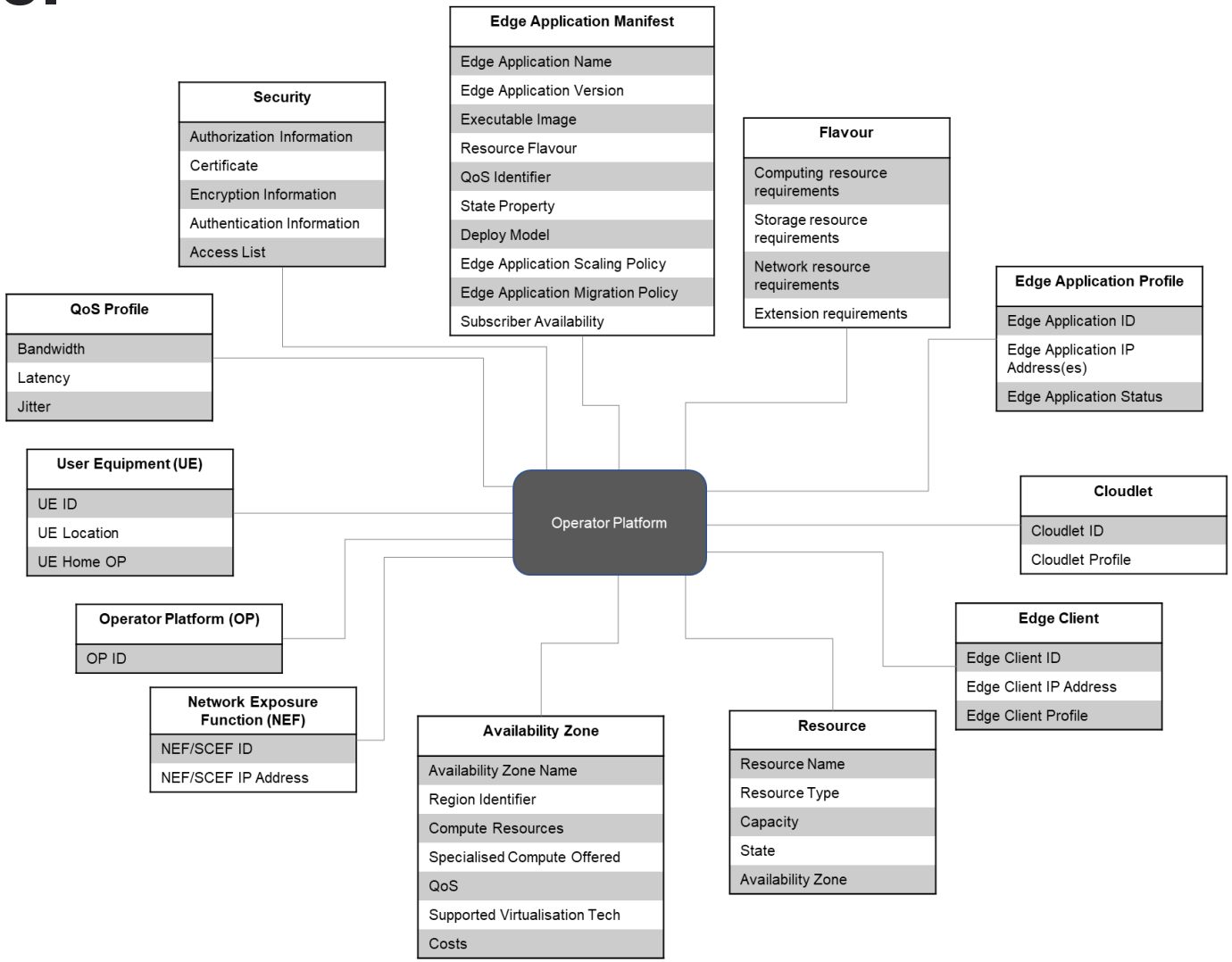
- To be enabled by East-West bound interface
- Should enable:
  - Offering resources/capabilities in other networks to application providers
    - Needs exchange of resource catalogues
  - Lifecycle management and monitoring of resources/capabilities in other networks provided to application providers
  - Access to edge resources and network capabilities in visited networks (i.e. roaming)
  - Sharing of edge resources to/from other networks
  - Low latency interaction between edge resources in different networks

