GSMA Intelligence

GSMA Open Gateway: State of the Market, H1 2024

The supply side is in place; focus now shifts to demand

June 2024

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The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

We invite you to find out more at www.gsma.com

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GSMA Intelligence

GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts, and publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily.

GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself.

Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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01 Executive summary

The opportunity ahead for GSMA Open Gateway

GSMA Open Gateway is based on a simple idea: leverage the power of mobile networks globally by opening up access to network capabilities through common application programming interfaces (APIs).

When we established GSMA Open Gateway in 2023, we believed in this idea but could not have imagined the level of support to come – and how quickly it arrived. To date, we have nearly 50 operators signed up, representing almost two thirds of the global mobile industry by market share. It is an incredible testament to the shared belief and urgency to act on it.

Focus must now be on delivery. There are 17 APIs in use, with a further 11 defined in CAMARA, covering use cases such as anti-fraud, quality on-demand and edge compute. We would like operators, the developer community and others to take full advantage of these capabilities. Examples that speak to this engagement include US operators using device location capabilities for drone tracking, and South African operators jointly working to prevent fraud.

There is a window of opportunity, but this will not stay open forever. We encourage more operators to participate, and a deeper set of engagement with developers and other distribution partners (particularly GSMA Open Gateway aggregators), as collaboration is key to success. It also requires visible markers of progress, such as the number of operators, API usage and the extent to which usage is monetised.

I'm excited about the opportunity ahead and the work required to deliver on that opportunity. I hope this first State of the Market report helps provide data and insights on progress and challenges, and that we can track these over time, including in the next edition later in 2024.

Henry Calvert
Head of Networks
GSMA

State of the market

01

Two thirds of the telecoms sector covered

A year on from the launch of GSMA Open Gateway, nearly 50 operators accounting for 65% of global mobile market share have signed up. This shows clear intent to establish the supply side of the API equation, with nine operators committing in H1 2024. We expect further momentum in H2, filling in the geographies where take-up remains underpenetrated relative to expectations.

02

MWC as a launchpad

For any big technology announcement, the stage matters. For GSMA Open Gateway, MWC 2024 provided a global platform and a chance to leverage the power of combined voices from the CEO level on the urgency to use APIs to monetise 5G networks. The pace of operator sign-ups has moderated since then, with focus shifting to driving awareness among the developer community and bringing APIs in play via hyperscaler and aggregator distribution.

03

Easy wins versus slow burns

Many of the early API launches have focused on fraud prevention and security, using SIM Swap and Number Verification. These represent easy wins, given the ever-present risks from fraudsters and breaches for operators and their customers. Other parts of the API library are also being deployed (e.g. Device Location, Quality on Demand) but more selectively. Across the total of 17 APIs, it is likely that usage will not be uniform; it will be concentrated in areas where developer interest and monetisation are highest. H2 2024 and 2025 should provide reference points to determine where the greatest take-up lies.

04

Big-picture strategic goals

The ultimate goal is to leverage the APIs in the GSMA Open Gateway library to drive incremental mobile revenues. Part of this is about helping stimulate a long-subdued revenue growth trend, under pressure following smartphone saturation. However, it is also about validation that the 5G enterprise story is real, with developers a new vehicle to monetising 5G network assets in addition to direct enterprise sales. While revenue growth is the goal, it is the intermediate goals (developer engagement, API usage and demonstrable willingness to pay) that build on each other to generate revenues that matter.

05

It takes a village

The ultimate impact of this sector-wide API strategy relies on the participation of scaled distribution partners, most importantly hyperscalers and Open Gateway aggregators – companies that connect multiple operators to multiple developers. These companies have already amassed legions of developers and go-to-market channels that the operators will require to monetise their networks at scale. Most of them see GSMA Open Gateway as a win–win, as it brings further API assets for their own channels. However, this should not be taken for granted; connecting developers to the Open Gateway value proposition will require work and messaging.

Numbers to note

65%

Global market share coverage

As of March 2024, 49 mobile operators had committed to GSMA Open Gateway APIs. This represents approximately 65% of global mobile market share (by connections). The number is rising each month.

24%

European share of the global API base

The geographic breakdown of operator commitments indicates regions at par, above or below their established market share. Europe, for example, is the leading region, with committed operators representing a quarter of the entire global addressable base despite accounting for only 10% of mobile connections. Africa, by contrast, under-indexes.

2x

Growth in operators committed over the last 12 months

The premise of GSMA Open Gateway is that by offering APIs with common standards, developers can leverage network capabilities on a global scale. The strong momentum behind commitments from operators over the last year demonstrates progress on meeting the scale requirements.

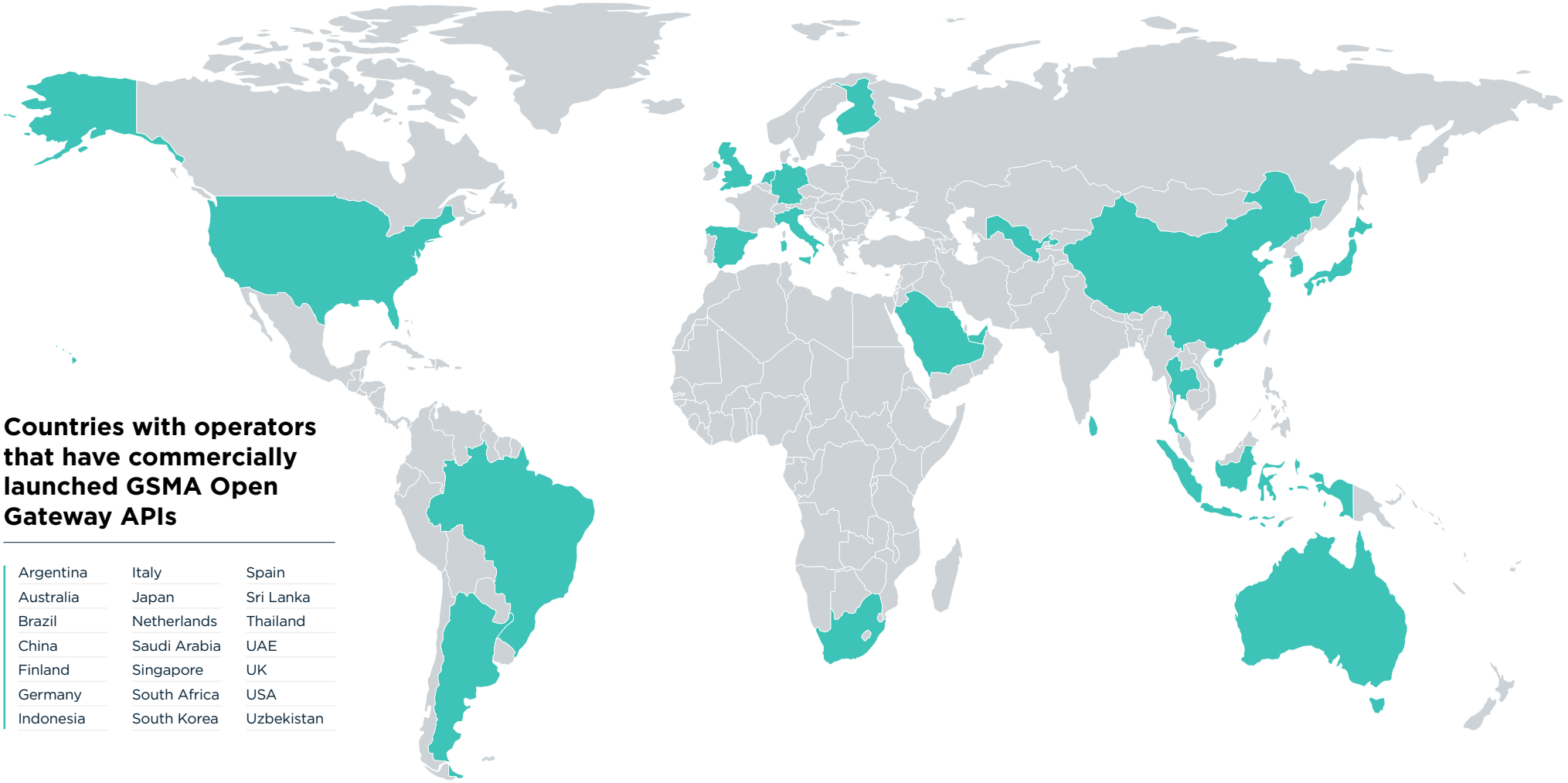
17

APIs in the GSMA Open Gateway library

There are 17* APIs in the library, spread across different categories or 'families'. Much of the early activity has focused on security and fraud protection, but we are starting to see launches leveraging device location, edge compute and carrier billing.

