

Supporting Operational and Technical Justification

for

**Proposed Upgrades to an Existing Electronic Communications
Base Station**

at

Maida Vale Telephone Exchange, Maida Vale, London W9 1QD

Site Reference 168856

Arqiva Ltd and EE Limited

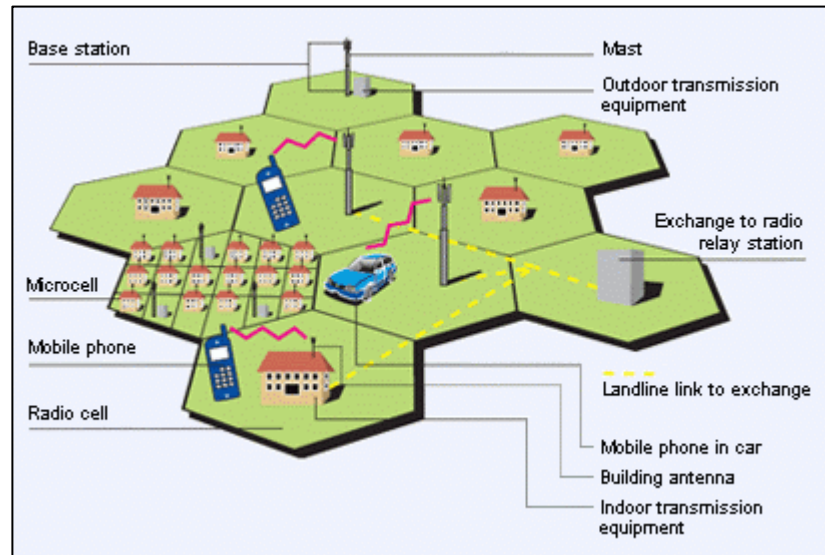
1. Introduction

- 1.1. This document has been prepared to support the application for a prior approval determination to upgrade an existing electronic communications base station, as outlined in the accompanying Description of the Proposal.
- 1.2. The document provides supporting technical information and justification on the following matters:
 - The operation of the base station
 - The special operational and technical requirements
 - Health and Safety information, including compliance with the guidelines of the International Commission on Non-Ionising Radiation Protection (commonly referred to as the ICNIRP guidelines).

2. How the Base Station Operates

- 2.1. Section 6 of the Code of Best Practice on Mobile Network Development in England, published June 2016, explains how mobile networks function and such guidance is relevant to Scotland, Wales and Northern Ireland.
- 2.2. The base station is required as part of a cellular network that provides public communications services in the form of mobile connectivity. These and the associated benefits are described in more detail in the accompanying document the **National Policy – Delivering Ultra Fast Broadband Mobile Connectivity**.
- 2.3. Cellular networks require base stations at intervals that provide localised areas of coverage, which are linked together like a patchwork quilt to provide nationwide coverage. Base stations typically require a supporting structure, like a mast or high building to support an array of antennas. Macro base stations are used to provide wide area coverage, but in urban areas it is sometimes possible to deploy micro base stations, especially where the requirement is to complete a very small gap in coverage

and /or to provide additional network capacity in areas of high demand. This basic network architecture is illustrated below.



- 2.4. The base station operates by receiving and transmitting to mobile devices, such as smartphones or tablets using radio waves. This is similar to television and radio reception, except the communication is two way. This is achieved by the antennas, dishes and other electronic communications apparatus, the main function of the supporting structure is to elevate this apparatus above intervening features such as tall trees, buildings, or valley sides that would otherwise cause interference.
- 2.5 Base stations use two forms of antenna systems. The first system uses sector antennas that look like vertically orientated strips. These look over the target coverage area and transmit and receive the signals to and from mobile devices. Base stations are typically split into three 120 degree sectors that combined provide 360 degree coverage and which requires three pairs of transmit and receive sector antennas.
- 2.6 With the First Generation networks the cell areas in rural areas had a radius of between 30 and 50 kilometres. This required masts of between 30 – 45 metres in height. The phones also needed to have very large batteries and external antennas, in order to supply the power necessary to communicate over such distances. The Third and Fourth Generation cells tend to be no more than 3 or 4 kilometres in

diameter, which means the mast heights tend to be lower (but not always depending on local factors). This is one reason why mobile devices are much smaller, because they can use much smaller batteries and no longer include external antennas. Battery technology has improved, but smartphones still tend to use a lot of power through a variety of data applications. The mobile devices are therefore a constraint on siting as the sector antennas on the base stations must now be much closer to the user than before.

- 2.7 It is anticipated that for additional capacity to 4G networks and future 5G services, there will be greater emphasis on the deployment of small cell antennas systems, particularly at the early stages of deployment. This is likely to entail network infrastructure smaller in size, but greater in density, to provide coverage to smaller geographical areas, with a radius of only a few hundred metres, typically attached to building elevations or public infrastructure such as street furniture.
- 2.8 The second system requires the use of dish antennas and these operate on a direct line of sight basis, a bit like a search light beam, to other dishes on corresponding installations on the network. These dish links to the wider network are critical for the following three main reasons:
- The dishes link the base station to the wider national network, which in turn is linked to other national and international networks.
 - The dish links also link the base station to a master control centre that manages the call handover process that occurs when a mobile user moves from one cell area to another.
 - The dishes also provide telemetric monitoring to ensure the site is working properly, with some faults able to be fixed remotely.
- 2.9 Base stations also require cabinets to house the electronic communications radio equipment and an electricity meter cabinet for the necessary power connection.

