on 31-Aug-2026

BERNSTEIN
SOCIETE GENERALE GROUP

31 August 2026

## Aerospace & Defense, US Telecom & Communications Infrastructure

# SpaceX: More on Direct-to-Device Mobile - what would a buildout cost? Our detailed bottom-up estimates




**Douglas S. Harned, Ph.D.**
+1 917 344 8430
douglas.harned@bernsteinsg.com



**Madison Rezaei**
+1 917 344 8622
madison.rezaei@bernsteinsg.com



**Laurent Yoon**
+1 917 344 8502
laurent.yoon@bernsteinsg.com



Nestor Wester
+44 20 7676 7067
nestor.wester@bernsteinsg.com



Nancy Wu
+1 917 344 8545
nancy.wu@bernsteinsg.com



Martin Boruchowicz
+1 917 344 8564
martin.boruchowicz@bernsteinsg.com



Andrew Chung
+1 917 344 8302
andrew.chung@bernsteinsg.com


*We continue to be optimistic about the overall SpaceX opportunity (launch, orbital data centers, Starlink broadband for consumers, enterprise, and government customers). This combination has led to our positive outlook for SpaceX stock. But, the one business that we have viewed as the most difficult is the direct-to-device mobile business. SpaceX plans to begin Starship launches of its Mobile V2 satellite constellation in mid-2027. We described the challenges for SpaceX of going it alone, without a terrestrial partner, in our recent report, "SpaceX: The Telecom Play - Can Direct-to-Device Work?". Here, we take that work to the next level: examining what a SpaceX buildout would likely require and cost, as well as what the implications would be for players in the telecom and tower industries. This work has been led by our US Communications Infrastructure and Telecom teams, each with direct industry experience in terrestrial buildouts.*

**We estimate the cost of a terrestrial greenfield network build between $50-$130B inclusive of spectrum costs (~$15-$80B exclusive). This equates to ~30k-120k macro sites.** The case swings wildly based on two decisions: (1) how aggressively does SpaceX want to compete with terrestrial providers on network quality, and (2) does SpaceX buy the 10MHz of low-band spectrum that Grain will soon auction. Elon commented in an X post "not true" in reference to the Bloomberg article, which said that SpaceX was looking at acquiring the Grain spectrum. But, our understanding is that while Elon may object to the content of the article, a Grain spectrum acquisition is not off the table. AST Mobile (not covered) is also eyeing the spectrum; the FCC granted them a 30-day special temporary approval to test supplementary coverage on it in their August 14 broadband deployment report.

Using those two levers, we have modeled **six scenarios**: a bare-bones metro network covering ~70% of POPs ("Metro", reminiscent of the DISH build), a "National" build that is more Sprint-like, but could be credible at the right price point, and a fully loaded premium network, approaching competitiveness with existing telcos ("Premium"). Each of those scenarios is modeled with and without the addition of Grain spectrum. **We would guess the most likely (of the unlikely) is a National build with the addition of Grain's spectrum: ~$70B and 57k macro sites over an ~8-year build period.**

For those of you who don't think about spectrum all day, allow us to translate: Grain's holdings represent a way to dramatically increase the efficiency and lower the cost of a new network build. **Having low-band spectrum (even a little bit) saves SpaceX ~30% of sites, and Grain has the only obviously available low band spectrum.**

To be clear, we still believe SpaceX is most likely to end with a partnership for its Mobile business. But, the company continues to indicate a terrestrial buildout is possible. Since we continue to hear large numbers discussed by investors, especially in the context of telcos and towers, we wanted to provide a detailed assessment. For those wanting to go extra deep, here's our 15-tab model.

on 31-Aug-2026



## BERNSTEIN TICKER TABLE

| | | | 28 Aug 2026 | | TTM | Adjusted EPS | | | | Adjusted P/E (x) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ticker | Rating | Cur | Closing Price | Price Target | Rel. Perf. | Cur | 2025A | 2026E | 2027E | 2025A | 2026E | 2027E |
| SPCX (SpaceX) | O | USD | 141.50 | 248.00 | NA | USD | | (0.20) | 1.30 | | (716.0) | 108.6 |
| AMT (American Tower) | O | USD | 176.23 | 214.00 | (31.6)% | USD | 5.40 | 7.01 | 6.93 | 32.6 | 25.1 | 25.4 |
| CCI (Crown Castle) | O | USD | 76.14 | 96.00 | (40.7)% | USD | 1.02 | 2.01 | 3.22 | 74.9 | 37.9 | 23.7 |
| SBAC (SBA Comm) | M | USD | 190.95 | 219.00 | (25.9)% | USD | 11.76 | 8.81 | 9.57 | 16.2 | 21.7 | 20.0 |
| T (AT&T ) | O | USD | 26.01 | 25.00 | (28.7)% | USD | 2.12 | 2.35 | 2.68 | 12.3 | 11.0 | 9.7 |
| CHTR (Charter) | M | USD | 153.62 | 150.00 | (60.3)% | USD | 36.20 | 38.98 | 40.75 | 4.2 | 3.9 | 3.8 |
| CMCSA (Comcast) | M | USD | 27.06 | 28.00 | (32.6)% | USD | 4.30 | 3.40 | 3.85 | 6.3 | 8.0 | 7.0 |
| TMUS (T-Mobile) | M | USD | 181.37 | 220.00 | (46.2)% | USD | 9.72 | 10.68 | 13.24 | 18.7 | 17.0 | 13.7 |
| VZ (Verizon ) | M | USD | 50.10 | 47.00 | (4.6)% | USD | 4.68 | 5.00 | 5.20 | 10.7 | 10.0 | 9.6 |
| SPX | | | 7,711.76 | | | | | | | | | |

O - Outperform, M - Market-Perform, U - Underperform, NR - Not Rated, CS - Coverage Suspended

Source: Bloomberg, Bernstein estimates and analysis.

## INVESTMENT IMPLICATIONS

We rate SpaceX Outperform, with a target of $248.

We maintain our Outperform rating for T (PT: $25), and Market-Perform rating for VZ (PT: $47), TMUS (PT: $220), CMCSA (PT: $28), and CHTR (PT: $150) - all unchanged.

We maintain our Outperform ratings for AMT (PT: $214) and CCI (PT: $96) and our Market-Perform rating for SBAC (PT: $219).

on 31-Aug-2026



## DETAILS

## PM SUMMARY

We've seen estimates for a SpaceX greenfield network build from $15B to $200B, but not yet a great, detailed bottom-up build. The most common approaches to use Dish's build and inflate a little. Dish spent ~$7.4B of cash capex between 2020-2024 for ~24k sites and ~268M pops (all spectrum costs + interest excluded). But there were two major differences between what Dish had/was doing and where SpaceX is today. First, Dish's build was primarily about meeting FCC coverage requirements cost-effectively to maintain spectrum licenses; it was never intended to support a real mobile subscriber base. Secondly, Dish was holding ~20MHz of nationwide 600MHz spectrum that could act as a low-band coverage layer - that was purchased by AT&T in July. The impact of using the Dish proxy is that most analyses therefore dramatically undercount both the absolute sites and cost of a new SpaceX build.

Mobile networks require two different types of considerations: **coverage** (does the service work as you move around, how far into the rural areas) and **capacity** (how many subscribers and how much traffic can the network support in a more congested area). For today's telcos, the conversation is all about capacity - coverage layers were built years ago - but for a new entrant, coverage is the dominant consideration.

Coverage is effectively defined by how many sites you have (could be towers or small cells) and how far your spectrum propagates. Using low-band spectrum, you can cover a wider radius - it won't support as many subscribers, but you don't care because you can cover more physical area. Think of it as a wide, shallow river. As you move into mid- and high-band spectrum, you have higher throughput and can support more traffic, but the signal doesn't propagate as far - the river is now a deep, skinny stream. Great for a capacity build, not so much for coverage. SpaceX's big hurdle is that they don't own any low-band spectrum today and there is only 10MHz available anywhere (the Band 26 that Grain currently owns).

In this analysis, we've gone deep on five areas:

1. Coverage requirements, including detailed population density and morphology modeling, with an incremental covered POP analysis.
2. Capacity requirements, inclusive of femtocell network offload proprietary to the SpaceX network design
3. Spectrum holdings and benchmarking on approximate cost ($/MHz-pop)
4. Detailed cost assumptions for both capex and Opex on a per-site and network-wide basis
5. Model validation against known build benchmarks, including Dish's unit costs and existing carrier metrics

We have phased the model to account for spectrum availability, labor and site constraints, and incremental subscriber additions, estimating the time to complete a full build. However, for this analysis, we have not assessed the return on a full network build or the ongoing economics beyond network Opex (specifically relevant for our tower names).

EXHIBIT 1: **SpaceX Greenfield Network Build Scenarios**

| | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|
| Terrestrial POPs coverage | 70.0% | 70.0% | 92.0% | 92.0% | 95.0% | 95.0% |
| **Macro sites required** [1] | **48,542** | **32,362** | **85,858** | **56,705** | **117,384** | **81,669** |
| POPs per macro site [2] | 4,932 | 7,398 | 3,665 | 5,549 | 2,768 | 3,978 |
| Program duration at max construction pace [3] | 9 | 6 | 13 | 8 | 12 | 8 |
| **Network CAPEX (excl. spectrum)** [4] | **$21.0** | **$14.3** | **$43.6** | **$29.7** | **$78.0** | **$55.9** |
| Spectrum (EchoStar + Grain + Upper C-band) [5] | $28.1 | $32.6 | $35.8 | $41.8 | $48.5 | $57.0 |
| **Total Program Cost** [6] | **$49.1** | **$46.9** | **$79.5** | **$71.5** | **$126.5** | **$112.8** |
| Subscriber ceiling before C-band, 2028-30 [7] | 14.6% | 10.3% | 24.6% | 17.3% | 43.1% | 32.2% |
| Marginal capex per incremental POP, coverage step alone [8] | - | - | $79.6 | $79.6 | $345.5 | $345.5 |

1. T-Mobile runs ~82,000 macro sites and covers ~98% of Americans. DISH built ~25,000 and reached 80%.

on 31-Aug-2026



2. Incumbents run 4,000-6,000. DISH ran ~10,700 and could carry only ~17% of its own subscribers on-net.

3. Capped by crews, zoning and utility interconnects, not by capital.

4. DISH spent $7.9bn ex-spectrum for ~25,000 sites - and never deployed a capacity layer.

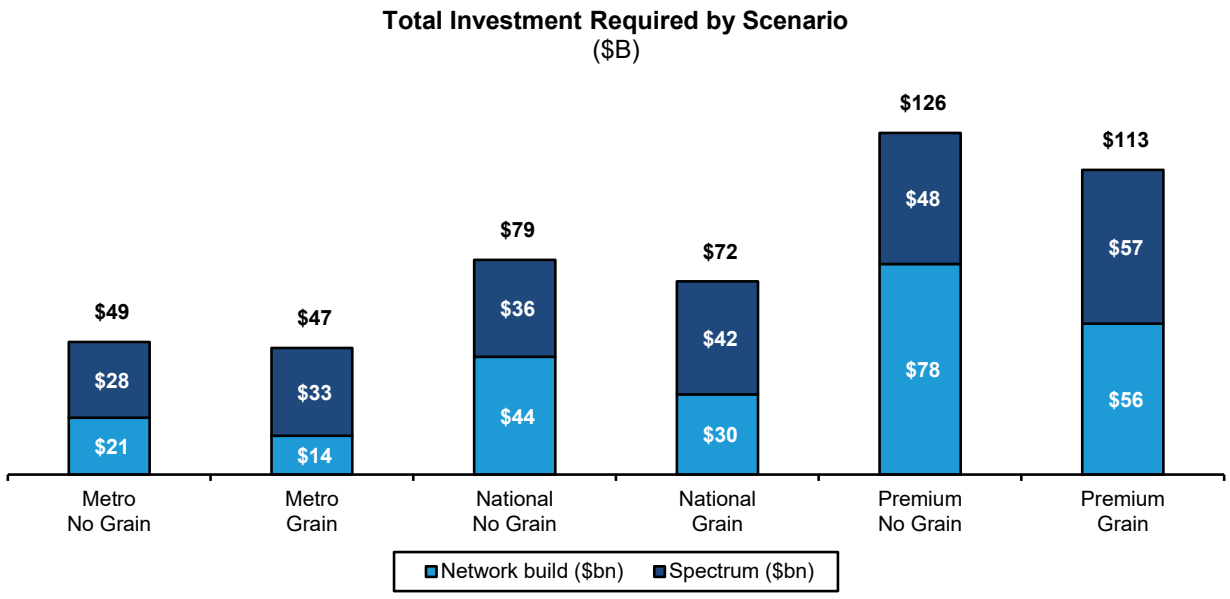
5. $21.6bn to EchoStar is already committed in every scenario. Grain adds $5-7.5bn where won; Auction 115 is sized to the build.

6. Excludes subscriber acquisition, handsets, retail and the satellite constellation. Grain reduces cost in every pair despite adding spectrum cost.

7. As penetration of covered POPs. This is the network SpaceX actually operates until the very end of 2030.

8. The National columns isolate the 70-to-92% step; Premium the 92-to-95% step.
Source: Bernstein analysis and estimates

EXHIBIT 2: **Total Investment Required by Scenario ($B)**

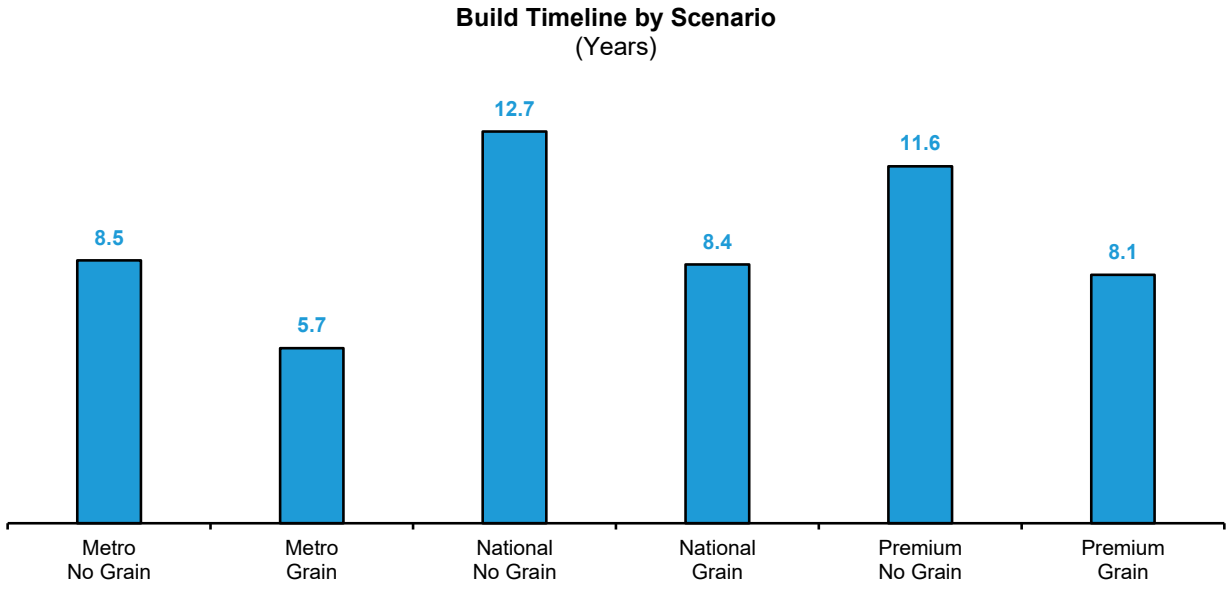



Grain decreases cost in every case, despite adding $5 - $7.5bn, because it reduces more the buildings than it adds to the licence.

on 31-Aug-2026



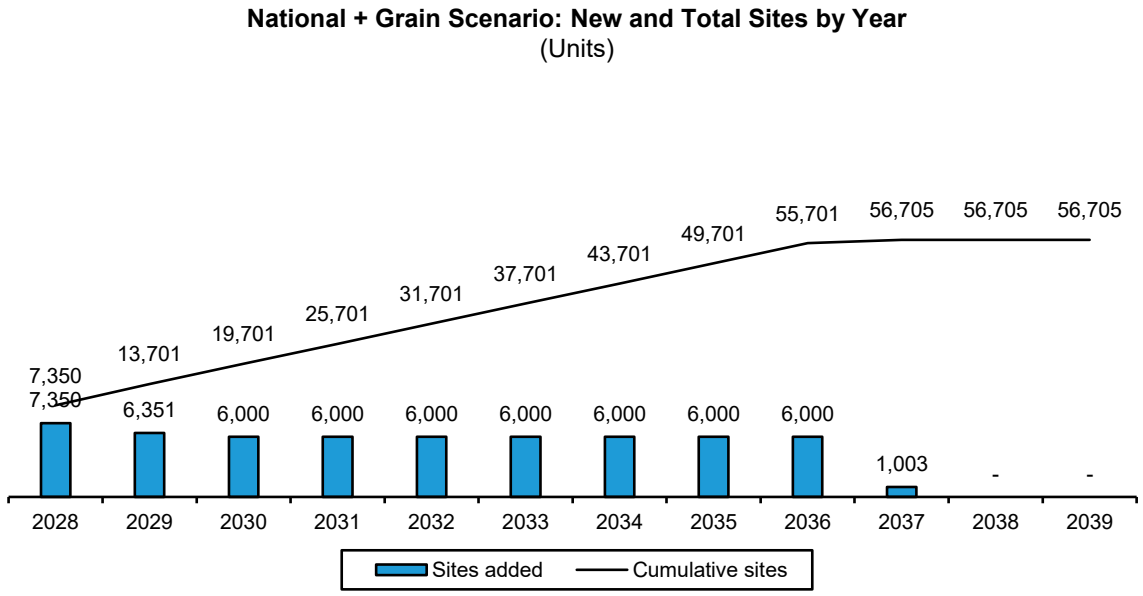
EXHIBIT 3: **Build Timeline by Scenario (Years)**




Construction capacity, not capital, is the binding constraint. The US builds only 1,200-2,000 genuinely new towers a year in total, the model assumes the build sits almost entirely on existing structures.