* 17 APIs are in use, with a further 11 defined in CAMARA, making a total of 28 associated with GSMA Open Gateway.

Global coverage of the GSMA Open Gateway initiative



Countries with operators that have commercially launched GSMA Open Gateway APIs

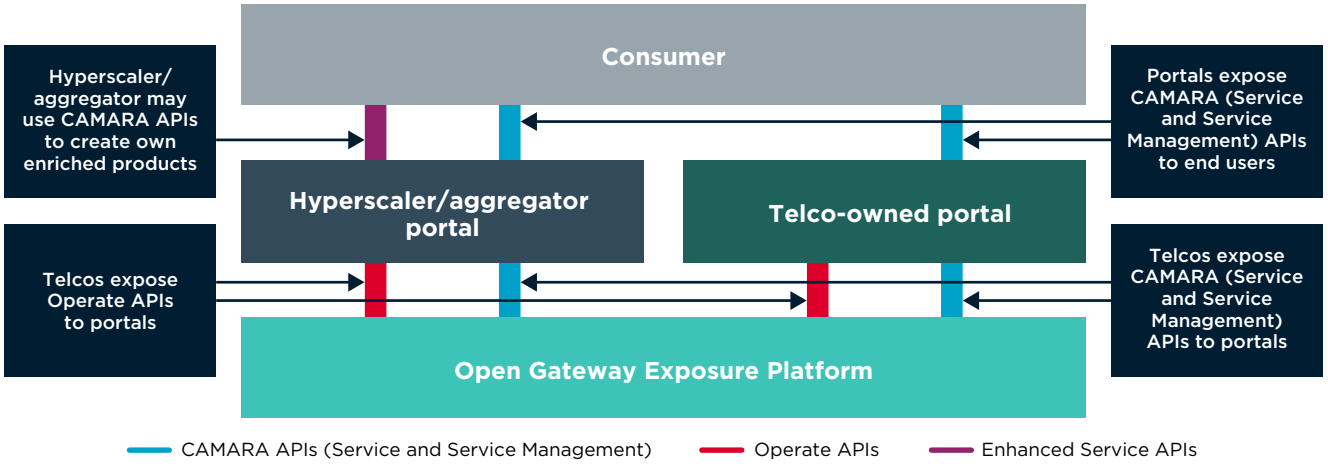
Argentina	Italy	Spain
Australia	Japan	Sri Lanka
Brazil	Netherlands	Thailand
China	Saudi Arabia	UAE
Finland	Singapore	UK
Germany	South Africa	USA
Indonesia	South Korea	Uzbekistan

The aggregator story: 2024 and fulfilling the potential

From the outset, the GSMA Open Gateway initiative envisioned a role for aggregators in the overall API exposure architecture. In simple terms, these companies serve as a hub, connecting to multiple sets of operators and multiple sets of developers.

The companies serving as aggregators represent diverse industries, making comparison complex. However, their role in the success of GSMA Open Gateway is clear.

API stakeholder architecture and relationship



Source: GSMA

Why aggregators?

The fundamental Open Gateway value proposition is one of scale, thanks to consistent APIs. Aggregators drive scale by connecting myriad operators with myriad developers, often leveraging existing developer communities.

Why 2024?

2024 promises to be a big year for Open Gateway aggregators. As the market develops, the aggregator opportunity will grow. More importantly, many aggregator solutions are still new or even pre-commercial. Launches should unleash the aggregator value to drive GSMA Open Gateway.

What's next?

While most aggregators already engage with myriad developers, driving Open Gateway use cases and usage will be key. This must be the priority as solutions launch and ramp up.

If there is a role for aggregators to play, we will likely see new entrants too.

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02 GSMA Open Gateway in context

Understanding GSMA Open Gateway and network APIs

A common framework

GSMA Open Gateway helps developers and cloud providers enhance and deploy services more quickly via single points of access to operator networks. This is achieved via common, northbound service APIs that expose mobile operator network capabilities within a consistent, interoperable and federated framework.

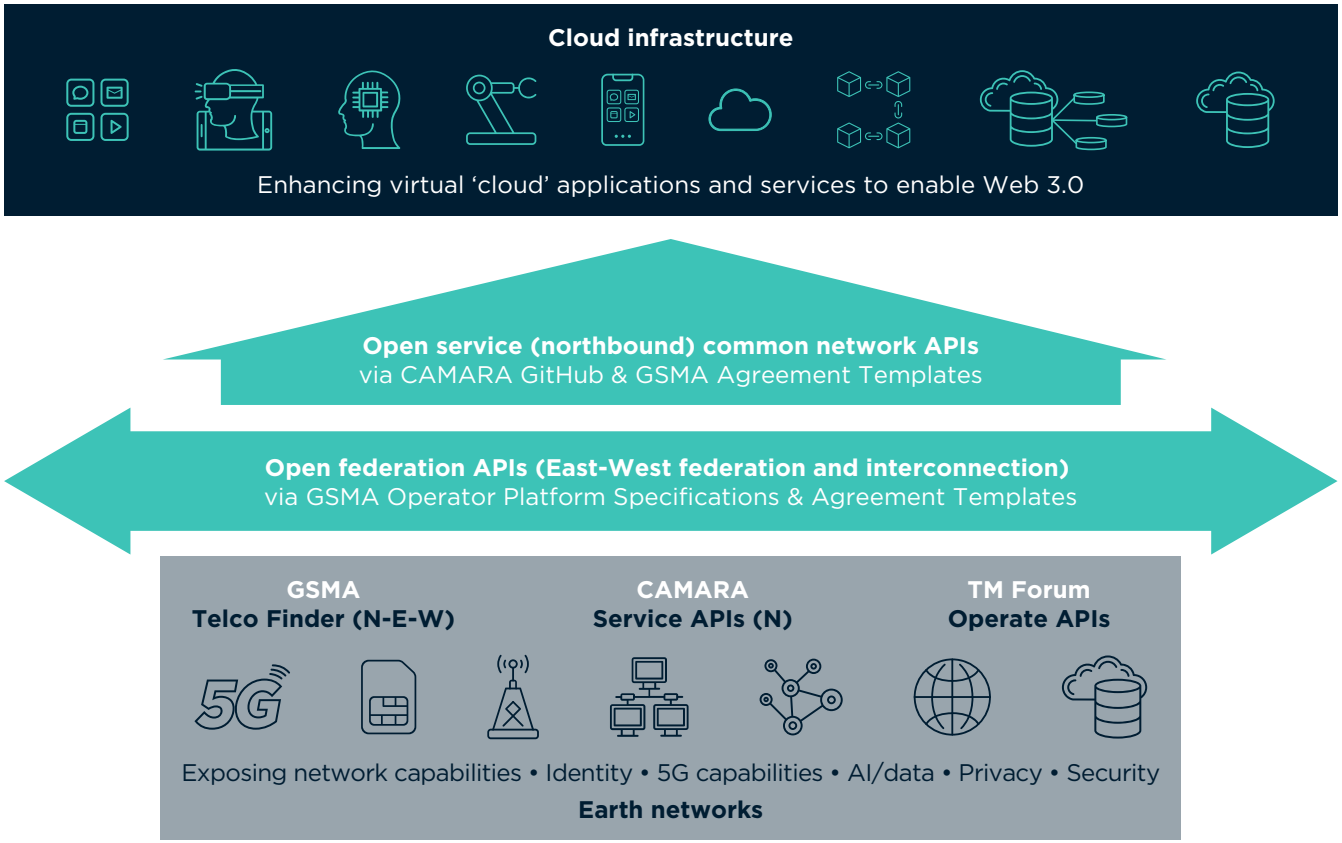
An open-source approach

GSMA Open Gateway APIs are defined, developed and published in CAMARA, the open-source project for developers to access enhanced network capabilities, driven by the Linux Foundation in collaboration with the GSMA.

New APIs and use cases

The GSMA Open Gateway initiative launched with eight network APIs, including SIM Swap, Device Status, Number Verification and Quality on Demand. The APIs have the potential to facilitate numerous use cases, including tackling digital fraud, simplifying user authentication and addressing quality-of-service issues.

