Tackling Partial Not-Spots in Mobile Phone Coverage

Consultation Document

5 November 2014

Contents

Ministerial Foreword

Mobile phones are no longer the luxury they once were. Today they are a central part of our modern lives and are widely viewed as an essential service. Consequently, we expect to be able to use our phones no matter where we are in the UK for work or pleasure.

This isn't just about lifestyle, it's vital for our modern economy.

Government has already introduced the Mobile Infrastructure Project to tackle the issue of complete not-spots, where there is no mobile signal available at all. However, I believe coverage should be much better. Over 20% of the UK is affected by partial not-spots – places where there may be a signal from one or two operators but not all four (O2, EE, Three and Vodafone).

This means that over one million people who live in these areas do not have the same choice of provider, handsets and packages as consumers elsewhere in the country. Meanwhile, the tens of millions of visitors to these areas lose connectivity as they can no longer access a signal from their own provider.

This consultation sets out a suite of policy options to achieve my goal of addressing this issue. I have held initial discussions with the four Mobile Network Operators and I note the work in place to improve coverage. I am keen to work with them to find a voluntary solution to the problem, however I would be prepared to mandate a solution in line with wider government interests, should insufficient progress be made.

Mobile phone coverage in the UK is already among the best in Europe, but I believe that it can be even better. Enabling everyone to access a mobile signal wherever there is one available is central to ensuring that the UK has a world-class digital economy now and in the future.

Rt Hon Sajid Javid MP
Secretary of State for Culture, Media and Sport

Scope of the Consultation

1. This is a public consultation which covers the UK. We particularly seek views from the mobile industry (network operators, retailers, Mobile Virtual Network Operators, wireless infrastructure providers), rural groups, consumers and those living in partial not-spots.

2. The consultation period will run for 3 weeks from 5 November to 26 November 2014.

3. Please respond before the closing date. There is a summary of questions at page 42. Please send responses to partialnotspots@culture.gsi.gov.uk. Responses sent to any other inbox will not be taken into consideration. If you do not have access to email, please respond to:
   > Partial Not-Spots Consultation
   > Telecoms team
   > DCMS, 100 Parliament Street
   > London SW1A 2BQ

4. This consultation is intended to be an entirely written exercise but we reserve the right to follow up any responses to seek further information. Please contact Vicky Smith on 020 7211 6000 if you require any other format e.g. Braille, Large Font or Audio.

5. For enquiries about the handling of this consultation please contact the DCMS Correspondence Team at the above address or email enquiries@culture.gov.uk heading your communication 'Partial Not-Spots consultation'.

6. Copies of responses may be published after the consultation closing date on the Department's website: www.gov.uk/government/organisations/department-for-culture-media-sport

7. Information provided in response to this consultation, including personal information, may be published or disclosed in accordance with access to information regimes (these are primarily the Freedom of Information Act 2000 ('FOIA'), the Data Protection Act 1998 ('DPA') and the Environmental Information Regulations 2004).

8. If you want the information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other

things, with obligations of confidence. In view of this, it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information, we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

9. The Department will process your personal data in accordance with the DPA, and in the majority of circumstances, this will mean that your personal data will not be disclosed to third parties.

10. This consultation follows the Government's Consultation Principles 2013 which is available at:
https://www.gov.uk/government/publications/consultation-principles-guidance

Executive Summary

1. The provision of basic core services such as power, water and telecoms to all is a key component of government policy. Research by Ofcom suggests that "the services seen as most essential by consumers were voice services in general, but mobile services in particular (voice and text)". It also noted that "consumers ranked the importance of telecommunications services alongside other 'key' essential services, like household utilities".[1]

2. Up to 21% of UK landmass is affected by partial not-spots. These are areas in which mobile phone coverage is provided by one or two of the UK operators (Vodafone, O2, EE and Three), but not all four. Partial not-spots affect a greater proportion of the country than complete not spots irrespective of how coverage is measured: 3% of UK premises, 10% of A roads, 16% of B roads and 21% of landmass. There is no direct policy initiative on the issue of partial not-spots.

3. The measures under consultation aim to eliminate partial not-spots for voice calls and text wherever possible and maximise the area in which consumers can make and receive calls and send and receive texts within the combined network coverage footprint of the four UK Mobile Network Operators (MNOs).

4. Any measure implemented should deliver additional coverage at the earliest point possible, though not at the expense of aggregate coverage improvements. It will also need to consider potential effects of some of these options in other areas, for example on the work of the emergency services and the intelligence agencies. In order to deliver maximum benefit, this should ideally be in place by the end of 2016.

5. This consultation examines three potential measures to address the problem of partial not-spots:
   a. addressing coverage (infrastructure sharing);
   b. Multi-Operator-Mobile Virtual Network Operator (where mobile services are retailed by an entity distinct from a mobile network operator e.g. TalkTalk Mobile, Virgin Mobile);
   c. national roaming.

---

[1] Ofcom (2014) Results of research into consumer views on the importance of communications services and their affordability http://stakeholders.ofcom.org.uk/binaries/research/affordability/affordability_report.pdf

It also considers a 'do nothing' option.

6. Government does not have a preferred option and is keen to hear views from stakeholders about the feasibility and desirability of all four proposals to inform its work in addressing partial not-spots.

7. As set out in initial discussions with the four UK MNOs, Government is looking for all parties involved to agree an effective solution preferably on a voluntary basis. However, in the event that a solution cannot be agreed, Government will consider whether to require measures to be taken. Some possible measures and draft legislative instruments are set out in this document. This consultation constitutes statutory consultation required by the relevant legislation.

8. **Do-nothing scenario:** The 'do-nothing' scenario examines the impact of measures that MNOs are already undertaking that reduce partial not-spots. Vodafone and O2's infrastructure sharing project, Project Beacon, represents one of the most significant changes to the UK's mobile network since the merger of Orange and T-Mobile to form EE and has important implications for the overall coverage achieved by the sector. In terms of total land area, Ofcom estimates that the percentage of total land mass that are partial not-spots will decrease from 21% to 13%. It is also possible that the Emergency Services Mobile Communications Programme (ESMCP), may also potentially contribute to the reduction in partial not-spots, but its impact on hand-held devices is not clear.

9. **Addressing coverage (infrastructure sharing):** Infrastructure sharing refers to shared use by multiple MNOs of equipment within a shared compound. This includes:

    - 'site sharing' in which entirely separate equipment is installed by each MNO within the same physical compound;

    - 'mast sharing' in which the same physical radio mast is used by each MNO to install entirely separate equipment; and

    - and 'full radio access network (RAN) sharing' where the same active equipment (antennae, base station electronics, and power) is used by the sharers.

10. There has recently been increased infrastructure sharing as the four UK MNOs have reached agreements to jointly manage physical networks (Mobile Broadband Network Limited (MBNL) in the case of EE and Three,

Cornerstone Telecommunications Infrastructure Limited (CTIL) in the case of O2 and Vodafone) in order to rationalise network deployment and reduce operational costs. Some of this work is ongoing, but once complete any further infrastructure sharing will necessarily imply sharing between the two physical networks (i.e. CTIL sharing sites, masts or RAN with MBNL and vice versa) or with the remaining sites operated independently by Three.

11. There is no direct technical barrier to mast sharing, site sharing or full RAN sharing, insofar as technical solutions are available. Such sharing arrangements have been successfully implemented in the UK and other markets. There are however practical considerations which limit the ability to share any specific site.

12. Two UK MNOs have made proposals to DCMS on mast sharing beyond existing infrastructure sharing arrangements. We have assessed that these proposals apply to between 527 and 627 masts. The costs and benefits of these proposals are analysed in the accompanying impact assessment.

13. Government would by preference look to MNOs to agree a more ambitious programme of passive infrastructure sharing. In the absence of such an agreement, Government may seek to direct Ofcom to vary the terms of Wireless Telegraphy Act 2006 licences for spectrum held by MNOs to include a coverage obligation that would require MNOs to achieve a level of geographic coverage equal to the combined geographic coverage figure for all MNOs. The direction would not specify how to implement this and the MNOs would be free to use a mixture of mast-sharing, roaming and other innovative solutions.

14. **Multi-Operator Mobile Virtual Network Operator:** A mobile virtual network operator (MVNO) refers to a range of business models whereby mobile services are retailed by an entity that is (at least to the retail consumer) distinct from the MNO on whose network the service is provided. The UK has a vibrant MVNO market. Examples of UK MVNOs include Virgin Mobile and TalkTalk Mobile.

15. A 'multi-operator' MVNO (MO-MVNO) would have agreements with two or more MNOs to provide access to their networks. In order for this to result in improved coverage for a subscriber, over use of one of the four MNOs, it would be necessary for the MVNO to enable subscribers to access these multiple networks (as opposed to simply apportioning a different host MNO to different subscribers on that single MNO's coverage). Though we have not been able to identify any regulatory or practical obstacle that prevents such a model arising, such offerings have not yet been made widely available to UK

consumers. Niche offerings are available, for example Manx Telecom offers access to the four UK MNOs on the basis of international roaming agreements using UK numbers.

16. There are two broad physical models by which an MO-MVNO could be established:
    a. Through a full MVNO with its own core network infrastructure. The MVNO would reach agreements with multiple host MNOs and provide a service where subscribers' phones either (1) connect preferentially to the RAN of a single host MNO and to other partner MNOs when the preferred MNO is not available, or (2) connect to the RAN of whichever partner MNO provides the strongest signal. The itemised customer billing functionality is provided by the MVNO.
    b. Through 'international' roaming agreements. The MVNO would reach agreements similar to those used in international roaming and at comparable or more favourable prices. As with current international roaming agreements, a third party would provide billing services and this cost would have to be factored into the consumer offering.

