Future demand for mobile broadband spectrum and consideration of potential candidate bands World Radiocommunication Conference 2015 Agenda Item 1.1

Response by Huawei to Ofcom's call for inputs

29 April 2013

Introduction

Huawei is pleased to have the opportunity to respond to the consultation by Ofcom on the Future demand for mobile broadband spectrum and consideration of potential candidate bands.

As a company that supplies the global market for telecommunications products and services, we continue to see significant growth in the demand for both mobile network infrastructure and for user terminal equipment. This is consistent with the significant increase in the demand for mobile broadband data services that is expected to develop over the next ten years.

In order to maintain a positive end-user experience as the volume of data traffic grows, it will be necessary for mobile network operators to continue to increase network capacity by investing in new network infrastructure. Spectrum is a key strategic input for mobile network operators because the ability to deploy radio access network infrastructure is critically dependent on the availability of spectrum resources.

We recognise that re-farming spectrum is a complex process and that it takes time to balance the requirements of the various stakeholder groups and constituencies. Given this, we see the allocation and identification of additional MOBILE / IMT spectrum resources at WRC-15 as being an essential first step if a future mobile broadband capacity crunch is to be avoided.

We regard the coordinated release of future IMT spectrum packages to be preferable to the gradual, drip-feeding of new IMT bands in to the market. Coordinating the future release of IMT spectrum at the European level will allow time for mobile network operators to optimise the efficient use of existing spectrum resources and will maximise the commercial relevance of the future release of IMT spectrum.

Responses to specific questions

Question 8: What are your views about the pros and cons of the frequency ranges in Table A6.1 in Annex 6 for mobile broadband and for existing applications using this spectrum? Do you have views on other bands that are not in Table A6.1?

470 MHz to 694 MHz

We fully support Ofcom's position that the 470 MHz to 694 MHz band should be considered as candidate MOBILE / IMT spectrum under WRC-15 agenda item 1.1, including the convergence between Mobile and broadcast services.

The unique propagation characteristics associated with this spectrum make it particularly suitable for the delivery of the deep, indoor coverage that will be essential if mobile broadband services are to become truly ubiquitous. This could be a significant factor in the successful deployment of Machine-to-Machine (M2M) applications and may also be relevant to the future deployment of Smart Meters[1].

The same propagation characteristics would also enable the delivery of high bit-rate, low-latency, broadband services to very sparsely populated rural areas. As such, this spectrum could play an important role in helping to deliver the European Digital Agenda target of 30 Mbit/s to every household[2].

We note the recommendation from the House of Lords Select Committee on Communications regarding the use of spectrum for broadcast[3]:

> *"141. We recommend that the Government, Ofcom and the industry begin to consider the desirability of the transfer of terrestrial broadcast content from spectrum to the internet and the consequent switching off of broadcast transmission over spectrum, and in particular what the consequences of this might be and how we ought to begin to prepare."*

We recognise the great importance of the incumbent spectrum users in this band and of ensuring that Digital Terrestrial Television (DTT) broadcast and Programming Making and Special Events services have access to an appropriate level of spectrum resources going forwards. We anticipate that the use of spectrum will always play an important role in the delivery of Television services, particularly in rural areas which may not have access to fixed, broadband internet services. In our view, the use of satellite based, DVB-S delivery platforms would be the most effective means of delivering linear programming to rural areas, but in some cases, eMBMS technology may be an option.

1 DIRECTIVE 2009/72/EC.

2 COM(2010) 245 final/2.

3 http://www.publications.parliament.uk/pa/ld201213/ldselect/ldcomuni/41/41.pdf

LTE based eMBMS technology has been designed to allow Internet Protocol Television (IPTV) services to be delivered over LTE network infrastructure. The use of this technology would allow the flexible sharing of bandwidth between IPTV and other IP based data services.

694 MHz to 790 MHz

We understand that the 694 MHz to 790 MHz, "700 MHz" band will be discussed under WRC-15 Agenda Item 1.2 and fully support the efforts being made to agree a channel plan that maximises the overlap with E-UTRA band 28 as used in Regions 2 and 3.

