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The pulse of the satellite industry: questions and answers for senior executives 2023

November 2023

About this report

This report looks at the questions that industry leaders in the satellite communications (SATCOM) industry want answers to in 2023. It is based on a survey conducted by NSR, an Analysys Mason company.[1]

The results of NSR's annual survey are a unique source of information about industry trends and issues that demand attention.

This year's survey elicited around 200 responses, illustrating the industry's growing curiosity and concern about the future of satellite and space technology.

The responses span a wide range of topics, although most fall into four categories (Figure 1):

- telecoms
- low-Earth orbit (LEO) and medium-Earth orbit (MEO) satellites
- SpaceX/Starlink
- direct-to-device (D2D) communication.

In this report, we discuss six of the most commonly asked (burning) questions in the industry today in order to provide thought-provoking insights and actionable strategies and to start engaging discussions that will shape the trajectory of the SATCOM industry.

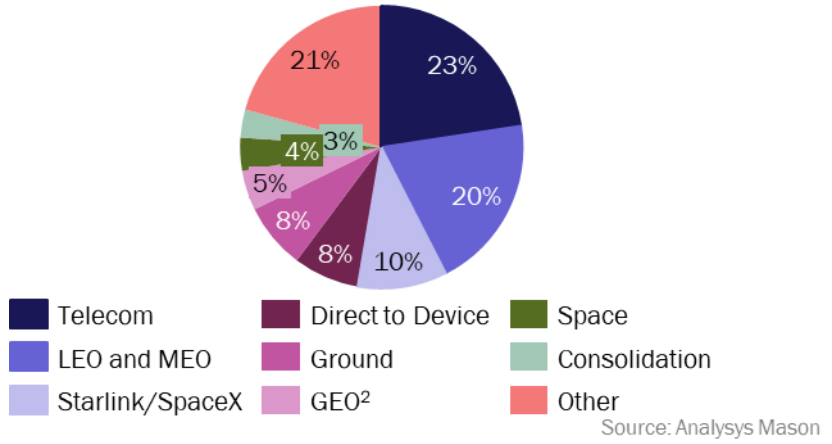
[1] For more information about the survey, see slides 9 and 10.

[2] GEO = geostationary orbit.

QUESTIONS ASKED IN THE SURVEY

- Which telecoms trends should satellite players be most aware of?
- With a challenging economic outlook for 2023, what are the prospects for the SATCOM industry?
- Are SpaceX/Starlink and Amazon's Kuiper the largest threats to the SATCOM industry?
- Can satellite direct-to-device technology live up to the hype?
- Where should satellite operators look for growth?
- Satellite–telecoms integration: how do we get there?

Figure 1: Topics raised in NSR's 'burning' question survey 2023



Source: Analysys Mason

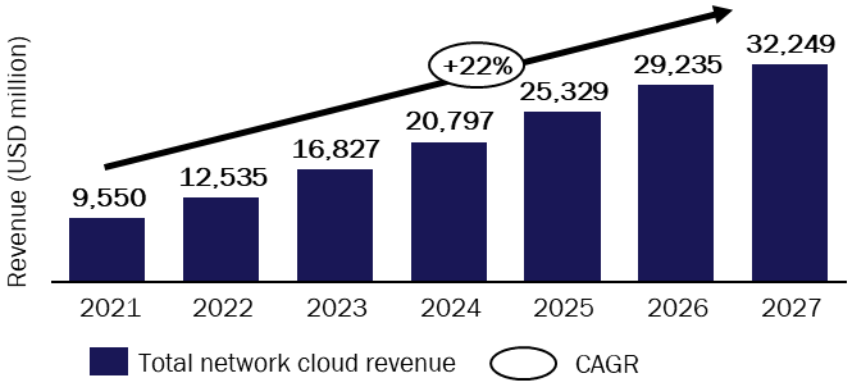
Question 1: Which telecoms trends should satellite players be most aware of?

As the telecoms landscape evolves, satellite players must remain aware of emerging and developing trends to seize opportunities and position themselves as strategic partners in the industry.