17. In order to ensure that existing MVNOs and new entrants are able to operate on an MO-MVNO model, Government would look to MNOs and MVNOs to ensure that agreements do not contain exclusivity provisions, as these constitute a significant barrier to MO-MVNO offerings. If agreements containing such provisions are likely to continue then Government would look to direct Ofcom to vary the terms of Wireless Telegraphy Act licences for spectrum used by MNOs to provide that MNOs, when entering into agreements with MVNOs, will not restrict the right of an MVNO to enter into agreements with other MNOs and that the terms of any agreement are fair and reasonable. The Government will also seek to ensure that MNOs are obliged to offer such agreements.

18. **National Roaming:** Under national roaming, in partial not-spots the coverage being provided by one or more MNOs would be made available to all other MNOs as well. As a result, a consumer could make or receive voice calls and send or receive text messages on their mobile phone in an area where their home network has no coverage. As it offers the potential to eliminate partial not-spots altogether in the UK, national roaming could make a significant contribution to extending coverage for consumers in the UK. However, there might be significant consequences for law enforcement work.

19. As is the case with other solutions such as mast sharing, the Government is aware that there are technical and other issues noted above that would need

to be resolved. The cost of resolving these need to be balanced against the benefits national roaming offers to consumers.

20. In discussions MNOs have reflected a clear desire to improve coverage for their customers, but there has been no willingness to deliver national roaming on a voluntary basis. The Government is therefore considering mandating national roaming as one of its options to tackle partial not-spots. This would make it obligatory for MNOs to share the coverage in partial not-spots.

21. To mandate roaming would mean directing Ofcom by way of secondary legislation to vary the licences of MNOs by requiring MNOs to enable non-seamless roaming in areas where there are partial not-spots. It is not proposed to extend national roaming beyond voice and text services.

The Proposal

22. The provision of basic essential services such as power, water and telecoms to all is a key component of government policy. Yet how an 'essential' telecoms service is understood has changed over time. Recent Ofcomresearch notes that "ultimately a service is essential if not having the service results in being excluded from normal social and economic activities".[2] There were four contexts within which this was identified:

    a. Safety, and access to emergency services – contacting someone in the event of an emergency, e.g. 112/999 or a family member, seeking rescue, and accessing information that prevents or reduces danger;

    b. Communication and social inclusion - being able to keep in touch, both to reach others and to be contactable, for physical and emotional well-being;

    c. Access to information, education and entertainment – for instance, broadcast news and information, education that helps to reduce division in society and breaks down stereotypes, informing people overall, and access to entertainment for social and emotional well-being and to enable bonding with others; and

    d. Economic livelihood – for instance, gaining access to work opportunities and meeting the expectations set by employers.

23. These benefits of social and economic inclusion provide value to society beyond the pure private value to the individual. In this light, the research by

---

[2] Ofcom (2014) Results of research into consumer views on the importance of communications services and their affordability
http://stakeholders.ofcom.org.uk/binaries/research/affordability/affordability_report.pdf

Ofcom suggested that "the services seen as most essential by consumers were voice services in general, but mobile services in particular (voice and text)". It also noted that "consumers ranked the importance of telecommunications services alongside other 'key' essential services, like household utilities".

24. The measures under consultation aim to eliminate partial not-spots for voice calls and text wherever possible and maximise the area in which consumers can make and receive calls and send and receive texts within the combined network coverage footprint of the four UK Mobile Network Operators (Vodafone, EE, O2 and Three). The market has moved to reduce the prevalence of partial not-spots itself through greater infrastructure sharing through Project Beacon. However, this will still leave 13% of geographic land mass in partial not-spots and other market-led solutions do not appear to be able to deliver substantial decreases in this figure. Therefore government intervention may be necessary to secure further progress.

25. Any measure implemented should deliver additional coverage at the earliest point possible, though not at the expense of aggregate coverage improvements or the ability of law enforcement. In order to deliver maximum benefit, this should ideally be in place by the end of 2016.

26. This consultation examines three potential measures to address the problem of partial not-spots:
    a. addressing coverage (infrastructure sharing);
    b. Multi-Operator-Mobile Virtual Network Operator (where mobile services are retailed by an entity distinct from a mobile network operator);
    c. national roaming.
It also considers a 'do nothing' option.

27. Government does not have a preferred option and is keen to hear views from stakeholders about the feasibility and desirability of all four options to inform its work in addressing partial not-spots.

28. As set out in initial discussions with the four UK MNOs, Government is looking for all parties involved to agree an effective solution, preferably on a voluntary basis. However, in the event that a solution cannot be agreed, Government will consider whether to require measures to be taken. The possible measures and appropriate draft legislative instruments are set out in this document. This consultation constitutes statutory consultation required by the relevant legislation.

Background

29. In 2010, Ofcom highlighted five particular aspects of poor or non-existent coverage, referred to as "mobile not-spots":
    a. Complete not-spots: where there are no networks at all – neither 2G nor 3G coverage;
    b. 3G/mobile broadband not-spots: where there is 2G but no 3G coverage;
    c. Interrupted coverage 'on the move': not-spots experienced when travelling;
    d. Indoor coverage: where there is no (or very poor) coverage inside buildings;
    e. Partial not-spots: operator specific not-spots, where there is coverage by some, but not all, operators.

30. A number of existing initiatives are being undertaken to address complete, mobile data, indoor and 'on-the-move' not-spots. These initiatives are outlined in the table below:

Initiatives to deal with Not-Spots

Type of not spot	Initiative
Complete not-spots	In October 2011, the Government announced the Mobile Infrastructure Project (MIP) – a £150 million capital expenditure plan to bring mobile network coverage to consumers and businesses that live and work in such areas. MIP is targeted at complete not-spots only.
Mobile data not-spots/Indoor not-spots	The large-scale introduction of 4G and the 800MHz and 2.6GHz spectrum auctions are targeted to significantly reduce mobile broadband not-spots. While stopping short of universal coverage, competition for the 4G licenses resulted in commitments by the MNOs to match the 98% indoor data coverage obligation placed on spectrum acquired by O2 by the end of 2017.
On the move not-spots	Network Rail is in the middle of a £1.9bn digital communications improvement programme to upgrade both its fixed line and mobile infrastructure. A new fibre optic network should be capable of handling up to 192,000 gigabit per second (Gbit/s) of data. It is expected that up to 70% of rail passengers by 2019 will benefit, while addressing a number of rail related not-spots.

31. In addition to these specific initiatives to improve not-spots, the Emergency Services Mobile Communications Programme (ESMCP) will place a requirement on the specific MNO selected to deliver Mobile Services for the Emergency Services Network to:

- Further address coverage not-spots in their national commercial infrastructure by December 2016 (Lot 3), primarily for vehicle based devices on major and minor roads.

- Extend their network over an infrastructure provided by ESMCP (Lot 4) to achieve 97% geographic coverage (to vehicle based devices) by between December 2016 and July 2018.

ESMCP has applied to the EU for State Aid approval for Lot 3, which would allow the MNO providing mobile infrastructure for ESMCP to take advantage of the additional coverage for its existing customers, and also to open Lot 4 to all MNOs. A successful outcome of this application is anticipated before July 2015 and may heighten competitive pressure on other MNOs to extend into those areas too.

It is not yet clear the extent to which the vehicle coverage provided by ESMCP in Lots 3 and 4 will be accessible to commercial handheld devices, which require a greater signal strength than vehicle based equipment, although there will be some handheld coverage for police in Lot 4 and a significant amount in Lot 3. It is nonetheless clear there is likely to be a significant improvement in coverage for commercial subscribers of the MNO that delivers Lot 3, and once State Aid is approved, Lot 4, that will be accessible by other MNOs.

32. There is no direct policy initiative aimed at tackling partial not-spots. Yet partial not-spots affect a greater proportion of the country than complete not spots irrespective of how coverage is measured: affecting 3% of UK premises, 10% of A roads, 16% of B roads and 21% of landmass.

33. There are two particular costs associated with partial not-spots:

a. Those who live and work in areas with partial not-spots face limited choice over the mobile products that they can use. Customers living in areas with coverage from multiple MNOs have a wider range of handsets, prices, data packages and terms than those not served by all operators;

b. Those who travel into partial not spot areas will lose mobile connectivity if the area is not being served by their own operator.

34. To get maximum efficiency from spectrum (the radio waves mobile phones and other wireless devices use to communicate – a limited and sought after

resource), people should get a service wherever a signal is available. The Government wants to make sure that everyone can access voice communications wherever this is technically possible, taking into account any impact on core law enforcement capabilities.

The Electronic Communications Code

35. The Electronic Communications Code (the Code) is the statutory regime[3] that regulates the legal relationship between landowners and infrastructure providers. The Code has been heavily criticised as confusing and out of date, and in 2011 the Government asked the Law Commission to undertake a review of whether the Code remained fit for purpose. Following an extensive consultation with industry and landowners, the Law Commission published its report in February 2013.

36. Since this time, Government has been considering the implications of the Commission's recommendations on network roll out and service provision to consumers. The Code underpins the roll out of physical communication infrastructure. Naturally, all options to address partial not spots are being considered within the context of Code reforms. We are committed to ensuring that any reformed legal framework supports efforts to improve network coverage while balancing the rights of all parties involved. Government will make its plans for Code reform public in due course.

Q.1: Do you agree that there is a need to improve the coverage of voice and text services in partial not-spots and that Government should seek to extend such coverage?

