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SATCOMS' MUSKONOMICS CHALLENGE

JUNE 2024

INDUSTRY BRIEF - SATELLITES

Executive summary

In this brief, we assess the outlook for the satcoms sector amidst the heightened risk of Starlink and Amazon duopolising the industry. The rationality of the economics behind SpaceX remains a mystery for many, posing a "Muskonomics" challenge for perplexed competitors: how to contend with a company seemingly immune to the conventional constraints of both physics and finance?

Towards a Starlink-Kuiper duopoly?

While Starlink's massive scale has long raised doubts about its financial rationale, we believe its "gigaconstellation" model is proving increasingly viable. The widening gap with competitors like OneWeb and Telesat may still be underestimated. We estimate Starlink and Amazon should represent 95% of the capacity deployed by commercial NGSOs constellation by 2030. In Q1 2024, we estimate Starlink propelled one OneWeb Gen-1 equivalent in mass every month, and twice the capacity. We now see Starlink and Amazon poised to emerge as a near-duopoly due to their unparalleled scale and competitive advantages.

Incumbent operators are caught in a strategic dead-end

Our cost analysis reveals a substantial cost advantage for Starlink Gen-2 and Kuiper compared to competitors, with infrastructure costs at least 50% lower. Operators are retreating to B2B and B2G in the hope of achieving differentiation with higher service quality (such as CIRs and SLAs) and avoiding direct price competition with gigaconstellations. In our view, this strategy will provide only temporary relief, exacerbating the challenges of a sector that is contending with escalating debt costs and diminishing returns on capital. We anticipate a significant decline in capital investment (excluding LEO constellations) in the years ahead.

01

LEOS HAVE WON, WHO WILL WIN LEO?

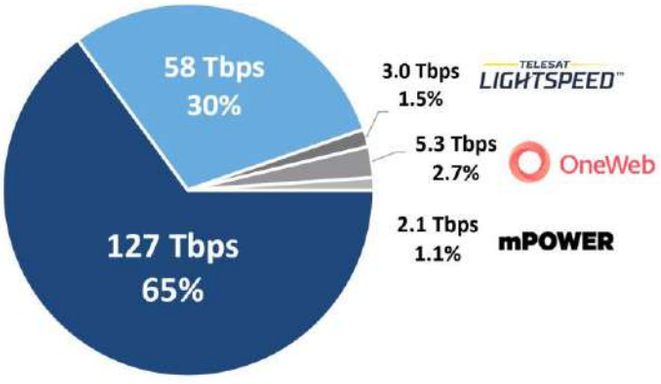
THE CASE FOR A STARLINK-KUIPER DUOPOLY

As LEO constellations have proven competitive against established operators, the size discrepancy between Starlink and Kuiper in comparison to other NGSO players is remarkable. The importance of differentiating them from other megaconstellations may still be underestimated. Should Amazon effectively challenge SpaceX, their unprecedented scale could position them to dominate the market in a quasi-duopoly scenario. Venturing into traditional telecom markets would provide the revenue needed to sustain their massive deployments.

Nevertheless, our estimates suggest that Starlink and Amazon will collectively represent nearly 95% of the capacity deployed by commercial constellation by 2030, eclipsing the combined capacity of OneWeb, mPOWER, and Lightspeed almost twentyfold. Compared to other players, Amazon and Starlink can almost be seen as constellations of constellations, as Starlink Gen-1 is currently operational across approximately five different shells, while the forthcoming Gen-2 is expected to comprise nine shells.

- **We estimate about 200 Tbps of sellable capacity should be deployed by the end of the decade by the five main commercial NGSO constellations**, representing a 52% CAGR from the ~3Tbps satellite capacity supply available in 2019.
- We assume Starlink will launch 5572 V2 mini satellites to complete its Gen-2 fleet (to achieve the FCC-granted total of 7,518 operational satellites), a capacity of 60Gbps per satellite, factoring in a gross-to-sellable adjustment of 30.

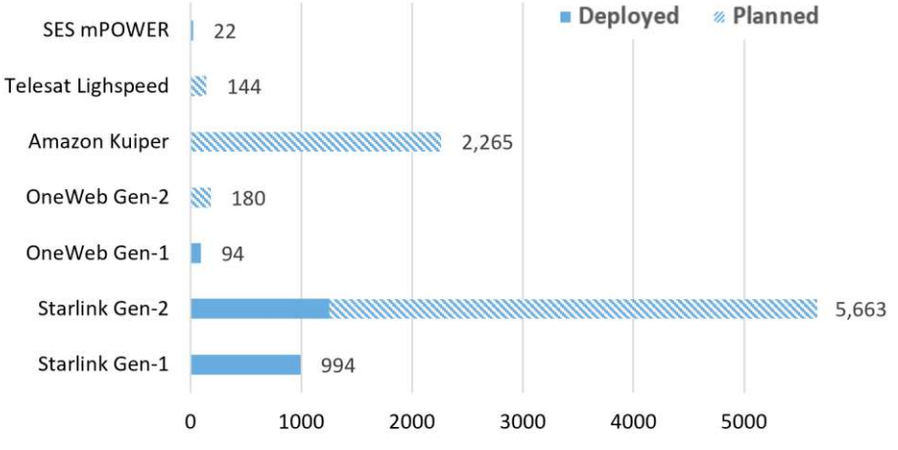
Sellable capacity in 2030e – Commercial NGSO Constellations



Source: BG IRIS estimates

When considering the mass launched into orbit, megaconstellations emerge as an unprecedented phenomenon within the space industry landscape, distinctly centered around Starlink and Kuiper. By 2030, our projections suggest that the cumulative mass of LEO broadband constellations may surpass 10,000 tonnes when sovereign constellations are factored in, mirroring the cumulative mass of satellites ever launched into space (excluding megaconstellations). In the first quarter of 2024, Starlink propelled 479 satellites into orbit, implying to a total mass of ~373t. This launch frequency equates to deploying more than one OneWeb equivalent in mass every month, and more two equivalent OneWeb Gen-1 in capacity. SpaceX is currently likely to perceive Amazon as its primary competitor, given that Amazon is the sole player whose scale and access to capital are comparable to Starlink's.

Megaconstellations: Total mass in orbit (t)



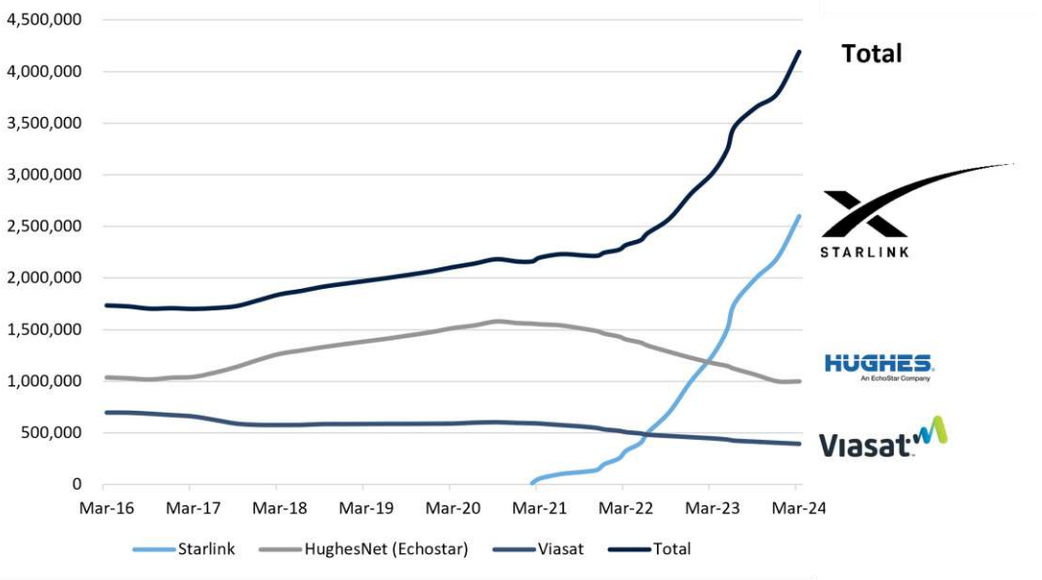
Source: BG IRIS estimates

Gigaconstellations are likely to target non-satellite markets as well

Starlink and Amazon may be eyeing the expansive telecom markets as a growth avenue, given the limited room for revenue growth in satcoms to sustain gigaconstellations' projected launch pace. While they may not significantly disrupt the telecom giants, the revenue potential from gaining market share among terrestrial operators could surpass that of other satellite operators.

