3.8 – 4.2 Ghz

Testbed observations

Prepared for:	**Spectrum Policy Forum**

26 September 2023

Agenda

3.8 to 4.2 GHz spectrum

- A little bit about the WM5G testbed
- 5G Ecosystem
- Conditions & licencing
- Usage today

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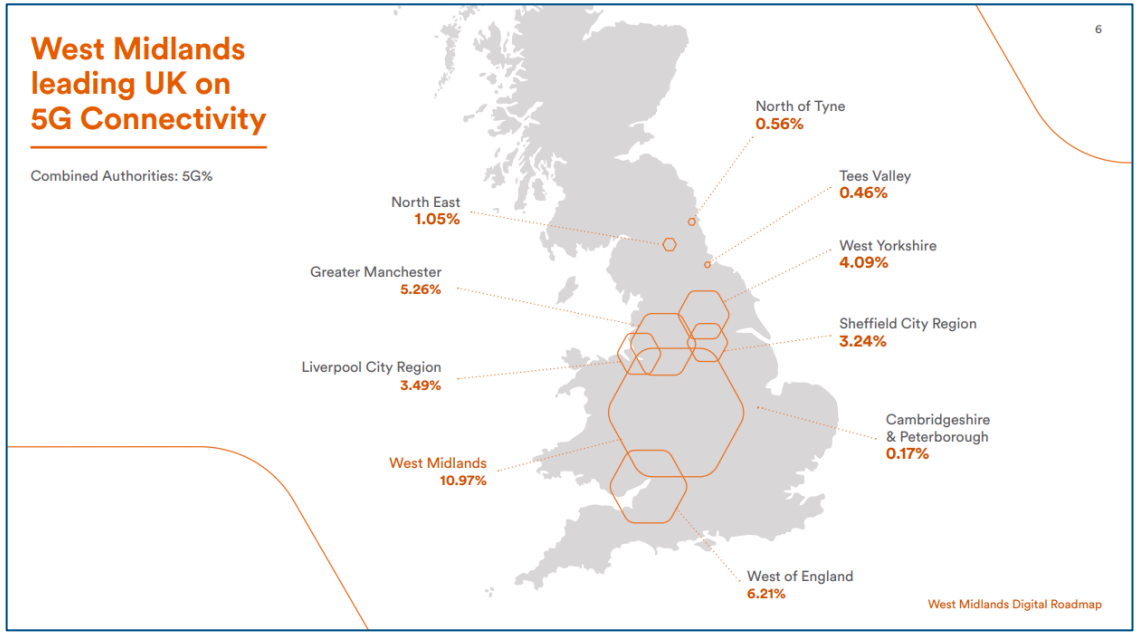
A bit about the WM5G Testbed & Birmingham Knowledge Quarter

WM5G

Largest of the DCMS 5G Testbed and Trials projects

- Accelerated deployment of public mobile services across the region
- 5G 5pring accelerator with Digital Catapult, O2, Wayra & Deloitte
- Approx 30 use case trials across transport, health, manufacturing



BKQ

- City centre knowledge quarter with 12 partners
- 6 teaching institutions
- 40,000 students
- 170 tech businesses
- 3,000 resident students
- Campus wide dense 5G network for teaching, operations and public use

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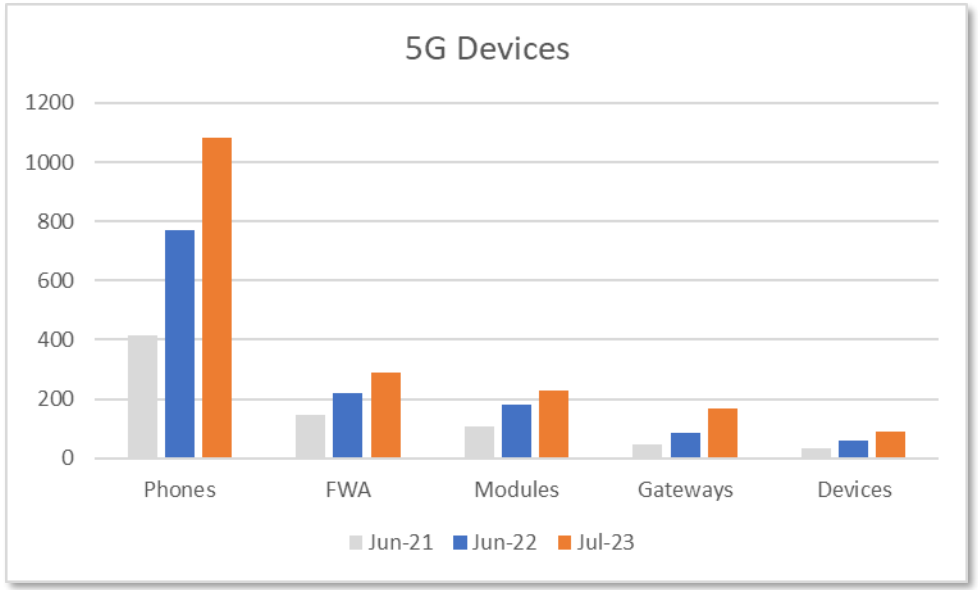
Ecosystem support is key