Source: Bernstein analysis and estimates

EXHIBIT 4: **National + Grain Scenario: New and Total Sites by Year (Units)**




Source: Bernstein analysis and estimates

on 31-Aug-2026



## A REMINDER ON WHY A TERRESTRIAL NETWORK IS ESSENTIAL

There are ongoing debates about the capabilities of Starlink's next-generation V2 mobile satellites. Relative to the current constellation, the new satellites are expected to have larger antennas, greater capacity, denser beamforming, and lower operating altitudes, all of which should improve link budges, spectral reuse, and the number of concurrent users. While there are still many unknowns (e.g., spectrum, network demand, interference management, realized throughput), it is reasonable to envision a scenario where basic downlink-centric experience, such as receiving notifications, loading web content, browsing social media outdoors, become increasing practical.

However, as we discussed in our prior note, the more fundamental challenge for D2D remains the Uplink, particularly for applications requiring continuous two-way communication such as voice/video calls, or a future AI-connected ecosystem. Lower orbital altitudes and more capable satellites can improve Uplink performance, but they do not eliminate the basic constraint that a handheld device has limited transmit power, antenna gain, and battery capacity. This challenge becomes even more difficult indoors, where building penetration losses can substantially degrade the signal before it ever reached the satellite. As a result, improvements in downlink performance address only part of the problem. The broader question remains whether D2D can ultimately deliver sufficiently reliable uplink performance across environments and use cases to evolve from a complementary coverage solution into a true substitute for terrestrial cellular networks.

on 31-Aug-2026



## OUR MODELED SCENARIOS

Since there is still significant debate about SpaceX's goals with their future mobile network, it's hard to define what kind of network they would build. For our purposes, we've looked at three options:

- **Metro Network, covering 70% of POPs:** We view this as a relatively unlikely outcome and a low case for capex numbers. Under this scenario, we assume SpaceX only attempts to cover 70% of POPs, with most of its concentration in Dense Urban and Urban locations, prioritizing network quality only to outdoor and in-vehicle design. We assume coverage of ~20% of rural arterial (beyond interstates), and very limited overshoot beyond the road polygons. Translation: this would be a very crappy network that would not compete well against existing carriers, even at a steep discount - it represents the bare minimum option for SpaceX to offer mobile service.

- **National Network, covering 92% of POPs:** This is our base case and would look similar to a Sprint-type network. Competitive enough in many areas for a proof-of-concept while they scale, okay coverage beyond the interstate corridor (~45% relative to the 20%), better in-building coverage and support for ~50-75M subscribers. In this scenario, SpaceX could be credible and perhaps even differentiated in certain areas with the augmentation of ever-evolving D2D tech. We model incremental 40MHz of Upper C-band spectrum to further enhance the network.

- **Premium Network, covering 95% of POPs:** Our high case and approaching full network parity with existing carriers across several metrics. This case requires spectrum purchases between $50-70B and 80-120k sites, rivaling TMUS's 82k nationally. As in the other cases, we assume sizable offloading of terrestrial network needs to the satellite network where possible, via femtocells, satellite tower backhaul, and D2D - it shows up more meaningfully in a premium build given the sheer site volume. We also assume antennas are more expensive, labor costs increase given scarcity, and a slightly compressed build timeline consistent with aggressive goals.

EXHIBIT 5: **Assumptions Overview by Scenario**

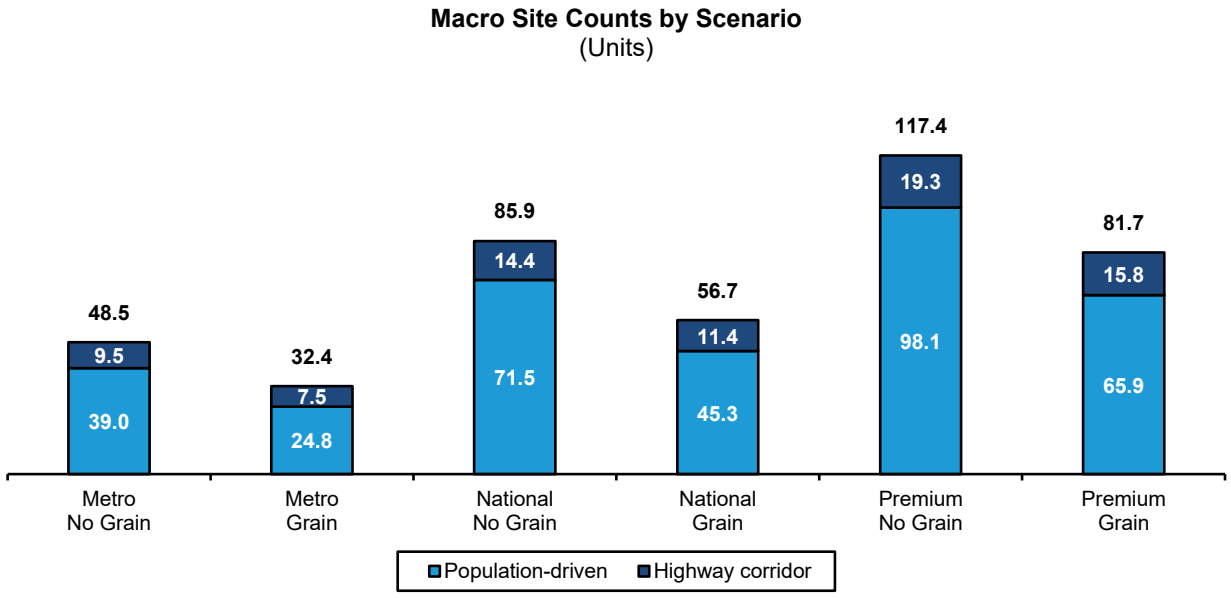
| | Metro Build | National Build | Premium Build |
|---|---|---|---|
| **Network Build Inputs** | | | |
| Terrestrial POPs coverage target | 70% | 92% | 95% |
| Share of rural arterials targeted for coverage | 20% | 45% | 70% |
| Land area covered (sqmi) | 68,519 | 235,671 | 310,563 |
| Max outdoor small cell adds per year | 10,000 | 30,000 | 50,000 |
| Traffic per subscriber per month (GB) | 30 | 38 | 48 |
| Downlink to uplink traffic ratio | 10.0 | 8.0 | 6.0 |
| Upper C-band MHz won at Auction 115 | 20 | 40 | 60 |
| Total MHz held | 85 | 105 | 125 |
| SpaceX share of covered POPs at maturity | 5% | 8% | 12% |
| **Output Metrics (all scenarios without Grain spectrum)** | | | |
| Macro Sites required | 48,542 | 85,858 | 117,384 |
| Small cell nodes | 23,802 | 39,693 | 87,253 |
| POPs per macro site | 4,932 | 3,665 | 2,768 |
| Capex per POP covered | $87.75 | $138.66 | $240.11 |

Source: Bernstein analysis and estimates

on 31-Aug-2026

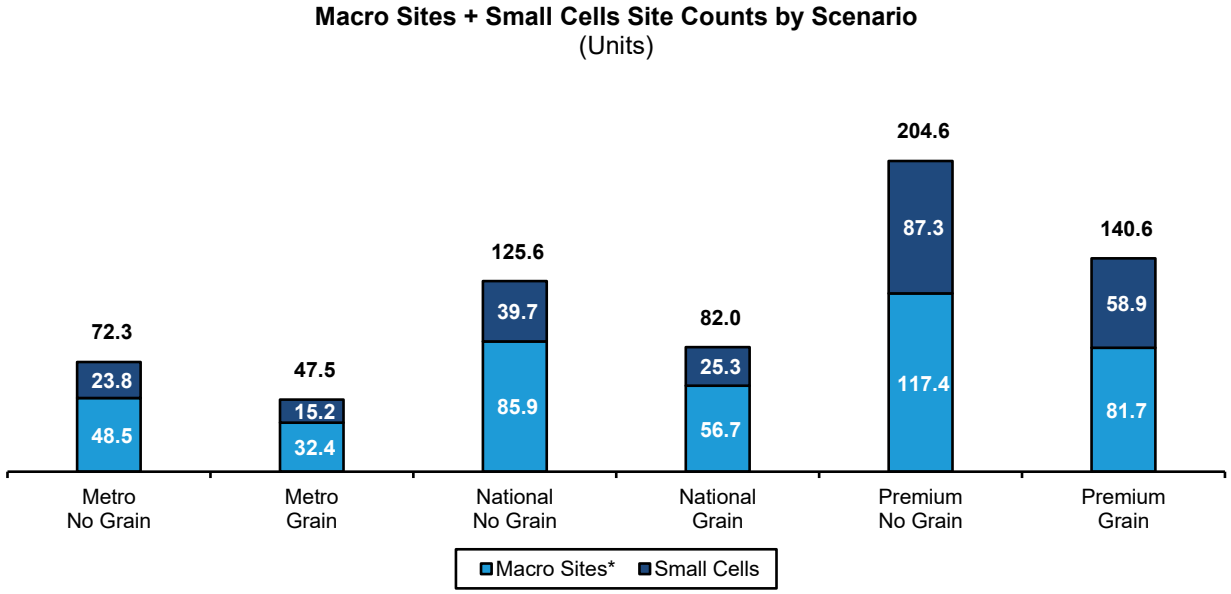


EXHIBIT 6: **Macro Site Counts by Scenario (Units)**




Split between the sites needed to reach people and the sites needed to cover the highways between them
Source: Bernstein analysis and estimates

EXHIBIT 7: **Macro Sites + Small Cells Site Counts by Scenario (Units)**




* Population-Driven + Highway Corridor
Source: Bernstein analysis and estimates

on 31-Aug-2026



## NETWORK BUILD: COVERAGE REQUIREMENTS

Most of the site-count numbers circulating on SpaceX start with a site count and multiply by a cost per site. Ours starts with where Americans actually live, asks how far a radio signal reaches in each kind of place at each candidate frequency, and then calculates the tower count from that geometry. The most essential thing to understand about coverage builds is that an incremental covered POP gets increasingly expensive as you move out from the densely populated areas. ~70% of the population has similar incremental costs, but then there are clear cutoffs as you expand into more and more rural areas. In other words, your POPs per square mile fall ~40x between the urban core (~940) and the rural blanket (~24). This is what makes nationwide coverage so expensive. Added to that, you don't just have to cover where people work and live...you have to cover the rural highways in between. Yes, in theory you could have a roaming or MVNO deal to eventually lower these costs, but today, that's not in place.

### HOW WE MODELED IT:

We anchored the population-versus-land curve on the 2020 Census Urban Areas file — 2,613 urban areas, 265,149,027 people, 80.0% of the US population on 103,872 square miles, or 2.94% of US land, We then split the urban 80% using the Center for Neighborhood Technology's density thirds off ACS (American Community Survey) 2017-21 block groups. That lays the population into **nine cumulative bands rolled up into four morphology tiers -** RF behavior and cost structure tend to differ by tier, not by band.

Above 80% of POPs the Census gives no continuous function, so bands 4-9 come from probit interpolation between the verified anchors on the standard assumption that log density is approximately normally distributed across space; ±30% on rural land area moves the National site count only 6.9%, so while you could do a more detailed analysis on this, we didn't think it was meaningful for this case.

The corridor layer is sized off FHWA Highway Statistics 2023 Table HM-20: **29,109 rural Interstate miles plus 97,964 rural freeway and principal arterial miles — of which we target 20/45/70% by case, credit 45/55/65% as already covered incidentally by the population footprint, and uplift spacing 1.20-1.50x for terrain and shadowing, leaving residual polygon overshoot at 1.00-1.10x.**

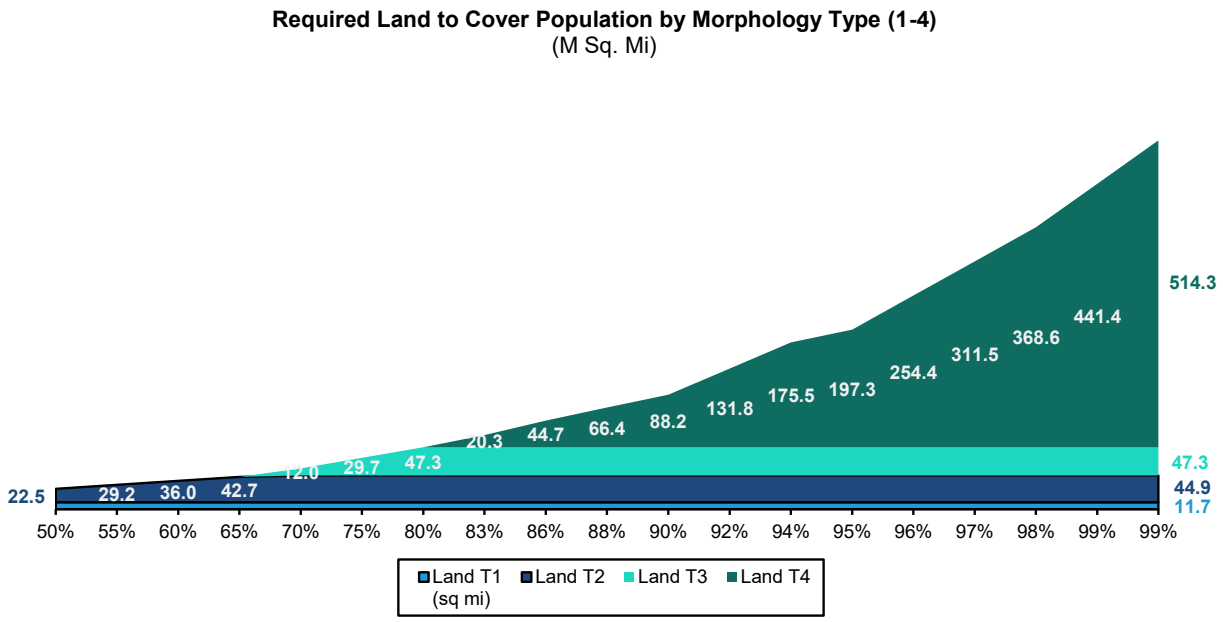
Corridor coverage is a linear problem, not an areal one — sites along a road scale with radius, not radius squared — so we hold that layer constant across the coverage build. This adds 11,413 sites in the National Grain case, roughly 24% on top of the population-driven grid.

Note: unlike previous coverage builds, there is no regulatory floor: the FCC waived SpaceX's AWS-4/H-block/AWS-3 terrestrial buildout obligations entirely (DA 26-471, 12 May 2026) and replaced them with satellite D2D performance metrics. At this point, coverage is purely a commercial decision.

on 31-Aug-2026



EXHIBIT 8: **Required Land to Cover Population by Morphology Type (1-4) (M Sq. Mi.)**




Source: Bernstein analysis and estimates

EXHIBIT 9: **Coverage & Network Scenarios Overview**

| Metric | Units | Metro No Grain | Metro Grain | National No Grain | National Grain |
|---|---|---|---|---|---|
| Terrestrial POPs coverage [1] | % | 70.0% | 70.0% | 92.0% | 92.0% |
| POPs covered | m | 239.4 | 239.4 | 314.6 | 314.6 |
| **Total Macro Sites [2]** | sites | **48,542** | **32,362** | **85,858** | **56,705** |
| Outdoor small cell nodes | nodes | 23,802 | 15,151 | 39,693 | 25,262 |
| Starlink-backhauled femtocells | units | 1,500,000 | 1,500,000 | 4,000,000 | 4,000,000 |
| POPs per macro site [3] | POPs | 4,932 | 7,398 | 3,665 | 5,549 |
| Colocations required on third-party towers | sites | 42,717 | 28,479 | 76,414 | 50,467 |
| New greenfield towers required [4] | sites | 971 | 647 | 2,576 | 1,701 |
| **Program duration at maximum construction pace [5]** | yrs | **8.5** | **5.7** | **12.7** | **8.4** |
| Network complete | year | 2037 | 2034 | 2041 | 2037 |

1. No regulatory floor applies — the FCC waived SpaceX's terrestrial buildout obligations on 12-May-2026, replacing them with satellite D2D performance metrics.

