# Response to Ofcom consultation

# Securing long term benefits from scarce spectrum resources

### A strategy for UHF bands IV and V

## From


## Ericsson Limited


## 7th June 2012

## *Future mobile broadband spectrum requirements*

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| Question 1: | Do you agree that meeting the future growth in demand for mobile broadband capacity will deliver significant benefits to citizens and consumers? |

Both broadband availability and speed are strong drivers in an economy. Last year Ericsson and Arthur D. Little concluded that for every 10 percentage point increase in broadband penetration GDP increases by 1 percent.

This growth stems from a combination of direct, indirect and induced effects. Direct and indirect effects provide a short to medium term stimulus to the economy. The induced effect, which includes the creation of new services and businesses, is the most sustainable dimension and could represent as much as one third of the mentioned GDP growth.

“Broadband has the power to spur economic growth by creating efficiency for society, businesses and consumers,” says Johan Wibergh, Head of Business Unit Networks, Ericsson. “It opens up possibilities for more advanced online services, smarter utility services, telecommuting and telepresence. In health care, for instance, we expect that mobile applications will be used by 500 million people.”

Erik Almqvist, Director at Arthur D. Little, says: “Until now there has been an absence of hard facts investigating the effects of broadband speed on the economy. This unique empirical study may help governments and other decisions makers in society make more correct tradeoffs and policy choices.”

“These results have been derived using rigorous scientific methods where the direction of causality, data quality and significance levels have been appropriately tested,” says Erik Bohlin, Professor at Chalmers University of Technology. “The results of this study support governmental policies that recognize and promote the importance of broadband.”

This study is the first of its kind in that it quantifies the economic impact of increases in broadband speed in a comprehensive scientific method using publicly available data.

Further information on this study may be found at:
http://www.ericsson.com/networkedsociety/media/hosting/Need_for_speed.pdf

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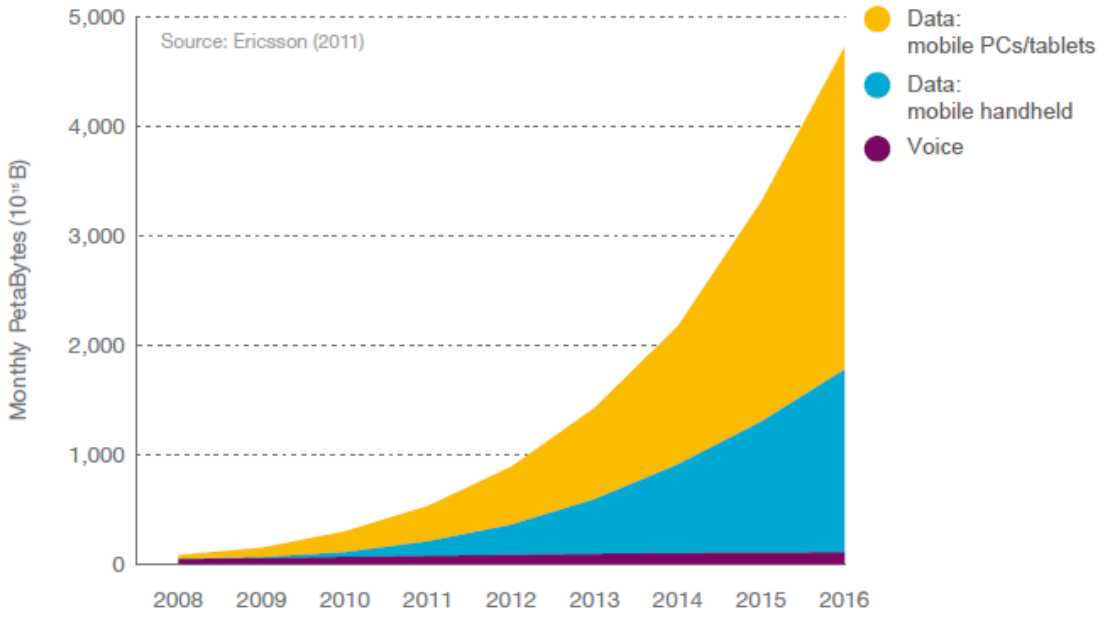
| Question 2: | Do you agree that additional harmonised mobile broadband spectrum will play an important role in meeting the future growth in demand for mobile broadband capacity? What are your views on the overall quantity of harmonised spectrum that will be required to meet future demand? How |

does this compare with the expected increase in spectrum for mobile use discussed in this section?

