Policies May Pivot —
but 47 U.S.C. § 1702 Holds Fast

Why NTIA's new "lowest-cost" rule risks funding broadband that will be obsolete before it goes live—and why only fiber, or wireless fed by fiber, meets Congress's future-proof mandate

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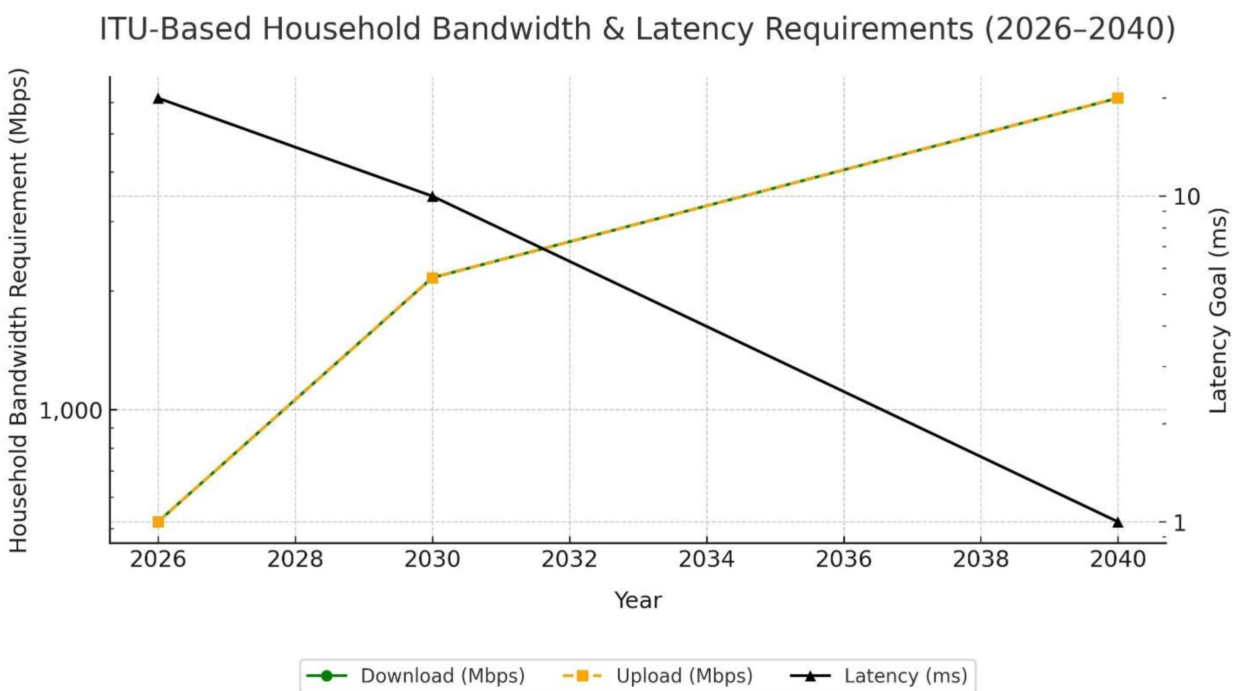

The numbers you see here come ***directly from ITU technical studies, not marketing slides***

Year	Household downstream / upstream (4 simultaneous users)	Latency ceiling	Primary source
2026	***≈ 520 Mbps ↓ / 520 Mbps ↑*** *(4 × 130 Mbps strong-interaction Cloud-VR streams at 8 K)*	***≤ 20 ms*** *E2E RTT*	*ITU-T J.1631 "Cloud-VR requirements", Table I.3 (CEP phase bandwidth ≥ 130 Mbps per user; Table I.1 RTT < 20 ms) itu.intitu.int*
2030	***≈ 2 160 Mbps ↓ / 2 160 Mbps ↑*** *(4 × 540 Mbps at 12 K, IEP phase)*	***≤ 10 ms***	*ITU-T J.1631 Table I.3 (IEP bandwidth ≥ 540 Mbps) & Table I.1 RTT < 10 ms itu.intitu.int*
2040	***≈ 6 160 Mbps ↓ / 6 160 Mbps ↑*** *(4 × 1 540 Mbps at 24 K, UEP phase)*	***≈ 1 ms*** *one-way (sub-ms round-trip)*	*ITU-T FG Net-2030 white-paper holographic use-case (compound service spec sets ~1 ms time-budget) itu.int*

Executive Summary

The Law Draws the Line: Legal Questions End at § 1702. The Rest Is Engineering.