2. T-Mobile runs ~82,000 macro sites, reaching ~98% of Americans; DISH runs ~25,000, reaching 80%.

3.Incumbents run 4,000-6,000 POPs/site; DISH runs ~10,700 but carries only ~17% of its subscribers on-net.

4. Against total US new-tower capacity of ~1,200-2,000/year, of which ~25% isn't even wireless.

5. Capped by construction capacity, not capital — the constraint most published estimates ignore.
Source: Bernstein analysis and estimates

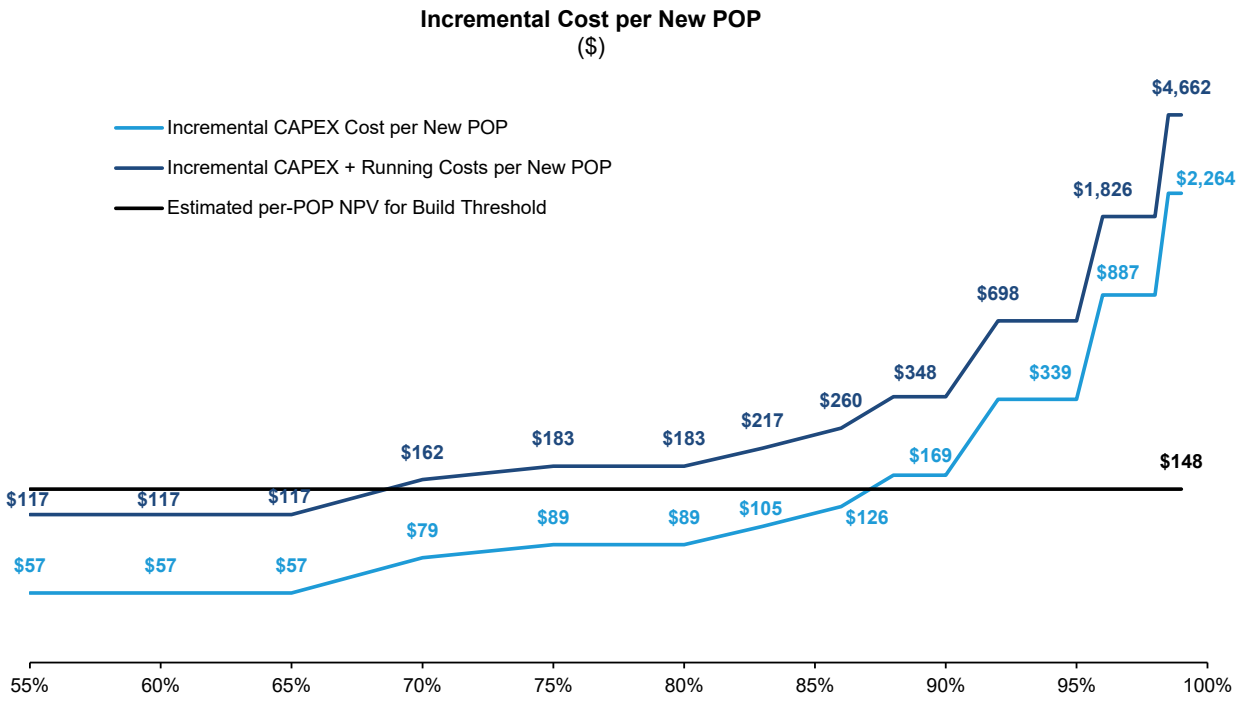


人在草木间

on 31-Aug-2026

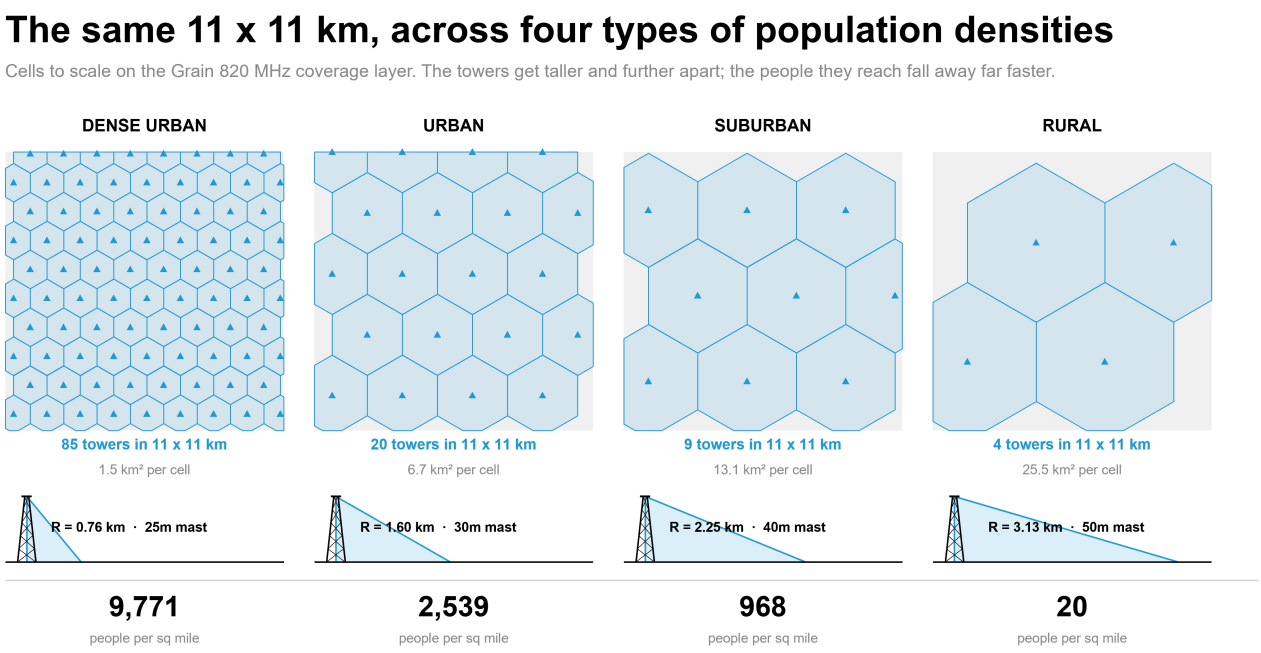


EXHIBIT 10: **Incremental Cost per New POP ($)**




Source: Bernstein analysis and estimates

EXHIBIT 11: **Coverage by Population Sites**

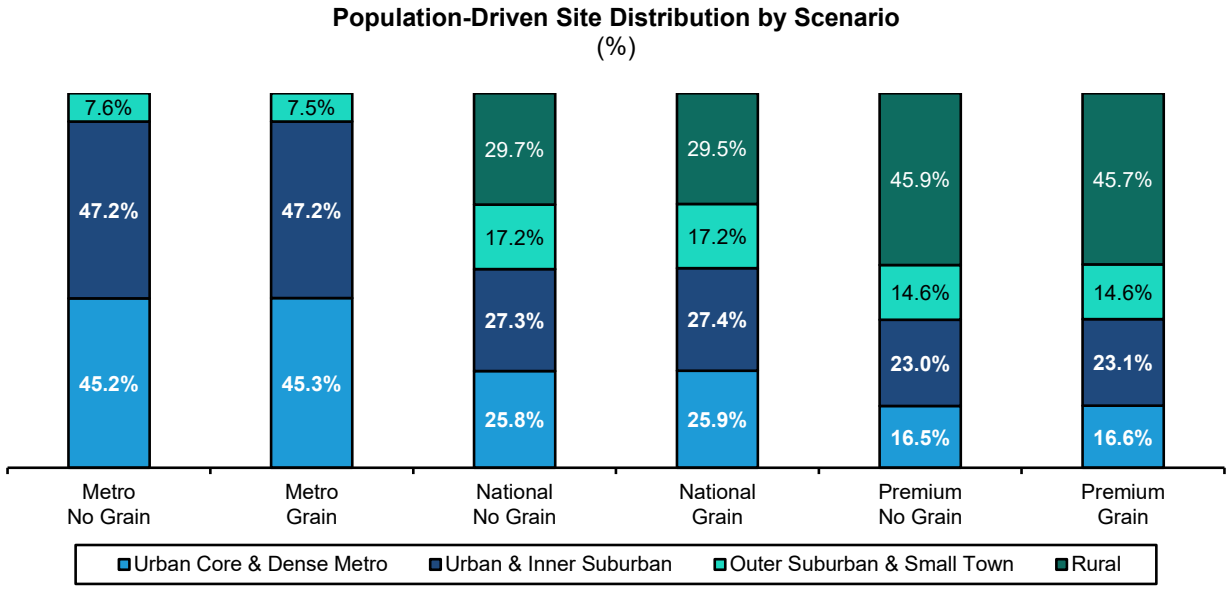



Source: Bernstein analysis and estimates

on 31-Aug-2026

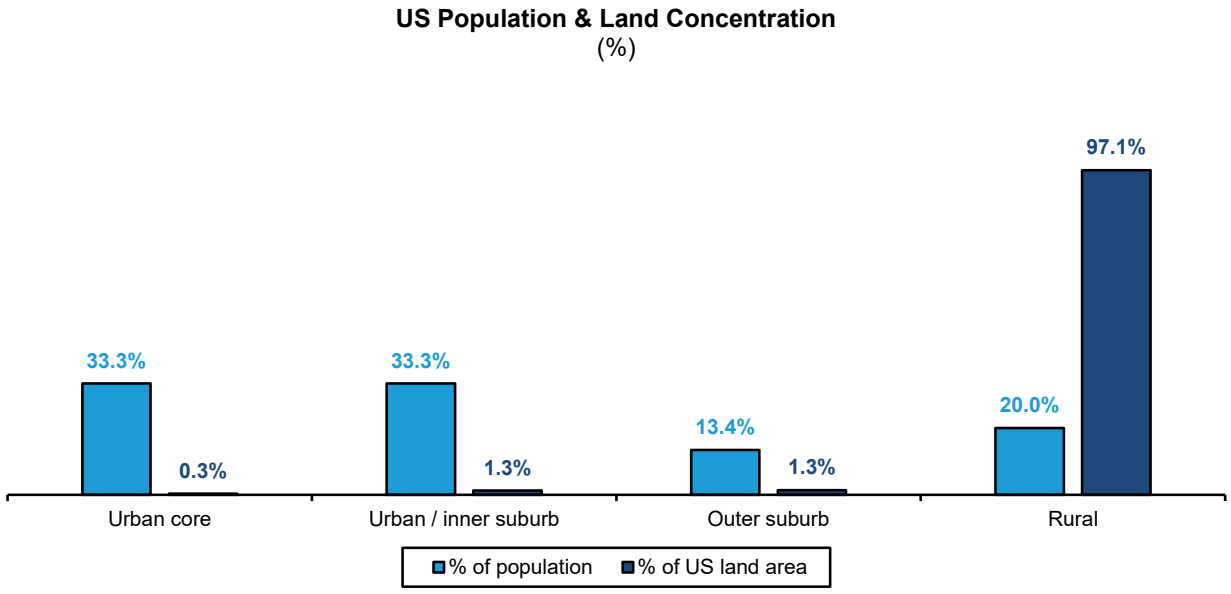


EXHIBIT 12: **Population-Driven Site Distribution by Scenario (%)**




Source: Bernstein analysis and estimates

EXHIBIT 13: **US Population & Land Concentration(%)**




More than 2/3 of the U.S. population is concentrated in less than 3% of total U.S. land area, making full land coverage increasingly challenging and subject to diminishing marginal benefits.
Source: Bernstein analysis and research

on 31-Aug-2026



## NETWORK BUILD: CAPACITY REQUIREMENTS

Coverage and capacity are two different problems. Coverage asks how far each tower reaches; capacity asks how many people can use it at once before it slows down (think of the moment your plane lands and everyone is trying to text at the same time). Build for reach, and you get whatever capacity happens to come with it — and on our numbers that turns out to be enough, for a while. On Day 1, Capacity isn't a concern - you have a very small number of subscribers and plenty of capacity in the network from your coverage build - 2-3.5x its target subscriber base across the entire thing. But subscribers concentrate just as the US population does, so before long, you need to add incremental capacity alleviation in your densest, most congested areas.

### HOW WE MODELED IT:

For every geographic area we build two grids - a coverage and a capacity - and keep the larger number. The traffic-driven floor is set so that a dense urban grid spaced 1.5 km apart reproduces roughly 4,000-5,000 people per site, which is what T-Mobile actually runs across its 82,000 macro sites. In every scenario we test, reach is the binding constraint, not traffic. That is the whole thesis: SpaceX's spectrum is mid-band and its coverage layer is narrow, so the network runs out of range long before it runs out of room.

Sizing the traffic side is straightforward arithmetic in three steps. Take a subscriber's monthly data allowance and convert it into what they consume in the busiest hour of the day (we use 7% of daily traffic, the standard planning convention, because networks are dimensioned for the peak, not the average - we all use our phones at the same time). Then we compute what one tower can deliver — spectrum available, multiplied by how efficiently the radios turn hertz into bits, multiplied by three sectors, multiplied by a loading factor of 55-72% because no network ever achieves its theoretical maximum. Divide the second by the first and you have subscribers per tower.

But usage and uplink/downlink balance must be considered too. A tower's real capacity is the *worse* of its download and upload capability, not the download alone. A network that can push video down but not pull photos up is capacity-constrained in practice. We size this as the minimum of the two, and the counter-intuitive result is that uploads are not yet the pinch point for this build (this is likely to be an issue for existing networks, but we'll save that analysis for another day).

The large antenna arrays that boost the download also help the tower hear the handset, so uploads only become the constraint once traffic is more balanced than roughly 5:1 down-to-up. Today's US networks run 8-10:1, but that ratio is falling as video calling and cloud backup grow, so this build has about one halving of the ratio in hand before uploads bind on capacity as well as on coverage. We feel like it's important to flag that the capacity outputs are probably the least robust numbers in this analysis: if you knock spectral efficiency down a third, or run data-per-subscriber at the 2031 forecast rather than today's, and the pre-C-band ceiling falls from 16.5% of covered population to roughly 11%, but probably for today, we're in range.

**SpaceX's stated ambition is not just towers. Shotwell and Musk have described putting "little femtocells" — small, self-installed licensed-band base stations — alongside the Starlink dishes already sitting on roughly 12m US premises, backhauling that traffic straight up to the constellation and bypassing the macro network entirely.** It is a genuinely clever asset play, because the expensive parts are already paid for: the dish is installed, the customer installed it themselves, and the incremental hardware is much, much cheaper than an incremental small cell (or tower) build. ~90% of mobile usage indoors, and indoor traffic is precisely what a premises femtocell can absorb and precisely what a satellite beam cannot. So we model it as real capacity relief: 1.5m to 8m units by case, taking 4-18% of total traffic off the macro grid, plus a further 0.5-3.0% offloaded to direct-to-device satellite.

But we notably restrict where that relief is allowed to land. Femtocells and D2D reduce traffic in the urban and suburban tiers only, because that's where you have capacity constraints. A femtocell exists where a premises and a dish already exist; D2D carries messaging and low-rate traffic, on beams sharing a few Mbps across a footprint the size of a state. Neither one builds a cell on an empty stretch of highway in Wyoming. **The offload story unfortunately relieves the cheapest part of the build and leaves the expensive part - femtocells improve the capacity headroom without moving the tower count or the capital bill significantly, at least based on today's tech.**

on 31-Aug-2026



EXHIBIT 14: **Site Count Overview**

| | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|
| **Total Macro Sites (population + corridor)** | 48,542 | 32,362 | 85,858 | 56,705 | 117,384 | 81,669 |
| of which: new-build (greenfield tower required) | 971 | 647 | 2,576 | 1,701 | 5,869 | 4,083 |
| of which: rooftop / non-tower structure | 4,854 | 3,236 | 6,869 | 4,536 | 7,043 | 4,900 |
| of which: colocation on an existing tower | 42,717 | 28,479 | 76,414 | 50,467 | 104,472 | 72,685 |
| Traditional Small Cells (may be Starlink-backhauled) | 971 | 647 | 2,576 | 1,701 | 5,869 | 4,083 |
| Starlink-backhauled femtocells deployed | 1,500,000 | 1,500,000 | 4,000,000 | 4,000,000 | 8,000,000 | 8,000,000 |

Source: Bernstein analysis and estimates

EXHIBIT 15: **Capacity Metrics Scenarios Overview**

| Metric | Units | Metro No Grain | Metro Grain | National No Grain | National Grain |
|---|---|---|---|---|---|
| Target subscribers [1] | m | 9.6 | 9.6 | 25.2 | 25.2 |
| Busy-hour demand per subscriber [2] | Mbps | 0.149 | 0.149 | 0.166 | 0.166 |
| Site capacity BEFORE Upper C-band [3] | Mbps | 119 | 132 | 158 | 176 |
| **Traffic asymmetry at which the UPLINK becomes the constraint [4]** | x | **5.6** | **5.2** | **5.4** | **5.1** |
| **SUBSCRIBERS THE GRID SUPPORTS, 2028-2030** | m | **35.0** | **24.8** | **77.3** | **54.5** |
| **as penetration of covered POPs [5]** | % | **14.6%** | **10.3%** | **24.6%** | **17.3%** |
| **CAPACITY HEADROOM before C-band (ceiling / target) [6]** | x | **3.7x** | **2.6x** | **3.1x** | **2.2x** |
| **as penetration once Upper C-band is on air (2031+) [7]** | % | **27.2%** | **18.3%** | **65.3%** | **43.2%** |

1. Target penetration of covered POPs; Boost peaked near 2.7%, with 83% of that share coming from a single wireless network.

