Network deployment – Our approach

We are deploying innovative technical solutions to extend and improve the capacity of our networks while minimising the impact of our base stations on communities and the environment.

Our mobile services rely on a network of more than 263,400 base station sites to send and receive calls and data. The network continues to expand as we extend coverage in emerging markets and improve capacity for new services in developed markets. We are working to reduce the overall number of base stations needed to achieve the desired coverage by deploying innovative technical solutions and cooperating with other operators to share sites.

When choosing a base station site, we must balance many, often conflicting, factors – including technical considerations, community concerns and visual impact. Most people welcome improved coverage and services but we recognise some have concerns about the location of new base stations, which we aim to understand and address through community consultation.

Some people are also concerned about potential health issues relating to radio frequency fields and we have a dedicated website on mobiles, masts and health to address these concerns, including links to independent, scientific reviews.

Improving our network

We want all our customers to access fast and reliable data services wherever they are. In 2013, we launched Project Spring, a £7 billion investment to improve our voice and data service offering in both mature and emerging markets. Over the next two years, we plan to upgrade and expand our networks to boost our 3G mobile coverage and further roll out 4G technology in Europe. Find out more about how Project Spring is supporting Vodafone’s strategy in our Annual Report.

Responsible network deployment

Our Site Planning and Implementation Guidelines, along with our EMF and Health and Safety standards, set consistent standards for all our markets in five key areas: legal compliance, environmental impact, radio frequency emissions, site planning and selection, and health and safety. Accompanying guidelines demonstrate best practice and help each market adapt the Group guidelines and standards to local needs.

The standards and guidelines also apply to contractors and their sub-contractors, who carry out much of the work involved in network deployment – from the planning and acquisition of sites to the construction and maintenance of base stations. Contractor compliance is a priority and we have an audit programme in place to monitor contractors’ performance in the key area of health and safety.

When selecting base station sites, we always aim to comply with local planning regulations. In some markets, complex local and national planning regulations (sometimes conflicting) mean it can take up to 18 months to obtain local permits for individual sites. However, Vodafone’s national operator licences often require coverage to be expanded sooner. As a result, some base stations may not have a local permit (see our Data section on violations of planning regulations). All our base station sites are designed and built to comply with international and local safety guidelines regardless of whether they are licensed as part of local or regional planning regimes.

In many countries we have signed up to recognised national codes of conduct for responsible network deployment. These codes are often in partnership with other service providers, local authorities, governments and consumer associations.

Community consultation

We want to roll out our network quickly, but community consultation is vital and can take time. We aim to balance technical considerations with community concerns, which can conflict. For example, higher masts can sometimes improve coverage but can also have greater visual impact.

Clear communication is key to alleviating concerns by keeping communities informed of plans. Training and information packs aim to help employees respond to questions clearly and openly.
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We tailor our communications and consultations in each market depending on local regulations and public attitudes – what is acceptable in one country may not be in others. When people do raise objections to planned base stations, we listen and accommodate their views as far as possible. The table shows some of the main factors we consider when deciding where to put our base stations.

<table>
<thead>
<tr>
<th>Community considerations</th>
<th>Technical considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Public concern relating to schools, hospitals, nature reserves and other such areas</td>
<td>• Compliance with local RF field strength guidelines</td>
</tr>
<tr>
<td>• Visual impact on the landscape</td>
<td>• Good coverage, capacity and improved services</td>
</tr>
<tr>
<td>• Compliance with local planning regulations</td>
<td>• Strong and safe construction</td>
</tr>
<tr>
<td>• Minimal disturbance to the community</td>
<td>• Efficient rollout</td>
</tr>
<tr>
<td>• Access to information</td>
<td>• Appropriate positioning to connect to the network</td>
</tr>
<tr>
<td>• Consultations</td>
<td>• Easy access and maintenance</td>
</tr>
<tr>
<td></td>
<td>• Access to power supply</td>
</tr>
</tbody>
</table>

Reducing visual impact

We use a range of base station designs to ensure we can choose the most suitable for each situation and blend in with the local environment. Each base station consists of antennas that emit and receive radiofrequency signals, a supporting structure and a cabinet to house network equipment.

Some are purpose built, some use masts shared with other operators and some are placed on existing structures such as rooftops or lamp posts. Some local communities prefer a bespoke design such as a tree mast to disguise the base station, while other communities prefer a discreetly sited standard design.

Examples of best practice for reducing visual impact are included in our guidelines on responsible network deployment and shared among local markets through internal conferences and our intranet. These include:

• Sharing sites with other mobile phone operators
• Using existing structures to support antennas and house equipment where possible

• Designing masts to blend into the surrounding street furniture, for example by looking like street lamps or flagpoles
• Constructing equipment cabinets from materials that match the environment or painting them to blend in
• Positioning masts so they are shielded from the most obvious viewpoint
• Ensuring small cell base stations meet our design criteria and fulfils local council requirements related to weight, size and the way they look.

Network sharing

More than 65% of base station sites across the Group are shared with other networks. By cooperating with other operators to share sites, we can accelerate the deployment of our network, limit the total number of sites required to provide coverage and cut costs by around 20%. Energy use and environmental impacts are reduced, making site sharing an important element of our strategy to improve network efficiency (see our Environmental footprint section). In Europe, the EU Commission also sees network sharing as a means to support the fast deployment of (new) mobile networks.

Sharing sites also relieves pressure on planning authorities because there are fewer sites to review. Sharing also helps us respond to communities’ desire to reduce the need for additional structures in their area. However, we recognise that we must also take into consideration that shared sites can raise other concerns because they are often larger and therefore more noticeable.

The majority of our network sharing is ‘passive’ – sharing site and infrastructure such as masts or poles and air conditioning units (see diagram on next page). ‘Active’ network sharing arrangements – where radio equipment is also shared – can be much more difficult to agree due to technical issues and the need to establish a high level of trust between competitor operators. We are, however, pursuing active network sharing in some markets despite these challenges. In some cases, licence agreements also require separate radio equipment to preserve full competition between operators.
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In March 2014, we committed to working with seven other major mobile operator groups on network sharing initiatives that will provide internet, mobile broadband access and affordable mobile services to unserved rural communities across Africa and the Middle East.

There are three types of network sharing:

### Passive sharing

The site and mast are shared but each operator maintains its own network equipment.

### Active sharing

All infrastructure is shared at a certain site, including the mast and network equipment.

### Regional roaming

Individual base station sites are maintained by individual operators with an agreement to use each other’s sites in different regions, expanding the coverage of each operator’s network without the need for more base stations.

**Data**

**Base station sites**

<table>
<thead>
<tr>
<th></th>
<th>2011/12</th>
<th>2012/13</th>
<th>2013/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of base station sites</td>
<td>238,000</td>
<td>248,000</td>
<td>263,400</td>
</tr>
<tr>
<td>Number of violations of planning regulations in relation to masts / base station sites¹</td>
<td>292</td>
<td>239</td>
<td>182</td>
</tr>
</tbody>
</table>

**Notes:**

1. The majority of these cases relate to base stations being moved or not built due to planning restrictions