Better Delivery of Universal Services Discussion Paper

Amazon Project Kuiper's response

1 March 2024

1. Introduction

Amazon's Project Kuiper welcomes the opportunity to contribute to the *Better Delivery of Universal Services* Discussion Paper (Discussion Paper). Project Kuiper is Amazon's initiative to provide fast, affordable connectivity to unserved and underserved communities: a flexible, high-performance broadband network that combines a constellation of satellites in low-earth orbit (LEO) with customer terminals, ground gateways, and global networking and infrastructure. Project Kuiper will cover the Australian continent, providing broad geographic availability, high-capacity broadband, and affordable equipment and service plans.

In this submission we:

- support the use of LEO satellite (LEOSat) networks as an alternative technology in the delivery of the Universal Service Guarantee (USG), and for the better delivery of advanced communications networks and solutions for regional, rural, and remote Australia generally; and
- note that it would be premature to consider expanding the scope of the standard telephone service (STS) to require direct-to-device (D2D) functionality.

2. Delivering advanced connectivity solutions to regional, rural, and remote Australia

We congratulate the Government on undertaking this consultation, including as part of a broader series of reviews on the delivery of communications and communications-dependent capabilities and solutions for regional, rural, and remote areas of Australia; particularly the triennial Regional Telecommunications Review and the statutory review of the Regional Broadband Scheme.

In addition to the need to deliver baseline services to people wherever they live or work, we believe it is also crucial to consider citizens in their capacity as community members whose interests are also served by advancements that support both the delivery of social services such as health and education, and industry developments that strengthen the economic health of communities. This broad approach to regional development also affords the opportunity for all levels of government to work together with civil society and industry to develop effective place-based advanced communications solutions.

3. About Project Kuiper

Project Kuiper is comprised of a constellation of more than 3,000 satellites orbiting the earth at altitudes of 590km, 610km, and 630km, and connecting to customer terminals and ground infrastructure to create a high capacity global broadband network.

Our satellites' proximity to the surface of the Earth enables them to deliver low latency to customers, making connectivity effective for uses like video calls, gaming, and high-definition streaming. Project Kuiper's satellites are designed and manufactured entirely by Amazon.

Project Kuiper's ground infrastructure includes earth stations that securely send and receive customer data to and from satellites; along with telemetry, tracking, and control (TT&C) antennas that keep the satellites properly operating. Global networking connects those stations to the internet, public cloud, or private networks.

Customer terminals are the technology customers use to receive broadband service. Project Kuiper's customer terminals, designed by Amazon, combine antennas and processors into a single, compact system. Last year, we revealed engineering models of three flat panel customer terminals[1] which will offer customers a range of pricing and performance options. Our standard customer terminal is less than 28 cm square and delivers speeds up to 400 megabits per second (Mbps). Our portable, ultra-compact customer terminal is 15 cm square and delivers speeds up to 100 Mbps. Our largest customer terminal delivers speeds up to 1 gigabit per second (Gbps) for the most demanding enterprise, government, and telecommunications applications. Project Kuiper terminals and services are designed to be easy and convenient to order, deliver, install, and use.

Project Kuiper's satellites, earth stations, and customer terminals are powered by a power-efficient, Amazon-designed silicon chip - an application-specific integrated circuit (ASIC) for satellite broadband, which in a single system-on-a-chip combines the processing power of a 5G modem chip in modern smartphones, the capabilities of a 5G base station to handle multiple users, and the technology that supports point-to-point communications in mobile backhaul. We use these chips to make the most efficient use of our available bandwidth, allowing the system to process up to 1 Terabyte per second (Tbps) of traffic on board each satellite.

Project Kuiper will operate as an internet service provider, serving individual households, as well as schools, hospitals, businesses, government agencies, and other organizations. Although Amazon has not yet revealed the pricing for Project Kuiper, affordability is a key principle. Amazon invents products such as Kindle, Fire Tablet, Echo Dot and Fire TV with affordability in mind, because we want to make them accessible to as many customers as possible. It is doing the same with Project Kuiper. Size and complexity are critical factors in the cost of these devices. Since our terminals are considerably smaller, lighter, and less complex than legacy designs, we will be able to dramatically reduce manufacturing and shipping costs.

