Telefónica

Whitepaper

Architecture, requirements and use cases of the QoD Mobile Open Gateway

Telefónica Open Gateway

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1. Introduction

1.1 Document Objective

The objective of this whitepaper is to provide a comprehensive understanding of the **Quality of Service on Demand Service (QoD Service)** to a technical audience, including developers, engineers, and integration specialists, who are seeking either to consume or to implement the API within their systems. This document aims to:

- Clearly articulate the purpose and functionality of the API within the context of Quality of Service on demand.

- Provide technical insights and guidance on integrating and leveraging the API effectively.

- Showcase the advantages and benefits of adopting the QoD service.

- Highlight best practices, recommendations, and real-world case studies to illustrate successful API implementations.

Through this document, readers will gain a solid understanding of the API's architecture, components, integration requirements, security considerations, and the overall workflow. It aims to empower technical professionals with the knowledge and tools necessary to integrate the QoD service seamlessly into their systems, enhancing their offerings and enabling a frictionless experience for end-users.

1.2 QoD Mobile API in CAMARA

The GSMA Open Gateway initiative, led by the GSMA (Global System for Mobile Communications Association), aims to drive collaboration and interoperability among telcos, aggregators, and service providers in the mobile ecosystem. It provides a platform for industry stakeholders to develop and deploy innovative mobile services, including digital identity solutions.

By participating in the GSMA Open Gateway initiative, telcos and aggregators can leverage the collective expertise and resources of the mobile industry to accelerate the adoption of digital services in different business scopes.

Figure 1: Logo for the CAMARA Project within Linux Foundation.

Network authentication mechanisms are available in the industry for years, but difficult integrations and market fragmentation have prevented them to fully succeed. Now, the QoD Mobile API itself is standardized in the [CAMARA](#) Telco Global API Alliance, facilitated by the GSMA. The CAMARA standardization of this API brings together telcos and service providers from around the world to establish best practices, share knowledge, and promote industry-wide cooperation. As a result, in the scope of the Open Gateway initiative, this API can be integrated by any kind of company in the digital services industry around the world in an easy, fast, and seamless way.

2. Overview of the QoD Service

2.1 Definition of the Service

The QoD Service enables applications to modify the network configuration of End Users during a certain period of time to enable certain features of their product regardless of the telco network operator that is serving the End Users. The network configuration that is activated, for the duration that the application indicates, can either unlock advanced use cases or even reinforce existing ones.

A typical QoD Service usage has the following 4 steps:

STEP 1 – Trigger	STEP 2 – Activate	STEP 3 – Enjoy	STEP 4 – Clean up
The End User is using an application that requires a specific network capability to work.	The QoD service identifies the subscription and activates the QoD session for the required time	Once the QoD service confirms that the service is ready, the application can start using it	When the network configuration is no longer needed, the application releases the session

As a descriptive example for an application that is meant to enrich the audience experience while attending a live sports event, an advanced feature for their spectators might be watching repetitions of relevant game plays. To do so, the application must ensure that the End User has a proper connectivity to watch it, regardless of the number of concurrent users that are watching the sports event in the same venue. The following diagram shows how the developer might offer this feature to their End Users, who will benefit from the features brought by the QoD Service without even noticing it is being used.

STEP 1 – Trigger	STEP 2 – Activate	STEP 3 – Enjoy	STEP 4 – Clean up
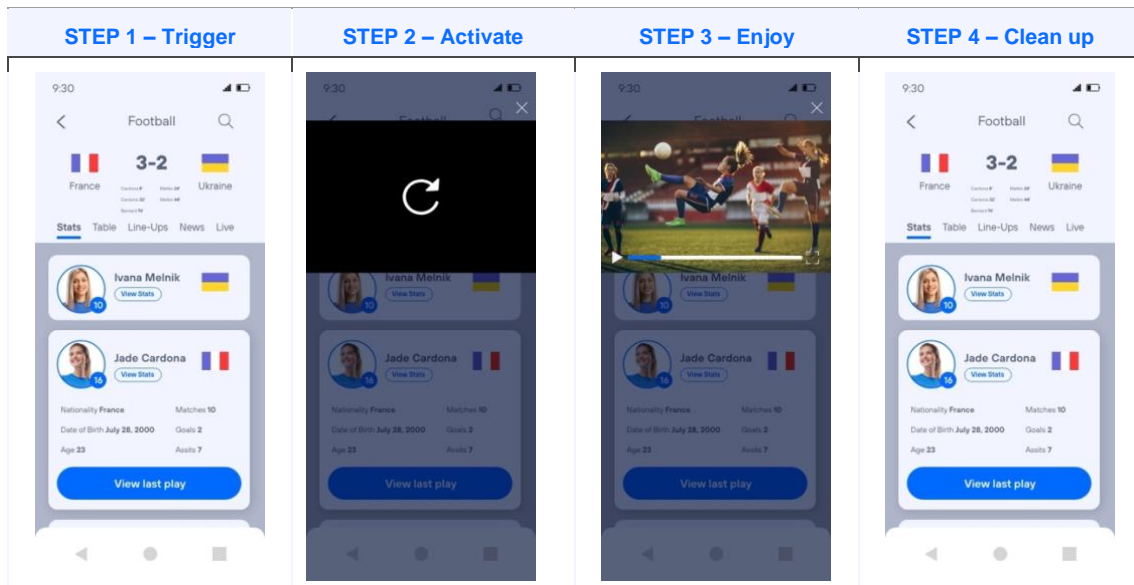
The QoD service is brought by a set of CAMARA APIs that enable application developers to integrate network configuration and optimization functionalities into their software, without the need for the End Users to run complex processes on their devices.