Satcoms make up just a tiny slice of the telecom market, less than 2%. IDC expects the global telecom and pay TV services market to reach USD1.541bn in 2023. In contrast, we estimate the global satcom market at about USD29bn, including TV broadcasting (USD5bn), satellite Internet services (USD23bn) and low data rate services (USD2bn) such as satellite phones. Most of the time, satellite operators are not competing with telecoms providers, and are often viewed as "the solution of last resort". Satellite Internet indeed predominantly serves niche markets that are underserved by traditional telecoms (planes, boats, deep rural areas) or cater for clientele for whom reliability and ubiquity of coverage hold precedence over cost considerations (military, emergency response).

Number of satellite internet subscribers



Source: BG IRIS. Starlink's customer numbers includes both residential and non-residential subscriptions.

Despite an increase in subscribers, we believe that the current growth of the satellite B2C market is not sufficient to sustain the scale of gigaconstellations. Since the commercial launch of Starlink in early 2021, we estimate that the number of customers for B2C satellite internet has doubled, based on subscriptions to key players such as Starlink, Viasat, and Hughes. Although Viasat no longer reports its subscriber numbers, we assume a churn rate similar to that of Hughes. This suggests only ~30% of Starlink subscribers originate from Viasat or Hughes (Starlink passed the 2.7m customers mark in April according to the company). However, we are sceptical that the observed market growth justifies Starlink's accelerating deployments, considering its capex likely exceeds that of Viasat and Echostar by a factor of 10x.

The move towards non-satellite markets aligns with industry sources indicating that SpaceX's investor communication is increasingly portraying Starlink's growth potential as centred on capturing substantial volumes of residential internet subscriptions. The current monthly influx of Starlink new subscribers, approximately 100k per month, appears insufficient to absorb the production of user terminals ("Dishy").

The main obstacle to the development of satellite internet for rural mass markets has been its limited and costly capacity. Viasat and Echostar, pioneers in delivering residential internet services to approximately 2m subscribers in the Americas, have long grappled with oversubscribed networks. We believe that Starlink Gen-1 is also relatively limited in terms of capacity to effectively compete with large telecoms. We estimated the total usable capacity (adjusted for unpopulated or commercially restricted areas such as China) of Starlink Gen-1 to be 11.8 Tbps. Assuming a 2 Mbps provision per user, typically sufficient to statistically guarantee 100 Mbps to each user thanks at a 50:1 oversubscription ratio, Starlink Gen-1 could serve globally approximately 6m subscribers with a broadband connection.

However, with the second generation of LEO megaconstellations, this is changing. We estimate the combined capacity of Starlink Gen-2 and Amazon could reach 185 Tbps, enough to accommodate 50-100m subscribers globally with a broadband connection. That compares to the total of 481m fixed broadband subscriptions in OECD countries as of December 2022, according to OECD. Our analysis relies on what we deem as reasonable assumptions drawn from limited disclosures by SpaceX and Amazon concerning their constellations (refer to cost analysis in section 2.1). This calculation is somewhat optimistic however, as it assumes an even geographical customers distribution.

We anticipate significant cost reductions from gigaconstellations, likely narrowing the cost disparity between satellite internet and telecom operators across broad regions. Our analysis suggests that Starlink Gen-1 monthly cost base is USD8 per deployed sellable Mbps for its infrastructure (refer to section 2.1 for detailed cost breakdown). Assuming a global fill rate of 50% and a 2Mbps subscriber provision, this translates to a minimum subscription price of USD32 per month to cover space and ground infrastructure costs alone (excluding user terminal, CAC, and other SG&A expenses). We estimate that Starlink Gen-2 could slash its cost per Mbps to USD1.5, yielding a monthly cost base of roughly USD1.5 per deployed Mbps. At these rates, Starlink could potentially deliver a broadband connection boasting a 100Mbps advertised data rate for a space infrastructure cost ranging from USD5-17 per month, contingent upon fill rate. This aligns closely with the average monthly wholesale fee for FTTH links in France.

Capacity cost of a Starlink broadband subscription – Sensitivity table

Cost base (capex per Mbps deployed per month)

Fill rate (% of sellable capacity)	10 $/Mbps	8 $/Mbps	6 $/Mbps	4 $/Mbps	3 $/Mbps	2 $/Mbps	1 $/Mbps
80%	38	30	23	15	11	8	4
73%	41	33	25	16	12	8	4
66%	45	36	27	18	14	9	5
59%	51	41	31	20	15	10	5
52%	58	46	35	23	17	12	6
45%	67	53	40	27	20	13	7
38%	79	63	47	32	24	16	8
31%	97	77	58	39	29	19	10
24%	125	100	75	50	38	25	13
17%	176	141	106	71	53	35	18

Starlink Gen-1 | Starlink Gen-2 | Amazon Kuiper

Source: BG IRIS estimates. Based on the assumption of 3mbps provisioned by user

Flexibility in pricing strategies from gigaconstellations should enable them to access diverse markets… and introduce significant uncertainties for competitors. Starlink and Kuiper will likely employ "yield management" approaches to optimise fill rates across their entire footprint, potentially making satellite internet an attractive option in low-ARPU markets. The supply and demand imbalances inherent in gigaconstellations are likely to result in considerable price variability within their offerings. If they can command higher prices elsewhere, such as in rural areas in high-ARPU markets like the US or in B2B/B2G sectors, gigaconstellations may still find it feasible to offer lower pricing locally while maintaining a profitable business model. HughesNet recently unveiled its strategy to compete with Starlink for the lower end of the Latin American market by offering lower prices, with the hope that Starlink's pricing won't be excessively low due to terminal costs. However, we are sceptical of the long-term viability of this strategy. Starlink's current pricing likely follows a producer-surplus maximising strategy, considering the near-monopoly it enjoys in residential broadband. Marginal costs appear to be lower than perceived, given that Starlink's offer is currently priced at EUR40 per month in France, with terminals at EUR225.

An update to our scenarios

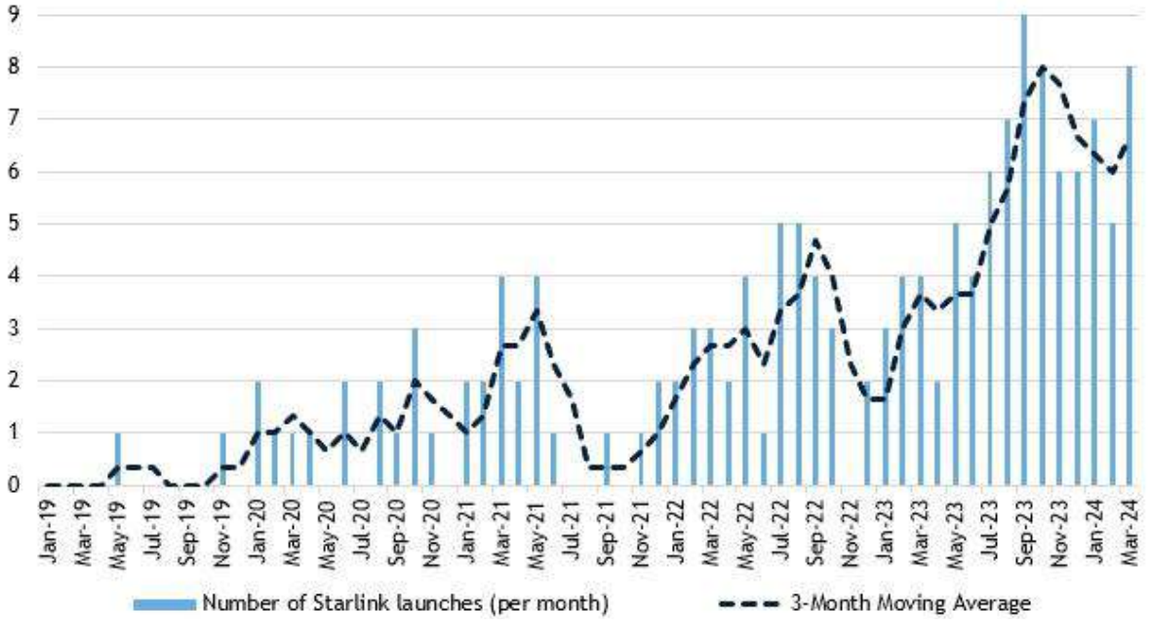
We now view satcoms at risk of seeing the emergence of a near-duopoly as Starlink and Amazon will benefit from scale far exceeding competitors, coupled with their own specific competitive advantages derived from vertical integration and synergies with the rest of their business.

