Response to Ofcom consultation on Arqiva's 28 GHz spectrum access license variation

1) Introduction

Viasat welcomes the opportunity to comment on Ofcom's public consultation on variation of Arqiva's 28 GHz spectrum access license ("consultation")[1]. Viasat provides comments below on the proposed license variation requested by Arqiva and potentially for future reauthorization of the released 2 x 224 MHz 'near-national' spectrum in the paired frequency bands 27.8285-28.0525 GHz and 28.8365-29.0606 GHz. In these comments, Viasat explains that (i) access to satellite spectrum, including the frequency bands under consideration in the consultation, is essential to meet the requirements of fixed and mobile satellite users in the UK; and (ii) there is no reason to exclude access to the proposed geographic zones around the radio equipment locations that Arqiva proposes to retain after the license variations.

As Ofcom is aware, satellite broadband is an important solution for serving the unmet connectivity needs of millions of broadband users throughout the UK. The UK has a high number of geographically dispersed households and small businesses in both metropolitan and rural areas, currently served with low broadband speeds. These UK households and small businesses are served with legacy Digital Subscriber Line (DSL) or are not served at all. Additional broadband needs, beyond service to fixed users in the UK, includes high-speed connectivity for mobile and government customers while on the move. Satellite broadband is uniquely suited to address these unmet connectivity requirements for users throughout the UK.

In order to be able to meet these satellite broadband needs in the UK, it is vital that the frequency bands and amount of available spectrum for satellite gateways and user terminals keep pace with changes and innovations in satellite network technologies. One of the major changes that has been taking place is the development of Ultra-High Throughput Satellites (UHTS) operating in geostationary satellite orbit (GSO). GSO satellites being launched today have many new and advanced network features, including vastly increased spectrum reuse and the ability to use smaller end-user terminals. The true innovation, however, lies in the services that these satellites can provide, including high-speed broadband to customers featuring speeds of 150 Mbit/s today, and even faster speeds in the next few years.

Satellite technology has advanced to the point that today's satellite broadband systems are approaching "Shannon's Limit" in terms of spectral efficiency[2]. Access to adequate spectrum is now the primary limiting factor in allowing these satellite networks to increase capacity for the benefit of the UK consumers.

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[1] Consultation: "Arqiva's 28 GHz spectrum access license", (15 February 2023), https://www.ofcom.org.uk/__data/assets/pdf_file/0030/253794/Arqivas-28-GHz-spectrum-access-licence.pdf.

[2] See M. Viswanathan, Channel Capacity & Shannon's theorem - demystified, GAUSSIANWAVES, Apr. 23, 2008, https://www.gaussianwaves.com/2008/04/channel-capacity/. Today's satellite systems provide actual transmissions at near the maximum capacity that theoretically can be achieved over a given amount of spectrum. This means that making more spectrum available is the only way to increase satellite capacity and serve more end users.

Viasat provides responses below to Question 1 in the consultation.

2) Viasat comments on question 1 of the consultation:

Question 1: Do you have any comments on this variation? Please provide evidence for your position.

Viasat agrees with Ofcom's provisional view that granting Arqiva's request to reduce the scope of its license will facilitate efficient use of the spectrum under consideration in the consultation, given its limited current use in most geographic areas of the UK. There will also be significant benefits to UK citizens and consumers by freeing up this unused spectrum.

Most of the UHTS technologies today extensively use the entire Ka band (*i.e.*, 27.5 – 30 GHz/17.7-20.2 GHz) to serve a wide range of satellite broadband applications in urban, suburban and rural locations alike, and also offer services via earth stations in motion (ESIM), providing broadband for air and sea vessels as well as land-based users, such as emergency response providers on vehicles, buses, and trains. Notably, Viasat satellite network designs are able to use the same part of the spectrum for user terminals and gateways and employ highly intensive frequency reuse with a significant number of spot beams, all contributing towards high overall spectrum reuse and efficiency of the network.