GSMA Open Gateway facilitates direct access to network capabilities for developers via a common set of APIs, promising to unlock innovation at a global scale



Source: GSMA

GSMA Open Gateway APIs

API family				
Anti-fraud	**Mobile connectivity and value-added services**	**Fixed Connectivity**	**Cloud and edge**	**Payments**
Device Status	Device Location Verification	Home Devices Quality on Demand	Simple Edge Discovery	Carrier Billing
IMEI Fraud	Geofencing		Traffic Influence	
KYC Fill In	Location Retrieval			
KYC Match	Connectivity Insights			
Number Verification	Mobile Quality on Demand			
SIM Swap				
SIM Swap Subscription Notification				
One Time Password				

Full descriptions are available at GSMA Open Gateway API Descriptions

Source: GSMA

The driving forces behind GSMA Open Gateway

Network API exposure is not new

Around 80% of operators in the GSMA Intelligence Network Transformation Survey 2023 claim to have exposed network APIs on a commercial basis. While it has long been possible to expose network APIs, operators have struggled to adopt a standardised approach that achieves scale. Recent initiatives by the mobile industry to develop a common set of network APIs have provided fresh momentum.

Innovation at a global scale

Some 49 mobile operator groups have committed to the GSMA Open Gateway initiative, representing 65% of global mobile connections. This level of support is important to encourage developers to build applications that leverage Open Gateway APIs.

Enterprise demand is key

Enterprise awareness of (and demand for) customised connectivity is growing. This is mainly being driven by enterprises' need to have greater control and achieve better performance over their network infrastructure.

New network capabilities and increased collaboration underpin momentum

Collaboration

- Collaboration among operators is helping developers build applications using APIs that work across multiple networks.
- Support from cloud providers for operators' network API exposure efforts is attracting a broader developer audience.
- Collaboration between industry bodies, standards development organisations and open-source groups is driving interoperability.

Operator strategies

- Pressure on operator connectivity revenues (stagnating or growing by low, single digits) is driving efforts around network APIs and other new areas.
- Operators are using network APIs for internal purposes, such as building new services for end users and delivering internal efficiencies (e.g. using APIs for network monitoring and management).

Customer demand

- Enterprise demand for customised connectivity is growing across logistics, manufacturing, utilities and other sectors.
- Enterprise demand for identity validation and fraud prevention solutions is rising amid escalating digital security challenges.
- Consumers are seeking better quality networks to support demanding activities such as online gaming.

Technology

- As mobile networks become more cloud-like, it is becoming easier for developers to build new capabilities that can be exposed via network APIs.
- The improved performance of 4G and 5G networks is enabling a range of new consumer and enterprise use cases that can be supported via APIs.

Source: GSMA Intelligence

Mapping the ecosystem: who is driving momentum?

Mobile operators

Exposing APIs (which connect into network functions) allows developers to directly tap into network capabilities. This removes the need for operators to connect directly with individual developers or applications, promising the scale that could unlock network innovation and deliver an important new revenue stream for mobile operators and their partners.

Network vendors

Major network equipment vendors (e.g. Ericsson, Huawei, Nokia and ZTE) provide platforms that expose network APIs across various operators, irrespective of the underlying network vendor. These platforms offer developers a variety of tools to build new use cases and capabilities for their customers.

Hyperscalers

Hyperscalers offer cloud infrastructure and services via APIs to developers and customers. Developers consume thousands of these APIs. With increasing collaboration between hyperscalers and operators, developers can now gain access to network APIs for building and hosting new applications on hyperscale infrastructure.

CPaaS companies

Communication platform as-a-service (CPaaS) companies offer cloud-based platforms that provide developers with the tools and APIs needed to embed communication features (such as voice calling, video conferencing, SMS and chat) into their applications. The emergence of GSMA Open Gateway presents CPaaS companies with the chance to provide a wider array of capabilities via their platforms.

Systems integrators

Systems integrators (SIs) play a crucial role in bridging the gap between various technologies, systems and processes within industrial settings. SI developers are expected to be among the primary users of network APIs, implementing them in use cases on behalf of their enterprise customers. Examples of SIs include Capgemini and Accenture, and specialised OT integrators such as Atos and Kyndryl.

Industry groups

Collaboration between the GSMA, TM Forum and the CAMARA Project on the GSMA's Open Gateway API ecosystem is important for increasing interoperability. The GSMA focuses on how network capabilities support service APIs, while TM Forum leads the definition and development of operations, administration and management APIs, which provide programmable access to OSS/BSS capabilities.

Developers

The GSMA Open Gateway initiative needs a community of developers to succeed. Mobile operators can work directly with external developer teams to build this community, or can work with network vendors, hyperscalers and other companies positioning themselves as API aggregators. Developers are employed across various types of organisation – from large corporations with dedicated software development teams to startups where developers fulfil various responsibilities. Understanding the developer landscape and focusing on the developers most likely to use network APIs will be key to driving momentum behind GSMA Open Gateway.

Source: GSMA Intelligence

The difference this time round

Learning from history

In the past, several industry-wide initiatives have aimed to open communication and network APIs to developers and other stakeholders. However, many of these initiatives have been shut down or subsumed for internal purposes.

Operator alignment

GSMA Open Gateway was announced in February 2023 with the support of 21 mobile operator groups, accounting for around 45% of the mobile industry. A year later, 49 mobile operator groups had committed to the initiative, representing 65% of global mobile connections. This highlights the sustained momentum behind GSMA Open Gateway and the initiative's global appeal.

Ecosystem support

GSMA Open Gateway has resonated more strongly with the wider mobile ecosystem than previous industry-wide API initiatives. This is indicated by the business models adopted by API aggregators and the level of support from public cloud providers.

GSMA Open Gateway offers several distinct advantages over previous industry-wide API initiatives

Advantage	Explanation
Operator alignment	Similar operator initiatives have failed in the past due to a lack of industry alignment. However, with two thirds of operators already signed up to GSMA Open Gateway, the latest effort is a global solution. Momentum has been helped by C-suite buy-in across the industry.
Friendlier business models	From the outset, network API aggregators have been talking openly about the importance of developing business models that are favourable to all parties. This is important as CPaaS platforms have previously delivered minimal revenue uplift for operators.
Support from public cloud providers	AWS, Google and Microsoft Azure were all included in the initial Open Gateway announcement. Having the major public cloud providers on board from day one helps operators reach a wider base of application developers more quickly.
New network capabilities	Networks have evolved considerably in the 4G and 5G eras. This has introduced new use cases, while the shift to cloud-based networks makes it easier to expose network capabilities.

Source: GSMA Intelligence

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03 Recent key developments

Recent developments among mobile operators

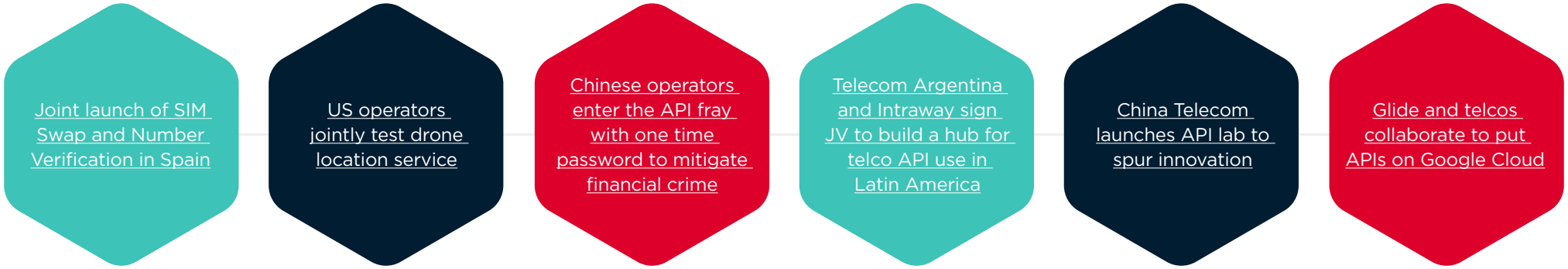
Taking centre stage

If 2023 was a year of setting up, 2024 is the year of implementation. Many of the major operator announcements on APIs were made at MWC Barcelona 2024 to take advantage of the global platform and staging point with distribution partners (mostly hyperscalers) attending. In most cases, operator announcements were made with competitors, underlining the cross-sector value of common APIs. Examples include operators from Spain, the US and South Africa (see below).

Prioritising the low-hanging fruit

Most of the early activity has focused on security and fraud protection. The APIs here are easy wins with banks, payment providers and customers, considering the risk of financial loss. The US collaboration for drone location is also interesting and likely a sign of things to come with the growing use of non-terrestrial network (NTN) vehicles in hard-to-reach areas and for emergency response.