---

[3] Schedule 2 of the Telecommunications Act 1984, amended by the Communications Act 2003

Options for Reform

37. Following initial work by Government and discussions with the telecoms industry and Ofcom, we have shortlisted three potential measures for tackling partial not-spots. These are evaluated against a do-nothing scenario which includes the existing changes to the network committed by MNOs, most notably Project Beacon.

38. It is acknowledged that there are risks associated with the outcomes of these initiatives, and this must be considered as part of the analysis of the do-nothing scenario.

Do-Nothing Scenario

39. Vodafone and O2 have formed a new joint venture (TowerCo), into which the parties' base station sites and site management businesses have been transferred along with their related passive mobile network assets. Accordingly, TowerCo will be responsible for the management of a single, optimised grid of base station sites, including liaising with landlords and decommissioning or acquiring sites. The venture formalises a pre-existing arrangement between the parties to manage their sites jointly and facilitate site and passive asset sharing. The project also involves entering into contractual arrangements whereby the parties divide the UK into two regions, and each party over time takes responsibility for design, management and maintenance of the Radio Access Network (RAN) equipment in one half of the country. In this regard, parties deploy new Multi-Operator RAN equipment at each site to enable one set of radio equipment to broadcast multiple (or shared) frequencies.

40. This represents one of the most significant changes to the UK's mobile network since the merger of Orange and T-Mobile to form EE and has important implications for the overall coverage achieved by the sector. Ofcom has analysed these figures, and their estimate of the impact on partial not-spots coverage is provided in the table below:

Improvements to partial not-spots due to Project Beacon (source: Ofcom)

	2014	2016	Improvement
Premises	3%	2%	1%
Population (DCMS estimate)	1.5 million	1 million	0.5 million
Motorways	<1%	0%	-
A Roads	10%	6%	4%
B Roads	16%	9%	7%
Land mass	21%	13%	8%

41. Ofcom estimates the total premises in partial not-spots will reduce to approximately 2% by 2016. In terms of total land area, Ofcom estimates that the percentage of total land mass that are partial not-spots will decrease from 21% to 13%.

42. In addition to Project Beacon, there are also a number of internet- based initiatives that are being undertaken to assist in delivering greater connectivity, especially in rural areas. Vodafone, for example, has an initiative called Rural Open Sure Signal, which started in 2011, and uses a broadband internet connection to provide 3G connectivity to rural areas as a community-led trial in 12 communities. The project has given reliable mobile access to over 8,000 people in the 12 communities which are drawn from across the UK from the Shetlands in Scotland to Newton St Cyres in Devon. Vodafone announced the next phase of the programme in July 2014 to give a further 100 rural communities across the UK the opportunity to have reliable mobile access for the first time.

43. Such voice connectivity over broadband connections are already offered on smartphones by a number of operators – such as O2's "TuGo" facility, as well as the recent announcement by EE that they would be delivering a voice over WiFi service that works without a separate app.

44. While these voice over WiFi schemes are of great interest, their key drawback is that they would still only provide services near or around premises where an individual has access to WiFi. They do not provide a viable solution to connectivity on a geographic scale. Given that the impact of these schemes would therefore be limited, we have primarily taken the improvements in geographic coverage as a result of Project Beacon (as identified by Ofcom above) to be the do-nothing scenario for this analysis.

Detailed Discussion of Policy Options

45. The three policy measures under consideration:
    a. Addressing coverage (infrastructure sharing);
    b. Multi Operator-Mobile Virtual Network Operators; and
    c. National Roaming

are discussed in detail below. While Government prefers that any measure is adopted voluntarily by the telecoms industry, this consultation document also outlines the legislative measures that we may undertake should Government decide to mandate a solution.

Addressing coverage (infrastructure sharing)

46. Infrastructure sharing refers to shared use by multiple MNOs of equipment within a shared compound. This includes:
    - 'site sharing' in which entirely separate equipment is installed by each MNO within the same physical compound;
    - 'mast sharing' in which the same physical radio mast is used by each MNO to install entirely separate equipment;
    - and 'full radio access network (RAN) sharing' where the same active equipment (antennae, base station electronics, and power) is used by the sharers.

47. Infrastructure sharing in the UK has largely been driven by commercial considerations. There has recently been increased infrastructure sharing as the four UK MNOs have reached agreements to jointly manage physical networks (MBNL in the case of EE and Three, CTIL in the case of O2 and Vodafone) in order to rationalise network deployment and reduce operational costs. These arrangements both employ elements of full RAN sharing. Some of this work is ongoing, but once complete any further infrastructure sharing will necessarily imply sharing between the two physical networks (i.e. CTIL sharing sites masts or RAN with MBNL and vice versa) or with the remaining sites operated independently by Three.

48. There is no direct technical barrier to mast sharing, site sharing or full RAN sharing, insofar as technical solutions are available. Such sharing arrangements have been successfully implemented in the UK and other markets. There are however practical considerations which limit the ability to share any specific site. These include:
    a. The load-bearing capacity of towers;
    b. Space within sites;
    c. Tilt and height of the antennae;

d. Adverse effects on quality of service when antennas are combined;
e. Different technical standards employed by equipment vendors;
f. How an operator has implemented their network;
g. The age of component parts of the network;
h. The provision and capacity of backhaul services to sites.

49. The extent to which these considerations can be mitigated can be limited by contractual and planning considerations. In some cases landlords or infrastructure providers specifically limit or prohibit sharing of various infrastructure elements or for third parties to benefit from existing infrastructure.

50. Government is already considering the scope to share infrastructure within the context of Code reform, and any reforms to the legal framework will need to balance the interests of all parties involved.

51. Two UK MNOs have made proposals to DCMS on mast sharing beyond existing infrastructure sharing arrangements. We have assessed that these proposals apply to between 527 and 627 masts. The MNOs in question assess this would eliminate partial not-spots in approximately 3% of UK landmass (compared with 21% landmass currently in partial not-spots). The costs and benefits of these proposals are analysed in the accompanying Impact Assessment.

52. The principal advantages of mast sharing as per these proposals are:
a. Availability of 3G and 4G data services that would not be provided under the national roaming option in this consultation; and
b. Seamless service with call handover between cell sites.

53. Conversely, the principle risks and disadvantages in mast sharing as per these proposals are:
a. Time to delivery: the considerations inherent in passive infrastructure sharing described above make it unclear whether passive infrastructure sharing could be delivered to a single consistent timetable for a broad range of sites. Some sites will require conclusion or renegotiation of commercial agreements and the presence of specific time pressures may disadvantage one or multiple parties to reaching such agreements.
b. Scalability: it is clear that infrastructure sharing on some sites will be more straightforward because the issues set out in paragraphs (48) and (49) do not arise or can be resolved quickly. However, a threshold will be reached beyond which further site sharing will either be technically disproportionate (and therefore not suitable for addressing

these partial not-spots) or the cost disproportionate to the benefit derived by the sharer's subscribers from these additional sites.

   c. Regulatory policy: In the event of an agreement on passive infrastructure sharing to achieve the policy objective stated in paragraph 3, Government would wish to ensure that all parties to the agreement were assured of its enforceability. In the absence of such assurance, Government may seek to ensure compliance through regulation as described in paragraph (55) below.

   d. Competition policy: in order to maintain the current level of differentiation between physical mobile networks, care would have to be taken to ensure passive infrastructure sharing is not extended to active network infrastructure elements. Further consolidation of existing active network elements could require consideration from a competition perspective.

Q.2: To what extent are sharing arrangements scalable beyond the simplest sites that could be shared?

54. Considering data received from MNOs and with reference to adjustments and estimates made by independent technical advisers, we estimate in our impact assessment that the incremental cost per site of implementing mast sharing as per the proposals referenced in paragraph (51) is £50,000 in capex and £10,000 in annual opex. Based on MNOs proposals of 527-627 masts this would result in capex costs of £26m-£31m and ongoing opex costs of £5m-£6m p.a. and result in a reduction in geographic coverage of partial not-spots of 3 percentage points. MNOs may seek to recoup such costs through charging a premium for minutes carried on these masts or through spreading the cost across all minutes carried. In 2013 mobile call volumes totalled 134 billion minutes in the UK (Ofcom Communications Market Report 2014) so such cost increases are likely to be very small.

55. Government would by preference look to MNOs to agree a more ambitious programme of passive infrastructure sharing than that hitherto proposed and referenced at paragraph (51). This would take the form of a "must offer/must accept" obligation in which MNOs agree to make available for sharing all possible sites, as well as agreeing to install equipment at all sites where this provides a coverage benefit. In the absence of such an agreement, Government may seek to direct Ofcom to vary the terms of Wireless Telegraphy Act 2006 licences for spectrum held by MNOs to include a coverage obligation that would require MNOs to achieve a level of geographic coverage equal to the combined geographic coverage figure for all MNOs. The direction would not specify how to implement this and the MNOs would be free to use a mixture of mast-sharing, roaming and other innovative solutions. A draft Direction to this effect is included at Annex A. A more

comprehensive site sharing agreement across more sites would have higher associated costs which will need to be assessed based on a final number of sites agreed or mandated.

Q.3: Would the draft Direction to Ofcom at ANNEX A be effective in requiring sharing at all sites where there would exist a potential coverage benefit?

Q.4: To what extent would the costings referenced in paragraph (54) be generally applicable to all sites at which sharing may be required by the coverage obligation?

Q.5: To what extent do you consider mast sharing will achieve sufficient improvements in tackling partial not-spots?