Availability of spectrum is necessary, but not sufficient. For vertical applications the full ecosystem needs to be in place.

For vertical applications, the full ecosystem of network, CPE, devices, software, and integration all need to be aligned

- Availability of hardware was a serious constraint
- Test devices and SIMs difficult to get hold of
- Band support was limited, but expected to continue to improve
- Specialist devices are still low in number, eg 4,571 LTE industrial gateways vs 167 5G



5G announced devices - source GSA

Spectrum conditions & licencing

The conditions applied to Shared Access Licencing have material impacts on deployment.

Licence conditions played a key part in deployment options:

- Bandwidth – 100 Mhz helps with both capacity and coverage
- Power – 24 dbBm limit imposes significant limits on both indoor and wider coverage applications

Whilst bandwidth availability is good, MNOs have the advantage of higher power (and taller cells) to provide wide area coverage

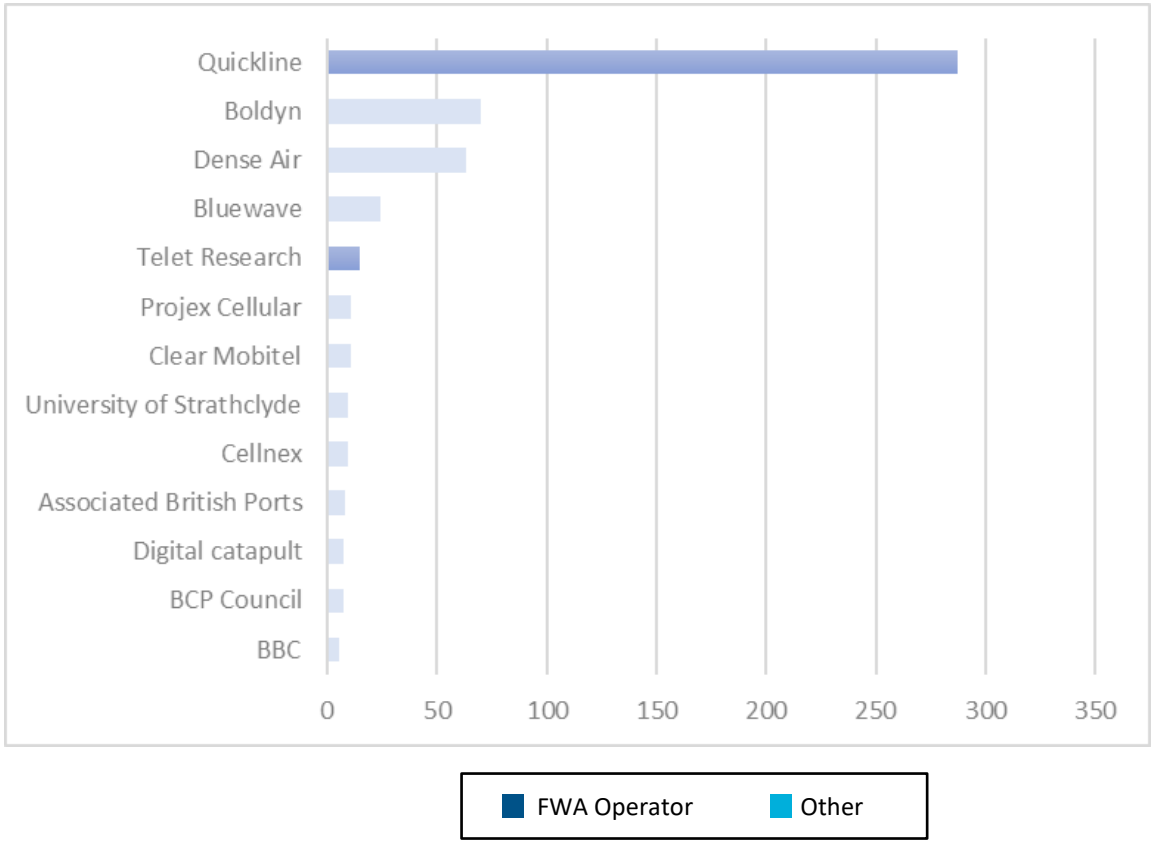
While OK for testbeds, the manual & and forms-based licence processing approach is a barrier to large-scale deployments.