The shift to non-satellite market is not necessarily good news for other satellite operators as (i) it does not prevent gigaconstellations from continuing expansion in B2B market (ii) higher revenues would allow gigaconstellations to sustain a huge cost advantage based on higher economies of scales. In addition, both Starlink Amazon benefit from significantly lower cost of capital, which matters a lot in the capital intensive satcoms industry. The launch cost advantage enjoyed by Starlink is not to be underestimated. Assuming a USD2,000 per kg cost advantage versus market rate, it would represent a cost saving of USD11.3bn for launching the Gen-2. The synergies with its B2C business and cloud services are surely at the heart of Amazon's strategy for Kuiper. The smallness of satcoms market will probably limit the amount of viable competition, especially if Starlink and Amazon manage to penetrate other satellite markets.

The pace of Starlink launches is accelerating. We represent below the monthly number of SpaceX launches related to its Starlink business. The underlying trend is clearly towards an acceleration, and we forecast an operational success of the Starship would further strengthen both the pace of Starlink launches (in mass per month) and its cost advantage. In 2023, SpaceX reportedly generated approximately USD9bn in revenue, with its employee count reaching 13,000 by September of that year. With revenue per employee close to USD700,000, SpaceX surpasses peers such as Airbus (USD470,000) and Boeing (USD450,000). Profitability hinges on value-added rather than revenue alone, and must consider average salaries (likely higher at SpaceX). However, given SpaceX's extensive vertical integration, we believe its model is proving highly successful and remarkably cost-effective.

The pace of Starlink launches is accelerating

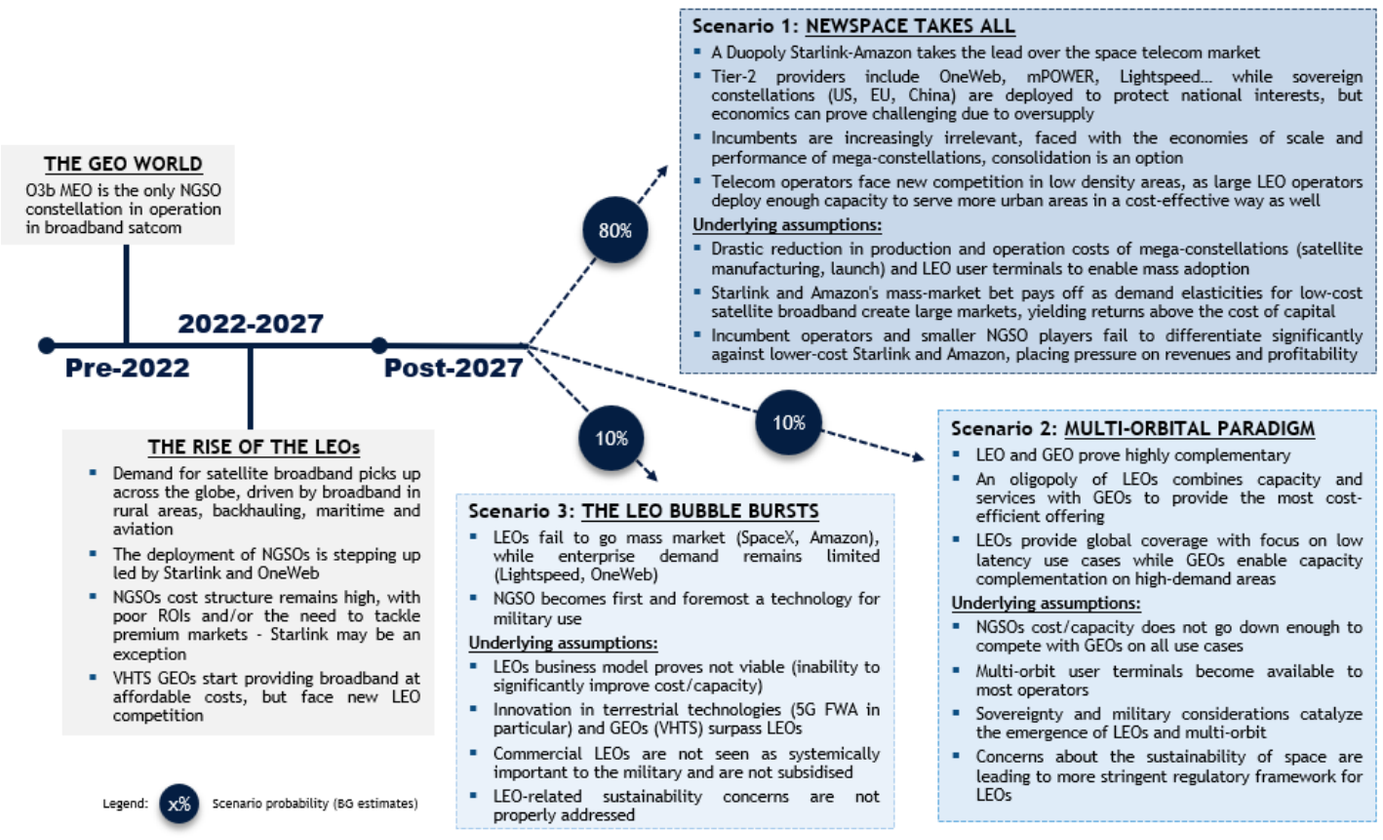
Monthly number of Starlink launches since Jan 2019



Source: BG IRIS, based on data from Jonathan C. McDowell,

In light of recent developments, we now foresee a Starlink-Amazon near monopoly in the satcoms sector as the most likely scenario. We have revised our long scenario probability from 35%/50%/15% to 80%/10%/10% respectively for scenario 1/2/3 (see below). Our primary scenario has shifted from the "multi-orbital paradigm" (where a multi-orbital offer prevails) to "NewSpace takes All' (characterised by Amazon and Starlink dominance while other players struggle to remain profitable). LEO progress has surpassed our expectations in the past two years, so that we anticipate diminishing synergies between integrating LEO and GEO technologies into a unified offering. This expectation stems from (i) the diminishing cost efficiency advantage of GEO over the next decade and (ii) the decreasing relevance of capacity complementation, given the substantial capacity being deployed by LEOs across the Earth's surface.

Our three long-term diverging scenarios for Satcoms



Source: BG IRIS

While our previous projections anticipated GEO-VHTSs would withstand the rise of LEOs throughout the current decade, we now observe significant challenges. The anticipated cost advantage over LEOs has failed to materialise against Starlink, potentially due to SpaceX's aggressive pricing strategy aimed at market penetration, but in our view more likely because of the cost effiency of Starlink. Consequently, we anticipate a drastic decline in new GEO's launches for commercial satcom applications in the coming years (except in broadcast applications), as the business case for capacity complementation with NGSOs constellations seems minimal.

02

THE OPERATORS' STRATEGIC STALEMATE

WHAT CAN THE INCUMBENTS DO?

Faced with gigaconstellations, operators must strategically choose their battles. Our cost analysis indicates that the cost advantage of Starlink and Amazon will compel other players to retreat to niche markets, where they can differentiate their offerings enough to avoid direct price competition. However, such niche markets may prove too limited, exacerbating the challenges for operators facing declining capital efficiency metrics and high debt costs. Iris^2 could offer an attractive strategic option for European players... if the project ever reaches an agreement with the European Commission.

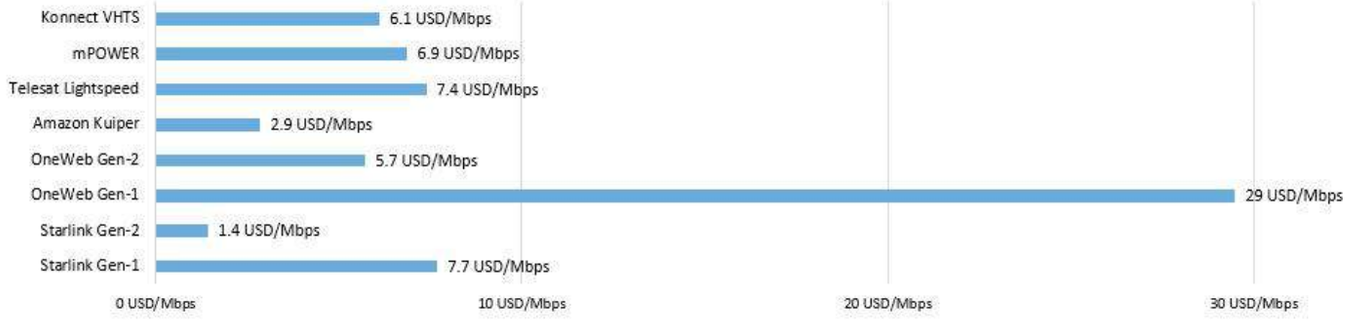
Incumbent operators cannot compete on cost…

Our cost analysis indicates a significant cost advantage for gigaconstellations over competitors, with infrastructure costs at least 50% lower. While gigaconstellations may not directly align their pricing strategies with these reduced costs, opting instead for higher margins rather than undercutting competition, or encountering challenges related to low fill rates, their pricing flexibility poses a significant threat to competitors. This flexibility could potentially act as a Damocles sword hanging over rivals.