Multi-operator Mobile Virtual Network Operators (MO-MVNOs)

56. A Mobile Virtual Network Operator (MVNO) refers to a range of business models whereby mobile services are retailed by an entity that is (at least to the retail consumer) distinct from the MNO on whose network the service is provided. Within this range of models, a distinction is made between 'white label' MVNOs (wholly managed by the host MNO) and 'full' MVNOs (where the MVNO manages and owns various elements of the core network). The UK has a vibrant MVNO market, with many smaller operations offering niche products including low cost calls to specific international destinations. Examples of UK MVNOs include Virgin Mobile and TalkTalk Mobile.

57. An MO-MVNO would have agreements with two or more MNOs to provide access to their networks. In order for this to result in improved coverage for a subscriber over use of one of the four MNOs, it would be necessary for the MVNO to enable subscribers to access these multiple networks (as opposed to simply apportioning a different host MNO to different subscribers on that single MNO's coverage). Though we have not been able to identify any regulatory or practical obstacle that prevents such a model arising, such offerings have not yet been made widely available to UK consumers. Niche offerings are available, for example Manx Telecom offers access to the four UK MNOs on the basis of international roaming agreements using UK numbers, though these appear expensive when compared with tariffs offered by other UK MNOs and MVNOs. It is likely that no major UK MVNO has yet provided such an offering because (1) demand has been difficult to assess, and (2) agreements between MNOs and MVNOs generally include exclusivity provisions which prevent the MVNO from reaching simultaneous agreements with other host MNOs.

58. There are two broad physical models by which an MO-MVNO could be established:

    a. Through a full 'national' MVNO with its own core network infrastructure. The MVNO would reach agreements with multiple host MNOs and provide a service where subscribers' phones either (1) connect preferentially to the RAN of a single host MNO and to other partner MNOs when the preferred MNO is not available, or (2) connect to the RAN of whichever partner MNO provides the strongest signal. The itemised customer billing functionality is provided by the MVNO.

    b. Through 'international' roaming agreements. The MVNO would reach agreements similar to those used in international roaming and at comparable or more favourable prices. As with current international roaming agreements, a third party would provide billing services and this cost would have to be factored into the consumer offering. The only divergences from genuine international roaming agreements would be that (1) the agreement would potentially be with another UK-based communications service provider, and (2) reciprocal agreements would not be viable as the MNVO would not be able to provide its own RAN for the partner MNO's customers to roam onto.

59. To establish a new provider on the full MVNO model, the following broad steps would be required:

    a. Provisioning of the MVNO core network infrastructure (Home Location Register, Mobile Switching Centre, etc.);

    b. Negotiation of agreements with at least one host MNO and roaming agreements with other MNOs as required; and

    c. Development and launch of the retail offering.

60. In the case of an organisation which has existing staff and expertise in mobile network infrastructure provisioning, DCMS independent technical advisers suggest that (a) may be feasible in as little as 3-6 months for a single host network. Additional time may be required to allow provisioning for multiple host networks and to ensure appropriate support for law enforcement. Further bespoke software and extensive testing may be required to support multiple host MNOs, and the same advisers estimate this would take at least 3 months. Beyond this, the conclusion of suitable commercial agreements with host MNOs would take additional time and would depend on the goodwill of all parties and the number of agreements to be reached. In total it is estimated the proposed solution could be operational in 15 months.

61. DCMS independent technical advisers estimate that establishment of an MVNO on this model would cost on the order of £5m in capex and £1m-£3m annually in opex. This is based on a small niche MVNO targeted at those in and around partial not-spot areas rather than something marketed to the

general population. In addition MNOs are estimated to face capex costs of £1m each to support the interface between the host radio access network and the MVNO core network as well as ongoing opex costs of at least £100k p.a. each. Increased site rental costs could add an additional £1m p.a. in opex each for the three MNOs operating a 2G network. MNOs may seek to recoup such costs through spreading the cost across all minutes carried. In 2013 mobile call volumes totalled 134 billion minutes in the UK (Ofcom Communications Market Report 2014) so such cost increases are likely to be very small.

62. To establish a new provider on the international roaming MVNO model, the following broad steps would be required:
    a. Reach agreement with a single MNO partner as an anchor network and SIM provider;
    b. Reach international roaming agreements with other MNOs and agree data clearing house solution for billing of services;
    c. Development and launch of the retail offering.

63. The international roaming MVNO model hinges on striking an agreement with an anchor MNO and international roaming agreements with the remaining MNOs. Such agreements are well established, but remain subject to commercial negotiation and the risk that terms cannot be agreed. The incentive provided by reciprocal international roaming agreements does not apply to MVNOs and may hinder negotiations.

64. DCMS have not produced costing estimates for the establishment of an MVNO on the international roaming model.

65. The principle benefits of an MO-MVNO option for reducing partial not-spots include:
    a. Rapid implementation and comparative absence of practical per-site obstacles to implementation;
    b. Limited capex and opex costs compared with a national roaming solution (though costings dependent on implementation);
    c. Limited impact on existing network provisioning by MNOs;
    d. Limited physical network infrastructure changes;
    e. Possibility of implementing a 'best signal strength' solution which is unlikely to be commercially attractive to MNOs under national roaming although this may have a detrimental impact on battery life.

66. The principle risks and disadvantages of an MO-MVNO option for reducing partial not-spots include:

a. Current agreements between MVNOs and host MNOs generally contain exclusivity provisions that prohibit the MVNO from reaching similar agreements with further host MNOs.

b. Benefits of improved coverage are only available to subscribers of the MO-MVNO and not to all mobile users.

c. Commercial agreements with multiple host MNOs may be difficult to reach and conclusion of these on mutually favourable terms is dependent on goodwill from all parties.

d. Some agreements between landlords or wireless infrastructure providers and MNOs require payment by the MNO or renegotiation for provision of MVNO services from the installed infrastructure. It is conceivable that these costs may in effect be duplicated were multiple MNOs to reach agreements with a single MVNO. This cost would likely fall to the MVNO, though it is not clear that this would exceed the analogous cost arising from an agreement with a single MNO (as this would depend on the basis by which costs are calculated).

e. It may not be feasible to provide an MO-MVNO offering on an international roaming model at comparable tariffs to single operator MVNO and MNO offerings due to the third party functions associated with this model.

f. In order for an existing MVNO to provide a multi-operator service, there would be a requirement for SIM updates and this may pose technical challenges and present a barrier to complete penetration at the consumer level. This barrier would be overcome with time.

g. Depending on how the solution is implemented the consumer experience for subscribers may suffer some detriments compared to current mobile use. In particular, if a non-seamless solution was used then subscribers may experience more dropped calls than they would normally as they move from operator to operator. In addition, should the contractual arrangement be to have an "anchor" MNO provider that would have preferred status the consumer may suffer from lower battery life as their phone would most likely be set to scan more frequently for the anchor network's signal.

h. There may be an impact on law enforcement capabilities – this would need to be fully considered if this option were to be chosen.

67. In order to ensure that existing MVNOs and new entrants are able to operate on an MO-MVNO model, Government would look to MNOs and MVNOs to ensure that agreements do not contain the exclusivity provisions described in paragraph (66.a), as these constitute a significant barrier to multi-operator MVNO offerings. As an enabling measure, Government would look to direct Ofcom to vary the terms of Wireless Telegraphy Act licences for spectrum used by MNOs to provide that MNOs, when entering into agreements with MVNOs for voice and text, will not restrict the right of an MVNO to enter into

agreements with other MNOs and that the terms of any agreement are fair and reasonable. To provide data services, MNOs would have to strike separate deals as this would go beyond the scope of the current policy proposal. The Government would look to direct MNOs to offer MVNO arrangements. A draft Direction is set out at Annex B.

Q.6: Would the draft Direction to Ofcom at ANNEX B be effective in enabling the creation of multi-operator MVNO offerings in the UK, and why?

Q.7: To what extent would the costings referenced in paragraph (61) accurately represent the cost of establishing an MO-MVNO as described?

Q.8: Are there any practical considerations for the two MO-MVNO models described in paragraph (58) that would favour either as a solution for partial not-spots?

National Roaming

68. A mobile phone will always seek to find and lock on to its home network. While it can detect other networks in the area it will be denied permission to use them as the customer does not subscribe to those network providers. This means that subscribers remain on their home network and benefit from the range of services they have signed up for.

69. One option for overcoming the problem of partial not-spots is to enable a system of national roaming. This would mean that in partial not-spots the coverage being provided by one or more MNOs would be made available to all other MNOs as well. As a result a consumer could make or receive voice calls and send or receive text messages on their mobile phone in an area where their home network has no coverage. National roaming therefore offers the potential to eliminate partial not-spots altogether in the UK as all MNOs would be required to share coverage in the affected areas.

70. There are two broad types of national roaming available, seamless and non-seamless. Seamless national roaming takes place when a call is not dropped as the phone moves between networks as and when one becomes unavailable during a call. Under a non-seamless option, the call is dropped as one network becomes unavailable and the user would have to dial again once connection to the other network is made. A review of national roaming by

Analysys Mason[4] found that seamless national roaming, while possible, is both technically complex and likely to be more expensive to implement. As well as the cost element for operators it also reduces the differentiation between operators, as even an operator with poor coverage appears to have good coverage if there is an automatic handover to other operators.

Examples of roaming

71. The concept of roaming onto other networks is not new. When travelling abroad UK consumers can normally roam onto overseas networks and vice versa for overseas consumers traveling to the UK. This is made possible by agreements between MNOs in the UK and overseas.

72. A form of national roaming has also been used in the UK to facilitate the market entry of a new MNO – as a result Three customers in some areas can roam onto EE's 2G network where there is no 3G coverage provided by Three. Roaming has also been used in the merger of MNOs - when T-Mobile and Orange merged, a roaming arrangement was put in place to allow customers to roam on to each other's networks.