Ericsson has performed measurements since the early days of mobile broadband from a large base of live networks covering all regions of the world. The aim of our Traffic and Market Data Report is to share analysis based on these measurements, internal forecasts and other relevant studies to provide insights into the current traffic and market trends.

Please see - Traffic and Market Data Report November 2011, Ericsson AB
At the following link: http://hugin.info/1061/R/1561267/483187.pdf

Ericsson also provided a limited update in Feb 2012 which can be found at the following link: http://www.ericsson.com/res/docs/2012/tmd_report_feb_web.pdf




'Traffic' refers to aggregated traffic in mobile access networks.
DVB-H and Mobile WiMax or WiFi traffic have not been included.
M2M traffic not included.

Our early 2012 update confirmed that total traffic was indeed growing at a CAGR of 100% during 2011. As can be seen in the figure above we expect total traffic at the start of 2016 to have increased by a factor of 4.7 times above the total traffic at the end of 2011. However the growth rates for dongle and smart phone growth appear to be different and driven by screen size as a key parameter.

The quantity of spectrum alone is an insufficient measure of capacity. It is necessary to look at the way in which bands will be used and their technical capacity as well as the proportion of user equipment capable of using the bands.

900MHz – around 10MHz is available and can relieve the 2100 FDD band. Currently some carriers are unused in the 2100 band and taken together the user capacity can be assumed to be capable of being doubled. In addition the network can be taken to increase in capacity by moving to more HSPA but noting that extra carriers today are already being added as HSPA to carry data. The fraction of carriers using Release99 targeted at voice and low speech is higher than it will be in future when all carriers are in use. The calculation of capacity still available as a result of further rollout of WCDA is complex and not the same as looking at theoretical capacities. The use of Wi-Fi offload is clearly a way around temporary overloads in the home, at work and at locations where the user is on the pause. Noting that such locations also occur on public transport where the local use of Wi-Fi could allow the users, as an aggregate, to use more efficient radio technologies than relying on individual choice of wireless handset. This already happens on some main line railway routes.

There will be further attempts to generate models of required spectrum capacity and user demands in the next ITU study period and we prefer not to speculate on an appropriate model in this response.

However using gross estimates to apply our own network findings to the limited case of the UK we can look at whether the suggestion that UK networks will exhaust existing spectrum is plausible. As a rough estimate we see of the order of a doubling of UMTS capacity as being possible by further investment in today's spectrum and installed base of sites. Since this programme will take a finite time it is probable that over capacity events will occur at times and Wi-Fi usage at home and in the office is likely to have a part to play. However such offload will be elective in the main until the majority of smart phones have Passpoint (Hotspot 2.0) built in, which could take a further two to three years given the volume of existing smart phones which will need to be replaced rather than simply bought new.

The earliest practicable LTE capacity to be brought on stream is probably the 1800 band which can support LTE for up to two 10 MHz carriers. In modelling terms we would expect these carriers to replace capacity which is currently used by dongles. This will free up significant capacity by greater efficiency and moving PC based large users off WCDMA leaving capacity for ten or more smart phone users for each dongle user that decides to move. Getting PC users onto LTE or Wi-Fi is a critical part of the story.

Following the use of 1800MHz the next spectrum to be made available will come from the combined auction. Give the delays caused by radar clearance for 2600MHz the key way to avoid a crunch is to use 800MHz LTE to satisfy dongle needs. This capacity will be available first in the key target areas for growth to the question is then how long before it is used up. However the 2600 capacity will follow in availability in due course.

Taken together the re-farming of GSM spectrum to LTE and HSPA, as well as auction of 800MHz and 2.6GHz would appear to offer an increase in data capacity of around seven times the total capacity available at the end of 2011. That capacity will continue to be all that is available until the end of 2015. On the Ericsson growth forecasts we will have an increase demand of 4.7 times above today by that time which will still be increasing at a CAGR of around 40% or more. At the predicted rate of growth at that point the UK will be reliant on Wi-Fi offload by the end of 2016. If a ceiling for Wi-Fi of 30% of all data is assumed then the offload capacity will only be sufficient for a further year. We could therefore predict a capacity crunch by end 2017. This aligns well with the suggestion that the 700MHz spectrum should be in use for mobile broadband by the start of 2018.

