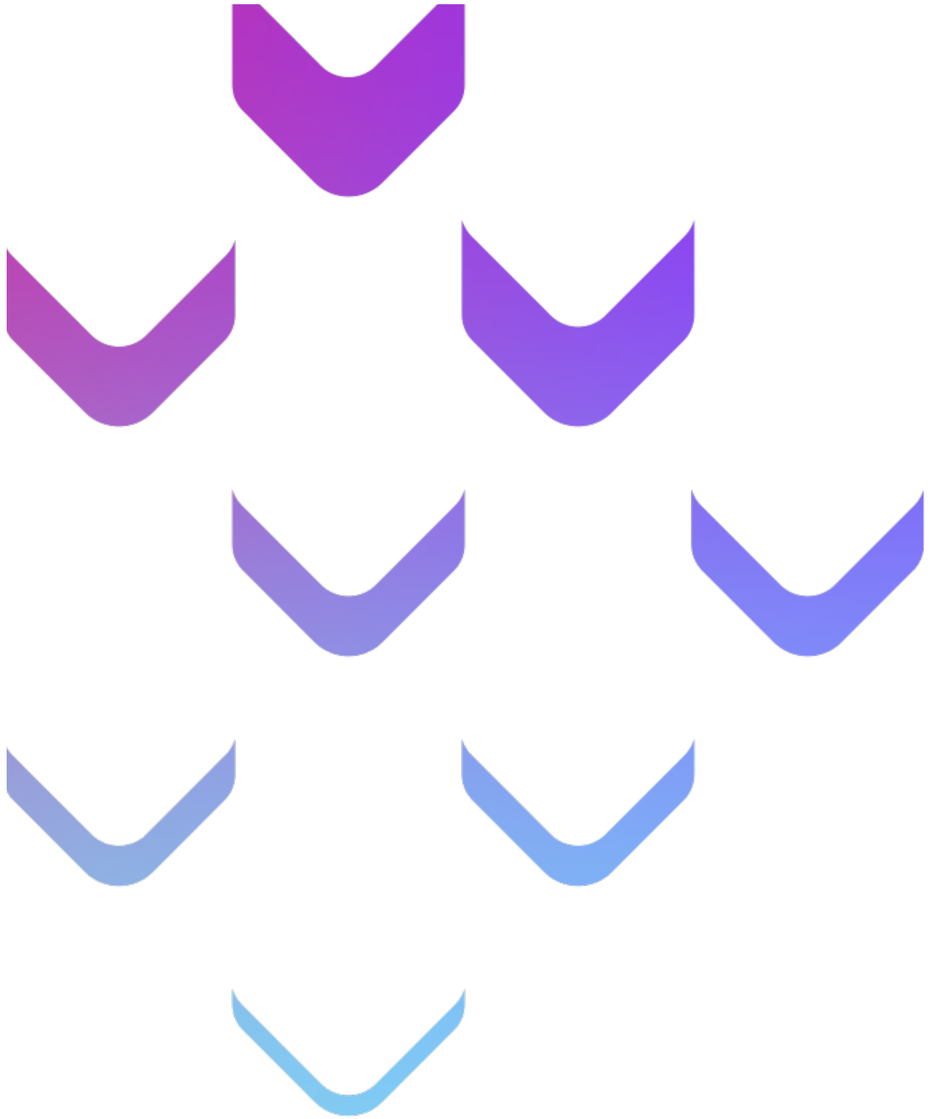
The world of wireless connectivity is on the cusp of a major transformation, and it’s happening on your phone too. In this session, we will embark on a journey through the evolution of 1G to 5G networks and operators, charting the path that has led us to the brink of this exciting new era and will explore how Network APIs are emerging as the pivotal tool for unlocking the full potential of our interconnected world. From enhancing connectivity and data exchange to revolutionizing user experiences, these new wireless APIs are set to transform our digital landscape. Get ready to uncover the future of Network APIs and learn how you can leverage them to drive innovation for your customers.

The Next API Revolution Will Be Wireless

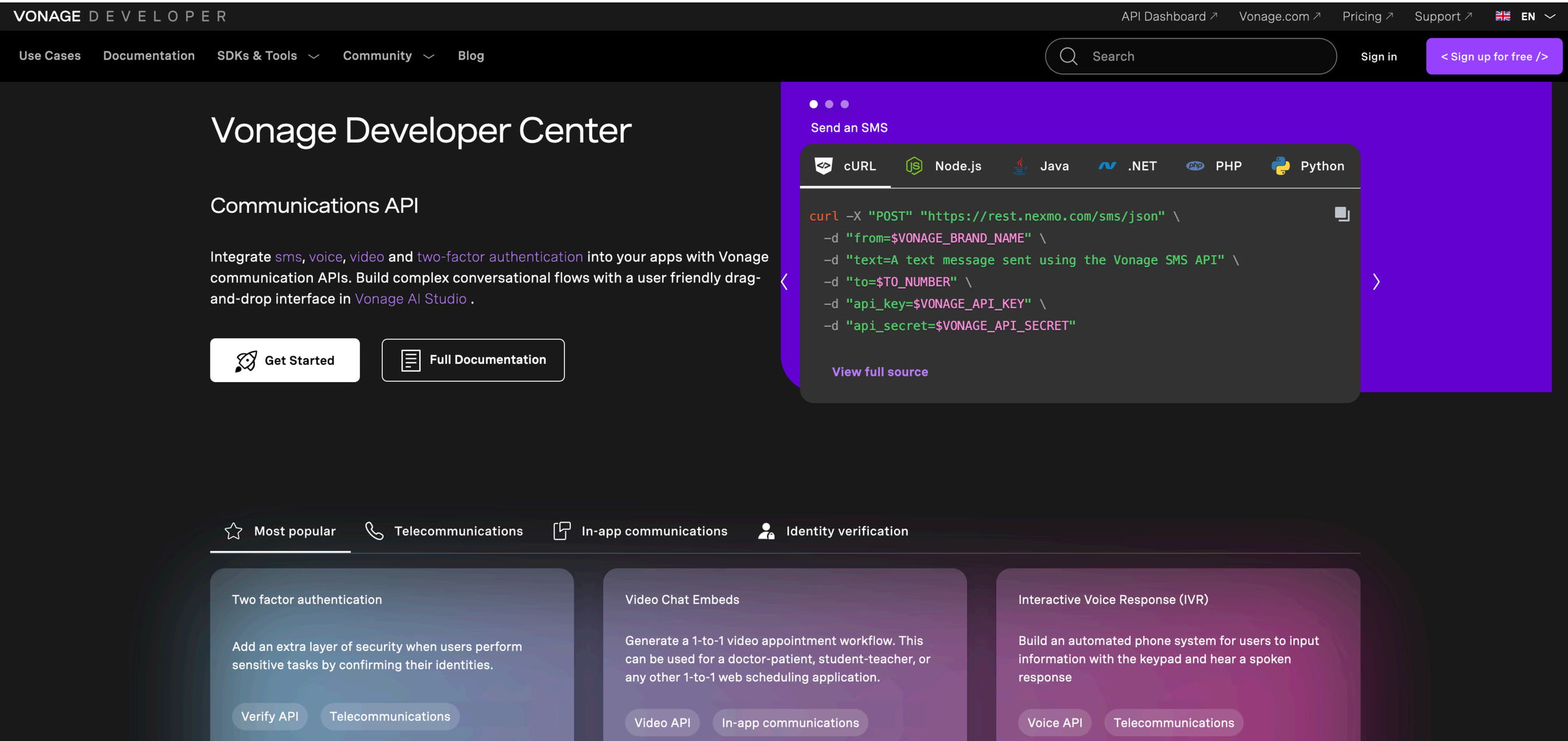
Paul Ardeleanu

Senior Manager - Developer Relations, Vonage

DevCon 2023



Vonage


VONAGE DEVELOPER
API Dashboard ↗
Vonage.com ↗
Pricing ↗
Support ↗
EN
Use Cases
Documentation
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Communications API
Integrate sms, voice, video and two-factor authentication into your apps with Vonage communication APIs. Build complex conversational flows with a user friendly drag-and-drop interface in Vonage AI Studio .
Get Started
Full Documentation
Send an SMS
cURL
Node.js
Java
.NET
PHP
Python
curl -X "POST" "https://rest.nexmo.com/sms/json" \
-d "from=$VONAGE_BRAND_NAME" \
-d "text=A text message sent using the Vonage SMS API" \
-d "to=$TO_NUMBER" \
-d "api_key=$VONAGE_API_KEY" \
-d "api_secret=$VONAGE_API_SECRET"
View full source
Most popular
Telecommunications
In-app communications
Identity verification
Two factor authentication
Add an extra layer of security when users perform sensitive tasks by confirming their identities.
Verify API
Telecommunications
Video Chat Embeds
Generate a 1-to-1 video appointment workflow. This can be used for a doctor-patient, student-teacher, or any other 1-to-1 web scheduling application.
Video API
In-app communications
Interactive Voice Response (IVR)
Build an automated phone system for users to input information with the keypad and hear a spoken response
Voice API
Telecommunications

developer.vonage.com/tools

Client SDKs

The Client SDKs allows you to build in-app messaging and voice solutions. Android, iOS and JavaScript are supported.

Android SDK

Develop voice and message applications using the Client SDK for Android.

iOS SDK

Develop voice and message applications using the Client SDK for iOS.

JavaScript SDK

Develop voice and message applications using the Client SDK for JavaScript.

Server SDKs

The Server SDKs allow you to quickly get up and running with the Vonage APIs in your language of choice.

vonage-ruby-sdk

gem version 7.10.0

Vonage REST API client for Ruby

Ruby — 215 — 105

vonage-dotnet-sdk

nuget package 6.3.3

Vonage REST API client for .NET

C# — 90 — 74

vonage-php-sdk

stable 4.0.0

Vonage REST API client for PHP

PHP — 104 — 8

vonage-node-sdk

npm package 3.5.1

Vonage REST API client for Node.js

Javascript — 357 — 167

vonage-python-sdk

pypi package 3.5.2

Vonage REST API client for Python

Python — 165 — 109

vonage-java-sdk

version 7.4.0

Vonage REST API client for Java

Java — 85 — 121

Vonage CLI

You use the Vonage Command Line Interface (CLI) to manage your Vonage account and use Vonage API products from the command line.

vonage-cli

npm package 1.2.4

Vonage CLI (Command Line Interface)

JavaScript — 16 — 7

Framework Libraries

The Vonage framework libraries can get you up and running with the Vonage APIs quickly and easily in your framework of choice.

vonage-laravel

stable 1.0.3

Vonage framework library for Laravel

PHP — 14 — 4

nexmo-rails

gem version 1.0.0

Vonage framework library for Rails

Ruby — 8 — 1

nexmo-spring-boot-starter

version 1.1.0

Nexmo starter and auto configuration for Spring Boot

Java — 5 — 4

Client SDK UI Web Components

A set of UI Web Components to be used with the Vonage Client SDKs.

vc-keypad

A versatile keypad primarly used for phone number inputs

Javascript — 2 — 0

vc-text-input

A simple text input with a send button commonly displayed below a list of messages

Javascript — 2 — 0

vc-members

Lists all active members of a conversation

Javascript — 2 — 0

vc-messages

Used as part of a chat app UI to display messages in a conversation

Javascript — 2 — 0

vc-typing-indicator

In a chat app UI it displays typing indicators when appropriate

Javascript — 2 — 0

Silent Authentication SDKs

The Silent Authentication SDKs allow you to force a mobile connection for a successful HTTP request.