When Congress passed the Infrastructure Investment and Jobs Act (IIJA), it didn't leave future-proofing open to interpretation. It wrote it into law. Specifically, 47 U.S.C. § 1702(a)(2)(I) defines a Priority Broadband Project as one that must:

- Deliver broadband service with specific performance attributes (speed, latency, reliability), **and**
- Ensure that the network can easily scale speeds over time to:
  - Meet evolving household and business needs, and
  - Support 5G, successor wireless, and other advanced services [1].

This isn't just a suggestion. It's a statutory mandate—a legal foundation that draws a hard line between what qualifies as a Priority Broadband Project and what doesn't. If a project can't meet both present and future performance criteria, then it is, by law, ineligible for priority designation.

The first determination—whether those phrases carry legal weight—is a legal question. It asks whether, in light of NTIA's subsequent guidance, restructuring notice, and policy memos, the requirements of § 1702(a)(2)(I) still apply. That means lawyers must ask: Can the phrases "can easily scale speeds over time," "meet evolving household and business needs," and "support 5G, successor wireless, and other advanced services" be read at face value, or were they overwritten by later agency rules?

If those phrases are still in force—as we argue they are—then the legal analysis ends there. The statute governs. All subsequent NTIA guidance must conform to it, not replace it.

From there, everything becomes engineering. What does it mean to meet evolving household and business needs? What bandwidths, latency levels, availability targets, and architectural features are required to support successor wireless technologies and other advanced services? These are not legal questions. They are engineering questions, and only network engineers—not attorneys or policy analysts—are trained to answer them.

And engineers don't guess. We build. We simulate. We test. We plan for headroom and growth.

We wouldn't ask lawyers to design power grids. So why are we letting policy override physics in broadband planning? The results of **our** analysis? See the chart above.

1 The Statutory Bedrock

Congress spoke with precision. The law requires networks that can scale easily to meet future needs. That phrase—"easily scale"—isn't ornamental. It places a burden of proof on every applicant for BEAD funds: can your network architecture scale to meet what households, businesses, schools, and hospitals will demand in 2030? 2040?

Let's be blunt. Networks built to hit 100/20 Mbps in 2025 are already behind. What's needed is infrastructure that remains viable for decades, not just months. That's why NTIA's original NOFO and technology notices acknowledged the inherent advantages of all-fiber builds. One strand of fiber doesn't just meet today's needs; it's already delivering symmetrical 10 Gbps in homes, and pushing well beyond 100 Gbps in enterprise and metro rings [2][3].

These aren't speculative technologies. They're commercially deployed. Fiber's capacity is bounded only by optics and terminal electronics—not the medium itself. No other access platform offers this flexibility.

2 Engineering Beyond: Designing for the 2030–2040 Performance Period

Once the legal foundation is clear, engineers must take over. The law demands that networks be future-ready, but it doesn't define what the future looks like—that's the job of traffic engineering, capacity planning, and real-world modeling.

Engineers approach this by asking: What kinds of applications will homes, schools, medical centers, government offices, and small businesses run in 2030? 2035? 2040? What level of bandwidth, latency, uptime, and service symmetry will those applications demand? These questions require forecasting based on historical growth rates, usage patterns, and emerging technology trends.

We've been doing this for decades. Internet traffic has consistently grown at compound annual rates of 20% to 50%, with global Internet traffic doubling every two to three years. More importantly, the distribution and nature of that traffic has evolved:

- **Cloud dominance**: Core applications and data increasingly live in the cloud, driving high-bandwidth access needs across sectors.
- **Symmetry of use**: Remote work, education, telemedicine, and home-based production all require fast upload speeds, not just downloads.
- **Device proliferation**: Smart homes, IoT sensors, security cameras, VR/AR headsets, and more push constant background data over the last mile.

And in locations with reliable multi-gigabit access—fiber-fed homes, MDUs, and campuses—actual usage by unconstrained subscribers already proves these forecasts right:

- Studies from CableLabs and SamKnows show households with gigabit access often burst to 700 Mbps or more in peak-hour scenarios [12][13].
- Cloud backups, gaming updates, 4K and 8K streaming, and AI-driven workloads are straining even symmetrical 1 Gbps lines.