Project Kuiper is a long-term initiative into which Amazon is investing billions of dollars. Our US Federal Communications Commission (FCC) license requires that we deploy and operate at least half of our global satellite constellation by July 2026. We have secured 80 heavy-lift launches with commercial launch providers Arianespace, Blue Origin, SpaceX, and United Launch Alliance (ULA) to deploy our satellite constellation, and we have options for additional launches with Blue Origin. Together, these agreements represent the largest commercial procurement of launch vehicles in history. We have increased satellite production ahead of a full-scale deployment this year, and expect to offer service to customers beginning in 2025.

LEOSat systems as an alternative technology in the supply of the STS

As noted, Project Kuiper will operate as an internet service provider, providing broadband connectivity to customers throughout Australia. Although we have not publicly announced our service plans, Project Kuiper is capable of supporting voice products, with its low-latency functionality enabling call quality comparable to existing terrestrial networks. We are also able to

[1] https://www.aboutamazon.com/news/innovation-at-amazon/heres-your-first-look-at-project-kuipers-low-cost-customer-terminals

support the network requirements of other carriers with backhaul services that can help extend and in-fill their own fixed and mobile terrestrial networks to new service coverage areas.

LEOSat systems' lessened reliance on ground infrastructure can also help address service continuity and reliability challenges impacting the supply of services by land-based networks, including:

- the avoidance of fault, maintenance, and service restoration challenges that particularly affect legacy copper and other wireline networks in regional, rural, and remote areas; and
- reduced exposure to natural disasters (such as fire and flood) particularly affecting terrestrial networks and the power grids on which they are heavily dependent.[2] These effects can be avoided or remediated by LEOSat technology and on-site back-up power, which will enable customer terminals to operate even when the power grid is down.

Moreover, whilst key existing performance measures for baseline services (for example, call quality and service availability) are closely referable to end-user needs, these measures have been shaped and defined in a technology-specific environment of (primarily) copper-based wireline access networks. Assessing the potential of alternative technologies also entails having regard to capabilities that can broaden end-user experience. For example, LEOSat systems can also offer the potential for unique service features, such as:

- portability - the ability to readily migrate service to a new location without complex disconnection and provisioning/connection processes;
- mobility – the ability to receive service whilst in transit, for example road and rail transport; and
- higher bandwidth in locations beyond the reach of terrestrial broadband networks.

We referred earlier to the value of reviewing universal service objectives alongside broader community and regional development objectives. In this regard, Project Kuiper's ability to provide secure, high performance networking capability to large industry and government customers, even in the most diverse and remote locations, can play a significant role in supporting local communities and developing regions.

Project Kuiper is participating in the Government's LEOSat Working Group and appreciates the opportunity to validate the potential of LEOSats to ensure that the capabilities of new technologies and services can be brought into the service of the community as quickly as possible. We believe this mission aligns with the government's digital inclusion objectives, including in regard to First Nations communities and specifically Closing the Gap Target 17; and we look forward to working with Government, First Nations communities, and other key stakeholders to affirm the capabilities of Project Kuiper and explore how best to deliver solutions-based outcomes for regional, rural, and remote communities in Australia.

We also encourage the Government to have regard to other performance related information available globally, including from pilot trials and other test results elsewhere, and the growing number of challenging situations in which LEOSat systems have demonstrated their effectiveness, such as in disaster response and recovery environments, where LEOSat systems have helped maintain connectivity to individual households and businesses, and supported mission-critical communications for first responders and aid workers.

[2] *Impacts of the 2019-20 bushfires on the Telecommunications network*, Australian Communications and Media Authority (ACMA), April 2020.