Roaming with Local Breakout

# Example high-level flow to be enabled by architecture



# Data Model



# Non-architecture aspects

- Support required for
  - Containers
  - VMs
  - Serverless Models

# Operator Platform API Group (OPAG) overview

Alexander Harmand, Head of Core and Service Platforms, Telefonica & GSMA OPAG Chair

2 Dec 2021

# Operator Platform APIs

- To support work of requirements, OPG set up a subgroup to look at APIs, conclusions on next slide.

- No surprise, no 1:1 mapping – new requirements vs existing solutions
- OPG trials and POCs have functional code
- Intent: start open source group, align on code, contribute to SDOs and Linux Foundation
- Goal: developer centric APIs

- Chair: Alexander Harmand, Telefonica, Deputy chair: Jason Hoffman, MobiledgeX
- Group started 18 November – participants expected to mirror OPG

# Status of OP implementation

With requirements for initial MVP completed, focus turns to implementation through to 1H2022

## Current status

- Standards exist from various organisations (ETSI, 3GPP, MEF, etc.), but come with limitations
  - Narrow focus on just edge compute or other aspect meant that important areas not covered
    - end-to-end aspects not covered or how to offer as a service
    - No consideration to move to platform approach that may expose other capabilities
  - Many of the requirements are thus not covered: coverage depends on area
  - Most important gap would be around the E/WBI interface to interconnect platforms, understand work is in progress
    - e.g. roaming and obviously federation are not covered currently
  - Also device side and interfaces towards developers need evolution though
- Pre-standard implementations available from vendors and operators that have been used in (interconnected) trials

## Consensus in OPAG that market availability should be accelerated through use of reference implementation

- To be developed as open source using available pre-standard implementations
- Focussing initially on APIs and other functionality relevant for interoperability
- Being set up as cooperation with Linux Foundation
- Assumed to be available by Q1/2 2022
- Work and experience will feed into standards development and future requirements development

# Continuous API Dev Lifecycle


NOTE: API Subgroup and Linux Foundation (LF) Open Source Development output is to deliver a harmonized set of APIS for interfaces and where appropriate functional blocks, and **NOT** a full platform.

To support standardisation efforts, SDOs will receive two drops:-

1) Requirements after publishing
2) update based on additional requirements and/or documentation on APIs from implementation

Interop testing may cover standards when available.

Focus of today's session



*code/API contributions under Apache 2.0 license conditions and Creative Commons 4.0 for documentation

Legend AA.35 ACTIVITY LF ACTIVITY HOST TBC

# Timelines

- API documentation  < MWC B 22
- OP API contributions to Linux Foundation to follow on iterative basis

# Deep Dive: SDO Mapping

Alexander Harmand, Head of Core and Service Platforms, Telefonica & GSMA OPAG Chair

02 Dec 2021

# Why

In order to foster  product developments the GSMA needs to ensure that the OP interfaces have proper stage 2 & 3 definition in the Industry.

# What

ETSI and 3GPP are the major active SDOs in edge definition. A mapping of the SDO davilable APIs and interfaces against GSMA OP interfaces is required in order to identify stage 2 and 3 availability and gaps for OP to fully defined. Single reference shall be maintained in case of SDOs overlap.

# How

Build a set of collaborative workshop with ETSI and 3GPP in order to:

- Agree upon the mapping and coverage against OPG
- Agee on focus point when more than a reference is available
- Agree on how to fill gaps and target SDO for fulfilling OP definition

# API Block Proposals

## Block A - Telefonica

- Application Onboarding
- Application Instance Management (Resource Life-Cycle Management)
- East/West Bound Interface Management
- Availability Zone Information Synchronisation Service
- LBO Roaming (Monitoring)
- LBO Roaming (Authentication)
- Edge Node Sharing (resource onboarding & Management)

