

The logo features the word "amazon" in its signature font with the curved arrow underneath, followed by a vertical bar and the words "project kuiper" in a clean, sans-serif typeface. The background is a dark blue gradient with a large, curved, starry band and a thin orange arc with a small circle at its end.

amazon | project kuiper

Project Kuiper

- Overview
- Highlights

Our Mission

Project Kuiper is an initiative to increase global broadband access through a constellation of satellites in low Earth orbit (LEO). Our mission is to deliver fast, affordable broadband to unserved and underserved communities around the world.

Bridging the Digital Divide – NGSO systems are key to addressing this challenge

1 billion

Unserved households across the globe have no fixed broadband today (50% of the global total).

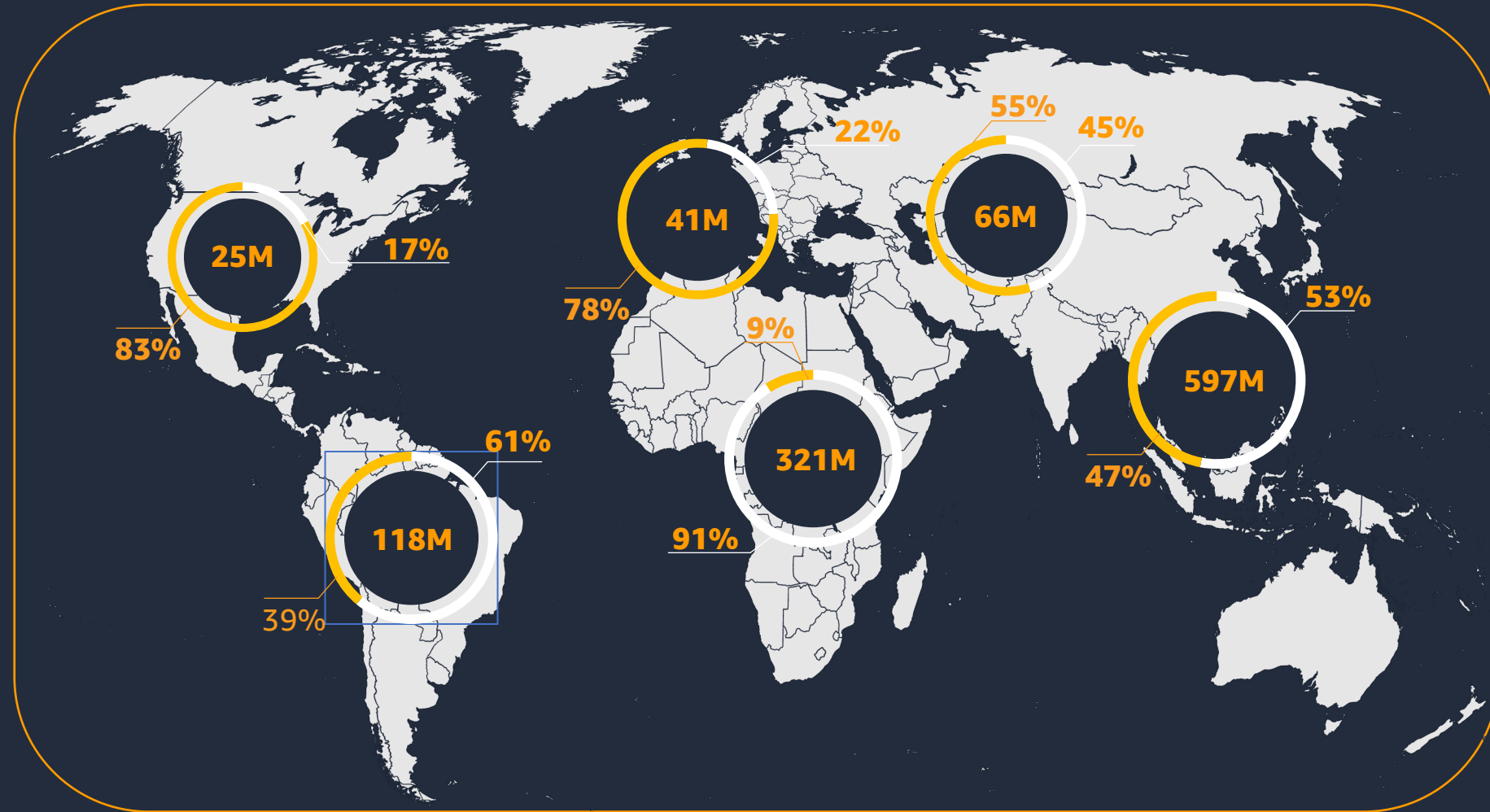
300 million

Underserved households are on legacy DSL technologies.

