Your response

Question	Your response
Question 1: Do you plan to use Q/V and/or E bands for gateways in the UK? Please provide further detail as follows: a) Which bands are you planning to use? b) When and for what purposes? c) How much spectrum do you anticipate will be needed in each band referred to in 1a) (indicating the total uplink and total downlink spectrum required)? Please provide evidence to support your capacity estimation. d) If you anticipate needing access to both Q/V and E band please explain the reasons. Provide supporting evidence explaining how you determine how much spectrum will be required for future gateways, and how this demand changes over time. e) What factors would influence your decision to place one or more gateway(s) in the UK? How many gateway locations do you anticipate needing in the UK for each of the frequency bands referred to in 1a). Why?	No response

Question	Your response
Question 2: To help us understand the services that the gateways will support, please provide the following information: a) Which downstream services do you anticipate serving with Q/V or E band gateways deployed in the UK? b) For each service in your answer to 2a) please explain which, if any, of these services will be available in the UK and who they would serve. c) For your response to 2b) please indicate when these services are expected to become available globally and to UK consumers. d) Are gateways in the UK required in order to serve UK consumers? If not, do you have plans for gateways (which will use Q/V/E) in other countries, which could be used to serve the UK? e) Do you plan to deploy gateways in the UK to serve consumers in countries other than the UK? If yes, please provide reasons for this approach. f) Are there any other identifiable benefits to UK people and businesses of locating gateways in the UK? If so, please provide evidence of this.	No response
Question 3: Do you have any information on gateways that are planned to be deployed in the UK in the Q/V bands including technical parameters? If so, please provide details.	No response
Question 4: Do you have any comments on the spectrum sharing considerations set out for the gateway	Confidential? – N As noted in the consultation, we consider it important to ensure adjacent band compatibility with EESS (passive)

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downlink and uplink in the Q/V bands? If so, please provide details.	in the 50.2-50.4 GHz frequency band where all emissions are prohibited under RR No. 5.340. Furthermore, both the 50.2-50.4 GHz and 52.6-54.25 GHz frequency bands are also subject to mandatory limits in WRC Resolution 750, for the level of unwanted emissions from FSS Earth-to-space links. The Met Office make use of measurements in the 50.2-50.4 GHz and 52.6-54.25 GHz frequency bands to initialise our operational Numerical Weather Prediction (NWP) models, which underpin our services to a range of users across the UK and beyond. Passive remote sensing measurements in these frequency bands provide all-weather temperature profile information (through both the troposphere and stratosphere). As such, they are essential to weather forecasting and have an exceptionally large impact on NWP forecast accuracy. <u>50.2-50.4 GHz</u> There are currently 22 current or planned satellite missions in the 50.2-50.4 GHz band, including many funded by the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), of which the UK is a founding member and significant funder: in 2022 (the most recent year reported), the UK provided over € 67m in member state contributions to EUMETSAT: the second highest of any member state. <u>52.6-54.25 GHz</u> There are currently 9 current or planned satellite missions in the 52.6-54.25 GHz band, including many funded by EUMETSAT. Based on our extensive use of this band, we are concerned that uplinks adjacent to these frequency bands without stringent out-of-band suppression, will degrade temperature soundings in the lower troposphere. This would be likely to degrade the accuracy of weather forecasts and our ability to monitor the Earth's climate.