Important trends include the following.

- **Cloud infrastructure:** vendor cloud revenue is forecast to continue growing rapidly worldwide with a compound annual growth rate (CAGR) of ~22%, driven by demand for cloud services from operators
  - players like Microsoft demonstrate that satellites have a major role to play through use cases like Azure
  - Amazon's Project Kuiper is expected to offer cloud services for Amazon Web Services (AWS) via satellite.
- **Telcos and mobile network operators:** face growth challenges and see satellite as an increasingly viable option for diversification
  - satellite is expected to continue to be a key enabler for covering hard-to-reach rural areas with broadband services, and for roaming out of mobile coverage areas.
- **IoT:** generates minimal revenue for operators, but satellite could be key differentiator for the consumer market
  - satellites are good for one-to-many broadcasts and communication, which is a major advantage in IoT.

Figure 2: Network cloud infrastructure vendor revenue, worldwide, 2021–2027[1]



Source: Analysys Mason

The **convergence of satellite and telecoms** is another important trend that satellite players should be aware of.

- This is an ongoing journey, with much work, competition and potential ahead.
- Satellite players have started to adopt common architecture and standards used by telecoms operators.
- The costs associated with satellite are high, which is a barrier to integration.
- As costs continue to reduce, the business case for satellite–telecoms integration will become increasingly appealing.

[1] For more information, see Analysys Mason's *Network cloud infrastructure: worldwide forecast 2022–2027*.

Question 2: With a challenging economic outlook for 2023, what are the prospects for the SATCOM industry?

The SATCOM industry maintains a positive outlook despite investors' reduced appetite for risk-taking. Industry revenue has grown with a ~1% CAGR since 2017 but could be accelerated via innovation in emerging trends including the following.

- **Multi-orbit.** Players such as SES and Eutelsat are beginning to combine traditional GEO satellites with LEO and MEO satellites.
- **Software-defined satellites.** A small number of these versatile satellites have been launched, and we expect more to be launched in future.
- **Cloud.** Microsoft Azure and Amazon's Project Kuiper are developed to offer cloud via satellite and will probably be deployed as a hybrid satellite/terrestrial solution in future.[1]
- **Antenna systems.** New LEO satellite systems require more complex antenna systems than those required for traditional GEO satellites. By improving throughput, operators can add value for customers.

Beyond innovation, operators should look to developing more efficient operations through new business models, reducing costs and developing new partnerships (such as Apple and Globalstar).[2]

Investment will not necessarily depend on traditional metrics such as ROCE. For example, Apple's partnership with Globalstar demonstrates a shift in valuation of SATCOM operators.