verify-silent-auth-sdk-android

Vonage Android Silent Auth SDK

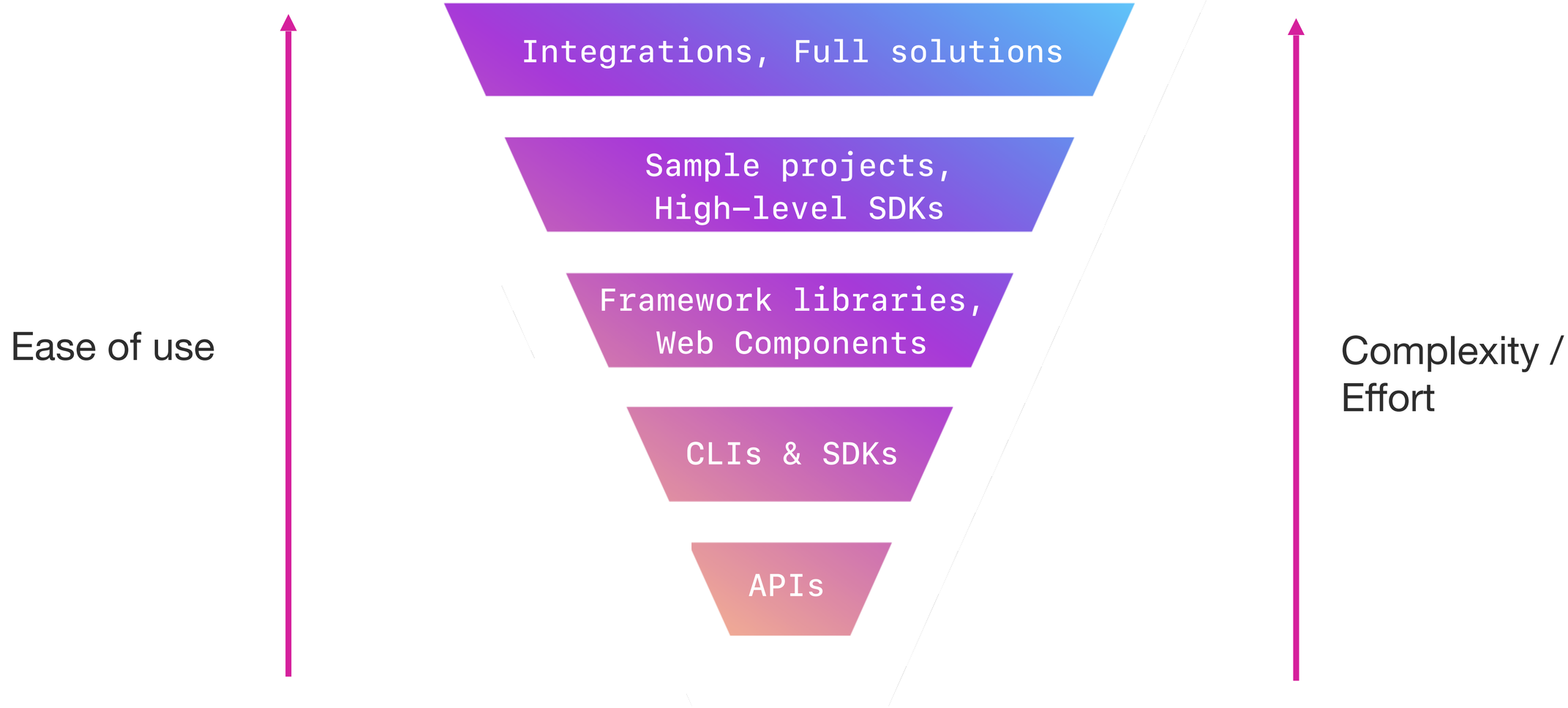
Java — 1 — 0

verify-silent-auth-sdk-ios

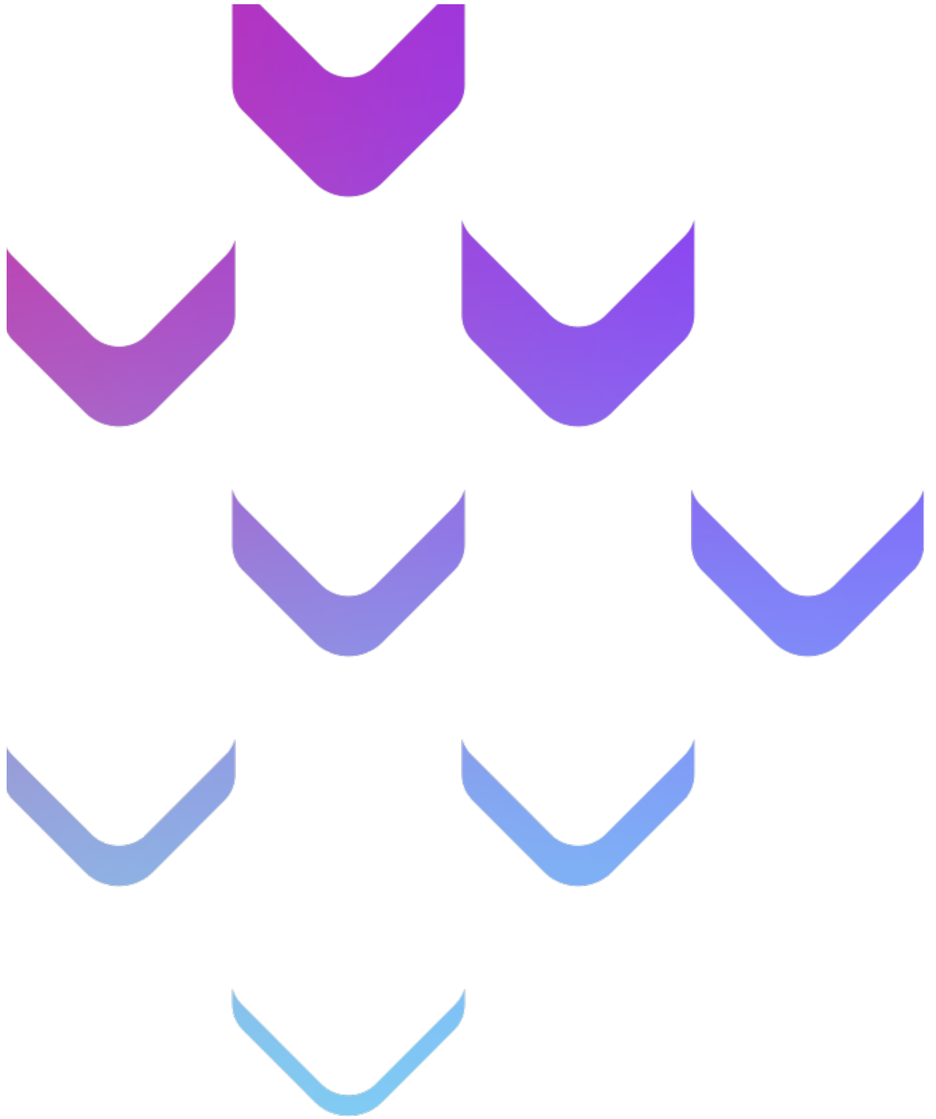
Vonage iOS Silent Auth SDK

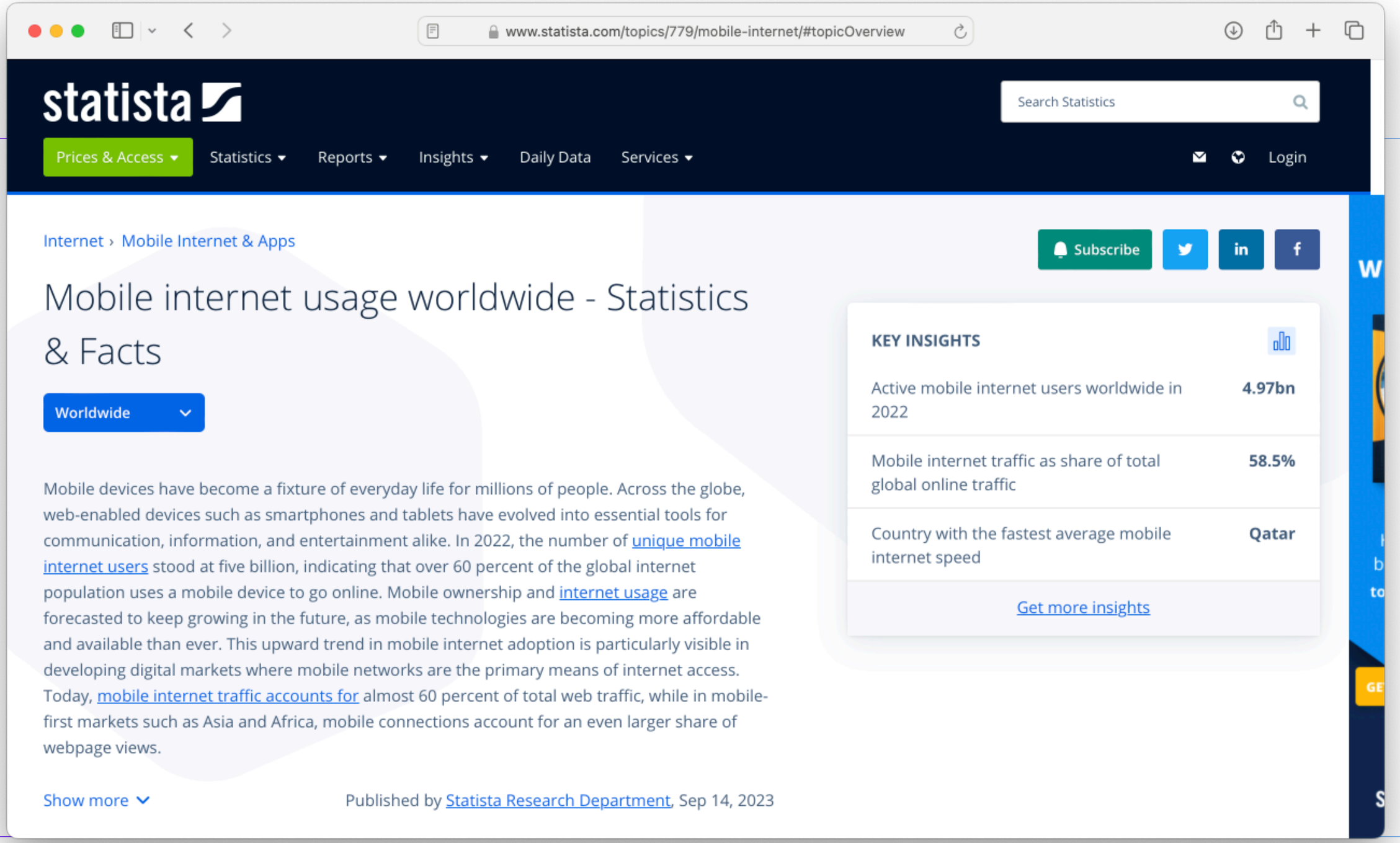
Swift — 0 — 0

developer.vonage.com/tools



Why am I here?




www.statista.com/topics/779/mobile-internet/#topicOverview
statista
Search Statistics
Prices & Access
Statistics
Reports
Insights
Daily Data
Services
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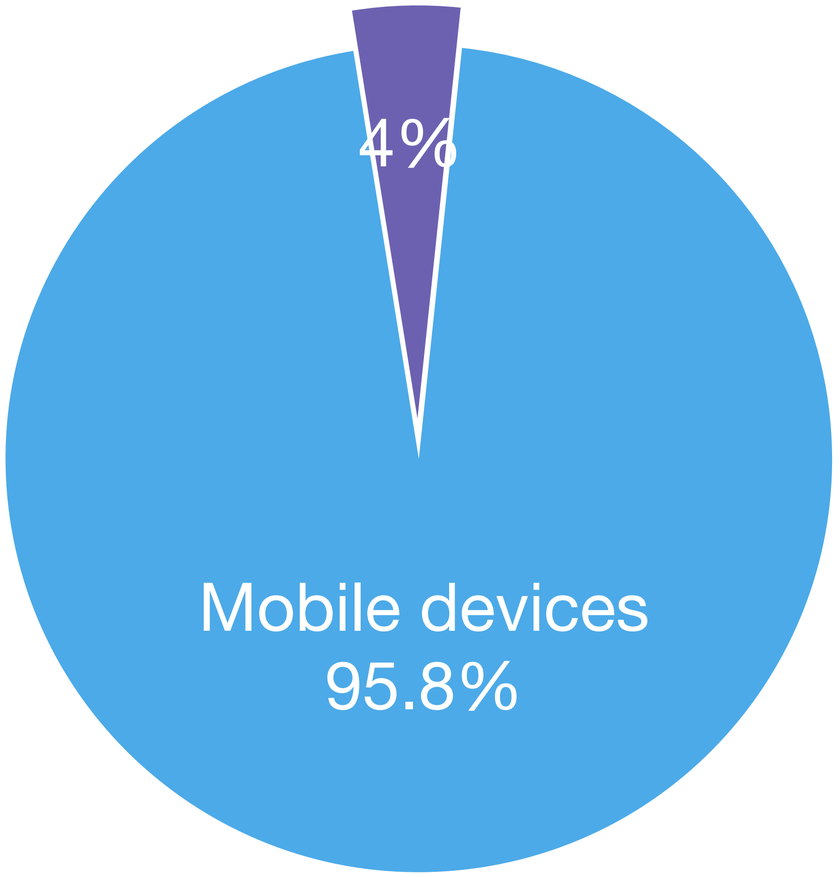
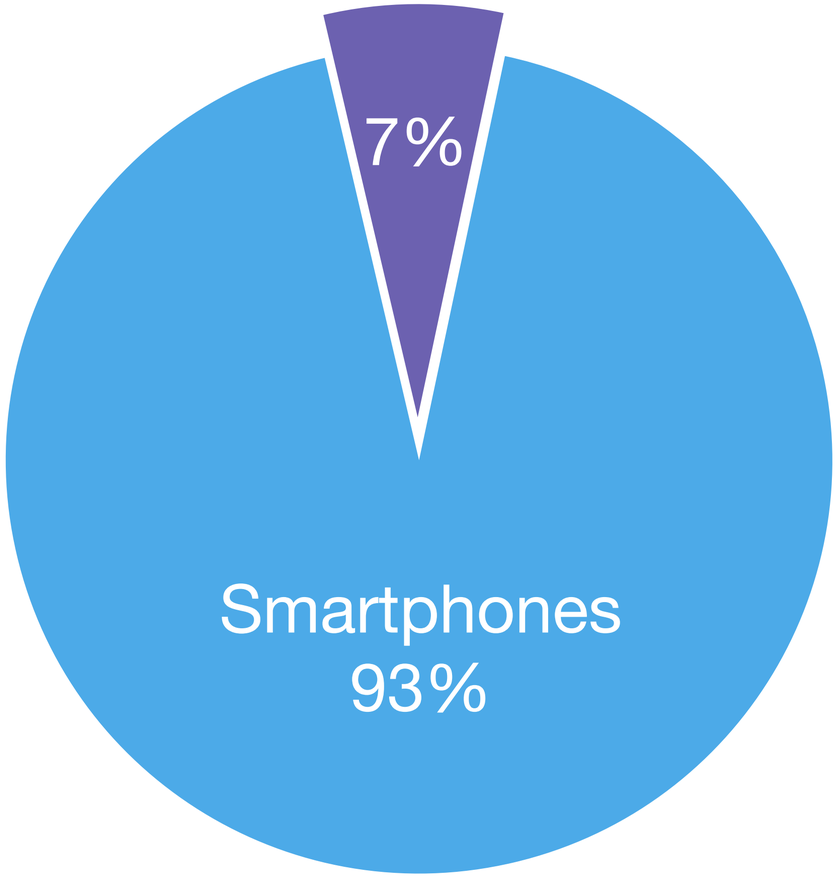
Subscribe
Mobile internet usage worldwide - Statistics & Facts
Worldwide
Mobile devices have become a fixture of everyday life for millions of people. Across the globe, web-enabled devices such as smartphones and tablets have evolved into essential tools for communication, information, and entertainment alike. In 2022, the number of unique mobile internet users stood at five billion, indicating that over 60 percent of the global internet population uses a mobile device to go online. Mobile ownership and internet usage are forecasted to keep growing in the future, as mobile technologies are becoming more affordable and available than ever. This upward trend in mobile internet adoption is particularly visible in developing digital markets where mobile networks are the primary means of internet access. Today, mobile internet traffic accounts for almost 60 percent of total web traffic, while in mobile-first markets such as Asia and Africa, mobile connections account for an even larger share of webpage views.
Show more
Published by Statista Research Department, Sep 14, 2023
KEY INSIGHTS
Active mobile internet users worldwide in 2022
4.97bn
Mobile internet traffic as share of total global online traffic
58.5%
Country with the fastest average mobile internet speed
Qatar
Get more insights