100 million

Business, enterprise, and public sector endpoints lack reliable connectivity.

[Source: S&P Market Intelligence](#)



○ Number of unserved households per region

— Percentage of served fixed-broadband households (DSL, cable, fiber)

— Percentage of unserved households within the region

EPFD FAI proposal Overview

- Amazon supports a WRC-27 Agenda item to:
 1. Increase the spectrum utilization by non-GSO systems in the Ku and Ka bands to provide more capacity to help bridge the digital divide
 2. Studying and based on studies: Revising the outdated EPFD framework in Article 22
- This proposal is already a DIAP from the last CITEEL meeting
- Article 22 contains limits to quantify the obligation under No. 22.2 on non-GSO systems to not cause unacceptable interference to GSO FSS and BSS networks
- Amazon's goal:
 - Maintain necessary protection to GSO networks from unacceptable interference *and* achieve more efficient use of spectrum by non-GSO systems to enable the delivery of fast, affordable broadband to unserved and underserved communities around the world.

Why studies are needed

Close digital divide

Current EPFD limits are operational restrictions that limit the ability of non-GSO operators to provide broadband to unserved and underserved communities around the world.

Boost spectral efficiency

The use of conservative sharing assumptions to develop the EPFD limits in 1997-2000 burdened NGSO FSS systems with EPFD limits that over-protect GSOs. With better methods, we can continue to protect the GSOs from unacceptable interference while enabling more NGSO FSS connectivity, a win-win for the global community.

Embrace new technology

The GSO and NGSO technology or satellite protection criteria considered 25 years ago to develop EPFD limits ago do not reflect modern non-GSO or GSO system design—regulation must recognize and benefit from how satellite technology has evolved.

