



NON-TERRESTRIAL NETWORKS

Five questions about non-terrestrial networks

Altitude makes the first four design decisions before anyone at a satellite company makes one, so the stratosphere, low orbit, medium orbit and the geostationary arc are four different businesses. Only one of them is being built at scale, and it has become a volume business run by a single company. Read the five parts to find out:

1. what each orbit buys and what it costs
2. who puts cell sites on satellites and what a carrier should check first
3. who buys broadband from orbit, at what price, and how much public money follows it
4. what a platform at 20 km can do that a tower or a satellite cannot, and whether anyone has made it pay
5. what the FCC, the ITU and 3GPP decided in 2026 and what is still pending

About this ebook

This ebook collects the five parts of *Non-Terrestrial Networks*, published by Blue Prysm at www.blueprysm.com/analysis/.

The website carries the current edition. Where a figure here differs from the website, the website is the later version.

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First edition, October 2026

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What does each altitude buy and what does it cost?

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Who puts cell sites on satellites and what should a carrier check first?

None of the three national carriers mentions satellite backhaul in its FY2025 10-K, and no satellite operator reports what it earns from it. The contracts that do have names on them show it bought for reach and resilience. The only published comparison, AT&T's FirstNet deployables, carries **64** LTE users over a typical Starlink link against **600** over fibre. The orbit sets a floor under every packet: a geostationary hop adds at least **478 ms** to each round trip, where low orbit adds 6 to 42 ms.

PART 03

Broadband from orbit

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Who buys broadband from orbit, at what price, and how much public money follows it?

Starlink had **12.0 million** subscribers on 30 June 2026, twice as many as a year earlier, and each paid \$66 a month where a year before it was \$85. HughesNet fell to 622,000 and its owner, Hughes Satellite Systems, filed for Chapter 11 on 2 August 2026. BEAD gave satellite **21.9%** of its locations but only about **5.5%** of its deployment money, and NTIA's July review is expected to take a third or more of those locations back.

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High-altitude platforms

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What can a stratospheric platform do that a tower or a satellite cannot, and has anyone made it pay?

WRC-23 identified mobile bands from 694 MHz to 2.69 GHz for base stations on platforms flying at **18 to 25 km**. Neither the WRC-27 agenda nor the preliminary WRC-31 agenda reopens them. The standards record carries a warning: a 3GPP work item of September 2026 reports **severe co-channel interference** from a platform into terrestrial cells sharing 800 MHz. No operator has a commercial service or a published unit cost. SoftBank says **from 2027 onward**, Zephyr's Indonesian timetable says 2028, and the FCC declined to write rules for the platforms in 2024.

PART 05

How the rules treat non-terrestrial networks

What have the FCC, the ITU and 3GPP decided and what is still pending?

In twelve weeks of 2026 the FCC replaced the EPFD limits with performance-based protection criteria, in force from **13 July 2026**. It also adopted Part 100 to replace Part 25, which is **adopted but not effective**. WRC-23 had declined to put EPFD on the WRC-27 agenda, so the American and international rules now say different things about the same satellites. 3GPP has taken satellite access from bent-pipe phones in Release 17 to base

stations in orbit in Release 19, on **fourteen** band numbers, every one of them in satellite spectrum.

Work with Blue Prysm

What each orbit is good for

What does each altitude buy and what does it cost?

Altitude settles four things before any design choice is made: how long a packet takes, how much ground one platform sees, how long it stays in view and how far its motion shifts the frequency. Those four numbers make the stratosphere, low orbit, medium orbit and the geostationary arc four different businesses rather than one. On 7 October 2026 the satellite catalogue showed only one of the four being built at scale, and one constellation in it behind its licence milestone.



IN BRIEF

- Light takes **477.5 to 541.5 ms** to make a round trip through a geostationary satellite, depending on whether the satellite is overhead or 10° above the horizon, and nothing an engineer does can shorten that. Through Starlink's shells at 480 km the same trip is 6.4 to 22.0 ms, and through a platform at 20 km under 2 ms (our calculation).
- Height buys reach in return. Four geostationary satellites cover the Earth once at 10° elevation, where it takes 85 satellites at 480 km and 16,865 platforms at 20 km. Starlink flies **11,139**, forty times the 278 that single coverage needs at its own 25° minimum elevation, so its fleet is sized for capacity.
- Every constellation flies fewer satellites than its licence allows. On 7 October 2026 the catalogue held 11,139 Starlink satellites against 19,408 authorised, and 654 Eutelsat OneWeb against the 720 its US market access covers. Amazon Leo had **392** against the 1,616 that were due by 30 July 2026.

Height costs delay and buys reach

Every orbit makes the same trade before a single engineer is hired. Fix the altitude and the delay, the footprint, the length of a pass and the Doppler shift all follow. No design choice moves any of them (Exhibit 1).

Delay is the figure a user feels. Light covers about 300 kilometres in a millisecond. A satellite that relays the signal without decoding it, which 3GPP calls a transparent payload, sends every packet up from the user, down to a gateway and back the same way: four legs per round trip. Through a satellite at 480 km, the altitude of Starlink's main shells under [DA 26-36](#), those four legs take 6.4 ms when the satellite is straight overhead. Through a geostationary satellite at 35,786 km they take 477.5 ms, very nearly half a second. At 10° above the horizon, where the path is longest, the two figures stretch to 22.0 ms and 541.5 ms. Everything an engineer adds goes on top.

In return, height buys reach. At 10° elevation a satellite at 480 km serves users out to 1,521 km from the point beneath it, and a geostationary one out to 7,944 km, more than five times as far. Those footprints set the fewest platforms that could cover the Earth once: 85 at 480 km and 4 on the geostationary arc. A platform at 20 km sees only 108 km at the same elevation and would need 16,865 of itself to do the same job.

EXHIBIT 1

Altitude fixes the round trip, the footprint, the length of a pass and the Doppler shift of every system

SYSTEM, ALTITUDE AND PERIOD	ROUND TRIP, OVERHEAD TO 10°	FOOTPRINT RADIUS AT 10°	COVERAGE FLOOR AT 10°	LONGEST PASS AT 10°	DOPPLER AT 20 GHZ
Stratospheric platform, 20 km; holds station	0.3 to 1.5 ms	108 km	16,865	continuous	negligible
Starlink, 480 km; 94.2 min	6.4 to 22.0 ms	1,521 km	85	7.2 min	466 kHz, 23.3 ppm
Amazon Leo, 630 km; 97.3 min	8.4 to 26.7 ms	1,817 km	60	8.8 min	451 kHz, 22.5 ppm
Iridium, 780 km; 100.5 min	10.4 to 31.0 ms	2,076 km	46	10.4 min	437 kHz, 21.8 ppm
Eutelsat OneWeb, 1,200 km; 109.4 min	16.0 to 41.8 ms	2,672 km	28	14.6 min	401 kHz, 20.0 ppm
O3b mPOWER, 8,063 km, equatorial; 287.8 min	107.6 to 158.7 ms	6,031 km	6	108.5 min	122 kHz, 6.1 ppm
Geostationary, 35,786 km; 1,436.1 min	477.5 to 541.5 ms	7,944 km	4	continuous	about zero

Round trip: four propagation legs on a bent-pipe path, from straight overhead to 10° above the horizon, excluding processing and routing. Coverage floor: a lower bound on the platforms needed to cover the Earth once, to the nearest whole platform. Longest pass: straight overhead, ignoring the

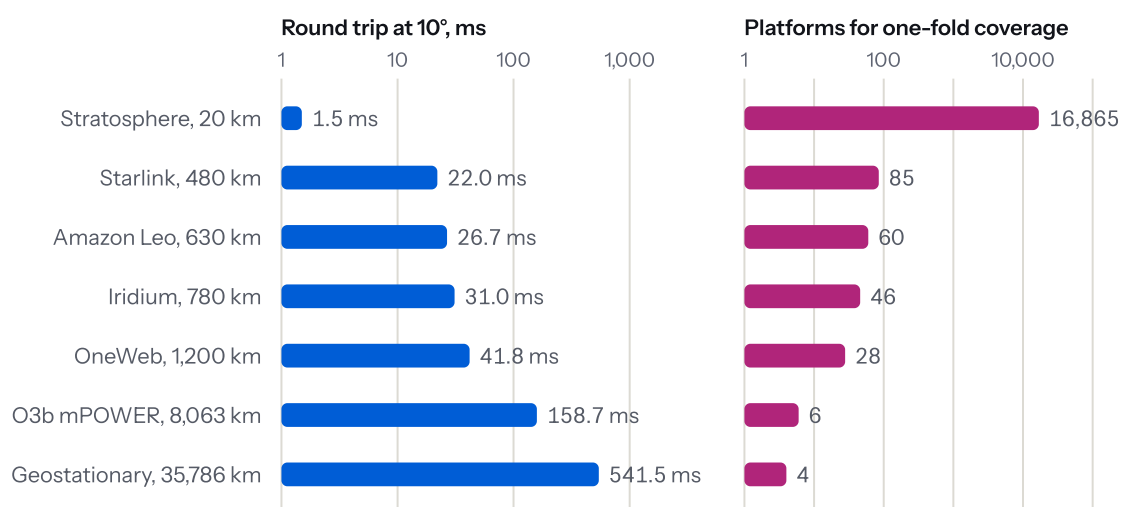
Earth's rotation except for O3b mPOWER. Altitudes from DA 26-36, FCC 20-102, DA 22-970 and the catalogue; 20 km, the lower edge of the Radio Regulations' definition, for the platform.

Source: Kepler's third law and spherical-Earth geometry, $\mu = 398,600.4418 \text{ km}^3/\text{s}^2$, $R = 6,371 \text{ km}$, $c = 299,792.458 \text{ km/s}$; altitudes from FCC 20-102, DA 22-970 and DA 26-36 and CelesTrak elements of 7 October 2026 (Calculated).

Height decides motion as well. A geostationary satellite turns with the Earth and, seen from the ground, never moves. One at 480 km crosses the sky in 7.2 minutes at most and is above 25° elevation for only 4.0 of them, so the terminal has to track it and hand over to the next one every few minutes. Its motion also shifts a 20 GHz downlink by up to 466 kHz, or 23 parts per million, which either the terminal or the network has to correct. From 480 km up to the geostationary arc, the round trip at 10° grows twenty-five fold while the coverage floor shrinks twenty-one fold (Exhibit 2). What the bottom of that curve, the stratosphere, means for a business is the subject of [part 4](#).

EXHIBIT 2

From 480 km to the geostationary arc the round trip at 10° rises twenty-five fold while the coverage floor falls from 85 to 4



Both axes logarithmic. Propagation only; the coverage floor is a lower bound, not a design.

Source: our calculation from altitude: bent-pipe round trip of four legs and spherical-Earth footprint at 10° elevation, hexagonal tiling (Calculated). Altitudes from FCC 20-102, DA 22-970, DA 26-36 and CelesTrak elements of 7 October 2026.

Starlink flies forty times the satellites that single coverage needs

A fleet of eleven thousand satellites is not what global coverage costs. The FCC's two Starlink grants, FCC 21-48 and FCC 22-91, set a 25° minimum elevation for user terminals. At that angle, covering the Earth once from 480 km takes at least 278 satellites. The catalogue held 11,139 on 7 October 2026, forty times the floor.

Coverage accounts for one satellite in forty and capacity for the other thirty-nine: the fleet is sized by the subscribers in [part 3](#) and by what they pay for.

40×

Starlink's 11,139 satellites on 7 October 2026, against the 278 it would take to cover the Earth once from 480 km at a 25° minimum elevation.

What each altitude is good for

Set against what a customer needs, the four numbers give each altitude a short list of jobs it is good for and a shorter list it cannot do at any price.

- **Geostationary.** Broadcast, trunking and backhaul wherever half a second of delay is tolerable, and ships and aircraft. Three satellites reach beyond 60° of latitude at 5° elevation. The 477.5 ms round trip rules out anything that has to answer in less than about 480 ms, including the 100 ms cap on BEAD's low-cost option ([part 3](#)).
- **Medium orbit, equatorial.** O3b mPOWER sells multi-gigabit trunks to islands, ships, oil platforms and the countries of the equatorial belt. Each satellite stays in view for about 108 minutes, long enough that handover is an occasional event rather than a constant one. From 8,063 km over the equator a satellite reaches about 54° of latitude at 10° elevation, so anywhere further north or south than that is out of reach.
- **Low orbit.** Interactive broadband and low-delay backhaul anywhere a terminal can see the sky. The price is paid at the terminal, which has to track and hand over every few minutes, and in the fleet, which has to reach scale before any one region gets continuous service.
- **Stratospheric platform.** A regional layer with a tower's link budget, serving unmodified phones over a disc 216 km across at 10°. Wide-area coverage is out of the question, since covering the Earth once would take 16,865 platforms. [Part 4](#) covers it.

JUDGEMENT

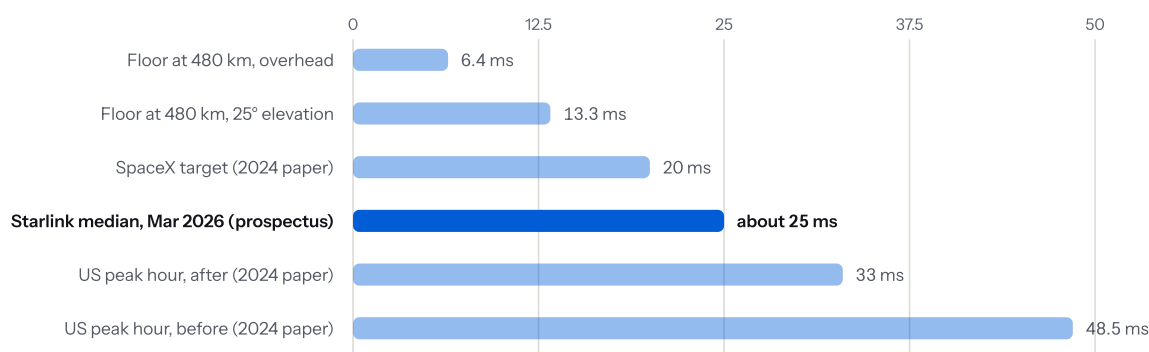
Exhibit 1 read against each use; latitude limits calculated from the footprint geometry; BEAD latency cap from the NTIA Restructuring Policy Notice of 6 June 2025

Measured figures land where the floors say they should, with the network's own overhead on top. SpaceX's [prospectus](#) gives a median Starlink latency of "approximately 25 milliseconds as of March 31, 2026", alongside a median of 225 Mbps at peak hours for residential users. The floor at 480 km is 6.4 ms overhead and 13.3 ms at the 25° minimum elevation, so somewhere between 12 and 19 ms of that median is routing on the ground, scheduling and queuing (Exhibit 3). SpaceX has been working that overhead down. Its own

[2024 paper](#) records the peak-hour median in the United States falling from 48.5 ms to 33 ms, against a target it set itself of 20 ms.

EXHIBIT 3

Starlink's measured median of about 25 ms is 12 to 19 ms above the propagation floor



Source: SpaceX prospectus (12 June 2026) for the median (Filed); Starlink, “Improving Starlink’s Latency” (2024) for the US medians and the target (Reported); floors are four propagation legs at 480 km (Calculated).

The tracking and the Doppler correction also explain a design assumption buried in the standard. Since Release 17, 3GPP’s satellite specifications have assumed a device that knows where it is from GNSS satellites, which is what lets it correct for the satellite’s motion itself. [Part 5](#) follows that assumption through to the 6G requirement that removes it, and [part 2](#) sets the delay figures against what a cell site can tolerate.