73. Roaming also exists on a very limited basis in the UK across all MNOs to enable emergency 999 calls to be made regardless of who provides coverage.[5]

74. There are also some, but not many, examples of national roaming in other countries. In France national roaming was part of the solution it used to tackle complete not spots (i.e. areas where no MNO provided coverage). As part of the government's subsidised programme (that was rolled out between 2003 and 2008) new masts were put up and it was a requirement that they allowed access to all MNOs. In Australia there have also been some instances where roaming has been allowed in specific local areas, enabling customers to roam onto another existing network.

75. This shows that roaming is technically possible and could help in significantly improving coverage for consumers in partial not-spots. However it is relevant

---

[4] Analysys Mason (2010) Study on the technical issues associated with the introduction of national roaming

http://stakeholders.ofcom.org.uk/binaries/research/technology-research/national-roaming.pdf

[5] However 999 roaming has shown that it can be technically complicated to ensure that all relevant data to ensure the safety of the public is available for emergency services. This would need to be taken into account when considering the viability of this option.

to note that there are no examples of roaming being done at a national level and on an 'any to any' network basis.

76. This is partly due to the nature of the telecoms industry. Being highly competitive, the extent of voice coverage has traditionally been a key point of differentiation between MNOs so they have invested heavily in developing networks to deliver the best services for their customers. As part of this work MNOs are continuously upgrading and investing in new technologies to deliver faster and more comprehensive mobile services to their customers. The upgrades to 3G and the current multi-billion pound investment in 4G networks provide evidence of this. MNOs have expressed concern that diverting resources to delivering national roaming for 2G or 3G voice services at a time when they are competing heavily on delivering 4G coverage and services could impact on their current investment programmes.

77. There are also technical challenges to national roaming. MNOs and DCMS technical consultants have advised that enabling roaming on a national scale is complex and would require extensive work by MNOs to iron out the issues for roaming to work on such a large scale.

78. This means that whilst national roaming could be an instinctive and appealing proposition for consumers, it could increase costs to MNOs and potentially impact on the investments being made by MNOs in the UK to deliver faster and better services for their customers. Careful consideration would need to be given to the technical challenges to deliver accurate and timely data to emergency services.

Technical challenges

79. In discussions, MNOs identified a number of issues that would need to be addressed to allow non-seamless national roaming. They also noted some potential consumer issues that may arise and need to be considered. These are summarised below and detailed in the Impact Assessment. Some consumer issues can be mitigated by individual subscribers choosing to disable roaming, and some concerns apply only when actually roaming, in an area where they would otherwise receive no service. Subscribers would need to decide whether the benefits provided by having service outweigh these issues.

Consumer experience

80. *Battery life*: MNOs have noted that there is the potential for greater battery drain as phones may increase the frequency of scanning for networks. This would have an impact if a user is regularly going in and out of coverage but as the Impact Assessment notes it is hard to quantify the magnitude of this

impact and in particular the additional impact over and above the routine scans carried out by mobile phones already.

81. ***Dropped Calls***: Whilst roaming will allow a call to be made where it could not have been made before in partial not-spots, non-seamless roaming means that it is possible for such calls to drop if a user moves back into an area covered by their home network and the phone reconnects to it.

82. A customer on the edge of their network coverage, without roaming would still be able to make a call but with roaming the call might bounce between their home network and another network with a stronger signal resulting in the call being dropped. This is likely to occur for a relatively small amount of the time and it may be possible to mitigate through setting network preferences.

83. MNOs note that they are striving to reduce the frequency of dropped calls but under roaming it would not be possible to identify whether dropped calls are happening due to internal problems within the networks, which can be improved by the operators, or due to national roaming, which the operator can do nothing about.

84. ***Loss of data services through signal lock***: This would occur where a customer has a strong 2G signal from another operator and roams onto them, losing their home network's weak 3G/4G signal. DCMS technical advisers consider this as potentially a large disbenefit as consumers value data access higher than voice. However, it may be possible to mitigate this to some extent through setting network preferences.

85. ***Unavailability of voicemail and other features***: Under national roaming, some of the added features of a mobile service, such as voice mail, may not be available. However this would depend on the type of arrangements put in place between the operators and therefore technological solutions to this could be found. Most networks can extend voicemail and major features to overseas networks when roaming internationally, so although it may be necessary to access voicemail etc. in a slightly different way, this is not seen to be a significant technological issue. However there may be additional costs associated with installing these additional features and how these are to be paid for. It should be remembered though that without roaming, consumers would not have signal at all so would not be able to access these features in the first instance.

86. ***Customer service and network outage***: A further concern that has been raised by the MNOs is the potential impact on all networks in the case of a network outage. The issue here is that in the case of a network outage on one network, the subsequent impact on the other networks from roaming on to them would cause problems for their own customers. Without an effective fail-safe this could even lead to other networks being overloaded with traffic, and

suffering subsequent outages of their own. Furthermore, in such a case, customers would not be certain on whose 'fault' the outage is. MNOs will need to consider how best this can be addressed and what investment would be needed.

Service Delivery Concerns

87. MNOs have noted a number of issues that would need to be addressed to enable national roaming. These are:

   a. **Area of coverage for national roaming**: National roaming cannot be implemented at a per site level (as masts are controlled at cluster level) so it will affect a wider group of consumers than absolutely necessary. This could add costs to MNOs. However as the Impact Assessment notes there is evidence to suggest that there are ways to target specific areas.

   b. **Network configuration**: MNOs will have to update their network functioning policies to allow other network SIMs to roam onto their networks.

   c. **Consumer provisioning**: A consumer's Home Location Register (that in effect controls who their customers can roam on to) will need to be updated to allow their customers to roam.

   d. **Consumer device/SIM configuration**: The above technical changes would require SIMs to be upgraded. This can take months of repeated targeted efforts to upgrade 'over the air' (eg via SMS) and still may not reach all consumers.

   e. **Voice service logic/Intelligent Network**: These services include access to voicemail and other services via short dialling and need extensive testing to function smoothly on an inter-network basis. However this would only affect consumers when roaming.

   f. **Retail and wholesale billing systems:** Extensive work will be needed to ensure that a robust billing system can operate between all MNOs to accommodate roamed calls so that consumers are charged correctly for their calls and texts.

   g. **Inter-operator testing:** National roaming would require extensive testing with the full cooperation of all MNOs to ensure that calls can be carried between the networks. It is expected that this would be time and resource intensive before a national roaming system can be launched.

88. We welcome comments on these issues from MNOs in particular to consider the extent of these issues and what options exist for tackling them.

Costs/benefits

89. National roaming would offer an improved service to all consumers who enter a partial not-spot. An estimated 1.5 million consumers who live in partial not-spot areas (reducing to around 1 million post-completion of Project Beacon) would benefit at the very least from a greater choice of providers, services and packages while those visiting partial not-spots would benefit from having mobile signal where they don't currently. From the information available we have assessed that the net present value over 10 years of the overall potential benefits of national roaming range from £54m to £249m. This reflects the value to UK consumers of having the ability to make and receive calls and text messages in partial not-spots when visiting those areas and doesn't capture the benefits of additional choice for consumers living there.

90. National roaming would inevitably require investment on the part of MNOs that would result in costs that need to be paid to other MNOs for use of their network in partial not-spots. It would be up to MNOs to determine the best way such costs could be recovered. One option could be for them to absorb such costs with a view to retain a competitive advantage to offer their customers comparatively better deals. Alternatively they could choose to recoup these costs as part of their normal commercial agreements with businesses and consumers.

91. We estimate that the net present value of the costs over 10 years could range from £276m to £400m and these are detailed further in the Impact Assessment. These relate primarily to the capital costs of IT and network system development and operating and site rental costs (for masts etc for the MNOs). MNOs may seek to recoup such costs through charging a premium for roaming minutes or through spreading the cost across all minutes carried. In 2013 mobile call volumes totalled 134 billion minutes in the UK (Ofcom Communications Market Report 2014) so such price increases are likely to be small. There might also be potential significant consequences for law enforcement.

92. We welcome feedback on the assessment of costs and benefits note in the Impact Assessment (see p. 40, questions 15-24).

Mandatory national roaming

93. Ofcom have advised Government that national roaming is technically feasible. The Government considers that national roaming can make a significant contribution to extending coverage for consumers.

94. The Government is aware there are technical and other issues noted above that would need to be resolved but the cost of resolving these need to be counterbalanced against the benefits national roaming offers to consumers.

95. Whilst discussions with MNOs have reflected a clear desire by the MNOs to improve coverage for their customers there has been no willingness to deliver national roaming on a voluntary basis. The Government is therefore considering mandating national roaming as one of its options to tackle partial not-spots. This would make it obligatory for MNOs to share the coverage in partial not-spots.

96. One means of mandating roaming would be to direct Ofcom by way of secondary legislation to vary the licences of MNOs by requiring MNOs to enable non-seamless roaming in areas where there are partial not-spots. A draft direction is attached at Annex C.

97. It is not proposed to extend national roaming beyond voice and text services.

Pricing

98. To ensure that the Direction is effective, we consider that it may be necessary to include provisions for controlling wholesale charges for roaming voice minutes. We consider that a site-specific approach for wholesale charges may be required rather than network-wide averages. This is to ensure existing investment incentives remain by allowing MNOs to recover costs incurred in providing roaming at individual sites.

99. Setting, or allowing MNOs to agree, a network-wide average charge may result in closure of those sites at which the cost of providing roaming is greater than the average charge, as these sites will be unprofitable. Site specific pricing (in the form of variable per minute charges for specific sites) would mitigate this unfavourable outcome. It is also uncertain whether MNOs would be able to agree charges expeditiously, even if required to act on a best endeavours basis.