It is tempting to suggest that GSM usage will fall dramatically to the point that more re-farming can take place. However the re-farming of 900MHz and 1800 MHz GSM spectrum will support only a very small increase in the total data capacity available in 2018. In the period up to end 2017 the decline in GSM is unlikely to have any material effect because of the improvements in efficiency being put in place in today's GSM networks to make space for UMTS and LTE.

Such predictions as the one above are fraught with risk and do not take account of any other capacity coming on stream. The capacity crunch will of course initially only affect cities and their suburban hinterlands and much of the country by area will have spare capacity. It is however in those city areas that the benefits of wireless are greatest and exhaustion of capacity will occur first.

Whilst the above analysis is only a very rough "guesstimate" it does appear plausible that the UK will run out of spectrum and the assumptions made by Ofcom also appear to be plausible at first sight.

The second Traffic and Market Report has been recently been issued and can be found via the following link: http://www.ericsson.com/news/1617338

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| Question 3: | Do you agree that additional harmonised spectrum provided by the 700 MHz band could play an important role in meeting the future growth in mobile broadband capacity? |

Ericsson does agree that additional harmonized spectrum in the 700 MHz band could play an important role in meeting future growth.

The valuable characteristics of 800MHz spectrum are mirrored by the 700MHz spectrum and we would expect that the common propagation characteristics will give it particular value as capacity available to mobile broadband both in Urban and Rural areas. The increased efficiency of spectrum when conditions are deliberately used to permit MIMO use mean that the spectrum could be particularly valuable in urban environments where the spectrum crunch will hit first and hardest.

Question 4: Do you agree that the value of the role played by the 700 MHz band in meeting the future growth in mobile broadband capacity would be greater if it becomes available before other capacity enhancing techniques have been exhausted at existing mobile sites?

This is not at all clear. If widespread rollout occurs at 700MHz before other capacity is exhausted then adding to that capacity on older equipment, such as the upgrades to provide say higher spatial diversity on 2600MHz, may be focussed on only the highest demand locations. This is likely because there may be some opposition to a national clearance of 700MHz if it were only to be used in city centres. This might at first sight lead to less capacity that might be desired in all but the highest demand centres. We suggest further consultation on timing at a later stage.

Question 5: What timing of 700MHz release would maximise the benefits associated with its use for mobile broadband?

The real crunch in capacity is expected to happen first in urban areas. One of the mechanisms to increase capacity which will benefit users in such areas in Inter-band Carrier Aggregation between 3GPP bands 20 (800MHz) and 7 (2.6GHz). It would make some sense to permit the network to receive the capacity extension from 2.6GHz before rolling out 700MHz. The extra efficiencies from inter-band working would then be achievable after roll out of 700 starts.

The efficient use of the band can only really start when suitable devices are made available in the market as well as when network equipment is ready. The agreement of a suitable CEPT band plan and the relevant standardization work is needed before manufacturers are able to finalise designs. In addition operators need to work on utilization strategies and socialize their preferences with devices manufacturers. All of these this are needed before the spectrum can be used.

In the case of 700MHz there may well be quite considerable discussion before the standards are established within CEPT and the necessary regulatory steps taken. The normal pattern of say two to three years to achieve capabilities in volume after standardization would be preceded by up to three years of European discussions which suggests that 2018 would be the first date at which the spectrum could be efficiently used.

Ofcom is fully aware of this timetable and has suggested the same date. However Ericsson believes that the benefits available from the 700MHz band are so great that the industry is likely to do everything it can to bring the capacity to market in a timely manner. The key is likely to be openness and co-operative working in the stages leading to agreement of the band plan.

## *Future DTT spectrum requirements*

Question 6: Do you agree that DTT will continue to play an important role in providing universal low cost access to PSB content over at least the next decade?

We do agree that DTT will continue to play an important role in accessing PSB content in the next decade.

