



CAMARA
THE TELCO GLOBAL API ALLIANCE

Presentation

17.12.2024

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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.

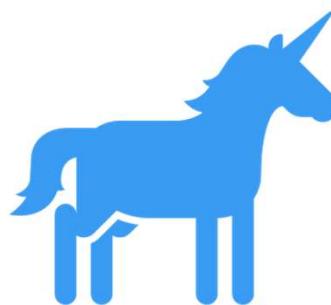


CAMARA Mission

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

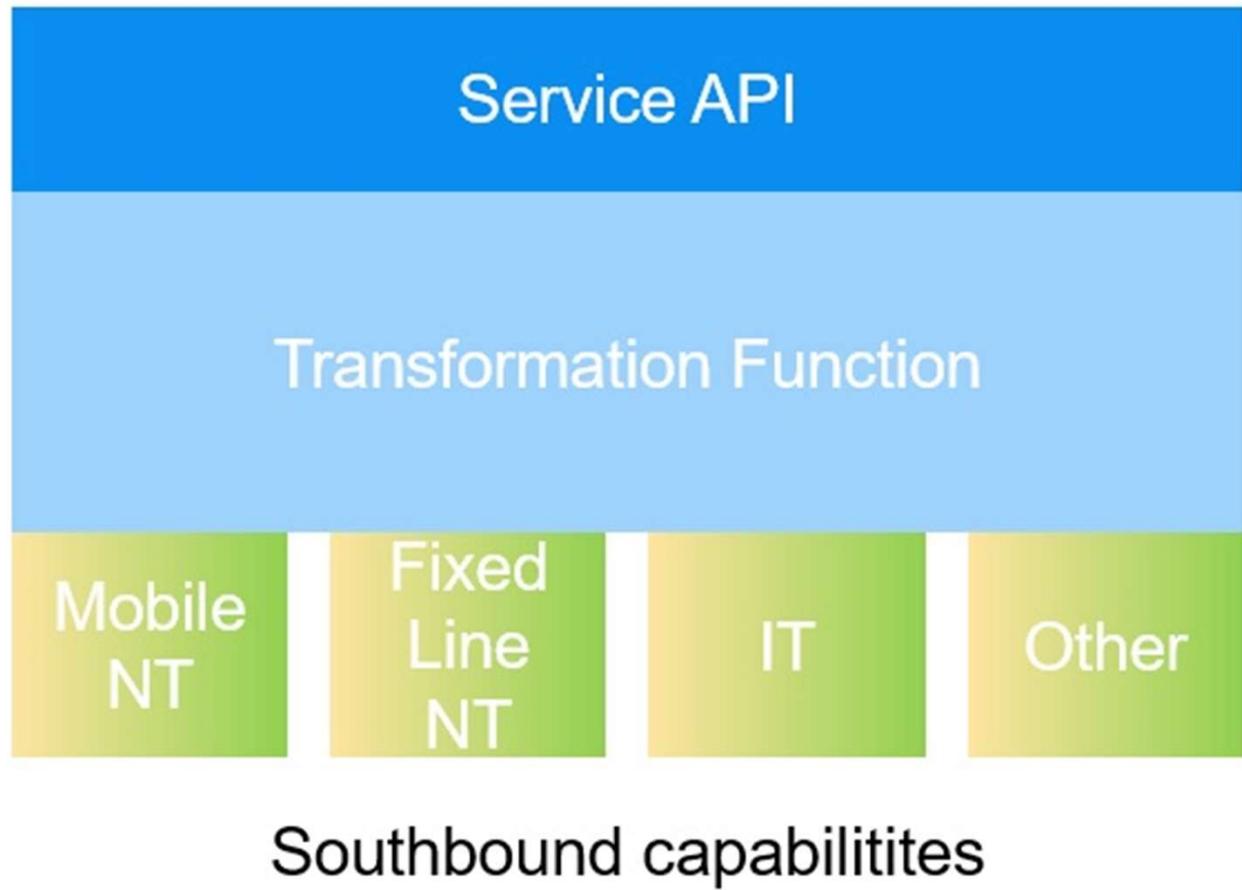
Key problems we try to solve

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).