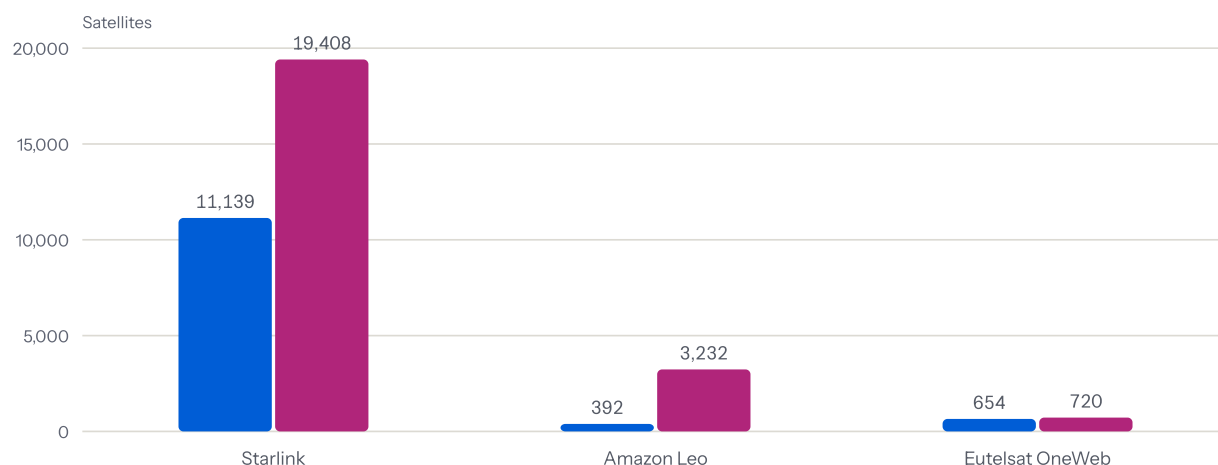
Every constellation flies fewer satellites than its licence allows

A constellation has three counts and they never agree. An FCC authorisation is a ceiling with dates attached. The catalogue counts hardware in orbit. The operator’s own figure, where it gives one, is a third number, and on 7 October 2026 the three differed for every system that has all three (Exhibit 4).

EXHIBIT 4

Starlink has flown over half of its authorised fleet, Eutelsat OneWeb nine tenths of its market-access cap and Amazon Leo about an eighth

■ On orbit, 7 Oct 2026 ■ Authorised, or US market access for OneWeb



Source: CelesTrak satellite catalogue, pulled 7 October 2026 (Calculated); FCC 21-48, FCC 22-91 and DA 26-36 for Starlink, FCC 20-102 and DA 26-553 for Amazon Leo, DA 22-970 for OneWeb (Filed). Note: Starlink's 19,408 is 4,408 Gen1 and 15,000 Gen2; a further 14,988 Gen2 satellites are deferred.

Most of Starlink's fleet flies in one narrow band of altitude. On 7 October 2026, 9,518 of the Starlink objects with current orbits were between 450 and 499 km, which is where DA 26-36 puts the authorised shells. A further 839 were lower, at 330 to 399 km, where the order places the lower shells and where SpaceX flies its direct-to-device satellites; the prospectus puts those at about 650. Starlink was 66.7% of every active object in the catalogue, of every kind: two in every three.

SpaceX's own counts run about 500 below the catalogue at every date that can be checked. The prospectus gives "approximately 9,600" satellites on 31 March 2026, when the catalogue held 10,157. The 10-Q for the quarter to 30 June, filed on 4 August, gives "over 10,200" without saying when; the catalogue held 10,721 on 30 June and 10,922 on 4 August. The gap is one of definition. In our view SpaceX counts satellites in service, while the catalogue counts every payload that has not decayed, including those still raising orbit, those on their way down and those that have stopped working (Exhibit 5).

EXHIBIT 5

Authorised, on orbit and the next date disagree for every system that has all three

SYSTEM	AUTHORISED OR PLANNED	ON ORBIT, 7 OCT 2026	THE NEXT DATE ON THE RECORD
Starlink (SpaceX)	19,408: 4,408 Gen1 and 15,000 Gen2; 14,988 more Gen2 deferred	11,139 , 10,838 flagged operational; SpaceX's 10-Q for the quarter to 30 June counts "over 10,200"	Gen2: 7,500 by 1 Dec 2028, 15,000 by 1 Dec 2031
Amazon Leo (Kuiper)	3,232	392 ; no launch after 2 Jul 2026	1,616 were due 30 Jul 2026, waived in part; 3,232 by 30 Jul 2029
Eutelsat OneWeb	720 for US market access	654 ; last launch 20 Oct 2024	440 new satellites on order from Airbus and 229 more under an authorisation to proceed; first deliveries from the 440 "next quarter" (10 Sep 2026)
SES O3b mPOWER	13 in the system	10 at about 8,066 km; 3 in transfer orbit since 13 Sep 2026	All 13 operational "by mid-2027"
Telesat Lightspeed	225 planned; FCC 17-147 covered an earlier 117-satellite design	None; two demonstration satellites	First satellites late 2026; global service "around the end of Q1 2028"
Geostationary, all operators	n/a	567 objects in the geostationary group	ViaSat-3 F3 expected in service by late summer and F2 in September 2026 (Viasat, 6 Aug 2026)

On orbit is CelesTrak's satellite catalogue: payloads launched and not decayed, pulled 7 October 2026 about 20:20 UTC. At the same time the catalogue's element-set groups held 11,110 Starlink, 391 Amazon Leo and 651 OneWeb objects. Neither count says which satellites carry a direct-to-device payload; the [direct-to-device series](#) covers those.

Source: FCC 21-48, FCC 22-91, DA 26-36, FCC 20-102, DA 26-553, DA 22-970 and FCC 17-147; SpaceX 10-Q and prospectus; Telesat Forms 6-K of 17 March, 4 August and 13 August 2026; Viasat 10-Q (Filed). CelesTrak catalogue and element-set groups, 7 October 2026, counted by Blue Prism (Calculated). SES release, 13 September 2026, and Eutelsat release, 10 September 2026 (Reported).

The other systems are either renewing a fleet or still building their first one. Eutelsat OneWeb has launched nothing since October 2024, but it has 440 new satellites on order from Airbus and an authorisation to proceed on 229 more, and the business those satellites will serve is growing. It earned €297 million from low orbit in the year to 30 June 2026, up 69.5% like for like and 59.0% as reported, which is a quarter of group revenue. Telesat enlarged Lightspeed from 156 to 225 satellites on the strength of a Canadian defence contract and puts the whole investment at about C\$7 billion. SES launched the last three of its thirteen O3b mPOWER satellites on 13 September 2026 and expects all thirteen to be working by mid-2027.

Amazon Leo missed its milestone and kept its licence

When the Commission granted Kuiper its licence in 2020, in [FCC 20-102](#), it attached two dates. Half the constellation had to be in orbit by 30 July 2026 and all of it by 30 July 2029. In January 2026 Amazon Leo told the Commission it had launched 180 satellites, expected about 700 by the deadline, and would like either two more years or a waiver. It got the waiver, “in part”, from the Space Bureau on 5 June 2026 in [DA 26-553](#). SpaceX had opposed the request, the order records, and had proposed that the satellites not yet flown be moved into a new processing round.

DA 26-553: THE WAIVER AND ITS CONDITIONS, 5 JUNE 2026

Any satellite deployed after the deadline loses the priority of Amazon Leo’s earlier processing round, until 30 March 2028 or until half the constellation is operating, whichever comes first.

Amazon Leo can bring that date forward to 30 October 2027 by certifying that the satellites are built and the launches bought.

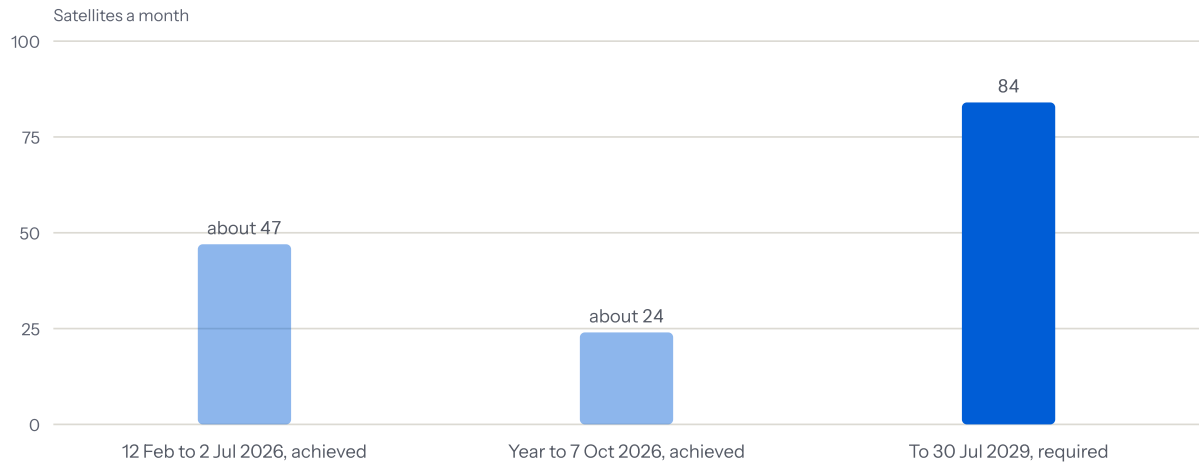
The shortfall still counts as a missed milestone when it comes to forfeiting Amazon Leo’s surety bond.

The 30 July 2029 deadline for the full constellation of 3,232 did not move.

The catalogue shows what that deadline asks. Amazon Leo had 392 satellites in orbit on the day of the milestone and still had 392 on 7 October, 1,224 short, or about three quarters of what was due. To reach 3,232 by 30 July 2029 it has to add 2,840 satellites in 33.7 months, which works out at 84 a month. Its seven launches of 2026 carried 216 satellites between 12 February and 2 July, about 47 a month over those twenty weeks and about 24 a month spread across the whole year to 7 October (Exhibit 6). Amazon has said it will roll the service out more widely in 2026. On 7 October no commercial launch date and no consumer price were on the record.

EXHIBIT 6

Amazon Leo must launch 84 satellites a month to July 2029, 1.8 times its busiest pace so far



Source: CelesTrak catalogue, launch and decay dates, 7 October 2026: 216 satellites on seven launches from 12 February to 2 July 2026, none since; 2,840 more needed in 33.7 months (Calculated). FCC 20-102 and DA 26-553 (Filed).

The 2029 milestone asks Amazon Leo for 84 satellites a month for nearly three years, from a programme whose busiest stretch managed about 47 and which has launched nothing since 2 July 2026. In our view that is the number to hold the programme to. The waiver kept the licence and changed nothing about the requirement, and the order still holds Amazon Leo to forfeiting its surety bond for the July 2026 shortfall.

Terms used

- **Geostationary, medium and low orbit.** Geostationary orbit is 35,786 km over the equator, where a satellite turns with the Earth and appears to stand still. Medium orbit is anything between about 2,000 km and that arc; low orbit is anything below about 2,000 km.
- **Stratospheric platform.** An aircraft, airship or balloon holding station at about 20 km. The Radio Regulations call it a high-altitude platform station and define it at 20 to 50 km; [part 4](#) covers it.
- **Bent pipe.** A satellite that receives a signal and sends it on without decoding it, which 3GPP calls a transparent payload. Every packet makes two trips through space each way, up to the satellite and down

to a gateway.

-
- **Elevation angle.** How high above the horizon the user has to look to see the platform. A lower minimum widens the footprint and lengthens the path. Operators set a minimum because a low path crosses more atmosphere and more terrain.
-
- **Doppler shift.** The change in received frequency caused by the platform moving towards or away from the user. It is given here in kilohertz at 20 GHz and in parts per million, which scales to any band.
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Implications

CARRIER STRATEGIST

Choose the orbit by the one number that decides your use, and ignore the rest. For backhaul of interactive traffic that number is the round trip; for trunking to islands it is capacity per site; for a regional layer you own it is footprint. Judge a supplier's constellation by what it delivers over your territory, at the elevation your terminals will see, because a headline count of 11,139 satellites tells you nothing about one cell site.

INVESTOR

Ask for three numbers for every constellation. The first is how many satellites are authorised, the second how many the catalogue shows in orbit, and the third how many the next milestone requires. Amazon Leo shows why the third matters, with 392 in orbit against 1,616 due in July 2026 and 3,232 due in July 2029. For Starlink the next milestone is 7,500 Gen2 satellites by 1 December 2028.

VENDOR

Sell wherever the altitude puts the cost, because that is where the buyer has a problem. Low orbit puts it in the terminal and the ground network, which have to track the satellite, correct a Doppler shift of 20 to 23 parts per million at Ka band and hand over every few minutes. Geostationary puts it in the satellite. The stratosphere puts it in the platform and its power system.

Method and limits

HOW THIS WAS BUILT

Everything in the physics table is calculated from a few stated assumptions. Kepler's third law gives the period, a spherical Earth of radius 6,371 km gives the slant range and the footprint, and the speed of light gives the delay. A round trip is counted as four legs of a bent-pipe path, from the user up to the satellite, down to a gateway and back the same way, with both ends at the stated elevation. The coverage floor is the surface of the Earth divided by one footprint, then multiplied by 1.209 to allow for hexagonal tiling. Doppler is the largest shift a user on the ground sees at 10° elevation; the Earth's rotation is ignored, which would move the low-orbit values by up to about 7%. Altitudes are the ones in the FCC orders, checked against the catalogue.

The counts are CelesTrak's satellite catalogue, meaning payloads that have been launched and have not decayed, with the catalogue's own operational flag. Its element-set groups, which hold only objects with a current orbit, give a second count to check against. On 7 October the two differed by 29 or fewer for every system. Altitude bands come from the mean motion in each element set.

WHAT IT DOES NOT SHOW

Propagation is a floor. Processing, queuing, scheduling and routing on the ground are left out, and Exhibit 3 gives a sense of how much they add. The coverage floor is likewise a minimum, the fewest platforms that put one overhead everywhere, and no fleet is designed to it; capacity, beam limits and minimum elevation push real constellations well above it. The catalogue counts hardware, not service. It cannot show which satellites are still raising orbit, which are held as spares and which carry a direct-to-device payload. Telesat Lightspeed is missing from the physics table because no filing or order gives the altitude of its current 225-satellite design.

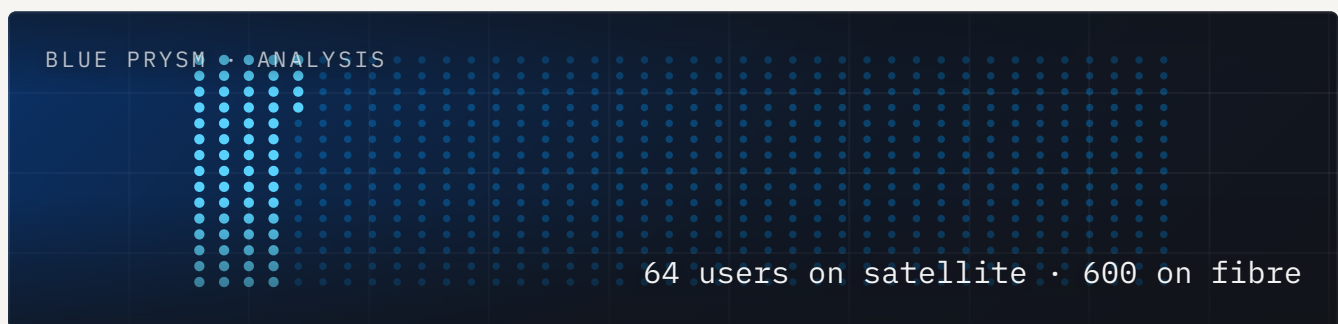
Data as of: CelesTrak catalogue pulled 7 Oct 2026 about 20:20 UTC · FCC orders and SEC filings as dated, read 7 Oct 2026 · Method version 1.0.

Sources. CelesTrak's satellite catalogue and element sets, pulled 7 Oct 2026; FCC orders FCC 21-48 and FCC 22-91 (Starlink Gen1 and Gen2), DA 26-36 (9 January 2026), FCC 20-102 and DA 26-553 (Amazon Leo, 5 June 2026), DA 22-970 (OneWeb) and FCC 17-147 (Telesat); SpaceX's 10-Q to 30 June 2026 and prospectus of 12 June 2026; Telesat's Forms 6-K of 4 August and 13 August 2026; Viasat's Form 10-Q to 30 June 2026; SES's release of 13 September 2026; Eutelsat's release of 10 September 2026 and results of 7 August 2026; Starlink's latency paper (2024). Second sources: Via Satellite on the Amazon Leo waiver (5 June 2026) and Light Reading on the Gen2 grant (13 January 2026). Retrieved 7 Oct 2026.

Backhaul from orbit

Who puts cell sites on satellites and what should a carrier check first?

Satellite backhaul connects a cell site to the core network through space instead of fibre or microwave. No American carrier reports it as material and no satellite operator says what it earns from it, so the size of the business is not on the record. The handful of contracts with names on them show carriers buying it for reach and resilience. The one product that publishes a comparison, FirstNet's deployables, carries 64 LTE users over Starlink against 600 over fibre.



