



**CAMARA**  
THE TELCO GLOBAL API ALLIANCE

# Presentation

11.11.2024

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APIs enabling seamless access to  
Telco network capabilities



Telco network capabilities exposed through APIs provide a large benefit for customers. By simplifying telco network complexity with APIs and making the APIs available across telco networks and countries, CAMARA enables easy and seamless access.

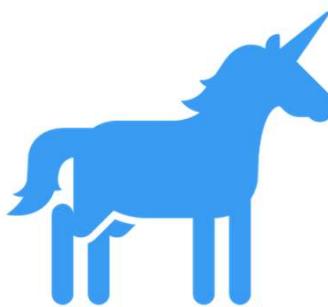


CAMARA Mission

# What is the CAMARA Project? Key problems we try to solve



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## Scale

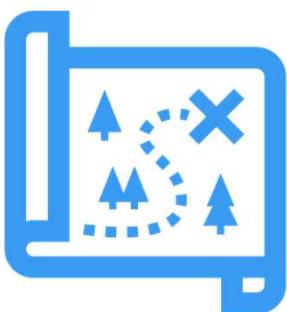
Developers dream of being the next unicorn...

If apps, products, or services are built on our APIs they want them in all relevant markets and networks globally.



## Consistency

Multi-nationals want consistency across all markets they operate in... they do not want APIs that only work in a single network in a single country. They do not want to try and build for the differences of each network.



## Simplicity

Telco networks are complex, and every network is different.... Developers want simple, intent-based APIs.



## Accessibility

We go to the developers where they are so the project is open sourced in the Linux Foundation. Allowing API users to work directly with CSPs creating the service.



## Demand Driven

We develop the APIs and design it in the way our customers need it. The demand is collected from organizations like GSMA OPAG but also from customers directly.

# Key problems we try to solve

## Consistency Benefit



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**Availability** across telco networks and countries is necessary:

- To ensure seamless customer experience
- To accelerate technology development and commercial adoption (minimize implementation effort)
- To accelerate education and promotion
- To support application portability

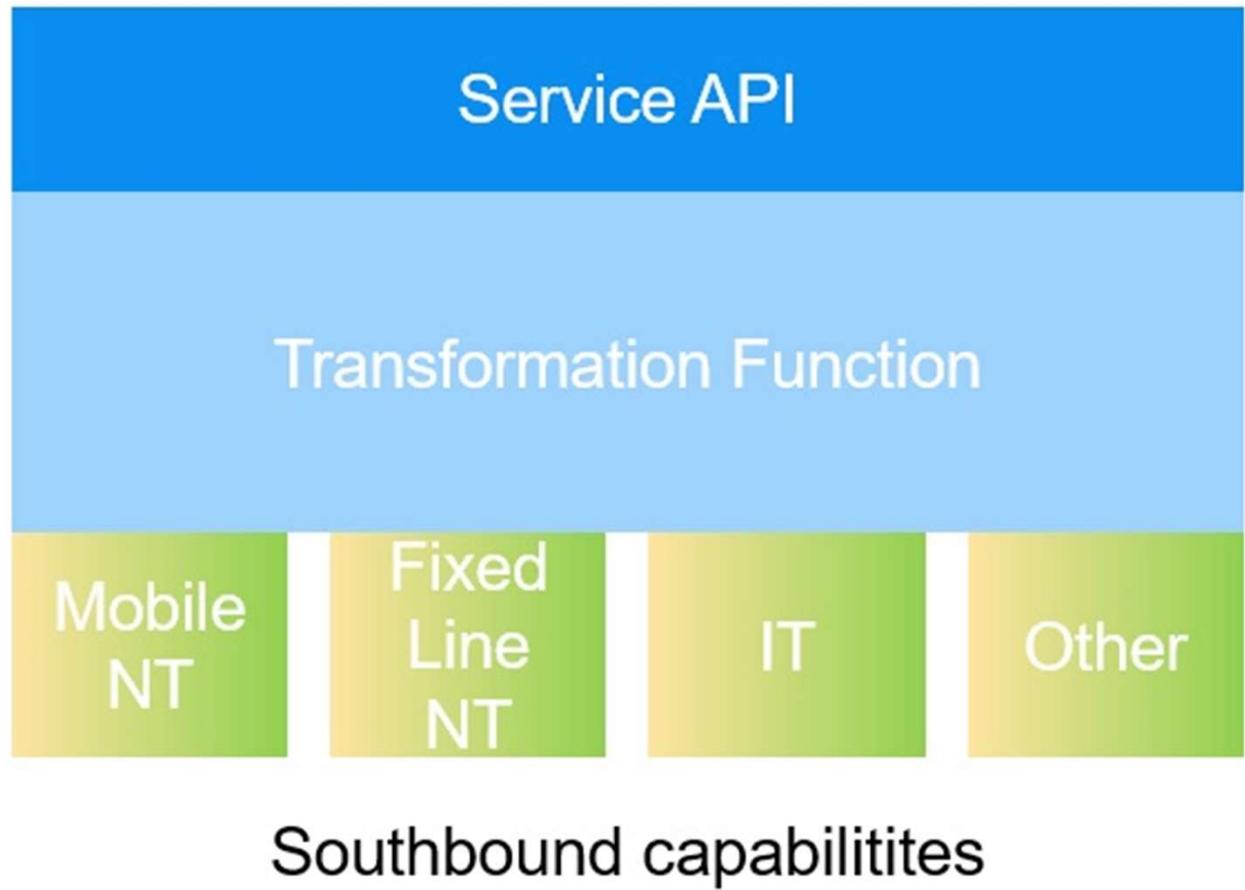
# Key problems we try to solve

## Simplicity Benefit



**Abstraction** from Network APIs  
to Service APIs is necessary:

- To simplify telco complexity making APIs easy to consume for customers with no telco expertise (user-friendly APIs)
- To satisfy data privacy and regulatory requirements
- To facilitate application to network integration



**CAMARA** is an open source project within Linux Foundation to define, develop and test the APIs. CAMARA works in close collaboration with the GSMA Operator Platform Group to align API requirements and publish API definitions and APIs. Harmonization of APIs is achieved through fast and agile created working code with developer-friendly documentation. API definitions and reference implementations are free to use (Apache2.0 license).