The [CAMARA Quality on Demand](#) workgroup provides a developer-friendly [API](#) around the following main two resources:

- A *QoS profile* describes the network configuration that must be applied. It includes a service level agreement based on the expected network quality indicators: throughput, latency, losses, … that can be offered by the profile.

- A *QoS session* is the actual implementation and usage of a certain QoS profile for a certain End User during a certain amount of time. It is started by the developer providing the information about the End User, the QoS profile to be applied, and the duration.

By leveraging the QoD Service APIs, applications gain the ability to interact seamlessly with the mobile network operator's systems, and enabling developers to focus on delivering a seamless user experience while relying on the API to ensure that their End Users' networking is optimized for their services.

2.2 Advantages and benefits

The QoD service offers the following advantages and benefits:

1. **Optimize your client's networking**. With the QoD service, you can activate the best networking configuration that suits better to the needs of your applications in real time. Regardless of whether your application requires a

short boost with better throughput or a temporal control on the maximum jitter or latency, there's a QoD profile ready for you to activate.

2. **Seamless user experience:** Your clients will enjoy the enhanced services you build with the capabilities brough to you by the QoD service without even noticing their network has been modified. This allows you to upsell advanced features with the security they will not suffer undesirable network issues.

3. **Improve your client's satisfaction:** Reduce the number of customer complaints whose cause is the networking of your clients because you can control and monitor the network conditions and adapt to them whenever your applications are being used. This will light those dark situations when customers didn't experience your application as they should, and you weren't able to manage.

4. **Integrate once, run with any telco:** With a standardized API, you can seamlessly integrate the QoD service into your applications just once, this is, without the need for custom implementations for each telco operator. This simplifies your development process and reduces your time-to-market.

5. **Quick and easy onboarding:** With the QoD service, you can configure the network of your clients easily with only a couple of lines of code. You will not have to guess and discover the available networking capabilities of their clients and will focus on what matters more to your business.

6. **Development toolbox:** The channel partners that distribute the QoD service have worked with the telcos to unify the development experience so that you can consume the service the same way your developers are used to with other services. They get all the SDKs, management, monitoring and troubleshooting tools they'd require.

By utilizing the QoD Service, developers of applications can capitalize on the usability, ubiquity, security, quickness, and simplicity of the APIs to manage their End Users networking and focus on the experiences they want to offer.

3. Architecture and Components

3.1 High-Level Architecture

The high-level architecture of the QoD Service comprises several key components that work together to facilitate seamless transactions between telcos, application developers, channel partners and end-users. The following are the primary components of the API's architecture:
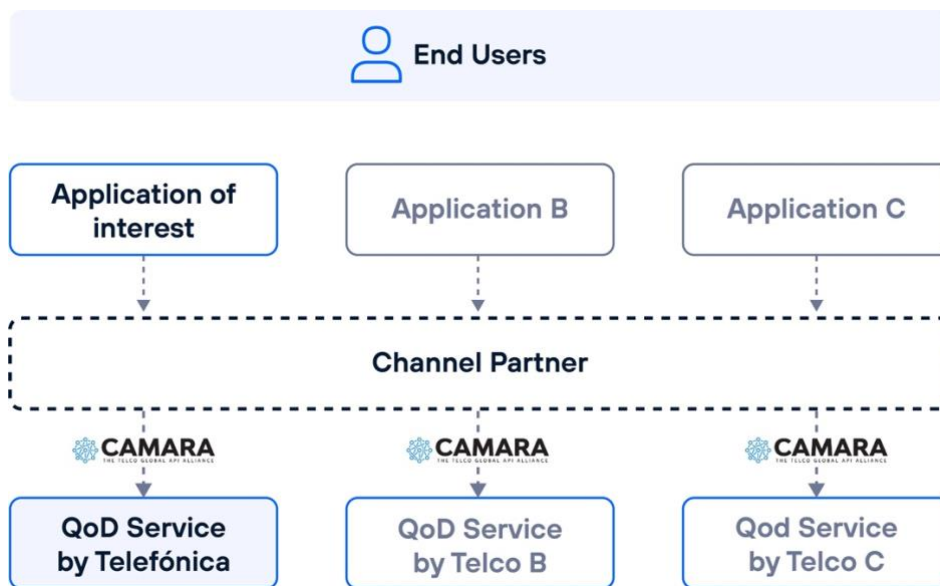
Where:

