Questions & Answers

Planning for the World Radiocommunication Conference 2015 (WRC-15)

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The World Radiocommunication Conference in Geneva in November 2015 will provide a rare opportunity for governments from around the world to agree new international spectrum allocations for the mobile service. The ITU plays a vital role in the global management of the radio-frequency spectrum and satellite orbits – this includes managing the World Radiocommunication Conference.

1. **How important is mobile broadband socially and economically to ITU Member States?**
   We have been witnessing the mobile broadband revolution for many years. It is essential for ITU Member States to develop broadband for economic growth, inclusiveness, education and a growing number of electronic services. It's a positive factor for development. What most countries realise is that broadband will be delivered in their country essentially through mobile. I think we can say overall that mobile broadband is how most countries will implement broadband. The reason for this is very clear. It is the same reason why mobile telephony introduced telephony to most people in the world. It was a revolution.

   If you look back 30 years ago, the penetration of fixed telephony in the majority of countries was only a few percent. 30 years later fixed penetration is still a few percent, so it has not really increased but mobile telephony is at 100% or more. The reason for that is the lack of fixed infrastructure and I think it is still true now that there is a lack of fixed infrastructure. Therefore I think in most cases mobile broadband will bring broadband in as mobile brought telephony in. Of course you can say technology like fibre optic is developing, but implementation requires a lot of investment for countries with a significant geographic area and takes a long time.

2. **How much of a challenge is rising mobile data traffic for member states?**
   The challenge of course, is that mobile broadband traffic is increasing something like 30 to 40% per year, which means it will double every two to three years. Obviously at that pace, if we had to double the amount of spectrum available every three years then after 20 years you would have used all the spectrum available. This is not going to happen and most of the effort by the mobile community to face this challenge is going to be through the use of more spectrally efficient technologies. LTE is one of the responses to this and LTE-A is another step in this response. We will see that 5G (or IMT-2020 as we call it in ITU) is going to be several times more spectrally efficient than 4G. Short of doing that, we would be building an industry that is not sustainable in the long run and would consume all the spectrum in the world.

3. **The ITU recommends that significant additional mobile spectrum needs to be made available by 2020 yet some Member States don't currently wish much additional spectrum under Agenda Item 1.1 at WRC-15. Is this a problem?**
   ITU's figure for additional spectrum is an average figure, and what is important to realise is that you have to look at the problem not only from an average perspective but also looking at the amount of spectrum needed in every area to satisfy requirements. Therefore it could be misleading to focus too much on the average figures. What is more important is to assess how much spectrum you will need in urban areas, and how much spectrum you will need in rural areas in any country. Both of these will drive spectrum requirements in different frequency bands. This is why in the frequency bands which are under discussion under Agenda Item 1.1 and 1.2, you have proposals for allocating spectrum below 1GHz and proposals for spectrum above 1GHz. Below 1GHz the 700MHz band is key for coverage in rural areas. But it's also important that we have harmonisation as much as possible, and I can see consensus being built around confirming the WRC-12 decision at 700MHz.

   For other frequency bands, it is likely that they are

not necessarily required or available everywhere, in every country, especially to satisfy the requirements in urban areas. So we will see that different countries are positioning themselves differently according to which frequency band is addressed. You also have to recognise that in some countries the candidate bands are already used by some key services like satellite broadcasting, defence, air traffic control or meteorology and these services cannot just go away. At the end of the day you will have frequency band allocations for the mobile service, but not always in every country, with regulatory provisions to protect the incumbent services. From this situation, administrations in each country will have to take a decision, which will take into account their national situation as well as the take up of the band for IMT, hence the availability of low cost equipment through worldwide economies of scale.

If you go back almost 25 years ago to 1992, frequency bands were decided for IMT around 2GHz. We knew these bands would take a long time before they could be freed up by the military. So the difficulties you see under Agenda Item 1.1 and you will see more in the future are essentially linked to the difficulties of vacating the candidate bands and the time it may take to vacate them, if at all feasible. If it takes 25 years it is not a good candidate band. The bands have incumbents and it takes time to relocate.

3. **To what extent do regulators need to be thinking quite far ahead in terms of band allocation?**
The type of discussions we have at WRCs are really paving the way for decisions that will be there for 20 or 30 years, and therefore the timeline for delivering spectrum can be many years. Look at the 2GHz band for 3G, which was allocated in 1992 and came to be used some 15 years later in most countries. Every country has its own pace to deliver the band.

If you look at more recent decisions, like WRC-2000's decision on the allocation of 2.6GHz for IMT, which was used by many incumbent services then, we knew it would take time. It is only now that you start to see a general interest to use this band, which it is one of the only ones fully harmonised worldwide. Even more recently, WRC-07 identified the first digital dividend, and eight years later, less than 50 countries have adopted the possibility which was then opened. So you need time between the allocation and the time the countries are ready. It's difficult and we should not underestimate this.

Investments in spectrum are generally over 20 years (or over 30 years in the case of military usage as they have more robust equipment). But after some time you realise maybe the technology has changed or you can provide the same service in a different frequency band, or use less of the band. But there is also the possibility that incumbent equipment, where it is used, is not used everywhere in the country and therefore you can take measures to protect that, such as through shared access, which is clearly one of the solutions to be used for the long term. If you have a band which is used by incumbents, you don't necessarily have to ask the incumbent to go away. You can share but the incumbent has to be protected and I think this is more likely to be the way additional bands will be made available in the future. I think decisions in the future will depend on the ability and willingness of the mobile operators to implement that sort of approach (more sharing) and be happy with it.

