## General Background Information for Telecommunications Development

This document is designed to provide general background information on the development of the Vodafone and Telefónica networks. It has been prepared for inclusion with planning applications and supports network development proposals with generic information regarding;-

1. Introduction
2. Digital networks
3. Site selection process
4. Planning policy guidance
5. Site or mast sharing
6. Councils
7. Consultation with schools
8. Legal cases
9. Further information

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Note - All references in this document refer to England only.

### 1.0 INTRODUCTION

Over 25 years ago under the Telecommunications Act 1984, a licence was granted to Vodafone and Telefónica to provide wireless (or mobile) phone services utilising unused radio frequencies adjacent to those transmitted for over 50 years by the television industry. Initially because this wireless technology was new and the number of potential customers unknown, a number of tall masts were used to provide basic radio coverage to the main populated areas. The design strategy used was similar to that used by local radio/television i.e. tall masts to cover large distances over all types of topography.

It is important to note that in recent years form has followed function and digital technology has resulted in the development of smaller equipment. In addition, smaller radio coverage areas have resulted in antenna/mast heights being generally reduced. The industry has also been able to develop low impact designs for use in sensitive planning areas such as in Conservation Areas, on Listed Buildings, and in National Parks etc. The wireless telegraph pole solution is just one example of a design which has minimised impact on visual amenity of the local neighbourhood.

### 2.0 DIGITAL NETWORKS – "2G/3G" OR SECOND/THIRD GENERATION

The Vodafone and Telefónica 2G digital networks were developed in the early 1990s. This digital technology is often referred to as GSM (Global System for Mobile Communications) which is the common European operating standard enabling phones to inter-connect to other networks throughout Europe and Internationally. In April 2000, Vodafone and Telefónica were successful in their bids for two of the five licences available to provide a 'Third Generation' mobile telecommunications service known as '3G' or UMTS.

In addition to voice services, this technology enables Vodafone and Telefónica to offer high resolution video and multi-media applications. Among other things this enables office services, virtual banking, e-retailing, video conferencing and high quality broadband internet access to be provided to users on the move. This is all made possible by higher rates of data transfer allowing wireless broadband access to the Internet for mobile phones and laptop computer data card users.

The 3G radio base station is designed to provide a service via cells in a similar way as the GSM (2G) system but with a few differences. Due to the increased data transfer, the location of 3G base station sites is even more critical. Base stations must be located where the local demand exists in order to provide the required levels of service, otherwise the network will not function.

Vodafone and Telefónica will ensure they comply with planning policy guidance by ensuring apparatus be installed on existing buildings and structures, including masts wherever possible. However, in spite of these efforts, there are likely to be instances where there is a need to install additional base stations to provide contiguous service. This is largely due to the characteristics of radio propagation at this frequency, demands on the service and the high data transfer rates.

It is very important to note that mobiles can only work with a network of base stations in place where people want to use their phones (or other wireless devices). without base stations, the mobile phones we rely on simply won't work.

## 2.1 How the cellular radio network works

The building blocks of the mobile telecommunications network are called radio base stations which transmit and receive calls to and from mobile phones using radio waves, similar to those used in domestic television and radio equipment. Radio base stations are often associated with free-standing masts, however they can be located on, or even inside, existing buildings and other structures. Vodafone and Telefónica use "radio frequencies" to transmit and receive calls at 900 MHz or 1800 MHz for 2G whilst 3G uses slightly higher frequencies within the 2100 MHz range.

## 2.2 How radio signals are transmitted

The radio signals are transmitted from antennas which are part of the radio base station and cover an area known as a "cell", hence the term "cellular phone". The size of the cell is dependent on a number of factors including: the height at which the radio base station is positioned; the topography of the surrounding landscape; anticipated demand; and the population density in the area.

Radio signal transmission from a radio base station can be likened to water being distributed from a garden sprinkler. The area immediately adjacent to the sprinkler remains almost "dry". However the grass gets progressively wetter moving further away from the sprinkler, until a wettest point is reached. Then the further away from the centre, the ground becomes progressively drier. Radio base stations provide network services in a similar manner. The area immediately beneath the antennas receives limited or, occasionally, no signal. Moving further away, the signal steadily improves until it reaches an optimum level and then gets progressively weaker.

