

Note: For single operator/unilateral demand sites then remove reference to the other operator from text

## **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 proposal with generic information.

### **1.0 INTRODUCTION**

Over 30 years ago under the Telecommunications Act 1984, a licence was granted to Vodafone and Telefónica to provide a wireless (or mobile) phone service 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**

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 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.

In February 2013, Vodafone and Telefónica were successful in their bids for 4G spectrum. 4G (sometimes called LTE (Long Term Evolution)) is the next major enhancement to mobile radio communications networks and will allow customers to use ultra-fast speeds when browsing the internet, streaming videos or sending emails. It also enables faster downloads. To meet this demand and improve the quality of service, additional base stations or upgrades to the equipment at an existing base station may be needed.

Vodafone and Telefónica will ensure they comply with planning policy guidance by ensuring apparatus is 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 these frequencies, 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. 4G will use frequencies within the 800 MHz and 2600 MHz ranges.

## **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 / 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 new installation to identify and sequentially discount alternative site options:-

1. Following a technical review which identifies need, Vodafone / Telefónica radio engineers undertake a desktop analysis to identify the best way of meeting the site requirement. This is completed by using computerised radio propagation modelling tools. These tools show every site on the 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.

### **4.0 PLANNING POLICY GUIDANCE ON TELECOMMUNICATIONS - NATIONAL PLANNING FRAMEWORK (NPF), SCOTTISH PLANNING POLICY (S.P.P) AND PAN 62**

#### **National Planning Framework (NPF3):**

Connectivity is not just about enabling physical movement, but also virtual links. High quality mobile and fixed broadband connections have become essential to support communities and business development in both rural and urban areas. At present, there remains a significant gap between our most and least connected areas, with digital access being considerably better in more accessible urban areas. Many parts of rural Scotland have little or no connection and require public investment to rebalance the distribution of infrastructure. (para 5.8).

To further reduce the need to travel and ensure continuing economic competitiveness, we will see a step change in digital connectivity in the coming years, supporting our broader aspirations for growth across the country. This will require significant investment in digital infrastructure to ensure coverage extends to our most remote, but asset-rich, rural and island communities. As well as providing new infrastructure to connect existing areas, future developments will build in digital connectivity as a matter of course. We are extending permitted development rights to facilitate this. (para 5.15).

Strengthened digital infrastructure will support our aspirations for more sustainable cities which attract new business. We can expect cities to become significantly 'smarter' in the next few years, using population density and shared infrastructure to further increase access to high performing digital services. (para 5.16).

### **Scottish Planning Policy (2014):**

SPP recognises that the NPF3 sets the context for supporting digital connectivity and highlights the importance of digital infrastructure, across towns and cities, and in particular in more remote rural and island areas. The economy and social networks depend heavily on high-quality digital infrastructure. To facilitate investment across Scotland, planning has an important role to play in strengthening digital communications capacity and coverage across Scotland. (para 292).

Consideration should be given to how proposals for infrastructure to deliver new services or infrastructure to improve existing services will contribute to fulfilling the objectives for digital connectivity set out in the Scottish Government's World Class 2020 document. For developments that will deliver entirely new connectivity – for example, mobile connectivity in a "not spot" – consideration should be given to the benefits of this connectivity for communities and the local economy. (para 298).

## **4.1 Need for development**

Planning authorities should not question whether the service to be provided is needed nor seek to prevent competition between operators, but must determine applications on planning grounds. The planning system should not be used to secure objectives that are more properly achieved under other legislation.

The planning system should support:

- development which helps deliver the Scottish Government's commitment to world-class digital connectivity;
- the need for networks to evolve and respond to technology improvements and new services;
- inclusion of digital infrastructure in new homes and business premises; and
- infrastructure provision which is sited and designed to keep environmental impacts to a minimum (para 293).

Local development plans should reflect the infrastructure roll-out plans of digital communications operators, community groups and others, such as the Scottish Government, the UK Government and local authorities. (para 294).

Local development plans should provide a consistent basis for decision-making by setting out the criteria which will be applied when determining planning applications for communications equipment. (para 295).

## **4.2 Siting and design**

All components of equipment should be considered together and designed and positioned as sensitively as possible, though technical requirements and constraints may limit the possibilities. Developments should not physically obstruct aerodrome operations, technical sites or existing

transmitter/receiver facilities. The cumulative visual effects of equipment should be taken into account. (para 299).

In order to achieve sensitive siting and design, para 295 of SPP signposts a series of options to be considered when selecting sites and designs for base stations. This is a checklist rather than a rigid set of steps

PAN 62 advises that the fundamental principle in siting and designing equipment is to minimise the contrast between the equipment and its surroundings. This can be achieved in two ways. Firstly by minimising contrast between equipment and people's expectations of a particular scene, such as assimilating a streetworks proposal with street furniture, and secondly by minimising contrast between equipment and its immediate setting or background by using existing features to screen or act as a backdrop to the proposal.

## **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 licence. In addition S.P.P advocates mast and site sharing within the series of options for consideration for the sensitive siting and design of mobile radio base stations. Vodafone and Telefónica have implemented a number of measures to identify and maximise site-sharing opportunities.

## **6.0 COUNCILS**

Government guidance on mobile telecommunications 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.

## **7.0 CONSULTATION**

S.P.P. recognises the importance of operators and their agents establishing an informed working relationship with planning authorities and encourages pre-application discussion. PAN 62 provides further information at paragraph 114 and Annex E on the Mobile Operators Association Ten Commitments to Best Siting Practice. Commitments 1 and 2 relate to pre-application consultation with the community and the planning authority. Such consultation is undertaken in accordance with MOA's Traffic Light Rating & Site Selection & Planning Model.

The operators fully comply with the 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.

A detailed report stated there is no scientific basis for siting base stations away from schools (NRPB report, January 2005)

## **8.0 LEGAL CASE**

The following legal case may be helpful;-

### **8.1 Harrogate case November 2004**

The Court of Appeal gave a judgment that Government Planning Guidance in PPG8 and now replaced by the NPPF (in England) 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.

## 9.0 FURTHER INFORMATION

We trust the above answers your main queries regarding our planned installation.

The enclosed site-specific details will identify any alternative discounted options and reasons why they were rejected and how the proposed site complies with national and local planning policies. The following websites may also be of interest:

Scottish Government Planning:

<http://www.gov.scot/Topics/Built-Environment/planning>

<http://www.gov.scot/Topics/Built-Environment/planning/National-Planning-Framework>

<http://www.gov.scot/Topics/Built-Environment/planning/Policy>