In order to improve the utilisation of spectrum that does not overlap E-UTRA band 28, we believe that steps should be taken to identify ways in which this spectrum could be made available for use by mobile services. Options include the addition of a new 2*5MHz Frequency Division Duplex (FDD) allocation and a Supplemental Downlink (SDL) allocation.

1452 MHz to 1492MHz

Mobile Network Operators (MNOs) typically see significant asymmetry between the volume of up-link and down-link data traffic, with the majority of the traffic flow being in the down-link direction. This down-link data is used to satisfy consumer demand for video-streaming services and for application downloads.

One way in which MNOs might manage the increasing demand for down-link data would be to supplement primary, Frequency Division Duplex (FDD) spectrum resources with a Supplemental Downlink (SDL) using L-band spectrum.

The 1452 MHz to 1492MHz band would appear to be particularly well suited to this application and has the potential to be made available in the near term. We fully support Ofcom's position that this band should be considered as candidate MOBILE / IMT spectrum under WRC-15 Agenda Item 1.1.

1300 MHz to 1400 MHz and 1427 MHz to 1527 MHz

We also support the inclusion of the 1300 MHz to 1400 MHz and 1427 MHz to 1527 MHz bands for consideration as candidate MOBILE / IMT spectrum under WRC-15 agenda item 1.1, since it may be feasible to make some of this spectrum available for IMT in the medium term (after 2015).

Specifically, we believe that it may be possible to identify spectrum in the 1350 MHz to 1400 MHz and 1427 MHz to 1517 MHz bands.

We note that further work will be required to determine how to manage the potential risk of interference from IMT services into the passive (receive only) services that operate in the 1400 MHz to 1427 MHz band.

We believe that it will be necessary to identify at least 100 MHz of spectrum in these bands in order to ensure that any future release will be commercially attractive to mobile network operators.

2700 MHz to 2900 MHz

We support Ofcom's position that the 2700 MHz to 2900 MHz band should be considered as candidate MOBILE / IMT spectrum under WRC-15 Agenda Item 1.1.

The close proximity of this band to existing E-UTRA bands 7 and 38 would make it particularly useful for IMT.

We note that the MOBILE / IMT use of this spectrum was previously considered and rejected at WRC-07.

We recognise the importance of the safety critical Primary Radar systems that currently operate within this band and understand the stringent protection requirements that must be applied in order to protect these services. Nevertheless, we note that the Ministry of Defence plans to release up to 100 MHz of spectrum in the 2700 MHz to 3100 MHz band and therefore hold the view that WRC-15 should reconsider the possible use of this band for IMT systems.

3600 MHz to 4200 MHz

Existing LTE technology can typically deliver data speeds of up to 40 Mbit/s per 5 MHz carrier using 2x2 MIMO technology. The use of carrier aggregation makes it possible to deliver higher data rates when required. A typical configuration in use today combines a 10 MHz carrier with 2x2 MIMO to deliver downlink data speeds of up to 80 Mbit/s. But as the demand for mobile data services continues to grow, there will come a point when existing Radio Access Networks (RANs) will become congested and new technology will be needed.

LTE-A (advanced) technology is currently being standardised[4] in order satisfy the future requirement for increased RAN capacity. LTE-A will combine a 100 MHz carrier with 8x8 MIMO to achieve down-link data rates that approach 3 Gbit/s under ideal conditions. This very high speed data capability will most likely be delivered by means of a hot-spot spectrum layer that will complement lower frequency, macro-cell coverage layers.

Spectrum in the 3600 MHz to 4200 MHz range would be ideally suited to this type of application because it would accommodate six, 100 MHz wide channels, each capable of supporting a 3 Gbit/s data stream. Given the propagation characteristics of this frequency range, the most effective use of this spectrum would be to deliver broadband services to static or very low mobility users.

We note that the Mobile radio service is already a co-primary user of the 3400 MHz to 3600 MHz band in a large number of Region 1 and 3 territories and that European member states

4 3GPP TR 36.814 V9.0.0.

are required to make the 3400 MHz to 3800 MHz band available for use for Electronic Communications Services (ECS) on a technology neutral basis[5].