Key announcements from the last six months



Source: GSMA Intelligence

Recent developments in the supply chain

Setting the table

Vonage (part of Ericsson), Nokia and other aggregators have made a number of deals with operators and (in some cases) hyperscalers to expand the distribution reach of their APIs that are part of the Open Gateway portfolio. Examples include Vonage's partnership with AWS (on security) and Nokia with Infobip.

Look to H2 2024

For their part, the mainstay hyperscaler behemoths have been relatively quiet, continuing to lay the groundwork for implementation. We expect more details on the platform play and developer strategy to become available in H2 2024.

Key announcements from the last six months

Source: GSMA Intelligence

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KPIs for APIs: how to judge success

Supply versus demand

Any marketplace requires buyers and sellers. The sell side is largely in place, with a large number of operators offering ready-made APIs to developers and other distributors. The demand side (developers, distributors and enterprises) is responding, with activity expected to increase in H2 2024.

What is success?

The main indicator of success will be the extent to which APIs drive incremental revenues. Developer engagement and usage is a prerequisite for this, which GSMA Intelligence will follow closely.

KPIs cover a range of 'must get right' areas

Operator buy-in (supply side)	API range	Usage (demand side)

• The number of operators signed up drives the overall addressable customer base for API usage.
• Geographic distribution underlines where commercialisation is possible.
	• GSMA Open Gateway comprises a library of 17 APIs. These are split into different families based on the use case being addressed (e.g. anti-fraud, mobile connectivity).
	• While a big number, it is key to understand whether demand is concentrated on a limited share of APIs (e.g. anti-fraud) or is broad-based.
		• As well as supply, the demand side needs to be there.
		• How can demand be measured?
		  • Distribution partner buy-in (hyperscalers and aggregators)
		  • Developer engagement
		  • API usage
		  • Operator revenues

Source: GSMA Intelligence

H1 2024 status update

Operator participation represents two thirds of global market share

A year on from GSMA Open Gateway being launched, nearly 50 operators accounting for 65% of global mobile market share have signed up. This shows clear intent among operators to establish the supply side of the API equation. Momentum continues to build, with nine operators committing in Q1 2024. We expect this to continue in Q2 and Q3, filling in the remaining geographies.

Sizing the geographic differences

How big is each region as a share of the mobile subscribers covered by operators involved in the GSMA Open Gateway initiative? China's sheer size means it has the largest addressable subscriber base for the API part of the GSMA Open Gateway library (approximately 30% of the global total). European groups are also at the forefront, taking around a quarter of global share, followed by South and Southeast Asia. Operators in the US and Canada occupy around 5% of the addressable base (roughly on par with their share of mobile subscribers), though the value draw is likely to be well above that considering the higher per-capita incomes and spending power. Africa, by contrast, still sits considerably below its mobile market share (15%) despite it being a vibrant digital services marketplace, particularly in payments.

Security and fraud APIs are the low-hanging fruit

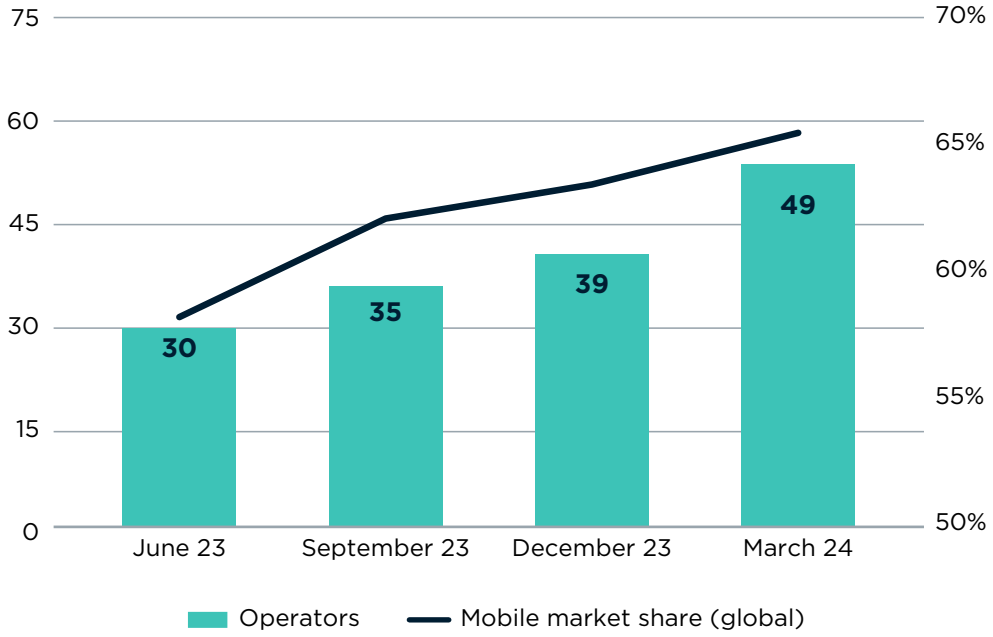
The point of GSMA Open Gateway is to house a library of APIs (via CAMARA) using common standards to attract developers, given the scale benefits that entails across multiple countries and distribution partners. There are 17 APIs that sit in different 'families' to help categorise the range of functionality available. Anti-fraud APIs have so far been the most popular to bring to market, either in testing or live deployments. This speaks to the sub-surface and pernicious effect that fraud has on consumer and business mobile customers where mobile networks are used as a threat vector. APIs designed to mitigate the risk work in partnership with banks and other financial institutions to improve the ease and veracity of customer verifications in a vastly evolving threat landscape.

Others are ramping up

Several other APIs have also gained traction in the ramp-up stage. Device Location (such as for lost or stolen handsets) and Quality on Demand (which offers companies the ability to design services that leverage cellular connectivity at a given level of performance) are two examples that have seen broad-based buy-in.

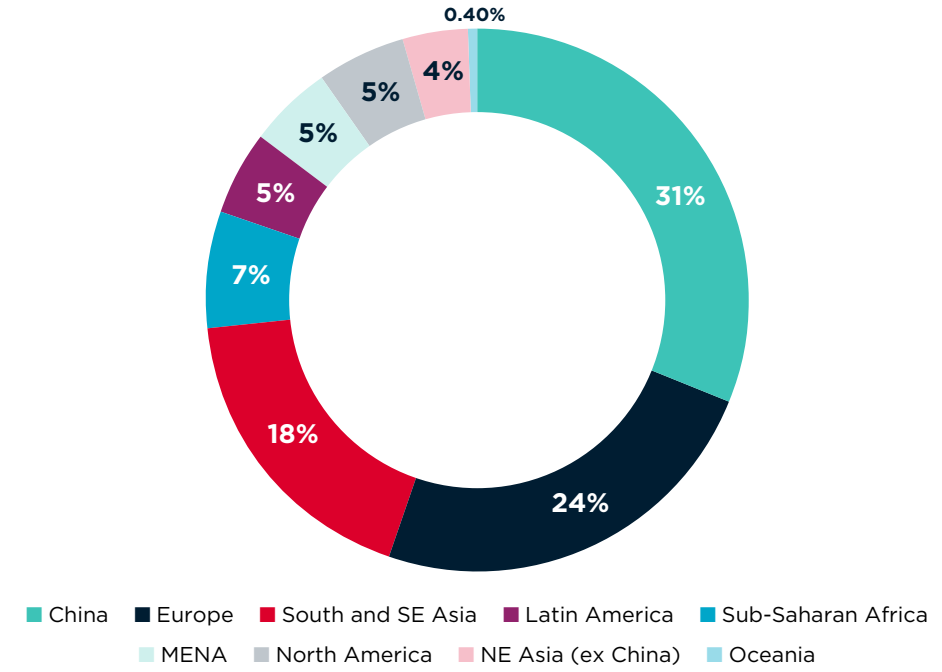
Nearly 50 mobile operators have signed up to GSMA Open Gateway

Number of operators participating in GSMA Open Gateway



Accurate as of March 2024
Source: GSMA Intelligence

Regional breakdown of operator participation



Data as of March 2024
Source: GSMA Intelligence

Participating operators cover all regions, with Asia and Europe strongest

China	Northeast Asia	South and Southeast Asia	Europe	North America	Latin America	Sub-Saharan Africa	MENA	Oceania
China Mobile	KDDI	AIS (Advanced Info Service)	Altice Portugal	AT&T	America Movil	Ethio Telecom	Du	Telstra
China Telecom	KT	Axiata	BT	Rogers	Entel Chile	MTN	e&	
China Unicom	NTT Docomo	Bharti Airtel	CK Hutchison	Verizon	Telecom Argentina		Omantel	
	SoftBank	Celcom Digi	Deutsche Telekom				STC	
		M1	KPN				Zain	
		Maxis	Liberty Global					
		Singtel	Mas Movil					
		Starhub	Orange					
		Telekom Malaysia	Swisscom					
		Telkomsel	Telefónica					
		True/DTAC	Telenor					
		U Mobile	TIM					
		Viettel Networks	Veon					
		YTL Communications	Vodafone					