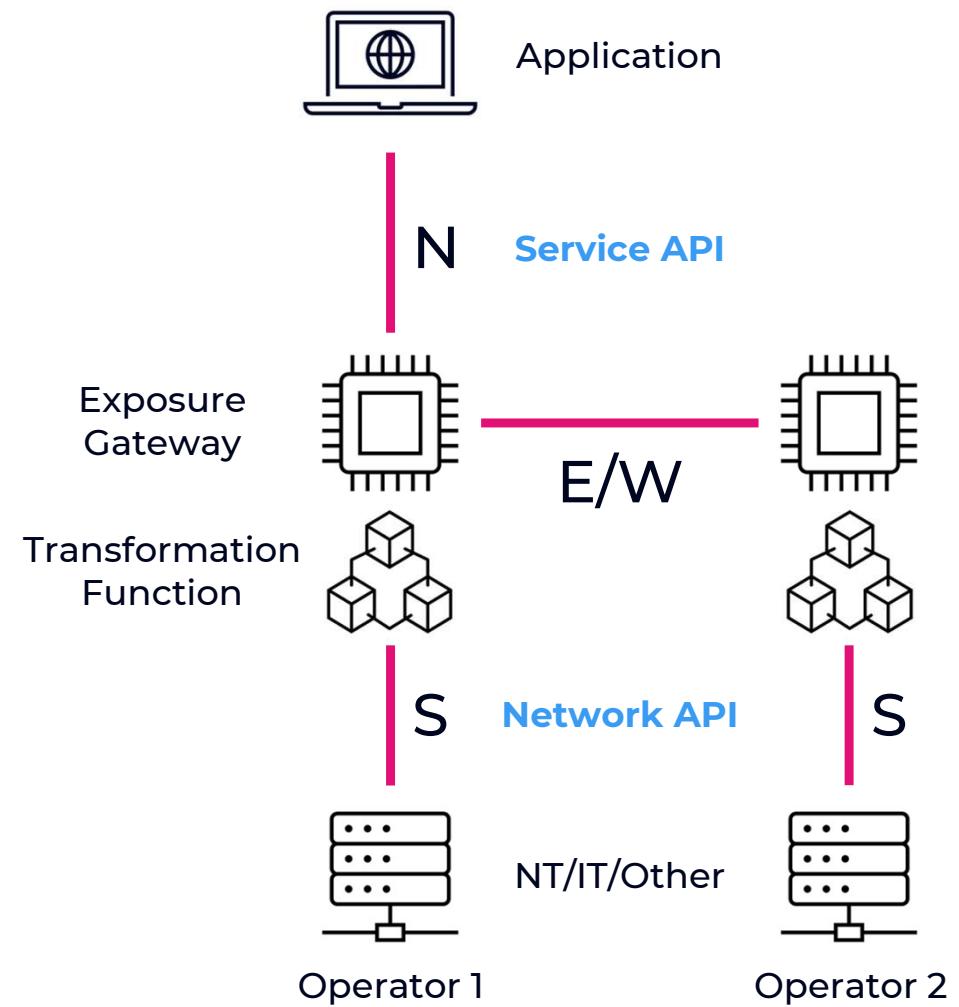


# CAMARA Scope



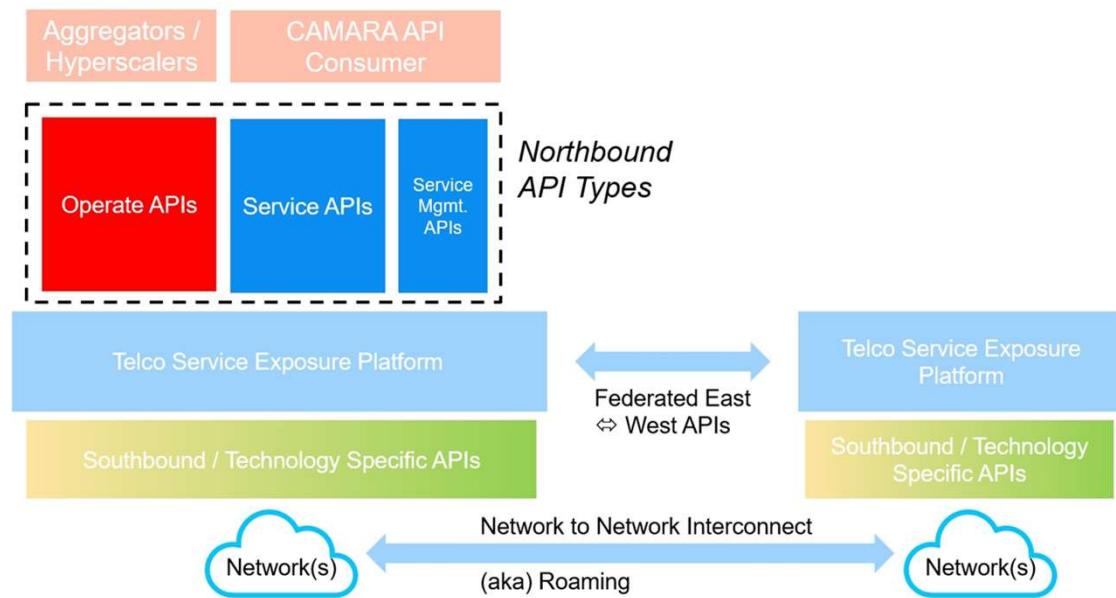
From functional perspective the scope is limited to **telco APIs**, that means APIs in the domain of telco mobile networks, telco fixed line networks, telco edge cloud, etc. or supporting these.

Thereby the focus is on the **northbound interface** (between telco operator and aggregator or capability consumer). East-/westbound interface APIs are out of scope for CAMARA.



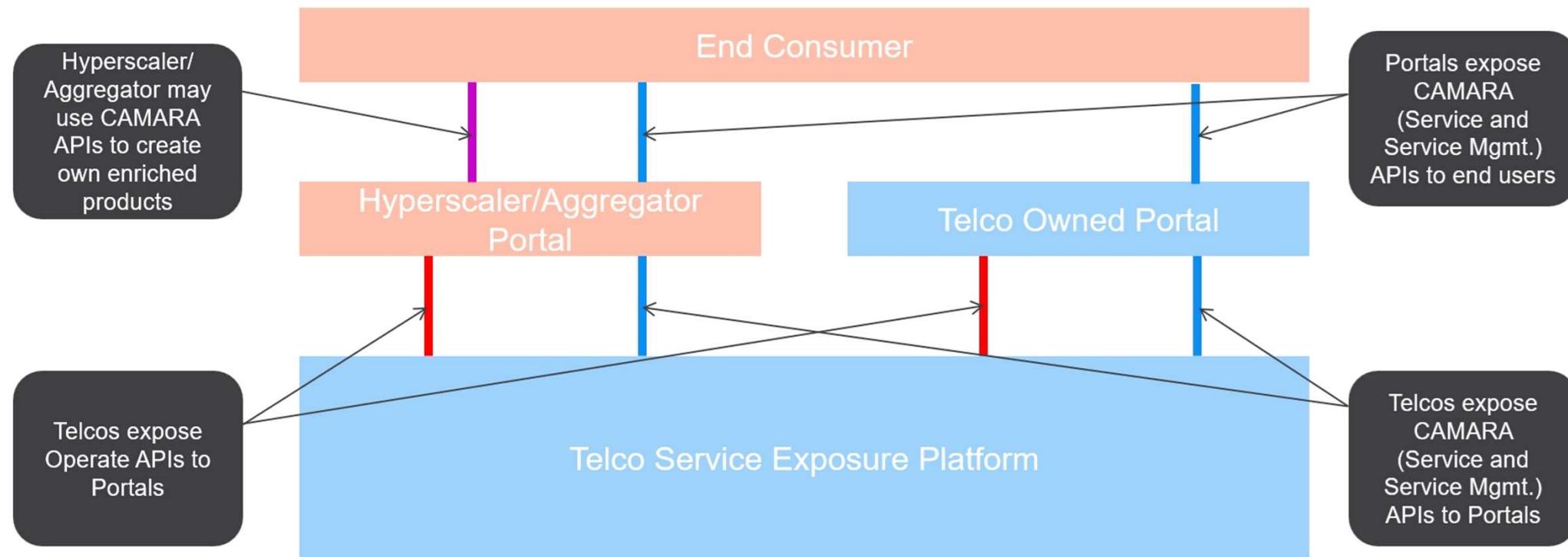
## We differentiate between 3 types of Northbound APIs:

- **Service APIs:** APIs intended for end consumers and integrated by developers to invoke a certain telco capability.
- **Service Management APIs:** APIs intended for end consumers to manage or get data about offered Service APIs in application runtime, e.g., check service availability or performance information.
- **Operate APIs:** Operational and maintenance APIs provided by a telco to channel partners for the purpose of service fulfillment and assurance to their [channel partner] customers. This may include service provisioning for a mobile user, technical API performance monitoring, fault ticketing, information exchange such as product catalog, pricing, settlement, etc.



**Service APIs and Service Management APIs** are in scope of CAMARA. Operate APIs are out of scope of CAMARA (these are already covered by other SDOs = Standards Development Organizations like TM Forum).

# CAMARA – Scope / Collaboration with Open Gateway and TM Forum

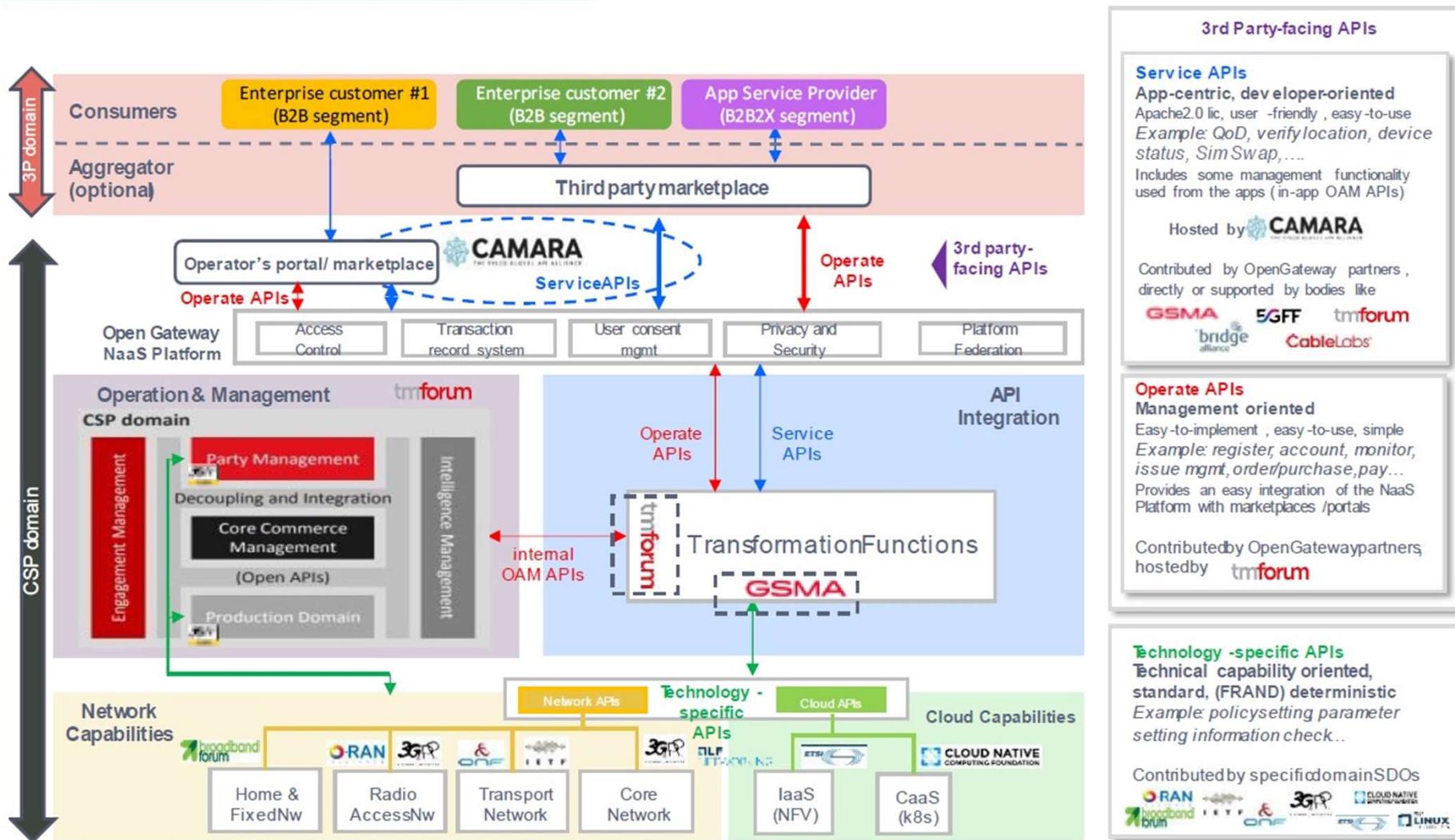


Hyperscalers and aggregators have the possibility to create own enriched products based on the CAMARA APIs and expose that in addition to the CAMARA APIs.

# CAMARA – Scope / Collaboration with Open Gateway and TM Forum



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CAMARA project defines CAMARA APIs.