2. GB/month, converted to busy-hour traffic at 7% of daily volume, net of femtocell and D2D offload.

3. Low-band + 2 GHz layer, sized as the min of downlink/uplink capacity rather than downlink alone.

4. US mobile traffic today runs 8:10:1 downlink-heavy and is trending lower; once Upper C-band deploys, the crossover shifts to 5:6:1.

5. Versus the target penetration three rows up: DISH covered 268m POPs but carried only ~17% of Boost's on-net traffic, reflecting a thin grid and spectrum position.

6. Headroom isn't binding today (2.1x-3.5x target), but at ~13% annual traffic growth per subscriber, 2.1x buys only ~6 years — against a 6-10 year build cycle. Grain also cuts headroom 25-30% per pair, since fewer sites mean less capacity.

7. C-band isn't optional — it's what determines whether the network can actually hold its subscriber base.
Source: Bernstein analysis and estimates

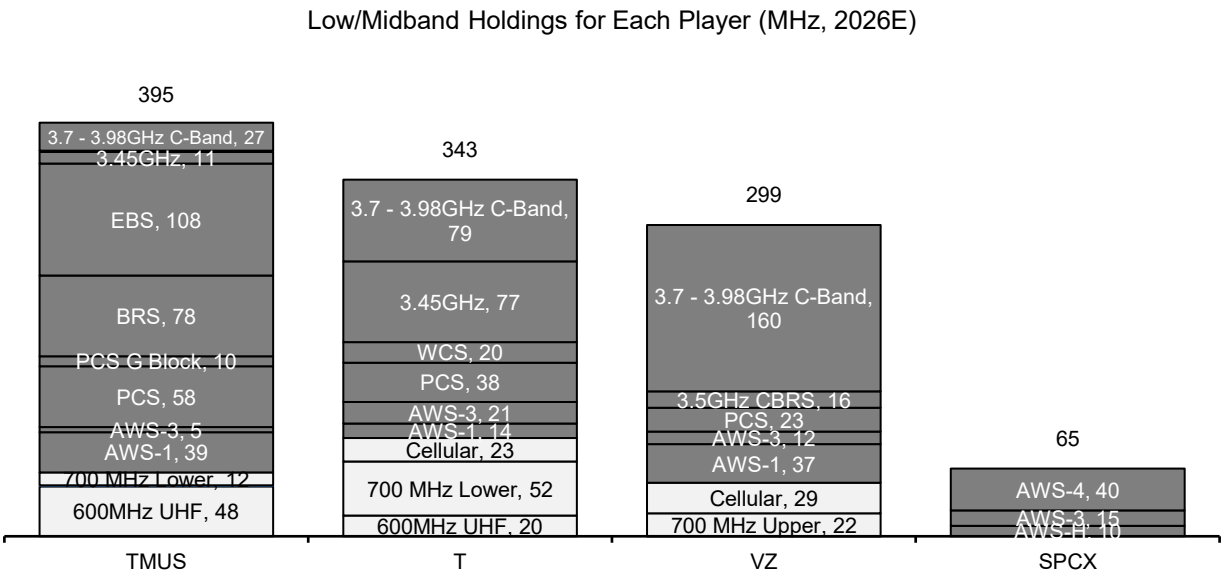
on 31-Aug-2026



## SPECTRUM CONSIDERATIONS

Spectrum is the crux of this entire case and perhaps the part least understood by investors. The spectrum bands dictate how far apart the towers can be in a coverage build, which as we mentioned, is really driving the numbers today. Spectrum is finite and expensive - it is only made available periodically through FCC auctions (each with different rules, geographic units, and timelines) or on the secondary market. Today, SpaceX holds ~65MHz; our scenarios have it reaching up to ~120MHz in a high case. This still pales in comparison to existing players, who have 300-400MHz of low- and mid-band spectrum.

EXHIBIT 16: **Spectrum Holdings fro T-Mobile, AT&T, Verizon, and SpaceX**

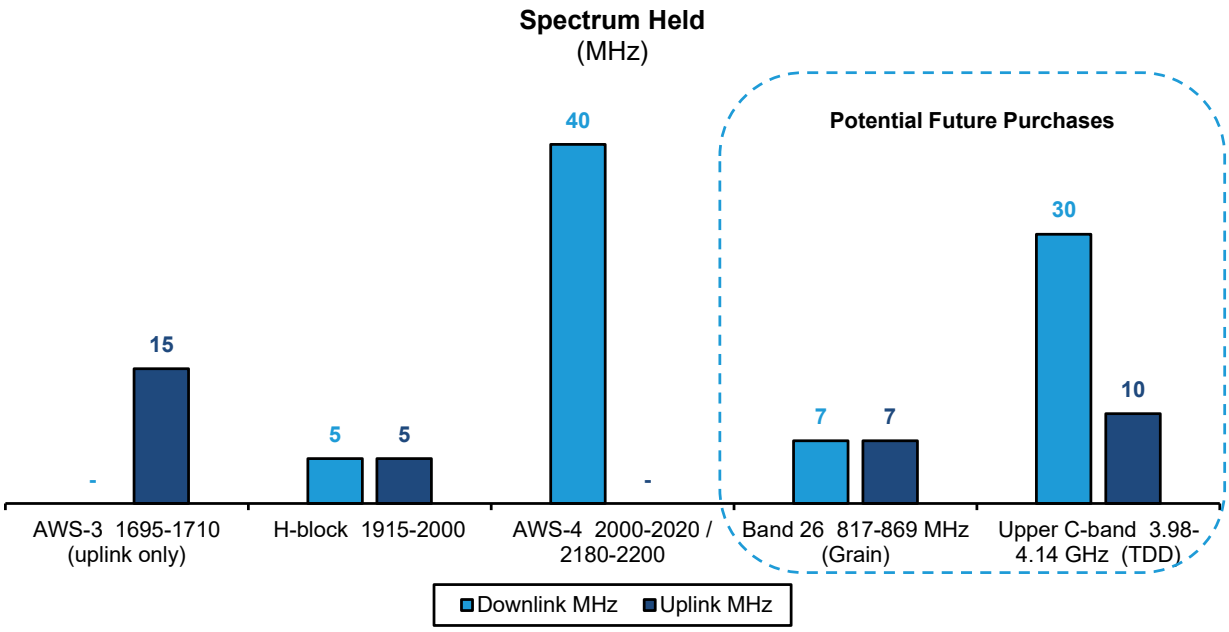



Source: Company Filings, SNL Kagan, FCC, Bernstein Research and Analysis

on 31-Aug-2026



EXHIBIT 17: **Spectrum Held (MHz)**




Coverage is limited by the phone talking back to the tower, not the tower talking to the phone. A handset transmits at 0.2 watts against a tower's 40 watts, so it is the uplink column that sets how far apart towers can sit - and therefore how many are needed.
Source: Bernstein analysis and estimates

## WHY LOW BAND IS ESSENTIAL

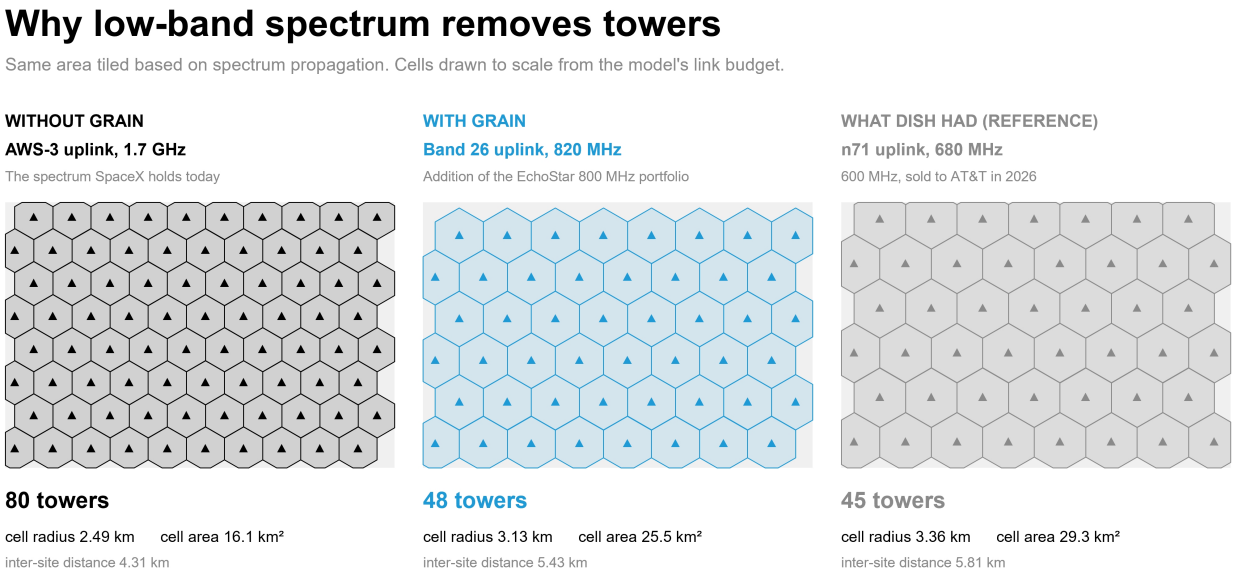
Low-band spectrum can cover a wide radius - it propagates further with a thinner layer - as opposed to mid- or high-band which has a shorter radius and a fatter pipe. SpaceX does not own any low band spectrum today, and its only apparent path to getting some is the Grain block being auctioned this fall. Low-frequency spectrum travels further before fading, and it penetrates walls and windows better — so the same handset, transmitting the same 23 dBm, reaches a tower that is meaningfully further away. Every incumbent US carrier has a low-band coverage layer underneath its network for exactly this reason: Verizon and AT&T on 700 MHz, T-Mobile on 600 MHz. SpaceX, as things stand, does not have one.

Halving the frequency does not quarter the tower count. In open air it roughly would, and models built on free-space assumptions still say so — which is how you end up with people quoting a 30x tower multiple for C-band against 600 MHz. In the real world, signals bounce off buildings and diffract around terrain, and the standard propagation models say the tower count scales close to linearly with frequency instead. We test that: if you rerun the identical engine at 600 MHz and the National build needs 43,685 towers against 88,563 at 1.7 GHz — a 2.03x difference on a 2.83x frequency change, nowhere near the 8x free-space thinking predicts. Low band is worth roughly a third of the tower count, not three quarters of it. **That is still the single largest swing factor in this analysis and the most important decision between our scenarios - whether SpaceX acquires low band spectrum or not.**

on 31-Aug-2026



EXHIBIT 18: **Low-band Spectrum Overview**




Source: Bernstein analysis and estimates

## SPECTRUM ACQUISITION OPTIONS: EXISTING HOLDINGS, GRAIN, UPPER C-BAND

For incumbents, the cost to acquire their current licenses (including mmWave) has been >$100B per player. Reproducing the spectrum holdings of the major wireless carriers would require hundreds of billions of dollars. That is, if the spectrum was available for sale. Arguably, the more important roadblock is finding the spectrum required to build a 4$^{th}$ terrestrial network in the first place. Much of the spectrum that can facilitate wireless service in the US is already used up either by incumbent carriers or other users for different applications. SpaceX's existing and potential spectrum position has three distinct components, each doing a different job.

**1. The existing EchoStar holdings — committed, but the wrong shape.**

SpaceX is acquiring AWS-4 (40 MHz), H-block (10 MHz) and unpaired AWS-3 (up to 15 MHz) from EchoStar, 65 MHz in total, for roughly $20bn plus about $2bn funding EchoStar's debt interest through November 2027. The FCC approved it on 12 May 2026 (DA 26-471), though the spectrum sits in a trust until closing targeted for 30 November 2027. Here is the problem: only 20 MHz of it is usable *upload* spectrum — 15 MHz at 1695-1710 and 5 MHz at 1915-1920 — against 45 MHz of download. The 2180-2200 MHz download band has no matched upload pair anywhere in the portfolio, because the AWS-3 pair at 1755-1780 went to Verizon, T-Mobile and AT&T at Auction 113 in June 2026. **So SpaceX owns a portfolio whose coverage reach is governed by 1.7 GHz — mid-band, with mid-band propagation — and a 2.25:1 download-to-upload asymmetry it cannot fix by buying more of the same.**

**2. Grain's 800 MHz — the coverage layer SpaceX doesn't have, and doesn't yet own**

This is the asset that changes the build costs meaningfully. Band 26 at 817-824 MHz paired with 862-869 MHz is genuine low band. It drops the coverage layer from 1.70 GHz to 0.82 GHz, stretching the rural cell radius from 2.49 km to 3.13 km, and **cuts the National build from 88,563 towers to 58,423.** Roughly 10 MHz is deployable as a contiguous carrier, which is ample for coverage — cell-edge planning uses a 1.44 MHz upload grant — but carries almost no capacity, so the other bands still have to do that work. It is a coverage asset, full stop. Grain bought the portfolio from T-Mobile on 11 August 2026 for $2.9bn cash plus its own 600 MHz licenses, roughly $3.6bn all-in. Before T-Mobile, this was Sprint's coverage layer...a bit of a full-circle moment for the telecom geeks.

on 31-Aug-2026



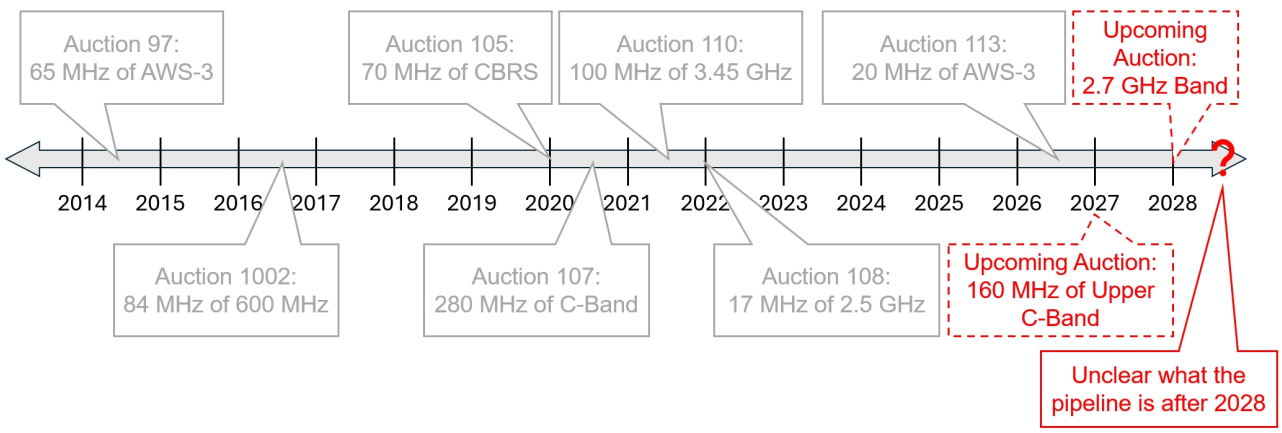
Bloomberg reported on 20 August that it hopes to generate about $6bn — a ~1.7x markup within days of closing. Musk replied "not true." What is confirmed is that FCC Order DA 26-653A1 requires Grain to select a satellite partner through a neutral competitive process, with selection complete by 5 November 2026 and an application filed by 4 December. Note also that the FCC construct is a *secondary satellite license*, which reads more like a long-term lease than an outright assignment — if it is leased, this is a capitalised lease rather than a purchase. AST SpaceMobile is the competing bidder and already holds temporary FCC authority to test on these exact frequencies.