We see a clear need for continued provision of SD and HD content for PSB channels. However we do not have confidence in the finding that users want more channels of SD to a greater extent than more channels of HD. It is possible that if one asked the same question in three or more years time one would get a different answer. We would suggest that the questions do not address the utility that the public derives from the existing channels. In general the public do not differentiate between the PSB and COM channels to the same extent as those in the industry.

Many users complain that the programmes on COM muxes are not what they want to see and bemoan the lack of BBC1+1 compared with say a shopping channel. It is true that viewers want more choice of PSB programming but the problem is financing it. However more of the PSB programme material is being produced in HD as time goes by and the number of channels that broadcasters will need to be HD seems unlikely to be static.

Ofcom are unclear at times in that the document recognises the need for sufficient PSB channels to make the platform attractive but then falls into discussing only DTT capacity. There is a good reason for the uncertainty because some channels from PSB broadcasters do appear on COM multiplexes.

In order to generate clear policy positions it seems to us that what is needed is to maintain the policy of providing low cost access for consumers to PSB and maintaining the attractiveness of that offer. The continued existence of COM muxes for non PSB purposes is a second consideration and should be separated out from it.

Our reasoning is that the public policy of maintaining an attractive PSB and maintaining the current level of COM services may not be achievable.

Question 7: Do you agree that, absent major changes in available spectrum, DTT would continue to remain attractive to viewers and deliver important benefits to citizens and consumers over at least the next decade?

It seems uncertain that the existing PSB line up would be attractive in ten years time when the vast majority of users have HD TVs if it still only offers 4 or 5 HD programmes. Ericsson is not convinced that the existing mix of DVB-T and DVB-T2 is sustainable over that period.

It certainly has the capability of having the capacity needed with suitable management of the transition to MPEG 4 and DVB-T2 on all the PSB multiplexes. However that only yields a limited extra capacity without putting content on the COM muxes. The BBC Trust in its decision to remove the second interactive channel sent a message that it will not pay for additional capacity on the DTT platform beyond that already under its control. That is probably the biggest barrier to the platform staying attractive. If PSB1 went to DVB-T2 MPEG4 then the capacity added could be almost 20Mbits/s of MPEG4 capacity. Simulcasting BBC3 and BBC4 in HD would use up the majority of that capacity. The additional capacity left would be up to four interactive SD channels, one HD interactive channels or a new HD only channel. How to finance the extra BBC programming that would make the change attractive to consumers would be a challenge. Without a purposefully managed changeover to DVB-T2/MPEG4 for PSB there would be a need to acquire more spectrum for simulcasting purposes.

Question 8: What are your views on the future technical evolution of the DTT platform? Are there other relevant factors affecting future DTT spectrum requirements that we should consider as we develop an approach to secure benefits from UHF band IV and V over the long term?

Our view is that a thoroughgoing review is needed and a plan for changeover to DVB-T2 and MPEG4 should be drawn up. There is a need for the filtering needs for 700MHz Mobile broadband to be included in that new equipment. The plan needs to be sympathetic to the issues caused by the possibly short interval following the existing protracted DSO process.

The market for dual channel DVB-T2 PVRs and STBs would have to be secured before a changeover and without regulatory certainty that will not happen today. If, as seems necessary, there is to be significant domestic antenna regrouping then we suggest that it should coincide with the change to DVB-T2 and MPEG4. There is otherwise a real risk that the public will become disenchanted with the process, especially if there is a widespread perception of difficulties around the work of Mitco in the 800MHz clearance. Overall we believe it would increase public confidence if the Government and Ofcom had a stronger control of the whole process than in the past.

This may seem to be difficult as it appears to be beyond Ofcom's current powers but that issue can be remedied by suitable changes being placed in the Communications Bill to be put before Parliament in 2014. The ability to discuss what future powers might be needed in this context is already within Ofcom's existing statutory authority.

It makes sense to widen the scope of the last Arqiva review to making the PSB channels based on a re-use pattern of three as is proposed for the use of 600MHz for the COM channels. We realize that this could have a serious effect on the advertising market but believe that the existing use of an MFN for PSB needs to be justified on an objective basis. We do understand that the degree of regionalization of advertising on the non-PSB

channels is perhaps not as critical as on the PSB channels. However if we are to get the best deal from negotiations with our neighbours we need to have looked at all the options first.