Accurate as of March 2024
Source: GSMA

Early starters versus slow burners

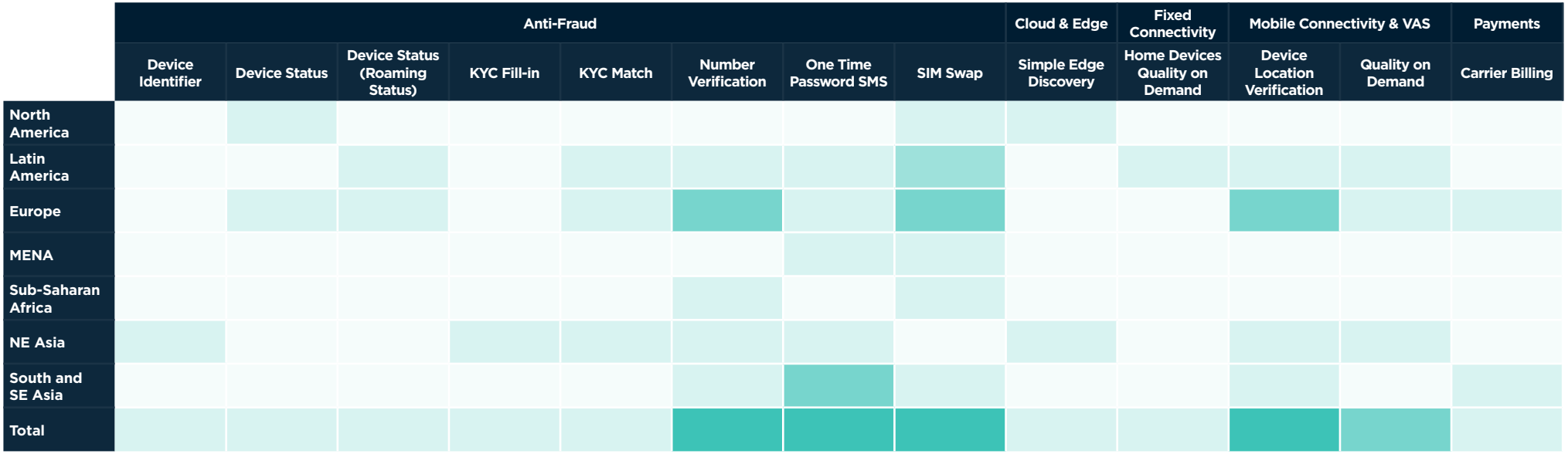
Security for starters

Many of the early API launches have focused on fraud protection and security. Examples include Number Verification (a seamless process that can replace manual, SMS-based confirmations) and SIM Swap (designed to detect potential instances of stolen devices being used illegally for unauthorised transactions).

Demand prospects

The CAMARA library of APIs is much larger, covering anything from access to edge compute to carrier billing. While we expect most APIs to be launched/made available, the commercial success of each remains to be seen. This will be influenced by developer interest, customer demand and the extent to which digital services already have things covered (e.g. billing).

APIs launched so far concentrate on anti-fraud and device location services



The darker the shading, the greater the number of APIs that have been commercially launched.

Source: GSMA Intelligence

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GSMA Open Gateway in action: SIM Swap in Brazil

Fraud detection emerges as leading initial use case

Use case

In December 2023, Claro, TIM and Vivo announced the launch of three network API services focused on improving digital security: SIM Swap, Number Verify and Device Location. The operators have reported good traction for all three, with the highest demand seen for SIM Swap, which is used to check whether a given phone number has recently changed SIM cards. This helps prevent account takeover attacks, in which fraudsters take control of the account owner's SIM card using social engineering techniques and stolen personal data.

Strategy

For this first set of APIs, Brazilian operators have collaborated with Infobip as technical integrator and Microsoft Azure as services platform provider. Working with an intermediary makes it easier for developers to transact with multiple operators. If developers had to pay each operator individually, it could act as a deterrent to API consumption. Brazilian operators are also forming partnerships with other companies to extend the reach of API solutions. For example, Telefónica has partnered with Chainlink Labs to integrate the SIM Swap API, enhancing blockchain transaction security.

Customers

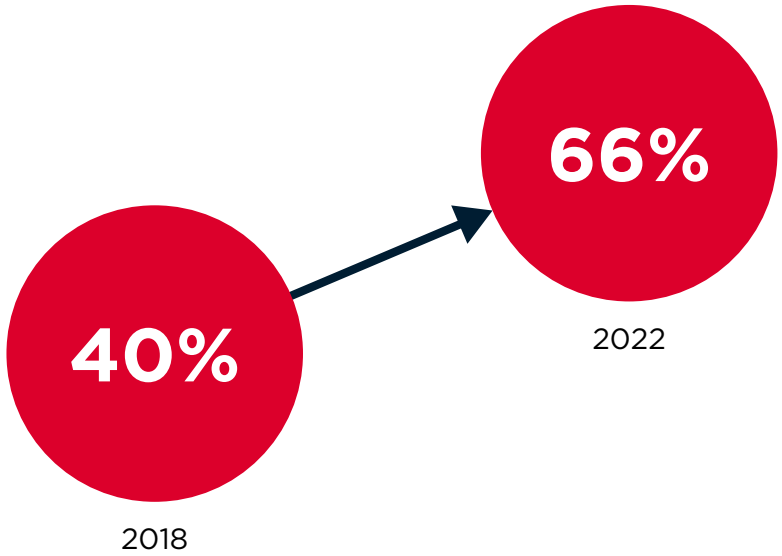
Daycoval – Daycoval is a financial services company in Brazil that focuses on providing credit to companies and individuals. As transactions shift to digital platforms, Daycoval is encountering new security challenges, particularly concerning online scams. To mitigate the risks, Daycoval is integrating the SIM Swap API, with the goal of minimising fraud linked to SIM card swaps. This API empowers Daycoval to bolster security in its onboarding procedures by identifying suspicious SIM card activities and thwarting attempts at identity theft.

Itaú – With customers conducting a growing number of financial transactions through online channels, banks are confronted with new challenges to safeguard customer security. In response, Brazilian operators have collaborated with Itaú, Brazil's largest private bank, to integrate GSMA Open Gateway's SIM Swap API. This helps Itaú thwart potential SIM card swapping crimes and verify the identity of its customers. Itaú can therefore provide its users with a more efficient and secure experience.

GSMA Open Gateway in action: SIM Swap in Brazil

Key data points

Around two thirds of banking transactions are conducted through mobile banking in Brazil
Percentage of total transactions



Source: Pesquisa Febraban de Tecnologia Bancária 2023, Deloitte

Growing demand for the SIM Swap API as surge in mobile banking requires improved user security measures

3m The number of SIM Swap APIs that Claro processed in March 2024.

BRL 1.2m The price per valid request on the SIM Swap API varies according to volume, ranging from BRL0.10 to BRL0.40, indicating monthly revenues of up to BRL1.2 million from the SIM Swap API for Claro in March 2024.

10m The number of SIM Swap APIs that Claro expects to process by mid-2024.

Source: "Claro receives 3 million requests per month for SIM swap API", TeleTime, March 2024

GSMA Open Gateway in action: Quality on Demand in Germany

Operators showcase the value of network quality guarantees

Use case

The Quality on Demand (QoD) API allows an application developer to request a certain quality of service (e.g. stable latency or throughput) for specified application data flows between application clients and application servers. In September 2023, Deutsche Telekom (DT) became the first operator to commercially launch the QoD API. O2 Telefónica and Vodafone (the other two major mobile operators in Germany) are currently testing the QoD API, with a view to commercially launching the capability once testing is complete.

Strategy

DT has established a dedicated business unit called Magenta API Capability Exposure (MACE) to manage its portfolio of network APIs, reflecting the strong endorsement of API exposure by senior executives within the operator. MACE will be responsible for ensuring alignment across the sales and delivery units of DT's local operating companies. The operator has made a promising start in Germany. It has announced multiple API proof of concepts (PoCs) and established go-to-market partnerships with Ericsson, Nokia and Microsoft, broadening its developer audience.

