

Private Mobile Networks

May 2022

The GSA logo is positioned in the bottom right corner of the page. It features the letters 'GSA' in a white, bold, sans-serif font. To the right of the letters are three curved, parallel lines that resemble a signal or Wi-Fi symbol, rendered in a light blue or white color. The logo is set against a dark, semi-transparent rectangular background.

GSA

Market Status Update

Introduction

Demand for private mobile networks based on 4G LTE¹ (and increasingly 5G²) technologies is being driven by the spiralling data, security, digitisation and enterprise mobility requirements of modern business and government entities. Organisations of all types are combining connected systems with big data and analytics to transform operations, increase automation and efficiency or deliver new services. Wireless networking with LTE or 5G enables these transformations to take place even in the most dynamic, remote or highly secure environments, while offering the scale benefits of a technology that has already been deployed worldwide.

The arrival of LTE-Advanced systems delivered a step change in network capacity, throughput and deterministic latency. Going forwards, 5G networks will bring increased densities of users and devices, even greater capacity, and further improvements to latency that enable use of mobile technology for time-critical applications.

Private mobile networks are often part of a broader digital transformation programme. This could include the introduction or development of cloud networking and other digital technologies such as artificial intelligence, machine learning and data analytics. More and more applications of the private mobile network will use these capabilities combined with mobile connectivity.

In addition to companies looking to deploy their own private mobile network for the first time, there is a large group of potential customers that currently operate private networks based on technologies such as TETRA, P25, Digital Mobile Radio, GSM-R and Wi-Fi. Many of these customers are demanding critical broadband services that are simply not available from alternative technologies, so private mobile networks based on LTE and 5G could eventually replace much of this market.

The exact number of existing private mobile networks is hard to determine, as details are not often made public. Even trying to track the number of existing customers (where one or many private networks could be deployed) can also be challenging. To improve information about this market, GSA now maintains a database of customer deployments of private LTE and 5G networks worldwide.

Since the last market update, GSA has been working with Executive Members Ericsson, Huawei and Nokia on harmonising definitions of what counts as a valid customer deployment of one or more private mobile networks, and on harmonising sector definitions. That work has led to a restatement of some of GSA's market statistics.

The definition of a private mobile network used in this report is a 3GPP-based 4G LTE or 5G network intended for the sole use of private entities, such as enterprises, industries and governments. The definition includes MulteFire or Future Railway Mobile Communication System. The network must use spectrum defined in 3GPP, be generally intended for business-critical or mission-critical operational needs, and where it is possible to identify commercial value, the database only includes contracts worth more than €100,000, to filter out small demonstration network deployments.

Private mobile networks are usually not offered to the general public, although GSA's analysis does include the following: educational institutions that provide mobile broadband to student homes; private fixed wireless access networks deployed by communities for homes and businesses; city or town networks that use local licences to provide wireless services in libraries or public places (possibly offering Wi-Fi with 3GPP wireless backhaul) which are not an extension of the public network.

Non-3GPP networks such as those using Wi-Fi, TETRA, P25, WiMAX, Sigfox, LoRa and proprietary technologies are excluded from the data set. Network implementations using solely network slices from public networks or placement of virtual networking functions on a router are also excluded. Where identifiable, extensions of the public network (such as one or two extra sites deployed at a location, as opposed to dedicated private networks) are excluded. These items may be described in the press as a type of private network.

GSA has identified 68 countries and territories where customers have deployed private networks based on LTE or 5G. In addition, there are private mobile network installations in various offshore locations serving the oil and gas industries, as well as on ships.

GSA has collated information about 794 organisations known to be deploying LTE or 5G private mobile networks. Since the last update of this report in February 2021, some organisations have been removed from the database and this analysis, owing to a lack of evidence that they met the definition criteria. These examples may be added again in the future.

GSA would like to thank its Executive Members Ericsson, Huawei and Nokia for sharing general information about their network deployments to enable this dataset and report to be produced.

¹ The set of requirements that need to be fulfilled by a 4G LTE system is defined by the IMT-Advanced specifications. 3GPP implements this in Release 8 through Release 14.