The biggest change that will face DTT in the environment after loss of 700MHz is likely to be the introduction of HEVC and finding the extra capacity for it. It is Ericsson's view that this change should probably be seen as a step beyond business as usual and it should be assumed that other means should be used to deliver this additional capacity rather than simply assuming it should be delivered by adding more capacity to the DTT over the air platform.

Question 9: Do you agree that a longer term approach to secure benefits from UHF band IV and V should consider how to safeguard benefits delivered by the DTT platform?

Ericsson does indeed consider that a longer term approach should consider how to safeguard the benefits of the DTT platform.

We see that the current pattern of consumers equipment changes as over the air interfaces evolve is not what the public expect from TV. They are used to TVs lasting ten years and adding new technology as an elective process. The use of High Tower transmitters with clear reception paths as part of the basic design limits the spectral efficiencies mechanisms such as MIMO that are an essential part of the advanced radio scene today. In essence roof top antennas represent an excellent way of delivering the service we have already. However improvements in gross bit rate currently seem limited beyond DVB-T2 without the use of MIMO for which the transmission environment is not well suited. Backwards compatibility is an essential requirement of thevolution of the PSB platform if there is no to be regulatory intervention, such as the scheme for Vulnerable Consumers in DSO and Mitco in 800MHz clearance. However there ought to be a limit to this kind of intervention and we suggest that the 700MHz should be the last regulatory intervention, which means it should include the final set of DTT platform changes.

Once DVB-T2 is universal the changeover to HEVC should not be allowed to require a further mandatory change to users receiving equipment. We recommend that further changes and new services are added to the platform over IP delivered to the home either by fixed line or wireless broadband.

The radio environment for use of UHF spectrum for wireless/mobile broadband will allow us to get significantly higher capacity from the use of MIMO than is possible with traditional high tower broadcasts. In areas where fixed broadband is available at high speed that can be used to deliver the additional services to the increasing number of IP connected TVs. In other areas we see the use of multi-band mobile broadband infrastructure carrying the additional material to IP terminals which in turn deliver the content to IP set top boxes or TVs.

Traditional high power broadcast transmitters are sited as high as possible to give directional rooftop antennas a minimum field strength. Such sites are limited in number and relatively expensive. The strength of these sites in the analogue era was that they offered wide area coverage with as little multipath propagation as possible in order to avoid ghosting. In addition the antennas used were often vertical slots around a cylindrical structure leading to close control of coverage area by feeding a vertical cylindrical array of antennas. Such antennas provide a single signal with horizontal polarization that can be controlled for interference avoidance. These characteristics are used to the full in transmitting DTT with DVB-T2 to get close to the Shannon limit for transmission bit rate.

In order to get more capacity out of the same spectrum it is necessary to generate more spatial paths, thus achieving frequency reuse. These can be by using polarization isolation or separated antennas or both. However the existing main station transmitter and receiving antennas are firmly locked into horizontal only polarization. Opportunities for using multiple transmitters with equivalent coverage are not common because of the use of highly directional receiving antennas. Sutton Coldfield and Lichfield Arqiva masts are a rare example of a pair of suitable multiple antennas which offer similar performance across most of the West Midlands. The existing model of transmission from high sites is generally unsuited to exploiting the bit rate gains that flow from multiple spatial paths.

The use of a different and more complex antenna, not necessarily on the roof, together with lower height transmitting antennas allows a greater number of spatial paths to be formed. The multi-path phenomenon that would have been such a problem for analogue TV is a positive benefit for creating extra spatial paths in LTE-Advanced. The necessary transmitting antennas and sites would be equipped for LTE-Advanced at cell sites used for the 800MHz band. This use of UHF frequencies will offer significantly greater capacity that high tower DVB-T2. The most significant gain comes from the use of small cells which allow spatial re-use to an extent which is just not possible with long range broadcasting.

We suggest that this extra path be used to provide IP to the ever growing number of Smart TVs that accept IPTV inputs. This capacity will be much greater over the service area of a transmitter such as Crystal Palace than the use of a single DVB-T2 stream. The new antenna would be complementary to the DVB-T/DVBT2 based broadcasts. We see a particular value for this capacity with the future introduction of HEVC to provide future high definition services possibly as a simulcast for MPEG4 HDTV services.