TMForum develops the Operate APIs.

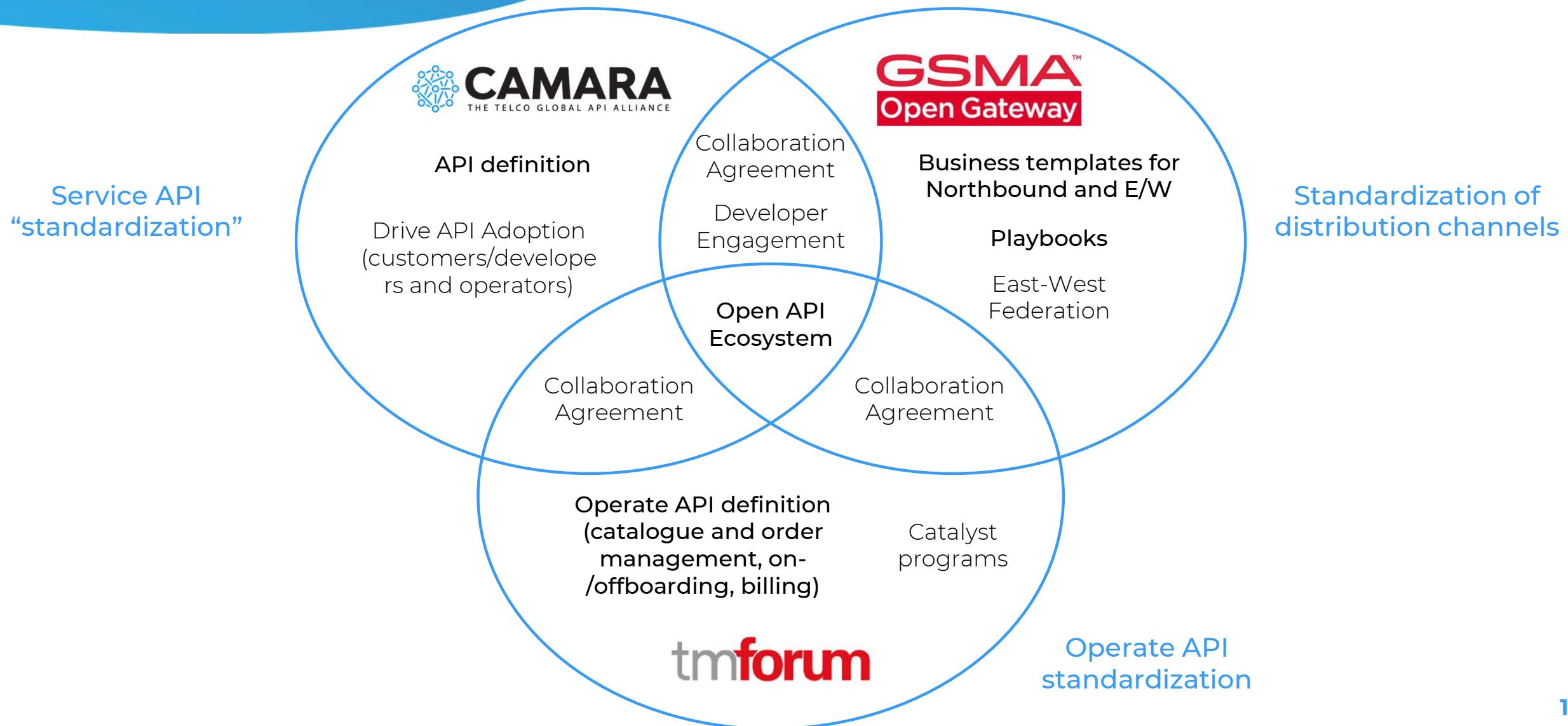
Several SDOs cover the different technology domains that provide the telco capabilities.

More details can be found in the whitepaper "The Ecosystem for Open Gateway NaaS API Development" (jointly published by GSMA, CAMARA, Linux Foundation and TMForum) available [here](#).

# CAMARA – Scope / Collaboration with Open Gateway and TM Forum



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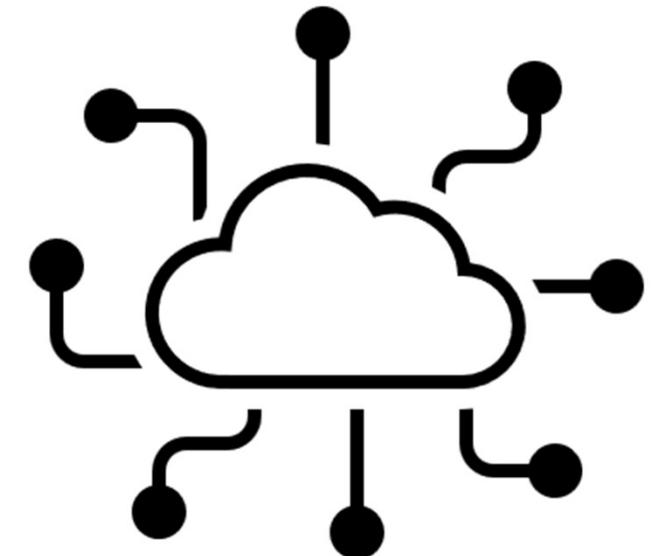
## The scope of the CAMARA Project is:

- Collect **API requirements** from GSMA Operator Platform Group and other sources
- Define **Service APIs and Service Management APIs**
- Create test plans / cases / tools from an API consumer perspective
- Develop and test **Service APIs and Service Management APIs**
- Create developer friendly **documentation**

## The following deliverables are provided by the CAMARA Project:

- Service API and Service Management API definitions and documentation
- Optionally Service API and Service Management API code and
- Test plans, cases and tools for the APIs all contained in deployment packages.

Project resources can be found in the GitHub repository: <https://github.com/camaraproject>.

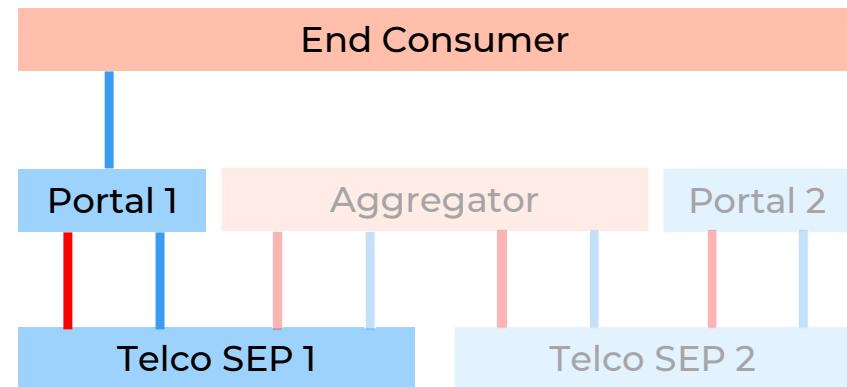


# CAMARA API Distribution Options



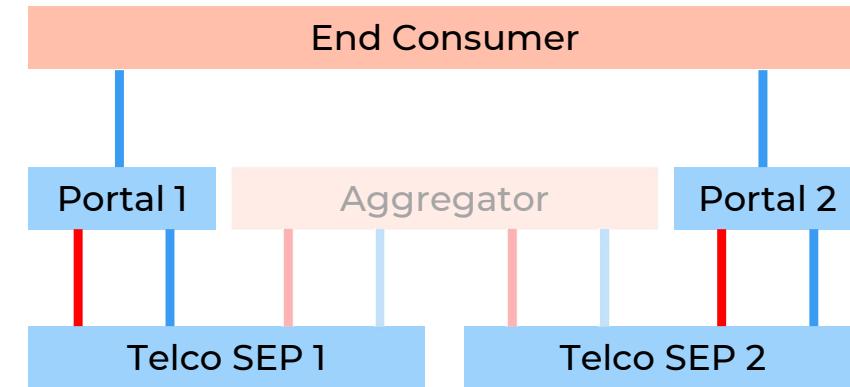
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## Single-Operator Relationship

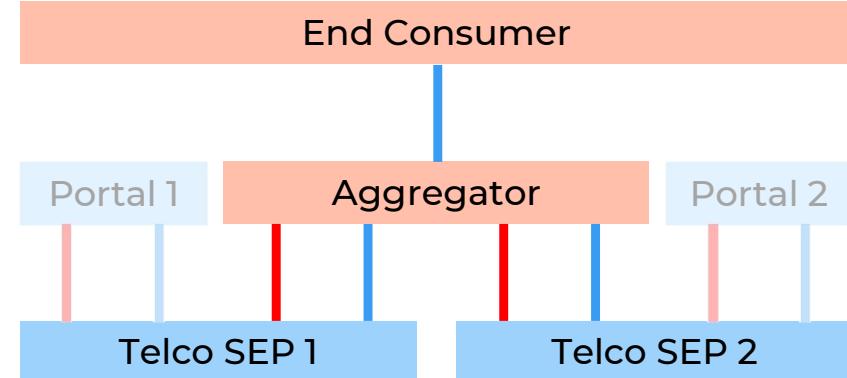


Blue lines =  
CAMARA APIs  
  
Red lines =  
Operate APIs  
  
SEP= Service  
Exposure  
Platform

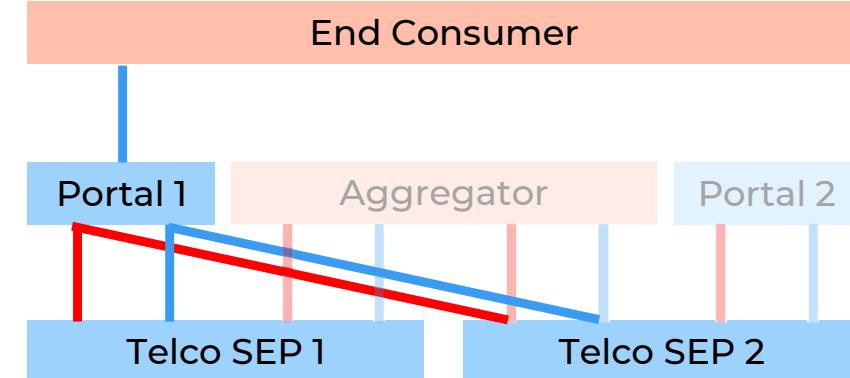
## Multi-Operator Relationship



## Operator Aggregation



## Single-Operator “API Roaming”



What is different now in comparison  
to former API exposure trials?