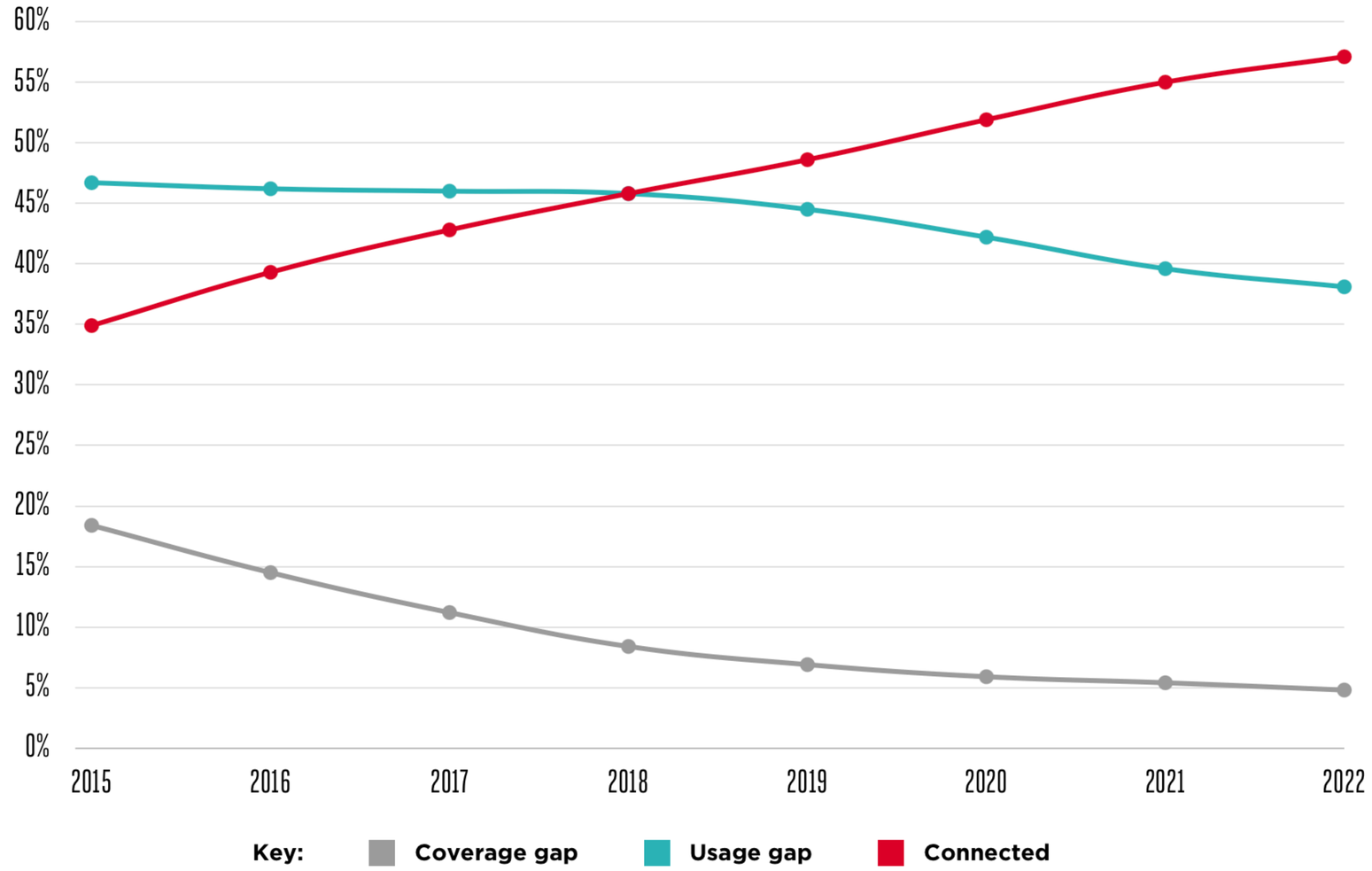
Internet users Q2 2023





Mobile internet connectivity | **3G, 4G & 5G** | **Download speeds**

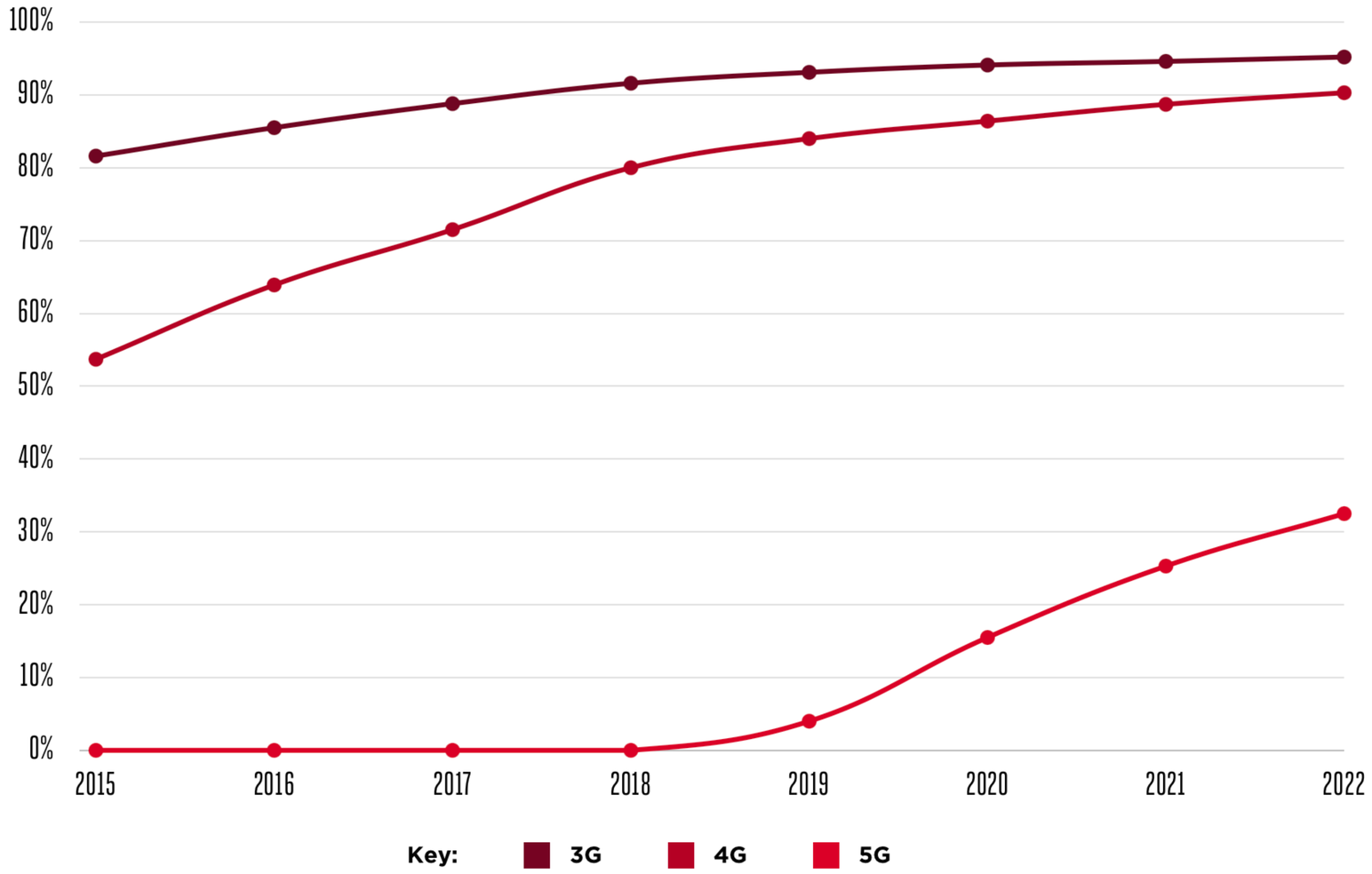
This graph shows the evolution of global mobile internet connectivity from 2015 to 2022, including the percentage of people connected, the coverage gap and the usage gap.



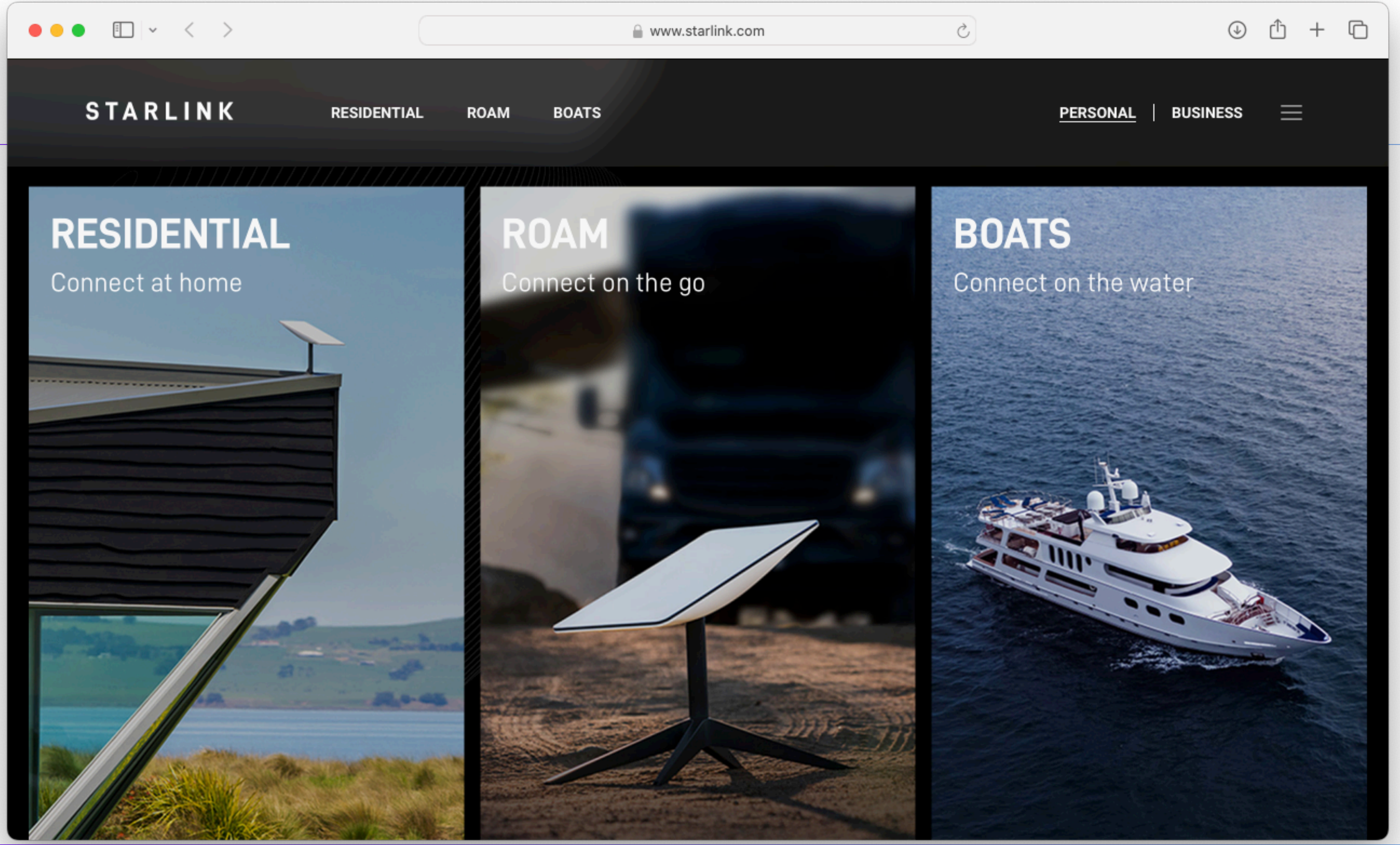
https://www.gsma.com/r/somic/

Mobile internet connectivity | **3G, 4G & 5G** | **Download speeds**

This graph shows the trend in 3G, 4G and 5G coverage from 2015 to 2022.



https://www.gsma.com/r/somic/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PERSONAL
BUSINESS
RESIDENTIAL
Connect at home
ROAM
Connect on the go
BOATS
Connect on the water

