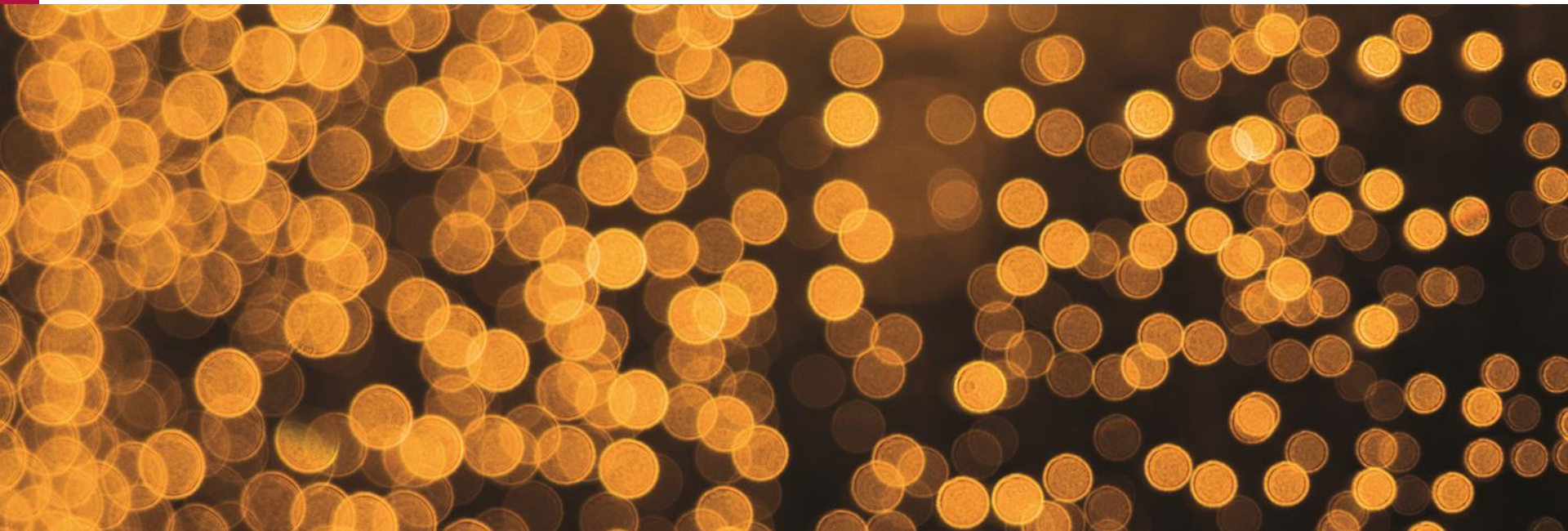


Drone operation in mobile bands

March 2021



Ofcom's technical analysis of potential interference issues caused by the deployment of mobile User Equipment (UE) airborne

- CEPT (which we are part of) is carrying out studies about drone operation in LTE bands. So far it has published ECC Report 309. There is still ongoing work, particularly in the areas of active antenna systems (AAS) and elements of a common authorisation regime or licence conditions.
- We analysed ECC Report 309 and applied its findings to the UK situation, using scenarios and coexistence parameters in published UK documents. Our work produced conclusions consistent with the ECC Report for the UK scenarios we have analysed so far.
- High level conclusions of our technical analysis:
 - Mobile networks need to be able to recognise aerial UE to implement measures specific to aerial use e.g. control interference within the network (it can worsen the overall downlink performance of a mobile network if not managed). It could also be needed to enforce geofencing or preventing access to certain bands depending on the proposed solution.
 - Main area of concern is potential interference to ATC Radar if UE uses 2.6 GHz. There are a few options to resolve this but the easiest and quickest may be to deny access to the band.
 - Additionally, geofencing needed for RAS and MOD sites (one solution could be to extend what is currently in place to protect airports, critical sites etc)

ATC 2.7 – 2.9 GHz radar issue

- Analysis showed that the biggest issue to consider is the potential interference to the 88 ATC Radars currently in operation.
- The risk of interference to the radars depends on the UE spurious emissions performance. The Radars are particularly sensitive to spurious emissions from aerial UEs.
- Worst case spurious emissions performance, based on limits set out in the UE standard, give rise to large areas of the country where interference could arise and therefore would mean drones could not use 2.6GHz. However, evidence suggest that UEs perform tens of dB below the standardised value, so it would be sensible to assume this in the risk analysis.
- Even in our best case scenarios some protection distance (geofencing) would still be needed. Tighter spurious emissions limits in a standard for airborne UE would result in smaller geofenced areas (but this may take some time).
- Given this, if this risk is too high then the way to mitigate this in the near term could be to prevent access to the 2.6GHz band either at the equipment or network level.



Other locations that may be impacted

Mobile networks

- CEPT Report 309 indicated that there is no evidence this effect would extend to adjacent mobile networks. The network that drones are operating on may want to put in place mitigations to protect themselves as it can worsen the overall downlink performance of a mobile network if not managed.

Radio Astronomy and other sites

- As many of these sites operate a no electronic device policy, a precautionary approach may be to geofence the perimeter of these sites. In the UK there are 7 Radio Astronomy sites (Jodrell Bank and Cambridge, and MERLIN sites at Knockin, Pickmere, Defford, Darnhall and Chilbolton).
- For certain Receive only, Permanent and Meteorological Satellite Earth stations we may look to also include some localised exclusion zones. However, the risk to these services are mainly if a drone is within the main beam or very close to it. We are looking into this further as if we take into account the elevation of the Earth station the separation distances are very close to the premises.

Military locations

- There are certain Military locations where additional geofencing will need to be deployed. These locations are set out [here](#) in our document “Frequency sharing arrangements between civil and military services”. Sites include Oakhanger, Colerne, Menwith, Bude and Portsmouth.

Next steps

Issues for stakeholders to resolve to progress this work

- Need to decide on the approach on 2.6 GHz band and the potential risk to ATC Radar. If it is decided not to allow operation in this band how can this be implemented?
- MNOs will need to decide how they will protect their own networks from the potential interference caused by aerial UEs. Do they need to be able to identify aerial UEs before they allow aerial UE mobile use on their networks? For enforcement purposes are they also able to identify an aerial UE quickly and resolve any issue?
- Need to develop solutions for geofencing of Radio Astronomy and other potential sites. How can spectrum management requirements be fed into the current CAA process?

Way forward

- Short term (next 6mth): I&T route already exists – non operational and non-commercial. MNO support/no objection required for each licence.
- Medium term (6mths -18 mths depending on issues being resolved): move to consult on proposals and then issue spectrum licences permitting full operational and commercial use. May not require each licence application to go to the MNO.
- Longer term (+3 years): if technical solutions developed which mitigate risks of interference we could consider moving back towards a licence exempt authorisation framework. Would depend on equipment standards and further technical work.

ATC radars @ 2.6 GHz