IN BRIEF

- Neither side of a backhaul contract puts a number on it. None of the three national carriers mentions satellite backhaul in its FY2025 Form 10-K, and no satellite operator reports mobile-backhaul revenue. The closest thing is SpaceX's **\$1,806 million** of Enterprise & Government revenue in the second quarter of 2026, which mixes backhaul with aviation, maritime, government and Starlink Mobile.
- FirstNet publishes the only comparison from a live product. Its deployables support up to **64** LTE users on a typical Starlink link, and its Mobile Connectivity Hub up to **600** on fibre, so the satellite link carries about a ninth.
- The orbit decides how much delay the site starts with. A geostationary hop adds at least **477.5 ms** to every round trip, before the network adds anything of its own; O3b mPOWER adds at least 107.6 ms and low orbit at 480 km at least 6.4 ms. Hughes sells geostationary backhaul for 2G to 5G sites and quotes the latency at 600 ms.

No American filer treats satellite backhaul as material

The first measure of a business is what its participants tell their shareholders, and on satellite backhaul they say nothing. It is too small for any American filer, on either side of the contract, to describe in a filing (Exhibit 1).

Among the buyers, the FY2025 Forms 10-K of AT&T, Verizon and T-Mobile, filed in February 2026, do not refer to satellite backhaul. None of the three names OneWeb, Amazon Leo, Starlink or SpaceX. Verizon comes closest, with one sentence about “partnering with satellite providers to enhance off-grid emergency and text messaging services”, which is direct-to-device, a different product. Where Verizon otherwise mentions satellite companies it is as competitors. T-Mobile mentions backhaul, but every reference is to a terrestrial contract.

The sellers say little more. SpaceX’s [prospectus](#) lists telecom among the industries its enterprise business serves and describes Starlink Fixed Site as “primary or backup connectivity for distributed business locations globally”, including sites “that are difficult to serve economically with fiber”, a fair description of a cell site on a hillside. There is no mobile-operator line in the accounts. Enterprise & Government revenue was \$1,806 million in the second quarter of 2026, more than double the \$867 million a year earlier, but the same figure holds aviation, maritime, government and Starlink Mobile. Eutelsat’s fixed connectivity revenue of €270 million in the year to 30 June 2026 grew 15.6% like for like, a rise it attributes mainly to low-orbit solutions, and it gives no backhaul figure. Viasat and EchoStar quantify none in their quarterly filings to 30 June 2026 either.

EXHIBIT 1

None of the six filers on either side of a backhaul contract quantifies it

FILER	DOCUMENT AND DATE	WHAT IT SAYS ABOUT SATELLITE BACKHAUL
AT&T	Form 10-K for FY2025, 9 Feb 2026	No reference to satellite backhaul; none to OneWeb, Amazon Leo, Starlink or SpaceX
Verizon	Form 10-K for FY2025, 17 Feb 2026	One sentence on “partnering with satellite providers to enhance off-grid emergency and text messaging services”, a direct-to-device service; other mentions list satellite companies as competitors
T-Mobile	Form 10-K for FY2025, 11 Feb 2026	Backhaul references are to terrestrial contracts; no satellite supplier named
SpaceX	Prospectus, 12 Jun 2026; Form 10-Q, 4 Aug 2026	Telecom listed among enterprise industries; Starlink Fixed Site described; no mobile-operator line. Enterprise & Government revenue \$1,806M in Q2 2026, including aviation, maritime, government and Starlink Mobile
Eutelsat	FY 2025–26 results, 7 Aug 2026	Fixed connectivity €270M, up 15.6% like for like, attributed mainly to low-orbit solutions; no backhaul figure
Viasat; EchoStar	Forms 10-Q to 30 Jun 2026, filed 6 Aug and 3 Aug 2026	No backhaul quantified

Source: the Forms 10-K for FY2025 of AT&T, Verizon and T-Mobile, searched in full text; SpaceX prospectus and 10-Q; Eutelsat results of 7 August 2026; Viasat and EchoStar 10-Qs to 30 June 2026 (Filed).

Carriers buy satellite backhaul for reach and resilience

What is public comes in three weights. The heaviest is a carrier’s own product page, then a satellite operator’s release or page, then a trade report that names both parties, and each arrangement carries its own tag (Exhibit 2).

EXHIBIT 2

Five arrangements name both parties, and only FirstNet's says what the link supports

OPERATOR	SYSTEM	WHAT THE SOURCE SAYS	DATE	WEIGHT
AT&T FirstNet	Starlink and Viasat named on product pages; OneWeb, Amazon Leo and Inmarsat listed among providers	190 or more deployable assets; satellite backhaul used "at the cell site to provide an alternate path to FirstNet" when fibre is damaged	Pages read 7 Oct 2026	Carrier page
Claro Brasil (Embratel)	SES O3b mPOWER	"4 Gbps over the O3b mPOWER network to extend its mobile backhaul service" in at least eight cities in the Amazon region, with more than 260,000 inhabitants	27 Oct 2022, multi-year renewal	Trade press
MEO (Portugal)	Eutelsat OneWeb	Low-orbit connectivity for resilience in MEO's portfolio; MEO hosts a OneWeb ground station; not described as cell-site backhaul	23 Sep 2026	Operator release
Operators "from India to South Africa to Peru", unnamed	Hughes JUPITER, geostationary	2G to 5G backhaul "across hundreds of sites"; "200 Mbps+ throughput per terminal"	Page read 7 Oct 2026	Vendor page
Vanu (rural Africa)	Amazon Leo	Named as a partner; the service is not described	Dec 2025	Trade press

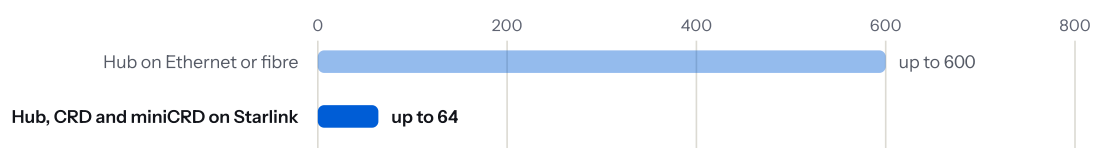
Only arrangements in which a company page, a company release or a trade report names both parties are listed. Eutelsat and SES also sell backhaul products to unnamed operators, including Eutelsat's reserved capacity for emergencies and SES's "Mobile Backhaul mPOWERED".

Source: FirstNet deployables and satellite pages; Via Satellite, 27 October 2022; Eutelsat release, 23 September 2026; Hughes cellular backhaul page; Light Reading, 29 December 2025 (Reported).

Every row in that table is a claim by a party with an interest in it, and only FirstNet's says what a satellite link supports in a live network product. Its Mobile Connectivity Hub, Compact Rapid Deployable and miniCRD "can support up to 64 simultaneous LTE users, using a typical Starlink satellite connection". On "high-speed ethernet or fiber" the Hub supports "up to 600 simultaneous FirstNet users". On the one product that publishes the comparison, then, a satellite link serves about a ninth of the users a fibre link does (Exhibit 3). The ratio comes from one product on one link, but it is the only measured figure in public.

EXHIBIT 3

On a Starlink link FirstNet's deployables support about a ninth of the users the Hub supports on fibre



Source: FirstNet deployables page, read 7 October 2026 (Reported). Note: FirstNet gives the 600 figure for the Mobile Connectivity Hub only and the 64 figure for the Hub, the Compact Rapid Deployable and the miniCRD.

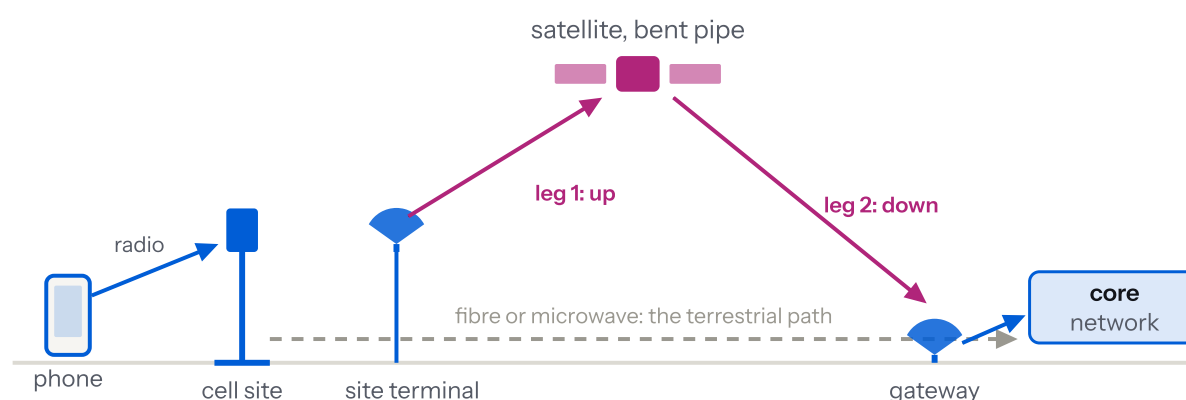
The other rows give throughput rather than users, which makes them harder to compare. Claro Brasil takes 4 Gbps over O3b mPOWER to extend mobile backhaul to at least eight cities in the Amazon region. Hughes sells geostationary backhaul to operators it does not name, at “200 Mbps+ throughput per terminal” across hundreds of sites. The five rows show carriers buying satellite backhaul where the alternative is no site at all, or as the second path for when the first is cut.

The orbit sets a floor under every packet the site handles

Backhaul adds a round trip of its own to everything a cell site carries. A satellite in that path adds four propagation legs, two up and two down, before the network has added anything of its own (Exhibit 4).

EXHIBIT 4

Satellite backhaul puts two space hops between the cell site and the core



Four propagation legs per round trip, calculated

Low orbit at 480 km: 6.4 to 22.0 ms, overhead to 10° elevation

O3b mPOWER at 8,063 km: 107.6 to 158.7 ms

Geostationary at 35,786 km: 477.5 to 541.5 ms

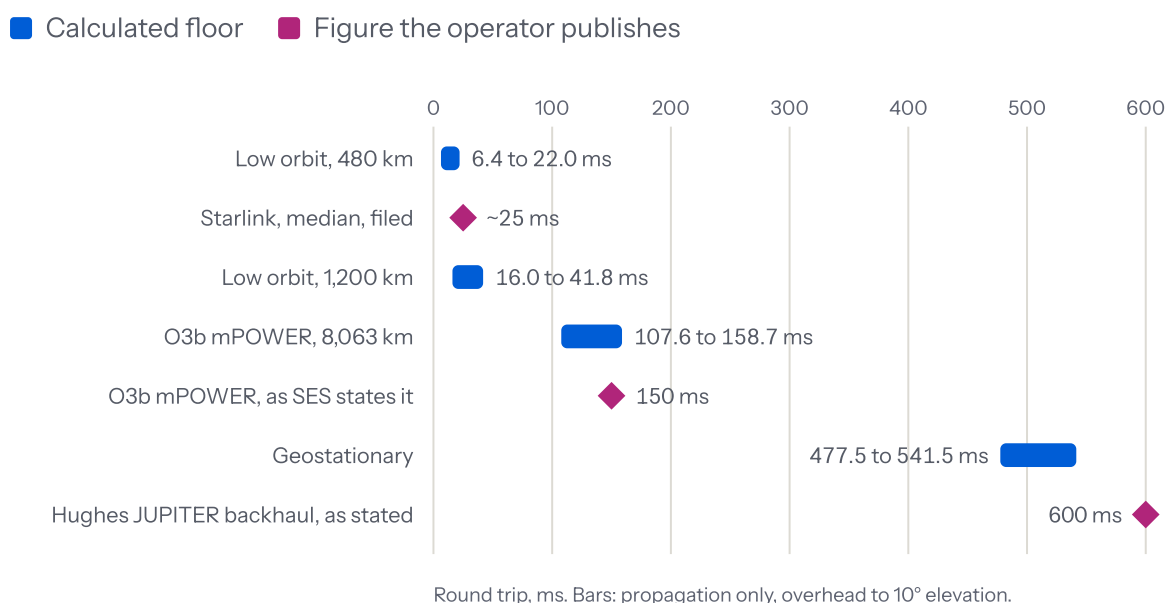
Propagation only. The network adds its own processing and routing on top.

Source: the path as 3GPP describes a transparent payload; round-trip floors are our calculation from altitude, four legs at the speed of light from overhead to 10° elevation ([part 1](#)) (Calculated).

How long those legs take depends only on the altitude, and [part 1](#) gives the floors from overhead to 10° elevation. Low orbit at 480 km adds 6.4 to 22.0 ms, and O3b mPOWER 107.6 to 158.7 ms. A geostationary satellite adds 477.5 to 541.5 ms, the better part of half a second before a single router has touched the packet. The figures the operators publish land just above those floors, as they should (Exhibit 5). SpaceX gives a Starlink median of about 25 ms. SES offers “150 milliseconds of predictable satellite latency”. Hughes describes its geostationary backhaul as “600 millisecond latency, 10-millisecond jitter”, and says its LTE optimisation saves “up to 60% of satellite bandwidth”.

EXHIBIT 5

Each operator's published latency falls just above the propagation floor of its orbit



Source: floors are our calculation, bent-pipe path of four legs (Calculated); SpaceX prospectus for the Starlink median as of 31 March 2026 (Filed); SES O3b mPOWER page and Hughes cellular backhaul page, read 7 October 2026 (Reported).

Half a second does not disqualify every service. Hughes sells geostationary backhaul for 2G to 5G sites, so voice and messaging run across that delay in live networks today. Anything interactive suffers, as does every protocol that waits on a handshake, because each exchange pays the half second again. Capacity runs in the same order as delay, orbit by orbit, and the operators put it as follows.

- **O3b mPOWER.** SES describes the system as delivering “multiple gigabits per second”, and Claro’s 4 Gbps bears that out.
- **Amazon Leo.** Amazon describes a Leo Ultra terminal at up to 1 Gbps down and 400 Mbps up.
- **Hughes JUPITER.** Hughes sells 200 Mbps and more per geostationary terminal.
- **Starlink V3.** SpaceX says its V3 satellites are “designed to offer one Tbps of downlink capacity per satellite” and are due to start deploying on Starship in the second half of 2026, a design figure rather than a measured one.

One more sign that SpaceX sees backhaul as a market: in [DA 26-36](#) the FCC authorised W-band uplinks to Starlink satellites, on an unprotected and non-interference basis, which SpaceX had asked for “particularly for backhaul use cases”.

Disaster fleets are the one visible carrier use

Satellite backhaul is most visible in an American network after a disaster. SpaceX's prospectus says that during Hurricanes Helene and Milton in 2024 its terminals "provided a rapid lifeline for communication and recovery" when cell towers, broadband lines and power were out "for days or weeks". SpaceX deployed over 650 terminals after the 2023 Maui wildfires. The cell sites go uncounted: neither the prospectus nor any carrier filing says how many were restored over satellite after those storms, and Verizon's and T-Mobile's 10-Ks do not name a satellite supplier for their disaster fleets.

FIRSTNET'S DEPLOYABLE FLEET

AT&T's FirstNet describes "a dedicated fleet of 190+ deployable assets for public safety", meaning satellite cells on light trucks, cells on wheels, compact rapid deployables and tethered drones.

Satellite backhaul's job in that fleet is "at the cell site to provide an alternate path to FirstNet" when the fibre is damaged.

FirstNet names Starlink, OneWeb, Viasat, Amazon Leo and Inmarsat among its providers, "and more".

The Mobile Connectivity Hub comes with two years of Starlink service, and buyers of the Compact Rapid Deployable take a Viasat priority data plan, so one fleet is buying from at least two suppliers.

A terminal on a tower needs a licence per site until Part 100 takes effect

One piece of paperwork scales badly. Under Part 25 of the FCC's rules an earth station is licensed site by site. Blanket licences exist only in listed bands, for geostationary and non-geostationary fixed-satellite service, as the Commission's own [2025 proposal](#) describes. For a carrier putting terminals on hundreds of towers that is a cost and a delay per site. Part 100, adopted in [FCC 26-47](#) on 22 July 2026, adds a "Nationwide, Non-Site license" under which individual sites are registered over time. An operator with a current, approved Form 312 that asks for a licence without waivers may "begin operating on a non-interference, unprotected basis once the application is placed on public notice" (Exhibit 6).

Part 100 is adopted but not yet in force. The FCC's own fee order of 14 September 2026 still refers to it as rules that have yet to "become effective and replace the existing rules" in Part 25. [Part 5](#) sets out the rest of what the new rules do.