**3. Upper C-band — capacity, and a four-year wait.**

Auction 115 offers 160 MHz at 3.98-4.14 GHz in eight unpaired 20 MHz blocks across 3,248 licenses, with bidding opening 27 April 2027. This is a capacity layer and nothing else. Its upload reach is roughly 60% of low-band, so a C-band-led coverage build would need far more towers than any scenario here contemplates — we model it strictly as an overlay on steel already erected for coverage. It also cannot be switched on before 31 December 2030 in the top 75 markets, or 1 July 2031 elsewhere, which means whatever SpaceX pays at auction in 2027 sits on the balance sheet for roughly four years. There is no pre-auction aggregation limit; the spectrum screen gets applied case by case afterwards.

**The shape of the problem, then: SpaceX has committed to $20bn of spectrum that gives it capacity but not reach, the asset that gives it reach is unsigned and contested, and the asset that gives it real capacity is four years from switch-on.**

EXHIBIT 19: **So far the only approved upcoming auctions are for 160 MHz of Upper C-Band (to be used in 2031) and an undetermined amount of the 2.7 GHz band**




Source: Company filings, SNL Kagan, FCC, Bernstein analysis

## BENCHMARKING SPECTRUM COSTS

Spectrum is priced per megahertz per person covered — $/MHz-POP — which is the only way to compare bands of different widths across different footprints. Spectrum auctions are notoriously hard to predict - the costs can vary wildly depending on who is bidding, what the alternatives are, the size of the geographic units, and the auction rules themselves. Fun fact: both Madison and Laurent (and another of our Bernstein analysts who won't be named here) have all participated in spectrum auctions. Ask us for our fun game theory stories if you're still poring through this hefty note.

The two spectrum values in question are for the Grain portfolio and for the Upper C-band auction:

- The Grain holdings are an interesting one - Grain paid T-Mobile $2.9B plus $0.3B in licenses - about $0.69/MHz-pop. It was cheap since T-Mobile was required to divest it - Dish had the option initially, extended once in 2024, and Grain eventually

on 31-Aug-2026



acquired it at ~80% of the Dish strike price. Bloomberg suggested the value at $6B ($1.29/MHz-pop), but it's a somewhat limited buyer set - only AST and potentially SpaceX. We model a range of $4.5-$8.5B implying $0.97-$1.83/MHz-pop.

- Upper C-band is in some ways more normal - it'll have more bidders (all of the incumbents) and some precedent (lower C-band, Auction 107). In theory, this should price lower than Auction 113 (The AWS-3 re-auction from June of this year) netting $2.53/MHz-pop - that was paired spectrum bought by incumbents. It was also immediately deployable. Upper C-band is unpaired, carries ~4 years of clearing wait time, and is capped at 450ft of antenna height. The better comparable is likely Auction 107 from 2021 where pricing was closer to $0.94/MHz-pop. Additionally for that auction, winning licensees pay pro rata into a pool estimated at ~$10B: $6.3B of accelerated relocation initiatives (SES $5.6bn, Eutelsat $504m, Telesat $189m), $4-5bn of estimated cost reimbursement, and open-ended radio-altimeter retrofit rebates. This puts our estimate for Upper C-band at $0.85-$1.25/MHz-pop plus a portion of the $10.3B rebate pool (an effective incremental $0.21/MHz-pop). Our cases have SpaceX winning 20-60MHz, putting total costs at $6.5B-14.2B for Upper C-Band.

**Spectrum is 40—70% of the network build cost — $29-58B. This is the most critical debate and sensitivity, but almost impossible to get better precision on.**

EXHIBIT 20: **Spectrum Value Comps**

| Grain Spectrum Comps | Date | $Bn | $/MHz-POP |
|---|---|---|---|
| Grain T-Mobile Purchase | Aug-2026 | $3.20 | $0.69 |
| DISH option on the same portfolio (never exercised) (1) | 2020-24 | $3.59 | $0.80 |
| Auction 73 - 700 MHz C block (2) | 2008 | $4.75 | $0.76 |
| Auction 1002 - 600 MHz incentive auction (3) | 2017 | $19.80 | $0.88 |
| Verizon buys UScellular 850 MHz cellular (4) | Oct-2024 | $1.00 | $1.44 |
| AT&T / EchoStar 600 MHz + 3.45 GHz (5) | Closed Jul-2026 | $23.00 | $1.40 |
| Auction 73 - 700 MHz B block (6) | 2008 | $9.14 | $2.24 |
| Auction 97 - AWS-3 paired (7) | 2015 | | $2.71 |

1. $3.59bn / 13.5 MHz / 332m POPs

2. Regional licences, open-access conditions

3. 70 MHz nationwide, weak bidder participation

4. Most recent low-band secondary trade. New Street put the 850-only slice at ~$1.51.

5. Blended. No band split disclosed by AT&T or any analyst.

6. Peak low-band pricing, pre-smartphone land grab

7. Not low band, but the paired-spectrum high-water mark

Source: Bernstein analysis and estimates

EXHIBIT 21: **Spectrum Position Scenario Overview**

| Metric | Units | Metro No Grain | Metro Grain | National No Grain | National Grain |
|---|---|---|---|---|---|
| Total MHz held | MHz | 85 | 99 | 105 | 119 |
| **Usable uplink MHz (1)** | MHz | **20** | **25** | **20** | **25** |

1. This is the binding resource — AWS-4 downlink (2180-2200 MHz) has no matched uplink in the portfolio, as the n66 pair went to Verizon, T-Mobile, and AT&T at Auction 113 (June 2026).
Source: Bernstein analysis and estimates

on 31-Aug-2026



## BUILD UNIT ECONOMICS

Once you've gotten this far, there's no point in getting lazy about unit costs. We price each tower from its parts, which lands between $258k and $364k all-in across our cases. For reference, Dish was $317,600 per site.

### HOW WE MODELED IT:

We went line-by-line: radios, antennas, the baseband computing at the base of the tower, cabling, mounting hardware, the tower crew's labor, the power plant, the backhaul connection (when fiber-fed as opposed to satellite backhauled), engineering and zoning work, and project management. Most of these come from the FCC's own catalog of eligible expenses (DA-21-947A4) — compiled when the government was reimbursing carriers for equipment swaps, which makes it an unusually well-documented price list. We also used the CostQuest 5G and 4G cost models and our own network expertise.

For 3-5% of sites, we assume they need a new tower build. We think through the C-band overlay depending on whether crews install it during the original climb or come back later, program overhead of 10-17%, and an allocated share of the core network and IT. We credit Open RAN with no discount per site, because the evidence does not support one: the FCC-commissioned Widelity study found no significant cost advantage, and AT&T attributed its savings to playing vendors against each other on unit pricing rather than to the technology itself. Running costs — tower rent, ground lease, backhaul, power, maintenance — are modeled per site per year, escalated at 2.5-3.0% and discounted over fifteen years at 9%.

We also put in a pace ceiling. The entire US builds only 1,200-2,000 genuinely new towers a year, and about a quarter of those are not even for wireless. We cap new-build additions between 1200 and 1500 per year across scenarios and cap additions to existing towers at 5,000-9,000 a year against DISH's demonstrated peak of about 5,000. Even on those assumptions, the base-case build takes 8.4 years, the no-Grain version takes 12.7, and Premium without Grain takes 8.1 (assuming a much more aggressive push).

While the capex is the more exciting number for this analysis, we also do an Opex build (hey tower friends). Our network Opex ranges are ~$2B-~$78B at full build, which again won't hit for several years.

EXHIBIT 22: **Capital Cost Metrics Scenario Overview**

| Metric | Units | Metro No Grain | Metro Grain | National No Grain | National Grain |
|---|---|---|---|---|---|
| **Network CAPEX (excl. spectrum) (1)** | $bn | **$21.0** | **$14.3** | **$43.6** | **$29.7** |
| Capex per macro site (colocation) | $ | $258,610 | $258,610 | $306,400 | $306,400 |
| Capex per POP covered | $ | $87.75 | $59.85 | $138.66 | $94.35 |
| **Marginal CAPEX per incremental POP - coverage step in isolation (2)** | $ | **-** | **-** | **$79.58** | **$79.58** |
| **Spectrum (EchoStar + Upper C-band all-in)** | $bn | **$28.1** | **$32.6** | **$35.8** | **$41.8** |
| **Total Program Cost (3)** | $bn | **$49.1** | **$46.9** | **$79.5** | **$71.5** |

1. DISH spent $7.9bn ex-spectrum for ~25,000 sites and 80% of POPs.

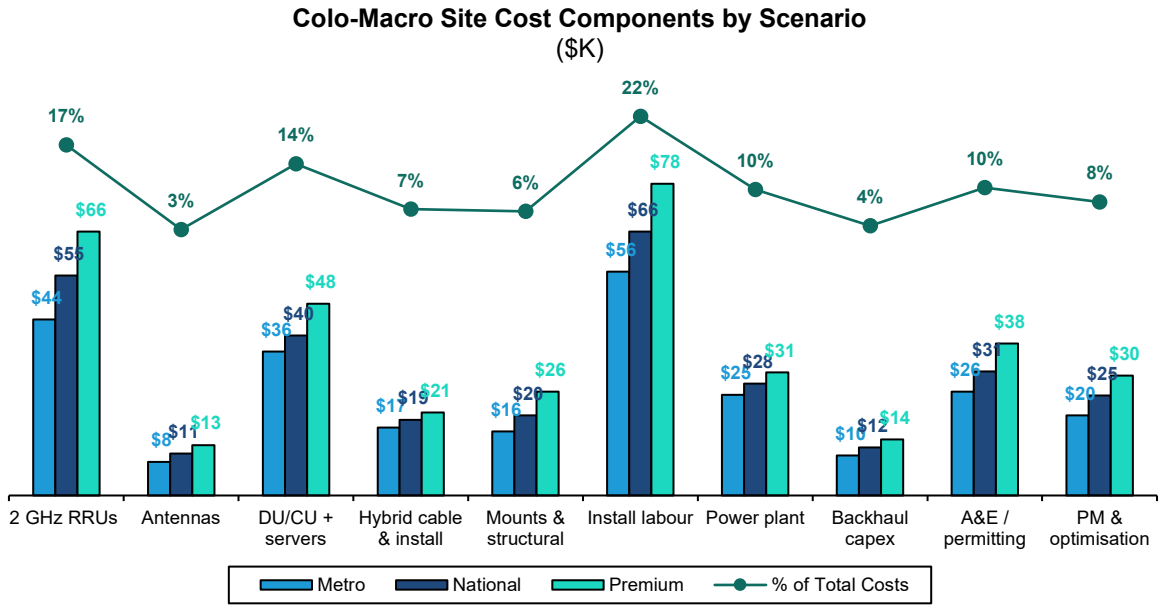
2. National columns isolate the 70%-to-92% coverage step; Premium isolates 92%-to-95%. Grain is held constant within each comparison, so this is coverage-only.

3. Network build plus spectrum — excludes working capital, subscriber acquisition, handset subsidy, retail, and the satellite constellation.
Source: Bernstein analysis and estimates

on 31-Aug-2026

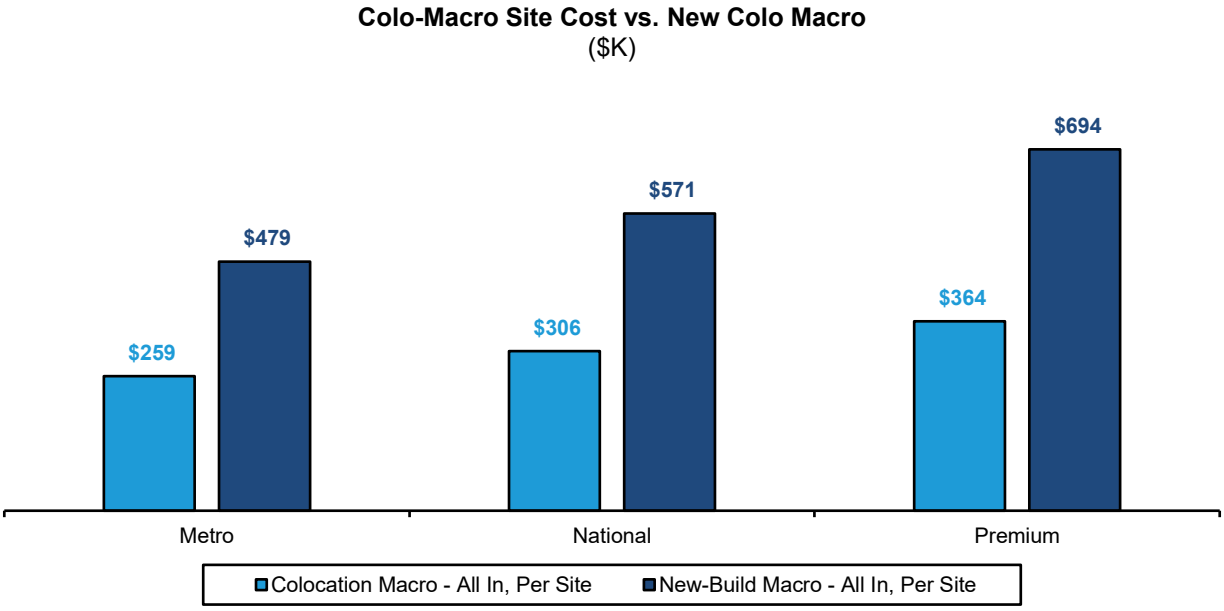


EXHIBIT 23: **Colo-Macro Site Cost Components by Scenario ($K)**




Costs are the same in Grain/No Grain Scenarios
Source: Bernstein analysis and estimates

EXHIBIT 24: **Colo-Macro Site Cost vs. New Colo Macro ($K)**




Source: Bernstein analysis and estimates

on 31-Aug-2026



EXHIBIT 25: **Operating Cost Metrics Scenario Overview**

| Metric | Units | Metro No Grain | Metro Grain | National No Grain | National Grain |
|---|---|---|---|---|---|
| Opex per macro site per year | $ | $58,721 | $58,735 | $57,921 | $58,148 |
| **Network opex at full build** | $bn/yr | **$3.4** | **$2.3** | **$5.7** | **$3.9** |
| NPV of 15 years of tower lease payments [1] | $bn | $11.1 | $7.4 | $17.2 | $11.4 |
| **Total 15-year cash cost (CAPEX + Spectrum + NPV of opex) [2]** | $bn | **$81.2** | **$69.0** | **$133.7** | **$108.7** |

1. Goes straight to the tower companies. This is the number the Towers monetise.

2. The number to compare against an equity story. For scale: SpaceX's entire disclosed. EchoStar spectrum commitment is ~$21.6bn.
Source: Bernstein analysis and estimates

## MODEL VALIDATION

Just to make sure we still have our network engineering chops, we thought we should put this model to a proper test. Give the engine DISH's spectrum and coverage target, and it predicts 22,952 towers against the roughly 25,000 DISH actually built — **8.2% low, so it errs on the conservative side, which is what we'd prefer.**

The DISH comparison runs across the full urban-and-suburban land area rather than any scenario's coverage target, so changing our SpaceX base case cannot quietly improve how well the model appears to match reality. Two further checks: the 600 MHz rerun, which confirms the near-linear frequency relationship inside the model rather than taking it on faith; and a density comparison against a real incumbent, where our base-case build serves 5,386 people per tower against T-Mobile's 4,087, or 0.71x. That is a thinner grid than an incumbent's, exactly as a coverage-first build should be, but it sits in the same league — unlike DISH at roughly 10,700 people per tower, which is the signature of a network built to satisfy a regulator rather than to serve customers.

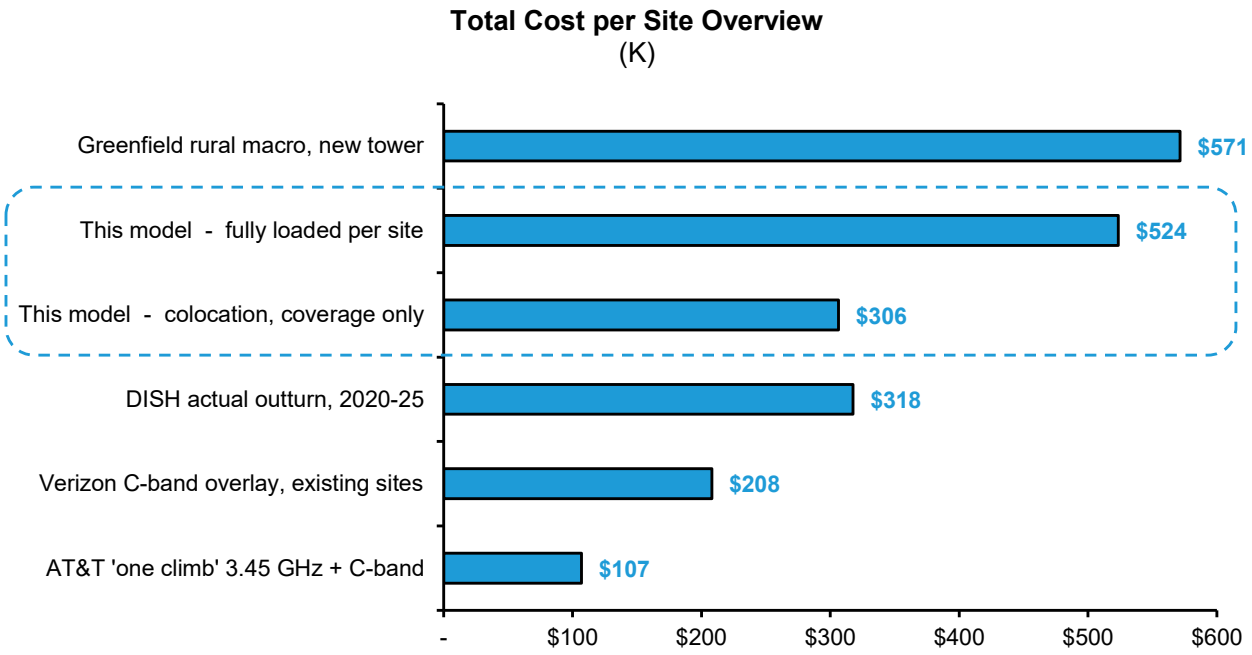
We stress tested ten of our inputs, each changing one input and recalculating the chain: ask the network to work three decibels deeper inside buildings, or hold the cell edge to a better standard, and the tower count swings 38.5% and the capital bill 35%. By contrast, raise every single unit cost by 25% and the total program moves just 6.4%, because spectrum is roughly two thirds of the base-case bill. The constructed part of our population curve is worth 6.9%.