² The set of requirements that need to be fulfilled by a 5G system is defined by the IMT-2020 specifications. 3GPP implements this in Release 15 through Release 18 (18 is the latest release in current development).

Players and Market Statistics

The private mobile network market is home to a wide range of service providers, including equipment and technology suppliers, mobile network operators, system integrators and the private network end users (who sometimes take responsibility for installing or operating their own infrastructure).

GSA has counted over 50 equipment vendors that have been involved in the supply of equipment for private mobile networks based on LTE or 5G. Commercial availability of pre-integrated solutions from several equipment providers increased in 2021; these solutions aim to simplify adoption of private networks, which should add market impetus. In addition, GSA has identified more than 70 telecom network operators (counting national operators within the same group as distinct entities) involved with private mobile network projects.

Also, global-scale cloud providers (often referred to as “hyperscalers”) are offering private mobile network solutions, sometimes in partnership with mobile operators or network suppliers. Their ability to exploit mass-scale cloud infrastructure and their existing presence in commercial enterprises is likely to drive additional growth in the private mobile network market.

GSA has been able to categorise 794 customers deploying private mobile networks, which as Figure 1 shows, are located around the world. Where organisations have subsidiaries in different countries or territories deploying their own networks, each subsidiary is counted separately.

LTE is used by 603 of the catalogued customers deploying private mobile networks for which GSA has data; 5G is being

Figure 1. Countries/territories with organisations catalogued as investing in private mobile networks (pilot projects, deployments and launches)

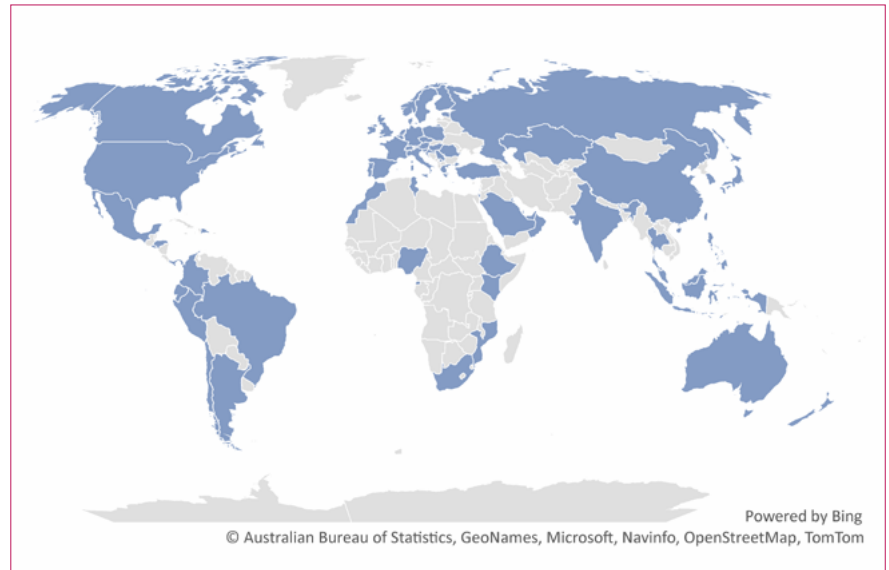
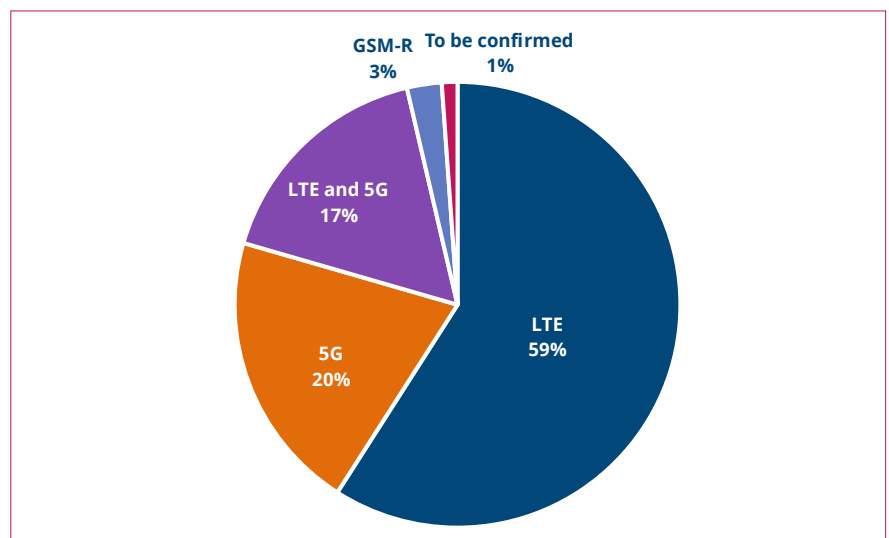