BEAD-funded networks, if built in 2026, are expected to support communities into the 2040s. That means engineers must design for:

- **Target peak traffic per household** exceeding 2 Gbps by 2030.
- **Sub-10 millisecond latency** to edge compute zones.
- **>99.999% availability**, including support for remote diagnostics and proactive maintenance.

Traffic engineering and capacity planning are not optional—they're core to every responsible network design. We don't do them because a federal law told us to. We do them because that's what makes a network usable, sustainable, and resilient.

To put it plainly: engineers don't wait for policy to tell them when to build for the future. It's our job to stay ahead of user needs and, for broadband, we've done it for 30+ years.

3 The IIJA Funds the Future: Fiber by Design, Not Just Default

The IIJA is more than a broadband bill (now law). It is a national digital infrastructure blueprint. And throughout its various divisions, Congress didn't just fund broadband for web browsing and Netflix. It funded use cases that require vastly more capacity, lower latency, and higher reliability than legacy copper, coax, or even most fixed wireless can provide.

Take a look at the digital demands baked into these infrastructure priorities:

- **Smart Grid Modernization** (Division D § 40107): Allocates over $3 billion for power systems using "operational fiber and wireless broadband communications networks" with sub-10 ms latency and symmetrical bandwidth—clearly aimed at fiber [8].
- **Connected Vehicle Infrastructure** (Division A § 13007): Requires cellular vehicle-to-everything (C-V2X) capability with multi-gigabit backhaul to every roadside unit—again, fiber [9].
- **EV Charging Network** (Division B §§ 11401–11404): Federal Highway Administration regulations (23 CFR 680.106) mandate 97% uptime with continuous remote monitoring—only achievable with redundant fiber-fed connectivity [10].
- **Smart Water Systems** (Division E § 50114): Enables leak detection and live quality analysis via networks of sensors—data-intensive, always-on, and latency-sensitive—best served by fiber or hybrid fiber-fed wireless rings [11].

In other words: fiber isn't just the default because it's fast. It's the default because every other part of IIJA depends on it.

These programs didn't happen in isolation. They happened in coordination—under a shared vision for scalable, sustainable infrastructure that can meet America's needs through mid-century and beyond. Any broadband plan that ignores this reality isn't just shortsighted—it's noncompliant.

4 Commercial Services That Demand Fiber Now

The future isn't theoretical—it's already arriving. Services currently in commercial deployment or testing are pushing the outer limits of non-fiber technologies. These include:

- **8K streaming platforms** with HDR and multi-angle viewing modes.
- **Augmented reality (AR) and virtual reality (VR)** applications in education, gaming, design, and remote collaboration.
- **Remote robotic surgery** and AI-assisted diagnostics in rural telehealth deployments.

- **Edge-based AI inference workloads**, requiring low-latency symmetric throughput to cloud and edge compute zones.

Each of these applications requires not just high throughput, but high availability and extremely low latency. VR stutter, dropped frames in surgery, or AI model delays can have life-changing consequences. Fiber's deterministic performance is the only practical foundation for networks tasked with delivering that level of quality.

Engineers know this. Fiber isn't a luxury—it's a necessity.

That's why major ISPs, hyperscalers, hospital systems, and energy providers are all transitioning to all-fiber environments. They're not waiting for NTIA to tell them to. They're doing it because the physics of fiber are irrefutable—and no regulatory memo changes that.

5 Engineering for the Future: A Discipline, Not a Guess

To engineers, the task is not a mystery. The plain text of 47 U.S.C. § 1702(a)(2)(I) tells us what we need to do: build a network—most likely starting in 2026—that meets the performance needs of users in the 2030–2040 timeframe. That's the mandate. That's the mission. And it's nothing new.

Every credible engineer performing a greenfield build performs traffic engineering and capacity planning. We do this whether it's a metro fiber loop, a rural fixed wireless overlay, or a 5G small-cell network. We model upstream and downstream flows, burst rates, latency paths, buffer sizes, contention ratios, signal attenuation, availability targets, and jitter tolerance. Then we design accordingly.