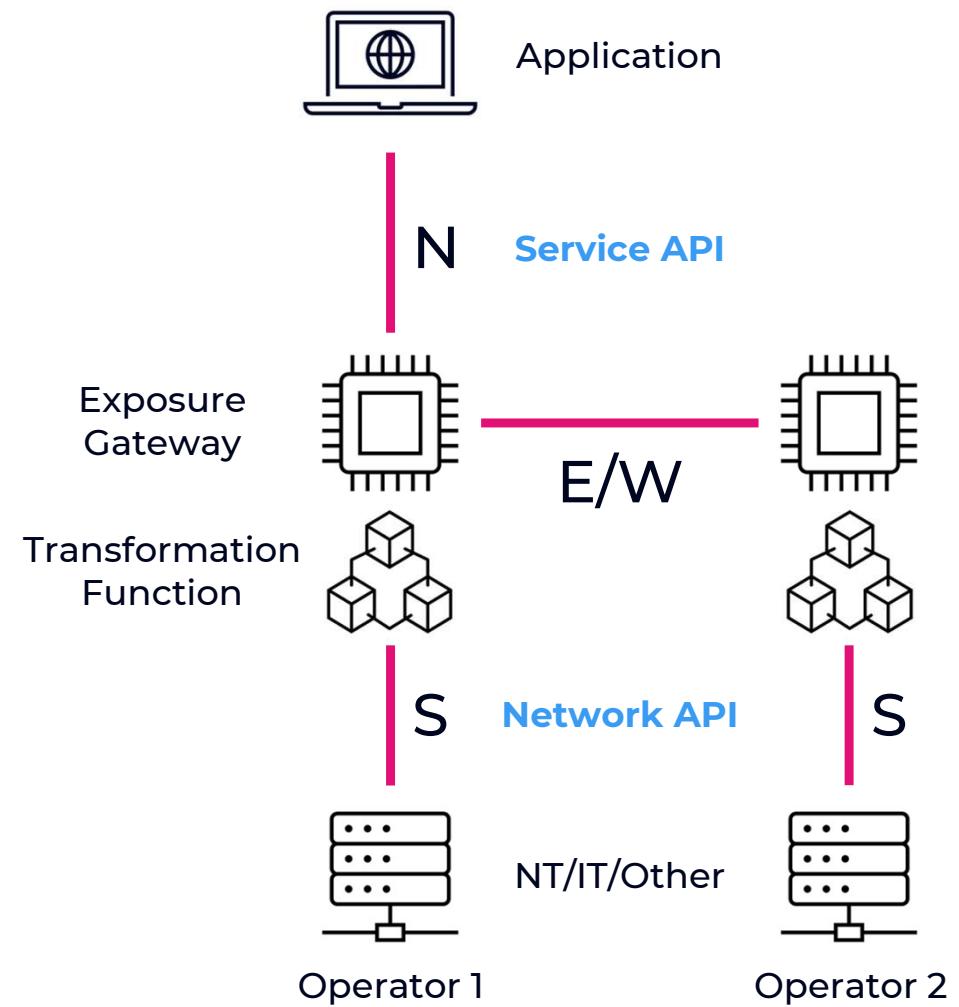


CAMARA Scope



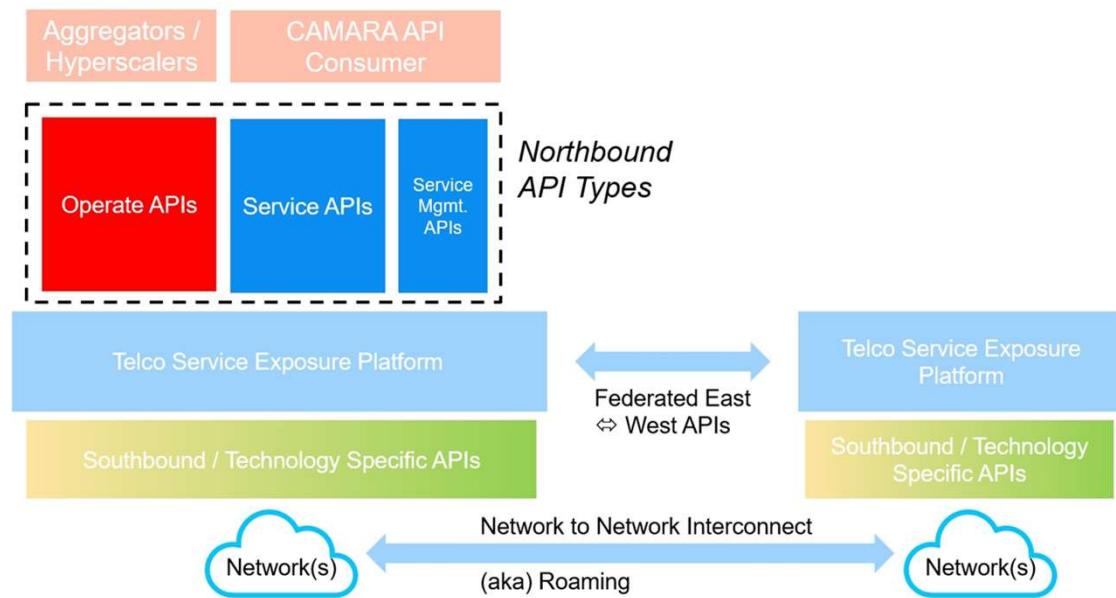
From functional perspective the scope is limited to **telco APIs**, that means APIs in the domain of telco mobile networks, telco fixed line networks, telco edge cloud, etc. or supporting these.

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.



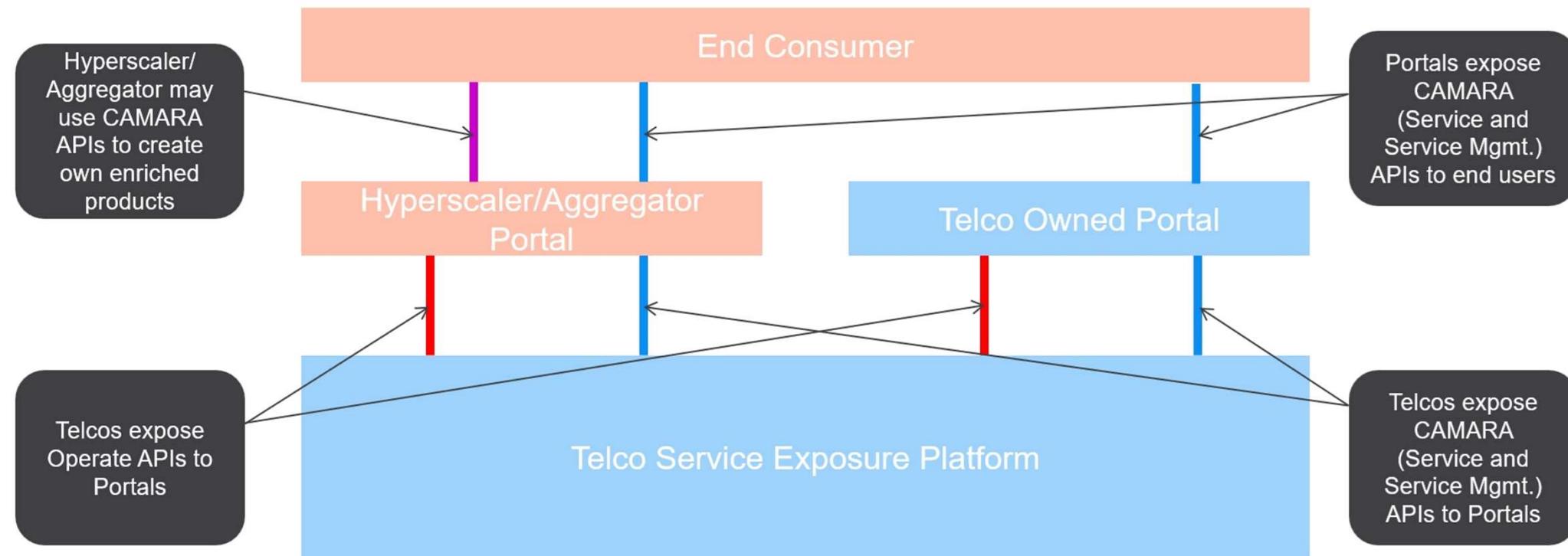
We differentiate between 3 types of Northbound APIs:

- **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

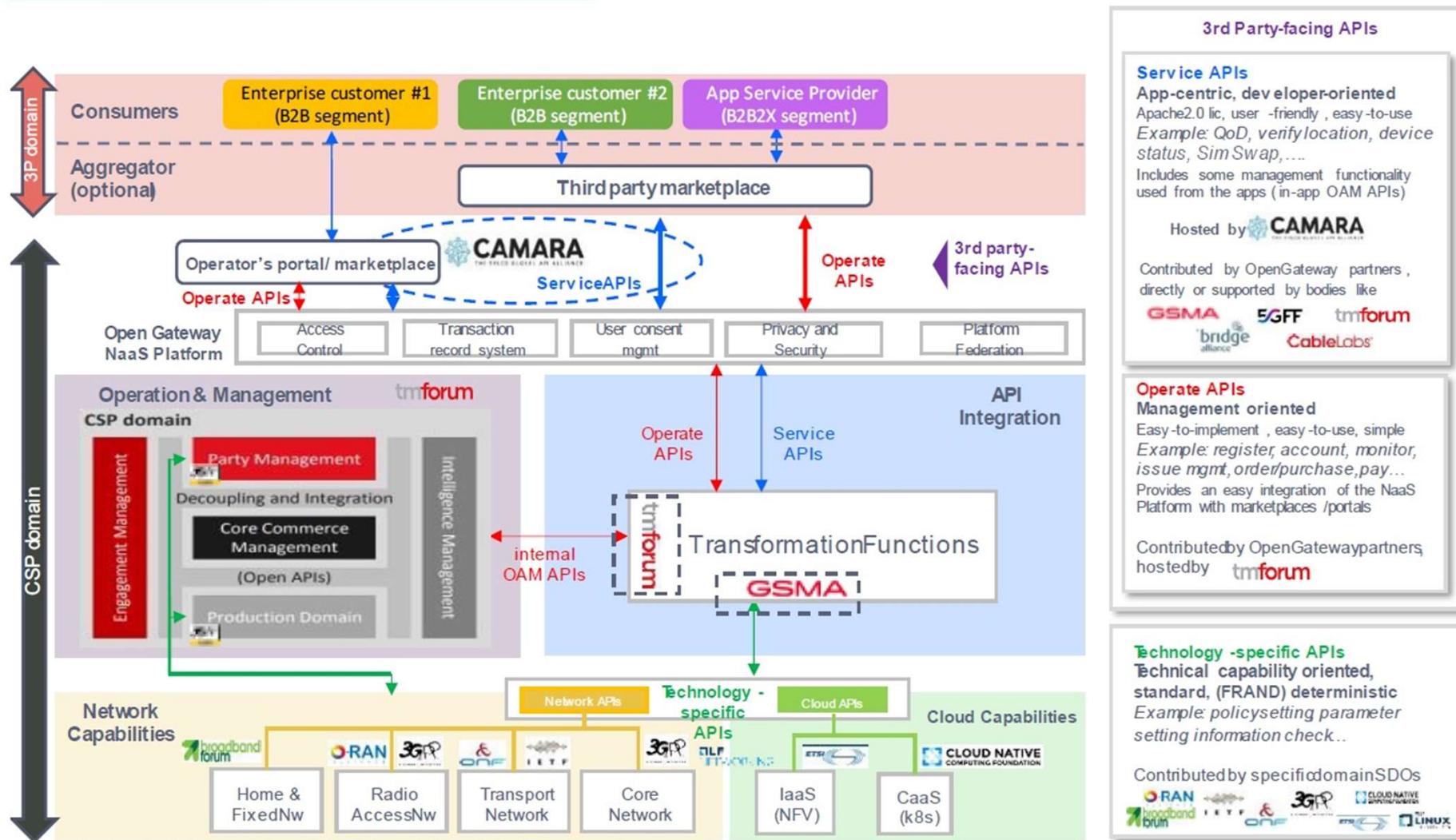


Hyperscalers and aggregators have the possibility to create own enriched products based on the CAMARA APIs and expose that in addition to the CAMARA APIs.

CAMARA – Scope / Collaboration with Open Gateway and TM Forum



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CAMARA project defines CAMARA APIs.

TMForum develops the Operate APIs.

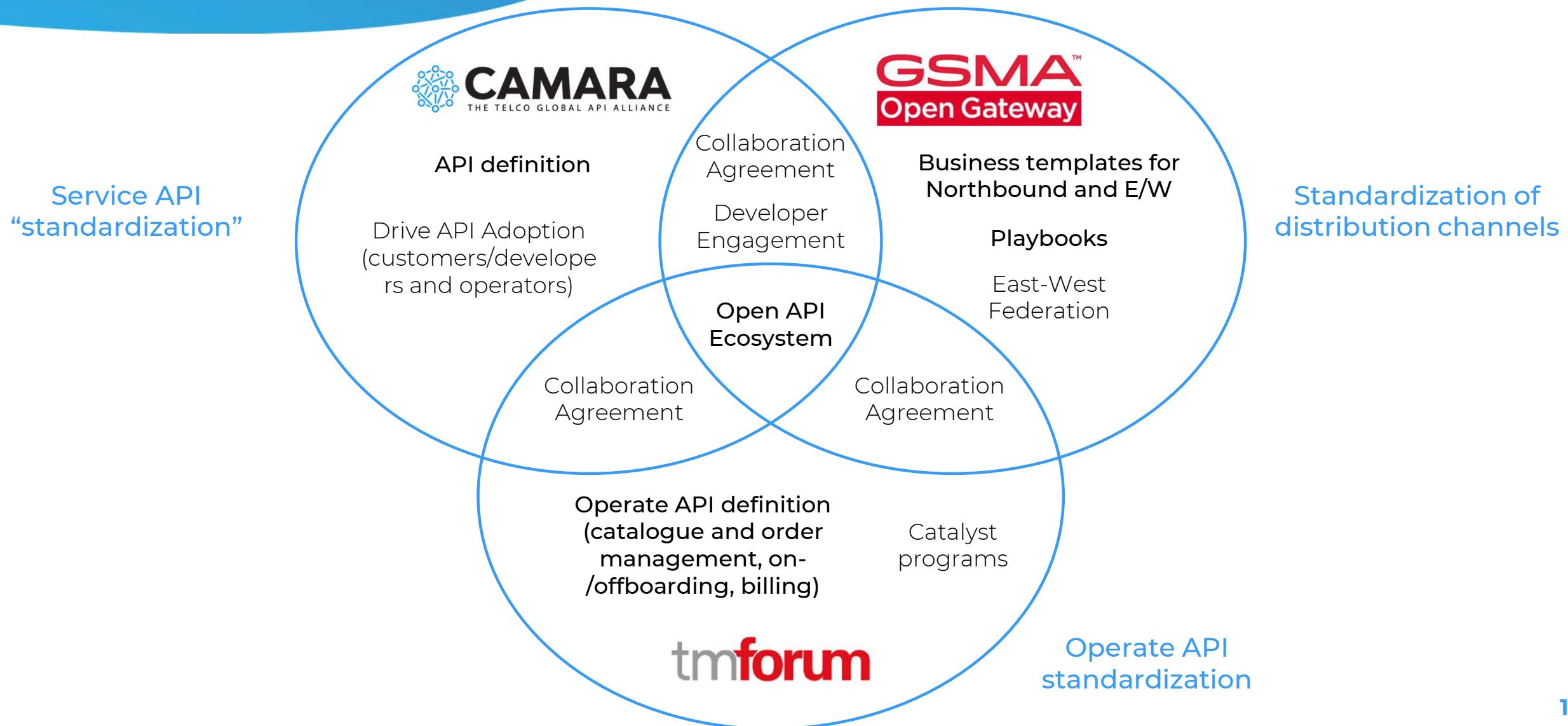
Several SDOs cover the different technology domains that provide the telco capabilities.