- **End Users**: these are the people that will use and benefit from the services brought by the QoD services. They are clients of two commercial chains:
  - o Application clients: they have a commercial relationship with the Application developers (see below) to enjoy the applications they provide.
  - o Telefónica or other Telco clients: They are subscribers of a telco (Telefónica or another) to connect their devices to the Internet.

- **Applications:** This group represents the applications that require the QoD Service features to enhance the services they provide to their End Users. They have a commercial relationship with Channel Partners to leverage their services to build-up, operate and troubleshoot some of the features of the software that they build.

- **Channel partners** are companies that offer advanced services for the development of applications to developers. These companies build some of their services leveraging the networking capabilities exposed by telco operators (see below). They can identify who is the Telco Operator that each End User has subscribed to and then , configure their networking properly.

- **Telco operators** provide communication and networking services to End Users and enable certified channel partners to configure the communication and networking services of their End Users to improve their user experience. They expose their capabilities through public and well-defined APIs discussed in the CAMARA Project.

3.2 Customer journey

The customer journey for a QoD Mobile can be divided in the following 4 steps:

STEP 1 – Trigger	STEP 2 – Activate	STEP 3 – Enjoy	STEP 4 – Clean up
The application discovers if the subscriber is eligible for the QoD service and prepares everything required to activate it	The application invokes the QoD service with the required parametrization to set up the required QoD session	The application runs the feature that requires the QoD session to work	When the application does not require the QoD session anymore, it releases it

3.2.1 STEP 1 – Trigger

The main goal of this step is for the application developer to prepare everything that is needed to set-up the network configuration that is required by the application and then trigger the activation.

To do so, the first step is to get the credentials required to access the QoD service, identify the end-user's telco network operator and finally discover the network profiles that are available. Channel partners provide a way to do all this in an easy and straightforward way: application developers should just follow a standard OIDC Auth Code flow.

Once the application developer has been granted an access token, the QoD Mobile API can be called to discover the QoD profiles that are available. To do so, he will consume the QoD-Profiles endpoint of the QoD API and select the one that fits best with the needs of the application.

3.2.2 STEP 2 – Activate

The goal of this step is to activate the QoD profile that is needed to adapt the end-user network configuration to the needs of the application. As the application developer should have been granted an access token previously, the QoD-Sessions endpoint of the QoD API must be called with the POST method.

3.2.3 STEP 3 – Enjoy

Once the QoD session is activated for the end-user, the application can run those features that require specific networking conditions to work. The application developer will trust the network to provide the features indicated by the QoD profile and provide the best possible user experience to the end-user that is enjoying the application.

3.2.4 STEP 4 – Clean up

When the application does not require the features brought by the QoD profile that was activated anymore, the clean-up process will be run. For this, the application can either wait for the expiration of the duration indicated when the session was created or cancel the session actively. To do the latter, the application must consume the DELETE method of the QoD-Sessions endpoint of the QoD API.

3.3 Technical Requirements and Considerations

There are certain relevant requirements and considerations that the application developer must consider when consuming the QoD service APIs. This section describes them so that the application developer can understand why they are relevant and apply the necessary actions when needed.

3.3.1   End-user identity

Understanding the identity of the end user is crucial for the QoD Service consumption for the following reasons:

- To determine the telco network operator that is providing the connectivity service to the end-user. This is key for the channel-partner to route the API calls to the proper telco operator platform to activate the QoD profile in the proper network.

- To determine the specific subscription amongst all of the telco network operator determined in the previous point, whose configuration must be modified to reach the service level indicated by the QoD profile selected by the developer.

Although the end-user is the same entity for the developer and for the telco operator, as they do not use the same identifiers, it is crucial for the developer to run the required logic to obtain a piece of information (access token) that identifies the subscription to be managed but complying with the levels of privacy required. This *access token* identifies univocally the developer (this is you), the telco network operator and the end-user. To obtain it, Open Gateway Services use the widely used industry standard OpenID Connect (OIDC). More details can be found here.

3.3.2   Legal and privacy considerations

The QoD service enables your applications to control and optimize the network services that are brought by a telco operator to an end-user. There is a previously existing legal framework between the end-user and the telco operator that describes the details of the provision of such network service and are to be modified by the specific QoD profile that your application is about to apply.