Link budget analysis – half the sites are required to fulfil performance objectives with 100 Mhz vs 20 Mhz at 3.8 Ghz

Shared Access Licencing UK

So far, the majority of the ~1600 licences (shared and local) are for low bandwidth LTE. The largest commercial use in the UK for 5G “private networks” appears to be FWA

Selected UK Private Network Licenses 3.8 – 4.2 Sept 2023



- Demand (and viable use cases) is likely suppressed due to limited availability of devices in the 3.8 to 4.2 band
- Power limits within this band also make it less suited to use cases requiring wide area coverage
- Many of the others are for government-funded trials or R&D including BAI, Dorset, Milton Keynes and BCP councils and several universities

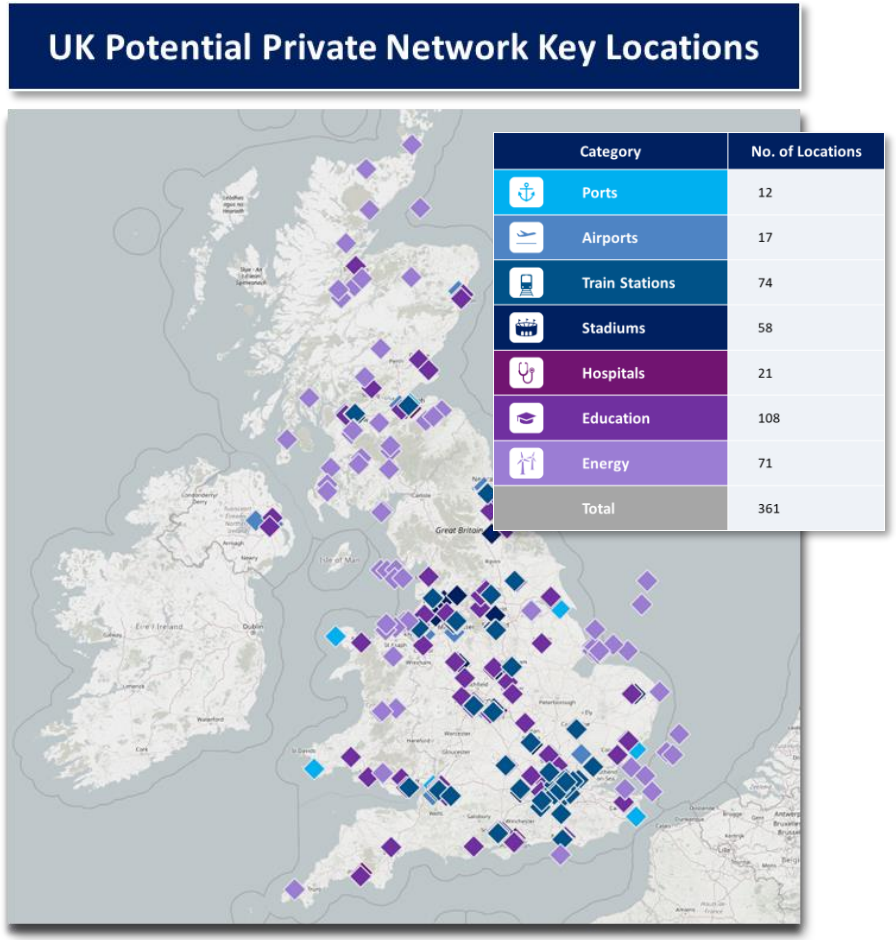
Source: Ofcom Spectrum Information Portal, Cartesian Analysis

A high potential market for private 5G networks

Our initial analysis points to 360 high-potential sites with a total of 8,800 potential locations for private networks.

Our observations regarding the use of 3.8 to 4.2 Ghz to address this opportunity are:

- The spectrum range is a little out of the mainstream, making the ecosystem availability problem even harder
- The bandwidth provided is good, which helps both capacity and coverage
- Power and height limits mean that MNO spectrum can be a better option for wide coverage, especially outside urban settings – medium power in urban is helpful
- Current licence processing is OK, but automated allocation is necessary for high volumes of applications and ease of deployment
- 3.8 to 4.2 Shared Access Licences for commercial deployments are quite limited with FWA the lead use case



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