Figure 3: SATCOM operator revenue, worldwide, 2017–2021

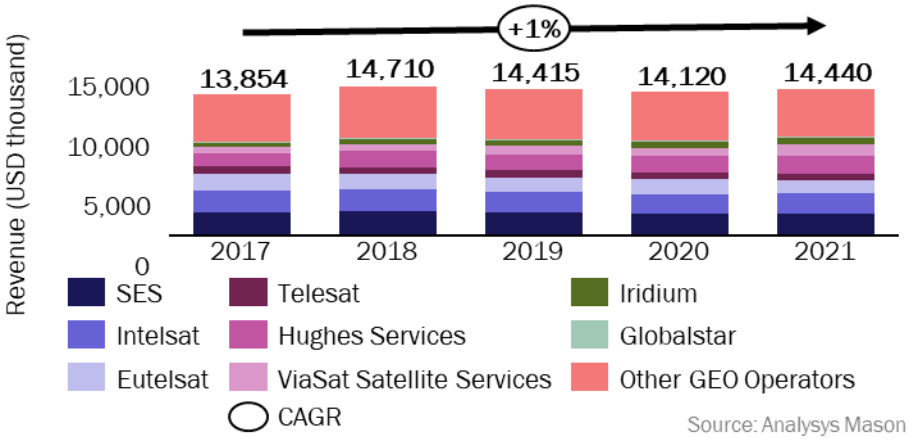
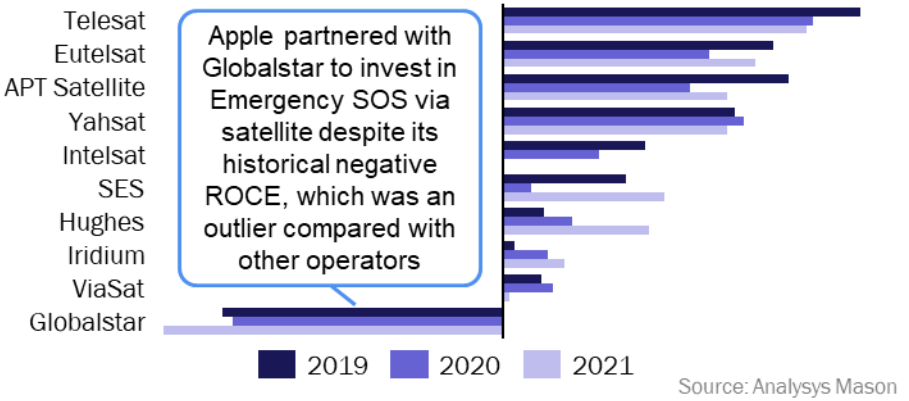


Figure 4: Return on capital employed (ROCE) is a common metric for assessing 'traditional players'



[1] Project Kuiper is expected to launch in 2026 and will likely be integrated with Amazon Web Services to provide cloud via satellite

[2] Apple and Globalstar recently made a significant investment in Emergency SOS via satellite on the iPhone 14.

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Question 3: Are SpaceX/Starlink and Amazon's Kuiper the largest threats to the SATCOM industry?

SpaceX/Starlink[1] and Kuiper are viewed as the biggest threats to traditional SATCOM GEO satellite players due to their capacity for vertical integration and their well-established brands.

- Starlink can benefit from launches enabled by SpaceX at minimal cost, optimising capex and allowing it to offer lower pricing, forcing others to reduce their pricing and margins.
- Amazon's Kuiper will probably integrate with AWS, and its launch will be supported by Amazon's branding, diluting the market and attracting capital away from other players.

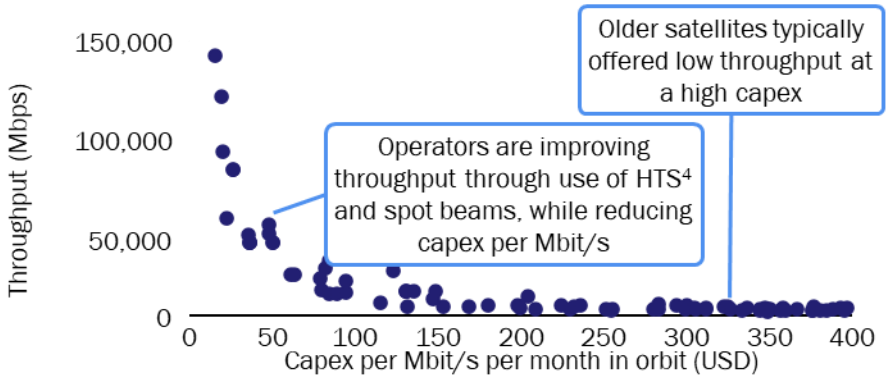
By offering lower capex on a per megabit per second basis, these new constellations threaten traditional GEO players.

- This is compounded by non-SATCOM services (i.e. Earth observation via Starlink's Starshield) being offered.
- In response, traditional players must innovate to reduce their capex to compete with players like Starlink and Kuiper.

However, GEO operators have some advantages over LEO players, and GEO operator revenue continues to grow due to a solid track record, a large installed base, penetration in key countries and other factors, including the following.