100. However it is likely that under this charging approach a small number of low traffic sites may have per-minute costs that are very high. It is therefore plausible that a site specific pricing structure may need to be complemented by additional measures, or be refined to account for the wide spread in estimated per-minute costs at those sites carrying the least traffic.

101. We consider that a synoptic method for calculating per-minute costs for roaming minutes should provide for the following and this is reflected in the draft direction relating to national roaming.

a. The calculation should take account of the reasonable annualised costs, efficiently incurred, of maintaining and operating sites where roaming is provided. The calculation could include, for example, the direct operating, maintenance, and equipment costs at a given site; annualised capex costs; the estimated or actual costs of providing backhaul to the site; a reasonably apportioned fraction of the cost of procuring spectrum for providing voice services from the site and an appropriate cost of capital.

b. The calculation should take account of the reasonable costs efficiently incurred of providing for roaming at the site in compliance with a roaming condition. This could for example include site-specific surveys, equipment upgrades and the cost of human resources associated with these site-specific activities. This may also include any additional site-specific operating costs incurred as a result of providing the roaming service (e.g. additional backhaul provision or landlord charges).

c. The calculation should also take account of reasonable core network costs efficiently incurred – costs associated with the provision of roaming in compliance with a roaming condition at a network level and that are not site specific. This could include the cost of matters such as network processing, changes to billing systems and subscriber management systems and the cost of providing extra capacity in the core network. These costs would need to be apportioned between all sites affected by the roaming condition.

d. The sum of the various costs, set out above, should be divided by the predicted volume of all minutes of calls at the site. This will provide a price per minute.

e. All the elements of the calculation are subject to an expectation that MNOs will calculate and, where appropriate, apportion the various costs on a reasonable basis and be able to provide evidence of this.

102. We would propose directing Ofcom to permit charges for roaming voice services that reflect the costs of providing these services associated with specific sites, and to require a charge determined by these costs. Explicit provision for similar charging arrangements for roaming SMS services has not been included in the draft Direction. This has not been considered necessary to ensure the effectiveness of the Direction. It may therefore be necessary to alter the term 'E' to include roaming text services and permit similar charging arrangements should evidence be received to support this.

Q.9: Do you consider that national roaming should be implemented in the UK? Please give your reasons.

Q.10: Do you think the draft direction at ANNEX C will be effective in delivering national roaming?

Q.11: Should there be a mechanism for controlling maximum prices for roaming minutes, and should this be at the site level described above and in the Schedule to the draft Direction?

Q.12: To what extent does the method described above for determining the cost of providing voice roaming services accurately capture the cost base associated with the service?

Q.13: Should there be a mechanism for controlling maximum prices for roaming SMS services?

Q.14: To what extent are agreements between landlords or wireless infrastructure providers and MNOs a limiting factor in pursuing passive infrastructure sharing, multi-operator MVNOs, or national roaming?

Impact on law enforcement and security

103.   Any solutions to tackling partial not-spots would also need to ensure that they do not have a negative impact on law enforcement or security work that involves requests to MNOs for communications data or interception of communications. If national roaming or MO-MVNO were to be the preferred option, then before it is implemented an assessment will need to be made of the extent to which this increases data requests and related costs for industry and Government. Consideration will also need to be given to the extent to which this impacts the timing of any planned roll out.

Summary of Options and Impacts

104.   The table below summarises the cost benefit analysis of each option, which is explored in more detail in the attached impact assessment. Options are compared to a do nothing scenario which includes completion of Project Beacon by 2016. Project Beacon is projected to eliminate around a third of partial not-spot areas and the additional coverage benefits are relative to that counterfactual.

105.   The monetised costs have been provided by our expert advisers Plum Consulting who have estimated costs based on evidence provided by MNOs. There is uncertainty in these costs as Plum has limited visibility of networks' core operations. The monetised benefits have been modelled using a willingness to pay study conducted for the Mobile Infrastructure Project (MIP). Making this data relevant to partial not-spots requires several layers of assumptions. This gives large ranges on benefits, and excludes some populations.

	2G National Roaming – as per DCMS proposal	Addressing Coverage: Passive Infrastructure Sharing – MNO offers	Multi-Operator MVNO
Assumptions[6]			
1. Coverage gain	13% geographic area	3% geographic area	13% geographic area for subscribers
2. Timing	Rollout by start of 2016	Rollout by start of 2017	Rollout by mid-2016
Monetised Costs			
3. Capex costs	£16m-£32m per MNO, largely for IT and network system development **Total = £64m-£128m**	£50k per site for 527-627 sites **Total = £26m-£31m**	£1m per MNO, plus £5m for an MVNO to upgrade to "full MVNO" status **Total = £9m**
4. Opex costs	£8m-£10m pa for EE, Vodafone and O2 in additional site rental and opex. £0.5m pa per MNO in extra customer service. **Total = £26m-£32m pa**	£10k per site for 527-627 sites **Total = £5m-£6m pa**	£0.1m-£1.1m per MNO, £1m-£3m for MVNO **Total = £1.4m-£6.4m pa**
5. Impact on security and law enforcement agencies	Cost implication	No impact	Small cost implication
Non-Monetised Costs			
6. Investment Risk	Negative and significant	Negative and small	Negative and small
7. Consumer Issues - Battery life - Dropped calls - Loss of data services	 Negative but likely small Negative but small Negative but likely small	 Potential small positive impact Small positive impact Small positive impact	 Negative for subscribers Negative for subscribers Small positive impact for subscribers

---

[6] Please see the endnotes following the table for a fuller discussion of each issue covered in this column.

8. Resilience	Negative and significant	No impact	Negative but small
Monetised Benefits			
9. Willingness to pay (WTP) for signal of local visitors making 3hr+ trips to partial not-spot areas	26m trips estimated to benefit with WTP of 50p per day for strong signal and 21p per day for a weak signal **Total = £5m-£13m pa**	6m trips estimated to benefit with WTP of 50p per day for strong signal and 21p per day for a weak signal **Total = £1m-£3m pa**	No WTP data applicable but potentially a benefit for some regular local visitors who might take up this service
10. WTP for signal of domestic tourists making overnight visits	7m trips estimated to benefit with WTP of £2.75 per day for a strong signal and 23p per day for a weak signal **Total = £2m-£20m pa**	1.7m trips estimated to benefit with WTP of £2.75 per day for a strong signal and 23p per day for a weak signal **Total = £0m-£5m pa**	No WTP data applicable and it is unlikely that many irregular visitors would take up this service
Non-Monetised Benefits			
11. WTP for residents in partial not-spots	Small positive impact on a large number of people (1 million residents)	Small positive impact on a large number of people (250k residents)	Small positive impact on a large number of people (1 million residents)
12. WTP of businesses in partial not-spots	Small positive impact on all businesses in area	Small positive impact on all businesses in relevant area	Small positive impact on all businesses in area
13. WTP for commuters	Likely to be no impact	Positive	Likely to be no impact
14. WTP for partial not-spot residents working in/regularly visiting partial not-spots where own MNO not present.	Potentially a large value but for a small number of people	Potentially a large value but for a very small number of people	Potentially a large value but for a small number of people
15. Greater coverage for public services	No impact	Possible small positive impact on data services	No impact
10 Year **Net Present Value**	**Central estimate -£187m** **(-£346m to -£27m)**	**Central estimate -£49m** **(-£75m to -£22m)**	**Central estimate -£41m** **(-£60m to -£22m)**

Endnotes to the Table

1.Post Project Beacon, Ofcom have estimated that 13% of geographic land mass will be remaining in partial not-spots (cf. 21% currently). Roaming would eliminate this, infrastructure sharing as proposed by MNOs would achieve 3% and a Multi-Operator MVNO would eliminate all 13% but only for subscribers.

In some cases the proposed regulatory measure accompanying an option may lead to a greater coverage gain than postulated in the summary of impacts (e.g. by using a geographic coverage direction to facilitate widespread passive infrastructure sharing), and the coverage benefit enumerated in the Table is not intended to represent the maximum theoretical coverage benefit of any option.

2. Technical experts advise that roaming could be implemented in 9-12 months at the earliest. Roaming benefits therefore accrue from 2016 and transition capex occurs in 2015. Infrastructure sharing is estimated to take 2 years (by technical advisers) so benefits accrue from 2017 with capex in 2015 and 2016. A Multi-Operator MVNO is estimated to take 15 months to rollout with benefits from mid-2016 and capex largely in 2015.

3. and 4. These costs have been estimated by Plum Consulting based on figures provided by the MNOs. It should be noted that the MNOs estimates of the costs of roaming were substantially higher but Plum Consulting have re-estimated these based on more reasonable underlying assumptions.

5. The Home Office have advised that there will be some costs to central government, security and law enforcement agencies for two of the options. This is unlikely to be an issue for a passive infrastructure sharing option but would likely add potentially significant costs to government under the MO-MVNO option and national roaming options. Without more technical detail on the implementation of these two proposals, it is difficult to provide accurate estimates of the costs or the risks to law enforcement capabilities.

6. Investment risk around roaming involves three main elements.
   i. A wholesale price which does not adequately compensate the operator could incentivise MNOs to reduce 2G coverage as the affected masts would no longer convey a coverage advantage. Given the varying costs of different rural masts a single uniform price may not be able to provide such adequate compensation across all sites. Ofcom believe it is possible in theory to incentivise maintaining such sites using mast by mast prices, but that this relies in practice on commercial negotiations or a third party finding this price point.
   ii. MNOs compete on coverage and removing their ability to compete on this reduces incentives to expand coverage. For 2G the risk is

seen as minor as coverage is equalising and no major expansion is planned. The potential for roaming to impact expansion of 3G and 4G networks is currently a substantial risk that needs careful management.

iii. MNOs are currently investing heavily to roll out 4G and investment for roaming may reduce available capital. Although roaming costs may be recoverable over time it requires upfront investment so could at the very least slow the current 4G rollout if it diverts resources.