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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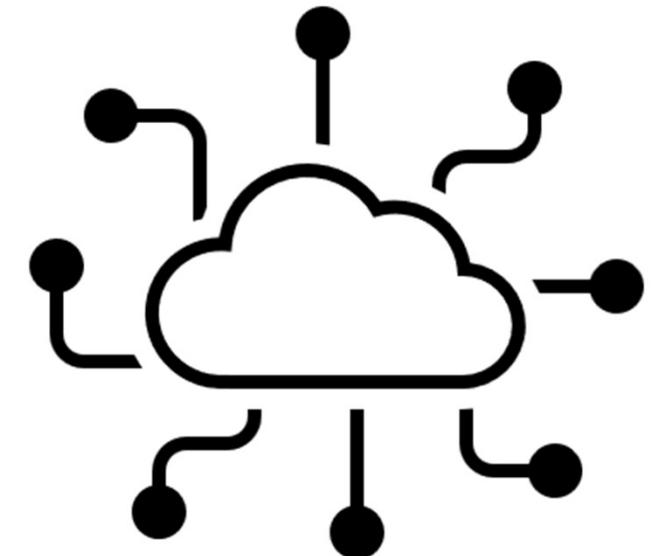
The scope of the CAMARA Project is:

- 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>.

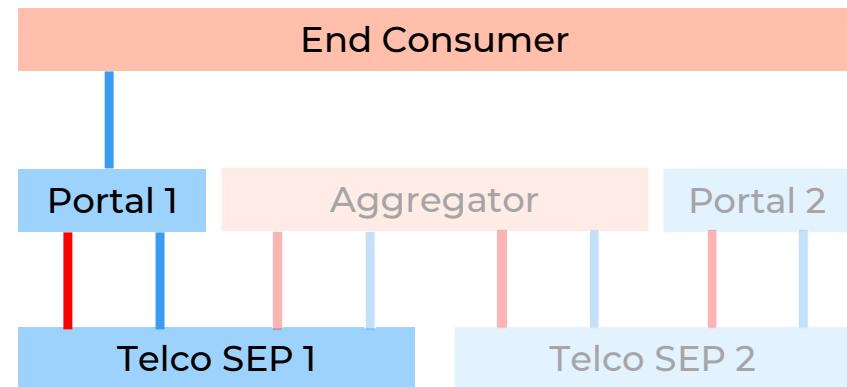


CAMARA API Distribution Options



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Single-Operator Relationship

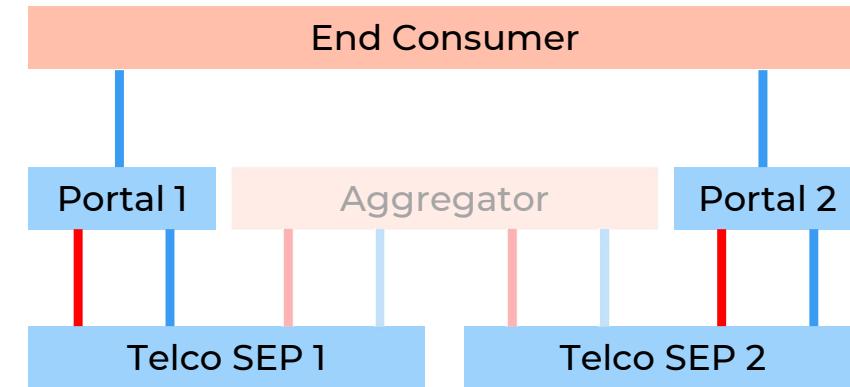


Blue lines =
CAMARA APIs

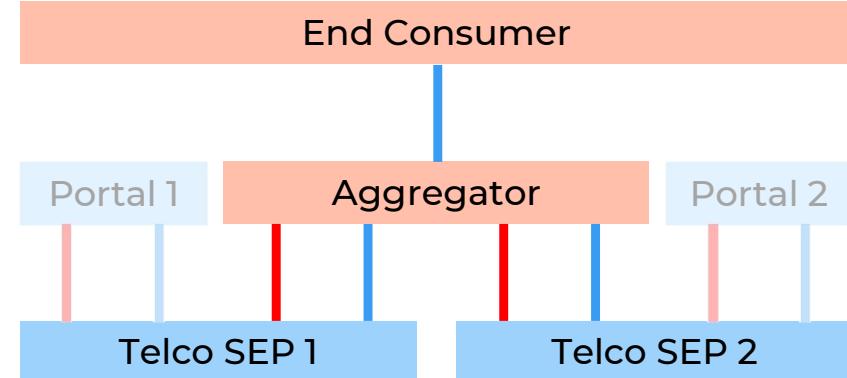
Red lines =
Operate APIs

SEP= Service
Exposure
Platform

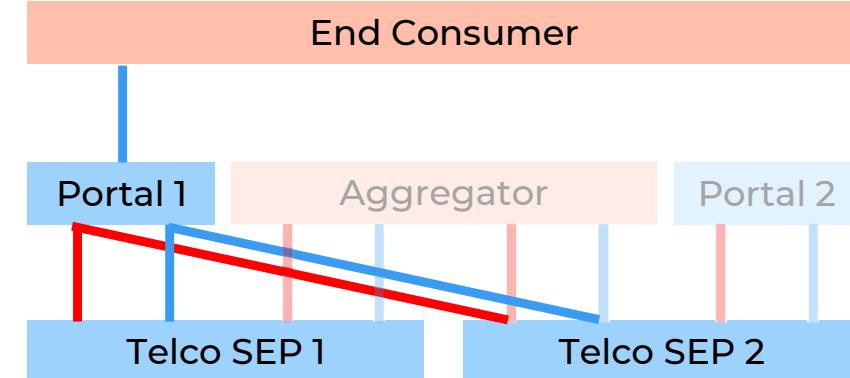
Multi-Operator Relationship



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	T Mobile	T mobile	vivo	ALEPH ZERO	CableLabs	BE CENTILLION	Charter	INDY	invia	OpenID					
	verizon	vodafone							SCENERA	shabodi										
Participating Organizations																				
	INCE	A1	ACL Digital	akross	AMANTYA	a-amdocs	ARGELA	AT&T	aws	axiata	Axiata DIGITAL LABS	BCTI	BearingPoint.	airtel	bridge alliance	broadpeak	Cappinno	Chenosis	China Unicom	China Unicom
	CISCO	RCH	cloudoniX	CodeB	cognizant	Colony	comviva	CaaSAA	csl.	CTHINGS CO	DETECON CONSULTING	DOMOS	DriveU.auto	EANTG	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	IP IPification	equalinetics	Italtel	PLATFORMS	Somewhere Together	KDDI	kt
	LATENCETECH	Lenovo	LG U+	THE LINUX FOUNDATION	LOTUSFLARE	lytn	M	MATRIXO SOFTWARE	MAVENIR	MICROKS	MIQUEST TECHNOLOGIES	nobstract.io	NEARLY COMPUTING	Netcracker	N	NGMN	NOS	NTT DATA		
	Open Sesame	optare	Optiva	ORACLE	VIRTUAL 5G LAB	plusmo	PRYVX	quobis:	Radisys	Red Hat	REPLY	STC	SEKURA	Simpel	sinch	Singtel	SPRY FOX	STARHUB	startologic	
	stechs	SUMMIT	swisscom	syniverse	TCS	TATA ELXSI	T	TELUS	ETIM	TruSense	UNRYO	VIRTUS	VRONMBR	wray castle	Whale Cloud	xacria	XSECURITYPULSE	ZTE		