This is why we request that you inform the end-users about this through a specific set of Terms and Conditions, so the telco operators can ensure that the end-users understand and accept that your application will improve their network services. We will provide specific texts and requirements during the Open Gateway onboarding process.

3.4 API Documentation

The QoD Service API is being defined and standardized in the CAMARA Quality on Demand workgroup. Currently, it provides a developer-friendly API whose definition is released in the following GitHub repository.

4. Conclusions

QoD service is the first service towards the long-term vision of a fully programable and configurable telco service. The service described in this document enables applications to modify the network configuration of End Users during a certain period of time to power up certain features of their product regardless of the telco network operator that is serving their End Users.

This way, Application developers can configure the networking of their clients to match the needs of their services, allowing them to build advanced features with the security that they will not suffer undesirable network issues. End-users are then more satisfied with the application they are consuming so that they will be able to purchase advanced plans and recommend the service to others.

Using the Open Gateway APIs also brings the capability to manage the networking of the client of any telco operator, so that developers can integrate their application once, but run with any telco operator. SDKs provided by channel partners will ease the development even more, allowing the integration to be done with very few lines of code.

In conclusion, by utilizing the QoD Service, developers of applications can capitalize on the usability, ubiquity, security, quickness, and simplicity of the APIs to manage their End Users networking and focus on the experiences they want to offer.

5. Other relevant information

You can join now the Telefónica Open Gateway Developer Hub to test our API, develop use cases with the power of the network and improve user experiences. Join Developer Hub

If you are interested in the potential of Telefónica Open Gateway and you are willing to collaborate with us, you can access our exclusive Partner Program: Join Partner Program

For further questions about the initiative, don't hesitate to contact our experts: Contact our experts

6. References and Additional Resources

6.1 Additional information about Telefónica Open Gateway Initiative

Learn more about the QoD Mobile API and other Open Gateway APIs and services in Telefónica in our website: https://opengateway.telefonica.com/

6.2 Additional information of the QoD Mobile CAMARA API

The Number Verification CAMARA API official documentation is collected in the following GitHub Repository: https://github.com/camaraproject/NumberVerification

6.3 Glossary of Terms

TERM	DEFINITION
Aggregator	Aggregator or 'Channel Partners' aggregate Operator's CAMARA standardised APIs to build Open Gateway-based services and implement Operator end-point routing based on final user identification on the network.
API Gateway	An intermediary platform that allows communication between different systems and APIs, providing a centralized and standardized approach for accessing and utilizing APIs. The Open Gateway operator platform is the API GW platform in the operator that exposes standardized APIs so third-party services can consume them in a secure and consistent way. Operator platform APIs are based on REST/HTTP. OAuth 2.0 and OpenID Connect are standard security mechanisms to control access to the APIs. APIs are reachable from the Internet and all traffic is encrypted with TLS.
AuthCode	Authentication method to validate the user's identity during the authentication process.
CAMARA	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).
Channel partner	See aggregator
Consent	The explicit permission given by the user for the processing of their personal data, as required by privacy regulations such as GDPR (General Data Protection Regulation).

IDP	Identity Provider, a service that authenticates and verifies the identity of users.
Open Gateway	An industry initiative led by GSMA (Global System for Mobile Communications Association) that transforms telecom networks into future-ready platforms, enabling seamless integration and access to telco capabilities through standardized APIs.
Open Code Repository	A platform or repository where developers can access and collaborate on open-source code and projects, such as GitHub.
OAuth 2.0 / OpenID Connect	Standards and protocols for user authentication and authorization, allowing secure access to APIs and services.
Privacy-by-Default	A principle that ensures privacy protection is integrated into systems and processes by default, requiring explicit user consent for the processing of personal data.
SDK	Software Development Kit, a set of tools, libraries, and documentation that enables developers to build applications for a specific platform or system.
Service Delivery Framework	An architecture or framework that enables the delivery of services in a structured and efficient manner.
User Identifier	A unique identifier associated with a user, such as an IP address or MSISDN, is used for authentication, routing, and identification purposes.
QoD Service	Connectivity service that provides a way to configure the networking characteristics of telco subscribers using a programmatic set of APIs, charged by the availability and the time and data volume transferred. The service APIs are defined in CAMARA. The service can be marketed following the internal, direct and indirect models. For the indirect model, the characteristics, operating and charging models are defined in GSMA.

QoD Mobile API	API that allows developers to discover the QoD profiles they can use and to activate timed sessions with one of them
QoS profile	A QoS profile describes the network configuration that must be applied. It includes a service level agreement based on the expected network quality indicators: throughput, latency, losses, … that can be offered by the profile.

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