"Magical" handsets

iPhone 15 Pro

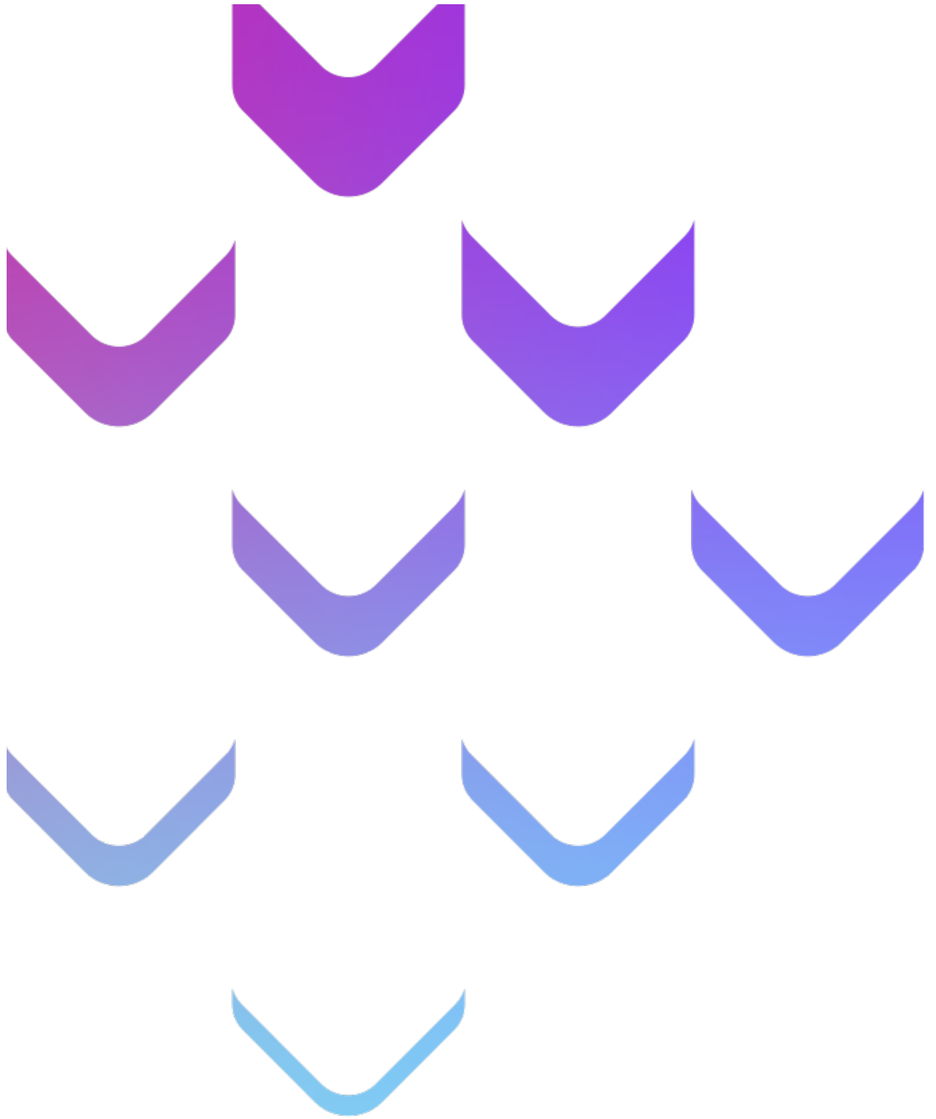
- 5G NR (Bands n1, n2, n3, n5, n7, n8, n12, n20, n25, n26, n28, n30, n38, n40, n41, n48, n53, n66, n70, n75, n76, n77, n78, n79)
- FDD-LTE (Bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 30, 32, 66)
- TD-LTE (Bands 34, 38, 39, 40, 41, 42, 46, 48, 53)
- UMTS/HSPA+/DC-HSDPA (850, 900, 1700/2100, 1900, 2100 MHz)
- GSM/EDGE (850, 900, 1800, 1900 MHz)

- 5G (sub-6 GHz) with 4x4 MIMO7
- Gigabit LTE with 4x4 MIMO and LAA7

Pixel 8 Pro

- 5G mmWave + Sub 6GHz23: Quad-band (850, 900, 1800, 1900 MHz)
- UMTS/HSPA+/HSDPA: Bands 1,2,4,5,6,8,19
- LTE: Bands B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/29/30/38/39/40/41/46/48/66/71
- 5G Sub-623: Bands n1/2/3/5/7/8/12/20/25/26/28/29/30/38/40/41/48/66/70/71/77/78
- 5G mmWave23: Bands n257/258/260/261
- eSIM

How did we get here?



A trip down the memory lane...

1900 1920 1940 1960 1980 2000 2020 2040

Early Experiments (late 1800s - early 1900s)

James Clerk Maxwell

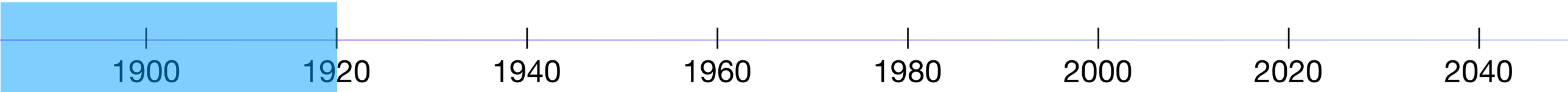
Predicted the existence of radio waves.

Heinrich Hertz

Demonstrated the existence of electromagnetic waves.

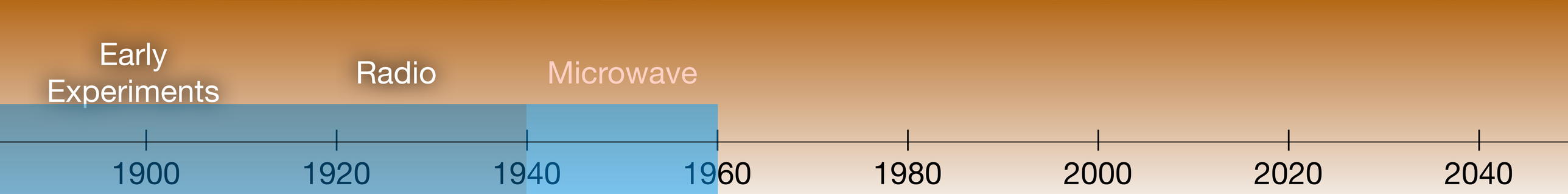
Guglielmo Marconi

Wireless telegraphy

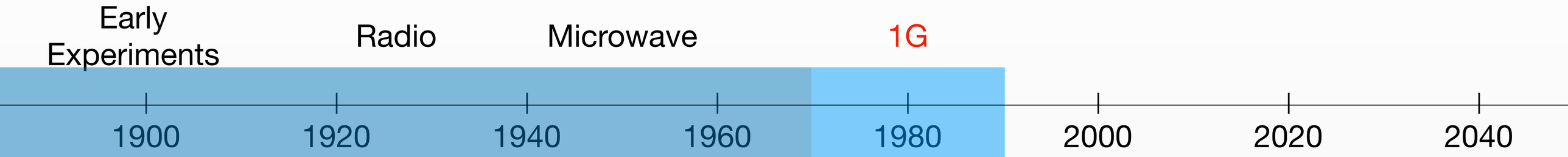


Radio Era (1920s - 1930s)

Microwave Communication (40s - 50s)



Cellular Networks (70-80s)



Digital Era (90s)

Internet Connectivity (00s)

Early Experiments

Radio

Microwave

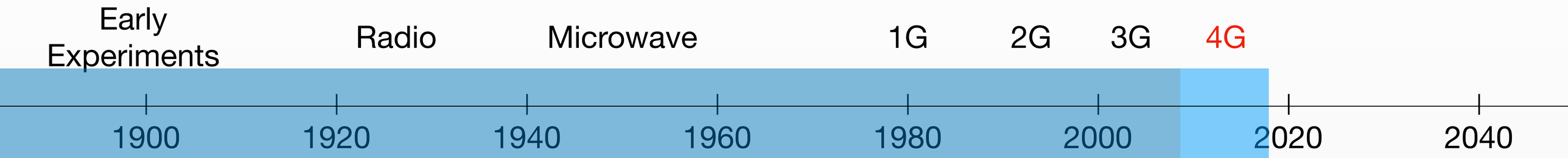
1G

2G

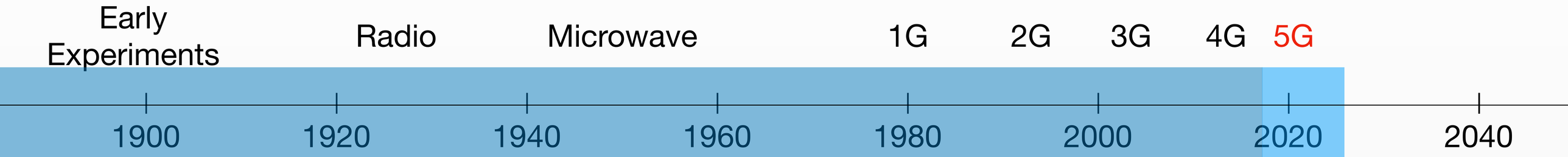
3G

1900 1920 1940 1960 1980 2000 2020 2040

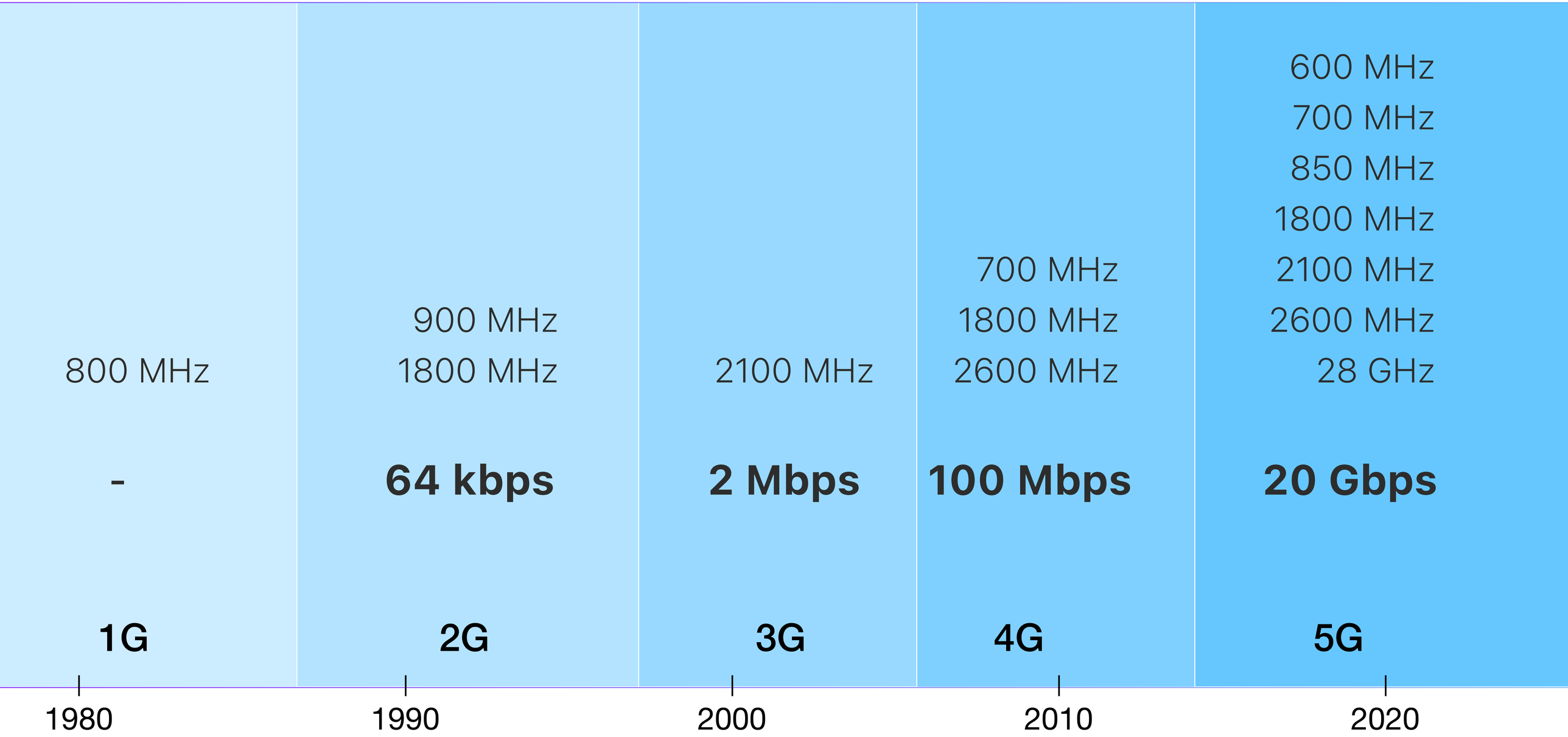
Faster Connectivity (late 00s-10s)



Faster-er 🤣 Connectivity (2020s)



