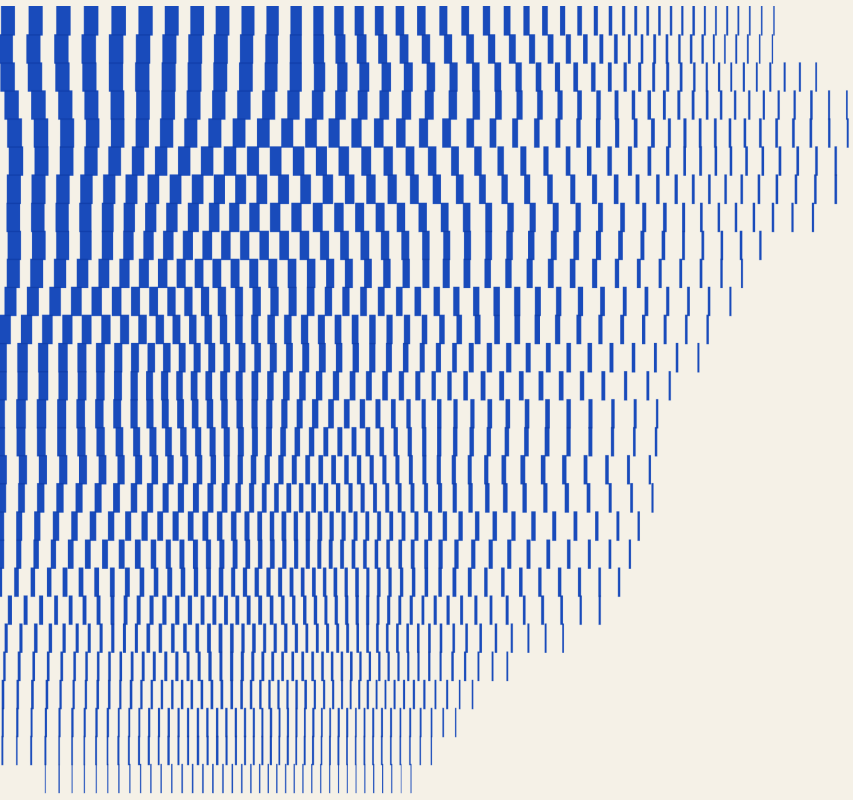
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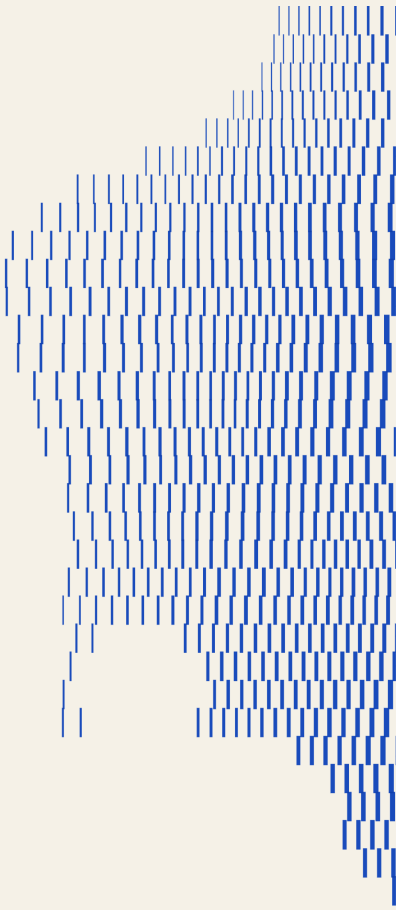
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Disconnected. Germany, Europe, and the cost of the Starlink alternatives

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Overview

- Satellite communication has become a pivotal military capability carrier for Ukraine. Without it, neither Ukraine's own drone strikes nor counter-drone operations would be possible.
- Ukraine depends heavily on Starlink and Starshield provided by US-based company SpaceX, who boasts the by far largest constellation in the world with a combined 10,000 satellites in operational orbit. Europe does not currently possess a viable alternative. The danger of this dependence became especially visible in October 2026, when SpaceX throttled Starlink connectivity over Ukraine. Europe and Ukraine are susceptible to blackmail.
- Europe's current plans are expensive and duplicative. The EU is building IRIS²; meanwhile, Germany is working on SATCOMBw 4. Both networks are supposed to operate in low Earth orbit and perform similar tasks. Both cost around 30 times as much per satellite as Starlink. Despite their high cost, whether the systems will actually close the capability gap remains unclear.
- The economics clearly point toward a joint European constellation. Satellite communication is a club good: the fixed costs are incurred once, and once the system is operational, each additional user adds hardly any cost. Ordering separately means paying those costs twice and squandering economies of scale.
- Europe's search for an alternative to Starlink epitomises the fundamental problem of European defence. Instead of joining forces, states pursue national projects side by side. The result is fragmentation: economies of scale fail to materialise and costs rise. This is why, despite being the world's second-largest defence spender, Europe obtains only limited capabilities in return.
- The way out is European integration. To that end, and in the interest of its taxpayers, Germany must use its defence billions as political leverage to build a unified European defence.