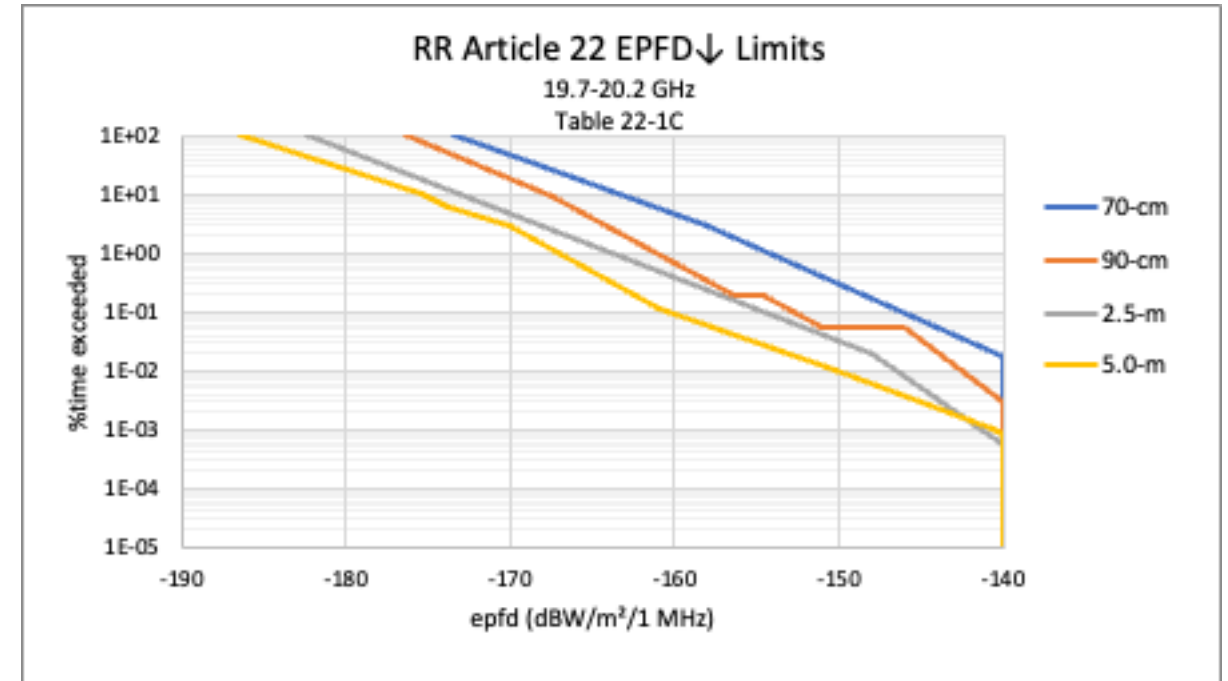
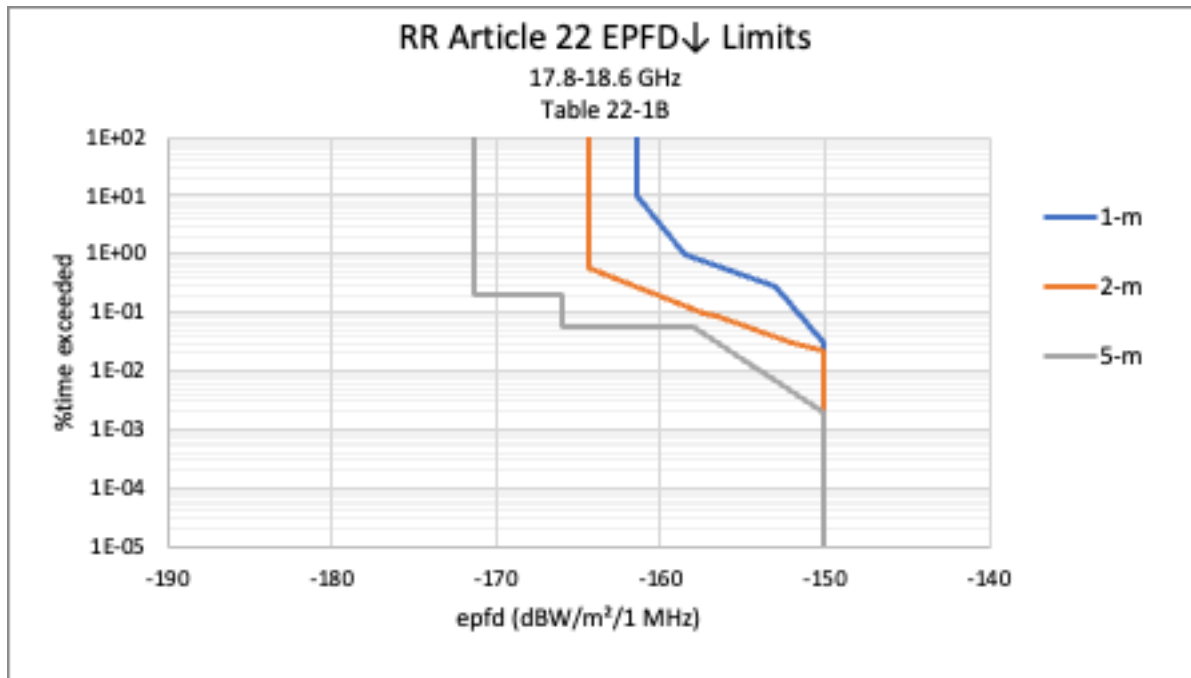
Enhance flexibility

The regulatory EPFD limits applicable to non-GSO systems below 30 GHz represent the single greatest operational restriction for systems like Kuiper. This delays the ability of NGSO systems to commence service, leaves a substantial amount of system capacity fallow, and increases the cost of our system and service

Address the root problem

Amazon and other NGSO operators have attempted to modify and improve existing regulatory implementations of the EPFD limits. The ITU has found that in many instances these improvements cannot correct the root cause of these issues: assumptions taken in development of EPFD limits in Article 22. Any Agenda Item is needed to allow for studies and updates of the Article 22 EPFD limits pending agreement at WRC-27.