We have revised our comparative cost analysis of NGSO constellations using the methodology from our prior reports. Despite uncertainties regarding each constellation designs and costs that necessarily implies a margin of error in these estimates, three conclusions emerge:

- **Amazon and Starlink will enjoy a substantial cost advantage, with a monthly cost base 50 to 75% lower than OneWeb Gen-2, their closest competitor in terms of cost competitiveness**. We attribute much of this advantage to the significant economies of scale inherent in gigaconstellations, impacting satellite manufacturing, R&D, and ground segment costs, alongside vertical integration. Starlink, in particular, benefits from uniquely competitive launch costs, courtesy of SpaceX's in-house launch capabilities. This factor significantly contributes to its cost advantage over Kuiper. Additionally, the execution capabilities demonstrated by SpaceX over the past decade have been impressive.
- **There is little differentiation in terms of cost competitiveness among other NGSO players**. Our estimates range from USD6 per Mbps for OneWeb Gen-2, the most cost-competitive player (excluding Starlink and Amazon), to USD7 per Mbps for Telesat Lighspeed. However, our estimates for OneWeb are based on favourable assumptions, assuming no significant deterioration in system performance despite the capex cut announced last January, while maintaining the lower capex envelope as our cost assumption.
- **OneWeb Gen-1 stands out as an outlier**, with costs almost 4 times higher than Starlink Gen-1. This is despite all the pre-bankruptcy funding, which we do not include in our cost calculation.
- **NGSO costs, excluding OneWeb Gen-1, are expected to align with the current GEO VHTS costs** (illustrated by Konnect VHTS in the table below), and even to be significantly lower for Starlink Gen-2 and Amazon's systems.

Capacity cost analysis *(Capex in USD per sellable Mbps per month)*



Source: BG IRIS estimates.

Cost analysis of leading broadband infrastructure

		NGSO							GEO
		Starlink Gen-1	Starlink Gen-2	OneWeb Gen-1	OneWeb Gen-2	Kuiper	Telesat lightspeed	mPower (SES)	Konnect VHTS (Eutelsat)
Deployment costs per satellite	Satellite mass	300 kg	800 kg	147 kg	600 kg	650 kg	800 kg	1700 kg	6300 kg
	Manufacturing costs per sat	USD 0.45m	USD 0.80m	USD 1.0m	USD 6.0m	USD 1.3m	USD 8.0m	USD 76m	USD 300m
	Manufacturing costs per kg	1500 USD per kg	1000 USD per kg	6803 USD per kg	10000 USD per kg	2000 USD per kg	9973 USD per kg	44492 USD per kg	47619 USD per kg
	Launch costs per sat	USD 0.33m	USD 0.91m	USD 1.2m	USD 1.8m	USD 2.0m	USD 2.4m	USD 24.4m	USD 70.0m
	Launch costs per kg	1111 USD per kg	1136 USD per kg	8000 USD per kg	3000 USD per kg	3077 USD per kg	3000 USD per kg	14332 USD per kg	11111 USD per kg
	Deployment costs per satellite	USD 0.78m	USD 1.7m	USD 2.2m	USD 7.8m	USD 3.3m	USD 10.4m	USD 100m	USD 370m
	Deployment costs per satellite per kg	2611 USD per kg	2136 USD per kg	14803 USD per kg	13000 USD per kg	5077 USD per kg	12973 USD per kg	58824 USD per kg	58730 USD per kg
Constellation	Number of satellites	4408	7518	640	300	3236	188	13	1
	Total satellites deployment cost	USD 3.5bn	USD 12.8bn	USD 1.4bn	USD 2.3bn	USD 10.7bn	USD 2.0bn	USD 1.3bn	USD 0.4bn
	Space segment cost, % of constellation cost	63%	81%	57%	80%	78%	56%	72%	67%
	Other costs (Gateways, R&D, insurance, etc...)	USD 2.0bn	USD 3.0bn	USD 1.0bn	USD 0.6bn	USD 3.0bn	USD 1.5bn	USD 0.5bn	USD 0.18bn
	Total constellation capex	USD 5.5bn	USD 15.8bn	USD 2.4bn	USD 2.9bn	USD 13.7bn	USD 3.5bn	USD 1.80bn	USD 0.55bn
Gross capacity	Theoretical throughput per sat	12.0 Gbps	60.0 Gbps	7.2 Gbps	60.0 Gbps	60Gbps	70.0 Gbps	200Gbps	500Gbps
	% functional satellites	89%	98%	99%	99%	98%	100%	100%	100%
	Total gross constellation throughput	47.3 Tbps	443 Tbps	4.6 Tbps	17.8 Tbps	190.3 Tbps	13.2 Tbps	2.6 Tbps	0.5 Tbps
	Gross capacity unit cost (USD/Mbps)	115 USD/Mbps	36 USD/Mbps	531 USD/Mbps	165 USD/Mbps	72 USD/Mbps	266 USD/Mbps	692 USD/Mbps	1100 USD/Mbps
Sellable capacity (adjustement)	Sellable capacity / gross capacity	25%	30%	30%	30%	30%	30%	70%	100%
	Adjusted constellation capacity	11.8 Tbps	133 Tbps	1.4 Tbps	5.3 Tbps	57.1 Tbps	3.9 Tbps	1.8 Tbps	0.5 Tbps
	Sellable capacity unit cost	462 USD/Mbps	119 USD/Mbps	1769 USD/Mbps	550 USD/Mbps	240 USD/Mbps	887 USD/Mbps	989 USD/Mbps	1100 USD/Mbps
Monthly Cost base	Satellite lifespan	5 years	7 years	5 years	8 years	7 years	10 years	12 years	15 years
	Sellable cost base (capex in Mbps/month)	7.7 USD/Mbps	1.4 USD/Mbps	29 USD/Mbps	5.7 USD/Mbps	2.9 USD/Mbps	7.4 USD/Mbps	6.9 USD/Mbps	6.1 USD/Mbps

Source: BG IRIS estimates.

… so they are retreating to niche markets

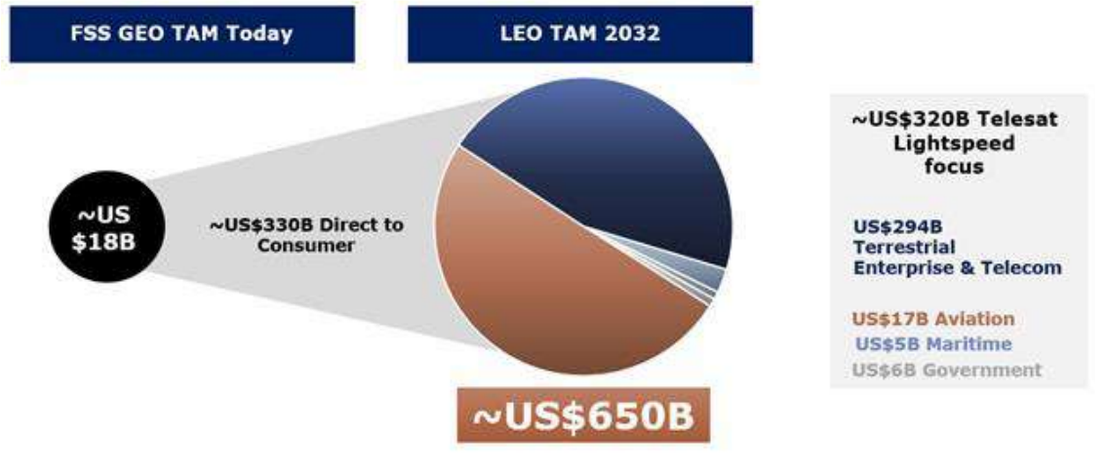
We anticipate that incumbent operators will increasingly target mobility and government markets, in the hope of charging a premium for differentiated and superior service quality compared to gigaconstellations, counterbalancing their higher costs. With scarce investment opportunities, operators confront a dilemma: (i) either hold back on investment to prioritise capital efficiency metrics, risking business contraction, or (ii) pursue growth through investment, potentially resulting in value destruction.