This is not unique to federally funded projects. It is the foundation of every competent network deployment. And we've been doing it for more than 30 years.

Fiber just happens to make that process easier and more robust. It gives engineers margin for growth, not just in bitrates but in protocol layering, service multiplexing, spectrum allocation, and physical upgrade paths. No other medium offers the same level of deterministic control and scalable headroom. Copper is a bottleneck. Shared-spectrum wireless is a compromise. Fiber is a platform.

So when engineers read the statute, we see a clear build spec: design for high-availability, low-latency, symmetrical throughput capable of scaling beyond 10 Gbps per user over time. That's not a suggestion. That's the design brief.

It also means that networks built to just scrape over the 100/20 line aren't compliant—they're obsolete on arrival. Traffic models show continued exponential growth. Cisco's Visual Networking Index, Akamai's State of the Internet, Sandvine's global usage reports, and internal planning documents from ISPs all point to the same outcome: next-decade homes and businesses will demand multi-gigabit performance.

And not just burst speeds. We're talking about sustained, concurrent high-throughput demands driven by edge computing, AI model integration, volumetric video, distributed storage syncs, and sensor-based automation.

This is why engineering must be front and center in BEAD reviews. The law makes clear what must be delivered. Engineers must determine whether the proposed networks can actually deliver it.

When the law says "support 5G and successor wireless," engineers hear a specific minimum requirement: fiber-fed cell sites with symmetrical multi-gigabit backhaul, sub-10 ms latency, and availability at five-nines or better. That is the real-world implication of the statute. That's what support means in the field.

The same goes for "evolving household and business needs." The statute isn't describing dial-up. It's describing 2030s cloud services, workplace virtualization, real-time render farms, and continuous sensor grids.

So let's be honest. If a proposed network can't grow into that role—and do it cost-effectively, without constant forklift upgrades—it doesn't qualify. Not in law. Not in engineering. Not in practice.

6 How NTIA's Rules Drifted from the Law

At the outset, NTIA's implementation of the BEAD Program respected the statutory hierarchy. Its May 2022 Notice of Funding Opportunity (NOFO) acknowledged that fiber should be the presumptive priority—because only fiber inherently meets the dual mandate of present performance and future scalability. That NOFO established a clear default: all-fiber builds should be funded unless they exceeded an "Extremely High-Cost-Per-Location Threshold." Even then, states had to justify any deviation with rigorous documentation [2].

In June 2024, NTIA issued a Technology Selection Guide reaffirming this preference. It reminded state broadband offices that non-fiber technologies needed to be accompanied by detailed engineering justifications demonstrating scalability, latency performance, and reliability. The Guide didn't eliminate the priority—it reinforced it [3].

But the tone changed with NTIA's June 2025 "Restructuring Policy Notice." There, NTIA deleted the fiber preference altogether. It substituted a new rule: if a non-fiber proposal comes in at least 15% cheaper than a fiber one, the cheaper bid wins—even if the network can't scale to meet § 1702(a)(2)(I)'s future-proofing requirement [4].

NTIA attempts to paper over the conflict by stating that the restructuring notice "does not supersede statute." But it then instructs state broadband offices to make funding decisions based on cost differential alone, with no requirement that the lower-cost solution still meets both prongs of the law.

That creates an irreconcilable tension.

Agencies cannot lawfully rewrite statutes by guidance. The Administrative Procedure Act, federal case law, and decades of agency practice make this clear: rules must conform to statute—not override it. So when § 1702 says every Priority Broadband Project must provide performance today *and* scalability tomorrow, NTIA cannot allow a waiver-by-pricing that discards the latter half of that requirement.

Moreover, fiber's up-front cost differential continues to shrink. Labor and materials price indexes show that, in many rural areas, fiber builds are within 10–15% of hybrid solutions—and far more cost-effective over a 10–15 year lifecycle.

NTIA's pivot isn't just legally questionable. It's economically shortsighted. And it invites litigation from stakeholders whose compliant, scalable networks are unfairly bypassed by rules that favor lowest cost over lasting value.