EXHIBIT 6

Once in force, Part 100 replaces a licence per site with one nationwide licence

ITEM	PART 25, IN FORCE	PART 100, ADOPTED 22 JUL 2026
Licensing basis	Site by site; blanket licences only in listed bands, for geostationary and non-geostationary fixed-satellite service	A "Nationwide, Non-Site license"; individual sites registered over time
Operation before grant		For an operator with a current, approved Form 312 asking for a licence without waivers: on a non-interference, unprotected basis once the application is on public notice
Status, 7 Oct 2026	Applies until Part 100 takes effect (fee order, 14 Sep 2026)	Adopted; no effective date; no Federal Register publication

A blank cell is an item the source documents do not describe.

Source: FCC 25-69 (29 October 2025) on Part 25; FCC 26-47 (adopted 22 July 2026); FCC fee order FCC 26-59, 91 FR 58258 (14 September 2026) (Filed).

Five checks before a carrier signs

- 1. Measure the round trip against the floor.** The orbit sets the floor and the network adds the rest, and a geostationary hop starts at 478 ms before anything else. Ask the supplier for its measured median and read it against the floors in [part 1](#).
- 2. Contract for users or throughput per site.** The only published comparison is FirstNet's, 64 LTE users on a typical Starlink link against 600 on fibre, and it was published by the buyer. Write the service level you need into the contract, because the terminal's peak rate is a different number.
- 3. Test the supplier's milestones and solvency.** Hughes Satellite Systems and subsidiaries including Hughes Network Systems filed for Chapter 11 on 2 August 2026, and say they expect to keep operating. Amazon Leo had 392 of the 1,616 satellites due at its milestone, and Lightspeed's global service is due around the end of the first quarter of 2028. All of it is in SEC filings and FCC orders.
- 4. Map the licensing path for every site.** Today that is site by site under Part 25; once Part 100 takes effect it is one nationwide non-site licence. Watch FCC 26-47 for its effective date.
- 5. Design in a second orbit or a second supplier.** FirstNet names five satellite providers for its deployables, "and more", which is how a careful buyer behaves.

JUDGEMENT

The checks are Blue Prism's; the evidence for each is cited above and in parts 1 and 5: EchoStar Form 8-K, Item 1.03, filed 3 Aug 2026 · DA 26-553 and CelesTrak, 7 Oct 2026 · Telesat 6-K, 13 Aug 2026 · FCC 26-47 · FirstNet pages

Terms used

- **Backhaul.** The link from a cell site back to the operator's core network, usually fibre or microwave. Satellite backhaul replaces it with a terminal at the site and a gateway somewhere on the ground.
- **Deployables.** Cell sites on vehicles, trailers, cases or tethered drones, moved into an area after a disaster. Each needs backhaul wherever it happens to be parked, and satellite is the one link that can be counted on to be there.
- **Earth station.** The FCC's term for any ground terminal that talks to a satellite, from a gateway dish to a terminal on a tower. Earth stations in motion, on ships, aircraft and vehicles, are licensed under rules of their own.

Implications

CARRIER STRATEGIST

Price satellite backhaul as reach and resilience, meaning the site you cannot reach any other way and the second path for when the first is cut. Write users or throughput per site into the contract, because the only published comparison, 64 users against 600, is a wide gap. Read the supplier's milestones and balance sheet before you sign, because one established backhaul vendor is in Chapter 11.

INVESTOR

Do not build a thesis on satellite backhaul revenue, because no filer reports any. SpaceX's \$1,806 million of quarterly Enterprise & Government revenue mixes it with aviation, maritime, government and Starlink Mobile, and the carriers, who are the buyers, do not mention it at all.

VENDOR

Sell the site rather than the satellite. The terminal, its power and its mounting, traffic optimisation of the kind Hughes says saves up to 60% of capacity, and failover between orbits are where a carrier needs help. Part 100's nationwide licence, once it is effective, cuts the paperwork per site, leaving integration as the larger part of the cost.

Method and limits

HOW THIS WAS BUILT

Each filing was searched in full text for the words satellite, backhaul, Starlink, SpaceX, OneWeb, Kuiper, Amazon and disaster. Exhibit 2 admits an arrangement only if a company page, a company release or a trade report names both parties, and tags each one with the weight of its source. The latency floors are calculated as in [part 1](#): four legs of a bent-pipe path, from overhead to 10° elevation, at the speed of light.

WHAT IT DOES NOT SHOW

Commercial backhaul contracts are rarely announced and almost never priced, so Exhibit 2 is a sample of what is public, not a census. Anything reported only second-hand is left out. No public source counts the cell sites that run on satellite backhaul, and the market estimates that exist sit behind analysts' paywalls. The capacity figures vendors publish are peak or marketing figures rather than contracted service levels, and the disaster record counts terminals shipped rather than sites restored.

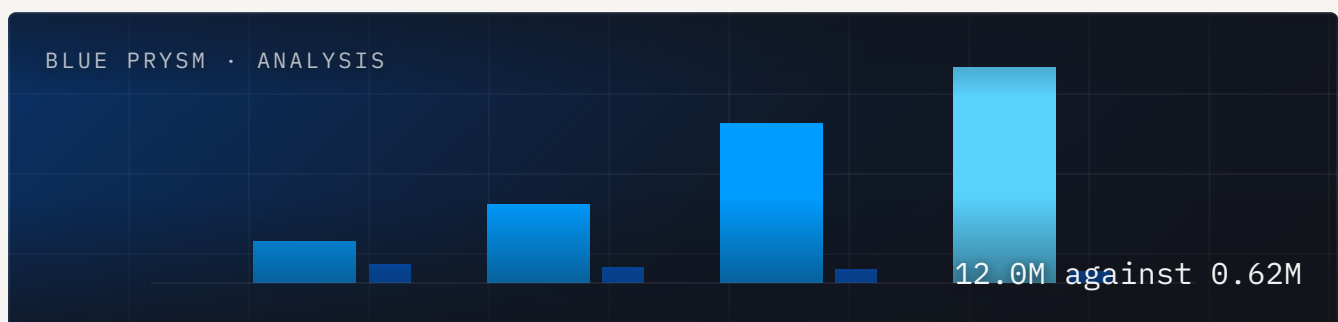
Data as of: filings as dated and company pages as read 7 Oct 2026 · Method version 1.0.

Sources. The FY2025 Forms 10-K of AT&T, Verizon and T-Mobile; SpaceX's prospectus (12 June 2026) and 10-Q to 30 June 2026; EchoStar's Form 8-K on the Hughes Chapter 11 filing; Eutelsat's results of 7 August 2026 and release on MEO of 23 September 2026; FirstNet's deployables and satellite pages; Hughes's cellular backhaul page; SES's O3b mPOWER page; Amazon's Amazon Leo page; FCC DA 26-36, FCC 25-69 and FCC 26-47. Trade press: Via Satellite on Claro Brasil (27 October 2022) and Light Reading on Amazon Leo's partners (29 December 2025). Retrieved 7 Oct 2026.

Broadband from orbit

Who buys broadband from orbit, at what price, and how much public money follows it?

Satellite broadband in the United States has become a volume business run by one company, and public money has little to do with it. SpaceX's first filings show Starlink doubling to 12.0 million subscribers in a year while the revenue it earns from each of them fell. Over the same period the two geostationary incumbents shrank, and one is now in Chapter 11.



IN BRIEF

- On 30 June 2026 Starlink had **12.0 million** subscribers, up from 6.0 million a year earlier (SpaceX Form 10-Q). The two geostationary services went the other way. HughesNet was down to 622,000, a fall of 38% since December 2023, and Viasat's American fixed base had lost 39% in fifteen months.
- SpaceX's connectivity revenue rose 65.8% in a year to **\$4,291 million** in the second quarter of 2026, even though the average Starlink subscriber paid less, **\$66** a month against \$85. The company tells investors to expect that average to keep falling as the base grows outside North America.
- The decline is now a matter for the courts. Hughes Satellite Systems, which runs HughesNet, filed for Chapter 11 on 2 August 2026, while EchoStar's DISH DBS subsidiary left its own Chapter 11 case on 1 October.
- BEAD's approved plans give satellite **21.9%** of locations and about **5.5%** of deployment dollars. In July NTIA asked states to remove the satellite locations that the updated FCC map shows as already served, and analysts expect a third or more to go. The whole satellite award is about \$1 billion over ten years, less than half of what Starlink's consumers paid SpaceX in a single quarter.

Starlink doubled in a year while both geostationary services shrank

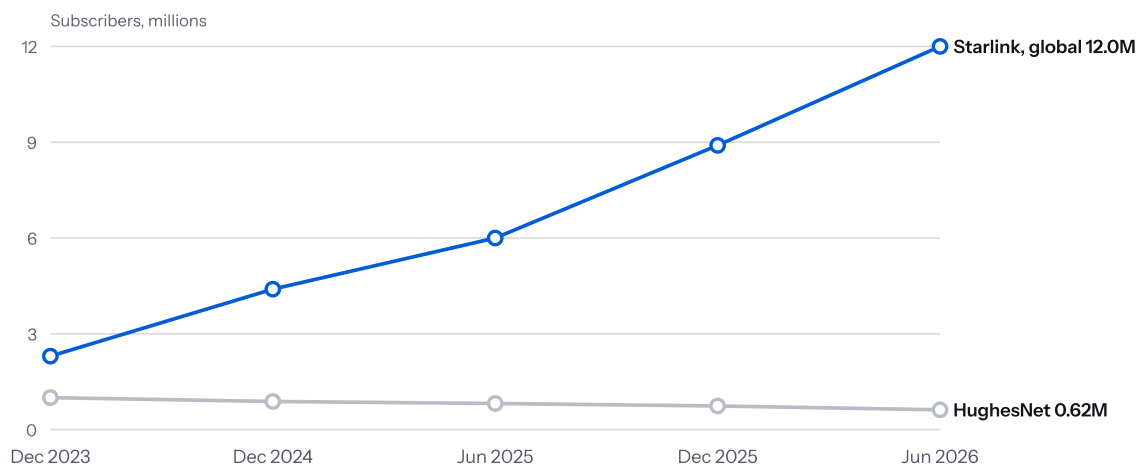
For the first time, every company selling consumer broadband from orbit in the United States files its subscriber count with the SEC, so the three series can be put side by side. They point in opposite directions (Exhibit 1).

Starlink reached 12.0 million subscribers worldwide on 30 June 2026. A year earlier it had 6.0 million, so by SpaceX's own figure the base grew 101.2% in twelve months. The series in the prospectus shows a pattern of doubling: 2.3 million at the end of 2023, 4.4 million at the end of 2024 and 8.9 million at the end of 2025. The geostationary operators report the mirror image. HughesNet, EchoStar's broadband service, fell from 1,004,000 subscribers in December 2023 to 622,000 in June 2026, a loss of 38%, and 59,000 of those went in the second quarter of 2026 alone. Viasat's American fixed broadband base went from about 189,000 in March 2025 to about 115,000 in June 2026, down 39% in fifteen months.

EXHIBIT 1

Starlink doubled in twelve months while HughesNet and Viasat lost more than a third of their customers

■ Starlink, global ■ HughesNet



Source: SpaceX prospectus (12 June 2026) and Form 10-Q for the quarter to 30 June 2026; EchoStar Forms 10-K for FY2024 and FY2025 and Form 10-Q to 30 June 2026 (Filed). Note: Starlink's count is global; HughesNet is EchoStar's broadband subscriber count. Viasat reports its US fixed base at fiscal quarter ends and is tabulated in Exhibit 2.

The two series are not on the same base. Starlink's figure is global, because SpaceX discloses no American count, while HughesNet's and Viasat's are American only. The direction does not depend on the base: one technology doubled in a year, while the other lost more than a third of its customers in two and a half years. Together the two geostationary services had about 737,000 subscribers at the end of June 2026, 6.1% of Starlink's global count, or one subscriber for every sixteen of Starlink's.

EXHIBIT 2

The three companies count subscribers differently, and each count is as filed

DATE	STARLINK, GLOBAL	HUGHESNET	VIASAT, US FIXED
31 Dec 2023	2.3 million	1,004,000	
31 Dec 2024	4.4 million	883,000	
31 Mar 2025	5.0 million		about 189,000
30 Jun 2025	6.0 million	819,000	
31 Dec 2025	8.9 million	739,000	
31 Mar 2026	10.3 million		about 130,000
30 Jun 2026	12.0 million	622,000	about 115,000

Starlink counts a “unique service line” assigned to a Starlink.com account without a negotiated agreement with its sales team. The count includes residential, roam and priority plans and excludes managed enterprise and government contracts. HughesNet is EchoStar’s broadband subscriber count. Viasat reports its US fixed broadband business only. A blank cell is a date at which the company did not report.

Source: SpaceX prospectus (12 June 2026) and 10-Q (4 August 2026); EchoStar 10-Ks for FY2024 and FY2025 and 10-Q to 30 June 2026; Viasat 10-Ks for FY2025 and FY2026 and 10-Q to 30 June 2026 (Filed).

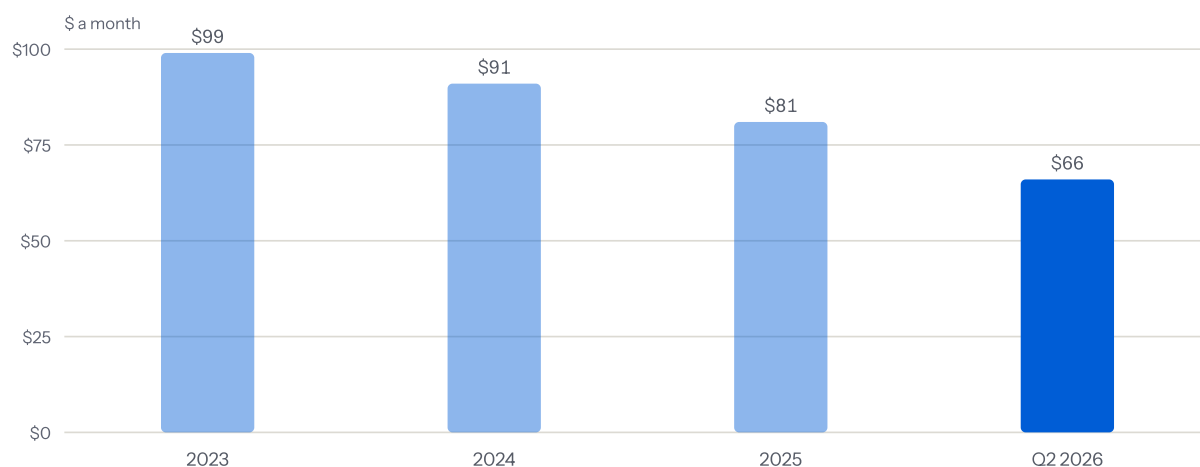
Revenue grew faster than the price fell

The money followed the subscribers, though not quite in step. SpaceX’s connectivity segment took in \$4,291 million of revenue in the second quarter of 2026, up 65.8% from \$2,588 million a year earlier. Consumers paid \$2,485 million of that and enterprise and government customers \$1,806 million. The segment made \$1,656 million of income from operations, which works out at a margin of close to 40%.

The average subscriber paid less. Revenue per subscriber was \$66 a month in the quarter, against \$85 a year earlier, a fall of 22.4%. SpaceX puts it down “primarily” to “international expansion and the addition of lower priced service plans”. The annual series runs the same way: \$99 in 2023, \$91 in 2024 and \$81 in 2025. The company tells investors to expect more of it “as the portion of our subscriber base outside North America continues to grow” (Exhibit 3). For comparison, Viasat’s American customers paid \$111 a month on average at 30 June 2026, nearly 70% more than the average Starlink subscriber worldwide.

EXHIBIT 3

Starlink's revenue per subscriber has fallen every year since 2023 as the base grows outside North America



Source: SpaceX prospectus (12 June 2026) for 2023 to 2025; Form 10-Q for the quarter to 30 June 2026 (Filed). Note: service revenue divided by average subscribers and by months in the period, as SpaceX defines it. The year-earlier quarter was \$85.

\$4,291M

SPACEX
CONNECTIVITY
REVENUE, Q2 2026

+65.8%

CHANGE ON Q2 2025

\$2,485M

OF IT FROM
CONSUMERS

\$1,656M

SEGMENT INCOME
FROM OPERATIONS

FILED

SpaceX 10-Q, quarter to 30 Jun 2026, segment revenue and key metrics

American retail prices, meanwhile, went up. From June 2026 billing, Starlink's residential plans in the United States cost \$55 a month for 100 Mbps, \$85 for 200 Mbps and \$130 for the top tier, according to SatelliteInternet.com and 9to5Google. In January they had been \$50, \$80 and \$120. 9to5Google, following Ars Technica, also reported in June that Starlink had stopped selling residential hardware outright and now

rents it. The average is falling because of where the new subscribers are, while the American price rises. Amazon Leo had published no consumer price and no commercial launch date by 7 October 2026.