Figure 2. Deployment of private mobile networks by technology (base: 794 catalogued customers deploying private wireless networks)



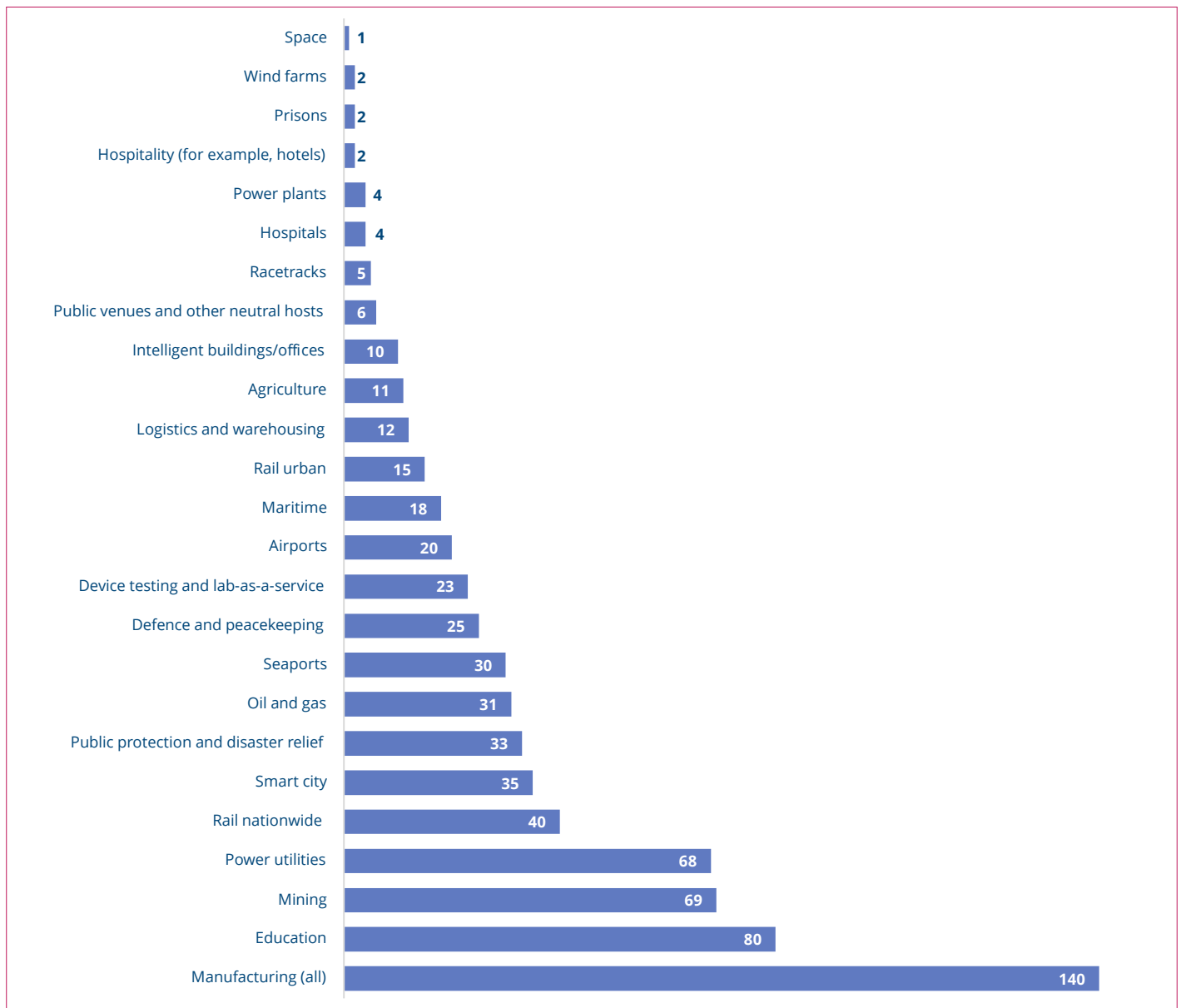
used by 296, 37% of these customers (see Figure 2). Although the proportion of 5G deployments makes up a significant number of references, it must be noted that this number skews toward long-term expensive trials and deployments within educational and test-bed or validation