In order to use mobile phones whenever and wherever we are, a network of radio base stations is required to maintain a continuous signal or 'network service' across a geographical area. The network is designed so that the cells from each radio base station slightly overlap. Travelling even a short distance may take us through a number of cell areas. Mobile phones are designed to monitor the strength of signal from surrounding radio base stations and automatically select the clearest signal, which often comes from the nearest site. As you approach the edge of the cell area, the phone will automatically select the adjoining radio base station, to provide a continuous service. This process is known as 'call handover'.

## 2.3 Factors affecting network services

The siting of a radio base station is largely dependent on the characteristics of the radio signals which they transmit. Physical features such as buildings or landscape can obstruct the signals. In open rural areas one base station can typically cover several kilometres in radius. However in urban areas where surrounding buildings will obstruct the signal, this range can be reduced to as little as a few hundred metres.

## 2.4 Network Capacity

Radio base station sites can only receive and transmit a limited number of simultaneous calls to and from mobile phones. In areas where the use of phones is particularly high, such as major towns or cities, many sites will reach the maximum number of calls they can process. When a customer attempts to make a call in an area where the network has reached its full capacity, the 'network busy' message is displayed on their mobile phone. In order to continue to meet customer demand and improve the quality of services in these areas, there is a need to increase the capacity of the network to allow more calls to be made.

## 2.5 Technical Requirements

Vodafone and Telefónica radio engineers identify the need for a new radio base station where the existing signal strength is insufficient to support network requirements, or where demand on the system is such that we need to increase capacity. The location of each radio base station is determined by the following factors:-

- The proximity of adjacent radio base stations and the signal coverage from them.
- The terrain height of the area and surrounding topography.
- The height and density of the buildings and structures within the area.
- The potential customer demand within the area.
- The service type that is required.

## 3.0 SITE SELECTION PROCESS

The following site selection procedures apply to each installation to identify and sequentially discount alternative site options:-

1. Following a technical review which identifies need, Vodafone and Telefónica radio engineers undertake a desktop analysis, to identify the best way of meeting the site requirement. This is completed by using Vodafone and Telefónica computerised radio propagation modelling tools. These tools show every site on both existing networks and identifies those areas where insufficient signal level exists or where there is a need to increase capacity.

2. The desktop search also identifies other operators' existing telecommunications installations. This interrogation of databases ensures any mast-sharing opportunities are maximised. Where available the LPA's mast register is also reviewed.
3. The radio engineers define a search area, which is then issued to an acquisition agent who undertakes a detailed ground search with the radio engineer to identify suitable options.
4. The acquisition agent will obtain site-specific details to identify those sites that are viable options. The possible options are short-listed according to those that combine the following: location within or close to the search area, a willing landlord with acceptable commercial terms, adherence to planning and environmental policy, and other site specific issues such as initial power and link availability. These options are then returned to the radio engineers for a computer modelling assessment, taking into account the ground height, potential available antenna height and surrounding obstructions.
5. Discussions are offered to the local planning authority to consider local policies and any protected areas and to agree additional public consultation if required. These discussions are used to identify a 'preferred' option.
6. A plan for local consultation is drawn up, and where appropriate, a consultation exercise is undertaken with the local community.
7. Finally a site survey provides a full structural analysis of the site including confirming power routes and how the site will be linked into the network. Terms with the landlord are then finalised, detailed plans prepared and the application submitted.

Vodafone and Telefónica are committed to ensuring the number and visual impact of any additional sites is minimised. Vodafone and Telefónica will continue to develop and utilise sympathetic and innovative design solutions.