- **Simplicity** – Telco complexity is hidden behind simple, easy to use APIs
- **Demand driven** - Listening to customer's voice and demand
- **Availability** – Open APIs with great support of many operators on many platforms
- **Alignment** - With standardization bodies like TM Forum or ETSI-MEC
- **Sustainability** – We have the CEOs behind (e.g. Open Gateway MoU, API Venture)
- **Telco maturity** – Telcos are now more digital and cloud oriented
- **Privacy** – Well defined

# CAMARA

Where we started...



**CAMARA**  
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Launched at MWC  
Barcelona 2022

22 Launch Partners

Supported by GSMA and  
Linux Foundation

Simple idea to “standardize”  
developer facing APIs



# CAMARA

... and where we are now



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Members	Premier										General					Associate Membership				
	accenture	ERICSSON	Microsoft	NOKIA	orange	TMobile	Telefónica	verizon	ALEPH ZERO	CableLabs	CENTILLION	Charter	INDY	invia	OpenID					
	vodafone								SCENERA	shabodi										
Participating Organizations																				
	INCE	FGFF	A1	ACL Digital	akross	AMANTYA	amdocs	ARGELA	AT&T	aws	axiata	AXIATA DIGITAL LABS	BCTI	BearingPoint.	bridge alliance	broadpeak	Capgemini	Chenosis	China Telecom	China Unicom
	cisco	RH	cloudfoniX	cognizant	Colony	comviva	CPAASAA	csl.	cthingsco	DETECON CONSULTING	DOMOS	DriveU.auto	EANTE+	EdgeX	e2	ETIYA	EVIDEN	f5		
	FUJITSU	GAPASK	Google Cloud	GSMA	HCL Software	Hewlett Packard Enterprise	HKT	HUAWEI	IBM	IEEE 5G+ Innovation testbed	infobip	INFO LYSIS	intel.	IPification	Italtel	KDDI	kt	LATENCETECH		
	Lenovo	LG U+	LINUX FOUNDATION	LOTUSFLARE	lytn	MATRIX	MAVENIR	MICROCKS	MQUEST	nabstractio	NEARBY COMPUTING	Netcracker	NGMN	NOS	NTT DATA	Open Sesame				
	optare solutions	Optiva	ORACLE	VIRTUAL 5G LAB	plusmo	PRYVX	quobis	Radisys	Red Hat	REPLY	SEKURA	Simpel	SINCH	Singtel	SK telecom	SPRY FOX	STARHUB	stateologic	SUMMIT	
	swisscom	syniverse	TCS	TATA ELXSI	TELUS	TIM	TruSense™	VIRTUS	VRONBRA	wray castle	Whale Cloud	xacria	SECURITY PULSE	ZTE						

- 134 Named Partners
- 409 (+389\*) companies participating in CAMARA
- 28 Active API family Sub Projects with 50 APIs, and 5 Working Groups
- 1186 (+1825\*) people joined CAMARA
- Development "home" for GSMA Open Gateway

\* Number in brackets indicates companies and people who are in contact but haven't joined

# CAMARA Logos



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Members	Premier	General												Associate Membership						
		accenture	T	ERICSSON	Microsoft	NOKIA	orange™	T Mobile	Telefónica	verizon	ALEPH ZERO	CableLabs®	BOE CENTILLION	Charter	INDY TE	invia	OpenID			
	vodafone										SCENERA	shabodi								
Participating Organizations																				
	INCE	5GFF	A1	ACL Digital	akross	AMANTYA	a-docs	ARGELA	AT&T	aws	axiata	AXIATA DIGITAL LABS	BCTI	BearingPoint.	bridge alliance	broadpeak	Cappemini			
	cisco	BH	cloudoniX	CodeB	cognizant	Colony	comviva	CPAASAA	csl.	CTHINGS CO. DE KOT SOLUTIONS	DATACURVE	DETECON CONSULTING	DOMOS	DriveU.auto	EANTE+	EdgeXR	e&	ETIYA	EVIDEN	f5
	FUJITSU	GAPASK	Google Cloud	GSMA	HCL Software	Hewlett Packard Enterprise	HKT	HUAWEI	IBM	IEEE 5G/6G Innovation Testbed	infobip	INFO LYSIS	Infosys	intel.	IPification	equali Networks	Italtel	KDDI	kt	LATENCETECH
	Lenovo	LG U+	THE LINUX FOUNDATION	LOTUSFLARE	lytn <sup>®</sup>	M	MATRIXIX SOFTWARE	MAVENIR	MICROCKS	nabstractio	NEARLY COMPUTING	Netcracker	N	NGMN	NOS	NTT DATA	Open Sesame			
	optare solutions	Optiva	ORACLE	VIRTUAL 5G LAB BY INNOVATECH	plusmo	PRYVX	quobis:	Radisys	Red Hat	REPLY	stc	SEKURA	Simpel	sinch	Singtel	SK telecom	SPRY FOX NETWORKS	startelelogic	SUMMIT	
	swisscom	syniverse.	tos	TATA ELXSI	TELUS	TIM	TruSense™	VIRTUS	VROMBAR	wray castle	Whale Cloud	xacria	XSECURITY PULSE	ZTE						

# Release Management Motivation and Benefits



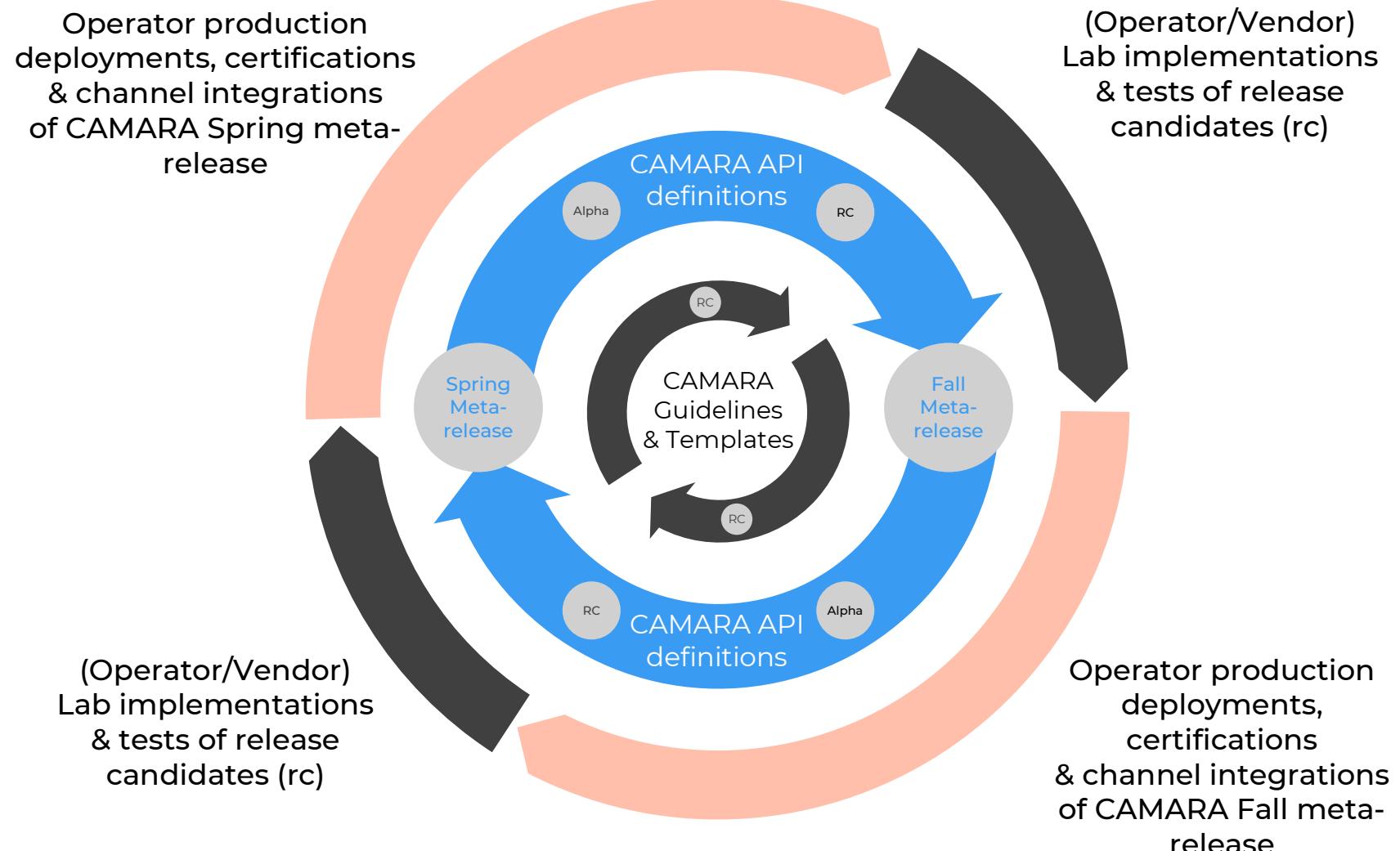
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- A **CAMARA meta-release** combines a set of CAMARA API versions into a **consistent** release.
- There will be **two meta-releases per year** (in spring and fall).
  - Network operator can plan their implementations and deployments in production.
  - API consumers can plan the integration in their platform and applications.
- All API versions in a meta-release **fulfill defined quality criteria** and are **compliant to current CAMARA guidelines** like from CAMARA Commonalities and Identity and Consent Management.
- **CAMARA meta-releases** ensure the
  - Availability of consistent API definitions (by use of guidelines, templates, and linting),
  - Quality of API definitions (by use of checklists, test definitions, and release management),
  - Stability of API definitions (clear criteria for stable versus initial API versions) and
  - Reliability of schedule and deliverables (with defined milestones and release candidates).
- **CAMARA meta-releases** provide the foundation for API version management in production.