Customers

Siemens – In February 2024, DT, O2 Telefónica and Vodafone announced their joint testing of the QoD API in collaboration with Siemens Energy. Siemens is leveraging this API to facilitate virtually assisted remote maintenance, which entails supporting on-site technicians using augmented reality applications in locations with unstable connectivity. These applications display critical information and guidance directly in a technician's field of view, allowing remote experts to help solve complex problems.

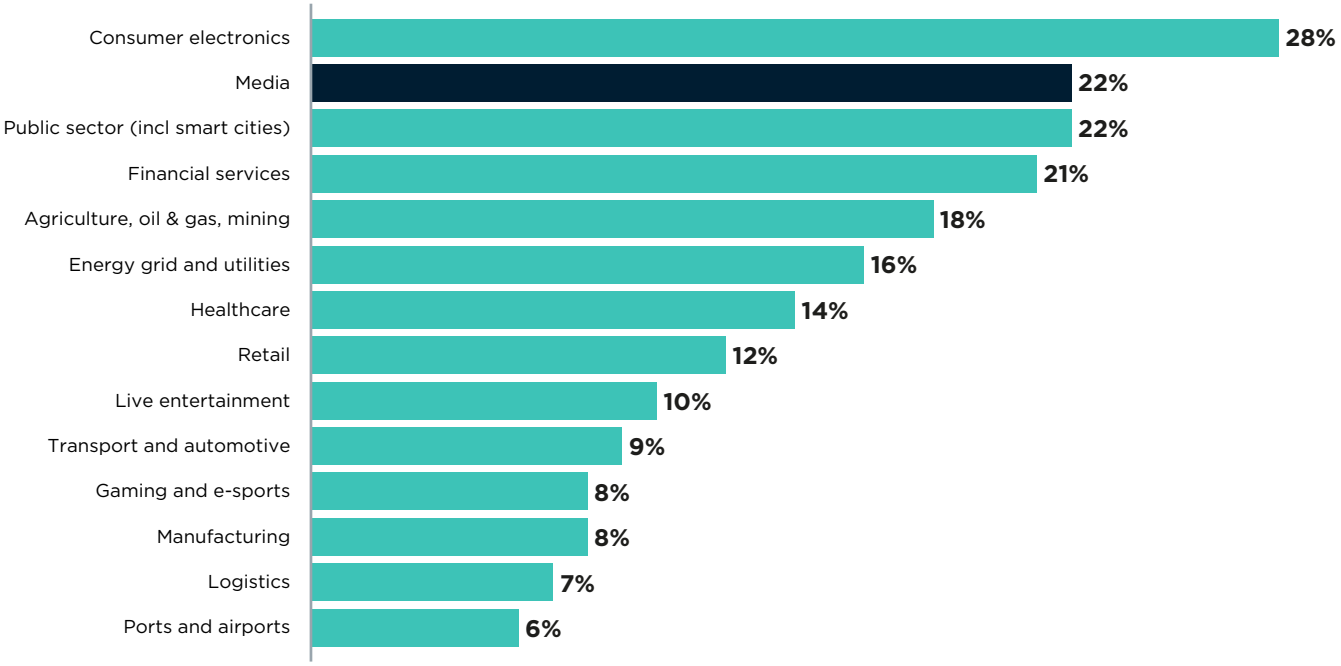
RTL Deutschland – DT's 5G Live Video Production solution went on sale in 2023. The solution leverages the operator's 5G SA and network slicing capabilities along with the QoD API to ensure stable broadcasting for live events. As a result, TV teams can transmit their live HD videos streams reliably, even without a satellite connection. RTL Deutschland is one of the companies using the solution for live broadcasting. It began testing with DT in 2022, before the two companies agreed a full production partnership for the UEFA Euro 2024 Football Championship.

GSMA Open Gateway in action: Quality on Demand in Germany

Key data points

Operators expect strong demand in the media sector for customised connectivity

At present, and thinking about the markets/countries where your company operates, what are the top three industry verticals where you see the highest demand for private wireless networks?



Source: GSMA Intelligence Operators in Focus: Enterprise Opportunity Survey, December 2023

Media companies explore GSMA Open Gateway APIs.
In February 2024, DT and Sony announced they successfully tested network APIs for enhanced live broadcast over 5G. DT has also conducted a PoC with Broadpeak, using the QoD API to improve video streaming quality of experience. These examples show the varied use cases for network APIs in the media sector, as well as the importance of operators engaging with enterprises to demonstrate the value of network APIs. Successfully transitioning customers from PoCs to commercial contracts will be key to maintaining early momentum.

Expanding QoD's appeal.
The true value of network APIs emerge when they are accessible across multiple networks. It will therefore be important for O2 Telefónica and Vodafone to commercially launch their own QoD APIs to make the offering more attractive to developers in Germany.

GSMA Open Gateway in action: Device Status in the US

Operators use APIs to support drone management

Use case

The Device Status API checks the connectivity status of user equipment. The API can be used to confirm whether a device is roaming and the country it is in. It can also provide information on the connection status of a device, confirming whether it is reachable by data or SMS. The ability to access this type of information is valuable in several scenarios, ranging from supporting drone flights to identifying potentially fraudulent SIM card locations.

Strategy

The three largest US operators – AT&T, T-Mobile and Verizon – were among the first operators globally to sign up for the GSMA Open Gateway initiative. Operators continue to make good progress testing the technology and formulating go-to-market partnerships. For example, AT&T and Verizon have both announced partnerships with Ericsson's Vonage and Microsoft's Azure Programmable Connectivity (APC) programme. Meanwhile, Dish was among the first tranche of operators to sign up for Nokia's Network as Code platform. As well as partnering with API aggregators, US operators are stepping up efforts to build direct relationships with developers, as highlighted by T-Mobile's recent efforts to push forward with its DevEdge developer platform.

Customers

AT&T, T-Mobile and Verizon have each carried out tests of the Device Status API in collaboration with developers at US drone manufacturer Inspired Flight Technologies (IFT). The Device Status API allows drone companies such as IFT to improve flight support and management, pinpointing where to send fly-over communications and relief immediately after unexpected weather events to expedite recovery efforts. It can also help drones maintain connectivity mid-flight and allow them to be re-contacted if any technical issues are encountered.

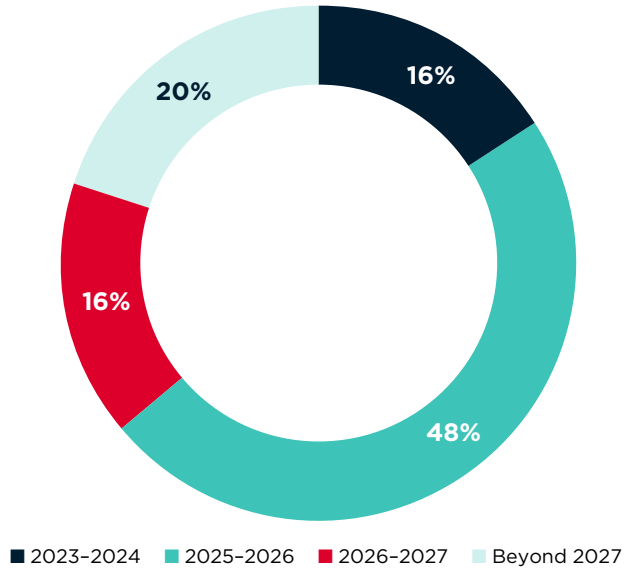
GSMA Open Gateway in action: Device Status in the US

Key data points

With mainstream adoption of UAV services largely anticipated from 2025, operators need to have a UAV strategy in place

Thinking about your target markets, when do you think commercial UAV products/services will become mainstream (defined as there being enough commercial products/services to drive adoption)?

Percentage of respondents from across UAV ecosystem

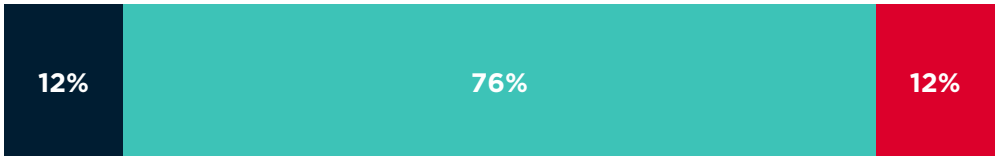


Source: GSMA Intelligence UAV Ecosystem Survey 2023

Operators can leverage GSMA Open Gateway APIs to develop value-added services for drone companies

For non-operators: Thinking about your UAV offerings, what type of involvement and role would you like mobile network operators to have in the UAV market?