- 137 Named Partners
- 415 (+526*) companies participating in CAMARA
- 30 Active API family Sub Projects with 53 APIs, and 5 Working Groups
- 1210 (+2078*) 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																
Participating Organizations																			

Release Management Motivation and Benefits



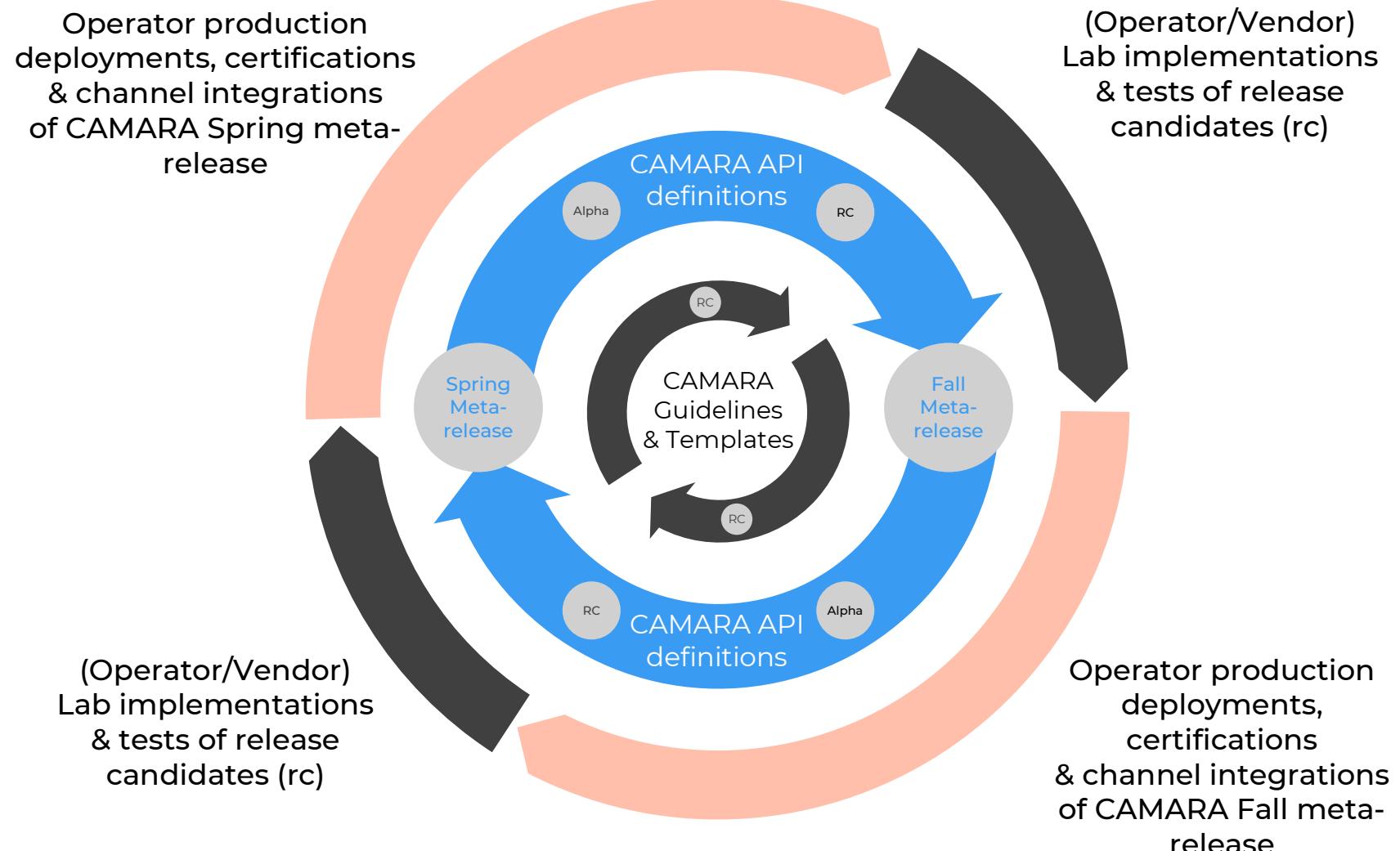
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- A **CAMARA meta-release** combines a set of CAMARA API versions into a **consistent** release.
- There will be **two meta-releases per year** (in spring and fall).
 - Network operator can plan their implementations and deployments in production.
 - 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 market¹



Number
Verification



OTP¹ (SMS)
Validation



Location
Verification



Sim
Swap



Simple Edge
Discovery

Updated initial CAMARA APIs (v0.y.z)

Previous versions launched in at least one market¹



Carrier
Billing



Device
Roaming Status



Device
Reachability Status



KYC³
Match



KYC³
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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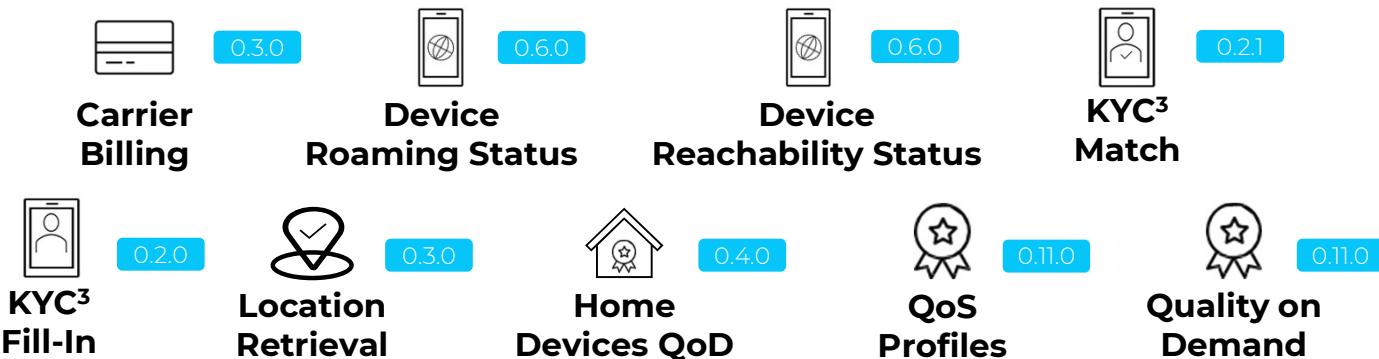
Stable CAMARA APIs (v1.0.0)

Previous versions launched in at least one market¹



Updated initial CAMARA APIs (v0.y.z)