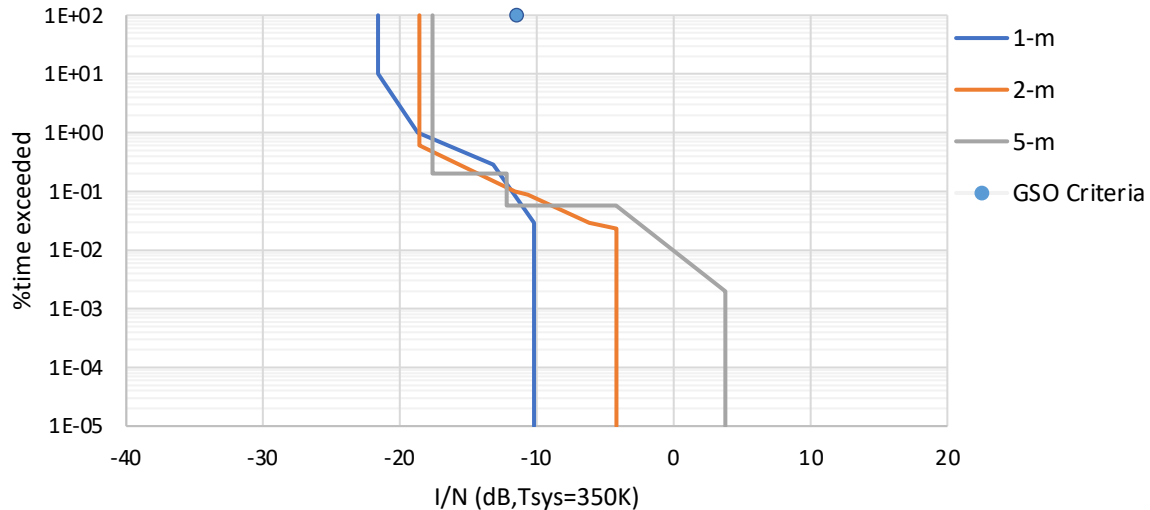
Status Quo Ka EPFD limits



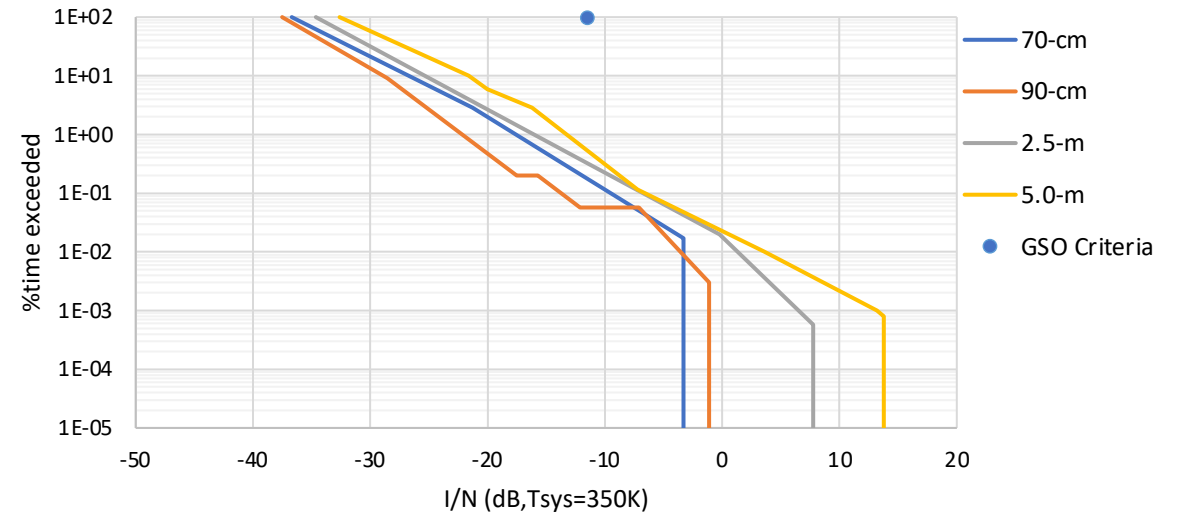
- These plots represent the applicable EPFD limits for Ka-band NGSO systems
- Note that even though the modern GSO systems and protection criteria are similar, the limits in Table 22-1C for 19.7-20.2 GHz band are much more restrictive than the limits in Table 22-1B for 17.8-18.6 GHz