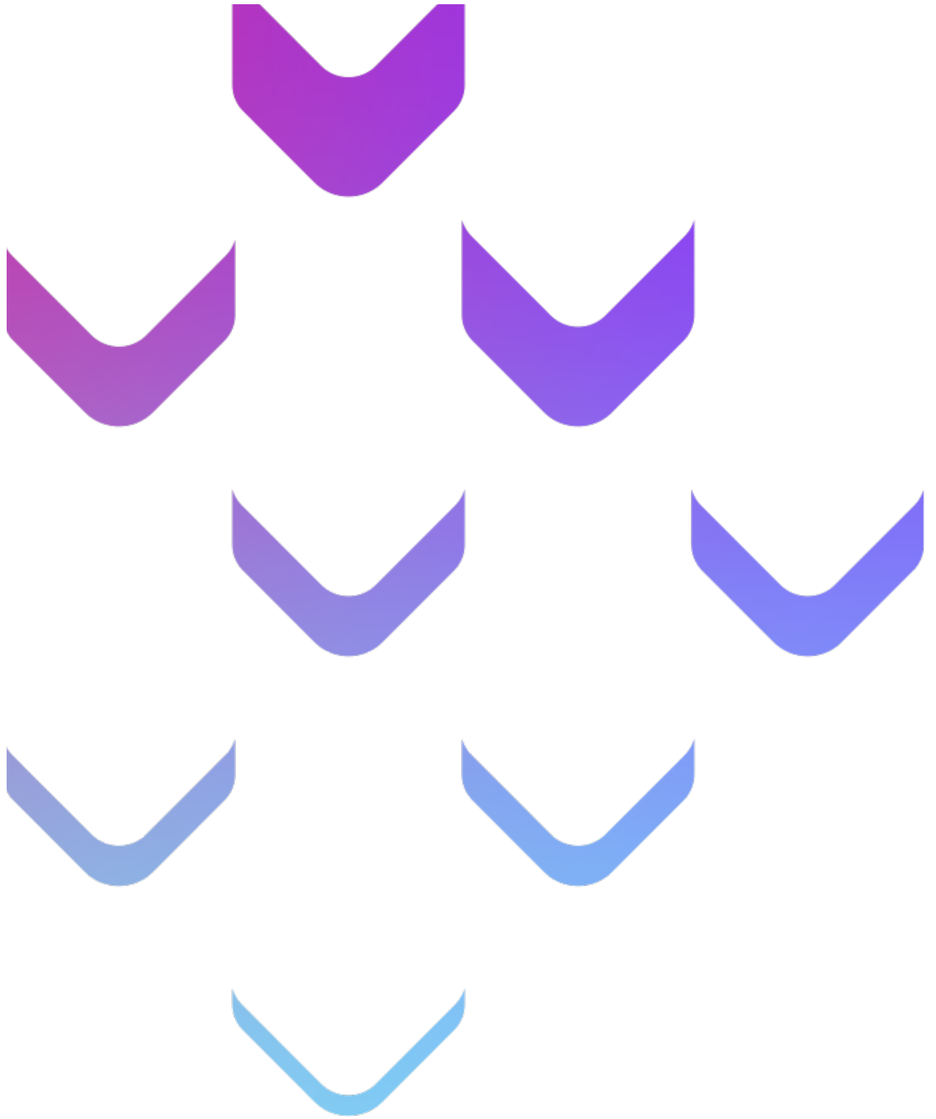
Frequencies & Speeds



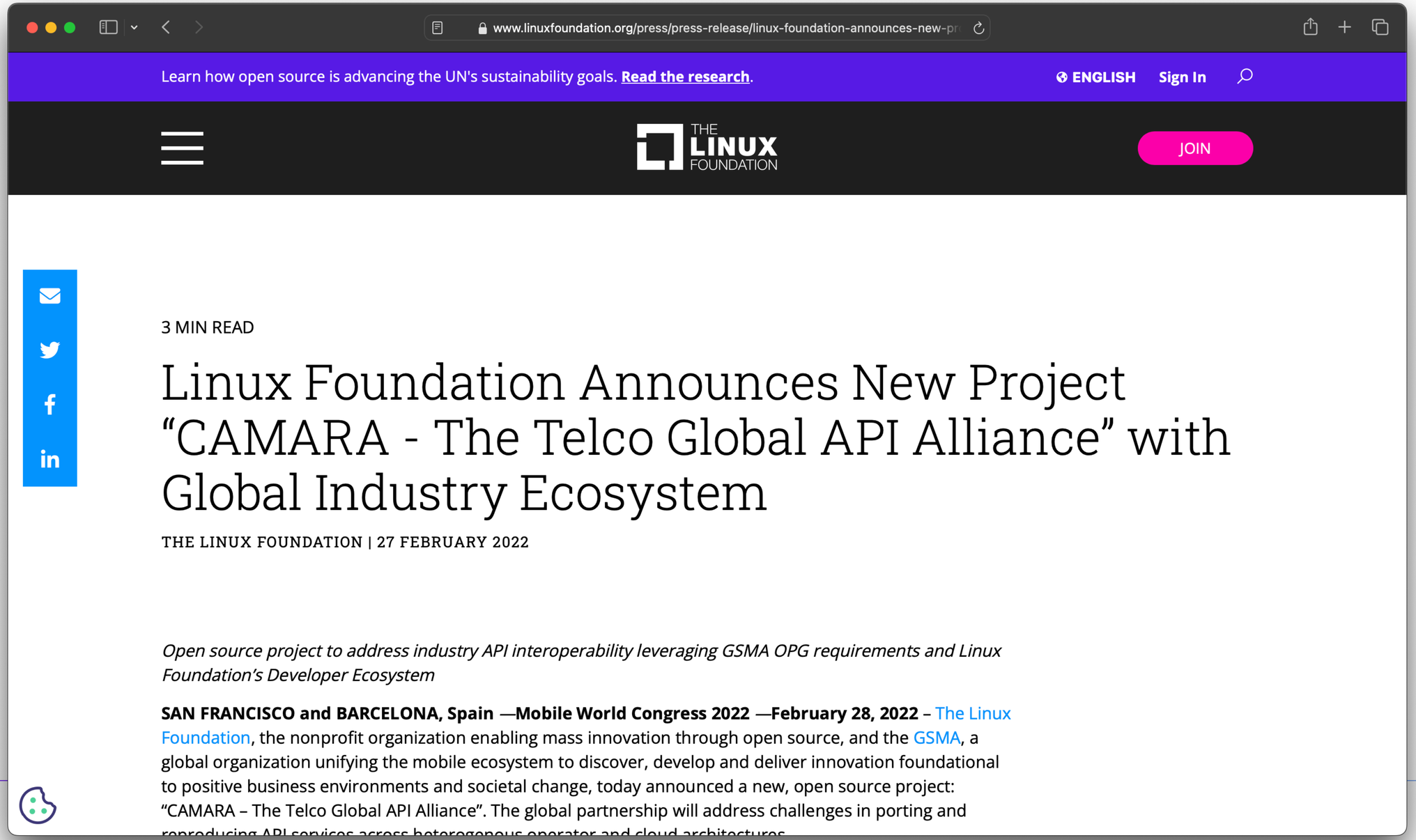
4G & 5G capabilities

- high-speed data transmission
- low latency
- enhanced quality of service (QoS)
- high capacity
- support for file transfer and streaming
- LTE (Long Term Evolution)
- Voice over LTE (VoLTE)

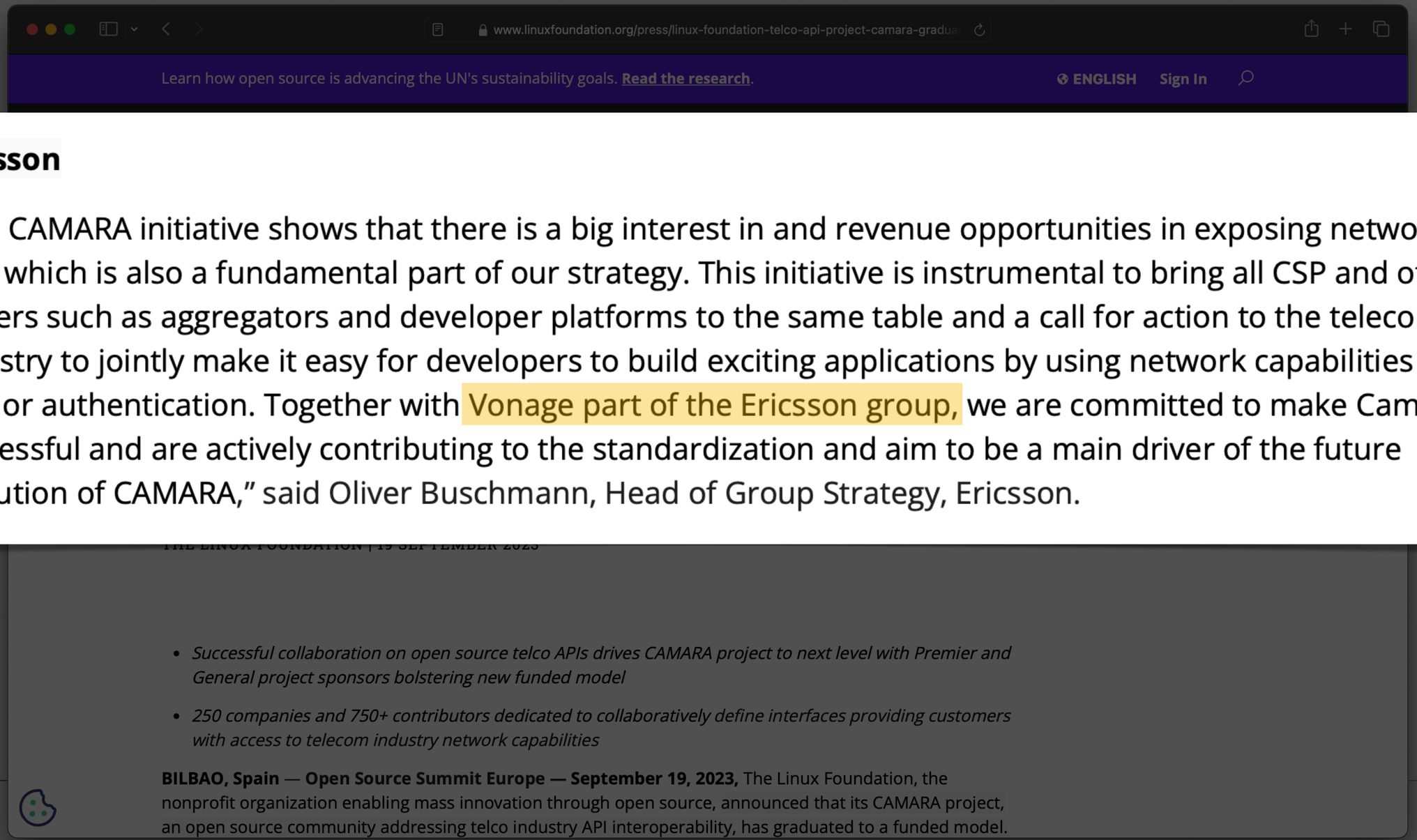
What's next?



CAMARA - The Telco Global API Alliance



CAMARA - The Telco Global API Alliance



Ericsson

"The CAMARA initiative shows that there is a big interest in and revenue opportunities in exposing network APIs which is also a fundamental part of our strategy. This initiative is instrumental to bring all CSP and other players such as aggregators and developer platforms to the same table and a call for action to the telecom industry to jointly make it easy for developers to build exciting applications by using network capabilities like QoS or authentication. Together with Vonage part of the Ericsson group, we are committed to make Camara successful and are actively contributing to the standardization and aim to be a main driver of the future evolution of CAMARA," said Oliver Buschmann, Head of Group Strategy, Ericsson.

- *Successful collaboration on open source telco APIs drives CAMARA project to next level with Premier and General project sponsors bolstering new funded model*
- *250 companies and 750+ contributors dedicated to collaboratively define interfaces providing customers with access to telecom industry network capabilities*

BILBAO, Spain — Open Source Summit Europe — September 19, 2023, The Linux Foundation, the nonprofit organization enabling mass innovation through open source, announced that its CAMARA project, an open source community addressing telco industry API interoperability, has graduated to a funded model.

Structure

The structure of CAMARA consists of Sub Projects and Working groups

Within one Sub Project one API family is developed and maintained. Working groups span more than one (in most cases all) Sub Projects and cover overarching topics like maintaining an API Backlog or Commonalities (topics that are in common for all Sub Projects).

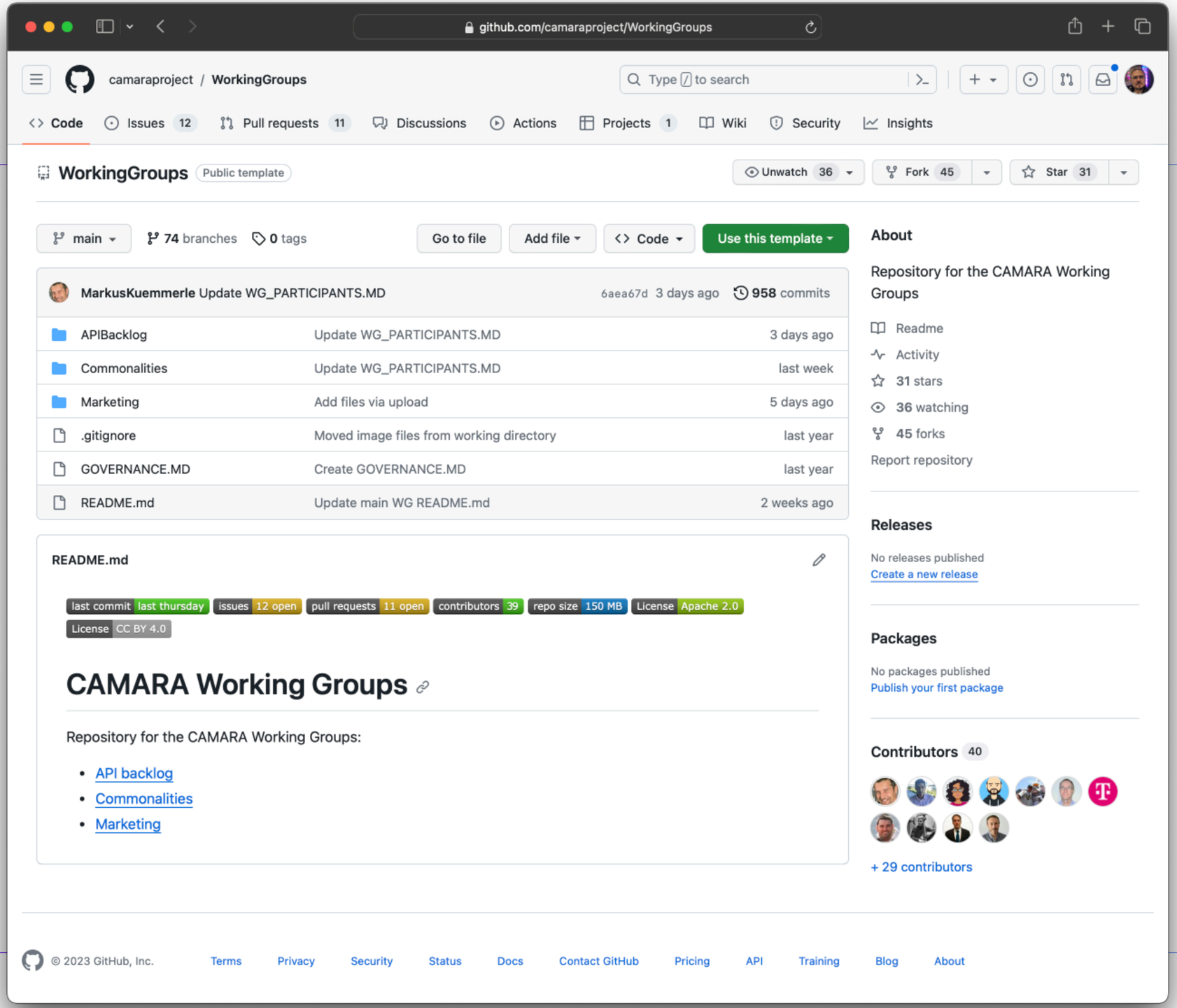
Each Sub Project is contained in a separate GitHub repository, while all working groups were together in one additional GitHub repository. In the “Governance” repository all regulations for the open source project are saved.

