

# 6G requirements and spectrum considerations

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# On the demand and requirements for 6G

**Introduction of 6G must address demonstrable customer needs across mobile, fixed and non-terrestrial networks that cannot be met with 5G.**

## **Operational excellence**

- 6G must not inherently trigger a hardware refresh of 5G RAN infrastructure.
- Material practical gains in spectral and energy efficiency must be demonstrated.
- Absolute energy reduction must be achieved when assessed across mobile and fixed networks to support the transition to low carbon economies.

## **Introduction principles**

- Existing IMT spectrum identifications (<7GHz) will remain essential for delivering mobile coverage and new services.
- Ability to smoothly migrate traffic from 5G to 6G in the existing bands (so a better version of DSS). 6G must not result in degraded performance for customers connected to 5G networks.

## **New services and innovation**

- 6G should consider support for innovative new features such as joint sensing and communications, AI, extended AR/VR, enhanced positioning etc.
- 6G should facilitate seamless integration and interoperability with fixed and satellite networks.
- 6G should inherently support network related APIs, fostering new service offerings which leverage network capabilities.

# Spectrum considerations

Introduction of, and migration to, 6G will require timely availability of suitable spectrum to match the expected trends in user demand

## Both new bands and reframed existing bands are required

Growing the capacity and capability of mobile networks in a financially and environmentally sustainable way will require both access to new spectrum bands in low and mid frequencies, and refarming of existing bands.

## Existing 5G capacity growth also needs additional spectrum

New spectrum should not be exclusively associated with enabling accelerated development of 6G. New bands currently being discussed, such as the upper 6 GHz band, should be made available in due time for mobile networks in a **technology neutral** way.

Refarming of existing bands is an important means to **increase spectral efficiency** and can link the availability of spectrum for a new technology with trends in end user demand.

Dynamic Spectrum Sharing (DSS) was used to allow **smooth transition** between 4G and 5G technologies in same bands and is expected to be available also with 6G.

**The WRC-27 agenda item identifies several potential bands that could potentially support some 6G requirements. This is a welcome result from WRC-23 but the future availability of these is uncertain given existing use and studies are only just beginning in the international fora and have not yet been discussed at all in the UK with industry stakeholders.**

# WRC-27 candidate 6G bands (Region 1)

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## Initial review of outcomes from a UK MNO perspective

### 4,400 – 4,800 MHz

- We understand this is a harmonised NATO band and used by the military and has not previously been discussed for release in the UK.
- It is a fixed-satellite service downlink band (the paired uplink is the U6GHz band already identified to IMT).
- There is some licence-exempt use and Radioastronomy.

### 7,125 – 7,250 MHz

- This band hosts a raft of services including Government use, space science services, PMSE .

### 7,750 – 8,400 MHz

- Over 1,000 fixed links in 7.45 -7.9 GHz.
- Various other fixed-satellite, mobile-satellite and science services.

### 14.8- 15.35 GHz

- Mostly overlaps the 14.5 – 15.35 GHz band which is heavily used for fixed point-to-point links (3,589 licences).
- overlaps the harmonised NATO band 14.3 – 15.25 GHz and is used by defence users for fixed and mobile.
- The top 120MHz is assigned by Ofcom for civilian use;
- The top 150MHz of the band has an international secondary allocation to passive space science services.



# 6G timeline – operator proposal

- ✓ 1<sup>st</sup> set of 3GPP 6G specifications target completion by Q4 2029
- ✓ 6G work in Rel-20 to be 21-month & Rel-21 to be 24-month
- ✓ Rel-20 plan should balance the work for 5G-Advanced enhancements and 6G related studies