# Release Management Release Cycle



- 2 releases each year
  - Fall (in September)
  - Spring (in March)
- Continuous and overlapping cycles
  - Update of CAMARA guidelines
  - Development and updates of API definitions in CAMARA
  - Lab implementations and production deployments at network operators
- Tests of API release candidates
  - Within operator (lab) implementations
  - Based on CAMARA test definitions
- Feedback in all phases
  - From(lab) implementations and deployments to CAMARA API definitions and guidelines
  - From API definition work to CAMARA guidelines



For details see: <https://wiki.camaraproject.org/display/CAM/Meta-release+Process>

# Meta-release Fall 2024



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## Stable CAMARA APIs (v1.0.0)

Previous versions launched in at least one market<sup>1</sup>



Number  
Verification



OTP<sup>1</sup> (SMS)  
Validation



Location  
Verification



Sim  
Swap



Simple Edge  
Discovery

## Updated initial CAMARA APIs (v0.y.z)

Previous versions launched in at least one market<sup>1</sup>



Carrier  
Billing



Device  
Roaming Status



Device  
Reachability Status



KYC<sup>3</sup>  
Match



KYC<sup>3</sup>  
Fill-In



Location  
Retrieval



Home  
Devices QoD



QoS  
Profiles



Quality on  
Demand



Application  
Profiles



Call Forwarding  
Signal



Carrier  
Billing Refund



Connectivity  
Insights



Population  
Density Data



QoD  
Provisioning

## New initial APIs to subscribe for event notifications in CloudEvents format (v0.y.z)



Connectivity Insights  
Subscriptions



Device Reachability  
Status Subscriptions



Device Roaming  
Status Subscriptions



Geofencing  
Subscriptions



SIM Swap  
Subscriptions

# Meta-release Fall 2024



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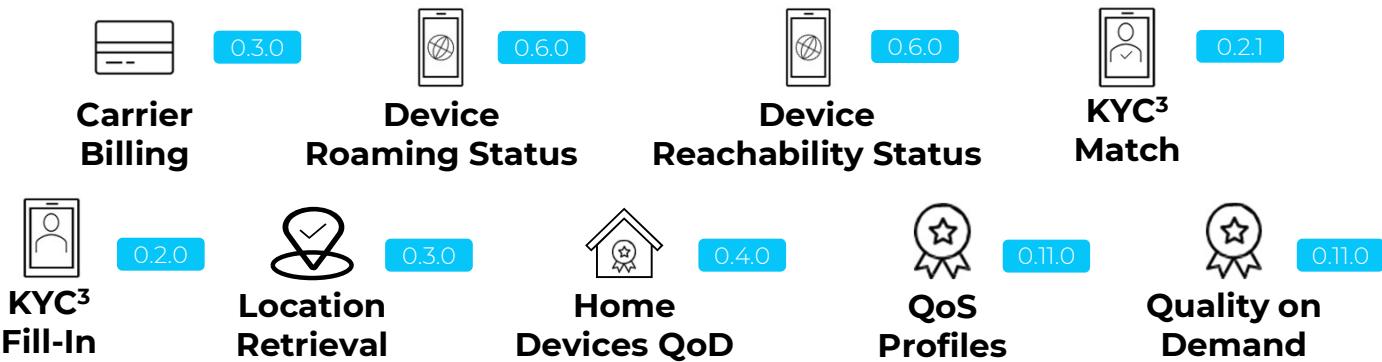
## Stable CAMARA APIs (v1.0.0)

Previous versions launched in at least one market<sup>1</sup>



## Updated initial CAMARA APIs (v0.y.z)

Previous versions launched in at least one market<sup>1</sup>



## New initial APIs (v0.y.z)



## New initial APIs to subscribe for event notifications in CloudEvents format (v0.y.z)



# Beyond Fall24 Meta-release – Upcoming APIs



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## Upcoming APIs

Work in progress or newly started



Age Verification  
(KYC<sup>1</sup>)



Application Endpoint  
Discovery  
(Edge Cloud)



Device Identifier



Network Access  
Management  
(Home Devices)



Site to  
Cloud VPN



Blockchain  
Public Address



Click To  
Dial



Customer  
Insights



Dedicated  
Networks



Device Data Volume  
(Device Status)



Device Quality Indicator  
(Device Status)



Device Swap



Edge Application  
Management  
(Edge Cloud)



Model as a  
Service



Most Frequent Location  
(Location Insights)



Network Slice  
Booking



Number  
Recycling (KYC<sup>1</sup>)



Quality by  
Design



Region  
Device Count



Short Message  
Service



Subscription  
Status  
(KYC<sup>1</sup>)



Tenure  
(KYC<sup>1</sup>)



Traffic  
Influence  
(Edge Cloud)



Verified  
Caller



WebRTC –  
BYON<sup>2</sup>

# Current CAMARA API Families (1)



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<b>Blockchain Public Address</b>	<b>Call Forwarding Signal</b>	<b>Carrier Billing CheckOut</b>	<b>Click to Dial</b>	<b>Connectivity Insights</b>	<b>Customer Insights</b>
Manage a blockchain public address associated to a phone number	Determine if a “call forwarding” service is enabled	Purchase, pay, and follow up on fulfilment of products	Establish web-based communication by clicking an object	Alerts the consumers if and when the QoS threshold has breached	Provides an index or scoring related to the user's credit profile
<b>Dedicated Networks</b>	<b>Device Identifier</b>	<b>Device Location</b>	<b>Device Status</b>	<b>Device Swap</b>	<b>Edge Cloud</b>
Requests / modifies / deletes a (logical) dedicated network	Check the identity of the subscribers' device	Check the location of a device	Check the network connection and roaming status of a device	Check if the MSISDN has had a change of device in the last 30 days	Provide and manage network and compute resources for an application
<b>Home Devices QoD</b>	<b>Know Your Customer</b>	<b>Location Insights</b>	<b>Model as a Service</b>	<b>Network Access Management</b>	<b>Network Slice Booking</b>
Request prioritization of traffic on a specific device on the home network	Allows service providers to validate user information with operators	Give insights to the home area and latest location of a device	Build, deploy, monitor, and invoke LLM	Manage fixed devices that reside at customer premises	Reserve, dynamically provision, query, dynamically delete a slice

# Current CAMARA API Families (2)



## CAMARA Working Groups

### Number Verification

Allows users to verify the phone number of the connected device

### OTP Validation

To offer secure user authentication to service providers

### Population Density Data

Get dynamic population density data in a specific area for a future date & time

### API Backlog

Maintains the API Backlog for CAMARA

### Commonalities

Guidelines and assets mandatory for all CAMARA Sub Projects

### Identity and Consent Management

Provides solutions to capture, store and manage user consent

### Quality on Demand

Allows users to set mobile connection quality and get notifications

### Region Device Count

Query the number of active devices in the specified area

### Short Message Service

Send SMS to the destination address(es)