Keywords: Satellite communications, strategic autonomy, defense procurement, European defense, strategic enablers

JEL-classification: F52, H41, H56, H57, L96

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Disconnected.Germany, Europe, and the cost of the Starlink alternatives

Satellite communication has become the pivotal military capability carrier for Ukraine, which largely depends on Starlink and Starshield for its communication along the front line, fire-control, and counter-drone (C-UAV) operations. This dependence is increasingly becoming a problem. In October 2026, the functionality of portable Starshield terminals was throttled; a decision that severely impaired the defence against Russia's new jet-powered attack drones.[1]

As early as February 2025, US negotiators floated cutting off access during talks on a minerals deal.[2] Such pressure is possible because no alternative is available. Officially, access is controlled by SpaceX and Elon Musk; contractually, by the U.S. Department of "War", which procures Starshield for Ukraine. Either way, the decisions are made across the pond. Should the United States again restrict the availability of Starlink/Starshield for Ukraine, Europe could not step in.

Ultimately, Europe's security thus hinges on a system that is politically controlled by the United States. In Europe, two approaches are currently competing to close this capability gap: an EU programme that has already been adopted (IRIS²) and a national German project (SATCOMBw 4). Both pursue the same goal in parallel, with joint costs foreseeably far exceeding those of Starlink.

The culprit behind these high costs is fragmentation in Europe; a state of affairs for which not least Germany is responsible. With SATCOMBw 4, the Bundeswehr is building its own constellation for €8–10 billion. Germany is thus mobilising roughly as much money as Starlink has cost in total – and doing so in parallel with the European IRIS² system, which Germany co-finances through the EU budget and ESA.

The economic problem is clear: satellite networks are club goods. Almost all of their costs are incurred during the build-up; after that, the marginal cost for additional users diminishes rapidly. Any parallelism therefore multiplies the fixed costs without moving the needle on output created. The solution thus lies in a common European approach that prevents costly duplication, harnesses economies of scale and avoids unilateral procurement.

As for the performance of these expensive European systems, it is at least questionable whether the fragmented capacities would ultimately suffice for a conflict like the one in Ukraine – or a larger one. The data is simply unavailable. If they did not, the fragmentation of the planned systems would not only constitute a waste of public resources but a threat to European security. Under plausible assumptions about the growing role of satellite-based communication and unmanned systems, however, it is perfectly conceivable that the planned systems will be insufficient.

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[1] Rushton (2026) and Schuler (2026)
[2] Reuters (2023) and Reuters (2025)

Europe's turf wars in space

Like reconnaissance, strategic airlift and air-to-air refuelling, satellite communication is a *strategic enabler*: a capability without which modern armed forces cannot operate and which, due to the high fixed costs and economies of scale involved, is too costly for individual states to build up on their own (EC and HR, 2025).

Because of its higher orbital altitude, Europe's existing military satellite infrastructure is not designed to control large numbers of drones and unmanned systems, which require low latency. Instead, satellites in low Earth orbit (LEO) are needed, which are not yet available in sufficient numbers.[3] At present, only Starlink, which now has around 10,000 satellites at altitudes of 330 to 500 kilometres, provides this functionality in full.[4]

To close Europe's capability gap vis-à-vis Starlink, the European Commission launched the IRIS^2 programme in 2023.[5] Its 358 satellites, 340 of them in low to very low Earth orbit, are to be operated by a consortium of Eutelsat (FR/UK), SES (LU) and Hispasat (ES) (SpaceRISE, 2025; HispaSat, 20261). Of these 340 satellites, 330 will orbit at an altitude of 1,200 km and 10 below 750 km. The former include 66 satellites dedicated specifically to defence and security.[6] The remaining 18 satellites will be placed in medium Earth orbit (SES, 2026). IRIS^2 is intended to provide governments and armed forces with secure communications. The first launches are planned for 2029.[7]