An initial option for established operators to offset their elevated costs is to focus on market segments with higher pricing (typically government services and mobility). But we see a strong risk that Starlink and Amazon may undercut competing offering with aggressive pricing. Although initially aimed at the mass market, we anticipate that both Starlink and Amazon will strive to maximise their fleet-wide fill rates by catering to all verticals and covered regions. There seems to be little reason why they would not pursue market share gains in both B2B and B2G. With their larger scale and substantial unused capacity, competitive pressure on other NGSOs is poised to intensify. B2G segments are likely to exhibit greater resilience against gigaconstellation, given that price considerations are typically less critical, and the inclination to not rely solely on Starlink (and Elon Musk) seems pronounced. Telesat has engaged in business meetings with government agencies in Taiwan, a sign in our view that Taiwan is looking for an alternative to Starlink in the event of conflict with China.

A second option is to differentiate through service quality to justify a higher price (per Mbps). However, the potential "quality-sensitive" B2B market and government customers are limited in size and, over the long run, they remain exposed to substitution risk by gigaconstellation services. We have previously identified five main sources of technical differentiation for a satellite broadband system, excluding costs: (i) Geographic reach, especially beyond +/-50-55° latitude, (ii) latency, (iii) user terminal costs, (iv) upload/download ratio, (v) maximum throughput per terminal. (i) and (ii) are in favour of gigaconstellations, while we believe (iii), (iv), and (v) will become irrelevant as gigaconstellations continue to enhance their hardware. Operators emphasise better service quality than Starlink, particularly with more reliable Service-level agreements (SLAs) that offer Committed Information Rate (CIR, i.e. guaranteed minimum bandwidth), whereas Starlink only provides best-effort service. We anticipate that many customers will prioritise low prices, a trend already observed maritime markets. In most cases, internet service is a commodity.

Telesat Lightspeed's TAM assumptions are aggressive, in our view

A signal that operators' core TAM can't absorb all the capex being deployed?



Source: Telesat

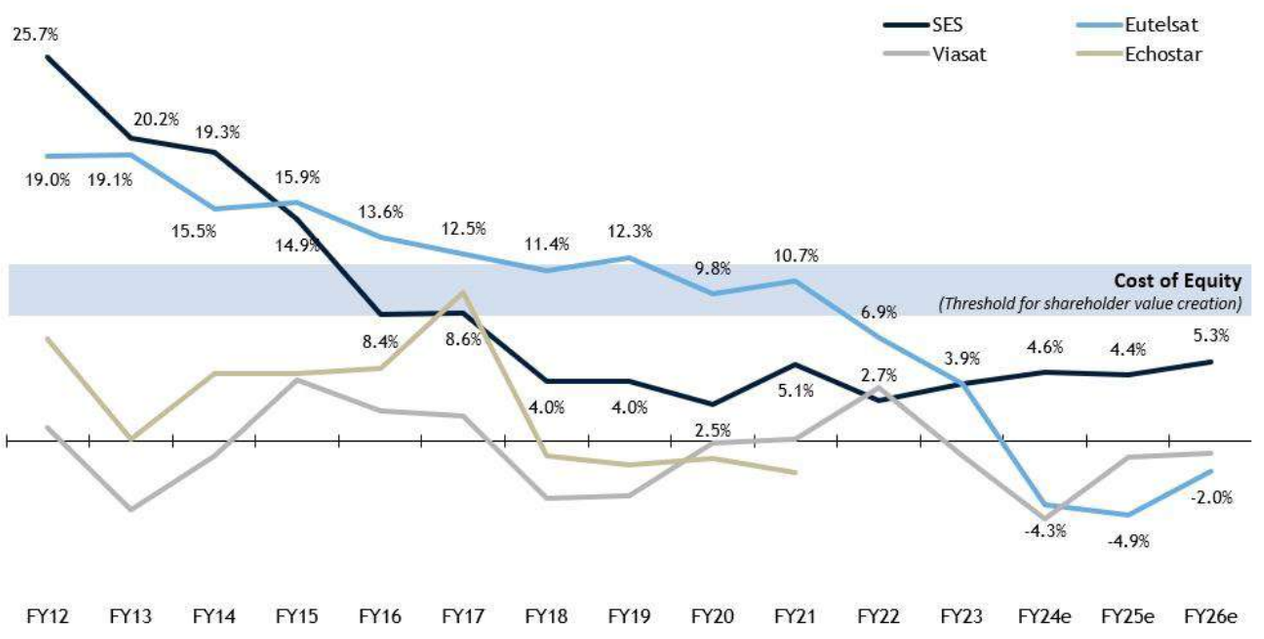
We thus foresee stiffer pricing competition as capacity becomes commoditised. Although Starlink may lack the necessary sales force to penetrate professional and government markets, it can leverage existing satellite communications distributors like Marlink and Speedcast, thereby risking the marginalisation of other operators as capacity providers. Speedcast has introduced dynamic plans enabling customers to switch providers based on availability and costs. Starlink is preferred when accessible, primarily due to its favourable cost per bit. We anticipate a growing number of operators entering into "co-petition" with Starlink, such as the SES-Starlink partnership catering to cruises, effectively transforming into resellers of Starlink services.

We anticipate heightened operators focus on B2B satellite markets, exemplified by HughesNet's recent strategic shift regarding its Jupiter 3 satellite. But they risk facing limited growth prospects due to the escalating dominance of gigaconstellations coupled with pricing pressures and potential oversupply, all of which are likely to squeeze profitability. Euroconsult reports that the maritime services market, including about one-third in capacity revenues, totalled USD1.8bn in 2022, projected to grow at a 6% CAGR by 2032. Similarly, the IFC connectivity services market stood at USD1.6bn in 2022, with an expected growth rate of 13.5% by 2032. Collectively, mobility markets could generate an additional USD300-400m in annual revenues each year (about a third of that at capacity level). Considering the market share gains we expect from gigaconstellations and the history of overly optimistic forecasts regarding satcoms markets, we continue to think the growth opportunities in mobility will be limited for incumbent operators, especially in the medium term when we expect LEO market share gains to accelerate.

Another issue is that the satcom sector is suffering from a capital efficiency problem. The once-very-attractive business model of satellite operators deteriorated with TV-related revenue erosion and now pricing pressures on internet capacity. Metrics such as ROE or ROIC are unlikely to make a recovery, even in the face of growth, as intensifying competition emerges from gigaconstellations. We are particularly wary of the market potential to absorb the substantial capex currently being deployed by SpaceX, Amazon and OneWeb, among others. Overcapacity could quickly lead to increasingly aggressive pricing strategies, accentuated by the predominantly fixed cost nature of satellite operations.

How to make money with satellites? Don't launch them

ROE of main listed satellite operators



Source: BG IRIS, company data, Bloomberg,

Incumbent operators are burdened with debt

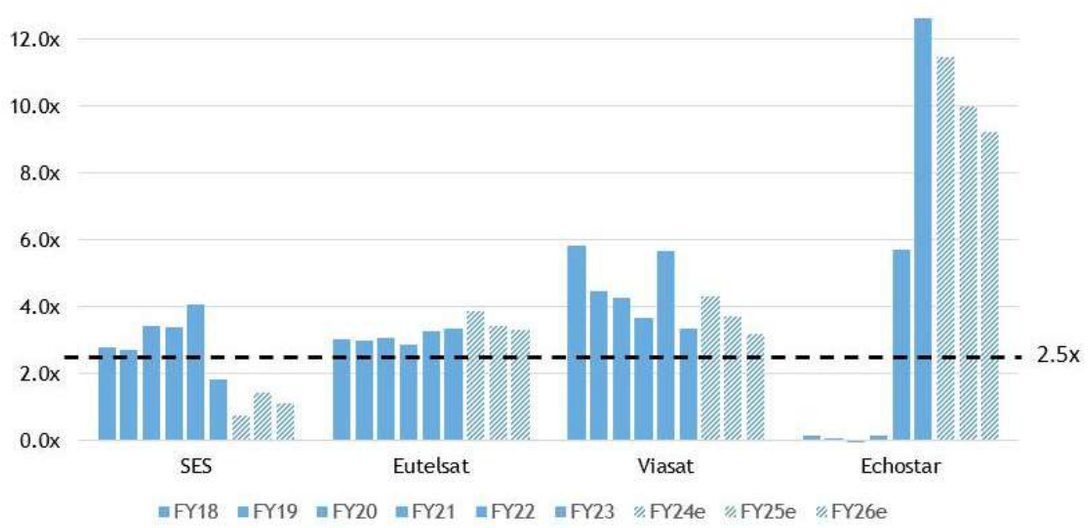
The situation of incumbent operators is now critical from a debt perspective, signalling increasingly high borrowing costs are on the horizon. Many face market distrust, reflected in the significantly high yield to maturity of their listed bonds, most of which are rated as junk by credit rating agencies. Only SES stands out as an exception.