facilities, with a limited number running real operation in industrial situations. GSM-R, a secure voice and data communication platform specifically for the rail industry, is being deployed by 3% of these customers.

As we build our database, GSA's data suggests that the manufacturing sector is a strong adopter of private mobile networks in terms of the number of customer deployments, with 140 identified companies involved in known pilots or deployments, up from 111 at the end of 2021.

As shown in Figure 3, the education sector is the second most-common group, with 80 customer deployments, followed jointly by mining companies (69) and power utility companies (68). Rail organisations, including nationwide (40), urban (15) and smart cities (35), round out the top five.

Figure 3. Number of identified customers deploying private mobile networks in trials and commercially by sector (base: 794 organisations)



In this update we have also added provided further breakouts of the manufacturing sector, separated into process and discrete with further subcategories (see Figure 4).

Our latest data shows there are 71 discrete manufacturing customer deployments, compared with 42 process manufacturing, with an additional 27 to be confirmed. Of the subcategories, automotive has the most customer deployments, followed by electrical equipment, appliances and components, and then computer, electronic and optical products.

Please note that owing to the removal of projects not meeting the new €100,000 threshold and following a standardisation process in which several customer deployments were reclassified and a wider range of categories introduced, the analysis in this issue is not directly comparable with that in the previous issue.

When viewing these insights, readers should bear in mind that although the data gives an indication of the number of customers deploying private wireless networks, it does not provide a view of the market value of each segment. For example, some market segments, such as utilities or public protection and disaster relief, a customer deployment could represent a nationwide network deployment, equivalent in value to many hundreds or potentially thousands of campus-style private networks.

GSA also tracks the spectrum bands being used for customer deployments assigned specifically for local or private network purposes. Figure 5 shows that, including known spectrum assignments and customer deployments, C-band spectrum is the most widely assigned. After that comes CBRS spectrum (also technically within the C-band, but split out owing to the unusual way it has been assigned in the US).

Figure 4. Deployment of private mobile networks among manufacturing customers, in trials and commercially, by subcategory where identified (base: 82 organisations)