In parallel, the Bundeswehr plans to expand its SATCOMBw satellite communications system with the SATCOMBw 4 project, adding a layer of 100 to 200 satellites in low Earth orbit. The first 40 satellites are to be operational over NATO's eastern flank in 2029, with full operational capability planned from 2030.[8]

The capabilities of IRIS^2 and SATCOMBw 4 are not identical,[9] but they overlap at their core: both are meant to provide government and military users with secure communications from low Earth orbit. Whether and how a separate German network can substantially complement the capabilities of IRIS^2 and meet the requirements arising from the growing use of unmanned systems remains unclear. What is striking, however, is how much the two systems cost.

It is already foreseeable that, per satellite, the European systems will cost many times as much as SpaceX has spent on Starlink overall. SpaceX reports its roughly 10,000 Starlink satellites (as of 31 March 2026) at a value of $12.9 billion, including launch costs (SpaceX, 2026). This implies around €1.2 million per satellite.

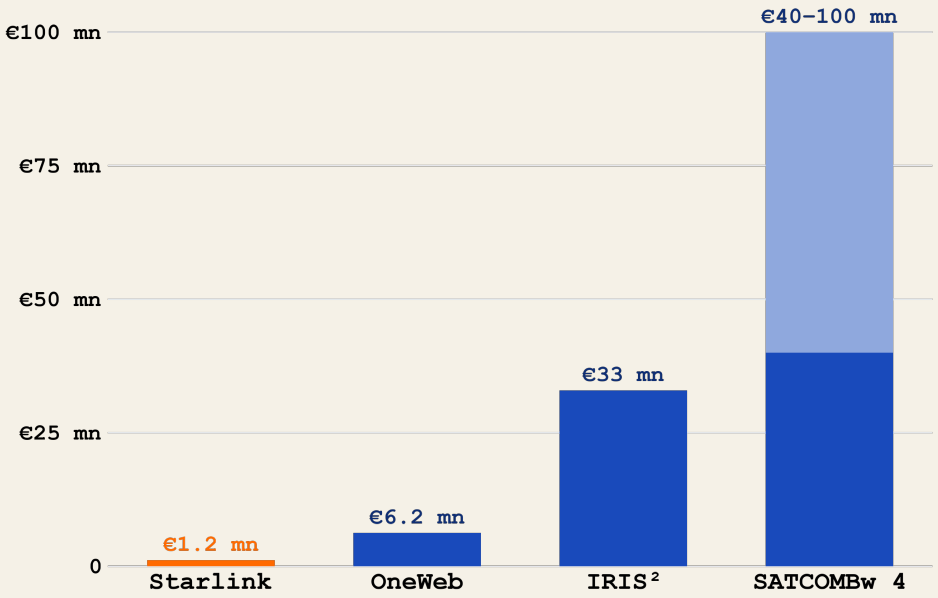
The European programmes have been costed well above this: each low-orbit satellite in the IRIS^2 project will cost around €33 million, and in Germany's SATCOMBw 4 even

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[3] Cf. the applications of Ukraine's DELTA system for real-time drone guidance (Ministry of Defence of Ukraine, 2026).
[4] Cf. McDowell (2026) for satellite count and orbital data.
[5] Infrastructure for Resilience, Interconnectivity and Security by Satellite. EU Commissioner Andrius Kubilius said of IRIS^2: "When we have IRIS², it will be better than Starlink" (Euronews, 2026).
[6] Blackman (2026).
[7] tagesschau.de (2025).
[8] Der Spiegel (2026) and bundeswehr-journal (2026).
[9] Unlike SATCOMBw 4, IRIS^2 is also aimed at commercial users. Compared with Starlink, IRIS^2 is designed around fewer satellites at higher altitudes: the higher a satellite flies, the larger the area it can cover. The number of satellites alone is therefore not sufficient for a technical comparison (Bonora, Giordani, and Zorzi, 2026).

between €40–€100 million, depending on the size of the final constellation. The European company Eutelsat, providing connectivity to private customers through its LEO network OneWeb, too, comes to around €6 million per satellite. In total, around €27–29 billion has been earmarked for IRIS², SATCOMBw 4 and the expansion of OneWeb, around €20 billion of which from public funds – roughly three times the cost of Starlink. Starlink owes its substantial cost advantage to economies of scale in production and its fleet of reusable rockets.[10] Yet, economies of scale are precisely what Europe's patchwork approach in space precludes. What's more, German taxpayers are currently paying for two systems simultaneously. On top of the €8–10 billion for SATCOMBw 4 comes an expected €2.5–3 billion that Germany contributes to IRIS² via the EU budget and ESA.[11]

Figure 1: Cost per satellite in low Earth orbit



Source: Authors' calculations.