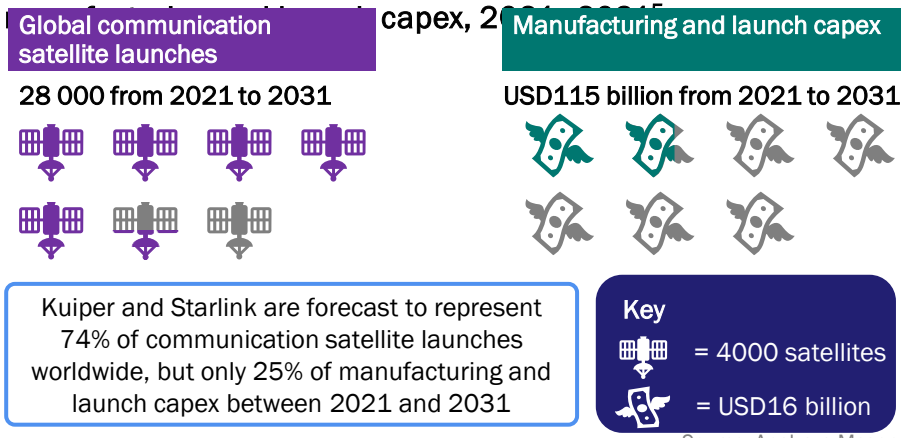
- A few GEO satellites can cover the Earth, but thousands of LEO satellites are required, with a 20–30% sellable capacity.[2]
- Starlink is not developed to offer the non-contended service required for SCADA[3] or military applications.

Figure 5: GEO players' response to Starlink and Kuiper threats



Source: Analysys Mason

Figure 6: Starlink and Kuiper's share of launches, and capex, 2



Source: Analysys Mason

[1] Starlink is a SpaceX subsidiary company. [2] Since LEO satellites are constantly orbiting the Earth, they spend significant time over deep ocean where there is little, if any, demand for their capacity, making this non-sellable capacity. [3] SCADA: Supervisory Control and Data Acquisition. [4] HTS = high-throughput satellite. [5] Coloured proportion indicates proportion of total market represented by Kuiper and Starlink.

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Question 4: Can satellite direct-to-device technology live up to the hype?

D2D services could be the largest opportunity in SATCOM's history, but some challenges must be addressed to make it a mainstream solution.

- **Spectrum availability.** The limited availability of spectrum is a bottleneck that can be resolved with frequency reuse, which would require close co-operation with mobile network operators (MNOs).
- **Wideband coverage** depends on the next generation of satellites; currently only a few traditional mobile satellite service (MSS) operators offer services with limited capabilities to a small number of users.
- **Technical challenges** include managing interference, ensuring network interoperability, developing constellations, manufacturing and launch, all of which are complex.
- **Regulatory and policy issues** such as licensing and spectrum, particularly for solutions using mobile spectrum, must be resolved for D2D solutions to become mainstream.

In order to engage with these challenges, there is a developing D2D ecosystem, consisting of chip and handset manufacturers, SATCOM operators and telecom operators.

D2D's success will be dependent on the collaboration of SATCOM operators with technology, distribution and consumer-facing partners.

Figure 7: Early approaches to D2D services

Vendor-driven: vendors are leading early commercialisation

iPhone 14
- Apple partnered with Globalstar to offer an additional Emergency SOS via satellite service on its iPhone 14 using satellite spectrum
- This was hoped to increase equipment sales and revenue

Motorola Defy
- A partnership of Mediatek, Bullitt, Skylo and Motorola developed Motorola Defy, which offers a satellite service plan that is independent of the MNO, using satellite spectrum
- This generates additional revenue beyond handset sales by enabling two-way satellite messaging

MNO-driven: if/when D2D becomes seamless, MNOs will lead deployment

Coverage above and beyond
- T-Mobile and SpaceX have collaborated to enable text messaging via satellite using T-Mobile's spectrum
- This is intended to enhance quality of service for high-end plans to engender loyalty and attract new subscribers

Future developments
- Future satellite-enabled mobile plans may involve pay-per-use, day passes or monthly add-ons to traditional mobile plans

Source: Analysys Mason

Question 5: Where should satellite operators look for growth?