CAMARA Technical Steering Committee

The Technical Steering Committee is the oversight body for the technical CAMARA Project. The Technical Steering Committee currently consists of the following participants:

Name	(Company) Role
Herbert Damker	(Deutsche Telekom AG) Active Maintainer, TSC chair
Eric Murray	(Vodafone) Active Maintainer, TSC deputy chair
Ludovic Robert	(Orange) Active Maintainer, TSC deputy chair
Adnan Saleem	(Radisys) End User Council representative
Chris Howell	(Vonage) Active Maintainer
Diego González Martínez	(Telefónica) Active Maintainer
Doug Makishima	(Summit Tech) End User Council representative
George Glass	TM Forum representative
Henry Calvert	GSMA representative
Jan Friman	(Ericsson) Active Maintainer
Jose Luis Urien	(Telefonica) Active Maintainer
Kevin Smith	(Vodafone) Active Maintainer
Mahesh Chapalamadugu	(Verizon) End User Council representative
Shilpa Padgaonkar	(Deutsche Telekom AG) Active Maintainer
Toshi (Toshiyasu) Wakayama	(KDDI) Active Maintainer

The Technical Steering Committee meetings are held virtually, are open for the public and are scheduled each first Thursday in a month at 10am CE(s)T and every third Thursday in a month at 4pm CE(s)T time. You're welcome to join via: Meeting link.


github.com/camaraproject/WorkingGroups
camaraproject / WorkingGroups
Type / to search
Code
Issues 12
Pull requests 11
Discussions
Actions
Projects 1
Wiki
Security
Insights
WorkingGroups
Public template
Unwatch 36
Fork 45
Star 31
main
74 branches
0 tags
Go to file
Add file
Code
Use this template
MarkusKuemmerle Update WG_PARTICIPANTS.MD
6aea67d 3 days ago
958 commits
APIBacklog Update WG_PARTICIPANTS.MD 3 days ago
Commonalities Update WG_PARTICIPANTS.MD last week
Marketing Add files via upload 5 days ago
.gitignore Moved image files from working directory last year
GOVERNANCE.MD Create GOVERNANCE.MD last year
README.md Update main WG README.md 2 weeks ago
README.md
last commit last thursday
issues 12 open
pull requests 11 open
contributors 39
repo size 150 MB
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License CC BY 4.0
CAMARA Working Groups
Repository for the CAMARA Working Groups:
API backlog
Commonalities
Marketing
About
Repository for the CAMARA Working Groups
Readme
Activity
31 stars
36 watching
45 forks
Report repository
Releases
No releases published
Create a new release
Packages
No packages published
Publish your first package
Contributors 40
+ 29 contributors
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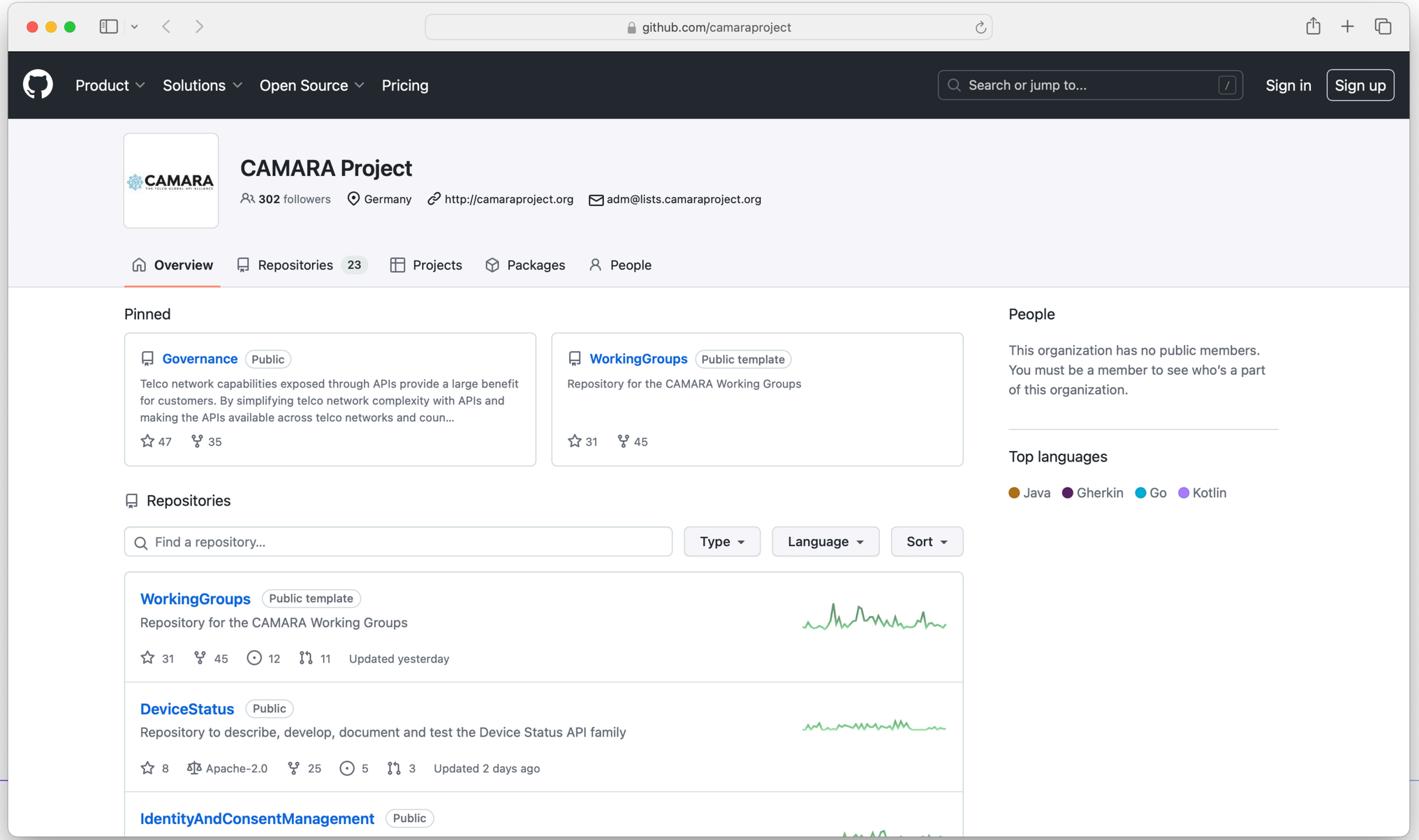
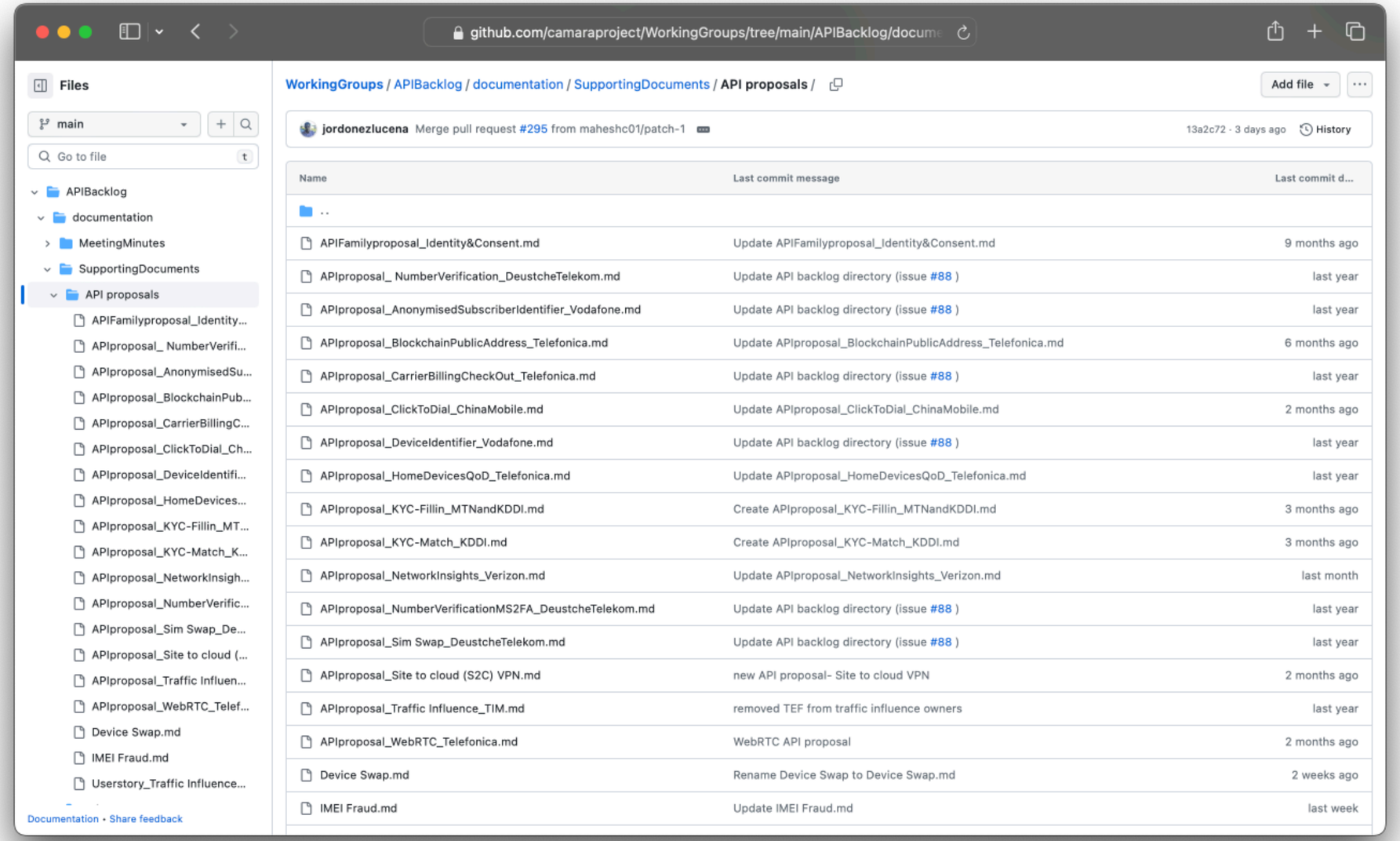
API
Training
Blog
About