The practical implication is that this model is meant to be argued with on its own terms. A reader who thinks SpaceX would build to a thinner engineering standard than our National case can and should move those two design inputs and read the answer off the model rather than debating the conclusion.

on 31-Aug-2026



EXHIBIT 26: **Total Cost per Site Overview**




The model's cost per site against every comparable US benchmark. DISH is the only greenfield build this century; Verizon's C-band program is the cleanest capacity-overlay comparison.
Source: Bernstein analysis and estimates

## APPENDIX

on 31-Aug-2026



EXHIBIT 27: **Model Inputs Overview Part 1**

| COMMON RECEIVER & MARGIN TERMS | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| UE transmit power (Power Class 3) | dBm | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 |
| UE antenna gain incl. body loss | dBi | (3.0) | (3.0) | (3.0) | (3.0) | (3.0) | (3.0) |
| **UE EIRP** | dBm | **20.0** | **20.0** | **20.0** | **20.0** | **20.0** | **20.0** |
| Thermal noise over cell-edge PUSCH allocation | dBm | (112.42) | (112.42) | (112.42) | (112.42) | (112.42) | (112.42) |
| gNB receiver noise figure | dB | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Receiver noise floor | dBm | (109.92) | (109.92) | (109.92) | (109.92) | (109.92) | (109.92) |
| Required uplink SINR at cell edge | dB | (4.0) | (4.0) | (3.0) | (3.0) | (1.5) | (1.5) |
| **Receiver sensitivity** | dBm | **(113.92)** | **(113.92)** | **(112.92)** | **(112.92)** | **(111.42)** | **(111.42)** |
| Feeder / jumper loss | dB | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Interference margin | dB | 2.0 | 2.0 | 3.0 | 3.0 | 4.0 | 4.0 |
| Shadow-fade margin | dB | 7.0 | 7.0 | 7.5 | 7.5 | 8.0 | 8.0 |
| **Fixed loss subtotal (feeder + interference + shadow fade)** | dB | **9.50** | **9.50** | **11.00** | **11.00** | **12.50** | **12.50** |

| COVERAGE-LAYER BAND SELECTION - which spectrum actually sets the grid | | | | | | | |
|---|---|---|---|---|---|---|---|
| Grain Band 26 acquired and used as the coverage layer? (1 = yes) | flag | 0 | 1 | 0 | 1 | 0 | 1 |
| **EFFECTIVE coverage-layer uplink centre frequency** | GHz | **1.700** | **0.821** | **1.700** | **0.821** | **1.700** | **0.821** |
| **EFFECTIVE coverage-layer panel gain** | dBi | **17.5** | **15.0** | **17.5** | **15.0** | **18.0** | **15.0** |
| Frequency advantage vs the 1.7 GHz AWS-3 uplink | dB | - | 6.33 | - | 6.33 | - | 6.33 |
| **Net link-budget advantage after the lower panel gain** | dB | **-** | **3.83** | **-** | **3.83** | **-** | **3.33** |

| 3GPP TR 38.901 PATH-LOSS MODEL PARAMETERS | | | | | | | |
|---|---|---|---|---|---|---|---|
| UE height h_UT | m | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| RMa average street width W | m | 20 | 20 | 20 | 20 | 20 | 20 |
| RMa average building height h | m | 5 | 5 | 5 | 5 | 5 | 5 |
| gNB height - Urban core & dense metro | m | 25 | 25 | 25 | 25 | 25 | 25 |
| gNB height - Urban & inner suburban | m | 30 | 30 | 30 | 30 | 30 | 30 |
| gNB height - Outer suburban & small town | m | 40 | 40 | 40 | 40 | 40 | 40 |
| gNB height - Rural | m | 50 | 50 | 50 | 50 | 50 | 50 |
| RMa path-loss constant - tier 1 | dB | 123.18 | 123.18 | 123.18 | 123.18 | 123.18 | 123.18 |
| RMa distance slope - tier 1 | dB/decade | 39.09 | 39.09 | 39.09 | 39.09 | 39.09 | 39.09 |
| RMa path-loss constant - tier 2 | dB | 121.20 | 121.20 | 121.20 | 121.20 | 121.20 | 121.20 |
| RMa distance slope - tier 2 | dB/decade | 38.84 | 38.84 | 38.84 | 38.84 | 38.84 | 38.84 |
| RMa path-loss constant - tier 3 | dB | 118.10 | 118.10 | 118.10 | 118.10 | 118.10 | 118.10 |
| RMa distance slope - tier 3 | dB/decade | 38.45 | 38.45 | 38.45 | 38.45 | 38.45 | 38.45 |
| RMa path-loss constant - tier 4 | dB | 115.70 | 115.70 | 115.70 | 115.70 | 115.70 | 115.70 |
| RMa distance slope - tier 4 | dB/decade | 38.15 | 38.15 | 38.15 | 38.15 | 38.15 | 38.15 |

Source: Bernstein analysis and estimates

on 31-Aug-2026



EXHIBIT 28: **Model Inputs Overview Part 2**

**T1 Urban core & dense metro (>4,965 /sq mi) | 2 GHz coverage layer (n70 uplink 1695-1710 MHz, FDD)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 1.70 | 0.82 | 1.70 | 0.82 | 1.70 | 0.82 |
| gNB panel / array gain | dBi | 17.5 | 15.0 | 17.5 | 15.0 | 18.0 | 15.0 |
| Uplink beamforming / RX combining gain | dB | - | - | 2.0 | 2.0 | 3.0 | 3.0 |
| TDD uplink duty-cycle penalty | dB | - | - | - | - | - | - |
| Design building-penetration loss | dB | 13.0 | 13.0 | 14.5 | 14.5 | 16.0 | 16.0 |
| Total losses (fixed + penetration + TDD) | dB | 22.50 | 22.50 | 25.50 | 25.50 | 28.50 | 28.50 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **128.92** | **126.42** | **126.92** | **124.42** | **123.92** | **120.92** |
| Cell radius (38.901 inversion) | m | 683 | 856 | 607 | 761 | 509 | 619 |
| Cell radius | km | 0.68 | 0.86 | 0.61 | 0.76 | 0.51 | 0.62 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **1.18** | **1.48** | **1.05** | **1.32** | **0.88** | **1.07** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 1.18 | 1.48 | 1.05 | 1.32 | 0.88 | 1.07 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 1.21 | 1.90 | 0.96 | 1.50 | 0.67 | 0.99 |
| Capacity ISD floor | km | 2.20 | 2.20 | 1.50 | 1.50 | 1.10 | 1.10 |
| Capacity cell area | km2 | 4.19 | 4.19 | 1.95 | 1.95 | 1.05 | 1.05 |

**T2 Urban & inner suburban (1,205-4,965 /sq mi) | 2 GHz coverage layer (n70 uplink 1695-1710 MHz, FDD)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 1.70 | 0.82 | 1.70 | 0.82 | 1.70 | 0.82 |
| gNB panel / array gain | dBi | 17.5 | 15.0 | 17.5 | 15.0 | 18.0 | 15.0 |
| Uplink beamforming / RX combining gain | dB | - | - | 2.0 | 2.0 | 3.0 | 3.0 |
| TDD uplink duty-cycle penalty | dB | - | - | - | - | - | - |
| Design building-penetration loss | dB | 10.0 | 10.0 | 11.5 | 11.5 | 13.0 | 13.0 |
| Total losses (fixed + penetration + TDD) | dB | 19.50 | 19.50 | 22.50 | 22.50 | 25.50 | 25.50 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **131.92** | **129.42** | **129.92** | **127.42** | **126.92** | **123.92** |
| Cell radius (38.901 inversion) | m | 1,436 | 1,802 | 1,276 | 1,601 | 1,068 | 1,301 |
| Cell radius | km | 1.44 | 1.80 | 1.28 | 1.60 | 1.07 | 1.30 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **2.49** | **3.12** | **2.21** | **2.77** | **1.85** | **2.25** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 2.49 | 3.12 | 2.21 | 2.77 | 1.85 | 2.25 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 5.36 | 8.44 | 4.23 | 6.66 | 2.96 | 4.40 |
| Capacity ISD floor | km | 4.50 | 4.50 | 3.20 | 3.20 | 2.50 | 2.50 |
| Capacity cell area | km2 | 17.54 | 17.54 | 8.87 | 8.87 | 5.41 | 5.41 |

Source: Bernstein analysis and estimates

on 31-Aug-2026



EXHIBIT 29: **Model Inputs Overview Part 3**

**T3 Outer suburban & small town (~200-1,205 /sq mi) | 2 GHz coverage layer (n70 uplink 1695-1710 MHz, FDD)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 1.70 | 0.82 | 1.70 | 0.82 | 1.70 | 0.82 |
| gNB panel / array gain | dBi | 17.5 | 15.0 | 17.5 | 15.0 | 18.0 | 15.0 |
| Uplink beamforming / RX combining gain | dB | - | - | 2.0 | 2.0 | 3.0 | 3.0 |
| TDD uplink duty-cycle penalty | dB | - | - | - | - | - | - |
| Design building-penetration loss | dB | 8.0 | 8.0 | 9.0 | 9.0 | 10.0 | 10.0 |
| Total losses (fixed + penetration + TDD) | dB | 17.50 | 17.50 | 20.00 | 20.00 | 22.50 | 22.50 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **133.92** | **131.42** | **132.42** | **129.92** | **129.92** | **126.92** |
| Cell radius (38.901 inversion) | m | 1,957 | 2,461 | 1,789 | 2,249 | 1,540 | 1,880 |
| Cell radius | km | 1.96 | 2.46 | 1.79 | 2.25 | 1.54 | 1.88 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **3.39** | **4.26** | **3.10** | **3.90** | **2.67** | **3.26** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 3.39 | 4.26 | 3.10 | 3.90 | 2.67 | 3.26 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 9.95 | 15.73 | 8.31 | 13.15 | 6.16 | 9.18 |
| Capacity ISD floor | km | 7.00 | 7.00 | 5.00 | 5.00 | 4.00 | 4.00 |
| Capacity cell area | km2 | 42.43 | 42.43 | 21.65 | 21.65 | 13.86 | 13.86 |

**T4 Rural (<200 /sq mi) | 2 GHz coverage layer (n70 uplink 1695-1710 MHz, FDD)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 1.70 | 0.82 | 1.70 | 0.82 | 1.70 | 0.82 |
| gNB panel / array gain | dBi | 17.5 | 15.0 | 17.5 | 15.0 | 18.0 | 15.0 |
| Uplink beamforming / RX combining gain | dB | - | - | 2.0 | 2.0 | 3.0 | 3.0 |
| TDD uplink duty-cycle penalty | dB | - | - | - | - | - | - |
| Design building-penetration loss | dB | 5.0 | 5.0 | 6.0 | 6.0 | 7.0 | 7.0 |
| Total losses (fixed + penetration + TDD) | dB | 14.50 | 14.50 | 17.00 | 17.00 | 19.50 | 19.50 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **136.92** | **134.42** | **135.42** | **132.92** | **132.92** | **129.92** |
| Cell radius (38.901 inversion) | m | 2,724 | 3,431 | 2,488 | 3,134 | 2,140 | 2,615 |
| Cell radius | km | 2.72 | 3.43 | 2.49 | 3.13 | 2.14 | 2.62 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **4.72** | **5.94** | **4.31** | **5.43** | **3.71** | **4.53** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 4.72 | 5.94 | 4.31 | 5.43 | 3.71 | 4.53 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 19.27 | 30.59 | 16.08 | 25.52 | 11.89 | 17.77 |
| Capacity ISD floor | km | 12.00 | 12.00 | 12.00 | 12.00 | 10.00 | 10.00 |
| Capacity cell area | km2 | 124.70 | 124.70 | 124.70 | 124.70 | 86.60 | 86.60 |

Source: Bernstein analysis and estimates

on 31-Aug-2026



EXHIBIT 30: **Model Inputs Overview Part 4**

**T1 Urban core & dense metro (>4,965 /sq mi) | Upper C-band capacity layer (3.98-4.14 GHz, TDD, 64T64R)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 |
| gNB panel / array gain | dBi | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 |
| Uplink beamforming / RX combining gain | dB | 6.9 | 6.9 | 9.0 | 9.0 | 10.0 | 10.0 |
| TDD uplink duty-cycle penalty | dB | 7.0 | 7.0 | 7.0 | 7.0 | 5.2 | 5.2 |
| Design building-penetration loss | dB | 15.0 | 15.0 | 18.5 | 18.5 | 22.0 | 22.0 |
| Total losses (fixed + penetration + TDD) | dB | 31.50 | 31.50 | 36.50 | 36.50 | 39.70 | 39.70 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **133.82** | **133.82** | **129.92** | **129.92** | **126.22** | **126.22** |
| Cell radius (38.901 inversion) | m | 584 | 584 | 464 | 464 | 373 | 373 |
| Cell radius | km | 0.58 | 0.58 | 0.46 | 0.46 | 0.37 | 0.37 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **1.01** | **1.01** | **0.80** | **0.80** | **0.65** | **0.65** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 1.01 | 1.01 | 0.80 | 0.80 | 0.65 | 0.65 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 0.89 | 0.89 | 0.56 | 0.56 | 0.36 | 0.36 |

**T2 Urban & inner suburban (1,205-4,965 /sq mi) | Upper C-band capacity layer (3.98-4.14 GHz, TDD, 64T64R)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 |
| gNB panel / array gain | dBi | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 |
| Uplink beamforming / RX combining gain | dB | 6.9 | 6.9 | 9.0 | 9.0 | 10.0 | 10.0 |
| TDD uplink duty-cycle penalty | dB | 7.0 | 7.0 | 7.0 | 7.0 | 5.2 | 5.2 |
| Design building-penetration loss | dB | 12.0 | 12.0 | 15.5 | 15.5 | 19.0 | 19.0 |
| Total losses (fixed + penetration + TDD) | dB | 28.50 | 28.50 | 33.50 | 33.50 | 36.70 | 36.70 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **136.82** | **136.82** | **132.92** | **132.92** | **129.22** | **129.22** |
| Cell radius (38.901 inversion) | m | 1,227 | 1,227 | 973 | 973 | 782 | 782 |
| Cell radius | km | 1.23 | 1.23 | 0.97 | 0.97 | 0.78 | 0.78 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **2.12** | **2.12** | **1.69** | **1.69** | **1.35** | **1.35** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 2.12 | 2.12 | 1.69 | 1.69 | 1.35 | 1.35 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 3.91 | 3.91 | 2.46 | 2.46 | 1.59 | 1.59 |

Source: Bernstein analysis and estimates

on 31-Aug-2026



EXHIBIT 31: **Model Inputs Overview Part 5**

**T3 Outer suburban & small town (~200-1,205 /sq mi) | Upper C-band capacity layer (3.98-4.14 GHz, TDD, 64T64R)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 |
| gNB panel / array gain | dBi | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 |
| Uplink beamforming / RX combining gain | dB | 6.9 | 6.9 | 9.0 | 9.0 | 10.0 | 10.0 |
| TDD uplink duty-cycle penalty | dB | 7.0 | 7.0 | 7.0 | 7.0 | 5.2 | 5.2 |
| Design building-penetration loss | dB | 10.0 | 10.0 | 13.0 | 13.0 | 16.0 | 16.0 |
| Total losses (fixed + penetration + TDD) | dB | 26.50 | 26.50 | 31.00 | 31.00 | 33.70 | 33.70 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **138.82** | **138.82** | **135.42** | **135.42** | **132.22** | **132.22** |
| Cell radius (38.901 inversion) | m | 1,669 | 1,669 | 1,361 | 1,361 | 1,124 | 1,124 |
| Cell radius | km | 1.67 | 1.67 | 1.36 | 1.36 | 1.12 | 1.12 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **2.89** | **2.89** | **2.36** | **2.36** | **1.95** | **1.95** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 2.89 | 2.89 | 2.36 | 2.36 | 1.95 | 1.95 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 7.23 | 7.23 | 4.81 | 4.81 | 3.28 | 3.28 |