7 Ceiling ≠ Floor

Designing a network to meet only the minimum required performance isn't prudent—it's planning for obsolescence. In telecommunications engineering, the distinction between a service floor and a technological ceiling is critical. A network that just reaches today's floor cannot absorb tomorrow's demand. And in the case of many proposed BEAD projects, the so-called "floor" of 100 Mbps download and 20 Mbps upload is already being eclipsed in real-world usage by households with robust service access.

Consider how different technologies behave under load:

Fixed Wireless Access (FWA): Spectrum is a shared and finite resource. Each additional subscriber on a cell sector reduces the throughput available to others. FCC OET Report 23-134 presents data showing that upstream speeds drop well below the 20 Mbps minimum when a modest number of users are active [5]. In rural sectors, where spectrum reuse is more difficult due to low tower density, these problems are magnified. Latency fluctuations and packet loss further degrade user experience. FWA can be a viable stopgap, but it's structurally limited by physics.

LEO Satellite: Low Earth Orbit satellite service suffers from constrained bandwidth and variable latency. The FCC's Measuring Broadband America Report (2024) shows Starlink delivering upload speeds between 5–20 Mbps and latency between 30–50 milliseconds, with degradation during peak hours [6]. These are best-case conditions for a low-saturation deployment. As subscriber counts grow, service levels decline. LEO systems are a technological marvel—but they do not yet meet the legal definition of scalable infrastructure.

Fiber: In contrast, fiber optics offer a medium with no practical ceiling in consumer applications. A single strand can support 10 Gbps symmetrical today with commercially available electronics. In enterprise deployments, 25 Gbps and 100 Gbps links are in active use, and standards such as IEEE 802.3bs support 400 Gbps and beyond [16]. Fiber is not just scalable—it is limitlessly so, constrained only by the electronics at either end. These electronics can be upgraded without re-trenching or re-permitting, making fiber the only medium where the ceiling is orders of magnitude above the statutory floor.

So why does this matter? Because if your technology's ceiling *is* the statutory floor—100/20 Mbps—then you've built a network that's maxed out on day one. Any increase in usage, any shift in traffic patterns, or any new service requirement will break it. There's no headroom. That's not future-proof. That's failure baked in.

This is not a theoretical concern. Usage patterns continue to rise sharply. Applications like cloud gaming, high-resolution video conferencing, smart-home sensor networks, and volumetric content delivery (used in VR and AR systems) all impose significant and sustained loads. These loads are not just bursts; they often involve multiple simultaneous sessions across multiple devices in a single household.

Furthermore, upload demand—long neglected in policy modeling—is rising fast. With home offices, remote collaboration, real-time medical diagnostics, and AI-enabled edge processing, symmetrical service isn't a luxury. It's a baseline.

Bottom line: when evaluating broadband technologies for BEAD funding, states must distinguish between those that merely *meet* the statute on paper and those that *exceed* it in practice. Fiber clears both bars. Others hit the floor—and stop there.

8 Plain-English Advice

All stakeholders—from state broadband offices to community leaders and potential network bidders—have a part to play in ensuring that BEAD-funded networks are compliant with the law and engineered for long-term success. But the guidance must be grounded not just in cost modeling or policy memos, but in the dual reality that governs this program: the legal definition of a Priority Broadband Project, and the engineering science that determines whether a project actually delivers on that promise.

For State Broadband Offices:

- **Evaluate bids based on lifecycle performance—not just capital cost.** NTIA's 2025 policy shift encourages decision-making that prioritizes the lowest initial price. But fiber's total cost of ownership over 10–15 years is often lower than that of fixed wireless or satellite, which require more frequent upgrades and offer lower resilience. Include operating cost, upgrade cycles, and future demand in your calculus.

- **Insist on engineering documentation.** Every proposed project must include technical specifications that clearly demonstrate scalability. Ask: Can this network scale to symmetrical multi-gigabit service? Can it deliver sub-10 ms latency? If not, it does not comply with § 1702(a)(2)(I).

- **Guard against backdoor policy overrides.** Just because NTIA no longer requires fiber as the default doesn't mean you are relieved of the statutory obligation. Your fiduciary and administrative duties include compliance with the law as written. Design your selection processes to withstand legal scrutiny.

For Network Bidders:

- **Fiber builders:** Document your scalability roadmap. Lay out how current PON deployments can evolve to 10, 25, 50 Gbps. Show that no additional trenching or pole attachment will be needed. Demonstrate cost efficiency across a 10- to 20-year horizon.