Percentage of respondents



Basic services

- Network support for airborne connectivity
- Addressing interference challenges
- Connectivity provision through UAVs

Value-added services

- Data-based services
- Payload applications
- Mobile edge compute
- Network slicing

Comprehensive services

- Full UAV operator services
- UTM system provision
- End-to-end UAV services for industry verticals
- Delivery of goods in urban and remote areas

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06 Solution comparison

Charting the aggregator landscape

Defining a GSMA Open Gateway aggregator and explaining the diversity of the ecosystem

When the GSMA Open Gateway initiative launched, it envisioned API consumers (developers integrating Open Gateway APIs into their code) engaging with operators in one of two ways:

directly
a one-to-one relationship between the developers and an operator.

aggregator
a one-to-many relationship, brokered by a third party connecting into multiple operators.

The role of aggregators in the GSMA Open Gateway ecosystem was reflected at launch. Alongside the operator signatories on MoUs, support from – and use cases involving – AWS, Ericsson (Vonage), Google and Microsoft was front and centre. GSMA Open Gateway developer hackathons sponsored by Nokia, and Infobip's role in enabling the Open Gateway launch in Brazil, signalled the breadth of companies active in the space, including hyperscalers, network infrastructure suppliers and CPaaS players.

The diversity of the aggregator landscape is a function of the diverse ways developers engage with operator network capabilities, along with the technical solutions and infrastructure necessary to expose network APIs. It also provides operators and developers with options for connecting to each other.

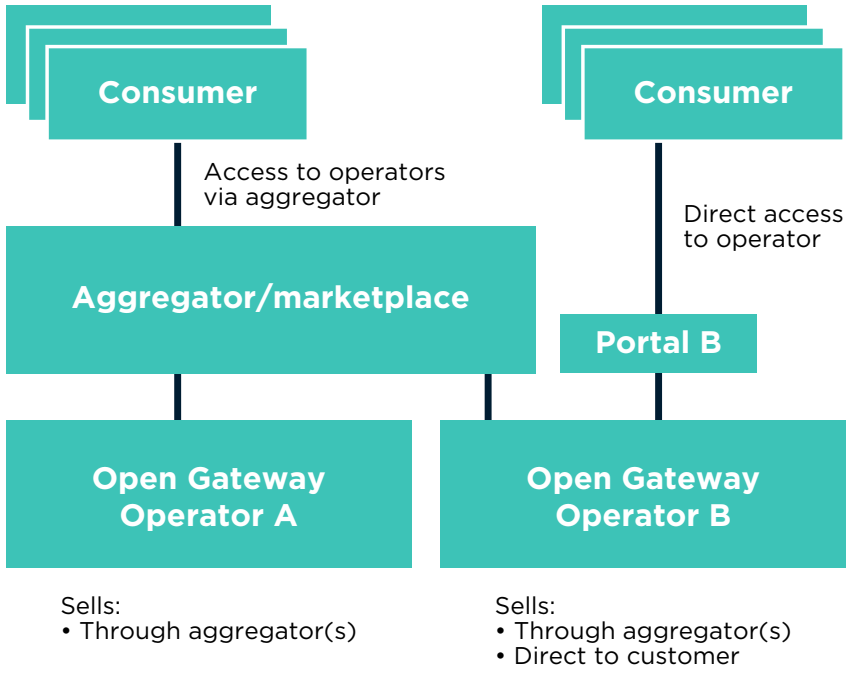
However, this diversity makes direct comparison of aggregator solutions difficult, complicating the decision on who to partner with.

GSMA Open Gateway relationship models

The **consumer** is a developer, application service provider (ASP), ISV, enterprise customer or service integrator that creates code that invokes the service APIs

The **aggregator** may be an operator or third party (hyperscaler, OTT). It sells on behalf of the Open Gateway community and is effective when it represents a high number of operators

Each **operator** sets its own T&Cs with the channels, but there needs to be full alignment on product (standard APIs) and business framework



Source: GSMA

Charting the aggregator landscape

Why aggregators are critical to the success of GSMA Open Gateway

GSMA Open Gateway API aggregators include a 'who's who' of the mobile, communications and cloud ecosystems. They are a diverse set of companies looking to drive use of open network APIs. Envisioned as an integral part of the GSMA Open Gateway architecture from the inception of the initiative, the role they play in unlocking the opportunity is multi-faceted.

Scale

- Aggregators serve as a single channel connecting developers to multiple operators, without the need for individual contracts.
- Cross-aggregator federation supports further reach.
- In many cases, the aggregator will already maintain a substantial developer community, driving value for operator customers.

Billing and administration

- Beyond being a conduit between operators and API consumers, aggregators can manage administration functions related to API access.
- These may include charging and settlement, as well as price setting and exposure.

Developer tools

- For developers to take advantage of GSMA Open Gateway APIs, resources beyond basic documentation will be critical – for example, educational assets and simplified coding environments.
- Where they already work with developers, aggregators will be well positioned to offer these resources, likely integrating them into environments developers already use and understand.

API value-adds

- Aggregators may enrich GSMA Open Gateway APIs to deliver enhanced functionality and value to developers.
- This might take the form of integrating APIs into cloud networking processes and workflows that enterprises already use, or combining GSMA Open Gateway APIs with communication APIs to boost the functionality of existing services.

Demand generation

- GSMA Open Gateway aggregators have an interest in driving usage of the APIs and the broader Open Gateway value proposition.
- To this end, they serve an important marketing function, helping to ensure developers understand the opportunity and seeding demand for Open Gateway API usage.

GSMA Open Gateway aggregator solutions: buying criteria

The diverse nature of the companies serving as GSMA Open Gateway aggregators complicates direct comparisons of them. Ultimately, however, the decision – for operators and developers alike – can be framed in terms of a set of solution characteristics and capabilities. These buying criteria capture the current positioning, strengths and weaknesses of the aggregator solutions, providing a basis for evaluation.

Developer position

The way a solution engages with, and supports, developers is key to the value to operators and developers.

Developer reach – network APIs
How many developers are using network APIs (including GSMA Open Gateway) via the solution? This represents scale.

Developer reach – overall
Beyond network APIs, how many developers are engaged? This provides an indication of its potential and attractiveness.

Developer resources
Training and tools to simplify the use of GSMA Open Gateway APIs, helping developers take full advantage of the capabilities available.

API support

Aggregator solutions connect developers to operator networks via exposed APIs. The APIs supported define its reach.

GSMA Open Gateway APIs
Which Open Gateway APIs are supported? This indicates maturity and capability breadth.

Network APIs
The network APIs supported in addition to GSMA Open Gateway. This is a further sign of solution maturity and potential value for developers when combined with Open Gateway APIs.

Communication APIs
Are communication APIs supported in addition to GSMA Open Gateway and other network APIs, lending broader value?

Business model

Technical capabilities and work with developers aside, the way a solution is sold impacts its fit with operator or developer needs.

Operator positioning
What are the engagement models and go-to-market for working with operators (the operator value proposition)?

Developer positioning
What are the engagement models and go-to-market for working with developers (the developer value proposition)?

Charging models
How do operators, developers and enterprises pay for using the solution?

Solution reach

Alongside the number of developers leveraging a solution, operator and ecosystem partners are key references.

Operator engagement
How many operators are currently working with the solution or solution supplier? This indicates scale alongside developer engagement.

Key customers
Which customers are working with the solution, implicitly endorsing it?

Ecosystem partners
In addition to developers, who else is supporting the solution and adding to its capabilities?

Aggregator solutions: hyperscalers

AWS

Solution: Vonage ISV on AWS Marketplace

Availability: commercial

Developer position
AWS announced a collaboration with Vonage in February 2024 to enlist Vonage's software solution, combining Vonage's software with AWS cloud services using Vonage's APIs on AWS Marketplace. AWS's community of developers will gain access to the software solution.

API support
AWS has been an active Open Gateway supporter since inception. In a blog from early 2024, AWS noted several APIs (Device Status, Quality on Demand, Edge Discovery), showing interest and understanding of the space.

Business model
The release announcing the Vonage software solution on AWS Marketplace highlighted the combination of Vonage APIs with AWS Generative AI services, delivering enhanced developer capabilities thanks to AWS assets and Vonage Open Gateway APIs.

Solution reach
AWS's MWC24 messaging on network APIs included partnerships and collaborations with: Orange, T-Mobile US, Telefónica, Verizon and Liberty Global.