For infrastructure sharing radio networks are kept separate and there is no purchasing of minutes from each other so risk i) above is not relevant. Risk ii) is relevant as there is some convergence of coverage. However, the MNOs proposals for site sharing still maintain considerable differences so this risk is proportionally smaller. Risk iii) is also still relevant for infrastructure sharing but substantially smaller as the upfront capex costs are smaller.

For the Multi-Operator MVNO option risk i) is relevant as MNOs would have to sell minutes to the MVNO(s). However, as fewer customers would be expected to use the service than roaming the risk is proportionally smaller. Risk ii) is notable as although the MNOs will still be able to compete with each other on coverage there will be a competitor(s) in the Multi-Operator MVNO who they cannot compete with as any extra coverage will accrue to them too. Risk iii) is much smaller for this option as the capex expenditure will mostly fall on the Multi-Operator MVNO, not the MNOs.

7. See paragraphs 80-86 on national roaming and paragraph 66 (g) on a Multi-Operator MVNO solution. For passive infrastructure sharing the consumer experience would be the same as currently but there would some minor improvements for issues like dropped calls as networks would have slightly larger coverage.

8. Monetised costs for roaming have assumed no extra capacity is required for network resilience. MNOs have suggested capacity would need to be doubled at a cost of £100m+ each to ensure their networks could cope with all customers roaming from a rival network in the case of an outage. Plum Consulting advises this is excessive given outages are rare, however having no resilience requirement presents a risk of mass loss of service. There is a balance between cost and appetite for risk that will need to be made and development of a technical solution which mitigates this may be feasible with associated cost. This is not a problem for infrastructure sharing where networks remain separate. For the Multi-Operator MVNO option it could potentially be a risk as the customers of that MVNO(s) would move onto another network if one suffered an outage.

However, given the smaller number of subscribers expected this would be a far reduced impact.

9 and 10. Willingness to pay (WTP) figures have been taken from a RAND study of total not spots for MIP. Visitors to a partial not-spot who do not have access to the network operating there experience this as a total not-spot. WTP figures from the MIP study have been directly applied to an estimated partial not-spot visitor. To estimate the number of partial not-spot numbers an assumption has been made that visitors spread evenly across local authorities. This may over-estimate the benefits, but more granular data is not available.

Population has been scaled according to how many partial not-spots are removed under roaming and infrastructure sharing. The large ranges reflect uncertainty over the most appropriate WTP figures to choose from the study. For the Multi-Operator MVNO option it is not possible to estimate benefits in the same way as only those subscribing to the service would benefit, not all customers. It is more likely that residents or regular visitors to such areas would subscribe than those who visit these areas more irregularly.

11 and 12. Residents and businesses in a partial not-spot are assumed to choose an operator who provides coverage. Their only benefit is a choice of providers. The adult population in partial not-spots is estimated at 1 million post-Project Beacon completion and all of these would benefit under both the roaming and Multi-Operator MVNO option. Under the passive infrastructure sharing option only those within the areas suggested by MNOs would benefit and with the smaller geographic area covered this is estimated to be 250,000 people.

13. While travelling at speed on a train or in a car there will be limited benefit from non-seamless roaming or the Multi-Operator MVNO option as signal will drop in and out as the consumer passes through areas served by different operators. Passive infrastructure sharing will provide a seamless experience so will not have this problem.

14. It is likely only 2% of premises will remain in partial not-spots after completion of Project Beacon. Static individuals will usually have access to landlines and fixed internet so the incremental value of phone signal is less.

15. Emergency and critical public services access an independent communications network (Airwave). Replacement network including data service is under development.

Assumptions

Following our technical advice we have assumed that roaming could be operational by the start of 2016, a Multi-Operator MVNO could be operational by mid-2016 and passive infrastructure sharing could be operational by the start of 2017.

Q.15: Are these proposed timings feasible and to what extent can they be accelerated?

Non-Monetised Costs

The risk of MNOs switching off unprofitable masts under roaming is assumed to be manageable through setting mast-by-mast prices.

Q.16: Is this a reasonable assumption and would mast by mast pricing be an effective solution? Are there alternative solutions?

Q.17: Can you provide any evidence of the impact of roaming on battery life, dropped calls and loss of data service through 2G signal lock?

Q.18: To what extent could user customisation enable consumers to avoid these impacts?

Q.19: Are there any other substantial consumer issues which roaming could cause which are not covered in the Impact Assessment?

Q.20: What are the likely costs of ensuring that networks would be resilient to "mass roaming" where all the users of one network roam onto another in the instance of an outage on their network?

Monetised Benefits

The benefits of roaming and infrastructure sharing have been monetised using willingness to pay (WTP) data for visitors to total not-spots, as described in the Impact Assessment. This assumes that visitors to a partial not-spot who do not have access to the network operating there experience this as a total not-spot.

Q.21: Is this assumption reasonable?

Q.22: Can you provide any further evidence on the experience of visitors to a partial not-spot?

Non-Monetised Benefits

Residents and businesses in partial not-spots are assumed to mainly benefit from additional choice of providers rather than additional coverage, as set out in the impact assessment.

Q.23: Can you provide any further evidence or data on this and other benefits to residents and businesses in partial not-spot areas?

The Multi-Operator MVNO option assumes there is sufficient demand from consumers to support such a solution.

Q.24: Can you provide any further evidence on the demand for such a service and the benefits that consumers might receive from it?

Q.25: Please let us know if you have any additional comments on this consultation.

Summary of Consultation Questions

Q.1: Do you agree that there is a need to improve the coverage of voice and text services in partial not-spots and that Government should seek to extend such coverage?

Infrastructure Sharing

Q.2: To what extent are sharing arrangements scalable beyond the simplest sites that could be shared?

Q.3: Would the draft Direction to Ofcom at ANNEX A be effective in requiring sharing at all sites where there would exist a potential coverage benefit.

Q.4: To what extent would the costings referenced in paragraph (54) be generally applicable to all sites at which sharing may be required by the coverage obligation?

Q.5: To what extent do you consider mast sharing will achieve sufficient improvements in tackling partial not-spots?

MO-MVNO

Q.6: Would the draft Direction to Ofcom at ANNEX B be effective in enabling the creation of multi-operator MVNO offerings in the UK, and why?

Q.7: To what extent would the costings referenced in paragraphs (59 and 62) accurately represent the cost of establishing an MO-MVNO as described?

Q.8: Are there any practical considerations for the two MO-MVNO models described in paragraph (58) that would favour either as a solution for partial not-spots?

National Roaming

Q.9: Do you consider that national roaming should be implemented in the UK? Please give your reasons.

Q.10: Do you think the draft direction at Annex C will be effective in delivering national roaming?

Q.11: Should there be a mechanism for controlling maximum prices for roaming minutes, and should this be at the site level described above and in the Schedule to the draft Direction?

Q.12: To what extent does the method described above for determining the cost of providing voice roaming services accurately capture the cost base associated with the service?

Q.13: Should there be a mechanism for controlling maximum prices for roaming SMS services?

Q.14: To what extent are agreements between landlords or wireless infrastructure providers and MNOs a limiting factor in pursuing passive infrastructure sharing, multi-operator MVNOs, or national roaming?

Following our technical advice we have assumed that roaming could be operational by the start of 2016, a Multi-Operator MVNO could be operational by mid-2016 and passive infrastructure sharing could be operational by the start of 2017.

Q.15: Are these proposed timings feasible and to what extent can they be accelerated?

Non-Monetised Costs

The risk of MNOs switching off unprofitable masts under roaming is assumed to be manageable through setting mast by mast prices.

Q.16: Is this a reasonable assumption and would mast by mast pricing be an effective solution? Are there alternative solutions?

Q.17: Can you provide any evidence of the impact of roaming on battery life, dropped calls and loss of data service through 2G signal lock?

Q.18: To what extent could user customisation enable consumers to avoid these impacts?

Q.19: Are there any other substantial consumer issues which roaming could cause which are not covered in the Impact Assessment?

Q.20: What are the likely costs of ensuring that networks would be resilient to "mass roaming" where all the users of one network roam onto another in the instance of an outage on their network?

Monetised Benefits

The benefits of roaming and infrastructure sharing have been monetised using willingness to pay (WTP) data for visitors to total not-spots, as described in the Impact Assessment. This assumes that visitors to a partial not-spot who do not have access to the network operating there experience this as a total not-spot.

Q.21: Is this assumption reasonable?

Q.22: Can you provide any further evidence on the experience of visitors to a partial not-spot?

Non-Monetised Benefits

Residents and businesses in partial not-spots are assumed to mainly benefit from additional choice of providers rather than additional coverage, as set out in the Impact Assessment.

Q.23: Can you provide any further evidence or data on this and other benefits to residents and businesses in partial not-spot areas?

The Multi-Operator MVNO option assumes there is sufficient demand from consumers to support such a solution.

Q.24: Can you provide any further evidence on the demand for such a service and the benefits that consumers might receive from it?

Q.25: Please let us know if you have any additional comments on this consultation.

Annexes

Draft Directions:

A. Addressing coverage (infrastructure sharing)
B. MO-MVNOs
C. National Roaming

S T A T U T O R Y   I N S T R U M E N T S

2014 No. XXXX

ELECTRONIC COMMUNICATIONS

The Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2014

Made - - - -	***
Laid before Parliament	***
Coming into force in accordance with Article 1	

The Secretary of State makes the following Order in exercise of the powers conferred by section 5 of the Wireless Telegraphy Act 2006([7]).