NSR expects annual revenue in the satellite and space industry to grow with a CAGR of ~6.8% between 2021 and 2031.

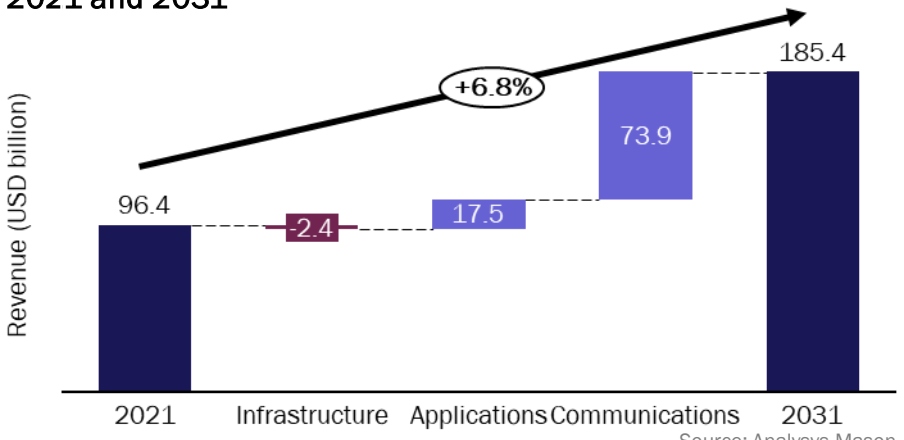
This is expected to be driven by growth in communications revenue, representing growth of ~USD74 billion. However, satellite operators have some important considerations.

- At least 60% of this is expected to come from D2D and consumer broadband, which operators must be able to offer.
- Customers want complete end-to-end solutions, giving a competitive advantage to operators that can offer these.
- Multi-orbit solutions will become increasingly important as a growth area for SATCOM operators.

Three main growth strategy categories are available to SATCOM operators in order to monetise their capacity.

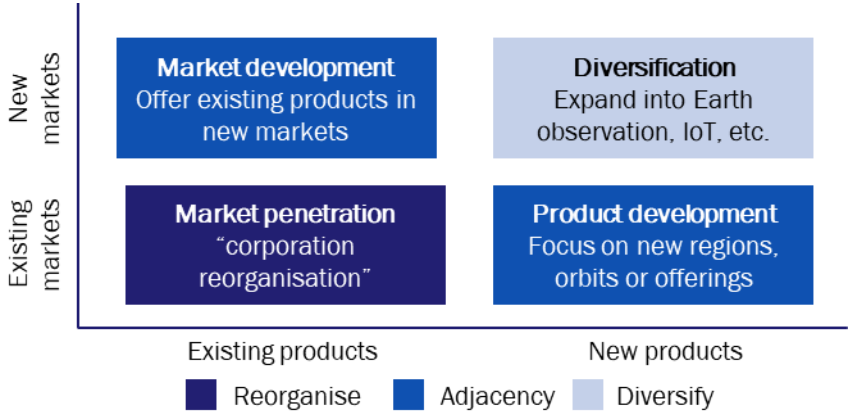
- **Reorganise:** most operators are engaging in processes such as corporation reorganisations optimise operations and structure, allowing operators to improve penetration.
- **Adjacency:** most operators offer Mbit/s-based connectivity, and must expand to new markets (new end users) or develop new products to differentiate themselves.
- **Diversify:** operators can expand into other space mission profiles such as Earth observation and IoT to further monetise their infrastructure.