**Federation Definition Support**

## Block B - TBC

- QoS Management
- Charging
- Billing
- Traffic Influence
- Collecting Network Status / Network Events
- Confirm User Location
- Mobility Triggers
- Mobility Control
- Location Privacy Indicator
- Managing Service availability in LADN
- Application relocation

**Network Integration Support**

## Block C - TBC

- Application Resource Catalogue
- Orchestration
- Virtualised Infrastructure Manager
- Container Infrastructure Manager

**Orchestration/Cloud Management**

## Block D - TBC

- Telemetry
- Notifications
- Trouble Ticketing
- Ordering
- User Authentication and Authorisation
- Registration
- Discovery
- Mobility/QoE

**Management & Others**

# API Mapping Summary | NBI (1/2)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| Application onboarding and image management. | Provide and manage application images to be deployed on resources within the operator network. | • ETSI MEC 010-2 | How much can be reused from this Spec? |
| Application Instance Management (Resource Life-Cycle Management) | Reserve and use compute resources within the operator network for the deployment of applications on VMs or Containers. | • ETSI MEC 010-2 | How much can be reused from this Spec? |
| Telemetry | Track usage and load of resources/capabilities used within the operator network. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF)<br>• 3GPP 28.552, 3GPP 28.554 | Depending of the data source. Not all requirements collected in the PRD might be covered in 3GPP definition. |
| Notifications | Be informed about events related to reserved/used resources/capabilities. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | Not all requirements collected in the PRD might be covered in 3GPP definition. |
| Network Events | Be informed about events related to users/subscribers using the reserved/used resources/capabilities. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |
| Trouble Ticketing | Inform network(s) of issues arising around resource/capability reservation/usage. | • TMF 621 | |
| Application Resource Catalogue | Retrieve information on available resources and capabilities. | • ETSI MEC 011<br>• TMF 639 (Resource inventory)<br>• TMF 634 (Resource Catalog)) | ETSI MEC 010-2 or ETSI MEC 011? |

# API Mapping Summary | NBI (2/2)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| Ordering | Order the use of resources/capabilities. | • TMF 641 | |
| Charging | Obtain charging data on used capabilities/resources. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |
| Billing | Retrieve bill/billing data. | • TMF 636 (BSS) | |
| QoS Management | Control QoS profiles used for user/subscriber access to application. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF)<br>• ETSI GS MEC 015 | |
| Traffic Influence | Influence routing and mobility policies for traffic associated to application. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF)<br>• ETSI GS MEC 015 | |
| Managing Service availability in LADN | Manage area where application should be available. | • 3GPP 23.501 | Concept definition. Stage 2/3 status? |
| Application relocation | Manage the relocation of a user session to another resource. | • 3GPP 23.558 \| TS 23.548<br>• 3GPP TS 23.501 \| TS 23.502<br>• ETSI MEC 021 | How much work is already done on 3GPP? |
| Confirm User Location | Confirm whether the user is at a given location. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |

# API Mapping Summary | EWBI (1/2)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| Application onboarding | Provide and manage application images to be deployed on resources within the operator network. | • ETSI MEC 010-2 | How much can be reused from this Spec? |
| Application Instance Management (Resource Life-Cycle Management) | Reserve and use compute resources within the operator network for the deployment of applications on VMs or Containers. | • ETSI MEC 010-2 | How much can be reused from this Spec? |
| Telemetry | Track usage and load of resources/capabilities used within the operator network. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF)<br>• 3GPP 28.552, 3GPP 28.554 | Depending of the data source. Not all requirements collected in the PRD might be covered in 3GPP definition. |
| Notifications | Be informed about events related to reserved/used resources/capabilities. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | Not all requirements collected in the PRD might be covered in 3GPP definition. |
| Network Events | Be informed about events related to users/subscribers using the reserved/used resources/capabilities. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |
| Trouble Ticketing | Inform network(s) of issues arising around resource/capability reservation/usage. | • TMF 621 | |
| East/West Bound Interface Management | Setup and maintain the EWBI (E.g. keep alive) | • ETSI MEC 011<br>• TMF 639 (Resource inventory)<br>• TMF 634 (Resource Catalog)) | ETSI MEC 010-2 or ETSI MEC 011? |

