

Ofcom's view and next steps on bands above 6GHz

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Update on Ofcom's activity on above 6 GHz

Summary of the preliminary mm-Wave bands we identified (*)



Frequency range (GHz)	6-20	20-40	40-60	60-100
Specific bands identified (GHz)	10.125 -10.225 10.475 – 10.575	31.8 – 33.4	40.5 – 43.5 45.5 – 48.9	66 - 71
Potential bandwidth	2x100 MHz	1.6 GHz	5.8 GHz	5 GHz
Coexistence	Primary allocation to fixed, (mobile) and radiolocation	Fixed and radio-navigation services	Mobile mobile-satellite radio-navigation (low use)	Inter-satellite, mobile, mobile-satellite, radio-navigation (low use)

(*) Obtained after a public call for input (Jan. – Apr. 2015), an internal technical, coexistence and policy analysis, and an external consultancy. Ofcom might further update this list after further studies and further consultations with external stakeholders.

- No technical consensus on which part(s) of the mm-Wave spectrum will be more or less suitable for 5G from a technology perspective
- To mitigate *technology uncertainty* it is important to identify bands in *different* parts of the mm-Wave spectrum
- Contiguous spectrum is required, with components for the different operators sufficiently close ($\pm 5 - 10\%$)
- No agreement on how much spectrum is needed per operator (responses range from 100MHz to 1GHz)

- Concern on different bands expressed by different incumbent users
 - Satellite Industry, Space Science community and Met Office, Manufacturers, Amateur Radio Groups,...
- Difficulty in understanding demand for mobile and non-mobile uses
 - It is critical to understand use-cases for mm-Wave
- Difficulty in assessing opportunities for spectrum sharing at mm-Wave

- Ofcom will continue to seek to influence the development of the European Common Proposal on future agenda items
 - Initial view of bands provided to CEPT CPG PTA
- Goal: focus an agenda item for the World Radio Communication Conference in 2019 (WRC-19) and to maximise the potential for international harmonisation of 5G spectrum

A few technical thoughts for this panel

Mm-Wave: technical assessment



Prop. loss in free space (downlink)



Prop. loss in free space (uplink)



Prop. loss in free space (sounding)



Real-world propagation effects



Intra-cell and inter-cell interference/
opportunities for sharing



Antenna dimensions



Beamforming and MIMO solutions



Transceiver design



Electromagnetic field exposure



Consistency of QoE across time, space and areas

- Peak speed is not the most relevant metric for consumer
 - mm-Wave technologies shouldn't be designed around this metric



- Where and who is going to benefit of mm-Wave services?



A few questions for this panel



- How much mm-Wave spectrum is it needed for mobile access? Is 100 MHz @ 6 GHz = 500MHz @ 32 GHz?
- Which are the most promising parts of the mm-Wave spectrum from a technology perspective? (E. g. 10 vs 20 vs 70 GHz)
- Can we allow multiple mobile operators to share mm-wave bands?
- When will mm-wave technology be ready (in a way to be beneficial for consumers) for mobile services? In 5, 10 or 15 years?
- Will spectrum allocated for mm-Wave be used only in dense urban deployments? Or mm-Wave services will be more widely available?

Thanks for your attention!