Google

Solution: N/A

Availability: N/A

Developer position
The GSMA Open Gateway launch release noted Google as part of Telefónica's Early Adopter programme. Since then, it was included in the GSMA's MWC24 Open Gateway update messaging but not in any specific deployments cited, and no aggregator solution has been announced.

API support
Until a solution is launched, it is unclear which APIs would be supported. A Live Coding Session at MWC24 saw Google appear alongside ClearX, suggesting API support may come via partners.

Business model
While it is too early to suggest how Google might monetise Open Gateway support, heavy AI messaging at MWC24 suggests a focus on selling API-enhanced Google Cloud services.

Solution reach
Beyond network APIs, Google claims an array of operator customers as well as telco-focused network and IT partners. These all serve as potential GSMA Open Gateway customers and/or partners.

Microsoft

Solution: Azure Programmable Connectivity (APC)

Availability: public preview

Developer position
Microsoft claims 20–30 developers currently leveraging its network APIs, with a broader Azure customer base estimated at more than 500,000 (a potential indication of the addressable market). Developer resources are available via the Azure portal, including videos, documentation and sessions explaining APC.

API support
Three GSMA Open Gateway APIs are supported: SIM Swap, Number Verification and Device Location. Additionally, 11 communication APIs are available via Azure Communications Services, promising integration opportunities.

Business model
Developers pay APIs at the price set by the operators in a marketplace model (with APC billing on their behalf), plus payment for APC platform access. At the public preview stage, access to APC is not charged.

Solution reach
Thirteen operators are claimed as APC partners: AT&T, BT, Claro, Deutsche Telekom, MEO, Orange, Rogers, Singtel, T-Mobile, Telefónica, TIM, Verizon and Vivo.

Aggregator solutions: CPaaS and infrastructure players

Ericsson / Vonage

Solution: Vonage Global Network Platform

Availability: commercial

Developer position
While it is unclear how many customers leverage its network APIs, 1.6 million registered developers are claimed in total. Its developer portal is positioned as a 'one-stop shop' for tutorials, blogs and broader community support.

API support
GSMA Open Gateway APIs include SIM Swap and Number Verification. Eight communication APIs (aggregated) are supported, covering more than 28 communication channels and methods.

Business model
Developers are charged via a pay-per-use model, with other models (subscription, value-based) considered depending on use case. Operators are either 'sold with' (wholesale/retail) or 'sold through' (co-branded resell), with pay-per-use and revenue-share charging models.

Solution reach
Ericsson claims nine operators are using its network APIs. Notable references include AT&T, DT, Singtel, Telefónica, Telkomsel and Verizon. A partnership with AWS extends its developer and solution reach.

Infobip

Solution: Infobip CPaaS / SaaS

Availability: commercial

Developer position
While Infobip claims 12 enterprise customers for its network APIs, it maintains over 50,000 developers on its CPaaS. Beyond documentation, the Shift developer conferences and developer outreach extend awareness and learning. Over 5,000 developers attend Shift events in the US and Europe, and engineer-led content across Infobip platforms reaches more than 50,000 developers monthly.

API support
Twenty communication APIs are supported in addition to five network APIs. GSMA Open Gateway API support includes SIM Swap, Number Verify and Device Location.

Business model
Across both the operator and developer communities, Infobip claims a flexible charging model, including fee per transaction, revenue share and tier models.

Solution reach
Some 23 network API customers (including Telefónica, Vodafone, DT, Orange, MTN and Airtel) join over 800 telco customers in total. API reach is extended via 26 platform customers (e.g. Adobe, Oracle and Salesforce).

Nokia

Solution: Network as Code

Availability: commercial

Developer position
Over 500 developers are on Nokia's solution and Network APIs. A deep set of resources support them, including a developer portal, SDKs, documentation, tutorials, use cases and applications with code.

API support
Twelve network APIs are supported, alongside 16 communication APIs via Infobip. GSMA Open Gateway APIs include Device Status, Number Verification, SIM Swap, Device Location Verification, Location Retrieval, Connectivity Insights and Quality on Demand.

Business model
Operators buy Nokia's Network Exposure Function to expose capabilities. Network as Code is positioned jointly as a platform for 5G monetisation via API usage revenue share. Developers pay per transaction or via subscription bundles, billed digitally.

Solution reach
Its 12 operator customers include BT, Dish, Elisa, Liberty Global, Nos, Telecom Argentina and Telia. Solution partners include Immersal, Infobip, Innova Solutions and Kepit.

Sizing up the aggregators: who's who and who's best?

There is no simple answer to the question of which GSMA Open Gateway aggregator solution is best.

In the early days of commercial availability and solution development, the capabilities and scale of solutions are still evolving. More importantly, the varied nature of today's aggregators means solutions should be seen as more or less attractive to a given developer's needs. Rather than asking which is best in the market, the real question should be: which is best for me?

Hyperscalers

Integrated into their omnipresent cloud services, hyperscalers would seem to offer greatest promise of a compelling, successful GSMA Open Gateway solution. particularly given developer reach (the massive universe of enterprises that already work with them) and operators' increasing embrace of the cloud. For enterprise developers currently working with them, cloud players would seem, at least, a network API natural starting point.

Operators have always had a love/hate relationship with cloud providers, wary of potential competition – especially for the B2B services they hope will help monetise 5G investments. At the same time, network API exposure (and telecoms more generally) is likely to represent a small part of any hyperscaler's revenues, potentially questioning their long-term commitment and reflected in the lack, so far, of commercial solution availability.

CPaaS suppliers

While not as extensive as cloud behemoths, Infobip and Ericsson's Vonage maintain an impressive set of developer and telco relationships. More importantly, they can promise to link network APIs to scaled communication API exposure, to create new and in-demand services, with in-house (Ericsson) or partnered (Infobip via Nokia) network assets, such as the Network Exposure Function, to round out their offers.

Cloud players can bury network API charges in an attempt to monetise other services, but enterprises currently building communication apps will naturally look to CPaaS players when tapping network APIs. A key value proposition will be developer outreach. Infobip's focus on community would seem to transcend sales strategy and could be a powerful differentiator if it can scale GSMA Open Gateway API support beyond its initial offering.

Network infrastructure vendors

Hyperscalers want to sell cloud services. CPaaS players want to enrich communication services. The network vendor angle combines an existential interest in shoring up revenues as network capex plateaus, with support for network capabilities exposure (e.g. Nokia's positioning of NEF assets alongside the Network as Code offer). Operators that have already invested in these assets would be a natural fit to engage on GSMA Open Gateway.

Where they would seem disadvantaged is in developer reach. Ericsson aims to resolve this via Vonage, bolstered by an AWS partnership. Meanwhile, Nokia's Network as Code offer also claims impressive developer scale. Its focus on extending this – via sponsored Devcon events, extensive developer resources and a partnership with Infobip – shows it is serious about bringing demand to the Open Gateway opportunity.

Sizing up the aggregators: who's next?

The GSMA Open Gateway aggregator landscape is rapidly evolving.

Announced solutions are being market tested or polished for general availability. Operators and developers are gaining access to these solutions, developing an understanding of how they work and what they can deliver. While a handful of players have dominated early aggregator activity, the market's evolution will also include the arrival of new players, who should add new capabilities and perspectives to the Open Gateway opportunity.

Huawei, ZTE and other network infrastructure vendors

Huawei and ZTE are both GSMA Open Gateway channel partners, with API portal offers. Huawei's inTouch Aggregator, for example, is a cloud service platform delivering communication services via APIs, and working to integrate Open Gateway APIs. ZTE, in turn, recently achieved certification for the Open Gateway QoD API following commercialisation at China Mobile. Commercial aggregator solutions would be a natural follow-on for each.

Whether other infrastructure suppliers follow suit remains to be seen – but in an effort to deliver end-to-end solutions, it would not be surprising.

Chinese cloud providers

The presence of AWS, Google and Microsoft as part of the GSMA Open Gateway launch highlighted the role cloud providers already play in the network API exposure space. However, they are far from the only cloud providers in the market.

Chinese cloud providers – Alibaba, Baidu and Tencent – already maintain API gateway solutions along with scaled developer communities. Following GSMA Open Gateway support from China's three largest operators, the potential aggregator role for Chinese cloud providers is clear.

Operators and friends

Our Open Gateway aggregator definition notes that an aggregator may be an operator or third party. Given East-West interface specifications, federation across operator platforms is possible, allowing operators to act as an aggregator, nationally or beyond.

Operators have a track record of leveraging their assets to support competing services (e.g. network sharing and MVNO offers) to maximise the value of network investments. Connecting broad operator scale to developers may require partnering with other aggregators too.

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