**4.0 PLANNING POLICY GUIDANCE ON TELECOMMUNICATIONS**

The National Planning Policy Framework (NPPF) was published on 27th March 2012. The NPPF supports high quality communications infrastructure and recognises it as a strategic priority. Paragraph 42 states that: *"Advanced, high quality communications infrastructure is essential for sustainable economic growth. The development of high speed broadband technology and other communications networks also plays a vital role in enhancing the provision of local community facilities and services."*

The NPPF goes on to state in paragraph 46 that: *"Local planning authorities must determine applications on planning grounds. They should not seek to prevent competition between different operators, question the need for the telecommunications system, or determine health safeguards if the proposal meets International Commission guidelines for public exposure."*

**5.0 SITE / MAST SHARING**

Vodafone and Telefónica actively encourage and support site sharing for both commercial and environmental reasons. All operators are required to explore site-sharing opportunities under the terms of their licences. Vodafone and Telefónica have implemented a number of measures to identify and maximise site-sharing opportunities through their network sharing agreement.

**6.0 COUNCILS**

**6.1 Moratoria**

Government guidance on mobile telecom installations advises that local authorities should make suitable council owned property available to network operators for base station development. If suitable council sites are not made available, operators may have to look for alternative sites which the local community might find less acceptable.

Moratoria may also increase the number of new sites needed as council owned buildings are often better suited for base stations e.g. tall buildings. The operators believe it is preferable to deal with proposed developments on council property on a case by case basis.

**6.2 Mast register**

Guidance in the Government's Code of Best Practice on Mobile Phone Network Development recommends that local authorities develop a register of local base stations based on a map.

The Code goes on to say, *"Ideally, all the information should be available to be viewed electronically and in hard copy. Local authorities should ensure that the mast register is kept up to date and may make a reasonable charge if anybody wishes to obtain a copy of any of the information."*

**7.0 Consultation with schools**
The operators fully comply with Government Guidance on pre application consultation with schools and colleges. They provide evidence to the local planning authority that they have consulted the relevant body of the school or college.

The Government's Code of Best Practice on Mobile Phone Network Development gives guidance on the factors operators should consider when determining whether consultation is required, as each development is different. These factors are equally applicable for Local Planning Authorities who carry out their own consultation once the application has been submitted. A recent report stated that there is no scientific basis for siting base stations away from schools (NRPB report, January 2005)

**8.0 LEGAL CASES**
The following legal cases may be helpful;-

**8.1 Harrogate case November 2004**
The Court of Appeal gave a judgment that Government Planning Guidance in PPG8 (now replaced by NPPF) is perfectly clear in relation to compliance with the health and safety standards for mobile phone base stations. The Court of Appeal and the High Court both upheld Government policy in response to a planning inspector's decision that departed from that policy and failed to give adequate reasons for doing so.

**8.2 Winchester case November 2004**
The Court of Appeal decision upheld an earlier decision by Mr Justice Sullivan that a mobile phone network operator should not use its compulsory acquisition powers as part of its day to day radio base station siting processes.

The Court of Appeal agreed with Mr Justice Sullivan that these far-reaching statutory powers were never intended for use in day to day planning situations and should be used by an operator only as a last resort when there is no other siting alternative. The House of Lords on 16 March 2005 refused leave to appeal the Court of Appeal ruling.

**8.3 Bardsey case January 2005**
The Court of Appeal confirmed that the permitted development regime for mobile phone base stations is compliant with the Human Rights Act.

This was a case in which a local planning authority failed to comply with its obligations to act within the 56 day period provided under the permitted development regulations.

**9.0 FURTHER INFORMATION**
We trust the above answers your main queries regarding our planned installation.

The enclosed site-specific details will identify the alternative discounted options and reasons why they were rejected and how the proposed site complies with national and local planning policies.

The Local Government Ombudsman's Special Report on Telecommunication Masts gives some positive recommendations and advice to Local Planning Authorities in determining Prior Approval applications. A copy of the report is available at http://www.lgo.org.uk/pdf/phone-masts-sr.pdf

## HEALTH AND MOBILE PHONE BASE STATIONS

We recognise that the growth in mobile technology has led in some cases to public concern about perceived health effects of mobile technology and its deployment, in particular about siting masts close to local communities. Quite naturally, the public seeks reassurance that they are not in any way harmful or dangerous.