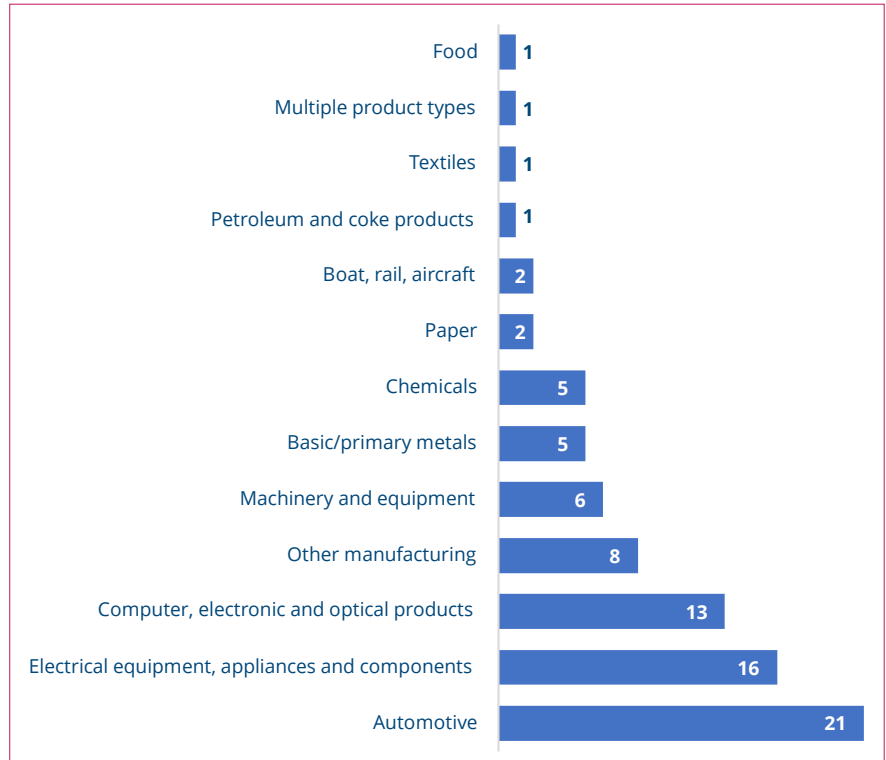
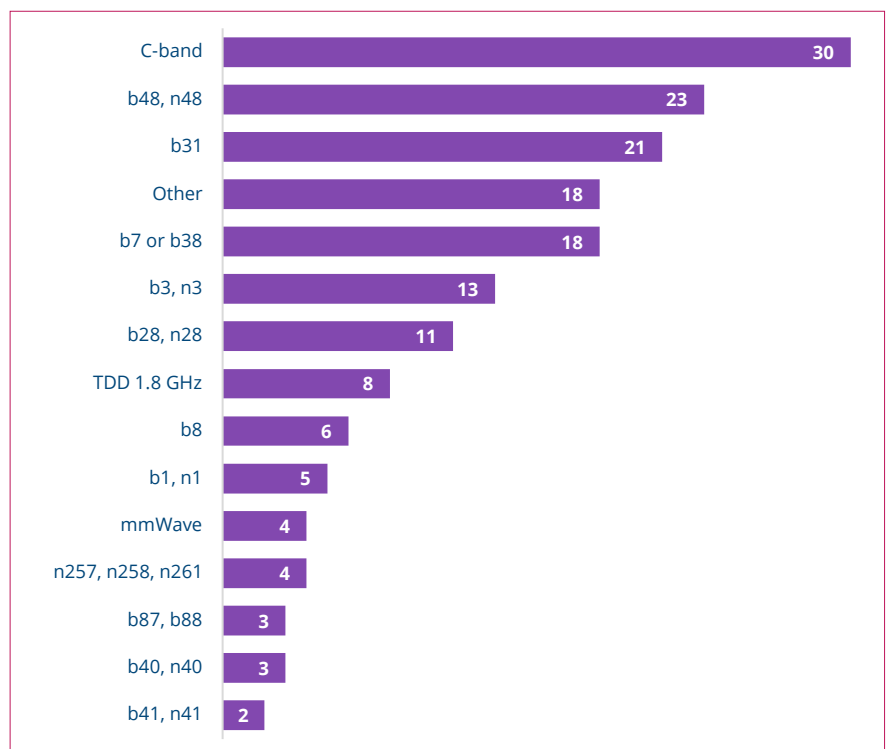


Figure 5. Spectrum bands used for private mobile networks; customer deployments identified using each band (base: 169 organisations)



Telecom regulators are also showing signs of making increased allocations of dedicated spectrum available for private mobile networks — typically small tranches in specified locations.