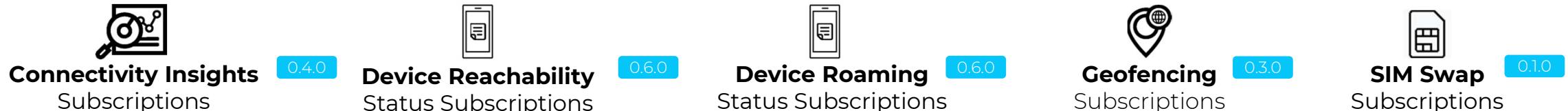
Previous versions launched in at least one market¹



New initial APIs (v0.y.z)



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



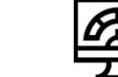
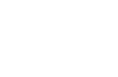
Beyond Fall24 Meta-release – Upcoming APIs



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Upcoming APIs

Work in progress or newly started

 Age Verification (KYC¹)	 Application Endpoint Discovery (Edge Cloud)	 Blockchain Public Address	 Capability And Runtime Restrictions	 Click To Dial	 Customer Insights	 Dedicated Networks	 Device Data Volume (Device Status)
 Device Identifier	 Device Quality Indicator (Device Status)	 Device Swap	 Edge Application Management (Edge Cloud)	 High Throughput	 Elastic Netw.	 Model as a Service	 Most Frequent Location (Location Insights)
 Network Access Management (Home Devices)	 Network Slice Booking	 Number Recycling (KYC¹)	 Quality by Design	 Region Device Count	 Session Insights (Connectivity Insights)	 Short Message Service	
 Site to Cloud VPN	 Subscription Status (KYC¹)	 Tenure (KYC¹)	 Traffic Influence (Edge Cloud)	 Verified Caller	 WebRTC – BYON²		

¹ KYC = Know Your Customer

² BYON = Bring Your Own Number

Current CAMARA API Families (1)



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Blockchain Public Address

Manage a blockchain public address associated to a phone number

Call Forwarding Signal

Determine if a “call forwarding” service is enabled

Capabilities And Runtime Restrictions

Provide capabilities and runtime restrictions

Carrier Billing CheckOut

Purchase, pay, and follow up on fulfilment of products

Click to Dial

Establish web-based communication by clicking an object

Connectivity Insights

Alerts the consumers if and when the QoS threshold has breached

Customer Insights

Provides an index or scoring related to the user's credit profile

Dedicated Networks

Requests / modifies / deletes a (logical) dedicated network

Device Identifier

Check the identity of the subscribers' device

Device Location

Check the location of a device

Device Status

Check the network connection and roaming status of a device

Device Swap

Check if the MSISDN has had a change of device in the last 30 days

Edge Cloud

Provide and manage network and compute resources for an application

High Throughput Elastic Netw.

Calculates load-balancing paths with given duration, data and bandwidth

Home Devices QoD

Request prioritization of traffic on a specific device on the home network

Know Your Customer

Allows service providers to validate user information with operators

Location Insights

Give insights to the home area and latest location of a device

Model as a Service

Build, deploy, monitor, and invoke LLM

Current CAMARA API Families (2)



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CAMARA Working Groups

Network Access Management

Manage fixed devices that reside at customer premises

Network Slice Booking

Reserve, dynamically provision, query, dynamically delete a slice

Number Verification

Allows users to verify the phone number of the connected device

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

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

Quality on Demand

Allows users to set mobile connection quality and get notifications

Marketing / Outreach

Plans and performs marketing activities for CAMARA

Release Management

Guidelines and assets for Release Management in CAMARA

Region Device Count

Query the number of active devices in the specified area

Short Message Service

Send SMS to the destination address(es)