Figure 8: Satellite and space operator revenue, worldwide, 2021 and 2031



Source: Analysys Mason

Figure 9: Growth strategies for SATCOM operators



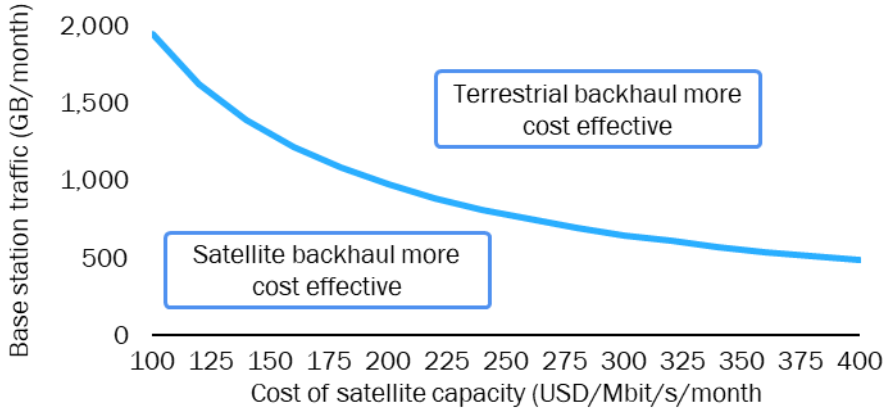
Source: Analysys Mason

Question 6: Satellite–telecoms integration: how do we get there?

In order to achieve satellite-telecoms integration, SATCOM operators need to take four steps.

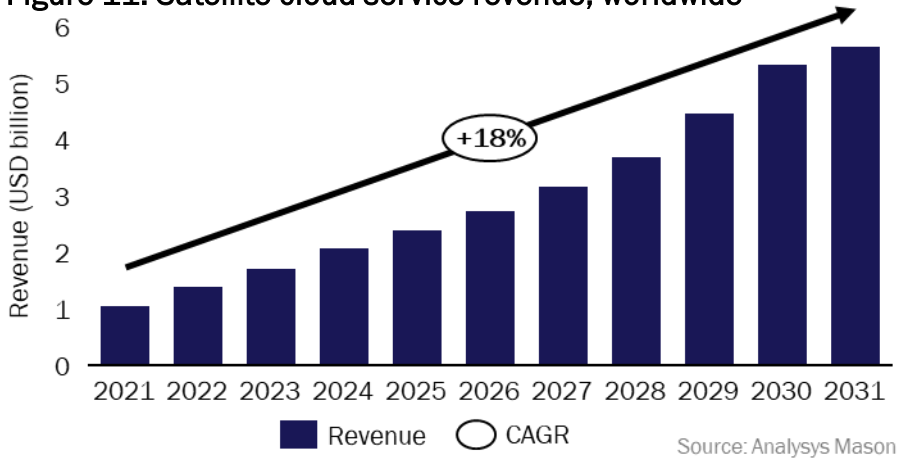
- **Acknowledge and embrace the commoditisation of satellite technology:** as access to space becomes cheaper and easier, satellites will increasingly appeal to telcos.
  - As the cost of satellite decreases, new applications will become attractive for telcos (for example, for backhaul, consumer broadband, private networks and mobility).
- **Adopt common standards:** it is crucial to ensure interoperability and seamless integration with existing telecoms networks.
  - 5G is a significant step in the journey toward integration and unification of terrestrial and non-terrestrial networks.
- **Foster an ecosystem of partnerships:** the expertise of SATCOM and telecoms players must be brought together in order to develop innovative solutions.
- **Cultivate new opportunities:** satellite can unleash new markets and become a growth engine for the telco industry in areas such as D2D, cloud, IoT[1], edge computing and private networks. This is expected to enable year-on-year revenue growth as high as 18% for applications such as satellite cloud.

Figure 10: Comparison of satellite and terrestrial options for wireless backhaul customers



Source: Analysys Mason

Figure 11: Satellite cloud service revenue, worldwide



Source: Analysys Mason

Other popular questions

In addition to the questions discussed on the previous slides, a number of other noteworthy and topical questions were submitted by industry leaders in response to NSR's annual survey. These included the following:

- Where will investment be allocated (with hard data, both commercial and government) for SATCOM architecture, and how will that enable the architecture of the future?
- Where will the spectrum come from to support NSR's predicted 300PB per month 5G D2D market by 2030?
- Multi-band and multi-orbit sounds good on paper, but when will the ground segment support this?
- What kind of telco partnerships should we expect to see SATCOM pursuing in the near future?
- Is there opportunity for multiple SATCOM operators in telco partnerships, or will partnerships largely be set up through a few exclusive contracts with a small number of SATCOM operators?
- When and where will Chinese LEO communications services compete with Starlink, OneWeb and others?
- Are satellite owners currently feeling any pressure to upgrade/update satellite operating systems to be more secure?
- How do service providers differentiate themselves from the competition as bandwidth is becoming a commodity?