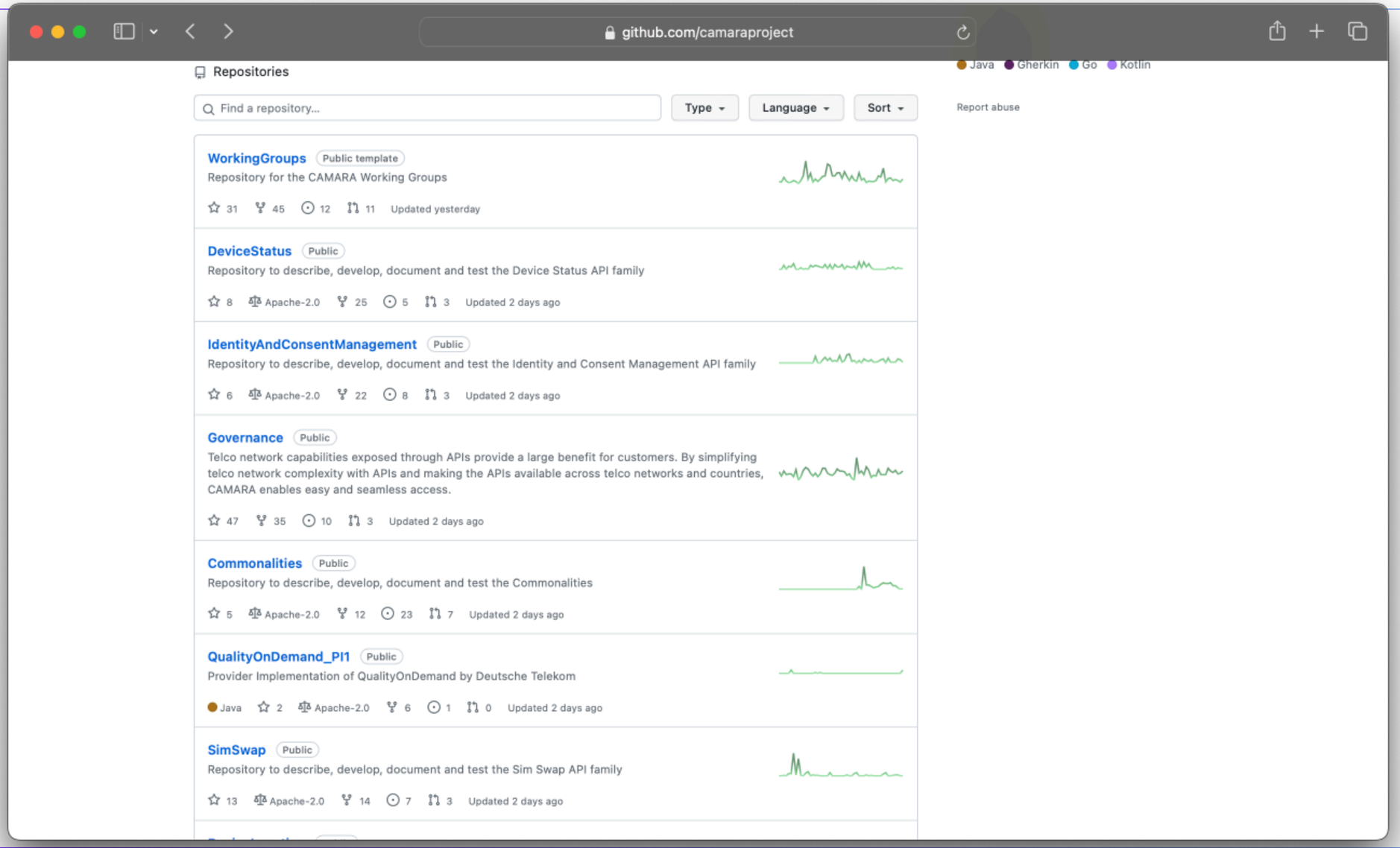
CAMARA Project on GitHub



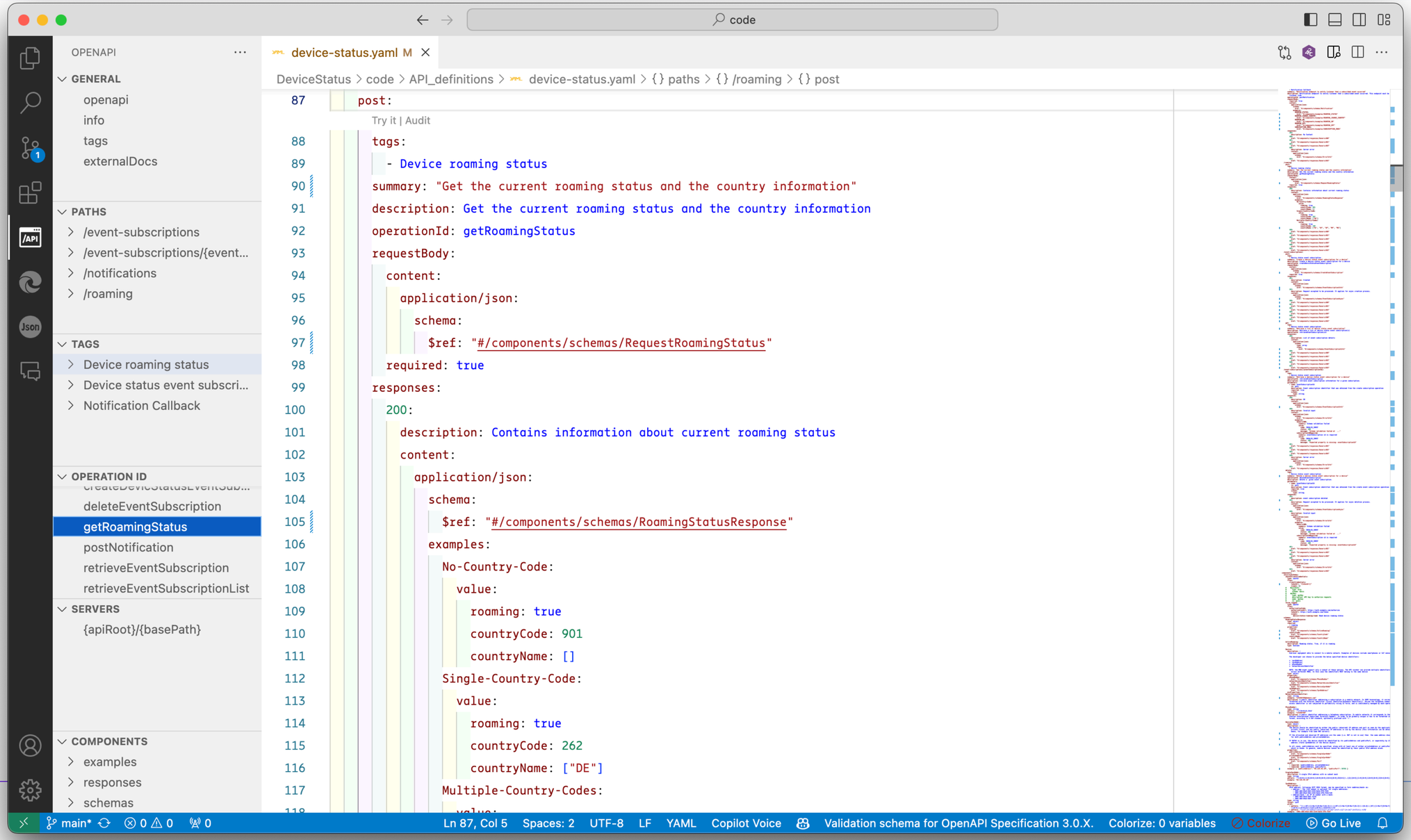
API Proposals



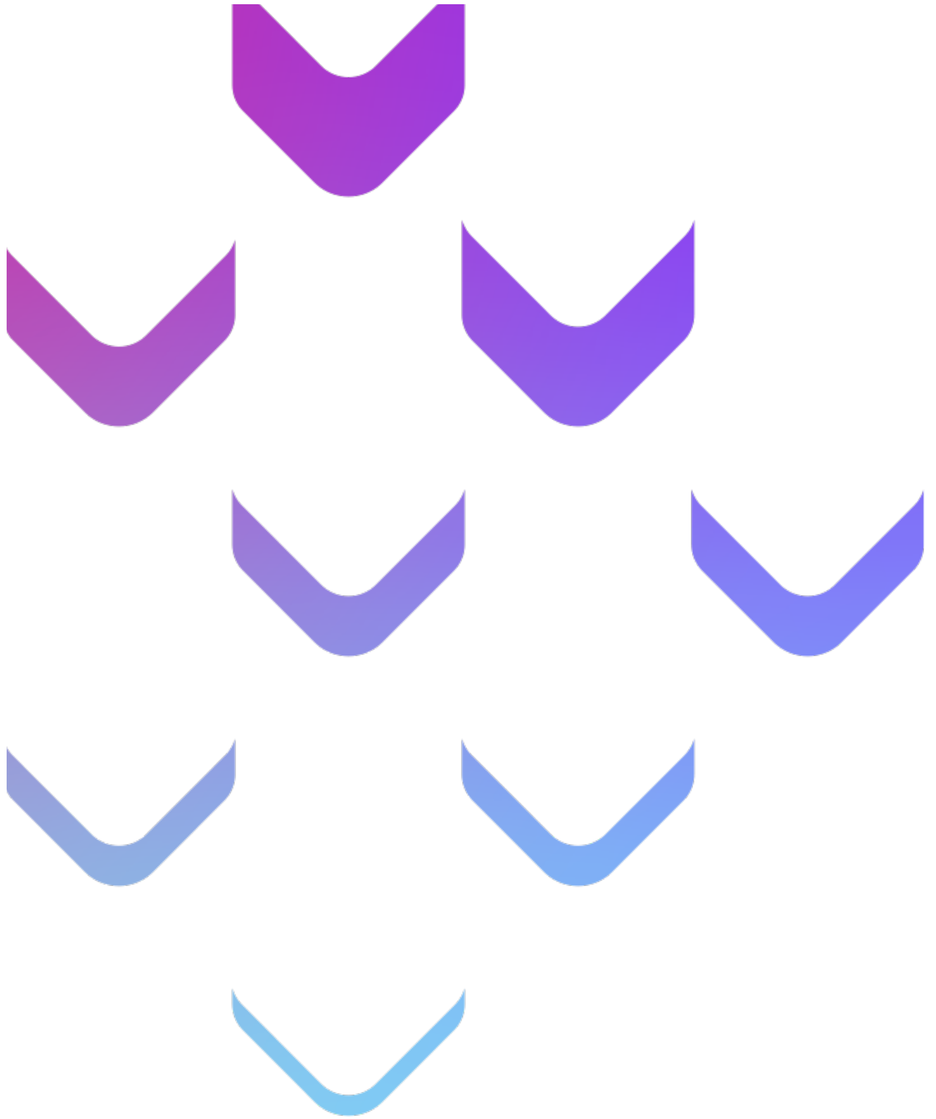
CAMARA APIs


github.com/camaraproject
Repositories
Java Gherkin Go Kotlin
Find a repository...
Type
Language
Sort
Report abuse
WorkingGroups Public template
Repository for the CAMARA Working Groups
31 45 12 11 Updated yesterday
DeviceStatus Public
Repository to describe, develop, document and test the Device Status API family
8 Apache-2.0 25 5 3 Updated 2 days ago
IdentityAndConsentManagement Public
Repository to describe, develop, document and test the Identity and Consent Management API family
6 Apache-2.0 22 8 3 Updated 2 days ago
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 countries, CAMARA enables easy and seamless access.
47 35 10 3 Updated 2 days ago
Commonalities Public
Repository to describe, develop, document and test the Commonalities
5 Apache-2.0 12 23 7 Updated 2 days ago
QualityOnDemand_PI1 Public
Provider Implementation of QualityOnDemand by Deutsche Telekom
Java 2 Apache-2.0 6 1 0 Updated 2 days ago
SimSwap Public
Repository to describe, develop, document and test the Sim Swap API family
13 Apache-2.0 14 7 3 Updated 2 days ago