**T4 Rural (<200 /sq mi) | Upper C-band capacity layer (3.98-4.14 GHz, TDD, 64T64R)**

| | | Metro No Grain | Metro Grain | National No Grain | National Grain | Premium No Grain | Premium Grain |
|---|---|---|---|---|---|---|---|
| Centre frequency (uplink) | GHz | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 | 4.06 |
| gNB panel / array gain | dBi | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 |
| Uplink beamforming / RX combining gain | dB | 6.9 | 6.9 | 9.0 | 9.0 | 10.0 | 10.0 |
| TDD uplink duty-cycle penalty | dB | 7.0 | 7.0 | 7.0 | 7.0 | 5.2 | 5.2 |
| Design building-penetration loss | dB | 7.0 | 7.0 | 10.0 | 10.0 | 13.0 | 13.0 |
| Total losses (fixed + penetration + TDD) | dB | 23.50 | 23.50 | 28.00 | 28.00 | 30.70 | 30.70 |
| **MAXIMUM ALLOWABLE PATH LOSS (uplink)** | dB | **141.82** | **141.82** | **138.42** | **138.42** | **135.22** | **135.22** |
| Cell radius (38.901 inversion) | m | 2,320 | 2,320 | 1,889 | 1,889 | 1,557 | 1,557 |
| Cell radius | km | 2.32 | 2.32 | 1.89 | 1.89 | 1.56 | 1.56 |
| **Link-budget inter-site distance (ISD = sqrt(3) x R)** | km | **4.02** | **4.02** | **3.27** | **3.27** | **2.70** | **2.70** |
| Coverage ISD after practical cap (rarely binds outside rural) | km | 4.02 | 4.02 | 3.27 | 3.27 | 2.70 | 2.70 |
| Coverage cell area (hex, 0.866 x ISD^2) | km2 | 13.98 | 13.98 | 9.27 | 9.27 | 6.30 | 6.30 |

Source: Bernstein analysis and estimates

on 31-Aug-2026





## I. REQUIRED DISCLOSURES

References to "Bernstein" or the "Firm" in these disclosures relate to the following entities: Bernstein Institutional Services LLC (April 1, 2024 onwards), Sanford C. Bernstein & Co., LLC (pre April 1, 2024), Bernstein Autonomous LLP, BSG France S.A. (April 1, 2024 onwards), Sanford C. Bernstein (Hong Kong) Limited 盛博香港有限公司, Sanford C. Bernstein (Canada) Limited, Sanford C. Bernstein (India) Private Limited (SEBI registration no. INH000006378), Sanford C. Bernstein (Singapore) Private Limited, Sanford C. Bernstein Japan KK（サンフォード・C・バーンスタイン株式会社）and analysts employed by Société Générale Africa Technologies & Services to produce Bernstein research under a Global Services Agreement in place between Bernstein and Société Générale.

Bernstein is part of a joint venture between Société Générale (SG) and AllianceBernstein, L.P. (AB). Unless specifically noted otherwise, for purposes of these disclosures, references to Bernstein's "affiliates" relate to both SG and AB and their respective affiliates.

### VALUATION METHODOLOGY

This research publication covers six or more companies. For valuation methodology and other company disclosures:
Please visit: https://bernstein-autonomous.bluematrix.com/sellside/Disclosures.action.
Or, you can also write to the Director of Compliance, Bernstein Institutional Services LLC, 245 Park Avenue, New York, NY 10167.

### RISKS

This research publication covers six or more companies. For risks and other company disclosures:
Please visit: https://bernstein-autonomous.bluematrix.com/sellside/Disclosures.action.
Or, you can also write to the Director of Compliance, Bernstein Institutional Services LLC, 245 Park Avenue, New York, NY 10167.

### RATINGS DEFINITIONS, BENCHMARKS AND DISTRIBUTION

### EQUITY RATINGS DEFINITIONS

**Bernstein brand**

The Bernstein brand rates stocks based on forecasts of relative performance for the next 12 months versus the S&P 500 for stocks listed on the U.S. and Canadian exchanges, versus the Bloomberg Europe Developed Markets Large and Mid Cap Price Return Index EUR (EDME) for stocks listed on the European exchanges and emerging markets exchanges outside of the Asia Pacific region, versus the Bloomberg Japan Large and Mid Cap Price Return Index USD (JPL) for stocks listed on the Japanese exchanges, and versus the Bloomberg Asia ex-Japan Large and Mid Cap Price Return Index (ASIAX) for stocks listed on the Asian (ex-Japan) exchanges -unless otherwise specified.

The Bernstein brand has three categories of ratings:

- Outperform: Stock will outpace the market index by more than 15 pp
- Market-Perform: Stock will perform in line with the market index to within +/-15 pp
- Underperform: Stock will trail the performance of the market index by more than 15 pp

Coverage Suspended: Coverage of a company under the Bernstein research brand has been suspended. Ratings and price targets are suspended temporarily, are no longer current, and should therefore not be relied upon.

Not Rated: A rating assigned when the stock cannot be accurately valued, or the performance of the company accurately predicted, at the present time. The covering analyst may continue to publish research reports on the company to update investors on events and developments.

Not Covered (NC) denotes companies that are not under coverage.

Bernstein brand stock ratings are based on a 12-month time horizon.

**Autonomous brand – common stocks**

on 31-Aug-2026



The Autonomous brand rates common stocks as indicated below. As our benchmarks we use the Bloomberg Europe 600 Financials Price Return Index (E600BK) and Bloomberg Europe Dev Mkt Financials Large and Mid Cap Price Ret Index EUR (EDMFI) index for developed European banks and Payments, the Bloomberg Europe 600 Insurance Price Return Index (E600IN) for European insurers, the S&P 500 and S&P Financials for US banks and Payments coverage, S5LIFE for US Insurance, the S&P Insurance Select Industry (SPSIINS) for US Non-Life Insurers coverage, the Bloomberg Emerging Markets Financials Large, Mid and Small Cap Price Return Index (EMLSF) for emerging market banks and insurers and Payments, and the Bloomberg Japan Financials Large & Mid Cap Price Return Index (JPFILM) for Japanese Financials. Ratings are stated relative to the sector (not the market).

The Autonomous brand has three categories of common stock ratings:

- Outperform (OP): Stock will outpace the relevant index by more than 10 pp
- Neutral (N): Stock will perform in line with the market index to within +/-10 pp
- Underperform (UP): Stock will trail the performance of the relevant index by more than 10 pp

Coverage Suspended: Coverage of a company under the Autonomous research brand has been suspended. Ratings and price targets are suspended temporarily, are no longer current, and should therefore not be relied upon.

Not Rated: A rating assigned when the stock cannot be accurately valued, or the performance of the company accurately predicted, at the present time. The covering analyst may continue to publish research reports on the company to update investors on events and developments.

Those denoted as 'Feature' (e.g., Feature Outperform FOP, Feature Under Outperform FUP) are our core ideas.

Not Covered (NC) denotes companies that are not under coverage.

Autonomous brand common stock ratings are based on a 12-month time horizon.

**Autonomous brand – preferred stocks**

The Autonomous brand has three categories of preferred stock ratings:

- Outperform (OP): The total return of the preferred instrument is expected to outperform preferred securities of other issuers operating in similar sectors or rating categories over the next six months.
- Neutral (N): The total return of the preferred instrument is expected to perform in line with preferred securities of other issuers operating in similar sectors or rating categories over the next six months.
- Underperform (UP): The total return of the preferred instrument is expected to underperform preferred securities of other issuers operating in similar sectors or rating categories over the next six months.

Autonomous preferred stock ratings are based on a 6-month time horizon.

**AUTONOMOUS CREDIT RESEARCH**

Where this report contains investment recommendations for credit instruments, as defined in article 3(1)(35) of the Market Abuse Regulation, the information below is presented to comply with its disclosure requirements.

The report may also include reference(s) to published opinions by other Autonomous or Bernstein analysts covering the equity securities of the issuer(s) referenced herein. Please note an investment recommendation for credit instruments published by the author(s) of this report may differ from the published view of the analyst covering equity securities for the issuer(s) contained in this report and vice versa.

**CREDIT RATINGS DEFINITIONS**

The Autonomous brand has three categories of credit ratings:

- Credit Outperform (C-OP): The total return of the Reference Credit Instrument is expected to outperform the credit spread of bonds of other issuers operating in similar sectors or rating categories over the next six months.

on 31-Aug-2026



- Credit Neutral (C-N): The total return of the Reference Credit Instrument is expected to perform in line with the credit spread of bonds of other issuers operating in similar sectors or rating categories over the next six months.
- Credit Underperform (C-UP): The total return of the Reference Credit Instrument is expected to underperform the credit spread of bonds of other issuers operating in similar sectors or rating categories over the next six months.

Autonomous credit ratings are based on a 6-month time horizon.

A list of all investment recommendations produced by the author(s) of this report alongside credit ratings history are available upon request.

It is at the sole discretion of the Firm as to when to initiate, update and cease research coverage. The Firm has established, maintains and relies on information barriers to control the flow of information contained in one or more areas (i.e. the private side) within the Firm, and into other areas, units, groups or affiliates (i.e. public side) of the Firm

**DISTRIBUTION OF EQUITY RATINGS/INVESTMENT BANKING SERVICES**

| Equity Rating | Market Abuse Regulation (MAR) and FINRA Rating Category | Global Rating Distribution | Investment Banking Relationships* |
|---|---|---|---|
| Outperform | BUY | 51.2% | 15.3% |
| Market-Perform (Bernstein Brand) Neutral (Autonomous Brand) | HOLD | 35.8% | 16.2% |
| Underperform | SELL | 13.1% | 13.6% |

* These figures represent the percentage of companies within each equity rating category for which affiliates of Bernstein have provided investment banking services within the previous 12 months.
As of June 30, 2026. All figures are updated quarterly.

Prior to April 1, 2024, Sanford C. Bernstein & Co., LLC. issued the ratings and price target information in the graph(s) below for the following companies: Charter Communications Inc and Comcast Corp.

**PRICE CHARTS/ RATINGS AND PRICE TARGET HISTORY**

This research publication covers six or more companies. For price chart and other company disclosures, please visit https://bernstein-autonomous.bluematrix.com/sellside/Disclosures.action or you can write to the Director of Compliance, Bernstein Institutional Services LLC, 245 Park Avenue, New York, NY 10167.

**CONFLICTS OF INTEREST**

Bernstein and/or affiliates have received compensation for investment banking services in the past twelve months from Space Exploration Technologies Corporation, AT&T Inc, Comcast Corp and T-Mobile US Inc.

Bernstein and/or affiliates have received compensation for non-investment banking securities-related products or services in the previous twelve months from the following clients: Space Exploration Technologies Corporation, American Tower Corporation, AT&T Inc, Comcast Corp, T-Mobile US Inc and Verizon Communications Inc.

An affiliate of Bernstein has received compensation for non-investment banking securities-related products or services in the previous twelve months from the following clients: Comcast Corp, T-Mobile US Inc and Verizon Communications Inc.

Bernstein has received compensation for non-investment banking securities-related products or services in the previous twelve months from the following clients: Comcast Corp.

Bernstein and/or affiliates expect to receive or intend to seek compensation for investment banking services in the next three months from Space Exploration Technologies Corporation and AT&T Inc.

on 31-Aug-2026



Affiliates of Bernstein managed or co-managed in the past twelve months a public offering of securities of Space Exploration Technologies Corporation, AT&T Inc, Comcast Corp and T-Mobile US Inc.

Bernstein and/or affiliates had an investment banking client relationship during the past twelve months with Space Exploration Technologies Corporation, AT&T Inc, Comcast Corp and T-Mobile US Inc.

Certain affiliates of Bernstein act as market maker or liquidity provider in the equities securities of: Space Exploration Technologies Corporation, American Tower Corporation, Crown Castle Inc, SBA Communications Corporation, AT&T Inc, Charter Communications Inc, Comcast Corp, T-Mobile US Inc and Verizon Communications Inc.

Certain affiliates of Bernstein act as market maker or liquidity provider in the debt securities of: American Tower Corporation, AT&T Inc, Charter Communications Inc, Comcast Corp, T-Mobile US Inc and Verizon Communications Inc.

**OTHER MATTERS**

The legal entity(ies) employing the analyst(s) listed in this report, and their location, can be determined by the country code of their phone number, as follows:

+1 Bernstein Institutional Services LLC; New York, New York, USA

+44 Bernstein Autonomous LLP; London UK

+212 Société Générale Africa Technologies & Services; Casablanca, Morocco

+33 BSG France S.A.; Paris, France

+34 BSG France S.A.; Madrid, Spain

+41 Bernstein Autonomous LLP; Geneva, Switzerland

+49 BSG France S.A.; Frankfurt, Germany

+91 Sanford C. Bernstein (India) Private Limited; Mumbai, India

+852 Sanford C. Bernstein (Hong Kong) Limited 盛博香港有限公司; Hong Kong, China

+65 Sanford C. Bernstein (Singapore) Private Limited; Singapore

+81 Sanford C. Bernstein Japan KK; Tokyo, Japan

Where this report has been prepared by research analyst(s) employed by a non-US affiliate, such analyst(s), is/are (unless otherwise expressly noted below) not registered as associated persons of Bernstein Institutional Services LLC or any other SEC-registered broker-dealer and are not licensed or qualified as research analysts with FINRA. Accordingly, such analyst(s) may not be subject to FINRA's restrictions regarding (among other things) communications by research analysts with a subject company, interactions between research analysts and investment banking personnel, participation by research analysts in solicitation and marketing activities relating to investment banking transactions, public appearances by research analysts, and trading securities held by a research analyst account.

Where this report has been prepared by research analyst(s) employed by Société Générale Africa Technologies & Services (part of the Société Générale group of companies), it has been prepared on behalf of a Bernstein company under a Global Services Agreement in place between Bernstein and Société Générale.

**CERTIFICATION**

Each research analyst listed in this report, who is primarily responsible for the preparation of the content of this report, certifies that all of the views expressed in this publication accurately reflect that analyst's personal views about any and all of the subject securities or issuers and that no part of that analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views in this publication.

**II. ADDITIONAL GLOBAL CONFLICT DISCLOSURES**

It is at the sole discretion of the Firm as to when to initiate, update and cease research coverage. The Firm has established, maintains and relies on information barriers to control the flow of information contained in one or more areas (i.e., the private side)

on 31-Aug-2026



within the Firm, and into other areas, units, groups or affiliates (i.e., public side) of the Firm.

## III. OTHER IMPORTANT INFORMATION AND DISCLOSURES

Separate branding is maintained for “Bernstein” and “Autonomous” research products.

- Bernstein produces a number of different types of research products including, among others, fundamental analysis and quantitative analysis under both the “Autonomous” and “Bernstein” brands. Recommendations contained within one type of research product may differ from recommendations contained within other types of research products, whether as a result of differing time horizons, methodologies or otherwise. Furthermore, views or recommendations within a research product issued under one brand may differ from views or recommendations under the same type of research product issued under the other brand. The Research Ratings System for the two brands and other information related to those Rating Systems are included in the previous section.

- Autonomous operates as a separate business unit within the following entities: Bernstein Institutional Services LLC, Bernstein Autonomous LLP, Sanford C. Bernstein (Hong Kong) Limited 盛博香港有限公司 and Sanford C. Bernstein (India) Private Limited. For information relating to “Autonomous” branded products (including certain Sales materials) please visit: www.autonomous.com. For information relating to Bernstein branded products please visit: www.bernsteinresearch.com.

Analysts are compensated based on aggregate contributions to the research franchise as measured by account penetration, productivity and proactivity of investment ideas. No analysts are compensated based on performance in, or contributions to, generating investment banking revenues.

This report has been produced by an independent analyst as defined in Article 3 (1)(34)(i) of EU 596/2014 Market Abuse Regulation (“MAR”) and the same article of MAR as it forms part of United Kingdom domestic law by virtue of the European Union (Withdrawal) Act 2018.

**To our readers in the United States**: Bernstein Institutional Services LLC, a broker-dealer registered with the U.S. Securities and Exchange Commission (“SEC”) and a member of the U.S. Financial Industry Regulatory Authority, Inc. (“FINRA”) is distributing this publication in the United States and accepts responsibility for its contents. Where this material contains an analysis of debt product(s), such material is intended only for institutional investors and is not subject to the US independence and disclosure standards applicable to debt research prepared for retail investors.