4. Mobile voice

As the Discussion Paper notes,[3] the USG operates as a safety net to ensure the supply of baseline services in situations where operators would not supply them because they cannot generate a reasonable investment return or where there is no other competitive reason to supply them. This policy recognises that the regulatory obligations comprising the USG framework are an imperfect fallback solution compared to commercial supply under competitive conditions.

The universal service regime was developed (and until fairly recently has continued to operate) in an environment where supply and demand conditions were well-established, due mainly to: (a) the monopoly supply of services in non-commercial areas by Telstra (and its former manifestations as Telecom Australia and the Postmaster-General's Department); and (b) conditions of relatively low technological dynamism, where copper-based wireline access networks, supplemented by microwave, have been the prevailing terrestrial network solution in regional and remote areas of Australia since the national network was first deployed (with fixed wireless, and, outside terrestrial network service coverage areas, geostationary orbit satellites only being deployed more recently and on a relatively limited basis). The supply of STS under the USG mostly assumes a geographic dimension: the overwhelming majority of people reliant on the statutory Universal Service Obligation ("USO") for their STS (and the overwhelming areas of net cost associated with its provision) are those inhabiting rural and remote parts of the country.[4]

In these conditions, the Government has been able to act with a high degree of certainty in defining, firstly, the features and performance requirements of the baseline service provided under the STS and, secondly, the geographic areas in which regulatory obligations become operative. In particular:

- regarding supply conditions, the baseline service and associated performance characteristics were referable to Telstra's legacy copper-based network and its organizational capabilities;
- demand conditions were referable to the basic and unquestioned need for end-users to be reliably connected to the PSTN, with access to emergency services; and
- USO areas[5] could be defined with reference to Telstra's accounts (that is, areas in which it did not recover a reasonable capital return).

In contrast, direct-to-device ("D2D") services, which are subject to high degrees of competitive and technological dynamism, are nascent and immature in Australia (and globally) across a range of dimensions.

[3] The Discussion Paper notes that the USO for voice and the SIP for broadband operate as safeguards to ensure these services are provided in non-commercial areas [p 3].This echoes the Explanatory Memorandum to the Telecommunications Act 1991 (which introduced the term "universal service" into the legislative framework), in explaining the "fundamental purpose" of the universal service arrangements as being "to *safeguard* access to a minimum level of essential telecommunications services for all persons in Australia" (Vol 1, p 75, emphasis added). The Productivity Commission further comments: "market mechanisms and commercial interests have the primary role in enabling universal service access to a baseline quality of telecommunications services. This confines any potential role for government to instances where there are availability, accessibility or affordability gaps in service provision, or where there is some form of market failure": *Productivity Commission Inquiry Report into the Telecommunications Universal Service Obligation - Overview and Recommendations*, No 83, 28 April 2017, p 6).

[4] The Discussion Paper estimates that around 3.5 million STS services are provided pursuant to the USO, p6.

[5] At least in terms of the geographical dimension, now defined as "net cost areas" under the Telecommunications Act 1997.

On the supply side:

- satellite systems used to provide these services are in the process of being designed, deployed, or enhanced, including competing technology solutions;
- technical standards are in ongoing development;
- new entrants offering service in regional, rural, and remote Australia are likely to emerge in the short to medium term;
- service features and performance capabilities are in ongoing development; and
- commercial models and associated commercial arrangements between satellite and terrestrial operators are in ongoing development.

On the demand side, whilst there is community interest in the potential to communicate using mobile devices outside terrestrial mobile service coverage areas, it is not presently possible to define or measure this demand with reference to service features and performance characteristics of this product; or even in the context of other potential competing products with similar features, such as mobility or location portability.

It is therefore not presently possible to either (1) define a baseline D2D service, or (2) identify areas in which such a baseline service might not be commercially supplied according to the dimensions of accessibility, availability, and affordability. Accordingly, it would not be appropriate to consider including D2D within the context of the universal service regime until supply and demand conditions have developed (as they are expected to over the short to medium term). We therefore suggest that this issue be reassessed if considered necessary as conditions mature and become capable of meaningful analysis.