The Secretary of State has consulted OFCOM and such other persons as the Secretary of State thinks fit in accordance with section 6(2) of that Act.

In accordance with section 6(4) of that Act, a draft of this Order was laid before Parliament and approved by resolution of each House of Parliament.

Citation and commencement

1. This Order may be cited as the Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2014 and shall come into force XX days after the day on which it was made.

Purpose of direction

2. The Secretary of State makes this direction for the purpose of ensuring effective and efficient use of and increased coverage for voice and SMS services by mobile network operators.

Interpretation

3. In this Order—

"electronic communications network" and "electronic communications service" have the same meaning given by section 32 of the Communications Act 2003([8]);

"licence" means a licence authorising the use in the United Kingdom of frequencies in the 900MHz or the 1800MHz frequency band to provide cellular mobile electronic communications services;

"MNO" means a mobile network operator;

([7]) 2006 c.36.
([8]) 2003 c.21.

"mobile network operator" means a holder of a licence; and

"SMS" means short messaging service.

Direction to OFCOM

4. OFCOM must exercise its power under section 10 of and paragraph 6 of Schedule 1 to the Wireless and Telegraphy Act 2006 to vary licences to provide for a condition requiring MNOs by [1st January 2016] [one year from the date this Order comes into force] to provide an electronic communications network that is capable of providing mobile voice and SMS electronic communications services to at least 89% of the area of the United Kingdom.

Signatory text

	Name
Address	Parliamentary Under Secretary of State
Date	Department for Culture, Media and Sport

EXPLANATORY NOTE

(This note is not part of the Order)

This Order directs the Office of Communications (OFCOM) to vary existing wireless telegraphy licences that authorise the use in the United Kingdom of frequencies in the 900MHz or the 1800MHz frequency bands to provide mobile phone services. The licences must contain a coverage obligation requiring mobile voice and SMS services to be provided in at least 89% of the area of the United Kingdom.

S T A T U T O R Y   I N S T R U M E N T S

2014 No. XXXX

ELECTRONIC COMMUNICATIONS

The Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2014

Made - - - -		***
Laid before Parliament		***
Coming into force	*in accordance with Article 1*	

The Secretary of State makes the following Order in exercise of the powers conferred by section 5 of the Wireless Telegraphy Act 2006([9]).

The Secretary of State has consulted OFCOM and such other persons as the Secretary of State thinks fit in accordance with section 6(2) of that Act.

In accordance with section 6(4) of that Act, a draft of this Order was laid before Parliament and approve by resolution of each House of Parliament.

Citation and commencement

1. This Order may be cited as the Wireless Telegraphy Act 2006 (directions to OFCOM) Order 2014 and shall come into force XX days after the day on which it was made.

Purpose of direction

2. The Secretary of State makes this direction for the purpose of ensuring effective and efficient use of spectrum by requiring MNOs, under the terms of their licence, to supply mobile and SMS electronic communications services to MVNOs when requested by an MVNO and to ensure that MVNOs are not contractually restricted from using the electronic communications network and mobile electronic communications services of more than a single MNO.

Interpretation

3. In this Order—

 "electronic communications network" and "electronic communications service" have the same meaning given by section 32 of the Communications Act 2003([10]);

"licence" means a licence authorising the use in the United Kingdom of frequencies in the 900MHz or 1800MHz frequency bands to provide cellular mobile electronic communications services;

([9]) 2006 c.36.
([10])   2003 c.21.

"MNO" means a mobile network operator;

"mobile network operator" means the holder of a licence;

"mobile virtual network operator" means a body that purchases mobile voice and SMS electronic communications services from an MNO for the purpose of contracting to sell such services to subscribers of the mobile virtual network operator;

"MVNO" means a mobile virtual network operator; and

"SMS" means short messaging service.

Direction to OFCOM

4.—(1) OFCOM must exercise its power under section 10 of and paragraph 6 of Schedule 1 to the Wireless Telegraphy Act 2006 to vary licences to provide for MNOs to be subject to—

    (a) an MVNO offer obligation; and

    (b) a non-restriction condition.

(2) An MVNO offer obligation is an obligation requiring an MNO—

    (a) to enter into an agreement with an MVNO to supply mobile voice and SMS electronic communications services where an MVNO requests this;

    (b) when entering an agreement to supply mobile voice and SMS electronic communications services to an MVNO, to—

      (i) do so on fair and reasonable terms; and

      (ii) not unduly discriminate against particular MVNOs.

(3) A non-restriction condition is a condition that prevents an MNO, when offering mobile voice and SMS electronic communications services to an MVNO, to agree conditions that limit the right of the MVNO to enter into such agreements with other MNOs.

Signatory text

<div align="right">

Name

</div>

Address   Parliamentary Under Secretary of State
Date   Department

<div align="center">

EXPLANATORY NOTE

(This note is not part of the Order)

</div>

This Order directs the Office of Communications (OFCOM) to vary existing wireless telegraphy licences that authorise the use in the United Kingdom of frequencies in the 900MHz or the 1800MHz frequency bands to provide mobile phone services. The licences must contain a provision requiring mobile network operators ("MNO") to offer to supply mobile and SMS electronic communications services to mobile virtual network operators ("MVNOs") and prevent MNO, when entering into contracts with MVNOs, from restricting the MVNO's ability to enter into contracts for such services with other MNOs. The licences must also ensure that the terms of any agreement between MNOs and MVNOs are fair and reasonable and not unduly discriminatory.

S T A T U T O R Y   I N S T R U M E N T S

2014 No. XXXX

ELECTRONIC COMMUNICATIONS

The Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2014

Made - - - -		***
Laid before Parliament		***
Coming into force in accordance with Article 1		

The Secretary of State makes the following Order in exercise of the powers conferred by section 5 of the Wireless Telegraphy Act 2006(**11**).

The Secretary of State has consulted OFCOM and such other persons as the Secretary of State thinks fit in accordance with section 6(2) of that Act.

In accordance with section 6(4) of that Act, a draft of this Order was laid before Parliament and approved by resolution of each House of Parliament.

Citation and commencement

1. This Order may be cited as the Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2014 and shall come into force XX days after the day on which it was made.

Purpose of direction

2. The Secretary of State makes this direction for the purpose of ensuring that MNOs are required under the terms of a licence to both enable and purchase roaming from one electronic communications network to another in the circumstances set out in this Order in order to provide effective and efficient use of spectrum and to provide for the calculation of the wholesale price of such roaming.

Interpretation

3. In this Order—

"coverage" means an outdoor area over which an MNO provides a mobile electronic communications service over an electronic communications network [with a 90% probability that users in outdoor locations can receive a voice and text service];

"electronic communications network" and "electronic communications service" have the same meaning given by section 32 of the Communications Act 2003(**12**);

(¹¹)   2006 c.36.

"licence" means a licence authorising the use in the United Kingdom of frequencies in the 900MHz or the 1800MHz frequency bands to provide cellular mobile electronic communications services;

"MNO" means a mobile network operator;

"mobile network operator" means a holder of a licence;

"non-seamless" means that when a call is connected through one MNO it does not transfer to another MNO without the call terminating;

"site" means an area on which is situated a mast, base station and other electronic communications apparatus required for the provision of a mobile electronic communications service; and

"SMS" means short messaging service.

Direction to OFCOM

4. OFCOM must exercise its power under section 10 of and paragraph 6 of Schedule 1 to the Wireless Telegraphy Act 2006 to vary licences to provide for a roaming condition and a pricing condition for compliance by [1st January 2016] [one year from the date this Order comes into force].

Roaming condition

5—(1) A roaming condition is a condition that, in areas specified in paragraph (2), requires the licensee to—

   (a) supply voice and SMS non-seamless roaming to other MNOs; and

   (b) purchase voice and SMS non-seamless roaming from other MNOs and make this available to its subscribers in areas described in paragraph (2).

(2) The roaming condition applies in areas where—

   (a) the licensee does not have coverage; and

   (b) at least one other MNO does have coverage.

Pricing condition

6.—(1) The pricing condition must provide for MNOs to charge for roaming in accordance with the calculation in paragraph (2).

(2) An MNO may not charge an amount for a voice call of one minute for the supply of voice and SMS non-seamless in compliance with the roaming condition that exceeds A, where—

"A" means $\dfrac{B + C + D}{E}$;

"B" means the reasonable costs efficiently incurred of maintaining and operating a site on an annualised basis;

"C" means the reasonable costs efficiently incurred necessary to provide the services required by the roaming condition at a site over a period;

"D" means the reasonable core network costs efficiently incurred over a period of providing the services required by the roaming condition that are not specific to a site reasonably apportioned between the sites where the roaming condition applied; and

"E" means the number of minutes of voice traffic in total over a site.

Signatory text

Name

(^{12})   2003 c.21.

Address   Parliamentary Under Secretary of State
Date   Department for Culture Media and Sport

EXPLANATORY NOTE

(This note is not part of the Order)

    1.This Order directs the Office of Communications (OFCOM) to vary existing wireless telegraphy licences that authorise the use in the United Kingdom of frequencies in the 900MHz or the 1800MHz frequency bands to provide mobile phone services. The licences must provide for non-seamless voice and SMS roaming in areas where the licensee does not have coverage but another mobile network operator does have coverage and for a condition setting out the calculation for the wholesale price to be charged by MNOs for roaming.

Department
for Culture
Media & Sport

4th Floor, 100 Parliament Street
London SW1A 2BQ
www.gov.uk/dcms