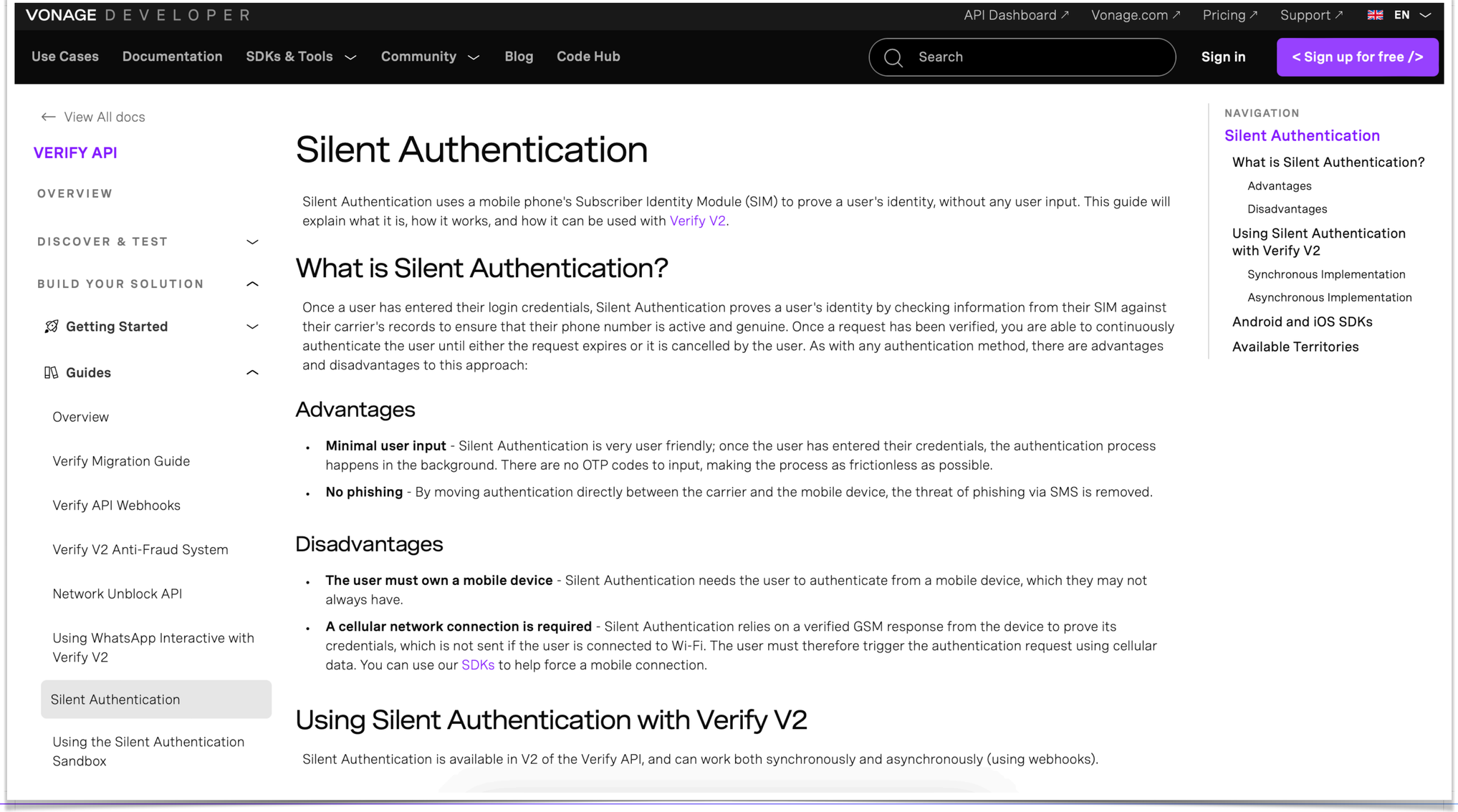
Demo

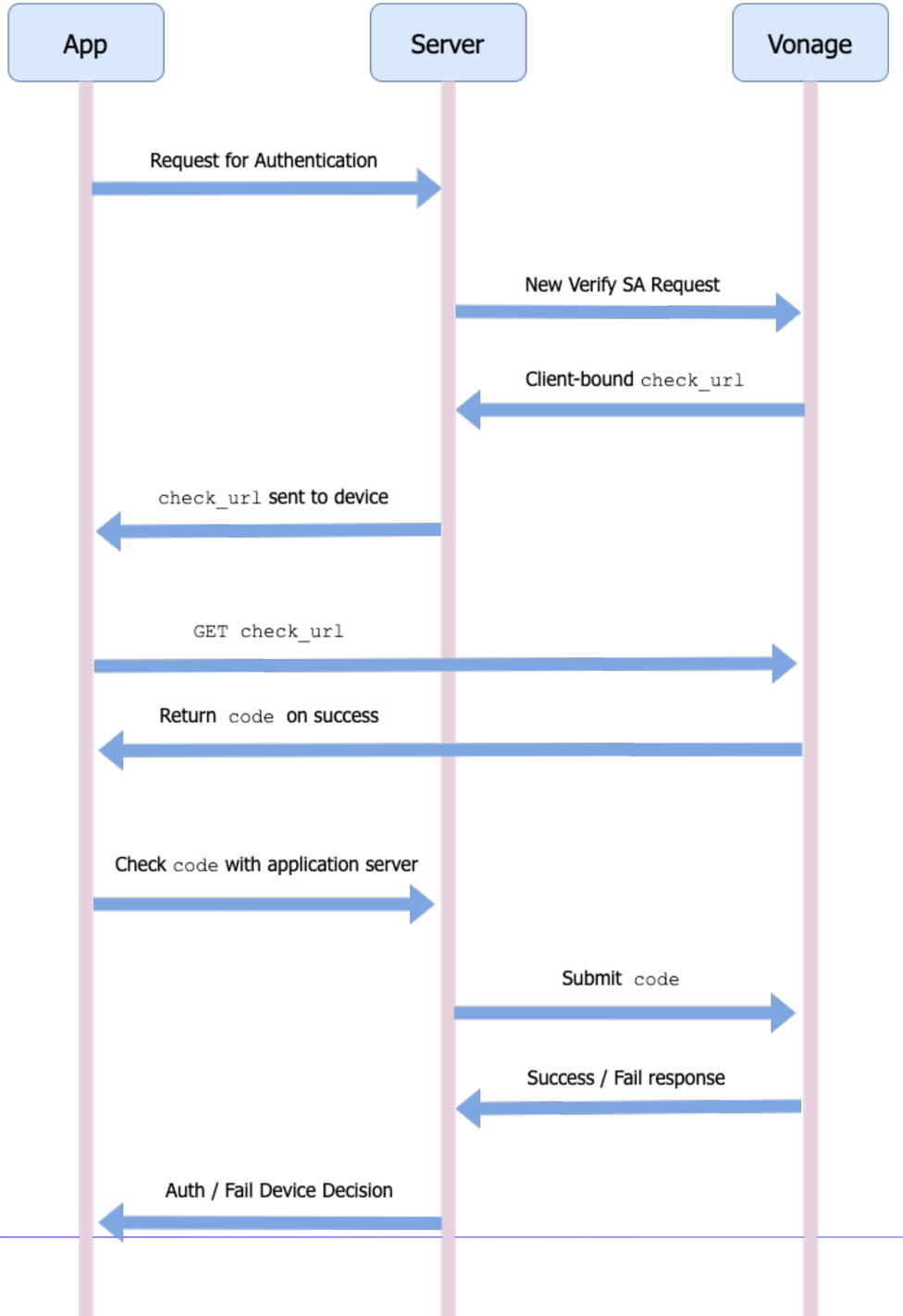

code
OPENAPI
device-status.yaml M
DeviceStatus > code > API_definitions > device-status.yaml > {} paths > {} /roaming > {} post
GENERAL
openapi
info
tags
externalDocs
PATHS
/event-subscriptions
/event-subscriptions/{event...
/notifications
/roaming
TAGS
Device roaming status
Device status event subscri...
Notification Callback
OPERATION ID
deleteEventSubscription
getRoamingStatus
postNotification
retrieveEventSubscription
retrieveEventSubscriptionList
SERVERS
{apiRoot}/{basePath}
COMPONENTS
examples
responses
schemas
87 post:
Try it | Audit
88 tags:
89 - Device roaming status
90 summary: "Get the current roaming status and the country information"
91 description: Get the current roaming status and the country information
92 operationId: getRoamingStatus
93 requestBody:
94 content:
95 application/json:
96 schema:
97 $ref: "#/components/schemas/RequestRoamingStatus"
98 required: true
99 responses:
100 200:
101 description: Contains information about current roaming status
102 content:
103 application/json:
104 schema:
105 $ref: "#/components/schemas/RoamingStatusResponse"
106 examples:
107 No-Country-Code:
108 value:
109 roaming: true
110 countryCode: 901
111 countryName: []
112 Single-Country-Code:
113 value:
114 roaming: true
115 countryCode: 262
116 countryName: ["DE"]
117 Multiple-Country-Codes:
main*
Ln 87, Col 5
Spaces: 2
UTF-8
LF
YAML
Copilot Voice
Validation schema for OpenAPI Specification 3.0.X.
Colorize: 0 variables
Colorize
Go Live

Real-world implementations

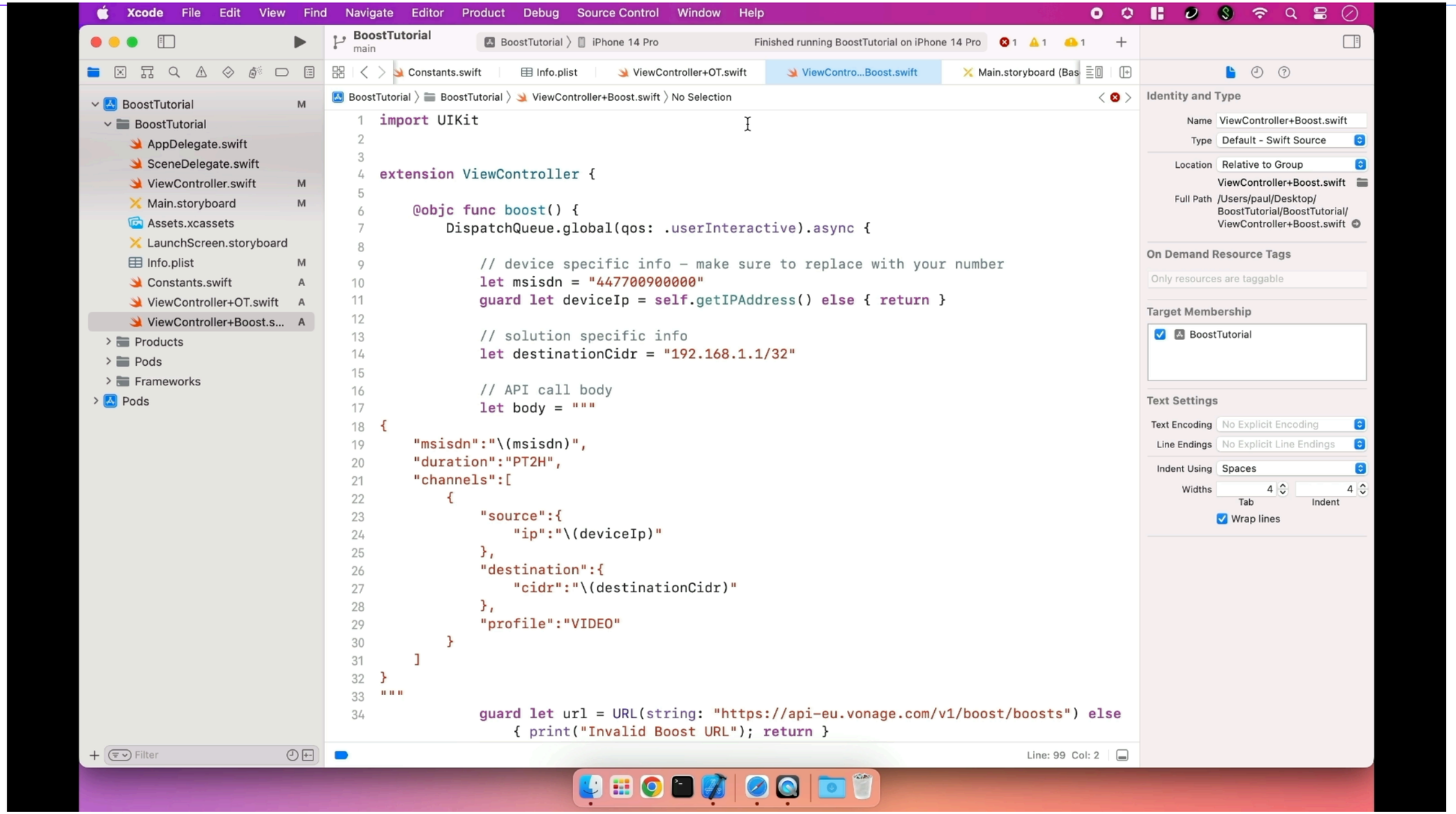


Silent Authentication




App
Server
Vonage
Request for Authentication
New Verify SA Request
Client-bound check_url
check_url sent to device
GET check_url
Return code on success
Check code with application server
Submit code
Success / Fail response
Auth / Fail Device Decision

Boost Network Connection



CAMARA
THE TELCO GLOBAL API ALLIANCE

Device Status | Edge Cloud | Click to Dial | Identity And Consent Management

Carrier Billing Check Out | Site to Cloud | Age Verification | Number Verification

OTP Validation | Home Location Verification | Network Slicing | Network Insights

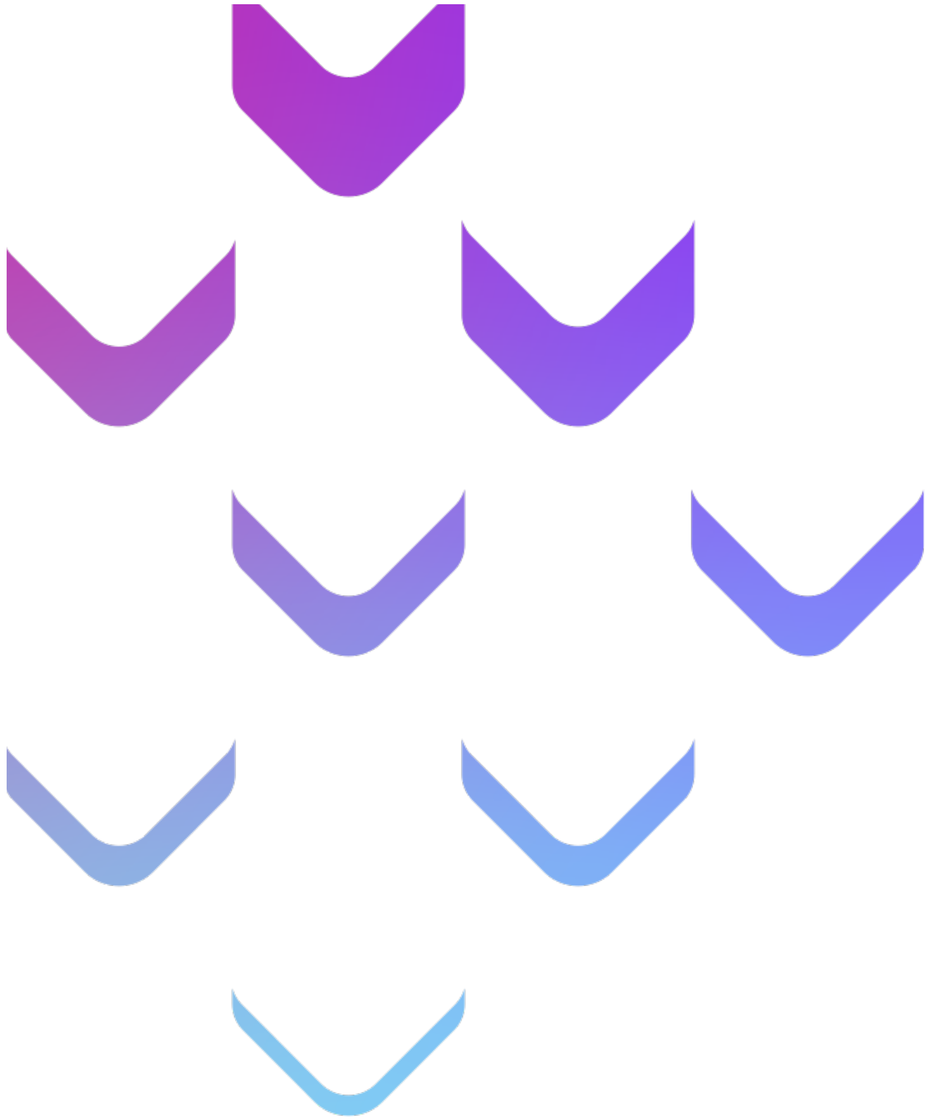
Device Location | Dynamic People Density Information | WebRTC | Traffic Influence

Sim Swap | Device Identifier | Blockchain Public Address | Know Your Customer

Quality on Demand | IMEI Fraud | Device Swap | Home Devices Quality on Demand

Device Visit Location | Home Location Verification | Region User Count | TBD

THANK YOU!



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x.com/pardel

github.com/pardel/presentations