In the case of satellite technology that efficiently delivers nationwide, reliable and affordable broadband across a diversified universe of users, including to hundreds of millions of devices, fragmented spectrum unnecessarily constrains the ability of satellite networks to connect UK users with the highest-speed, low-cost broadband that is possible with today's technology and even greater speeds and capacity that will be deployed in the future. Viasat notes that the currently paired frequency bands 27.5-27.8185 GHz and 28.4545-28.8265 MHz are available for both satellite gateways and user terminal use under the current UK band plan[3] in the 27.5-29.5 GHz (28 GHz) band. Now, with the request from Arqiva to release the near-national 27.8285-28.0525 GHz and 28.8365-29.0606 GHz paired spectrum bands, Ofcom has an opportunity to reduce the existing segmentation in the larger 27.5-30 GHz band to avoid the potential adverse impacts on connectivity that result from spectrum fragmentation. As explained above, contiguous spectrum for both satellite gateways and user terminals in the 27.5-30 GHz band is necessary to realise the full potential of UHTS technology and to facilitate innovation in the bands in the future.

Furthermore, the international community has affirmed the importance of 27.5-30 GHz uplink band, and the corresponding 17.7-20.2 GHz downlink band, for satellite-powered connectivity to end users. WRC-19 recognized the need for increased spectrum to provide reliable and high-speed broadband on aircraft, ships and land vehicles and validated the global operations of GSO ESIMs in the entire 27.5-29.5 GHz band, in addition to the 29.5-30 GHz band, which was already made available at WRC-15. WRC-23 will be considering a regulatory framework to further expand satellite use of the band by introducing satellite-to-satellite links (*i.e.*, WRC-23 Agenda Item 1.17) in these frequency bands to enable real-time relay of Earth Observation

[3] *See* UK spectrum map for frequency range 27.5-29.5 GHz (29 March 2022), http://static.ofcom.org.uk/static/spectrum/map.html.

and Space Science mission data in low earth orbit (LEO) through the use of innovative hybrid GSO-LEO communication solutions.

Viasat recognizes and welcomes Ofcom's intention, as stated in the recent *Space Spectrum Strategy* consultation (May 2022)[4], to provide additional capacity for ESIMs by extending authorizations to a larger range of frequencies within the 27.5-30 GHz band. Viasat also urges Ofcom to make the same part of the spectrum available for fixed user terminals, on the ground, which will facilitate efficient use of the satellite capacity deployed over the UK and enable cost-effective provisioning of advanced satellite services to UK users.

Viasat's understanding from the consultation[5] is that the radius proposed at each of the remaining Arqiva sites (*i.e.*, 2 and 3 kilometres), in condition 17 of the proposed new license, does not represent an "exclusion zone" to protect the radio equipment in those zones from potential interference from other users of the same spectrum. Viasat believes that in the interest of efficient use of spectrum, it is possible to establish spectrum access conditions for other users without any predefined radius for those sites. Viasat, therefore, urges Ofcom not to adopt the proposed 'geographical boundary' concept for the site-specific licenses.

3) Conclusion

Viasat highlights the need for contiguous spectrum access and a stable spectrum access environment in order for satellite operators to be able to offer the most advanced technologies available to serve consumers in the UK. Satellite broadband can provide affordable connectivity across the entire country, no matter where the user may live, travel or work, but only if adequate contiguous spectrum is available. The Ka band is a critical satellite band providing the necessary capacity for efficient, cost-effective broadband connectivity unavailable in other bands. Because of the size and advanced investment of capital required for satellite broadband connectivity, assured access to contiguous spectrum, including the spectrum under consideration in this consultation is critical to provide those services today and to continue innovation in the 27.5-30 GHz band in the future.

Releasing the unused near-national spectrum identified in the consultation for satellite broadband services and not constraining the use of the spectrum around the radio equipment that Arqiva will retain will go a long way to realizing Ofcom and the UK Government's goal of driving growth and innovation in the UK space economy[6] and Ofcom's wider goal of promoting efficient use of spectrum, supporting wireless innovation and enhancing competition[7].

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4 *See* section 4.7 of Ofcom *Space spectrum strategy* statement (10 November 2022), https://www.ofcom.org.uk/__data/assets/pdf_file/0023/247181/statement-space-spectrum-strategy.pdf.

5 Consultation, Section 3.13 3 km radius around radio equipment at Goonhilly, Cornwall; and 2 km radius around Morn Hill, Hampshire and Chalfont, Buckinghamshire.

6 *See* section 1.7 of Ofcom *Space spectrum strategy statement*.

7 *See generally* Ofcom *Spectrum strategy* statement: *Supporting the UK's wireless future* (19 July 2021), https://www.ofcom.org.uk/__data/assets/pdf_file/0017/222173/spectrum-strategy-statement.pdf.

Viasat stands ready to put the released spectrum into use for the benefit of UK citizens and consumers.