EPFD limits converted to I/N protection criteria

RR Article 22 EPFD↓ Limits
17.8-18.6 GHz



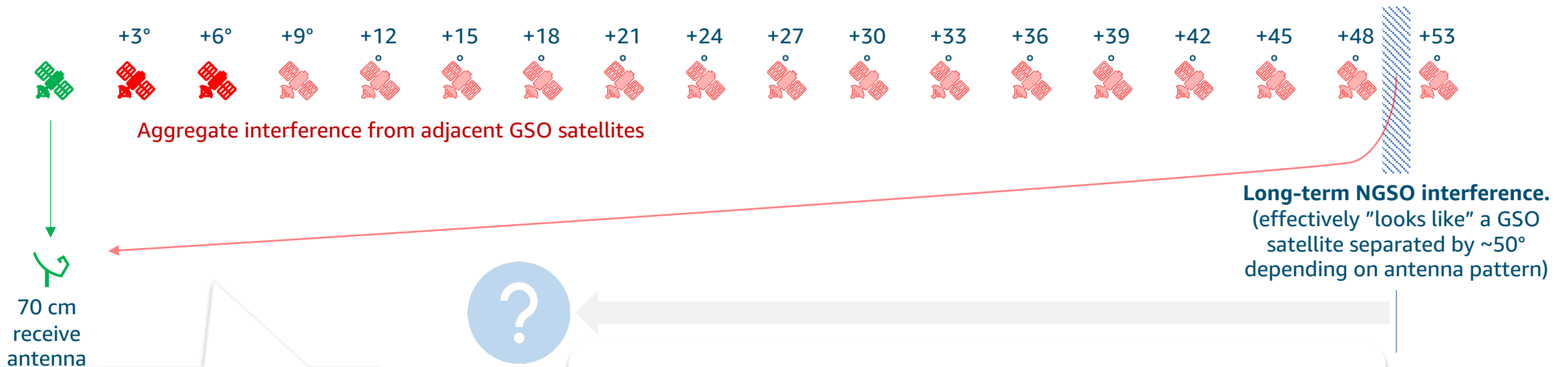
RR Article 22 EPFD↓ Limits
19.7-20.2 GHz



- These plots represent the applicable EPFD limits converted to I/N using an assumed $T_{sys}=350K$
- The EPFD limits were derived using Recommendation ITU-R S. 1323 Methodology A
- Methodology A of Recommendation ITU-R S.1323 only considers a short-term protection
- The blue dot represents the single entry FSS protection criteria used to derive the epfd limits
- Note that for the long-term portions of the curve, the EPFD limits are excessively restrictive as compared to the single entry FSS protection threshold of -11.5 dB

Impacts to non-GSO operations due to EPFD limit constraints

The **long-term** EPFD limits are the most challenging and drive the over-protection of GSO networks while significantly and artificially restricting NGSO operations. Consider the following graphical illustration.



Most satellite practitioners know that GSO adjacent satellite interference is driven by the first- and second-order neighboring satellites. Beyond this, the interference contribution is usually negligible.

This illustrates **there is available margin** for the long-term interference allowance to increase. This future agenda item will study this aspect while ensuring GSOs are protected to permissible interference levels.

Conclusions

- Amazon is committed to ensuring protection of the GSO
- The single-entry EPFD limits applicable to non-GSO systems in frequency bands below 30 GHz are proven to be outdated, spectrally inefficient, and severely constraining to NGSO operations without providing any additional benefit to GSO protection
- Work during the last WRC study cycle has shown that a more efficient regulatory framework can be developed to allow more operational flexibility for non-GSO while fully protecting GSO networks
- We encourage your administrations to support the proposal for a FAI to study ways the existing EPFD framework for FSS operations below 30 GHz can evolve to protect the GSO service, considering modern satellite technology, improvements spectral efficiency to allow satellite services to bring fast, affordable broadband to encourage the innovation, competition, and investment necessary to bridge the digital divide



Thank you