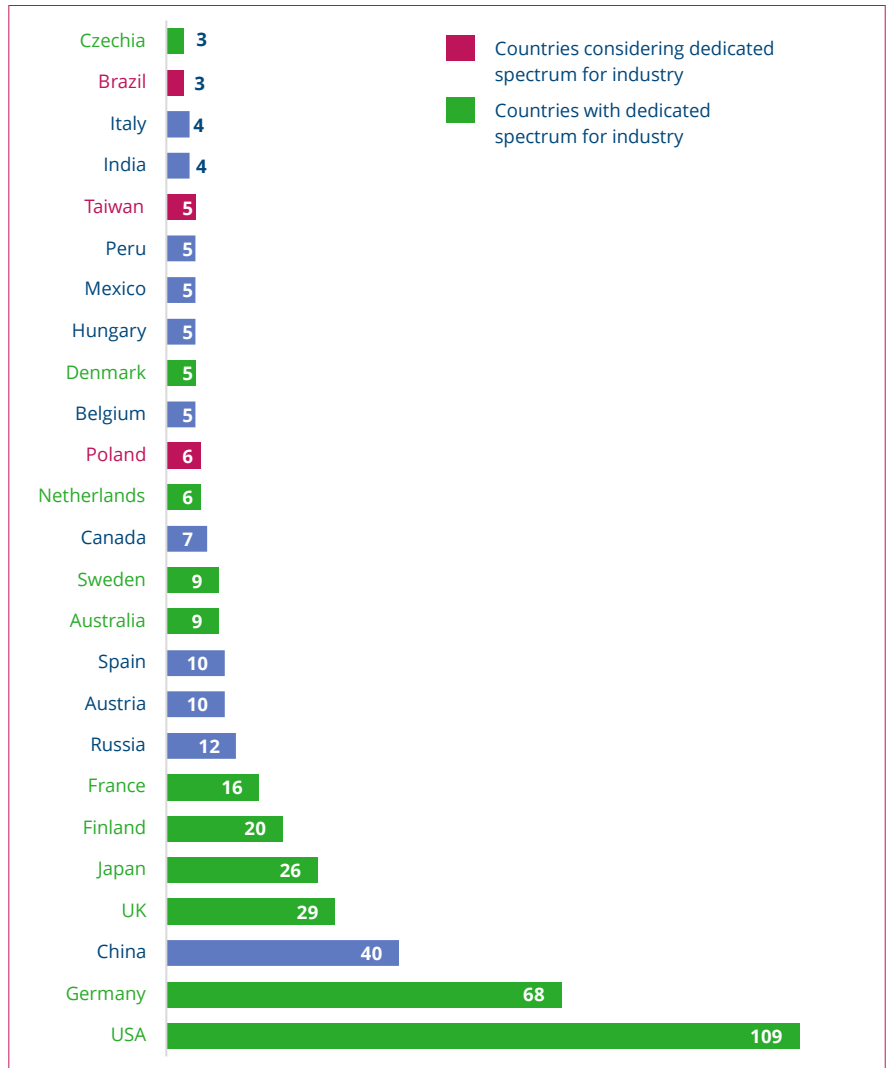
This could be acquired directly by organisations instead of by mobile operators, giving industries an alternative deployment model.

Dedicated spectrum of this sort has already been allocated in France, the US, Germany and the UK, for example, and there is typically a strong, positive correlation between the number of references and countries with dedicated spectrum, as shown in Figure 6.

GSA expects this trend to be followed in other countries in 2022.

Note that owing to the removal of projects not meeting the new size requirement of at least €100,000, the counts are not directly comparable with those in the previous issue, although the patterns are the same.

Figure 6. Customer deployment of private networks, top 25 by country (base: 456 organisations, where country has been identified)



Summary

A large number and a wide range of market participants are actively engaged in developing and delivering solutions for private mobile networks. With so much opportunity, and so many regulators planning initiatives to make spectrum available for LTE and 5G private usage, we expect significant market developments over the next couple of years. GSA will be publishing further statistical updates covering the private mobile sector during 2022.

ABOUT GSA

GSA is the voice of the global mobile ecosystem and has been representing mobile suppliers since 1998.

GSA Research

Mobile industry research is the backbone of GSA activity and covers topics from devices, chipsets and technology, to networks, features and spectrum.

The GSA research team is constantly following market dynamics and activity to ensure the latest data is available to GSA users via the GSA website.

Data is updated monthly and quarterly and can be referenced by users who register for free on the GSA website.

GSA GAMBoD Database

GSA reports are based on extensive data contained in the GSA GAMBoD databases, which is a resource available to GSA members and associates. Companies and policy makers can subscribe, as a GSA associate, to gain access to GSA databases and member reports for additional insights into the source data behind reports, which can be used for their own research purposes.

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