Bernstein Institutional Services LLC may act as principal for its own account or as agent for another person (including an affiliate) in sales or purchases of any security which is a subject of this report. This report does not purport to meet the objectives or needs of any specific individuals, entities or accounts.

**To our readers in Canada:** If this publication pertains to a Canadian domiciled company, it is being distributed in Canada by Sanford C. Bernstein (Canada) Limited, which is licensed and regulated by the Canadian Investment Regulatory Organization. If the publication pertains to a non-Canadian domiciled company, it is being distributed by Bernstein Institutional Services LLC, which is licensed and regulated by both the SEC and FINRA, into Canada under the International Dealers Exemption.

This document may not be passed onto any person in Canada unless that person qualifies as "permitted client" as defined in Section 1.1 of NI 31-103.

**To our readers in Brazil:** This report has been prepared by Bernstein Institutional Services LLC, and Banco BTG Pactual S.A. ("BTG") is responsible for the distribution of this report in Brazil.

**To readers in the United Kingdom**: This publication has been issued or approved for issue in the United Kingdom by Bernstein Autonomous LLP, authorised and regulated by the Financial Conduct Authority and located at 60 London Wall, London EC2M 5SH, +44 (0)20-7170-5000. Registered in England & Wales No OC343985.

This document is for distribution only to persons who (i) have professional experience in matters relating to investments falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended, the “Financial Promotion Order”), (ii) are persons falling within Article 49(2)(a) to (d) (“high net worth companies, unincorporated associations, etc.”) of the Financial Promotion Order, (iii) are outside the United Kingdom, or (iv) are persons to whom an invitation or inducement to engage in investment activity (within the meaning of section 21 of the FSMA) in connection with the issue or sale of any securities may otherwise lawfully be communicated or caused to be communicated (all such persons together being referred to as “relevant persons”). This document is directed only at relevant persons and must not be acted on or relied on by persons who are not relevant persons. Any investment or investment activity to which this document relates is available only to relevant persons and will be engaged in only with relevant persons.

on 31-Aug-2026



**To our readers in the member states of the EEA**: This publication is being distributed by BSG France SA, which is authorised and regulated by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and Autorité des Marchés Financiers (AMF).

**To our readers in Hong Kong:** This publication is being distributed in Hong Kong by Sanford C. Bernstein (Hong Kong) Limited 盛博香港有限公司, which is licensed and regulated by the Hong Kong Securities and Futures Commission (Central Entity No. AXC846) to carry out Type 4 (Advising on Securities) regulated activities and subject to the licensing conditions mentioned in the SFC Public Register (https://www.sfc.hk/publicregWeb/corp/AXC846/details)). This publication is solely for professional investors, as defined in the Securities and Futures Ordinance (Cap. 571). The purpose of this report is solely to provide an analysis of the issuers referred to in this report and is not intended for any purpose contrary to the laws of Hong Kong.

**To our readers in Singapore:** This publication is being distributed in Singapore by Sanford C. Bernstein (Singapore) Private Limited, only to accredited investors or institutional investors, as defined in the Securities and Futures Act 2001 of Singapore ("SFA"). Recipients in Singapore should contact Sanford C. Bernstein (Singapore) Private Limited in respect of matters arising from, or in connection with, this publication. Sanford C. Bernstein (Singapore) Private Limited is regulated by the Monetary Authority of Singapore and licensed under the SFA as a capital markets services licence holder for dealing in capital markets products that are securities and collective investment schemes and an exempt financial adviser for advising on, issuing and promulgating analyses and reports on securities. Sanford C. Bernstein (Singapore) Private Limited is registered in Singapore with Company Registration No. 20213710W and located at 8 Marina Boulevard, #12-01, Marina Bay Financial Centre, Singapore 018981, +65-6326-7000.

**To our readers in the People's Republic of China:** The securities referred to in this document are not being offered or sold and may not be offered or sold, directly or indirectly, in the People's Republic of China (for such purposes, not including the Hong Kong and Macau Special Administrative Regions or Taiwan, the "PRC") in contravention of any applicable laws of the PRC.

This document does not constitute an offer to sell or the solicitation of an offer to buy any securities in the PRC to any person to whom it is unlawful to make the offer or solicitation in the PRC.

We do not represent that this document may be lawfully distributed, or that any securities may be lawfully offered, in compliance with any applicable registration or other requirements in the PRC, or pursuant to an exemption available thereunder, or assume any responsibility for facilitating any such distribution or offering. In particular, no action has been taken by us which would permit a public offering of any securities or distribution of this document in the PRC. Accordingly, the securities are not being offered or sold within the PRC by means of this document or any other document. Neither this document nor any advertisement or other offering material may be distributed or published in the PRC, except under circumstances that will result in compliance with any applicable laws and regulations.

**To our readers in Japan**: This publication is being distributed in Japan by Sanford C. Bernstein Japan KK (サンフォード・C・バーンスタイン株式会社), which is registered in Japan as a Financial Instruments Business Operator with the Kanto Local Finance Bureau (registration number: The Director-General of Kanto Local Finance Bureau (FIBO) No.3387) and regulated by the Financial Services Agency. It is also a member of Investment Management Association of Japan. This publication is solely for qualified institutional investors in Japan only, as defined in Article 2, paragraph (3), items (i) of the Financial Instruments and Exchange Act.

For the institutional client readers in Japan who have been granted access to the Bernstein website by Daiwa Securities Group Inc. ("Daiwa"), your access to this document should not be construed as meaning that Bernstein is providing you with investment advice for any purposes. Whilst Bernstein has prepared this document, your relationship is, and will remain with, Daiwa, and Bernstein has neither any contractual relationship with you nor any obligations towards you.

**To our readers in Australia:** Sanford C. Bernstein (Hong Kong) Limited 盛博香港有限公司 is responsible for distributing research in Australia. It is regulated by the Securities and Exchange Commission under U.S. laws, by the Financial Conduct Authority under U.K. laws, which differs from Australian laws. Sanford C. Bernstein (Hong Kong) Limited 盛博香港有限公司 is exempt from the requirement to hold an Australian financial services license under the Corporations Act 2001 in respect of the provision of the following financial services to wholesale clients:

- providing financial product advice;
- dealing in a financial product;
- making a market for a financial product; and
- providing a custodial or depository service.

**To our readers in India:** This publication is being distributed in India by Sanford C. Bernstein (India) Private Limited (SCB India) which is licensed and regulated by Securities and Exchange Board of India ("SEBI") as a research analyst entity under the SEBI (Research Analyst) Regulations, 2014, having registration no. INH000006378 and as a stock broker having registration no.

on 31-Aug-2026



INZ000213537. SCB India is currently engaged in the business of providing research and stock broking services. Please refer to www.bernsteinresearch.in for more information.

- SCB India is a Private limited company incorporated under the Companies Act, 2013, on April 12, 2017 bearing corporate identification number U65999MH2017FTC293762, and registered office at Level 3A, 4th Floor, First International Financial Centre, Plot Nos C-54 and C-55, G Block, Near CBI Office, Bandra Kurla Complex, Bandra (East), Mumbai 400098, Maharashtra, India (Phone No: +91-22-68421401).
- For details of Associates (i.e., affiliates/group companies) of SCB India, kindly email MUM-BERNSTEIN-InCompliance@bernsteinsg.com.
- SCB India does not have any disciplinary history as on the date of this report.
- Except as noted above, SCB India and/or its Associates (i.e., affiliates/group companies), the Research Analysts authoring this report, and their relatives
  - do not have any financial interest in the subject company
  - do not have actual/beneficial ownership of one percent or more in securities of the subject company;
  - is not engaged in any investment banking activities for Indian companies, as such;
  - have not managed or co-managed a public offering in the past twelve months for any Indian companies;
  - have not received any compensation for investment banking services or merchant banking services from the subject company in the past 12 months;
  - have not received compensation for brokerage services from the subject company in the past twelve months;
  - have not received any compensation or other benefits from the subject company or third party related to the specific recommendations or views in this report; and
  - do not currently, but may in the future, act as a market maker in the financial instruments of the companies covered in the report.
  - do not have any conflict of interest in the subject company as of the date of this report.
- Except as noted above, the subject company has not been a client of SCB India during twelve months preceding the date of distribution of this research report. Neither SCB India nor its Associates (i.e., affiliates/group companies) have received compensation for products or services other than investment banking, merchant banking or brokerage services from the subject company in the past twelve months.
- The principal research analyst(s) who prepared this report, members of the analysts' team, and members of their households are not an officer, director, employee or advisory board member of the companies covered in the report.
- Our Compliance officer / Grievance officer is Ms. Rupal Talati, who can be reached at +91-22-68421451, or MUM-BERNSTEIN-InCompliance@bernsteinsg.com / Scbin-investorgrievance@bernsteinsg.com
- The Research investor charter and Terms & Conditions of SCB India are available on its website and may be accessed at Sanford C. Bernstein (India) Private Limited (https://bernsteinresearch.in/) for your reference.
- Disclaimer: Registration granted by SEBI, and certification from NISM, is in no way a guarantee of performance of the intermediary or provide any assurance of returns to investors. Investments in securities market are subject to market risks. Read all the related documents carefully before investing.

**To our readers in Switzerland:** This document is provided in Switzerland by or through Bernstein Autonomous LLP, and is provided only to qualified investors as defined in article 10 of the Swiss Collective Investment Scheme Act ("CISA") and related provisions of the Collective Investment Scheme Ordinance and in strict compliance with applicable Swiss law and regulations. The products mentioned in this document may not be suitable for all types of investors. This document is based on the Directives

on 31-Aug-2026



on the Independence of Financial Research issued by the Swiss Bankers Association (SBA) in January 2008.

**To our readers in the Middle East:** Bernstein Autonomous LLP, DIFC branch has its principal office at Gate Village 06, DIFC, Dubai, UAE. Bernstein Autonomous LLP, DIFC branch is regulated by the Dubai Financial Services Authority (DFSA) with the registration number CL10040 and is provisioned for Arranging Deals in Investments and Advising on Financial Products. All communications and services are directed at Professional Clients and Market Counterparties only (as defined in the DFSA rulebook). Persons other than Professional Clients and Market Counterparties, such as Retail Clients, are not the intended recipients of our communications or services.

**LEGAL**

All research publications are disseminated to our clients through posting on the firm's password protected websites, bernsteinresearch.com and autonomous.com. Certain, but not all, research publications are also made available to clients through third-party vendors or redistributed to clients through alternate electronic means as a convenience.

This publication has been published and distributed in accordance with the Firm's policy for management of conflicts of interest in investment research, a copy of which is available from Bernstein Institutional Services LLC, Director of Compliance, 245 Park Avenue, New York, NY 10167. Additional disclosures and information regarding Bernstein's business are available on our website www.bernsteinresearch.com.

The securities described herein may not be eligible for sale in all jurisdictions or to certain categories of investors where that permission profile is not consistent with the licenses held by the entities noted herein. This document is for distribution only as may be permitted by law. This publication is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of, or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or which would subject any of the entities referenced herein or any of their subsidiaries or affiliates to any registration or licensing requirement within such jurisdiction. This publication is based upon public sources we believe to be reliable, but no representation is made by us that the publication is accurate or complete. We do not undertake to advise you of any change in the reported information or in the opinions herein. This publication was prepared and issued by entity referred to herein for distribution to eligible counterparties or professional clients. This publication is not an offer to buy or sell any security, and it does not constitute investment, legal or tax advice. The investments referred to herein may not be suitable for you. Investors must make their own investment decisions in consultation with their professional advisors in light of their specific circumstances. The value of investments may fluctuate, and investments that are denominated in foreign currencies may fluctuate in value as a result of exposure to exchange rate movements. Information about past performance of an investment is not necessarily a guide to, indicator of, or assurance of, future performance.

This report is directed to and intended only for our clients who are “eligible counterparties”, “professional clients”, “institutional investors” and/or “professional investors” as defined by the aforementioned regulators, and must not be redistributed to retail clients as defined by the aforementioned regulators. Retail clients who receive this report should note that the services of the entities noted herein are not available to them and should not rely on the material herein to make an investment decision. The result of such act will not hold the entities noted herein liable for any loss thus incurred as the entities noted herein are not registered/ authorised/ licensed to deal with retail clients and will not enter into any contractual agreement/arrangement with retail clients. This report is provided subject to the terms and conditions of any agreement that the clients may have entered into with the entities noted herein. All research reports are disseminated on a simultaneous basis to eligible clients through electronic publication to our client portal.

The information in this report was prepared by Bernstein solely for the internal business use of our clients. Clients may store, display, analyze, reformat and print the information in this report for this limited use only. Clients may not copy, alter, create derivative works, resell, reverse engineer, commercially exploit, share or distribute any part of the information contained herein for any purpose without Bernstein’s express written consent. These restrictions include extracting data or using the content to develop indices or other products. Further, you may not use this report, or any portion of this report, to train or finetune any third-party machine learning or artificial intelligence system, or as a prompt or input into any such system. You also may not, without Bernstein’s express written consent, do any of the foregoing in connection with your own internal machine learning or artificial intelligence system.

Bernstein may use artificial intelligence tools in the preparation of its materials. Any such materials are reviewed by Bernstein’s research analysts prior to publication.

This report has been prepared for information purposes only and is based on current public information that we consider reliable, but the entities noted herein do not warrant or represent (express or implied) as to the sources of information or data contained herein are accurate, complete, not misleading or as to its fitness for the purpose intended even though the entities noted herein rely on reputable or trustworthy data providers, it should not be relied upon as such. Opinions expressed are the author(s)’ current opinions as of the date appearing on the material only and we do not undertake to advise you of any change in the reported

on 31-Aug-2026



information or in the opinions herein.

Any references to Societe Generale herein are purely factual, based upon publicly available information, and included for comparative purposes only. They do not constitute an opinion or recommendation with respect to the securities of Societe Generale.

This publication was prepared and issued by the entity referred to herein for distribution to eligible counterparties or professional clients. The information in this report is intended for general circulation and does not constitute an offer to buy or sell any security, investment, legal or tax advice nor a personal recommendation, as defined by any of the aforementioned regulators. It does not take into account the particular investment objectives, financial situations, or needs of individual investors. The report has not been reviewed by any of the aforementioned regulators and does not represent any official recommendation from the aforementioned regulators. The investments referred to herein may not be suitable for you. Investors must make their own investment decisions in consultation with advice sought from a financial adviser regarding the suitability of the investment product, taking into account the specific investment objectives, financial situation or particular needs of any recipient of the recommendation, before the recipient makes a commitment to purchase the investment product.

The analysis contained herein is based on numerous assumptions. Different assumptions could result in materially different results. The information in this report does not constitute, or form part of, any offer to sell or issue, or any offer to purchase or subscribe for shares, or to induce engagement in any other investment activity. The value of any securities or financial instruments mentioned in this report may fluctuate subject to market conditions. Information about past performance of an investment is not necessarily a guide to, indicative of, or assurance of future performance. Estimates of future performance mentioned by the research analyst in this report are based on assumptions that may not be realized due to unforeseen factors like market volatility/fluctuation. In relation to securities or financial instruments denominated in a foreign currency other than the clients' home currency, movements in exchange rates will have an effect on the value, either favorable or unfavorable. Before acting on any recommendations in this report, recipients should consider the appropriateness of investing in the subject securities or financial instruments mentioned in this report and, if necessary, seek independent professional advice.

The securities described herein may not be eligible for sale in all jurisdictions or to certain categories of investors where that permission profile is not consistent with the licenses held by the entities noted herein. This document is for distribution only as may be permitted by law. It is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or would subject the entities noted herein to any regulation or licensing requirement within such jurisdiction.

Source: Bloomberg Index Services Limited. BLOOMBERG® is a trademark and service mark of Bloomberg Finance L.P. and its affiliates (collectively "Bloomberg"). Bloomberg or Bloomberg's licensors own all proprietary rights in the Bloomberg Indices. Neither Bloomberg nor Bloomberg's licensors approves or endorses this material, or guarantees the accuracy or completeness of any information herein, or makes any warranty, express or implied, as to the results to be obtained therefrom and, to the maximum extent allowed by law, neither shall have any liability or responsibility for injury or damages arising in connection therewith.

No part of this material may be reproduced, distributed or transmitted or otherwise made available without prior consent of the entities noted herein. Copyright Bernstein Institutional Services LLC Bernstein Autonomous LLP, BSG France S.A., Sanford C. Bernstein (Hong Kong) Limited 盛博香港有限公司, Sanford C. Bernstein (Canada) Limited, Sanford C. Bernstein (India) Private Limited (SEBI registration no. INH000006378), Sanford C. Bernstein (Singapore) Private Limited and Sanford C. Bernstein Japan KK (サンフォード・C・バーンスタイン株式会社). All rights reserved. The trademarks and service marks contained herein are the property of their respective owners. Any unauthorized use or disclosure is strictly prohibited. The entities noted herein may pursue legal action if the unauthorized use results in any defamation and/or reputational risk to the entities noted herein and research published under the Bernstein and Autonomous brands.