3. Technical Information

- 3.1. All mobile network operators are licensed by Ofcom, the independent regulator and competition authority for the UK's communication industries, to use allocated radio spectrum to provide publicly available electronic communications services. .
- 3.2. There are now four mobile network operators and they receive and transmit calls within different frequency bands, particularly in relation to the different generation of mobile services.
- 3.3. All four operators are under a legal obligation to comply with the conditions of their licences granted by Ofcom. These conditions ensure compliance with legal obligations in respect of avoiding interference between themselves, with other radio systems, other electrical equipment, instrumentation and air traffic systems. The conditions of the licence are mandated by Ofcom who are responsible for the regulation of the civilian radio spectrum. Ofcom also has powers to investigate and remedy any reported significant interference.
- 3.4 The four operators have now consolidated their network infrastructure under two operations, i.e.:
 - Vodafone and Telefónica networks have formed Cornerstone Telecommunications Infrastructure Ltd (CTIL). CTIL is now also a code operator
 - Everything Everywhere or EE (in itself a merger between Orange and T-Mobile) and Hutchison 3G networks have formed Mobile Broadband Network Ltd (MBNL).
- 3.5 There are differences in the way in which these two companies have been formed and operate, but the net effect has increased the use of shared infrastructure and reduced network duplication between operators. In some cases, historic sites have been decommissioned and new sites planned are done so on a consolidated basis. This does mean that any new site will provide shared coverage for more than one operator and so widen the potential number of customers who can access the mobile services available. However, in more recent years, in order to meet significant areas

of call and data demands, particularly town and city centres, the operators are having to use greater amounts of separate apparatus, but still looking to share sites where operationally possible.

4. Technical and Operational Requirements

4.1. The location of the base station is guided by operational and technical factors in the first instance. Consistent with the statutory and planning policy requirements to share existing infrastructure, the start point has been to explore using such sites first, including those owned or managed by radio site management companies like Arqiva. More information on site selection is summarised in the Planning Statement provided with the planning application. From the technical and operational perspectives, the location of the base station is determined by the following factors:

- The need to provide an acceptable level of coverage over the target coverage area by the sector antennas and to meet expected demands (antennas can only handle certain call and data levels)
- The need to be able to obtain the required direct lines of sight for the dish antennas
- Proximity to a power source
- An accessible route for construction and future maintenance access
- A reasonable degree of security
- A sympathetic and willing site provider.

4.2 In addition to the above, the following considerations also have to be met:

- The antennas have to be installed to ensure compliance with ICNIRP guidelines. These guidelines provide protection to the general public and for occupational purposes. For rooftop installations, the antennas either have to be located along the building edge to ensure no one can walk in front of them or have a clearance of about 2.5 metres from the roof to the antenna base (as in the current case).

- Antennas have to be positioned to avoid radio interference with any existing equipment already installed on the building.
- All apparatus has to be maintainable in accordance with general health and safety requirements including the CDM regulations.
- All apparatus has to be installed in a structurally feasible manner.
- On a rooftop, all apparatus has to be clear of existing features such as access points, air conditioning units, roof lights, or other electronic communications apparatus.
- Apparatus has to be installed in accordance with the requirements of the building owner.

5. Compliance with Health and Safety Guidelines

- 5.1. The proposed base station has been designed, and will be constructed and operated, in accordance with all relevant health and safety requirements, including the precautionary ICNIRP guidelines as adopted in the EU Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0Hz to 300GHz).
- 5.2. The radio frequency public exposure limits for electromagnetic fields were developed by the International Commission on Non-Ionising Radiation Protection following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. The International Commission is a non-governmental organisation formally recognised by the World Health Organisation, which has adopted its guidelines.
- 5.3. These guidelines have also been adopted by the UK Government, along with other EU Members and many other Governments. The health and safety regulations that require compliance with the ICNIRP Guidelines are there to protect all members of the public 24 hours-a-day and incorporate a precautionary safety factor of 50. It is important to appreciate that they run across the top of the town planning system, i.e.

it does not matter what may be granted planning permission, compliance is still required and if the Guidelines were to change for whatever reason any permitted sites would have to be brought into compliance.

- 5.4 Mobile base stations use low powered transmitters and typically operate at no more than 50 watts, which is similar to an old domestic light bulb. In urban areas, base stations typically comply with the ICNIRP Guidelines by a factor in the hundreds and in rural areas that increases to a factor in the thousands. There are many other means by which people are regularly exposed to radio emissions on a daily basis that are much higher, although still well within these safety Guidelines, for example, watching the television or sitting in front of a computer.
- 5.5. The certificate submitted with the planning application certifies that the base station, when operational, will meet the precautionary ICNIRP guidelines. For the avoidance of doubt, the certification relates to the individual and cumulative emissions from all operators on the site.

6. ICNIRP Certification - National Planning Policy Guidance

- 6.1. Section 10 'Supporting high quality communications' of the National Planning Policy Framework for England provides the following guidance to local planning authorities on health safeguards and base station development:

"116. Local planning authorities must determine applications on planning grounds only. They should not seek to prevent competition between different operators, question the need for an electronic communications system, or set health safeguards different from the International Commission guidelines for public exposure."

7. Further Information

- 7.1. Further information on health and safety guidelines can be found from the following sources:

ICNIRP: <http://www.icnirp.org/>

World Health Organization: http://www.who.int/topics/electromagnetic_fields/en/

Public Health England: <http://www.hpa.org.uk/HPAwebHome/>

Mobile UK: <http://www.mobileuk.org/index.html>