Thus we agree strongly that future policy should consider safeguarding the benefits of the DTT platform. However we do not believe that means that the DTT platform should be given further room to grow using the same mechanisms as it does today. It is time to plan for a new future.

## *Other uses of UHF bands IV and V*

Question 10: Are there other material factors affecting the future requirements of PMSE that we should consider as we develop an approach to secure long term benefits from UHF band IV and V?

Ericsson has no comments on the future requirements of PMSE.

Question 11: Are there other material factors affecting the future requirements of Local TV that we should consider as we develop an approach to secure long term benefits from UHF band IV and V?

In an earlier answer we highlighted the need to consider whether the current advertising model and its resulting need for an MFN with interleaved spectrum can be justified. The real need for Local Television should also be considered along with the justification for continuing to use an MFN. The need to make the PSB platform attractive appears to be significantly more important in public policy terms than does the requirement for Local TV.

Our position is particularly informed by observation of Channel M in Manchester. When it was supported by a regional newsgathering service it could provide local content. However without the Manchester Evening News the local content went away and the service appeared unsupportable. In addition the coverage area was so restricted after it went to digital and subsequently changed from QPSK to 16 QAM and the costs were so high that the service was unviable. In the analogue model the transmission facilities were self provided but the need to co-site and use a purchased multiplex for digital service appeared to hit the prospects for the station.

It may be appropriate to ask consumers whether they prefer more PSB channels on a widened regional model as would result from regional SFNs or an hour or two of low cost regional news covering wider areas than did Channel M.

It does not seem right to simply assume that Local Television is a given in the present circumstances unless that is what the public wants and the broadcasters are guaranteed access to the local newsgathering resources to make it worthwhile. Traditionally universities and local authorities have been sources for local programming but that too seems unlikely in the next ten years or so.

Question 12: Are there other material factors affecting the future requirements of WSD applications that we should consider as we develop an approach to secure long term benefits from UHF band IV and V?

Ericsson has no comments on the future requirements of White Space devices.

Question 13: Aside from WSDs, are there other innovative ways in which to use UHF bands IV and V to deliver services and, therefore, material benefits to users

In our experience the material benefits from innovative services flow from harmonized applications. This is because only harmonized applications can generate sufficient economic value to outweigh the value that would be generated by other competing harmonized applications such as Broadcasting and IMT/Mobile Broadband.

IMT also includes the Multimedia Broadcast/Multicast Service (MBMS) that makes it suitable for broadcasting. In the case of LTE, the broadcast services can be time multiplexed with mobile broadband services on the same carrier frequency. No additional hardware is required in the IMT base stations to support MBMS. Due to the small cell sizes it is possible to offer localized broadcasting. The small cell sizes also facilitate very large, even national, single frequency networks, which are available even when higher order modulation modes providing high data rates are used.

Question 14: Are there other material factors affecting the future requirements of emergency services applications that we should be aware of as we develop an approach to secure long term benefits from UHF band IV and V?

Ericsson believes that the most cost effective way to provide broadband for the public service is to share the use of commercial networks with suitable safeguards for use by the emergency services.

The practice of reducing costs by sharing the high costs of sporadic use of spectrum by the emergency services was pioneered in the UK using TETRA where costs were spread over a wide part of the public service with high capacity being available to the emergency services where needed. The United States Public Safety System sought to emulate this for broadband by widening the set of users even further by sharing the facilities when not needed for the emergency services by letting the general public use the facilities. We believe that this is the correct logical approach to be followed in the UK.

Following our approach emergency services capacity is provided whenever and wherever the necessary public capacity is available for sharing. If commercial markets do not provide sufficient capacity it could be expected that the public service may seek to become an anchor tenant or perhaps add to capacity at sites delivered in the Mobile Infrastructure Programme.

The use of commercial spectrum allows the emergency services to access a wide range of commercial terminals and to place specialized applications upon them. The converse of this efficiency is that providing specialized spectrum for emergency services in a context which is directed at communications with personnel can increase the costs of those services. Thus we recommend that spectrum in UHF bands 4 and 5 should only be

allocated where using commercial or subsidized spectrum cannot be an appropriate substitute.

## *Securing long term benefits for citizens and consumers*

Question 15: Do you agree that the approach that is most likely to secure significant benefits from UHF band IV and V over the long term is one that enables the release of the 700 MHz band for mobile broadband whilst also ensuring the role of the DTT platform is safeguarded?