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

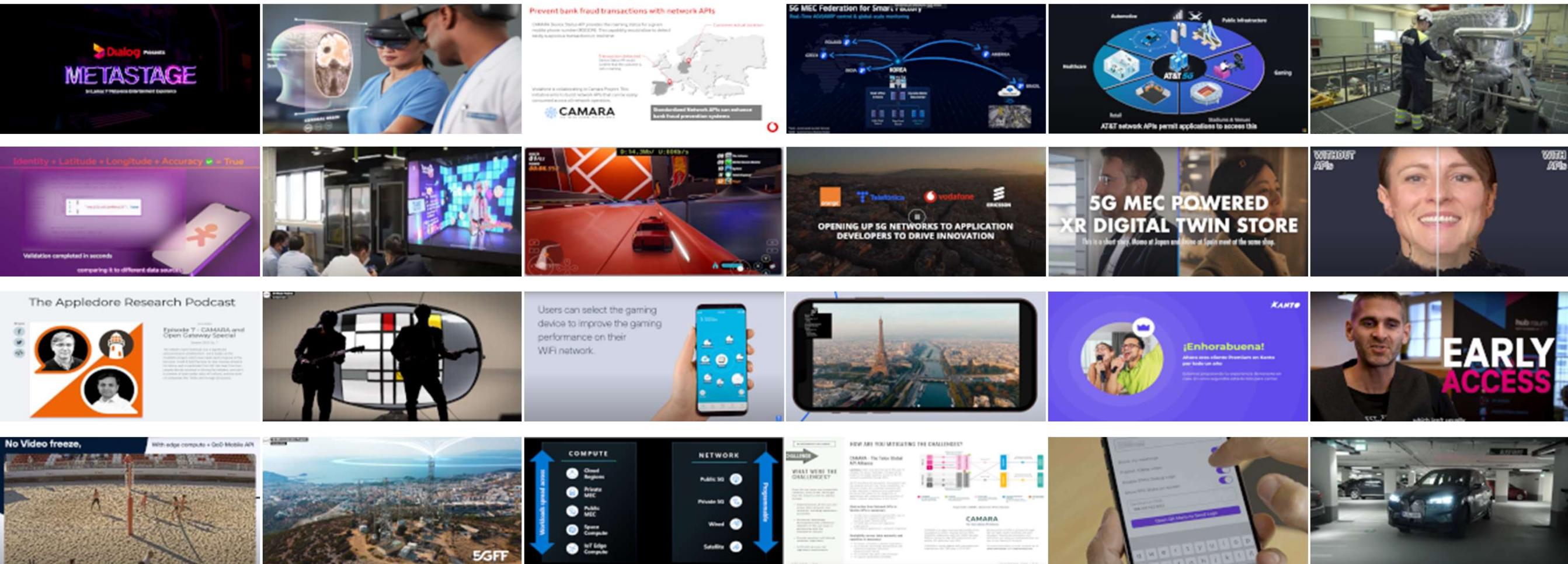
Web RTC

Add real-time communication capabilities to applications

CAMARA / Open Gateway API Showcases

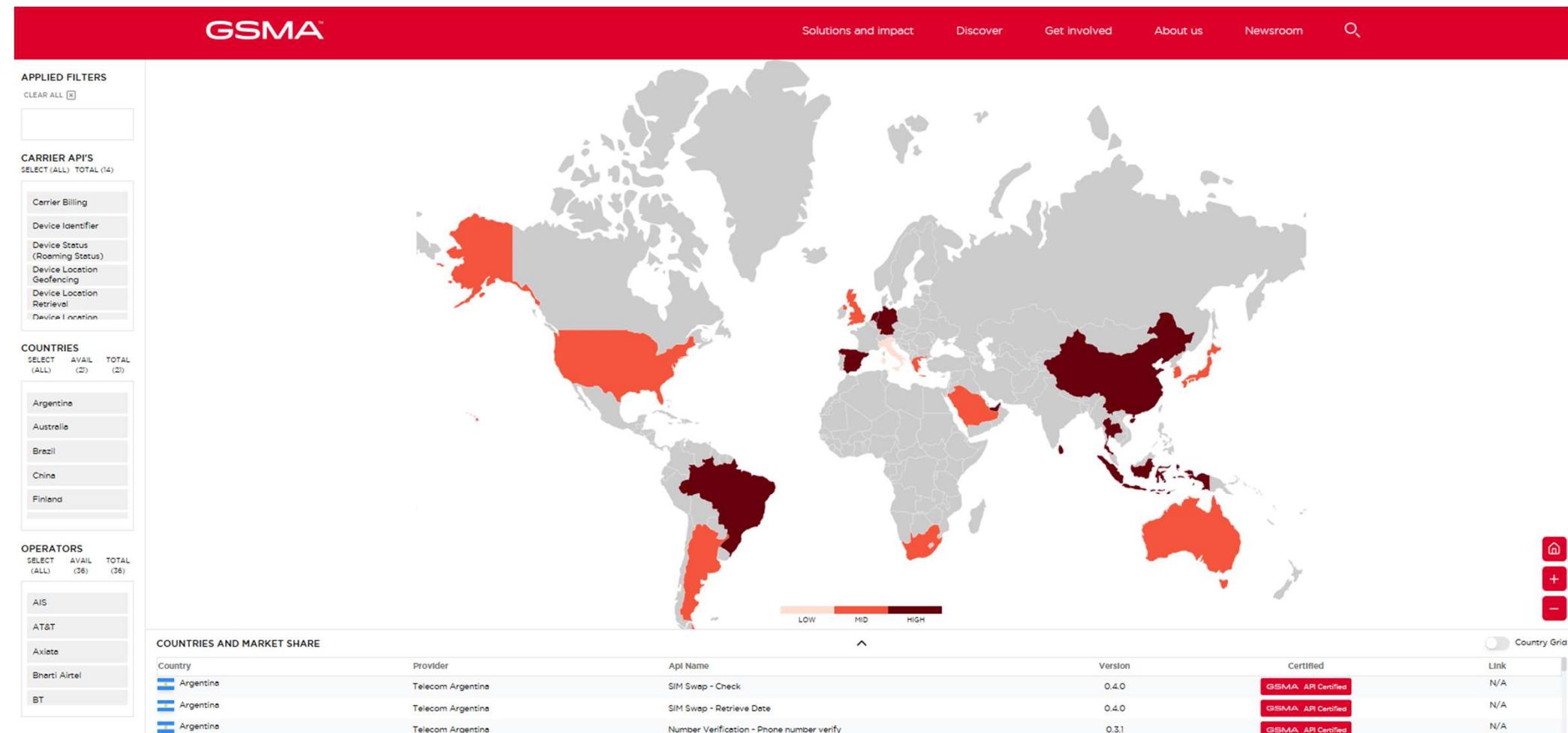


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<https://camaraproject.org/resources/>

CAMARA / Open Gateway API public launch status



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

CAMARA / Open Gateway API public launch status



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Commitment

95

67 operator groups and **28** Channel Partners supporting the Open Gateway MOU

278

operator networks represented

>74%

of mobile connections represented

Assets

37

APIs published in



56 APIs in Development

Technical

Standardization through certification
Certified APIs

Commercial

Open Service Agreement, Channel Partner On-Boarding and E-W Federation Agreement Templates

Impact

157

API Instances commercially launched across **52** networks in **24** markets

11

market champion launches with align GTM services, engaged with **28** Markets

>18,500+

media mentions in 2024 so far, 8K in 2023

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. The "Sub Projects A-H" menu is open, displaying a list of ten items: Blockchain Public Address, Call Forwarding Signal, Carrier Billing Check Out, ClickToDial, Connectivity Insights, Device Identifier, Device Location, Device Status, Device Swap, Edge Cloud, and Home Devices QoD. A red arrow points from the text above to this menu. The main content area features a large blue background image with white text: "APIs enable seamless access to Telco network capabilities".

- THE LINUX FOUNDATION PROJECTS
- CAMARA**
THE TELCO GLOBAL API ALLIANCE
- Home About ▾ Sub Projects A-H Sub Projects I-Z ▾ Working Groups ▾ Events Resources Contact

Latest News: Initial focus areas of colla...
ays to process connecte... [Read More →](#)

APIs enable seamless access to Telco network capabilities

- 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.

Developers Getting Started with CAMARA APIs



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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 code, issues, pull requests, discussions, actions, projects, security, and insights. The repository description states: 'Repository to describe, develop, document and test the QualityOnDemand API family'. It also links to the 'wiki.camaraproject.org/x/DAEG' and provides options to view as public or private. A large orange arrow points from the left screenshot towards the right one.

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.

A screenshot of the CAMARA Members page. The left sidebar shows navigation options: Home (Owner), Subscription, Admin, Pending, Members (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 dropdown menu for Membership is open. Below it, the User Details section shows the Email Address 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