- **Wireless and satellite providers:** Be candid about limitations. Include real-world data on latency, spectral reuse, and the upgrade pathway. If fiber backhaul is essential for future enhancements, acknowledge that. Transparency builds trust—even if your architecture isn't the ultimate answer in all geographies.

For Community Leaders:

- **Ask tough questions.** When your locality is presented with a network plan, ask: Will this still work in 2030? In 2040? What will it take to upgrade it? Who pays then? If the plan relies on spectrum that's already shared or bandwidth that's already strained, push back.

- **Demand proof—not promises.** Scalability isn't a brochure slogan; it's an engineering outcome. Don't accept vague references to "next-gen ready." Ask for modeling, field trial data, upgrade costs, and projected demand curves.

When each stakeholder demands rigor—in legal interpretation, in design assumptions, and in future-proofing methodology—the result is a broadband network that doesn't just meet a bureaucratic checklist. It meets the needs of real people, in real places, over real time.

9 Bottom Line

Statutes don't expire just because guidance changes. The language of 47 U.S.C. § 1702(a)(2)(I) remains the controlling authority. If a project cannot meet both the short-term and long-term obligations of a Priority Broadband Project, then it is not eligible for prioritization—regardless of whether it comes in 15% cheaper or has political momentum behind it.

The current trend—where NTIA nudges states toward cheaper builds, potentially at the expense of long-term viability—risks setting up thousands of communities for disappointment, frustration, and unnecessary rework. Even a modest 15% premium on fiber today can easily be offset by avoiding costly retrofits, customer churn, operational failures, and reputational damage down the road.

Fiber is not always the cheapest option up front. But in the context of a once-in-a-generation public investment meant to last decades, it is the most prudent. No other access technology offers the same blend of resilience, upgrade capacity, latency performance, symmetrical throughput, and lifecycle value.

Engineers know how to build for the future. And Congress already told us what that future needs to look like. It's time for states to align their procurement decisions accordingly.

Because when the dust settles and the policies pivot—as they inevitably do—the law will still be there. 47 U.S.C. § 1702 will still say what it says. And the network you built will either be ready for the future, or stuck in the past.

Choose wisely. Build once. Build right.

Author Bios

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References

[1] Infrastructure Investment and Jobs Act, Pub. L. 117-58, Div. F § 60102 (47 U.S.C. § 1702).

[2] NTIA, Broadband Equity, Access, and Deployment Program Notice of Funding Opportunity (BEAD NOFO), May 2022.

[3] NTIA, “Selecting the Most Robust, Affordable, Scalable Technology,” Policy Notice, June 26, 2024.

[4] NTIA, “BEAD Program Restructuring Policy Notice,” June 6, 2025.

[5] Federal Communications Commission, Office of Engineering and Technology, Report 23-134: Fixed Wireless Broadband Performance, 2023.

[6] Federal Communications Commission, Measuring Broadband America Report, 2024.

[7] NTIA Technical Report TR-22-560: Broadband Technology Evaluation, 2022.

[8] Infrastructure Investment and Jobs Act, Div. D § 40107 (42 U.S.C. § 17386): Grid Deployment Authority.

[9] IIJA, Div. A § 13007 (23 U.S.C. § 503): Intelligent Transportation Systems Deployment.

[10] IIJA, Div. B §§ 11401–11404 and FHWA 23 CFR § 680.106: National Electric Vehicle Infrastructure Standards and Requirements.

[11] IIJA, Div. E § 50114: Smart Water Infrastructure and Water Efficiency Improvements.

[12] CableLabs, “A Look at Real-World Usage in Gigabit Homes,” Technical White Paper, 2023.

[13] SamKnows, “Broadband Performance Metrics Report,” commissioned by Ofcom, 2024.

[14] Cisco, Annual Internet Report (2018–2023): Global Forecast and Trends.

[15] Cisco, “Visual Networking Index (VNI) Global IP Traffic Forecast,” 2017–2022.

[16] IEEE 802.3bs Standard for Ethernet, Amendment 5: 200 Gb/s and 400 Gb/s Operation.

[17] FS.COM, “25G/50G/100G PON Overview: Evolution of Passive Optical Networks,” 2023.