With the exception of SES, all main satellite operators are rated in the high-yield category by the Big Three credit rating agencies. High leverage has weighed on sector ratings, in addition to anaemic growth and structural challenges worsening (decline of video revenues, new competition from LEOs, diminishing visibility on investment...). SES has upheld a robust balance sheet mainly due to the proceeds from clearing the C-band, which facilitated deleveraging. Conversely, Eutelsat's credit profile has significantly weakened following its merger with OneWeb, mirroring the decline seen in Viasat's profile after its merger with Inmarsat.

Operators – Moody's ratings since December 2018

Source: BG IRIS, Moody's

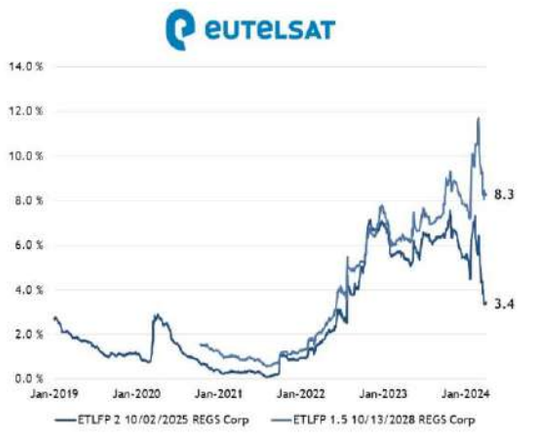
Operators – Net debt to EBITDA ratio

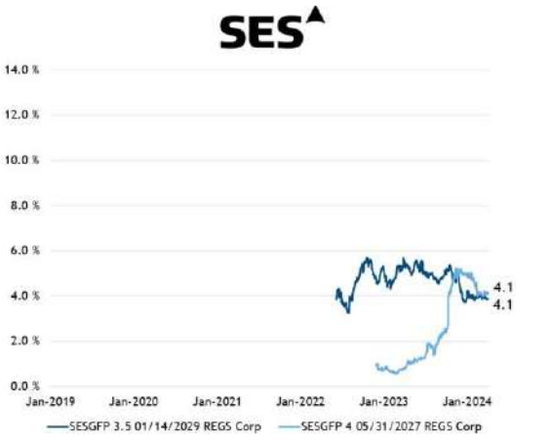


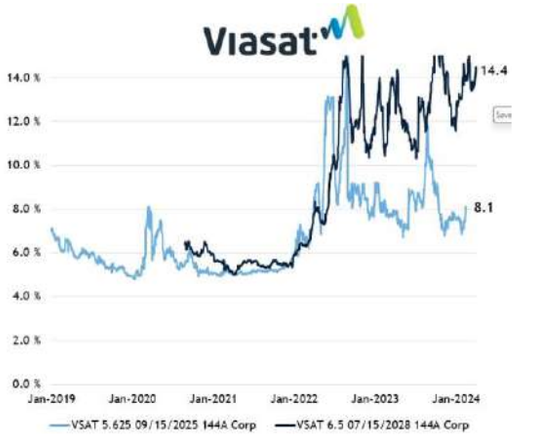
Source: BG IRIS estimates for SES and Eutelsat, Bloomberg

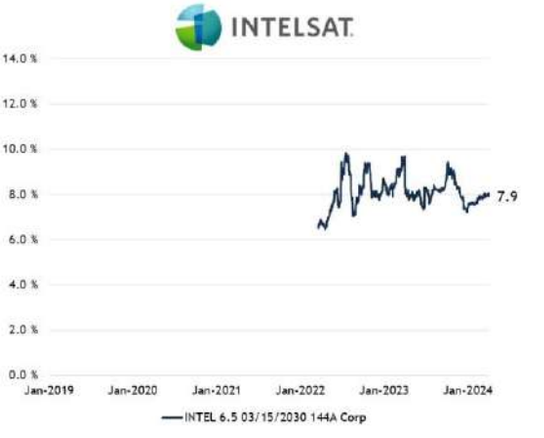
Bond yields for satellite operators are stressed (as indicated by the charts below). Eutelsat's debt received some relief through a successful issuance of EUR600m bonds in March, enabling the repayment of short-term maturities. However, the 9.75% interest rate on the new bond highlights a considerable rise in the operator's cost of debt. Telesat's debt is clearly under pressure from investors discounting significant risks associated with Lightspeed (with YTM rising from 28% to 40% following the announcement of Canadian government funding for Lightspeed). Viasat's bonds maturing in 2028 are trading at a YTM close to 15%, and its shares have plummeted by over 70% since the announcement of its merger with Inmarsat, even underperforming Eutelsat-OneWeb. Despite having deleveraged through bankruptcy and C-band proceeds, Intelsat still trades at roughly 8% YTM on its long-dated bonds, quite similar to Eutelsat.

Satellite operators - Bond Yield-to-maturity (%)









Source: BG IRIS, Bloomberg

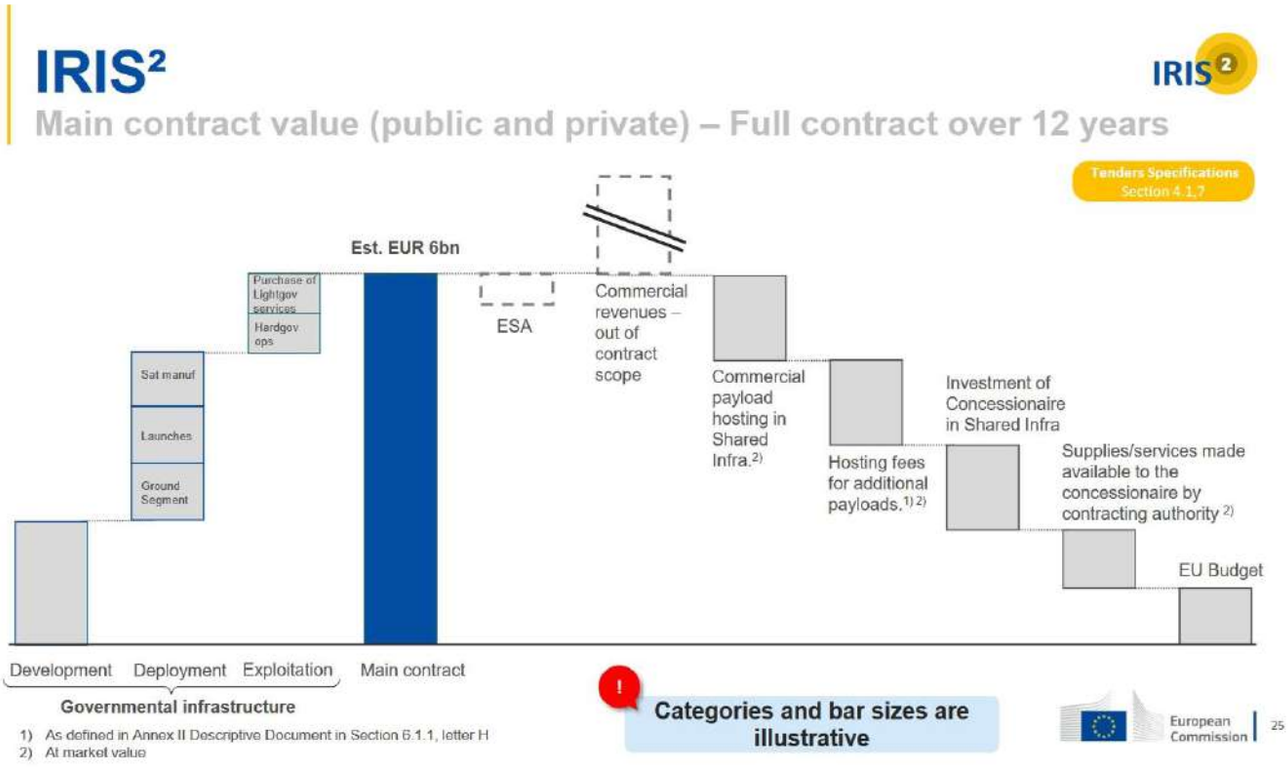
IRIS², an offer that can be refused

IRIS² would undoubtedly be an opportunity for the industry, especially European operators, to overcome a deteriorating situation amidst the rise of mega-constellations. However, the project remains highly complex (politically, technically and financially), and the prospects of reaching an agreement are very uncertain. Delays in negotiations are likely an indicator of low interest in Iris² among European industrialists.