One geostationary operator is in Chapter 11

The decline in geostationary broadband has reached the courts. On 2 August 2026 Hughes Satellite Systems Corporation and certain subsidiaries, including Hughes Communications and Hughes Network Systems, filed voluntary petitions under Chapter 11. EchoStar, the parent, did not file, and its two Chapter 11 cases are running in opposite directions. Its DISH DBS subsidiary, which runs the satellite television business, emerged from its own prepackaged case on 1 October 2026, two months after the broadband subsidiary went in.

HUGHES SATELLITE SYSTEMS, 2 AUGUST 2026

The petitions were filed in what EchoStar's [Form 8-K](#) calls "the United States Bankruptcy Court for the District of Texas", as In re Hughes Satellite Systems Corporation, Case No. 26-90739.

The 8-K says the debtors "expect to continue their existing operations without interruption".

A second 8-K, of 7 August, released the materials from talks with the holders of the company's 2026 notes, talks that "failed to achieve an agreement".

HughesNet had 622,000 subscribers at the end of June 2026, down from 1,004,000 at the end of 2023.

Viasat, the other geostationary consumer provider, is in the awkward position of adding capacity to a shrinking base. ViaSat-3 F2, launched in November 2025, was expected to enter service in September 2026, and F3, launched in April 2026, by late summer. Its FY2026 10-K warns that government support programmes "provide, or will likely provide, support to terrestrial service providers under terms and conditions that are not available to satellite-based service providers". BEAD tests that claim.

BEAD gives satellite a fifth of its locations and a twentieth of its money

BEAD became technology-neutral in June 2025, and by the end of August 2026 every state and territory had an approved plan. Satellite won a large share of the locations and a small share of the money, and in July, before all the plans were approved, NTIA moved to take part of the locations back.

The change came in NTIA's [Restructuring Policy Notice](#) of 6 June 2025, which "eliminates the 'Fiber Preference'" and ordered a fresh "Benefit of the Bargain" round for every eligible location. A priority project, under the notice, is one delivering at least 100 Mbps down and 20 Mbps up. For satellite it created a new instrument, the "LEO Capacity Subgrant", with four conditions attached.

- **Capacity.** The provider has to reserve capacity for every location in the project area.

— **Term.** The period of performance is ten years.

— **Payment.** Up to half of the grant can be paid early, once service is certified across the project area or subscription milestones are met.

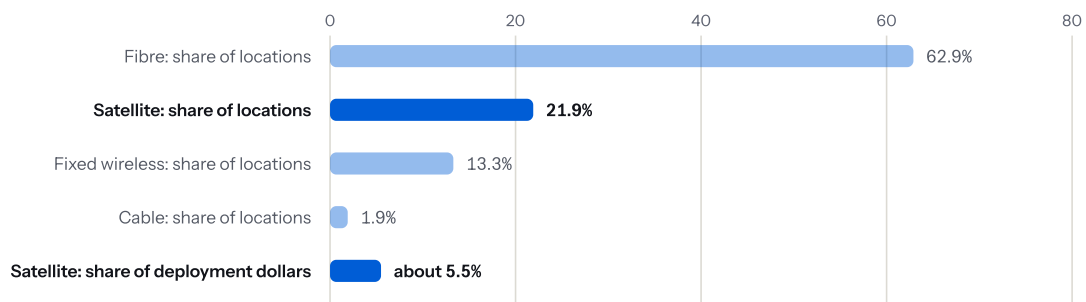
— **Equipment.** Customer equipment comes at no cost as part of a standard installation.

A condition that matters more than those four sits in the low-cost plan every subgrantee must offer. That plan has to deliver 100/20 Mbps with “latency performance of no more than 100 milliseconds”, and physics alone rules geostationary satellites out. The round trip through one is at least 477.5 ms, nearly five times the cap, and even O3b mPOWER in medium orbit starts at 107.6 ms ([part 1](#)). When Viasat says the terms are not available to satellite providers, it is right about its own orbit and wrong about low orbit.

On Broadband Breakfast’s tally of 28 August 2026 the approved plans cover 3.79 million locations and \$18.19 billion of deployment spending. Fibre takes 62.9% of the locations, satellite 21.9%, fixed wireless 13.3% and cable 1.9% (Exhibit 4). The money is split differently. SpaceX and Amazon are in line for a combined \$1 billion, which works out at about 5.5% of the deployment total: a fifth of the addresses for a twentieth of the cash, because satellite is cheap per address. ACLP at New York Law School counted 900,939 satellite locations and about \$1,025 million in the final proposals, about \$1,140 per satellite location against about \$4,800 for the programme as a whole (Exhibit 5).

EXHIBIT 4

Satellite won a fifth of BEAD’s locations but about a twentieth of its deployment dollars



Source: Broadband Breakfast, 28 August 2026, from NTIA award data for the approved plans and Connected Nation’s tally of satellite dollars in the draft plans (Reported); satellite share of dollars calculated by Blue Prysm as \$1 billion of \$18.19 billion (Calculated). Note: shares of dollars for the other technologies are not published.

EXHIBIT 5

Each BEAD figure comes from a different source, and the two trackers agree to within a tenth

MEASURE	FIGURE	SOURCE, DATE AND CLASS
Locations in the approved plans	3.79 million	Broadband Breakfast, 28 Aug 2026 (Reported)
Share of locations by technology	Fibre 62.9%, satellite 21.9% , fixed wireless 13.3%, cable 1.9%	Broadband Breakfast, 28 Aug 2026 (Reported)
Deployment spend in the approved plans	\$18.19 billion	Broadband Breakfast, 28 Aug 2026 (Reported)
Satellite subsidy	About \$1 billion, SpaceX and Amazon combined	Broadband Breakfast, from Connected Nation, 28 Aug 2026 (Reported)
Satellite share of deployment dollars	About 5.5%	Blue Prysm, on Broadband Breakfast's figures (Calculated)
Satellite locations and subsidy in the final proposals	900,939 locations, about \$1,025 million	ACLP at New York Law School, 16 Jul 2026 (Reported)
Subsidy per location	Satellite about \$1,140 (ACLP); all technologies about \$4,800 (Broadband Breakfast)	Blue Prysm (Calculated)
Satellite locations at risk in the July review	35% to 42%, about \$354 to \$423 million	ACLP at New York Law School, 16 Jul 2026 (Reported)

21.9% of 3.79 million is about 830,000 locations, against ACLP's 900,939. ACLP's \$1,025 million is 5.6% of the \$18.19 billion total. Quilty Space put satellite at "just under 5%" of the money in January 2026, with average subsidies of about \$750 to \$800 a location for Amazon Leo and \$1,500 to \$1,600 for Starlink.

Source: Broadband Breakfast, 28 August 2026; ACLP at New York Law School, 16 July 2026; Quilty Space, 16 January 2026; NTIA progress dashboard, 8 September 2026 (Reported and Calculated as marked).

In July NTIA told states to check every satellite-awarded location against the updated FCC map and to remove any that the map shows as already served, or as not existing at all. StateScoop reported that NTIA would revoke approval of those locations unless a state could refute the new data. ACLP estimates the cut at 35% of satellite locations, about \$354 million, or 42% and about \$423 million if unlicensed fixed wireless counts as service. StateScoop's own tally of the 47 states that had proposed satellite locations found an average expected cut of 33.77%, ranging from 0.9% in Rhode Island to 75.4% in Mississippi. On ACLP's base, that leaves satellite with between \$602 million and \$671 million.

Two later steps complicate the picture. In August NTIA said, as Broadband Breakfast reported, that states cannot unilaterally alter BEAD contracts they have already signed, which is hard to square with a review that asks them to remove locations. On 3 September a Supplemental Deployment Policy Notice, reported by Light Reading, let states put part of the roughly \$21 billion of non-deployment savings into a further deployment round for locations still unserved, without saying how much. Nothing had settled by 7 October 2026, when NTIA had still published no post-review satellite totals.

Satellite won about a fifth of BEAD's locations for about a twentieth of its money, at roughly a quarter of the average subsidy per location, and a third or more of those locations are expected to go in the July review. Against the business it subsidises, the award is small: about \$1.0 billion over ten years, before the cut, is less than half of the \$2,485 million that Starlink's consumers paid SpaceX in the second quarter of 2026 alone. In American broadband from orbit the subscriber pays and the subsidy is a footnote.

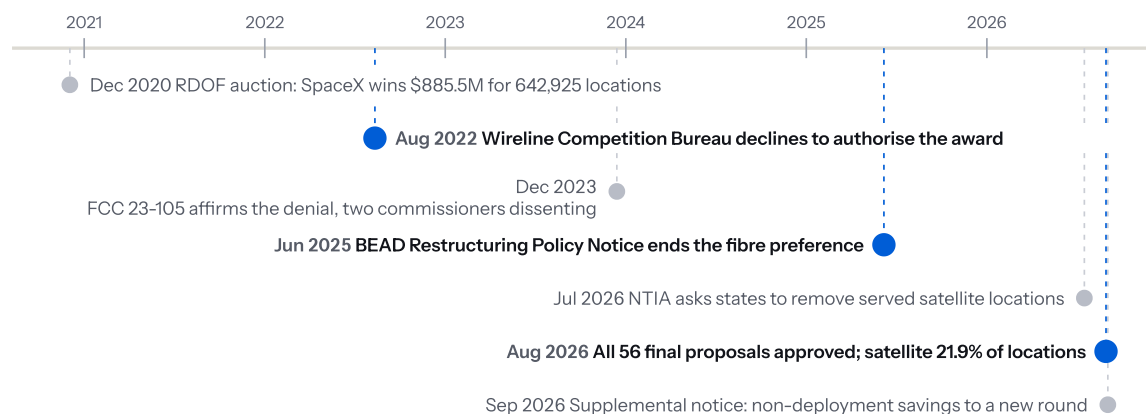
The subsidy record runs back to an award SpaceX lost

BEAD is the second federal programme to put satellite broadband on its books, and the first did not end well for SpaceX. In the 2020 Rural Digital Opportunity Fund auction it won "\$885,509,638.40 in 10-year support" to serve 642,925 locations in 35 states, which is about \$1,377 a location. The Wireline Competition Bureau declined to authorise the award on 10 August 2022, and the Commission affirmed that decision in [FCC 23-105](#), released on 12 December 2023, with Commissioners Carr and Simington dissenting. In November 2024 Carr, by then the incoming chairman, said it was "very unlikely" the FCC would revisit it, and it has not (Exhibit 6).

Two comparisons put the subsidy in proportion. The award SpaceX lost in 2022 was 86% of the whole BEAD satellite award to every provider, on ACLP's count, so the company has already been denied nearly as much public money as the current programme offers every satellite provider put together. SpaceX's prospectus mentions neither RDOF nor BEAD, which in our view says how much they matter to the business.

EXHIBIT 6

Federal subsidy decisions on satellite broadband ran from a 2020 RDOF win to the 2026 BEAD review



Source: FCC 23-105 (12 December 2023); NTIA BEAD Restructuring Policy Notice (6 June 2025) and progress dashboard (8 September 2026); Broadband Breakfast, StateScoop and Light Reading reports as listed in the sources (Filed and Reported as marked).

Terms used

- **ARPU.** Average revenue per user. For Starlink, SpaceX defines it as service revenue divided by the average number of subscribers and by the months in the period.
- **BEAD.** The Broadband Equity, Access, and Deployment programme run by NTIA, under which states award subgrants to build broadband to unserved and underserved locations.
- **Low-cost option.** The cheaper plan every BEAD subgrantee must offer eligible households. Since June 2025 it has had to deliver 100/20 Mbps with latency of no more than 100 ms; the subgrantee sets the price.
- **RDOF.** The FCC's Rural Digital Opportunity Fund, a 2020 reverse auction for ten years of support to serve rural locations.

Implications

CARRIER STRATEGIST

Treat Starlink as a competitor that files accounts, because it now does. It has 12.0 million subscribers, falling revenue per user and rising American prices, and the geostationary alternative is shrinking under it. Check the accuracy of your own coverage filings, because the July review removes satellite BEAD locations that the FCC map shows as served, so your filing decides who keeps a subsidy.

INVESTOR

Model Starlink as a volume business. Subscribers doubled in a year while revenue per subscriber fell 22%, and SpaceX says the mix will keep pushing the average down, so the question is whether volume keeps outrunning price. The subsidy line is small beside the subscription line and should be modelled that way. The next data points are SpaceX's third-quarter 10-Q, due around early November 2026, and NTIA's post-review satellite totals.

VENDOR

Plan for the terminal as an operator cost rather than a customer purchase, because both the subsidy and the market leader now treat it that way. BEAD's low-orbit grants require customer equipment at no cost with standard installation, and trackers report that Starlink has moved American residential hardware to rental. Geostationary capacity, meanwhile, is arriving into a shrinking base. ViaSat-3 F2 and F3 were expected in service by September 2026, against an American base down 39% in fifteen months.

Method and limits

HOW THIS WAS BUILT

Subscriber counts, revenue and revenue per user are as each company filed them, in its own definition, and Exhibit 2 sets those definitions out. The growth rates are calculated from the filed counts. The BEAD figures rest on two trackers. The national totals are Broadband Breakfast's tally of the approved final proposals, marked as reported, and the satellite share of dollars is calculated from that tally's own figures. ACLP's separate count of satellite locations and dollars is used for the July review and for the subsidy per satellite location. Exhibit 5 names the source of each figure.

WHAT IT DOES NOT SHOW

Starlink does not disclose an American subscriber count, so its global figure has to stand beside a national one for Viasat. Starlink's retail prices are as price trackers report them. NTIA had published no post-review satellite totals by provider on 7 October 2026, so what the July review will take away is an analyst's estimate rather than a result. Nothing here is investment advice.

Data as of: SEC filings to 30 June 2026 and NTIA dashboard of 8 Sep 2026, read 7 Oct 2026 · Method version 1.0.

Sources. SpaceX's 10-Q to 30 June 2026 and prospectus of 12 June 2026; EchoStar's FY2025 10-K, 10-Q to 30 June 2026 and Forms 8-K of 3 August, 7 August and 2 October 2026; Viasat's 10-Ks for FY2025 and FY2026 and 10-Q to 30 June 2026; NTIA's BEAD Restructuring Policy Notice (6 June 2025) and progress dashboard (refreshed 8 September 2026); FCC 23-105 on Starlink's RDOF award. Trackers and press: Broadband Breakfast on the approved plans (28 August 2026), the satellite review (14 July), signed contracts (14 August) and RDOF (22 November 2024); ACLP at New York Law School, BEAD awards for satellite (16 July 2026); StateScoop on 16 July and 23 July 2026; Quilty Space, BEAD's year-end snapshot (16 January 2026); Light Reading on non-deployment funds (3 September 2026); SatelliteInternet.com on Starlink's 2026 prices (28 May 2026) and 9to5Google on hardware rental (10 June 2026). Retrieved 7 Oct 2026.

High-altitude platforms

What can a stratospheric platform do that a tower or a satellite cannot, and has anyone made it pay?

A platform held at about 20 km has something a satellite cannot offer: the link budget of a tall tower over a footprint the size of a region, which lets it serve ordinary phones in ordinary mobile bands. WRC-23 wrote the international rules for doing that. The price remains unwritten. No operator has published a commercial service or a unit cost, and the nearest thing to either is SoftBank's trial service off Japan in August and September 2026.

BLUE PRYSM · ANALYSIS



IN BRIEF

- Height is the whole case. A platform at 20 km starts **28.8 dB** ahead of a satellite at 550 km on free-space loss at 2 GHz, about 760 times the power (our calculation). It serves a disc 216 km across at 10° elevation, and an unmodified phone can work with it in a terrestrial band.
- The international rules are written. WRC-23 identified mobile bands from **694 MHz to 2.69 GHz** for base stations on platforms at 18 to 25 km, and neither the WRC-27 agenda nor the preliminary WRC-31 agenda reopens them. National rules lag behind. The FCC declined to write any in January 2024, while Japan's Radio Regulatory Council approved a draft ordinance on 3 February 2026.
- The one piece of operator field evidence in the standards record is about interference rather than coverage. A 3GPP work item approved in September 2026 reports "severe co-channel interference" from a platform into terrestrial cells sharing 800 MHz, and its remedy, supplementary-uplink bands, is due by March 2027.

A platform at 20 km has a tower’s link budget and a region’s footprint

A platform at 20 km flies at a twenty-fourth of the height of Starlink’s main shells at 480 km, and that one ratio is the argument for putting a base station there.