Subscribe: sp-qod+subscribe@lists.camaraproject.org

Unsubscribe: sp-qod+unsubscribe@lists.camaraproject.org

Group Owner: sp-qod+owner@lists.camaraproject.org

Help: 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

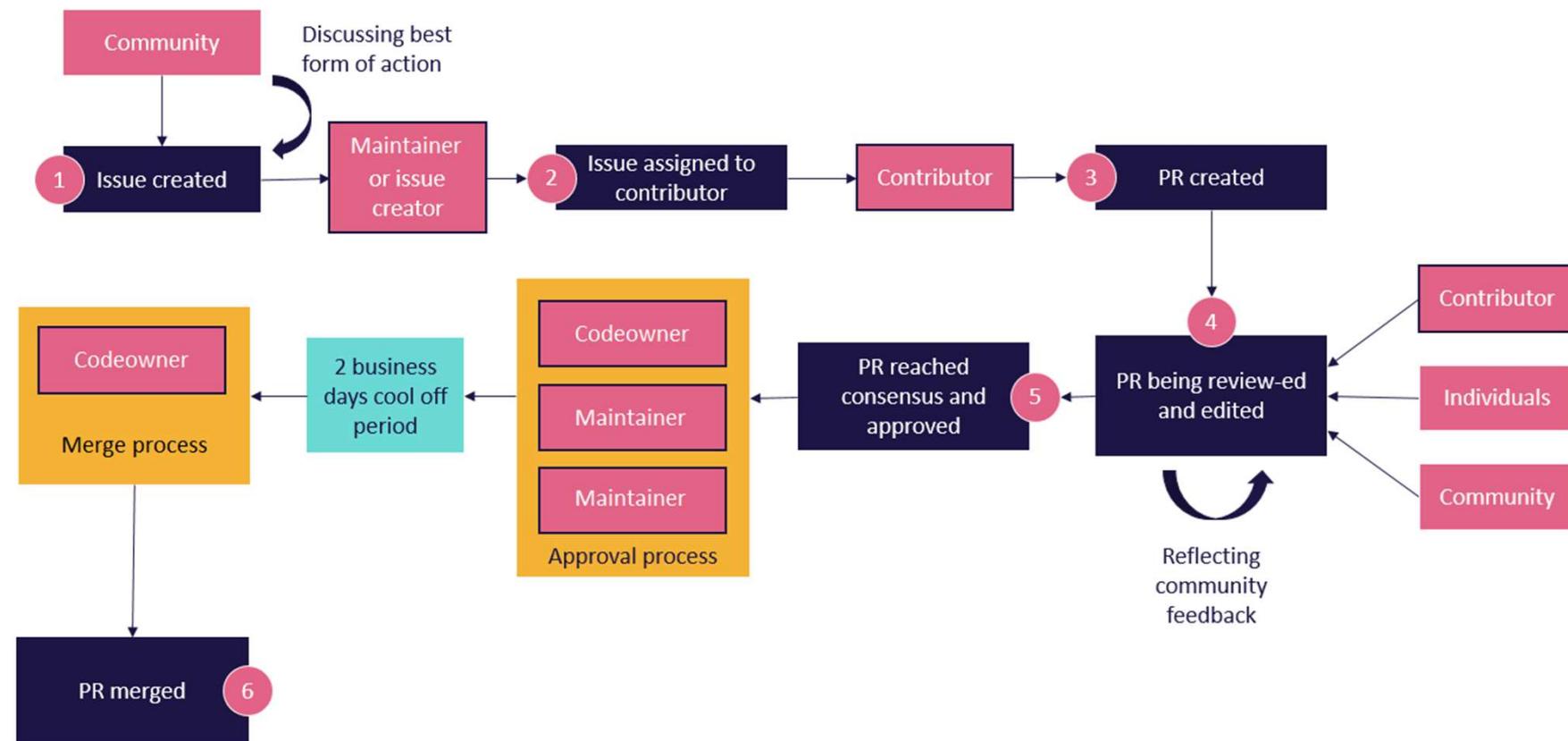
Contributorship and mailing list

- 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.

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



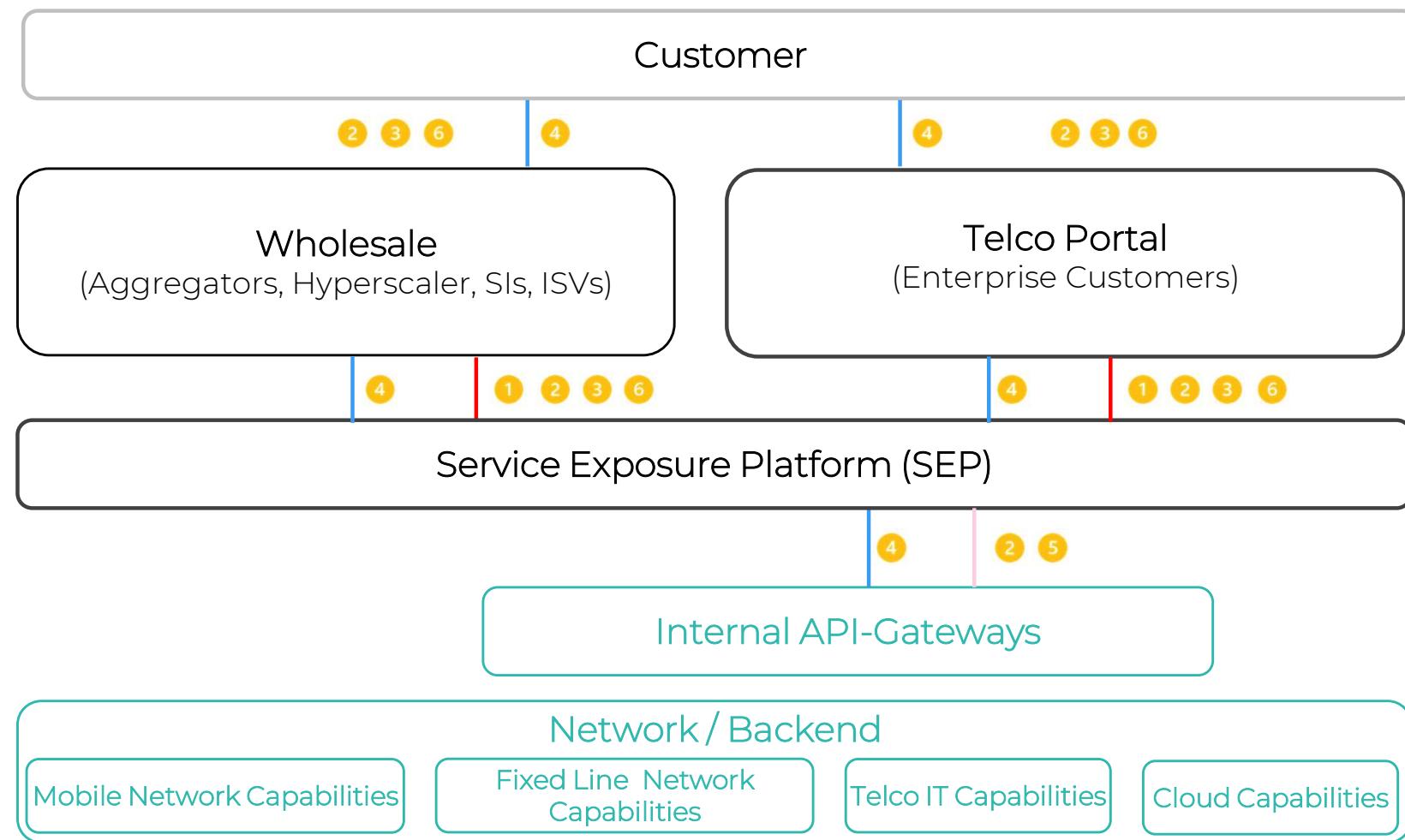
What have operators to do to implement Network APIs?



- 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



CAMARA
THE TELCO GLOBAL API ALLIANCE

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. 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...



CAMARA
THE TELCO GLOBAL API ALLIANCE

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
THE TELCO GLOBAL API ALLIANCE

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. 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. 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

THE TELCO GLOBAL API ALLIANCE