Last July, we warned that IRIS² was an opportunity for European operators, but that an agreement remained uncertain. We believe Iris² offers European operators a chance to resist the gigaconstellation competition by accessing captive markets and subsidised commercial capacity. Our understanding is that operators will be able to become concessionaires (under a 12-year contract) of Iris² if they invest in the project. However, we warned that the consortium may not reach an agreement with the EU, as happened with Galileo. Also, eligibility criteria are putting OneWeb-Eutelsat at risk due to the EU's sovereign requirement of no hindrance from a non-EU actor.

The European Commission is left to negotiate with a unique industrial consortium that is too big to fail, as it basically comprises all the leading European satellite operators and manufacturers. The structuring of the financial arrangements is complex (see extract from Iris information day below). This approach risks undermining the PPP (Public-Private Partnership) if the consortium concludes that it cannot meet all functional requirements in a viable constellation business model.

IRIS² contract breakdown



Source: IRIS² information day presentation

So far, this scenario has materialised as no agreement has been reached to date, as the deadline for the consortium's final proposal has been pushed back several times. Initial deadline was 30 October 2023, but was postponed to mid-February. No agreement appears to have been reached yet. Our industry contacts suggest continued pessimism across the industry about the realisation of such a project under the current framework. Large satellite manufacturers appear to fear cost overruns due to complex technical requirements, and risks related to expected sources of revenues (such as commercial revenues). The mandate for at least 30% of contracts above EUR10m to be subcontracted to smaller businesses also appears to be a limiting factor in the negotiations.

It remains to be seen if the current industry-wide crisis of European commercial satcom will act as a catalyst for Iris². Both Airbus and Thales Alenia Space have announced significant downsizing in their satellite divisions, with 750 and 1,300 job cuts respectively, citing low orders and expectations of structurally weaker demand for commercial satcom satellites (Thales' management has suggested the market has permanently halved). There is a growing sense of urgency within the European industry, acknowledging that traditional GEO players have been slow to adapt. However, key European industry players are likely to back it only if they see adequate profitability guarantees, which currently seem lacking.

03

SPACE PUBLIC & PRIVATE COMPANY AND TRANSACTION ACTIVITY

PERFORMANCE COMMENTARY AND MARKET DATA

Later stage VC funding has dominated European Private Transaction activity, with the biggest SpaceTech fundraisings in Europe coming from Italy, Finland and France. Despite increasing interest in space exploration and satellite technology, the past year has been challenging for listed space companies.

European Private Transaction activity

Top 20 SpaceTech fundraisings in Europe in the past 12 months – April 2024

Date	Target/Investee	Country	Description	Deal Type	Financing Round	Last Deal Size (EURm)
Apr-24	ORBEX	GBR	Launchers	Later Stage VC	Series D	20
Apr-24	ICEYE	FIN	Earth Observation	Later Stage VC	7th Round	86
Feb-24	unseenlabs	FRA	Earth Observation	Later Stage VC	Series C	85
Feb-24	AVEALTO	GBR	Telecommunications	Later Stage VC	Series A	32
Feb-24	Greener wave.	FRA	round Stations & User terminals	Later Stage VC	Series A	15
Jan-24	Latitude	FRA	Launchers	Later Stage VC	Series B	27
Jan-24	maiaspace	FRA	Launchers	-	-	85
Jan-24	PLDSPACE	ESP	Launchers	Grant	-	41
Dec-23	CloudFerro	POL	Earth Observation	Grant	-	22
Nov-23	blackshark.ai	AUT	Geospatial platform	Early Stage VC	Series A	33
Nov-23	D-ORBIT	ITA	In-Orbit Services	Later Stage VC	Series C	100
Nov-23	KUVA SPACE	FIN	Earth Observation	Later Stage VC	Series A	17
Oct-23	ConstellR	DEU	Earth Observation	Seed Round	Seed Round	18
Sep-23	The Exploration Company	DEU	Space Exploration	Early Stage VC	Series A	40
Sep-23	OPEN COSMOS	GBR	Earth Observation	Later Stage VC	Series B	47
Aug-23	RFA Rocket Factory	DEU	Launchers	Later Stage VC	-	30
Jul-23	LEAFSPACE	ITA	Ground Stations & User terminals	Later Stage VC	Series B	35
Jul-23	gravitilab AEROSPACE SERVICES	GBR	Launchers / In-Orbit Services	Later Stage VC	Series A	29
Jul-23	ALL.SPACE	GBR	Ground Stations & User terminals	Later Stage VC	Series C	22
Jun-23	Look Up SPACE	FRA	SSA	Seed Round	Seed Round	14

Source: BG IRIS, Pitchbook

Space and Aerospace & Defence market monitor: Performance commentary

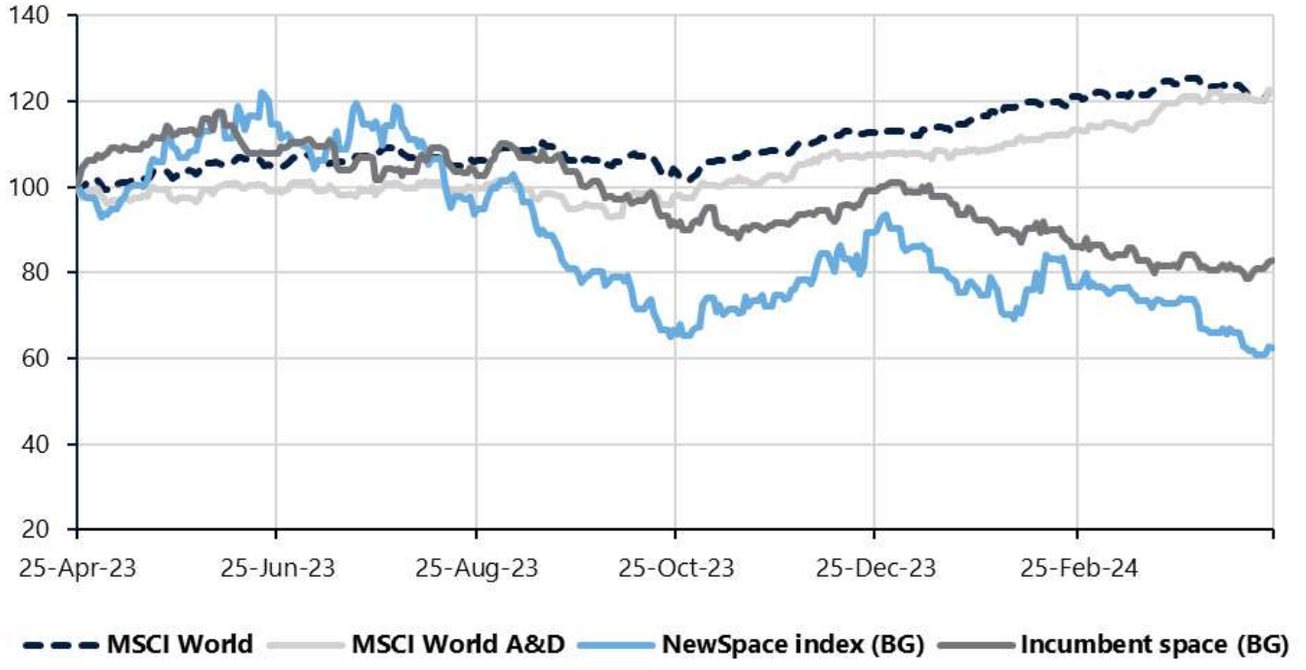
A challenging year for listed space companies

- The A&D (Aerospace & Defense) index mirrors the MSCI World (+22%) over the past year, buoyed by robust performance from European firms, such as aero-engine manufacturers Rolls-Royce (+170%) and Safran (+48%). However, the negative one-year returns of key US primes, including Boeing (-20%), RTX (-1%), Lockheed Martin (-5%), and Northrop Grumman (0%), have weighed on the index.