Ericsson agrees that this is the approach that is most likely to secure significant benefits for consumers.

Question 16: Do you believe there is a material risk that the DTT platform will have insufficient spectrum to continue to deliver important benefits (including providing universal low cost access to PSB content) if the 600MHz band is not used for DTT when the after clearance of the 700 MHz band?

Ericsson believes that there is indeed a material risk of insufficient spectrum for the DTT platform without using the 600 MHz band. As we state in other answers we believe that there should be concerted efforts to make the most effective use existing DTT spectrum. We recommend that the effect of greater use of SFN for the PSB channels should be studied to ensure that the current inefficiency is justified in terms of its effect on the advertising market. We believe that the consequential changes to the advertising market due to using regional SFNs should not be treated as unacceptable with proper investigation.

Without further consolidation there is a significant risk that it will not be possible to increase HD channels and continue to offer COM multiplex services even if the transmissions all change to DVB-T2.

Question 17: Do you believe that using the 600 MHz band for DTT after clearing the 700 MHz band would reduce the risk that the DTT platform will not be able to continue to provide important citizen and consumer benefits?

We agree that using the 600MHz band is a way of reducing the risk that the DTT platform would cease to be relevant and useful to the public. We make the assumption that 600MHz will form an integral part of the 700 MHz clearance programme from its outset.

We believe that this is a changeover programme which will be very complex. We expect that it will encompass antenna changes and change to DVB-T2 and MPEG4 services. The use of additional capacity will permit justification of the large change by including the benefit of extra channels for the general public.

In order to provide 700 MHz capacity in 2008 the clearance programme will need to start by 2015. The consumer equipment will need pre-fitted filters and specifications to which it can be tested. The planning work will need to start in 2013 and this does not include the spectrum co-ordination task. This requires urgent attention and we applaud Ofcom's early start on this work.

Question 18: Do you agree that the future benefits for citizens and consumers of enabling the release of the 700 MHz band whilst maintaining the role of DTT are likely to outweigh the loss in benefits of the 600 MHz band not being able to be used for other services in the long term?

Ericsson is firmly of the opinion that the economic value of releasing 700MHz for Mobile Broadband will outweigh any loss in benefits from other services, focusing particularly on White Space Devices. We see two specific groups of applications for WSDs being on the one hand as a free substitute for Internet connectivity to avoid paying licences fees and the other as substitute spectrum for Wi-Fi. The former application, almost by definition, reduces GDP and the potential benefits could be achieved in alternative ways such as flexible licensing schemes in cases where provision is hampered by licence fees and the market has failed to deliver service. The Wi-Fi application is clearly beneficial in economic terms but the long range of UHF is not necessarily appropriate and more capacity and higher powers at higher frequencies could achieve the same result for the economy whilst still offering the benefits of meeting Mobile Broadband needs.

Question 19: Have we identified correctly the possible short-term uses of the 600 MHz spectrum? Are there other short-term uses we should consider?

We do not have any further short-term uses that we wish to highlight.

Question 20: Which option(s) for releasing 600 MHz in the short term would maximise its value whilst supporting our proposed longer term objectives?

Ericsson has no views on these short term measures. We note only that the long transition programme means that short-term applications are really going to be limited to around

one or two years (2013 to 2015). There does not seem sufficient time to gain and investment return on any applications beyond those in use today, i.e. PMSE.

## *The wider impacts of changing the use of the 700MHz band*

Question 21: Do you agree that the wider impacts of a future change of use of the 700MHz band could be managed to prevent them having a detrimental impact on consumers and the services operating in this band?

We agree that the changes can be managed without detriment to consumers. However we do not intend this to be taken to support all the services discussed in the consultation document.

## *Proposed approach for securing future benefits and next steps*

Question 22: Do you agree that the approach set out in this consultation is likely to secure significant benefits for citizens and consumers over the long term?

We agree with the approach in terms of the release of 700MHz for broadband and the use of 600MHz for DTT.

Question 23: Have we correctly identified the main areas of future work that could follow this consultation process subject to its outcome?

It appears us that Ofcom has identified the main areas of future work that could follow this consultation process.