Question	Your response
Question 5: Do you have any additional information which could facilitate our consideration of coexistence between gateway uplink/downlink and other services in the Q/V band and adjacent bands, as appropriate? If so, please provide details.	Confidential? –N The Met Office uses data from multiple satellite-based passive sensing instruments operating in the 50.2-50.4 GHz and 52.6-54.25 GHz frequency bands. These are listed below (with those in **bold** on EUMETSAT missions which the UK has contributed to the funding of) <u>50.2-50.4 GHz</u> Current missions: - **AMSU-A**[1] (on NOAA 15/18/19 & EUMETSAT Metop-B/C), - ATMS[2] (on S-NPP & NOAA-20/21), - MWTS-2[3] & MWTS-3[4] (on FY-3), - SSMIS[5] (on DMSP), - MWRI-2[6] (on FY-3F). Additional instruments operating in this frequency band are also planned for future satellite missions including: - AWS[7] (on ESA AWS PFM from 2024), - **MWS**[8] (on EUMETNET Metop-SGA from 2025), - **MWI**[9] (on EUMETSAT Metop-SGB from 2026), - ATMS (on JPSS-4 from 2027), - MWRI-2 (on FY-3H from 2025). <u>52.6-54.25 GHz</u> Current missions: - **AMSU-A**[10] (on NOAA 15/18/19 & EUMETSAT Metop-B/C), - ATMS[11] (on S-NPP & NOAA-20/21), - MWTS-2[12] & MWTS-3[13] (on FY-3), - MWRI-2[14] (on FY-3F).

[1] https://space.oscar.wmo.int/instruments/view/amsu_a
[2] https://space.oscar.wmo.int/instruments/view/atms
[3] https://space.oscar.wmo.int/instruments/view/mwts_2
[4] https://space.oscar.wmo.int/instruments/view/mwts_3
[5] https://space.oscar.wmo.int/instruments/view/ssmis
[6] https://space.oscar.wmo.int/instruments/view/mwri_2
[7] https://space.oscar.wmo.int/satelliteprogrammes/view/aws
[8] https://space.oscar.wmo.int/instruments/view/mws
[9] https://space.oscar.wmo.int/instruments/view/mwi_metop_sg
[10] https://space.oscar.wmo.int/instruments/view/amsu_a
[11] https://space.oscar.wmo.int/instruments/view/atms
[12] https://space.oscar.wmo.int/instruments/view/mwts_2
[13] https://space.oscar.wmo.int/instruments/view/mwts_3
[14] https://space.oscar.wmo.int/instruments/view/mwri_2

Question	Your response
	- MWRI-RM (on CMA FY-3G) Additional instruments operating in this frequency band are also planned for future satellite missions including: - AWS[15] (on ESA AWS PFM from 2024), - HYMS[16] (on Spire HYMS IOD from 2024). More information about sensor characteristics for these missions can be provided if required.
Question 6: What are your views on enabling NGSO gateway earth stations to access the 51.4 – 52.4 GHz band before WRC-27 concludes?	Confidential? –N As noted in the consultation document, there is a need to consider adjacent band sharing with EESS (passive) in adjacent frequency bands. Given that studies on this matter will be undertaken as part of the preparations for WRC-27, we think it would be beneficial for the UK to consider the results of these studies and the decision taken at WRC-27 when considering national regulations.
Question 7: What are your views on initially enabling access to 37.5 – 40.5 GHz for gateways, with a later consideration of the 40.5 – 43.5 GHz frequency range? Do you consider 42.5 – 43.5 GHz to be usable in the uplink?	No response
Question 8: Do you have any information on gateways that are planned to be deployed in the UK in E band including technical parameters? If so, please provide details.	No response
Question 9: Do you have any comments on the spectrum sharing considerations set out for the gateway downlink and uplink in E band? If so, please provide details.	Confidential? – N As noted in the consultation, we consider it important to ensure adjacent band compatibility with EESS (passive) in the 86-92 GHz frequency band.

[15] https://space.oscar.wmo.int/satelliteprogrammes/view/aws
[16] https://space.oscar.wmo.int/satellites/view/hyms_iod