### Marketing / Outreach

Plans and performs marketing activities for CAMARA

### Release Management

Guidelines and assets for Release Management in CAMARA

### SIM Swap

Allows users to get information on SIM pairing changes

### Site to Cloud VPN

Create and configure site to cloud network service by one click

### Verified Caller

Show certified information on the phone before a call is answered

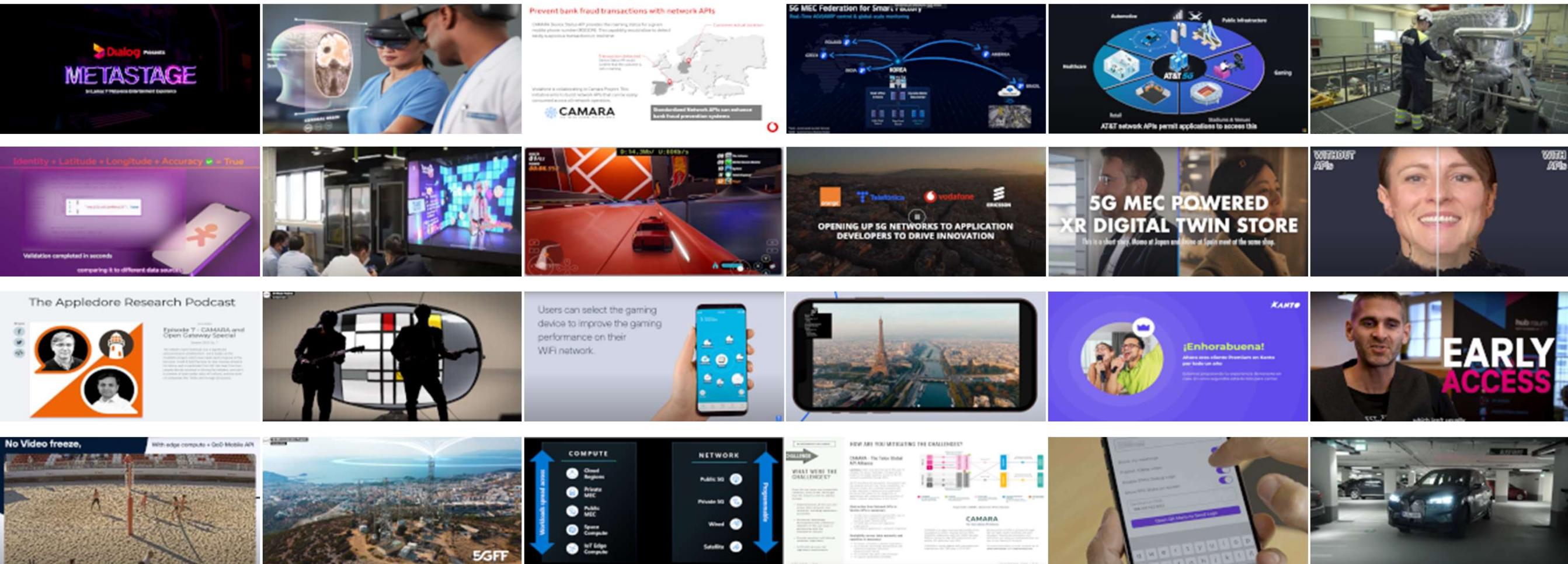
### Web RTC

Add real-time communication capabilities to applications

# CAMARA / Open Gateway API Showcases

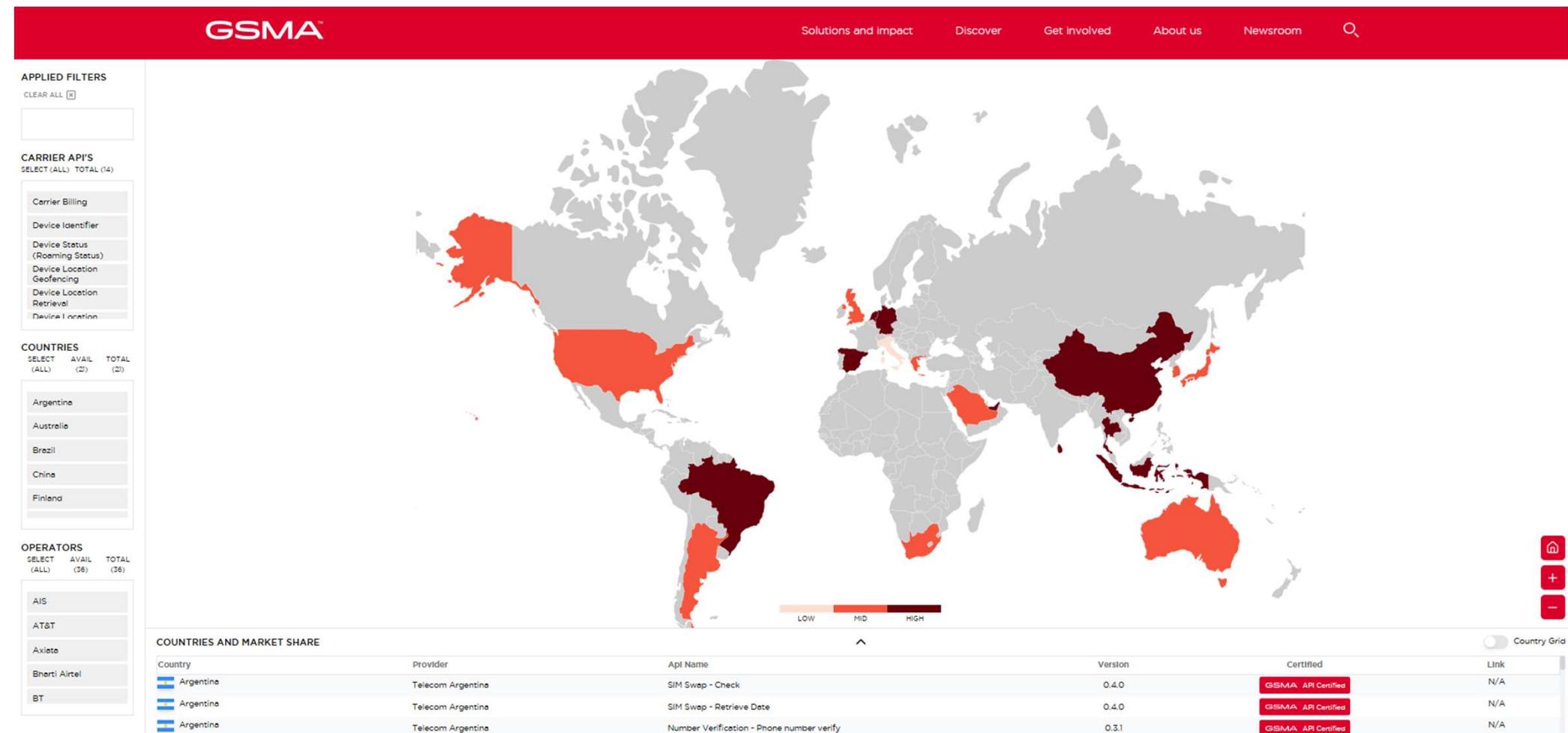


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<https://camaraproject.org/resources/>

# CAMARA / Open Gateway API public launch status



<https://open-gateway.gsma.com/>

# 5G network capabilities

## Introduction



**Telco network capabilities** are functions partly available already in 4G but new and much more powerful in the 5G network. These functions enable to get information out of the network but also to configure the network.

The on-demand, secure and controlled exposure of these capabilities pave the way for transforming operator networks into service enablement platforms, facilitating the application-to-network integration, which will be key to deliver enhanced and service-tailored customer experience in the 5G era.

# 5G network capabilities

## Introduction



Reachability and Location of UEs  
Identify (last known) location of drone



# of UEs in geographic region  
Traffic jam or Corona warning



# of UEs in slice, network congestion  
Adapt resolution for video transmission



Quality on Demand / Traffic influence  
Enable augmented reality



Wake up UEs  
Support low energy IoT devices



Block UEs in geographic region  
Crisis management



# Potential Business Use Cases



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## Authentication and Fraud Prevention



Secure Auth  
Fraud Prevention

Number Verify,  
Sim Swap, etc.

## Location Services



Location Verification  
Location Retrieval  
Location Geofencing

Location APIs

## Communication Quality



Safeguarding of Transactions  
Remote Control  
AR/VR/XR  
Gaming

Quality on Demand

## Device Information



Proactive User Information

Device Data Volume

## Edge Compute



Edge Application hosting  
Latency optimization

Simple Edge Discovery

Network APIs offer the opportunity

- For customers to optimize their use cases and applications
- For operators to monetize their investment in 5G infrastructure

**It's a win-win!**

# Benefit for developers to use CAMARA APIs



- 1 Reduces friction for developers to access network information across telcos globally.
- 2 Increases usage and value of telco networks by providing easy access to network capabilities.
- 3 Enables developers to create new applications or improve existing ones with access to these capabilities.



Additional revenue on existing assets, leveraging SDN and NFV capabilities

# Developers Getting Started with CAMARA APIs



The screenshot shows the CAMARA website's navigation bar with a red arrow pointing to the "Sub Projects A-H" dropdown menu. The menu lists various telco-related capabilities. The background of the page features a blue network-like graphic and a large white text overlay that reads: "APIs enable seamless access to Telco network capabilities".

- [Home](#)
- [About](#) ▾
- [Sub Projects A-H](#) ▾
- [Sub Projects I-Z](#) ▾
- [Working Groups](#) ▾
- [Events](#)
- [Resources](#)
- [Contact](#)

- [Blockchain Public Address](#)
- [Call Forwarding Signal](#)
- [Carrier Billing Check Out](#)
- [ClickToDial](#)
- [Connectivity Insights](#)
- [Device Identifier](#)
- [Device Location](#)
- [Device Status](#)
- [Device Swap](#)
- [Edge Cloud](#)
- [Home Devices QoD](#)

# Developers Getting Started with CAMARA APIs



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## Quality on Demand

### Scope

- Service APIs for "Quality on Demand" (see [APIBacklog.md](#))
- It provides the customer with the ability to:
  - set quality for access network connections (e.g. mobile device connection or fixed access between a home gateway and the service providers gateway router)
  - get notification if network cannot fulfill
- Describe, develop, document and test the APIs (with 1-2 Service Providers)
- Started: October 2021
- Location: virtually

### Meetings

- Meetings are held virtually: [Meeting registration / Join](#)
- Schedule: bi-weekly, Friday, 2 PM CET/CEST (13:00 UTC, 12:00 UTC during European DST). For date/time of next meeting see previous [meeting minutes](#).

### Results and Status

- Note: Please be aware that the project will have frequent updates to the main branch. There are no compatibility guarantees associated with code in any branch, including main, until a new release is created. For example, changes may be reverted before a release is created. **For best results, use the latest available release.**
- The latest available and released version 0.10.0 is available within the [release-0.10.0 branch](#)

- API definition v0.10.0 with inline documentation:
  - [View it on ReDoc](#)
  - [View it on Swagger Editor](#)
  - [OpenAPI YAML spec file](#)

- The previous released version v0.9.0 is available within the [release-0.9.0 branch](#)
- For changes between v0.10.0 and v0.9.0 see the [CHANGELOG.md](#)
- Provider implementations (PI) are available within separate repositories (partly for previous releases):
  - [QualityOnDemand\\_PI1](#) by Deutsche Telekom
  - [QualityOnDemand\\_PI2](#) by Orange
  - [QualityOnDemand\\_PI3](#) by Spry Fox Networks

### Contributorship and mailing list

- To subscribe / unsubscribe to the mailing list of this Sub Project and join or resign as a Contributor, please visit <https://lists.camaraproject.org/g/sp-qod>.
- A message to all Contributors of this Sub Project can be sent using [sp-qod@lists.camaraproject.org](mailto:sp-qod@lists.camaraproject.org).