Directly below a platform at 20 km a signal arrives in 0.067 ms, as near to instant as makes no difference to a phone. At 2 GHz the free-space loss over those 20 km is 124.5 dB; over the 550 km to a low-orbit satellite overhead it is 153.3 dB. The platform starts 28.8 dB ahead, about 760 times the power, and that margin lets an unmodified phone work with it in a terrestrial mobile band at terrestrial power.

Reach is what the height costs. At 10° minimum elevation a platform serves a disc 216 km across, about 36,600 km², a region rather than a country. Covering the Earth once would take at least 16,865 platforms, against 85 satellites at 480 km (part 1). A platform is a regional asset, and the size of the region depends on how low over the horizon its users can look (Exhibit 1).

EXHIBIT 1

Lowering the minimum elevation from 30° to 5° widens one platform’s coverage from 3,700 to 118,400 km²

MINIMUM ELEVATION	GROUND RADIUS	DIAMETER	AREA	LONGEST PATH TO A USER
5°	194 km	388 km	118,400 km²	195 km
10°	108 km	216 km	36,600 km²	110 km
15°	73 km	146 km	16,700 km²	76 km
20°	54 km	108 km	9,200 km²	58 km
30°	34 km	69 km	3,700 km²	40 km

The “up to 200 km in diameter” SoftBank gives for one platform, and Space Compass’s “100 to 200 km”, correspond to a minimum elevation of about 11°. Stratospheric Platforms’ 15,000 km² per platform corresponds to about 15° to 16°.

Source: spherical-Earth geometry, R = 6,371 km, platform at 20 km; free-space loss at 2 GHz, $20 \log_{10}(4\pi d/\lambda)$ (Calculated). SoftBank News, 26 September 2025; Space Compass, 3 March 2025; DCD, 4 March 2022 (Reported).

WRC-23 settled the international rules

The ITU has a name for a platform used as a mobile base station, HIBS, and WRC-23 in Dubai wrote its rules. They are now in the Radio Regulations (Exhibit 2).

The Radio Regulations define a high-altitude platform station as one “located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth”. The three HIBS resolutions narrow that window and lower it, to platforms “operating between 18 km and 25 km”, and Resolution 221 notes that

- transmissions “may occur at altitudes down to 18 km”. The two definitions overlap rather than coincide, which matters later. Four conditions attach to every identification.
- **Optional.** Each identification is optional for administrations and “does not establish priority”.
 - **Unprotected.** A platform cannot “claim protection from existing primary services”.
 - **Power-capped.** Each resolution caps the power-flux density a platform may put on another country’s territory, for instance $-114 \text{ dB(W/(m}^2\text{MHz))}$ to protect mobile stations at 694 to 960 MHz.
 - **Enforceable.** Notification requires “a firm, objective, actionable, measurable and enforceable commitment” to remove unacceptable interference immediately.

EXHIBIT 2			
WRC-23 identified mobile bands from 694 MHz to 2.69 GHz for platform base stations, with reception-only and transmission-only sub-bands			
BAND	WHERE	FOOTNOTE AND RESOLUTION	DIRECTION LIMITS
694 to 960 MHz (698 to 960 MHz in Region 2), or parts of it	Regions 1 and 2	5.312B; Res. 213 (WRC-23)	694 to 728, 830 to 835 and 805.3 to 806.9 MHz: reception by the platform only
698 to 960 MHz, or four sub-bands of it	Region 3, named countries only: the whole band in Australia and five other states; four sub-bands in China, India, Indonesia, Japan, Korea, Malaysia, the Philippines and Thailand	5.314A; Res. 213 (WRC-23)	698 to 728 and 830 to 835 MHz: reception only
1,710 to 1,980, 2,010 to 2,025 and 2,110 to 2,170 MHz	Regions 1 and 3; in Region 2, 1,710 to 1,980 and 2,110 to 2,160 MHz	5.388A; Res. 221 (Rev.WRC-23)	1,710 to 1,785 MHz (1,710 to 1,815 MHz in Region 3): reception only; 2,110 to 2,170 MHz: transmission only
2,500 to 2,690 MHz (2,500 to 2,655 MHz in Region 3)	All regions	5.409A; Res. 218 (WRC-23)	2,500 to 2,510 MHz (2,500 to 2,535 MHz in Region 3): reception only
Region 1 is Europe, Africa and the Middle East; Region 2 the Americas; Region 3 Asia and the Pacific. Fixed-service bands for the platforms’ links to the ground were identified at earlier conferences, and WRC-23 revised most of their footnotes editorially: 21.4 to 22 and 24.25 to 27.5 GHz in Region 2, 31 to 31.3 and 38 to 39.5 GHz worldwide, and 47.2 to 47.5 and 47.9 to 48.2 GHz.			
Source: WRC-23 Provisional Final Acts, MOD 5.388A, ADD 5.14A to 5.14C, Resolutions 213 and 218 (WRC-23) and 221 (Rev.WRC-23); Radio Regulations, Edition of 2024, and ComReg’s frequency plan for the final footnote numbers; TS 38.104 Release 19, clause 5.2 (Filed).			

Nothing more is coming from the ITU. The WRC-27 agenda adopted at WRC-23 has nineteen items, 1.1 to 1.19, and none concerns high-altitude platforms. The preliminary WRC-31 agenda has none either; its item 2.5 is about phones used aboard aircraft, a different matter. The international rulebook is settled until at least 2031, and the work has moved to national licensing and to 3GPP.

The United States has written no rules, and the one time it looked at the question it said no. The FCC asked in 2021 whether to admit high-altitude platforms to the 70/80/90 GHz bands. In [FCC 24-16](#) of January 2024 it declined, finding “highly divergent claims” about integrating the platforms into those bands, “with limited actual data to support such action”. The footnotes say more than the finding. They record that the only advocate to file a detailed technical study, Loon, “shuttered in early 2021”, and quote T-Mobile, which told the Commission there was “little current documented interest in those services and, unlike 5G, no deployment”.

To 7 October 2026 there is no FCC rulemaking and no US Table footnote implementing the WRC-23 identifications. Japan is moving quickly the other way. Its Information and Communications Council delivered a partial report on technical requirements for the platforms on 14 November 2025. MIC consulted on a draft ordinance from December 2025 to January 2026, and the Radio Regulatory Council found the drafts appropriate on 3 February 2026. The published documents give neither the bands nor the date the rules take effect, so Japan is writing rules whose content is not yet public.

The standard treats a platform as a base station that flies

3GPP never wrote a satellite specification for the platforms and did not need to. TS 38.104, the base-station radio specification, says in Release 19 that seventeen terrestrial bands, from n1 to n90, “can be applied for HAPS operation” (Exhibit 3). The SoftBank-led item that added them notes that “HAPS can be supported using terrestrial network (TN) functionality available in Rel-17”. To the standard, a platform is a terrestrial base station with an altitude, in terrestrial spectrum, and it needs none of the satellite bands in [part 5](#). The 6G study, TR 38.914, lists it among the non-terrestrial components 6G must support.

EXHIBIT 3

3GPP specifies a platform as a terrestrial base station and is now adding bands to manage its interference

DOCUMENT	DATE	WHAT IT SAYS ABOUT PLATFORMS
TS 38.104, clause 5.2	Release 19	Seventeen terrestrial bands “can be applied for HAPS operation”: n1, n2, n3, n5, n7, n8, n20, n25, n26, n28, n34, n38, n39, n41, n67, n85 and n90
NR_HAPS_bands work item, SoftBank	Approved September 2024, completed March 2025	“HAPS can be supported using terrestrial network (TN) functionality available in Rel-17”
RP-262210, China Telecom, SoftBank and CICT	Approved at RAN#113, Madrid, 14 to 17 September 2026; due March 2027	Reports “severe co-channel interference (CCI)” where a platform and terrestrial cells share a low band such as n5 at 800 MHz; adds supplementary-uplink bands, such as n89, for a platform with a mid-band downlink
TR 38.914, the 6G study	June 2026	Lists HAPS among the non-terrestrial components 6G must support

Source: 3GPP TS 38.104 clause 5.2 (Release 19); 3GPP work plan and the NR_HAPS_bands work item; RP-262210 (September 2026); TR 38.914 V20.0.0 (June 2026) (Filed).

In September 2026 operator field evidence entered the 3GPP record, and it concerned interference rather than coverage. [RP-262210](#), approved at RAN#113 in Madrid, comes from China Telecom, SoftBank and CICT. Its justification says that where a terrestrial network and a platform share a low band such as n5 at 800 MHz in the same area, “severe co-channel interference (CCI) occurs”. The cause is the platform’s height. The same thing that lets it reach a phone means its downlink “creates a massive line-of-sight (LOS) interference region” that degrades the terrestrial cells beneath it. The remedy the item specifies, due by March 2027, is to split the platform across two bands. Its downlink goes in mid-band, such as 2.1 GHz, and its uplink stays low on bands such as n89 at 800 MHz, because “closing the uplink budget at 2.1GHz is extremely challenging”.

The same height that lets a platform reach an unmodified phone by line of sight puts its signal into every cell for a hundred kilometres around. The only operator field evidence in the standards record is about that problem rather than about coverage, and the remedy splits the platform across two bands. In our view a carrier cannot drop a platform into the low band its towers already use and expect it to behave; it needs a frequency plan first.

No programme has reached a commercial service

The platforms that have flown longest belong to companies that have never sold a service, and every commercial date on the record is still in the future (Exhibits 4 and 5).

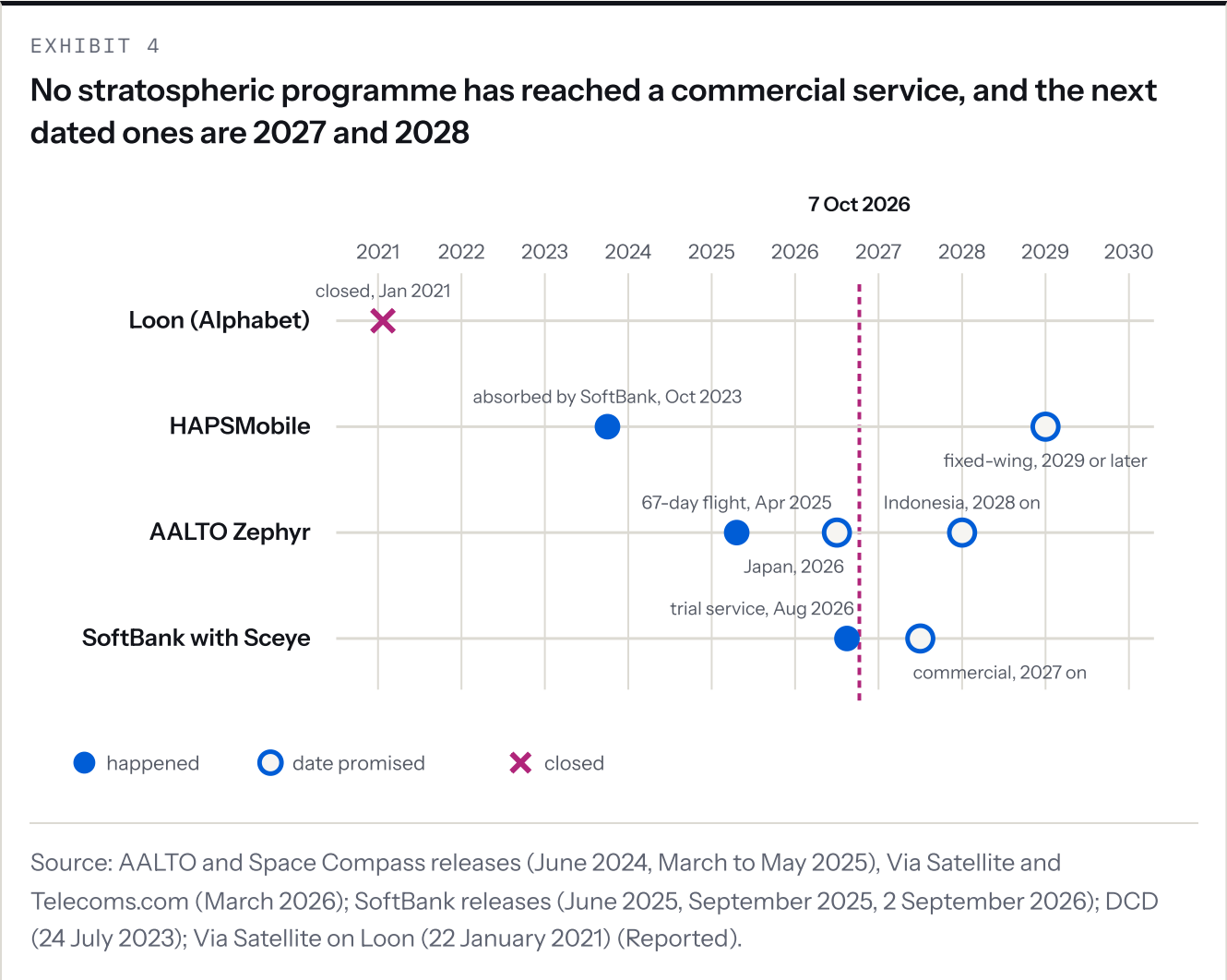


EXHIBIT 5

Of five platform programmes on the record, one has closed and none sells a service

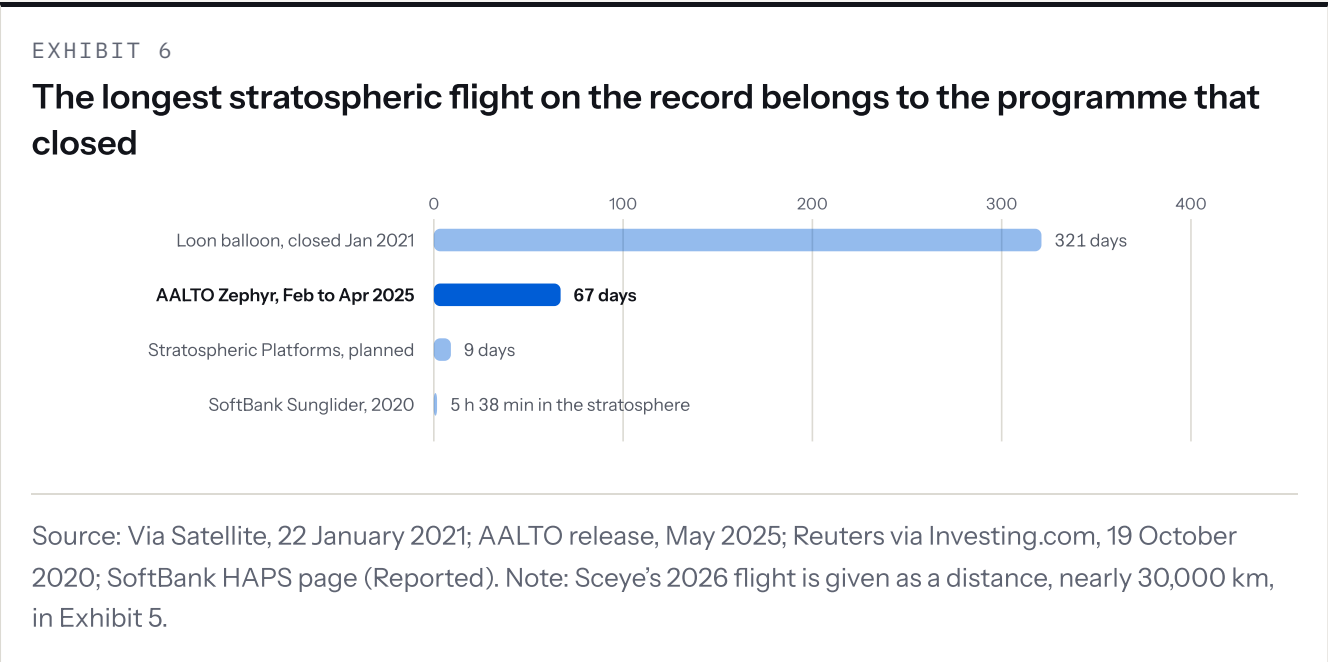
PLATFORM	TYPE AND ALTITUDE	LONGEST FLIGHT ON THE RECORD	STATUS, 7 OCT 2026
AALTO Zephyr, Airbus majority	Solar fixed-wing, 25 m span, 75 kg; “above 60,000+ feet”	67 days, 6 hours and 52 minutes, February to April 2025	4G link to a phone from about 20 km in Kenya, March 2025, at “more than 4.66 Mbps”; Japan service targeted for 2026 not announced by 7 Oct 2026; Telkomsel agreement: initial operations from 2027, commercial “from 2028 onwards”

Sceye, SoftBank exclusive in Japan	Helium airship; 16.5 to 17 km in 2026, 20 km design	Nearly 30,000 km, New Mexico to Japan and back, from 9 Aug 2026; over the continental US again on 4 Sep	SoftBank trial service off Cape Muroto, August to September 2026; commercial service “from 2027 onward”
Sunglider, SoftBank’s HAPSMobile	Solar fixed-wing, 78 m span; 62,500 ft (about 19 km) in 2020	5 hours 38 minutes in the stratosphere, SoftBank’s figure for the 2020 test	HAPSMobile absorbed by SoftBank on 1 Oct 2023; fixed-wing service “around 2029 or later”
Stratospheric Platforms, Deutsche Telekom 38% in 2020	Hydrogen fixed-wing, 60 m span planned; trials at 14 km on a Grob aircraft	Nine days planned	No status on the record for 2025 or 2026
Loon, Alphabet	Balloons in the stratosphere	321 days, one balloon	Closed January 2021

All figures are the companies’ own or trade reports of them. A 20-hour total flight is reported elsewhere for the same Sunglider test; SoftBank’s figure is for time in the stratosphere.