We take these public concerns seriously and are committed to providing the latest independent peer-reviewed research findings, information, advice and guidance from national and international agencies on radio frequency (RF) electromagnetic fields.

Vodafone and Telefónica ensure that our radio base stations are designed and operated so that the public are not exposed to radio frequency fields above the guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). In fact, radio base stations operate at low power and emit low levels of radiofrequency fields, typically hundreds to thousands of times lower than the ICNIRP general public guidelines.

### Research Reviews

There are about 1400 peer-reviewed publications on the biological and health effects of RF signals[3], which are used in mobile communication technology. The scientific community have collated, summarised and assessed these publications in research reviews, the most influential in the UK being the Mobile Phones and Health Report (also known as the Stewart Report) by the Independent Expert Group on Mobile Phones under the chairmanship of Professor Sir William Stewart. These research reviews are used by Governments to develop policy on exposure to radiofrequency signals.

Published in May 2000, the Stewart Report concluded that the balance of evidence did not suggest that exposures to radio frequency fields below international guidelines could cause adverse health effects, although it acknowledged that biological effects might occur below these values. The report stressed, however, that a biological effect does not necessarily mean a negative impact on health. Walking, drinking a glass of water or listening to music all produce biological effects.

Since 2000, over 30 further reviews have been carried out, carefully considering many hundreds of pieces of research. Most have made similar recommendations and have come to similar conclusions: that research should continue to address any gaps in the knowledge; and that overall, the possibility of adverse health effects from mobile communications remains unproven.

In June 2011 the World Health Organisation (WHO) noted that *"A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use"* WHO factsheet 193: Electromagnetic fields and public health: mobile telephones. Research reviews are used by guideline setting bodies and Governments to develop advice and public policy on exposure to the signal used by mobile communications technology.

### Compliance with International Exposure Guidelines

All Vodafone and Telefónica installations are designed, constructed and operated in compliance with the precautionary ICNIRP public exposure guidelines as adopted in EU Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). These guidelines have been set following a thorough review of the science and take into consideration both thermal and non-thermal effects and are there to protect all members of the public 24 hours a day. In addition, precautionary measures have been taken into account when setting relevant guideline limits for the public (i.e. in the UK a safety factor of 50 times is applied to the public exposure guideline).

When measured, field strengths are typically hundreds to thousands of times lower than the precautionary ICNIRP general public guidelines.

An ICNIRP certificate is provided with every planning application and this certifies that the mobile phone base station, when operational, will meet the precautionary ICNIRP guidelines. We also provide further documentation to clarify that the ICNIRP certificate declares that emissions from all mobile phone network operators' equipment on the site are considered when determining compliance.

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[3] Source: MMF web site: http://www.mmfai.org/public/research-overview.cfm?lang=eng

**ICNIRP Guidelines**

The radiofrequency public exposure limits for EMF fields were developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) http://www.icnirp.org following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. ICNIRP is a non-governmental organisation formally recognised by WHO. Established biological and health effects have been used as the basis for the ICNIRP exposure restrictions. The ICNIRP guidelines have been adopted for use in the European Union and the UK.

In August 2009, ICNIRP published a review of the guidelines for limiting RF exposure and concluded that "*it is the opinion of ICNIRP that the scientific literature published since the 1998 guidelines has provided no evidence of any adverse effects below the basic restrictions and does not necessitate an immediate revision of its guidance on limiting exposure to high frequency electromagnetic fields.*"

**Further Information:**

- **World Health Organisation** - http://www.who.int/peh-emf/en/
  EMF Project
- **ICNIRP** - http://www.icnirp.org/
  International Commission on Non-Ionizing Radiation Protection
- **Health Protection Agency** -
  http://www.hpa.org.uk/HPA/Topics/Radiation/UnderstandingRadiation/1158934607698/
- **UK Mobile Telecommunications and Health Research** - http://www.mthr.org.uk/
- **UK Mobile Operators Association** - http://www.mobilemastinfo.com/

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