# Developers Getting Started with CAMARA APIs



**CAMARA**  
THE TELCO GLOBAL API ALLIANCE

The image shows two screenshots of a GitHub interface. On the left, the main GitHub dashboard for the 'CAMARA Project' is displayed, showing pinned repositories like 'Governance' and 'Commonalities'. On the right, a detailed view of the 'QualityOnDemand' repository under the 'camaraproject' organization is shown. This repository has 754 commits, 6 branches, and 9 tags. It includes sections for 'About', 'People', 'Top languages', and 'Releases'. A large orange arrow points from the left screenshot towards the right one.

**CAMARA Project**

444 followers | Germany | <http://camaraproject.org> | [adm@lists.camaraproject.org](mailto:adm@lists.camaraproject.org)

**Pinned**

**Governance** Public

Telco network capabilities exposed through APIs provide a large benefit for customers. By simplifying telco network complexity with APIs and making the APIs available across telco networks and coun...

52 stars | 44 forks

**Commonalities** Public

Repository to describe, develop, document and test the common guidelines and assets for CAMARA APIs

JavaScript | 8 stars | 22 forks

**Repositories**

Find a repository... Type Language Sort

**QualityOnDemand** Public

Repository to describe, develop, document and test the QualityOnDemand API family

Java | 37 stars | Apache-2.0 | 60 forks | 20 issues | 6 pull requests | Updated 51 minutes ago

**camaraproject / QualityOnDemand**

Type to search | Watch 29 | Fork 60 | Star 37

**Code** Issues 20 Pull requests 6 Discussions Actions Projects Security Insights

**QualityOnDemand** Public

main 6 Branches 9 Tags Go to file Add file Code

/patch-1 · a531a6a · 3 weeks ago 754 Commits

ate swagger-editor-validator.yml · last month

ate code/API\_definitions/qos-profiles.yaml · 3 weeks ago

ate README.md · 5 months ago

ed configuration for linting ruleset · 3 months ago

ed .unotes/ to .gitignore · 2 years ago

ed configuration for linting ruleset · 3 months ago

ed configuration for linting ruleset · 3 months ago

ate CHANGELOG.md · 2 months ago

ate CODEOWNERS · 2 months ago

**About**

Repository to describe, develop, document and test the QualityOnDemand API family

[wiki.camaraproject.org/x/DAEG](http://wiki.camaraproject.org/x/DAEG)

Readme | Apache-2.0 license | Activity | Custom properties | 37 stars | 29 watching | 60 forks | Report repository

**Releases** 9

Benefit for developers  
to work in CAMARA



As a typical Open Source Project **CAMARA is driven by contribution!**

People who contribute define priorities and drive the direction.

Working in CAMARA on API definitions, API documentations and API code (transformation functions) enables to

- **Bring in own demand** and contribute a solution
- **Influence the definition** of new APIs and API versions
- Ensure that own requirements are considered
- **Provide code which can be used globally**
- **Learn** about CAMARA, Open Gateway and the Network API ecosystem
- **Get deep knowledge about the APIs**
- **Become maintainer and TSC member** to influence technical decisions in CAMARA

# Joining CAMARA as Developer



To join the CAMARA mailing list send an (empty) email to [all+subscribe@lists.camaraproject.org](mailto:all+subscribe@lists.camaraproject.org).

A screenshot of the CAMARA Members page. The left sidebar shows navigation options: Home (Owner), Subscription, Admin, Pending, Members (which is selected and highlighted in blue), and Activity. The main content area shows the user's profile: All / Members / markus / markus.kuemmerle@telekom.de (Mod). A "Membership" dropdown menu is open, showing "User Details" and "Email Address". The email address listed is markus.kuemmerle@telekom.de. A note at the bottom states: "Note: Changing this email address changes the email address for this person's account, affecting all of their other subscriptions." The entire screenshot has a blue border.

The CAMARA GitHub <https://github.com/camaraproject> can be accessed without any prerequisite. To create issues and start contributing to CAMARA you need a free GitHub account.

# Joining CAMARA as Developer



Each API family / working group in CAMARA is organized as a separate Sub Project with (example QoD):

- A dedicated lead repository (containing API definition and API documentation)
- 0...n provider implementation repositories (containing API code)
- A dedicated mailing list

**QualityOnDemand** Public

Repository to describe, develop, document and test the QualityOnDemand API family

Java ⭐ 37 Apache-2.0 60 19 5 Updated 3 days ago

**QualityOnDemand\_PI1** Public

Provider Implementation of QualityOnDemand by Deutsche Telekom

Java ⭐ 5 Apache-2.0 8 0 0 Updated 2 hours ago

**QualityOnDemand\_PI2** Public

Provider Implementation of QualityOnDemand by Orange

Kotlin ⭐ 0 Apache-2.0 1 1 0 Updated on Nov 9, 2023

**QualityOnDemand\_PI3** Public

Provider Implementation of QualityOnDemand by Spry Fox Networks

Go ⭐ 0 Apache-2.0 2 0 0 Updated on Apr 24, 2023

**sp-qod@lists.camaraproject.org**

Sub Project "Quality on Demand"

#### Group Information

- 95 Members
- 27 Topics , Last Post: May 17
- Started on 07/05/22
- RSS Feed

#### Group Email Addresses

Post: [sp-qod@lists.camaraproject.org](mailto:sp-qod@lists.camaraproject.org)

Subscribe: [sp-qod+subscribe@lists.camaraproject.org](mailto:sp-qod+subscribe@lists.camaraproject.org)

Unsubscribe: [sp-qod+unsubscribe@lists.camaraproject.org](mailto:sp-qod+unsubscribe@lists.camaraproject.org)

Group Owner: [sp-qod+owner@lists.camaraproject.org](mailto:sp-qod+owner@lists.camaraproject.org)

Help: [sp-qod+help@lists.camaraproject.org](mailto:sp-qod+help@lists.camaraproject.org)

# Joining a Sub Project as Developer



To join a Sub Project please have a look into its Readme.md (example Quality on Demand):

last commit may issues 20 open pull requests 5 open contributors 27 repo size 11.4 MB License Apache 2.0

## QualityOnDemand

Repository to describe, develop, document and test the QualityOnDemand API family

### Scope

- Service APIs for "Quality on Demand" (see APIBacklog.md)
- It provides the customer with the ability to:
  - set quality for a flow within an access network connections (e.g. mobile device connection or fixed access between a home gateway and the service providers gateway router)
    - Session mode, for a specific duration
    - Provision mode, indefinitely for each time the device connects to the same access network
  - get notification if network cannot fulfill
- Describe, develop, document and test the APIs (with 1-2 Service Providers)
- Started: October 2021
- Location: virtually

### Meetings

- Meetings are held virtually: [Meeting registration / Join](#)
- Schedule: bi-weekly, Friday, 2 PM CET/CEST (13:00 UTC, 12:00 UTC during European DST). For date/time of next meeting see previous [meeting minutes](#).

### Status and released versions

- Note: Please be aware that the project will have frequent updates to the main branch. There are no compatibility guarantees associated with code in any branch, including main, until a new release is created. For example, changes may be reverted before a release is created. For best results, use the latest available release.
- The latest available and released version 0.10.1 is available [here](#)
  - API definition v0.10.1 with inline documentation:
    - [View it on ReDoc](#)
    - [View it on Swagger Editor](#)
    - OpenAPI [YAML spec file](#)
  - The previous released version v0.9.0 is available within the [release-0.9.0 branch](#)
  - For changes between v0.10.0 and v0.9.0 see the [CHANGELOG.md](#)
  - Provider implementations (PI) are available within separate repositories (partly for previous releases):
    - [QualityOnDemand\\_PI1](#) by Deutsche Telekom
    - [QualityOnDemand\\_PI2](#) by Orange
    - [QualityOnDemand\\_PI3](#) by Spry Fox Networks