Contact us for answers to any of these questions, or your specific questions about the industry.

Methodology and respondent information

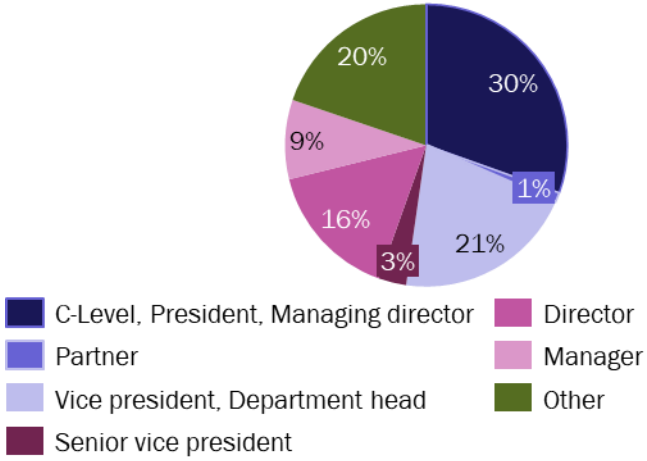
NSR's *Pulse of the Satellite Industry* presents our responses to six key industry questions and incorporates three major inputs: primary research, industry insights and expert validations

- **Primary research.** ~400 registrants to NSR's March 2023 breakfast briefing were asked to submit their questions about the industry that they would like us to answer. Of these, ~200 responses were received.
- **Industry insights.** The background and analysis presented in the *Pulse of the Satellite Industry* draws on a wealth of internal NSR and Analysys Mason research.
- **Expert validations.** Our team of experts in NSR are uniquely qualified.

An analysis of the survey respondents reveals a dynamic mix of industry leaders hailing from diverse sectors such as space agencies, end users, telecoms operators and satellite operators.

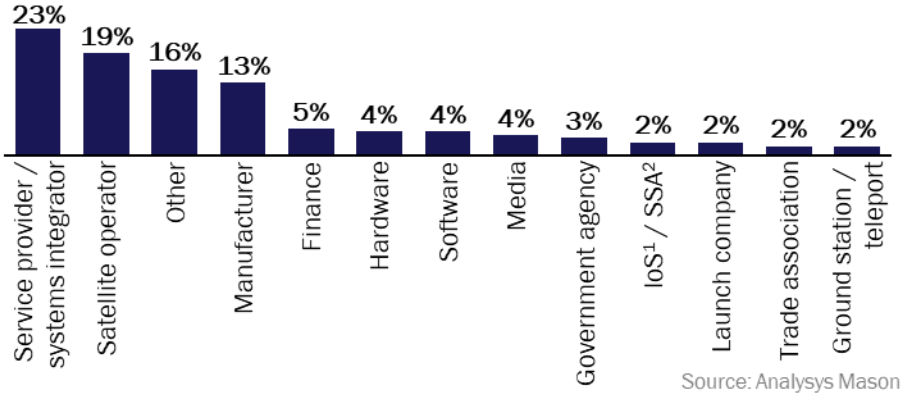
70% of this year's respondents occupy direct decision-making roles within their respective companies, and the remaining 30% serve as influential stakeholders that guide strategic direction.

Figure12: Seniority of survey respondents



Source: Analysys Mason

Figure 13: Area of business of companies attending the breakfast briefing



Source: Analysys Mason

[1] IoS = in-orbit services. [2] SSA = space-situational awareness.

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