Source: AALTO releases, March and May 2025; Sceye, 9 September 2026; SoftBank, 26 June 2025, 26 September 2025 and 2 September 2026; Via Satellite and Telecoms.com, March 2026; DCD, 24 July 2023; Reuters, 19 October 2020; Via Satellite, 22 January 2021 (Reported).

The flight records point the same way (Exhibit 6). The longest belongs to Loon, which closed. The longest by a company still flying belongs to AALTO, which has sold no service. The nearest thing to a service on the record is SoftBank’s trial, set out below.



SOFTBANK AND SCEYE OFF CAPE MUROTO, AUGUST TO SEPTEMBER 2026

Sceye’s airship left Roswell, New Mexico, on 9 August 2026 and flew more than 15,000 km across the Pacific. It held station “within a radius as small as 5 km” off Cape Muroto in Kochi, carrying “a 4G LTE-equivalent base station” and an onboard core.

SoftBank reports voice, SMS, video calls and disaster alerts, and says “the average round-trip response time for processing on the server onboard the HAPS was 68 milliseconds”.

Sceye says the flight ran at 16.5 to 17 km, below the 20 km at which the Radio Regulations define a high-altitude platform station and below the 18 km floor of the WRC-23 HIBS conditions. In our view the trial flew outside the international HIBS framework altogether, and neither release says under what Japanese authorisation it operated.

SoftBank aims at commercial service “from 2027 onward”.

No operator has published a cost or a revenue

No operator has published what a platform costs to build or to fly, or what a service earns, and the two data points that exist are a closure and an absorption. Loon’s chief executive said on its closure that “we haven’t found a way to get the costs low enough to build a long-term, sustainable business”. HAPSMobile lost ¥448 million in the year to March 2023, on ¥37 million of assets, before SoftBank absorbed it on 1 October 2023.

One transaction price exists. AeroVironment’s 10-K records that in March 2022 it “sold its 7 % equity interest in HAPSMobile to SoftBank, for 808,008,000 yen (\$ 6,497,000)”; the same note calls the stake “approximately 7 %”. At 7% the price values the whole company at about ¥11.5 billion, or about \$93 million (our calculation). On the funding side, HAPS JAPAN, led by NTT Docomo and Space Compass with Mizuho and the Development Bank of Japan, committed \$100 million to AALTO in June 2024, subject to approvals. SoftBank has not disclosed its stake in Sceye.

¥808M	≈\$93M	¥448M
AEROVIRONMENT’S APPROXIMATELY 7% OF HAPSMOBILE, MARCH 2022	IMPLIED VALUE OF ALL OF HAPSMOBILE AT 7%	HAPSMOBILE’S LOSS IN THE YEAR TO MARCH 2023
\$100M		
HAPS JAPAN COMMITMENT TO		

FILED

AeroVironment Form 10-K for FY2024, filed 27 Jun 2024, note on the investment in HAPSMobile; implied value calculated by Blue Prysm

REPORTED

DCD, 24 Jul 2023 (HAPSMobile loss and assets) · HAPS JAPAN and AALTO release, 3 Jun 2024 · SoftBank, 2 Sep 2026

That leaves footprint against footprint as the only comparison available with low orbit. One platform serves 9,200 to 36,600 km² continuously, depending on whether its users look down to 20° or 10° above the horizon. The companies claim more: one platform replaces 200 terrestrial towers, says Stratospheric Platforms (2020), or covers the area of about 500, says Sceye (2026). The structural difference is larger. A constellation has to reach global scale before it serves any region continuously, while a platform serves one region from its first day and never more. In our view that makes it an operator's layer, in the operator's own spectrum, for disaster recovery, islands and mountains, rather than a broadband network that competes with Starlink or Amazon Leo. Whether it is a cheap layer or an expensive one cannot yet be said, because no published figure allows a cost per gigabyte or per square kilometre to be set beside either.

Terms used

- **HAPS and HIBS.** A high-altitude platform station is any radio station on a platform at 20 to 50 km. HIBS is the ITU's term for one used as a mobile base station, under conditions written for 18 to 25 km.
- **Power-flux density.** The power arriving per square metre at the ground, which is the measure the Radio Regulations use to cap interference into a neighbouring country.
- **Supplementary uplink.** A band used only for the uplink, paired with a downlink in another band. The device can then transmit low, where its signal travels further, and receive high, where there is more capacity.
- **Station-keeping.** Holding a platform over a fixed point against the wind. The radius it holds decides how stable the cells beneath it are.

Implications

CARRIER STRATEGIST

Plan the frequencies before you fly. A platform is a layer you would own, over a region you choose, in spectrum you already hold. The one piece of field evidence in the standards record says that putting it in the low band your towers use brings severe co-channel interference into those towers. Watch Japan rather than the United States. The FCC has written no rules and opened no proceeding on the WRC-23 bands, while Japan's Radio Regulatory Council approved a draft ordinance on 3 February 2026.

INVESTOR

Model SoftBank's 2027 date with Loon's closure on cost and HAPSMobile's absorption beside it. There is no revenue, no unit cost and one transaction price on the record, AeroVironment's stake of approximately 7% in HAPSMobile, which valued the whole company at about \$93 million in 2022. AALTO's 2026 service in Japan had not been announced by 7 October, and its next dated service is Indonesia from 2028.

VENDOR

Design for the airframe, because the radio is settled. It is a terrestrial base station in terrestrial bands, in TS 38.104 since Release 19, with supplementary-uplink combinations due by March 2027, so there is little to differentiate there. What varies is what the platform can lift. Zephyr weighs 75 kg in all, while IEEE Spectrum reports Sceye payloads of up to 250 kg tested, so power and mass per cell decide which designs fit on which platform.

Method and limits

HOW THIS WAS BUILT

The bands, the footnotes and the conditions are read from the WRC-23 Provisional Final Acts themselves. The final footnote numbers are confirmed in the Radio Regulations, Edition of 2024, in a national frequency plan and in 3GPP TS 38.104, which cites them. The 3GPP position comes from the specification and from the work item descriptions, with nothing taken from secondary accounts. The footprints are calculated for a platform at 20 km over a spherical Earth of radius 6,371 km, and the path loss is free-space loss at 2 GHz.

WHAT IT DOES NOT SHOW

Programme dates, flight records and coverage claims are the companies' own and are reported unverified. No operator has published a unit cost, a capital or operating cost per platform, or any service revenue, so a cost comparison with a satellite constellation is not yet possible. The 3GPP interference statement describes an operator field trial that has not itself been published, so the conclusion is known and the data are not. Japan's published HAPS documents are the council report, the draft ordinance and its approval, and they give neither the bands nor the date the rules take effect.

Data as of: ITU and 3GPP documents, the FCC order and company releases as dated, read 7 Oct 2026 · Method version 1.0.

Sources. ITU, WRC-23 Provisional Final Acts (Resolutions 213, 218 and 221, the HIBS footnotes and the WRC-27 and WRC-31 agendas), with the final footnote numbers from ComReg's frequency plan for 5.312B, 5.314A and 5.409A; 3GPP RP-262210 (RAN#113, September 2026), TS 38.104 clause 5.2 and TR 38.914; FCC 24-16 (26 January 2024); Japan's MIC releases of 14 November 2025 and 3 February 2026; AeroVironment's FY2024 10-K; SoftBank's releases of 26 June 2025 and 2 September 2026 and its news of 26 September 2025; Sceye's release of 9 September 2026; AALTO on its 67-day flight and its Kenya 4G test; the HAPS JAPAN investment release (3 June 2024) and AALTO's Australia release (16 February 2026). Trade press: IEEE Spectrum on Sceye (28 March 2026), Via Satellite on Telkomsel (2 March 2026), Telecoms.com on the 2028 launch (4 March 2026), DCD on HAPSMobile (24 July 2023), Via Satellite on Loon (22 January 2021), Reuters via Investing.com on Stratospheric Platforms (19 October 2020). Retrieved 7 Oct 2026.

How the rules treat non-terrestrial networks

What have the FCC, the ITU and 3GPP decided and what is still pending?

Three bodies write the rules for a non-terrestrial network, and in 2026 they moved at different speeds. The FCC rewrote, inside twelve weeks, the two rules that had done most to shape low-orbit broadband in the United States. The ITU looked at its power limits, kept them and sent the question off to be studied. 3GPP finished the Release 19 work that lets an operator put a base station in orbit, a larger change than it sounds.



IN BRIEF

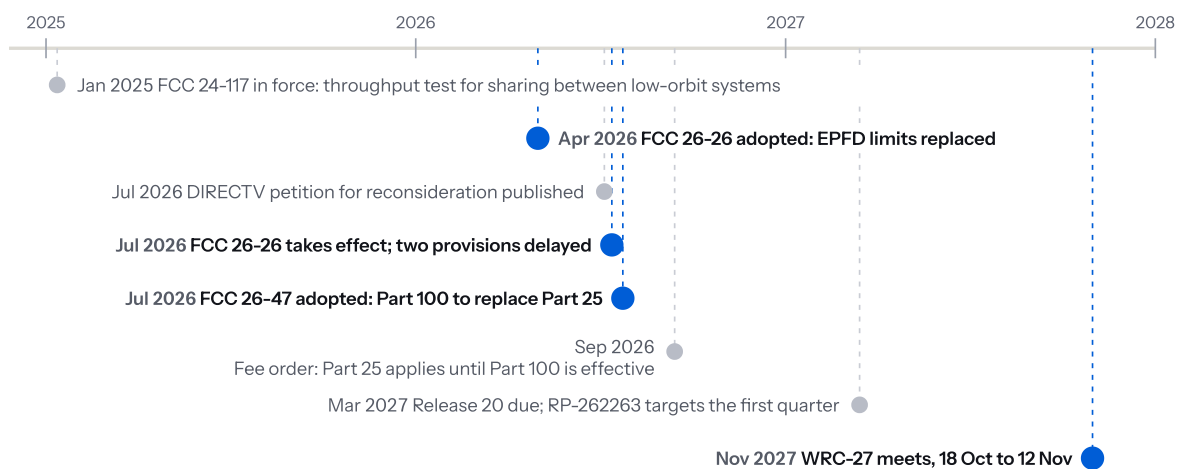
- FCC 26-26 replaced the EPFD limits with performance-based protection criteria from **13 July 2026**, and DIRECTV's petition for reconsideration is pending. The Commission puts the benefit at "well over \$2 billion" and the capacity gain at 100% to 700%, and both figures come from SpaceX's and Amazon's own comments.
- Twelve weeks later, in FCC 26-47 of **22 July 2026**, the Commission created Part 100, with a "default to yes" review, a 20-year licence term and a nationwide earth-station licence. It had no effective date on 7 October 2026, so Part 25 still applies.
- WRC-23 declined to put EPFD on the WRC-27 agenda, so outside the United States Article 22 still binds the same satellites the FCC has released from it. WRC-27 is a satellite conference in all but name: **thirteen** of its nineteen items concern satellite systems (our count), and it meets from 18 October to 12 November 2027.

The FCC rewrote two rules in twelve weeks

Two rules did most to shape low-orbit broadband in the United States. One was a power limit written at WRC-2000 to protect geostationary satellites. The other was a licensing process that treated each application as its own case. The Commission rewrote both in 2026, and one of the rewrites is in force (Exhibit 1).

EXHIBIT 1

The FCC adopted both rewrites within twelve weeks of 2026, and the ITU's next decision point is November 2027



Source: FCC 24-117; FCC 26-26 and 91 FR 26928; 91 FR 40964; FCC 26-47; FCC 26-59, 91 FR 58258; 3GPP work plan of 28 September 2026 and RP-262263; ITU WRC-27 dates (Filed). Note: the FCC's two rules are marked in colour.

The first is the power limit. The equivalent power-flux-density limit, EPFD, caps the signal a non-geostationary constellation may put on the ground in the 10.7 to 12.7, 17.3 to 18.6 and 19.7 to 20.2 GHz bands, so that geostationary links underneath keep working. [FCC 26-26](#), adopted on 30 April 2026, “replace[s] the EPFD framework with modern, performance-based GSO protection criteria”. The rule took effect on 13 July 2026, apart from two provisions delayed indefinitely. DIRECTV’s petition for reconsideration, with replies closed on 31 July, is pending.

The replacement is a measure of harm, and the harm is lost throughput (Exhibit 2). Where operators have no coordination agreement, a geostationary link may lose no more than 3% of its time-weighted average throughput over the long term. Over the short term it may suffer no more than a 0.1% absolute increase in unavailability. Links without adaptive coding, which cannot trade speed for resilience, are protected instead at an interference-to-noise ratio of -10.5 dB for 80% of the time. Low-orbit satellites must also keep at least 3° away from the geostationary arc. None of this is new to the Commission: the same throughput test has governed sharing between low-orbit systems since [FCC 24-117](#) took effect on 13 January 2025, with a looser 0.4% short-term test.

EXHIBIT 2

American satellite sharing now runs on one throughput metric, with a tighter short-term test where a geostationary link is the victim

CRITERION	GEOSTATIONARY LINK AS VICTIM (FCC 26-26)	LOW-ORBIT SYSTEM AS VICTIM (FCC 24-117)
Long term	3% time-weighted average throughput degradation	3% time-weighted average throughput degradation
Short term	0.1% absolute increase in unavailability	0.4% absolute increase in unavailability
Links without adaptive coding	Interference-to-noise ratio of -10.5 dB for 80% of the time	
Geometry	Low-orbit satellites keep at least 3° from the geostationary arc	
In force	13 Jul 2026; two provisions delayed indefinitely; DIRECTV petition pending	13 Jan 2025

FCC 24-117 protects earlier-round systems for ten years after the first grant in a later round, under the Commission’s 2023 order. A blank cell is an item its summary does not address.

Source: FCC 26-26 (1 May 2026) and 91 FR 26928; FCC 24-117 (15 November 2024) and 89 FR 100898; 91 FR 40964 (Filed).

The Commission puts the benefits at “well over \$2 billion, with capacity increases of 100% to 700% possible using the same number of in-orbit NGSO satellites”. Those figures come from the parties with the most to gain: SpaceX’s and Amazon’s comments supplied the range, on the argument that a system can use eight satellites at once over a location “instead of being effectively limited to one”.

Part 100 replaces case-by-case review with a default to yes

The second rule is Part 25. [FCC 26-47](#), adopted on 22 July 2026, creates a new Part 100 and says “The Commission will sunset part 25 once part 100 becomes effective.” It has not become effective. The FCC’s own fee order, published on 14 September 2026, keeps the current approach “until the newly adopted Part 100 rules become effective and replace the existing rules”. No Federal Register publication of FCC 26-47 had appeared by 7 October. When it does take effect, Part 100 changes seven things.

- **Review.** A “default to yes” regime, with targeted review only for listed issues, among them waivers, market access, foreign ownership and federal coordination. Completeness is decided within 30 days and public notice runs 15 days.
- **Licence term.** A default of 20 years for most systems.
- **Processing rounds.** Opt-in, with annual windows from 1 January to 31 October, starting in the Ka, Ku, Q and V bands.

- **Bond and milestones.** For processing-round systems only: a \$10 million surety bond, posted within 30 days of grant and declining to zero at 90% deployment, with half the system due in six years and all of it in nine. Other systems follow the ITU milestones (Exhibit 3).
- **Earth stations.** A “Nationwide, Non-Site license” under which individual sites are registered. An operator with a current, approved Form 312 asking for a licence without waivers may operate on a non-interference, unprotected basis once its application is on public notice.
- **Orbital debris.** Certification that satellites are designed and operated to de-orbit within five years of the end of the mission, which is the rule FCC 22-74 applied to satellites launched after 29 September 2024.
- **New categories.** Licences for several geostationary satellites at one location, for vehicles that change orbit and for systems that span several orbits.