Cheaper together

From an economic perspective, these patterns are not hard to explain. Satellite systems are a club good (Buchanan, 1965; Sandler and Tschirhart, 1980). Potential members can be excluded, but up to the capacity limit an additional member adds hardly any cost,

[10] Authors' calculations. Starlink: undepreciated value of the satellites, including launch costs, as of 31 March 2026 (SpaceX, 2026). OneWeb: investment to date (Holmes, 2026) and current orders (Reuters, 2026), excluding the ground segment, spread over around 1,300 satellites, including orders. IRIS²: €15.6 billion (HispaSat, 20262), minus the medium Earth orbit component (SES, 2026) and the ground segment, spread over 340 satellites. SATCOMBw 4: an estimated €8-10 billion for 100 to 200 satellites (Der Spiegel, 2026). Conversion: €1 = $1.1498.

[11] Calculated pro rata from the EU and ESA budgets (HispaSat, 20262; ESA, 2026; OHB SE, 2026; Statista, 2026).

since costs arise mainly during the build-up: R&D, satellites, launches and the ground segment need not be funded again with each additional user.[12] With two networks, however, precisely these fixed costs are incurred twice.

Table 1: Cost per satellite in low Earth orbit

	Cost	Satellites	Per satellite
Starlink	€11.2 billion	9,600	€1.2 million
Eutelsat OneWeb	€8.1 billion	1,300	€6.2 million
IRIS² (LEO)	€11.2 billion	340	€33 million
SATCOMBw 4	€8–10 billion	100–200	€40–100 million

Source: Authors' calculations.

Separate procurement also means forgoing economies of scale: instead of one large system, two smaller ones are built, with correspondingly smaller production runs. Yet it is production volume that determines how far the cost per satellite falls. Table 1 shows that unit costs are higher for smaller constellations.

Negotiating separately also weakens the state's bargaining position. Two buyers with small orders – IRIS² and SATCOMBw 4 – strike worse deals than one with a large order (Snyder, 1996; Dana, 2012). ESA's rules reinforce this: the agency awards contracts largely in proportion to what each country pays in, rather than to the best supplier (ESA, 2003).[13] A single contracting authority can achieve lower prices by bundling orders.

In economic terms, since satellite communication is a club good, a single European system would be the best solution. The realistic path forward would be to integrate SATCOMBw 4 into a common European architecture as Germany's contribution, with contracts awarded competitively rather than by national quota, and usage rights allocated according to funding shares. Instead, two separate systems are emerging: IRIS² and SATCOMBw 4. This duplication is yet another example of the enormous costs Europe inflicts on itself by fragmenting its defence buildup.[14]

The window of opportunity is closing: contracts for SATCOMBw 4 are expected to be awarded around the turn of the year. The 2027 budget already earmarks €2.15 billion for Bundeswehr satellite communication alone (Binder and Döring, 2026). Once terminals and interfaces are procured, path dependency arises, cementing the fragmentation for decades (Farrell and Klemperer, 2007).

Others are taking the opposite route: Poland, Hungary and Spain have already made additional contributions to IRIS² (SpaceRISE, 2026); Norway and Iceland are joining the EU project; an agreement with Ukraine is set to follow (EC, 2026). Even South Korea is

[12] Congestion can be preempted by assigning fixed capacity shares and priority rules. A separate network is not needed.

[13] For Germany, this is convenient: as recently as 2023, more flowed back to Germany in contracts than it paid in (Deutscher Bundestag, 2023).

[14] The same applies to the radar reconnaissance satellites of the Finnish manufacturer ICEYE, which Germany (SPOCK 1 service, around €1.7 billion; Rheinmetall AG, 2025), Poland (around €200 million; ICEYE, 20252) and Finland (around €158 million; ICEYE, 20251), among others, have each procured separately. They are not included in our analysis because they are reconnaissance rather than communications satellites.

considering linking its planned military constellation to IRIS².[15] What Seoul is considering, Berlin ought to follow more than "with interest" (Deutscher Bundestag, 2026).

[15] `hartpunkt` (2026).

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