- Our NewSpace index has fallen by 38% over the past year, with few signs of recovery as most listed companies are in negative territory. Major NewSpace SPACs such as Planet Labs (-53%), AST Spacemobile (-51%), and Virgin Galactic (-72%) have experienced substantial declines.

- Our Incumbent Space index has dropped by 18%, driven by notable declines among satellite operators: Viasat (-50%), Eutelsat (-35%), and Iridium (-53%). Notably, satellite manufacturer MDA has surged by 129%, Globalstar by 41%.

LTM Space index performance – 24th April 2024, in EUR



Source: BG IRIS, Bloomberg. (1) Market cap-weighted price return index, refer to next page for index components.

Market Data: Publicly traded Incumbent Space companies

				Performance (PR)				EV/Sales				EV/EBITDA			
	Company Name	HQ	Market Cap (EURm)	Price at 25/04/2024	YTD	1Y	2023	2022	LTM	CY2024	CY2025	CY2026	LTM	CY2024	CY2025	CY2026
Incumbent Space	EchoStar	US	4,031	14.85	-1%	-4%	-4%	-33%	1.6x	1.6x	1.6x	1.6x	14.0x	14.0x	12.5x	11.1x
	Iridium	US	3,324	27.37	-27%	-53%	-22%	+32%	6.3x	6.2x	6.1x	5.8x	10.7x	10.7x	10.1x	9.4x
	SES	LUX	2,465	5.53	-7%	+0%	-2%	-13%	1.9x	1.9x	1.9x	1.9x	3.8x	3.9x	3.8x	3.7x
	Globalstar	US	2,254	1.20	-32%	+41%	+41%	+22%	11.9x	11.5x	10.7x	10.1x	22.2x	22.5x	20.3x	18.5x
	Viasat	US	1,889	15.07	-40%	-50%	-14%	-25%	1.8x	1.7x	1.6x	1.6x	5.5x	5.2x	4.7x	4.5x
	Eutelsat	FRA	1,804	3.80	-11%	-35%	-39%	-35%	3.6x	3.4x	3.0x	2.8x	6.6x	6.3x	5.6x	5.2x
	Yahsat	UAE	1,460	0.60	-7%	-6%	+1%	-3%	3.4x	3.3x	3.1x	2.7x	5.8x	5.6x	5.3x	4.7x
	MDA	CAN	1,203	10.00	+27%	+129%	+79%	-33%	0.0x	0.0x	0.0x	0.0x	0.0x	0.0x	0.0x	0.0x
	OHB	DEU	832	43.30	+2%	+36%	+31%	-10%	0.9x	0.8x	0.7x	0.7x	10.0x	9.1x	7.8x	7.7x
	Intellian	KOR	450	41.89	-18%	-10%	+4%	-26%	1.9x	1.7x	1.4x	1.2x	16.2x	13.6x	8.5x	7.8x
	Telesat	CAN	356	7.13	-25%	-12%	+35%	-72%	-	5.8x	-	-	-	-	-	-
	Gilat Satellite Networks	ISR	276	4.83	-13%	+14%	+2%	-13%	0.7x	0.6x	0.6x	-	5.2x	4.7x	3.8x	-
	Avio	ITA	291	11.04	+30%	+20%	-12%	-18%	0.6x	0.6x	0.5x	0.5x	9.0x	8.6x	6.3x	5.2x
	KVH Industries	US	88	4.50	-6%	-53%	-50%	+18%	0.2x	0.2x	0.2x	-	1.8x	1.9x	1.5x	-
	Comtech	US	47	1.64	-79%	-83%	-33%	-46%	0.6x	0.6x	-	-	5.7x	4.7x	-	-
	Bigblu Broadband	UK	23	0.39	+1%	-35%	-12%	-49%	0.0x	0.0x	0.0x	0.0x	0.0x	0.0x	0.0x	0.0x
	Median				-27%	-4%	-4%	-13%	1.9x	1.9x	1.9x	1.9x	10.7x	10.7x	10.1x	9.4x
	Average				-21%	-13%	-0%	-3%	4.7x	4.6x	4.4x	4.2x	11.3x	11.3x	10.3x	9.5x

Market Data: Publicly traded NewSpace companies

				Performance				EV/Sales				EV/EBITDA			
	Company Name	HQ	Market Cap (EURm)	Price at 25/04/2024	YTD	1Y	2023	2022	LTM	CY2024	CY2025	CY2026	LTM	CY2024	CY2025	CY2026
New Space	Rocket Lab	USA	1,687	3.45	-31%	-1%	+42%	-67%	5.4x	3.9x	2.7x	1.8x	-	-	99.9x	8.3x
	iQPS	JPN	722	19.86	+144%	-	-	-	-	-	-	-	-	-	-	-
	Intuitive Machines	USA	622	5.09	+120%	-23%	-75%	+10%	6.4x	3.3x	2.2x	2.1x	-	-	26.0x	-
	Planet Labs	USA	494	1.70	-24%	-53%	-45%	-25%	1.0x	0.9x	0.8x	0.6x	-	-	10.0x	3.8x
	AST SpaceMobile	USA	512	2.00	-63%	-51%	+21%	-36%	24.6x	8.2x	2.5x	0.7x	-	-	24.3x	1.5x
	iSpace	JPN	416	4.47	-24%	-67%	-	-	-	-	-	-	-	-	-	-
	Virgin Galactic	US	325	0.81	-63%	-72%	-32%	-72%	-	-	-	-	-	-	-	-
	Spire Global	US	246	9.54	+35%	+89%	-1%	-70%	2.8x	2.4x	1.9x	-	-	20.0x	8.6x	-
	Terran Orbital	US	247	1.22	+19%	-20%	-30%	-83%	1.7x	1.0x	0.8x	0.7x	-	-	19.4x	-
	Blacksky	US	175	1.20	-6%	+5%	-12%	-64%	2.3x	2.0x	1.5x	0.8x	-	16.9x	5.9x	4.3x
	Ovzon	SWE	136	1.21	-7%	-53%	-69%	-16%	6.3x	5.6x	3.3x	3.1x	-	-	7.3x	6.2x
	Satellogic	URY	103	1.14	-28%	-28%	-44%	-67%	-	-	-	-	-	-	-	-
	Mynaric	DEU	125	20.10	-5%	-13%	+30%	-65%	-	2.2x	1.0x	-	-	-	8.2x	-
	GomSpace	DNK	53	0.37	-6%	+150%	+91%	-72%	-	-	-	-	-	-	-	-
	Satixfy	ISR	45	0.53	+62%	-58%	-95%	-16%	-	-	-	-	-	-	-	-
	AAC Clyde Space	SWE	23	4.09	+2%	-34%	-43%	-52%	0.7x	0.5x	0.3x	-	9.0x	4.2x	2.8x	-
	Astra Space	US	14	0.60	-71%	-89%	-66%	-93%	-	-	-	-	-	-	-	-
	Momentus	US	5	0.41	-74%	-98%	-96%	-80%	-	-	-	-	-	-	-	-
	Median				-24%	-37%	-12%	-30%	5.9x	3.6x	2.4x	1.2x	-	-	25.2x	3.8x
	Average				+29%	-32%	-14%	-29%	9.4x	4.1x	2.0x	1.3x	-	-	40.1x	4.6x

Source: BG IRIS, Refinitiv, as of April 24th, 2024.

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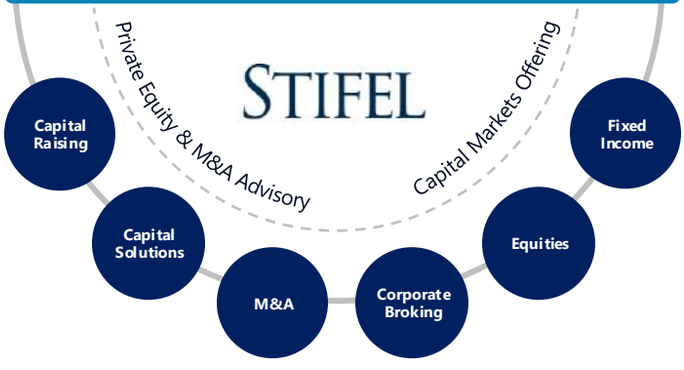

CORE SECTOR EXPERTISE


Diversified Industries


Healthcare


Natural Resources

FIG


Infrastructures


Real Estate


Technology

Note: (1) As at 02 February 2025; (2) as of 31 December 2024

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