# API Mapping Summary | EWBI (2/2)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| East/West Bound Interface Management | Setup and maintain the EWBI (E.g. keep alive). | • ETSI MEC is leading the EWBI scope, however these functionalities are not yet defined/developed.<br>• ETSI MEC 40?<br>• Stage 3 Development? | To check how 3GPP and ETSI can collaborate on those capabilities not already defined. |
| Availability Zone Information Synchronisation Service | Obtain information about which zones are shared by a partner OP, where they provide coverage and what amount and type of compute they provide. | | |
| LBO Roaming (Monitoring) | Obtain telemetry/usage data of subscriber's using the services/capabilities exposed by a Partner OP. | | |
| LBO Roaming (Authentication) | Authenticate and authorise subscribers needing access to services/capabilities exposed by a partner OP. | | |
| Edge Node Sharing (resource onboarding & Management) | Use and manage edge resource controlled by other OP for services offered to own users. | | |

# API Mapping Summary | SBI-CR (1/1)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| Orchestration | Automated management of the application deployment on the reserved/desired resources. | | |
| Virtualised Infrastructure Manager | Configuration and management of virtualisation infrastructure. | | |
| Container Infrastructure Manager | Configuration and management of container infrastructure. | | |
| Telemetry | Obtain usage and load data on cloud resources | | |
| Notifications | Receive notifications on events regarding cloud resources | | |

No SDO mapping contribution so far

# API Mapping Summary | SBI-NR (1/1)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| User Authentication and Authorisation | Authenticate subscribers wanting to access resources/capabilities and authorise their usage. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |
| Mobility Triggers | Be informed about the need to move an application session to a different anchor point or of the actual move. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |
| Mobility Control | Control when an application session is moved to a different anchor point. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |
| Confirm user location | Confirm that a provided location corresponds to a user's connection to a mobile network. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF) | |
| QoS Management | Control QoS profiles used for user/subscriber access to application. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF)<br>• ETSI GS MEC 015 | |
| Traffic Influence | Influence routing and mobility policies for traffic associated to application. | • 3GPP TS 29.122 (SCEF) \| TS 29.522 (NEF)<br>• ETSI GS MEC 015 | |
| Managing Service availability in LADN | Manage area where application should be available. | • 3GPP 23.501 | Concept definition. Stage 2/3 status? |
| Application relocation | Manage the relocation of a user session to another resource. | • 3GPP 23.558 \| TS 23.548<br>• 3GPP TS 23.501 \| TS 23.502<br>• ETSI MEC 021 | How much work is already done on 3GPP? |
| Location Privacy Indicator | | | |

# API Mapping Summary | SBI-CHF (1/1)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| Charging events | Provide charging data on application usage of resources and capabilities to be included in charging records. | • 3GPP TS 32.291 | |

# API Mapping Summary | UNI (1/1)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| Registration | Register and authenticate a UE with the OP. | • 3GPP TS 23.558 | |
| Discovery | Discover the available resources, capabilities and applications. | • 3GPP TS 23.558 | |
| Mobility/QoE | Handling of mobility and QoE reporting. | • 3GPP TS 23.558 | |

# API Mapping Summary | Edge App to Infra (1/1)

| APIs | Description | SDO References | Comments |
|---|---|---|---|
| Containers | Allow applications based on containers to interact with container infrastructure. | | |
| VMs | Allow applications based on VMs to interact with virtualised infrastructure. | | |

# Next steps

- Closing SDO mapping
- Agreeing in focus SDO reference
- Agreeing in gaps handling
- Agreeing in collaboration model
- Next session is a follow-up workshop on 21 January 2022

Next workshop:

21 January 2022 – invites shared with 3GPP and ETSI, alternatively contact futurenetworks@gsma.com for invitation or you can join here.

# Questions

Hands up please!

# Q&A

# For more information

SCAN ME

Download our latest requirements PRD at www.gsma.com/operatorplatform

To join the OPG or OPAG, open-source activities or for more information, contact futurenetworks@gsma.com

Next workshop: 21 January 2022 – invites shared with 3GPP and ETSI, alternatively contact futurenetworks@gsma.com for invitation