FILED

FCC 26-47, adopted 22 Jul 2026, released 23 Jul 2026 · FCC 26-59, 91 FR 58258, 14 Sep 2026 · FCC 22-74

Of the seven, the milestone change is the one an investor can put a price on. Under Part 25, as [DA 26-553](#) restates it, a licensee that misses the half-way milestone forfeits its bond. Its authorisation is also “reduced to the number of satellites that are in orbit and operating on the date of the missed milestone”. The second penalty is the severe one, because it shrinks the licence to whatever happens to be flying. Under Part 100 a processing-round system that misses the milestone keeps its authorisation and loses its place in the queue instead. The ITU’s own milestones run on a longer clock (Exhibit 3).

EXHIBIT 3

Part 100 keeps the six- and nine-year milestones but no longer cuts a constellation down to what it has flown

REGIME	HALF-WAY MILESTONE	FULL DEPLOYMENT	CONSEQUENCE OF A MISSED HALF-WAY MILESTONE
Part 25, in force	Half the constellation six years from grant (Amazon Leo, 30 Jul 2026; Starlink Gen2, 1 Dec 2028)	All of it nine years from grant (30 Jul 2029; 1 Dec 2031)	Authorisation “reduced to the number of satellites that are in orbit and operating on the date of the missed milestone”; surety bond forfeited
Part 100, processing-round systems; adopted, not effective	Half in six years from grant; \$10 million bond declining to zero at 90% deployment	All in nine years	Authorisation kept; the system moves into the processing round of the year the milestone was missed
ITU Resolution 35 (Rev.WRC-23), and Part 100 for systems outside the rounds	10% deployed two years after the seven-year bringing-into-use period and 50% five years after it: years nine and twelve from receipt of the filing	100% seven years after the period: year fourteen	

A blank cell is an item the source documents do not describe.

Source: FCC 20-102, FCC 22-91 and DA 26-553 for Part 25; FCC 26-47 for Part 100; WRC-23 Provisional Final Acts, Resolution 35 (Rev.WRC-23), years from receipt calculated (Filed and Calculated).

AMAZON LEO UNDER THE TWO REGIMES

Amazon Leo had 392 of the 1,616 satellites due at its half-way milestone on 30 July 2026 ([part 1](#)).

Under Part 25 the authorisation would have been cut to the satellites in orbit and operating on that date, and the bond forfeited. In the event the Space Bureau waived the cut in part on 5 June 2026 and kept the bond forfeiture.

Had Part 100 been in force, a processing-round system that missed the half-way milestone would have kept its authorisation and been moved into the round of the year it was missed.

The ITU kept Article 22

The EPFD limits are international law, written into Article 22 of the Radio Regulations, and the conference that could have reopened them chose not to.

At WRC-23 a CITEL proposal, co-signed by ten states including the United States, would have put a review of the EPFD limits on the WRC-27 agenda. It “was not adopted”. Instead, according to the plenary minutes

FCC 26-26 quotes, the conference invited ITU-R to study the limits “and to inform WRC-27 of the results of the studies, without any regulatory consequences”, a diplomatic refusal. The only EPFD question on the WRC-27 agenda is item 1.4, on limits for low-orbit downlinks at 17.3 to 17.7 GHz in Regions 1 and 3. Outside the United States, Article 22 still applies to the same satellites the FCC has released from it at home.

WRC-27 will instead do a great deal of other satellite business. Thirteen of its nineteen agenda items, on our count, concern satellite and space communication systems directly (Exhibit 4). Of the rest, item 1.7 brings IMT into bands with satellite incumbents, while items 1.17 to 1.19 concern space weather sensors and passive Earth-observation satellites. The conference meets from 18 October to 12 November 2027. The FCC has proceedings of its own on several of the same bands and is not waiting. FCC 25-29, adopted in May 2025, aims to make “over 20,000 megahertz of spectrum available for satellite use across four bands”, although no final rules had appeared in the Federal Register by 7 October 2026. The [direct-to-device series](#) covers the FCC rules that allow satellite service in terrestrial bands in the United States.

EXHIBIT 4

Thirteen of WRC-27’s nineteen items concern satellite systems, several in bands where the FCC also has proceedings

WRC - 27 ITEM	SUBJECT	BAND	AMERICAN POSITION, 7 OCT 2026
1.1	Earth stations in motion	47.2 to 50.2 and 50.4 to 51.4 GHz	Sharing with terrestrial 5G under review, FCC 25-70
1.2	Smaller uplink antennas	13.75 to 14 GHz	
1.3	Gateway uplinks	51.4 to 52.4 GHz	Proposed for satellite, FCC 25-29; pending
1.4	EPFD limits for low-orbit downlinks, Regions 1 and 3	17.3 to 17.7 GHz	Geostationary downlinks allowed at 17.3 to 17.8 GHz in 2022 (FCC 22-63), low-orbit in 2024 (FCC 24-97)
1.6	Equitable access	Parts of 37.5 to 51.4 GHz	42 to 42.5 GHz proposed for satellite, FCC 25-29; sharing review, FCC 25-70
1.10	Limits on satellite emissions	71 to 76 and 81 to 86 GHz	
1.11	Satellite-to-satellite links	Mobile- satellite bands	
1.13	Direct connectivity to phones		FCC rules allow satellite service in terrestrial bands, and the order of 1 July 2026 on the 800 MHz band (DA 26-653) wrote a satellite pathway for a low band too (direct-to-device series)
1.5, 1.12, 1.14, 1.15, 1.16	Unauthorised earth stations; low-data-rate and further mobile-satellite allocations; lunar communications; protection of radio astronomy from constellations		

None	Upper C-band	3.98 to 4.2 GHz	160 MHz at 3.98 to 4.14 GHz to be auctioned for terrestrial use (Auction 115) under FCC 26-46, satellite relocated; 6G part 2
WRC-31 preliminary item 2.3	Moving earth stations	12.7 to 13.25 GHz	FCC 25-29 asks about wider satellite use; pending
None	W-band	Parts of 92 to 114.25 GHz	Proposed for satellite, FCC 25-29; Starlink uplinks authorised in DA 26-36

Items 1.7 and 1.17 to 1.19 are left out of the count. The last three rows are American proceedings with no WRC-27 item. A blank cell is an item for which the agenda names no single band, or on which no American proceeding is cited here.

Source: WRC-23 Provisional Final Acts, Resolutions COM6/23 and COM6/25; FCC 26-46, FCC 25-29, FCC 25-70, FCC 22-63, FCC 24-97 and DA 26-36; Federal Register index, 7 October 2026 (Filed). The count of satellite items is Blue Prysm's (Judgement).

3GPP put the base station in orbit between Release 17 and Release 19

In Release 17 the standard let a phone talk through a satellite that did nothing more than relay its signal. Two releases later it had put the base station itself in orbit and linked satellites to one another, a long way in under four years (Exhibit 5).

EXHIBIT 5

3GPP added satellite access release by release, on fourteen band numbers, all in satellite spectrum

RELEASE	WHAT IT ADDED	BANDS FIRST LISTED
Rel-17, frozen March 2022	NR over satellite through transparent payloads, assuming “UEs with GNSS capabilities”; handheld phones in FR1 and VSATs above 10 GHz; NB-IoT and eMTC over satellite; satellite access in the 5G core	n255 (L-band), n256 (S-band)
Rel-18, March 2024	Coverage for smartphones with –5.5 dBi antennas, voice at 4.75 kbps; Ka band for VSATs; network-verified device location to 10 km; mobility between satellite and terrestrial cells; satellite backhaul in the 5G system	n254; n510, n511, n512 (Ka)
Rel-19, Stage 3 September 2025, frozen December 2025	Regenerative payloads: “gNB on board”, with Xn over the feeder link or inter-satellite links; RedCap devices over satellite; more uplink capacity; store-and-forward for IoT with a base station on board	n250 to n253; n247, n248, n508, n509 (Ku)
Rel-20, in progress, due March 2027	Operation that survives loss of GNSS; satellites that pre-compensate Doppler for NR devices that cannot; voice over NB-IoT through geostationary satellites; mobile VSATs “with small antennas (e.g., 20x20cm)”; 400 plus 400 MHz carrier aggregation in Ka	None so far
6G, TR 38.914, June 2026	One design for terrestrial and satellite; orbits from 300 km to geostationary; transparent and regenerative payloads; operation without GNSS required	At least the existing NTN bands; around 1.5, 2, 11/14 and 20/30 GHz

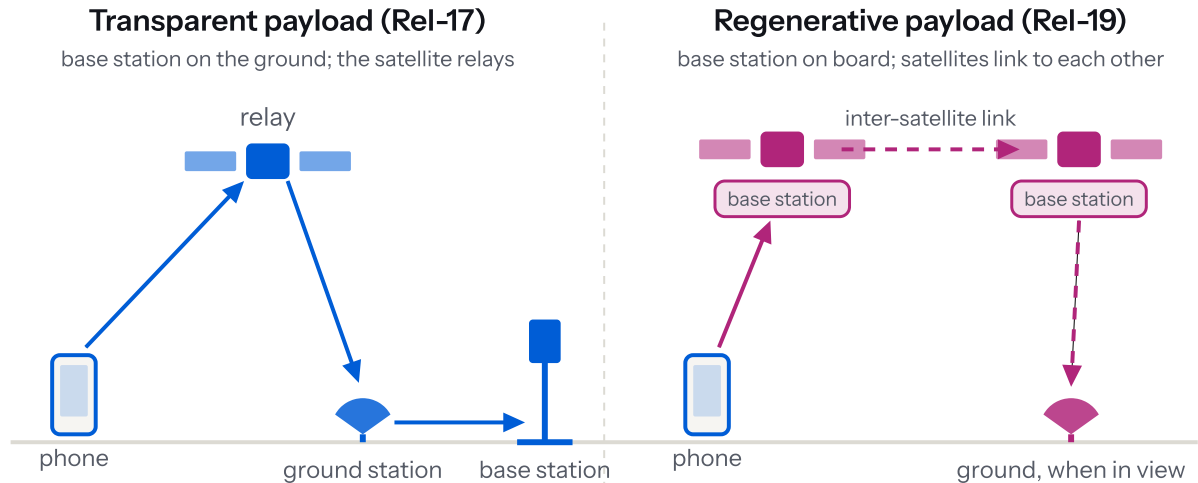
Release dates are the freezes the [6G series](#) records. Bands are those in TS 38.101-5, compared across its September 2026 versions for Releases 17 to 20; n510 and n511 are the Ka variants written for the FCC’s rules, n512 for CEPT’s.

Source: 3GPP work items RP-220208 to RP-262263 as listed in the sources; TS 38.101-5 V17.16.0, V18.15.0, V19.6.0 and V20.1.0; TR 38.914 V20.0.0; work plan of 28 September 2026 (Filed).

The difference between the two payload designs comes down to where the base station is (Exhibit 6). A transparent satellite relays to one on the ground. A regenerative satellite carries its own, and because it does, it can link to other satellites as well.

EXHIBIT 6

A transparent satellite relays to a base station on the ground; a regenerative one has the base station on board



One-way delay, calculated

Low orbit at 550 km: 1.8 ms overhead, 3.8 ms at 25° above the horizon

Geostationary at 35,786 km: 119 ms

Source: 3GPP RP-220208 (Release 17) and RP-251954 (Release 19); one-way delays calculated for 550 km and 35,786 km, as in the 6G series (Calculated).

Two Release 20 items show where the standard goes next. The first undoes an assumption Release 17 started with: every satellite specification so far has assumed a device that knows its own position from GNSS and uses it to correct its timing and frequency for the satellite's motion, the Doppler shift of up to 23 parts per million that [part 1](#) calculates. Without GNSS that device is lost. A GNSS-resilient study finished in June 2026 and a normative item followed. TR 38.914 goes further by making it a 6G requirement that the radio “shall be able to operate without GNSS in both Idle and Connected states”.

The second, [RP-262263](#), was approved in September 2026 with a target of the first quarter of 2027. It starts from an observation: “Some satellite systems perform downlink pre-compensation and uplink post-compensation in order to support NR UEs that are not capable of performing uplink pre-compensation”. It then asks whether those devices and standard satellite devices can share a cell. In our view this describes the direct-to-device systems that serve unmodified phones, whose radios the [direct-to-device series](#) describes. If so, 3GPP is bringing a design choice those systems made outside the standard back inside it.

Every one of the fourteen satellite band numbers in TS 38.101-5 is in satellite spectrum: L, S, Ku and Ka. 3GPP now specifies what an operator needs to run satellites inside its own radio network, base stations in orbit included. It does not specify a satellite band in terrestrial mobile spectrum, which waits for WRC-27 item 1.13 in November 2027.

Terms used

- **EPFD.** Equivalent power-flux density: the combined power that all of a non-geostationary system's satellites may deliver at a point on the ground. Article 22 of the Radio Regulations sets it to protect geostationary links.
- **Adaptive coding and modulation.** A link that changes its coding and modulation as conditions change, trading throughput for resilience. The FCC's new test measures harm as lost throughput on links like that.
- **Processing round.** The FCC's way of considering competing satellite applications in the same band together; earlier rounds are protected against later ones for a period.
- **Transparent and regenerative.** A transparent satellite relays the signal to a base station on the ground; a regenerative one has the base station on board.
- **FR1-NTN and FR2-NTN.** 3GPP's two frequency ranges for satellite bands: 410 MHz to 14.5 GHz, and 10.7 to 30 GHz.

Implications

CARRIER STRATEGIST

Plan backhaul at scale around Part 100's earth-station licence, once it is effective ([part 2](#)), because one licence for every site is a different cost from one licence per site. Plan radio-network design around the Release 19 and 20 features that let a satellite work inside your network as a regenerative base station. Expect no satellite service in your own terrestrial spectrum through the standard before WRC-27 decides item 1.13 in November 2027.

INVESTOR

Put three dates in the model. The first is 13 July 2026, when the EPFD replacement took effect, subject to DIRECTV's petition. The second is the Federal Register publication that sets Part 100's effective date, and the third is 12 November 2027, when WRC-27 ends. Discount the FCC's 100% to 700% capacity gain outside the United States, because it comes from SpaceX's and Amazon's own comments and because Article 22 still governs everywhere else.

VENDOR

Build to a band list that is now fixed. L and S serve phones and IoT, Ku and Ka serve VSATs, and Ka comes in American and CEPT variants. Put the design effort where the standard is still moving, which is in two places. One is the regenerative base station in orbit, a radio-network product built for space. The other is operation without GNSS, which 6G requires and Release 20 has begun.

Method and limits

HOW THIS WAS BUILT

Each FCC rule is read from the order itself, with its publication and effective dates taken from the Federal Register. The ITU position comes from the WRC-23 Provisional Final Acts and, for the conference's refusal of an EPFD agenda item, from the plenary minutes as FCC 26-26 quotes them. The 3GPP record comes from the work item descriptions and the specifications. The release in which each band first appears is found by comparing the band tables in the Release 17, 18, 19 and 20 versions of TS 38.101-5.

WHAT IT DOES NOT SHOW

An adopted order can be reconsidered, and FCC 26-26 is under a petition for reconsideration. Part 100 has no effective date, and its details may change before it takes effect. 3GPP's completion percentages and target dates are the work plan's own and move at every plenary. These are rules as written; nothing here says how any operator will use them.

Data as of: FCC orders and Federal Register to 14 Sep 2026, 3GPP work plan of 28 Sep 2026, read 7 Oct 2026; FCC DA 26-653 read 12 Oct 2026 · Method version 1.0.

Sources. FCC orders FCC 26-26 (1 May 2026) with its Federal Register entry and the DIRECTV petition; FCC 24-117 on sharing between low-orbit systems; FCC 25-69 and FCC 26-47 on Part 100, with the FY2026 fee order; DA 26-553 on the current milestone rule; FCC 22-74 on orbital debris; FCC 25-29, FCC 25-70 and FCC 26-46 on satellite bands. ITU: the WRC-23 Provisional Final Acts (Resolution 35 and the WRC-27 agenda). 3GPP: the work plan of 28 September 2026; work items RP-220208, RP-211601, RP-240779, RP-251954, RP-252504, RP-253813, RP-262261 and RP-262263; TS 38.101-5 (Release 17 to 20 versions of September 2026) and TR 38.914. Retrieved 7 Oct 2026.



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