Question	Your response
	The Met Office make use of measurements in the 86-92 GHz band to initialise our operational NWP models, which underpin our services to a range of uses across the UK and beyond. The window channels in the bands at 86-92 GHz are critical for the passive remote sensing of several atmospheric, cloud and precipitation parameters. They are also important for surface emissivity characterization, land surface parameters, including snow cover properties. There are currently 33 current or planned satellite missions in the 86-92 GHz frequency band, from Europe (7 missions), China, Japan, Russia and the USA. As noted in response to Question 4, the UK is a significant funder of EUMETSAT which has invested in many missions which rely on access to this frequency band. Given the importance of the 86-92 GHz frequency band for sensitive passive sensing measurements, and thus weather forecasting, it is important to establish suitable out of band limits to protect sensors operating in the EESS (passive) frequency band from gateways operating in the 81-86 GHz frequency band.
Question 10: Do you have any additional information which could facilitate our consideration of coexistence between gateway uplink/downlink and other services in E band and adjacent bands, as appropriate? If so, please provide details.	Confidential? – N The Met Office uses data from multiple satellite-based passive sensing instruments operating in the 86-92 GHz frequency band, these are listed below (with those in **bold** on EUMETSAT missions which the UK has contributed to the funding of): - **AMSU-A**[17] (on NOAA-15/18/19 & EUMETSAT Metop-B/C), - ATMS[18] (on S-NPP & NOAA-20/21), - MWRI-2[19] (on FY-3F), - AMSR-E[20] (on NASA Aqua), - MWHS-2 [21] (on FY-3C), - MWRI-1 [22](on FY-3C), - MWRI-RM [23] (on FY-3G),

[17] https://space.oscar.wmo.int/instruments/view/amsu_a
[18] https://space.oscar.wmo.int/instruments/view/atms
[19] https://space.oscar.wmo.int/instruments/view/mwri_2
[20] https://space.oscar.wmo.int/instruments/view/amsr_e
[21] https://space.oscar.wmo.int/instruments/view/mwhs_2
[22] https://space.oscar.wmo.int/instruments/view/mwri_1
[23] https://space.oscar.wmo.int/instruments/view/mwri_rm

Question	Your response
	- AMSR3[24] (on GOSAT-GW), - GMI[25] (on GPM Core Observatory) - **MHS**[26] (on EUMETSAT Metop-B), - **AMSU-B**[27] (on NOAA-15), - **HRMR**[28] (on Sentinel-6A). Additional instruments operating in this frequency band are also planned for future satellite missions including: - AWS[29] (on ESA AWS PFM from 2024), - **MWS**[30] (on EUMETNET Metop-SGA from 2025), - **MWI**[31] (on EUMETSAT Metop-SGB from 2026), - MWRI-2 (on FY-3H from 2025), - WSF-M[32] (on WSF-M1 from 2024) - **HRMR** (on Sentinel-6B from 2026 and CRISTAL from 2028) As a window channel for passive remote sensing measurements, many sensors operating in this frequency band use a large bandwidth to minimise noise. For example, MWS has nominal bandwidth of 4 GHz, which extends down to 87 GHz; ATMS has channel centre at 88.2 GHz and bandwidth 2 GHz, which extends down to 87.2 GHz. More information about sensor characteristics of specific missions can be provided if required.
Question 11: What are your views on considering enabling gateways to use E band before WRC-27 concludes?	Confidential? – N As noted in the consultation document, there is a need to consider adjacent band sharing with EESS (passive) in the 86-92 GHz frequency band. As stated in our response to question 6, given that studies on this matter will be undertaken as part of the preparations for WRC-27, we think it would be beneficial for the UK to consider the results of these studies and the decision taken at WRC-27 when considering national regulations.

[24] https://space.oscar.wmo.int/instruments/view/amsr3
[25] https://space.oscar.wmo.int/instruments/view/gmi_core
[26] https://space.oscar.wmo.int/instruments/view/mhs
[27] https://space.oscar.wmo.int/instruments/view/amsu_b
[28] https://space.oscar.wmo.int/instruments/view/hrmr
[29] https://space.oscar.wmo.int/satelliteprogrammes/view/aws
[30] https://space.oscar.wmo.int/instruments/view/mws
[31] https://space.oscar.wmo.int/instruments/view/mwi_metop_sg
[32] https://space.oscar.wmo.int/satellites/view/wsf_m1

Question	Your response
Question 12: Are there any other points that you deem would be helpful in our consideration of Q/V and E bands for future gateways? In providing your response, please include as much supporting evidence as you can.	No response

Please complete this form in full and return to.