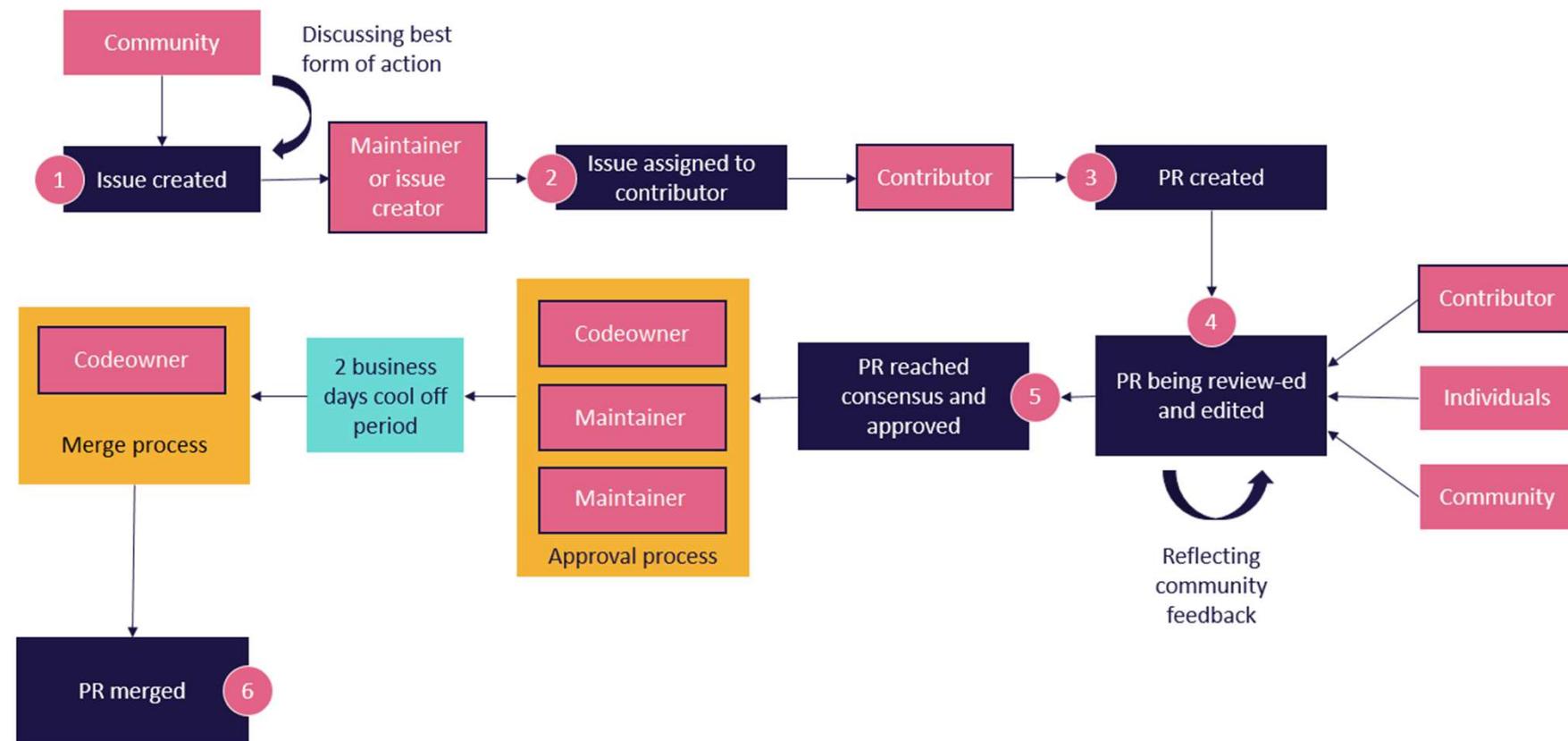
### Contributorship and mailing list

- To subscribe / unsubscribe to the mailing list of this Sub Project and thus be / resign as Contributor please visit <https://lists.camaraproject.org/g/sp-qod>.
- A message to all Contributors of this Sub Project can be sent using [sp-qod@lists.camaraproject.org](mailto:sp-qod@lists.camaraproject.org).

# Contributing to CAMARA



In the Project the “Fork and pull model” is used. Changes and contributions to CAMARA shall follow this process:



<https://github.com/camaraproject/Governance/blob/main/ProjectStructureAndRoles.md>

Benefit for operators to implement  
CAMARA APIs in their networks



Operators have made high investments in

- Spectrum licences
- Infrastructure (cell towers, fibre)

Operators haven't been successful in

- Increasing prices for connectivity contracts

CAMARA APIs open a possibility

- To monetize the high investments
- To improve customer experience
- For market positioning



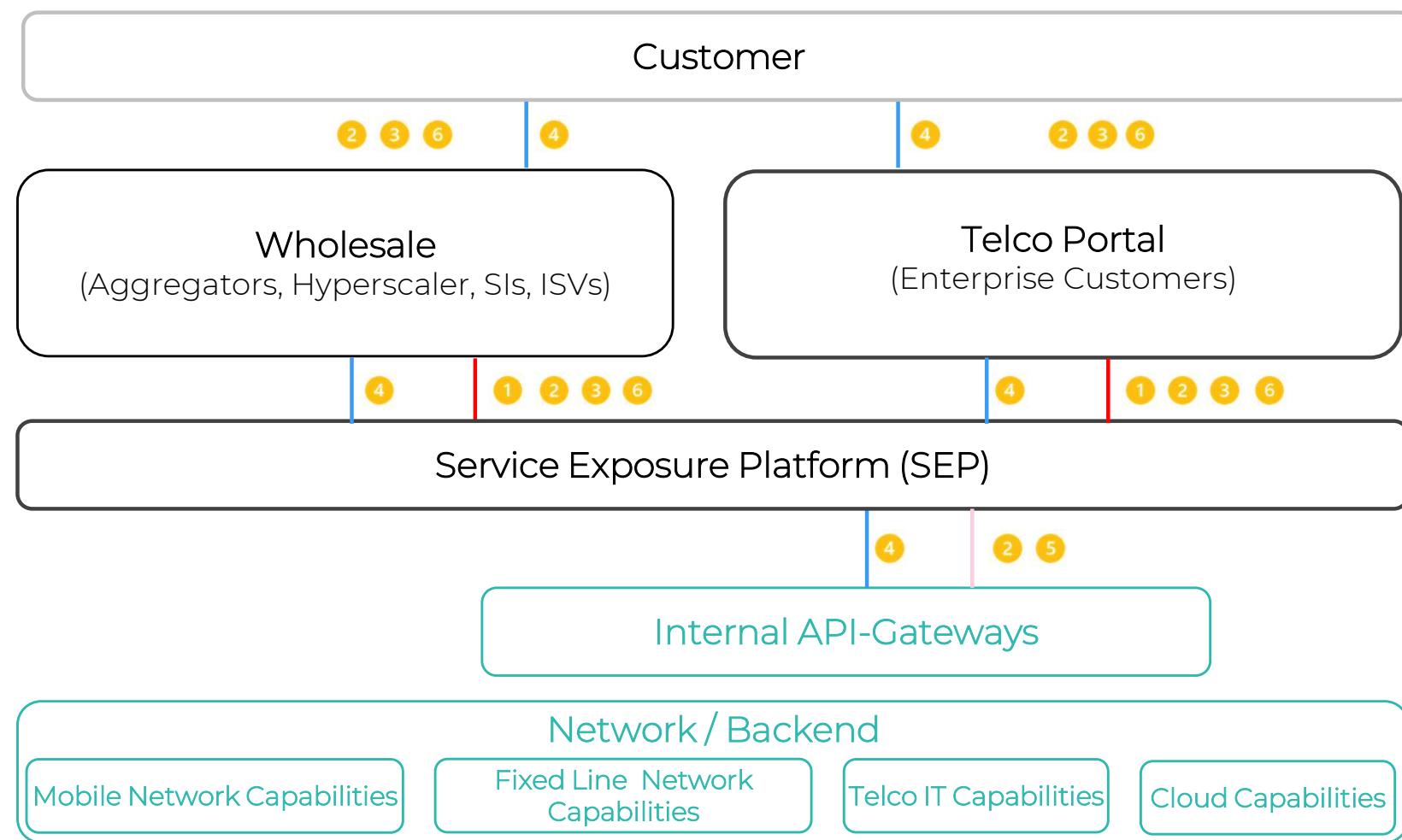
# What have operators to do to implement Network APIs?



- Develop APIs and products based on the network capabilities
- Implement an exposure infrastructure
- Define commercial products
- Sell it



# What have operators to do to implement Network APIs?



## Possible API workflows

1. Catalog published from SEP to portals
2. Customer onboarding to SEP
3. Customer orders API, SEP sends credentials to access API
4. If necessary SEP requests user consent for API. Capacity management is done. Customer uses API. SEP performs metering and rating.
5. SEP initiates billing for wholesale and retail
6. Customer offboarding

# Benefit for operators to work in CAMARA



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## Collaborative Innovation

- Industry Collaboration
- Standardization: contribute to development of industry standards, ensuring interoperability and consistency across networks and services
- Bring in your requirements!

## Networking and Partnerships

- Access to a growing global network of industry leaders
- Technological Advancements
- Knowledge Exchange

## Shared Resources

- Collaborative projects often lead to cost savings through shared resources and reduced duplication of efforts
- Benefit from the collective research efforts

# Benefit for operators to work in CAMARA



## Why Join CAMARA as a sponsor /member?

Seat on the Governing  
Board to influence  
CAMARA strategy

Elevate your Brand

Signal Support &  
Commitment to open API  
development

Discounts on Linux  
Foundation events &  
programs

Help ensure the Project  
continues to provide  
needed governance &  
infrastructure

Platform to showcase  
thought leadership

# Operators Getting Started with CAMARA



Individuals and organizations from API customers (e.g. enterprises and startups), aggregators, cloud operators, telco operators, network equipment vendors, system integrators, and software vendors are welcome to join CAMARA.

For organizations:

- If you are interested to show your logo on the CAMARA website as "**Participating Organization**" send a .SVG version of it to [adm@lists.camaraproject.org](mailto:adm@lists.camaraproject.org). Participation is free, without any fees or obligations.
- If you would like to become a **CAMARA sponsor** please don't hesitate to use the [enrollment link](#). The cost is depending on the kind of membership and the number of employees.
- Associate Members of The Linux Foundation can also join as "**Associating organization**" for free, without any fees or obligations.

# CAMARA

## Where are we going next...



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1

Additional APIs and roadmap sync across CSPs,  
Aggregators and Hyperscalers

2

API lifecycle management consistency,  
Documentation of API versioning and availability globally

3

Drive API Adoption (customers/developers and operators)

# CAMARA Contacts



**CAMARA**  
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Individuals and organizations from API customers (e.g. enterprises and startups), aggregators, cloud operators, telco operators, network equipment vendors, system integrators, and software vendors are welcome to join CAMARA.

To access CAMARA technical resources like API definitions, API specifications or API code just visit the [CAMARA GitHub](#). All resources are reachable without any prerequisite. To create issues and start contributing to CAMARA you need a free GitHub account without any further prerequisite. This participation is free, without any fees or obligation to work.

If you are interested to be included in the CAMARA communication, please subscribe to [all+subscribe@lists.camaraproject.org](mailto:all+subscribe@lists.camaraproject.org). You may unsubscribe from CAMARA and these communications at any time. Participation is free.

If you are interested to show your logo on the CAMARA website as “Participating Organization” you can send it to [adm@lists.camaraproject.org](mailto:adm@lists.camaraproject.org). Participation is also free.

If you would like to join as CAMARA sponsor or associating organization, please don't hesitate to use the enrollment link <https://enrollment.lfx.linuxfoundation.org/?project=camarafund>. Cost is depending on the kind of membership and the number of employees.





# CAMARA

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