We fully support Ofcom's position that the 3600 MHz to 4200 MHz band should be considered as candidate IMT spectrum under WRC-15 Agenda Item 1.1.

Question 9: Are there any other bands that are not in Table A6.1 for which you think we should be considering their pros and cons for mobile broadband and for existing applications using this spectrum?

3400 MHz to 3600 MHz

We note that the Mobile radio service is already a co-primary user of the 3400 MHz to 3600 MHz band in Regions 1 and 3 and that and that European member states are required to make the 3400 MHz to 3800 MHz band available for use for Electronic Communications Services (ECS) on a technology neutral basis.

We also note that the Ministry of Defence is currently examining the scope for releasing spectrum in the 3400 MHz to 3600 MHz band.

We therefore suggest that the 3400 MHz to 3600 MHz band should be considered for identification as global IMT spectrum under WRC-15 Agenda Item 1.1.

5 European Commission Decision 2008/411/EC.

Question 10: What are your views on bands which should be a priority for consideration for mobile broadband?

In our view, the following bands should be a priority for discussion at WRC-15:

Target Band	Frequency range	3GPP E-UTRA band No.	Scope for delivering IMT spectrum [MHz]	NOTES
UHF band IV and band V	470 MHz to 694 MHz	TBD	224	WRC-15 AI 1.1
UHF band IV and band V	694 MHz to 790 MHz	TBD	96	WRC-15 AI 1.2
L-band	1300 MHz to 1400 MHz	TBD	50	WRC-15 AI 1.1
L-band	1427 MHz to 1527 MHz	TBD	50	WRC-15 AI 1.1
L-band	1452 MHz to 1492MHz	TBD	40	WRC-15 AI 1.1 Also addressed by RSPP.
2700 band	2700 MHz to 2900 MHz	TBD	200	WRC-15 AI 1.1
3500 band	3400 MHz to 3600 MHz	42	200	For identification as global IMT spectrum at WRC-15 AI 1.1 Also addressed by RSPP.
3700 band	3600 MHz to 3800 MHz	43	200	WRC-15 AI 1.1 Also addressed by RSPP.
4GHz band	3800 MHz to 4200 MHz	TBD	400	WRC-15 AI 1.1
TOTAL			**1460**	

We note that the 2300 MHz band and the 2 GHz MSS bands have already been designated as global IMT spectrum and that facilitating IMT access to these bands is a priority within the EU.

It is worth noting that producing a hand-held device capable of operating over the 470 MHz to 4200 MHz range would be very challenging. In practice, it is likely that different devices would be developed to operate in different bands according to the requirements of the target market.

Abbreviations

CEPT	European Conference of Postal and Telecommunications Administrations.
CEPT FM	CEPT Frequency Management.
DECT	Digital Enhanced Cordless Telecommunications.
DTT	Digital Terrestrial Television.
DVB-S	Digital Video Broadcasting – Satellite.
DVB-T	Digital Video Broadcasting – Terrestrial.
E-UTRA	Evolved UMTS Terrestrial Radio Access.
ECS	Electronic Communications Services.
eMBMS	Evolved Multimedia Broadcast Multicast Service.
EU	European Union.
FDD	Frequency Division Duplex.
IMT	International Mobile Telecommunications.
IP	Internet Protocol.
IPTV	Internet Protocol Television.
LTE	Long-Term Evolution (evolved from third-generation technology).
LTE-A	LTE-Advanced (potential for down-link speeds of up to 3 Gbps).
MIMO	Multiple Input, Multiple Output (a diversified antenna technology).
MNO	Mobile Network Operator.
MSS	Mobile Satellite Service.
PPDR	Public Protection and Disaster Relief.
RAN	Radio Access Network.
RSPP	Radio Spectrum Policy Programme.
SDL	Supplemental Downlink.
UMTS	Universal Mobile Telecommunications System.
WRC-15	World Radio Communication Conference 2015.