Many of the difficulties we have encountered in the past are linked with the assumption that the mobile operators will need particular frequency bands in every country and everywhere in every country, but what we are seeing for the future is that this is not going to be the case. Every frequency band will have some benefits, but not in every country. And maybe in one country where a frequency band has benefits it will not be the case throughout its territory. So this opens up the possibility of sharing, but mobile operators have to demonstrate that this is working and that they can make it work. I think what will help in this type of process is to see a growing number of examples where this has worked successfully. Only then will we see more of this in the future.

4. **How important is harmonisation today, compared with in the past?**
Harmonisation has always been important, in particular because it allows equipment to be taken from one country to another and still work, and with the development of global exchanges and more and more people travelling this is an important aspect. Even more so today because the smartphone is a personal device, you have most of your life on it, and not to have access to it is totally unacceptable nowadays. That is the benefit of harmonisation.

But economies of scale are the central aspect. If you have a market of seven billion customers, then the manufacturer has the prospect of selling equipment in mass quantities and therefore can keep the costs down. What of course would limit this ability to keep costs down would be if we have too many different frequency bands competing in many different countries. This is why harmonisation is important. Harmonisation is something that has to be considered not just in terms of allocations - the decisions made at WRC - but also in the harmonisation of the band plans, which is something that is not binding but is equally important in driving costs down. For example in the 700MHz band plan we have a de facto solution in the APT band plan, which is not the only solution. There are other choices but most countries are going with the APT plan because it goes with greater economies of scale.

5. **Are there some concerns about decisions at WRC that a mobile allocation alongside an incumbent means the incumbent will eventually be forced out?**
   There is a genuine feeling that this is the case. So the mobile community has to work on explaining and convincing that this is not the case. For example, it could help admitting that the C-band is important in many countries because in sub-tropical areas the rain rate is such that the Ku-band or higher is not a solution. In these countries the C-band is used for supporting the mobile backhaul infrastructure for base stations. If you take that spectrum (for mobile use) then you have spectrum to connect to base stations but not to connect backhaul. When we get to the next conference, we're likely to be discussing frequencies higher than 6GHz. This is where the mobile backhaul infrastructure is, not just for tropical countries but everywhere. We have to be careful in finding a holistic approach that will be sustainable for the mobile industry as a whole, which does not take spectrum away from backhaul and gives it to base stations. You have to make it work as a system.

6. **How can the mobile industry provide reassurances that sharing between services is possible?**
   Things will be easier in a few years when we have shown that licensing on the basis of coexistence works. I think the satellite industry is very reluctant, because the only current example we have of coexistence is with WiMax operators and C-band earth stations, which is not working well. So it will be important to build something which works. When the C-band was discussed at WRC-07, a footnote was adopted by which a number of countries can use 3.4GHz - 3.6GHz for IMT. And what we have seen since then is a transition from WiMax to LTE, but this is taking some time so we still see interference. In the end, we could see that as a game in which everybody can win. We need to have constructive discussions between the C-band operators, the governments and the mobile operators. The problem now is in reported cases that C-band base station deployments have not been coordinated. So if these base stations are to be protected by mobile operators, frequency coordination needs to be effected, both at national level (under the auspices of the regulator) and at international level (under the auspices of the ITU). So everybody has to work to make this approach viable.

   C-band has been shared in two very different ways in the last 60 years. Sharing between mobile and fixed wireless and between them and fixed satellite services. This was foreseen from the beginning of satellite communications and regulated at the ITU level so that you could coordinate satellite earth stations with the relevant fixed or base stations. But the problem we are seeing now is that this regulation has not been implemented in many countries for many reasons, such as lack of resources. Every party in that game has realised that, if we want to build a viable system, we need to know where the objects that need to be protected are located. That's how sharing can work. But it is not so easy because it requires cooperation and resources.

7. **Should ITU Member States who plan to retain incumbent services in a WRC-15 candidate mobile band oppose changes at WRC-15 or should they consider their neighbours?**
   Everyone is interested in seeing mobile broadband in their country. So in those countries where an incumbent service is successful they need to be convinced that neighbouring countries are going to protect it as well. So the kind of international reformation that ensures such protection is important. If we look at what WRC-07 decided for the protection of the C-band earth stations for example, we have a regulatory solution.

   If we look at the protection of broadcasting, similar approaches are possible and work. In Region 1 for example there's a plan which provides protection for broadcasting, so there are regulatory solutions to protect those countries who want to continue for the foreseeable future to protect the incumbent, which doesn't mean they will reject mobile in the long run.

8. **Is it necessary to look at lower frequency bands for mobile or just focus on higher frequency bands?**
   It's equally important to address all bands. For example, 1.5GHz is not that high in spectrum and not as good as 700MHz for coverage. Basically, doubling the frequency means four times as many base stations are required so cost for coverage becomes an issue. This makes operators reluctant to provide service because of the cost. This is why lower bands are essential to provide coverage at reasonable cost, hence bridge the digital divide between urban and rural areas.

9. **Do WRC decisions mean Member States need to go and replan the band immediately or can this wait?**
   The final decision is for each country to implement and each will take whatever time it requires. One difficulty in that regard is when you address broadcasting, as there is a need for more careful frequency coordination to ensure you don't get interference in border areas. When you deal with interference from broadcasting into mobile, interference could prevent mobile something like 200km into a country.

In Europe for example this could mean an entire country, so this is why Europe was the origin of the GE06 plan, to ensure there is a stable framework to move from analogue to digital broadcasting. Since that plan was established, the 800MHz band started to be taken away from broadcasting and there has been a need for some frequency coordination to modify the usage. This will happen again with the 700MHz band allocation to mobile.. The fact that already several countries in Europe are planning to assign the 700MHz band for mobile shows that we already have an idea of what the replanning will be for broadcasting. These frequency planning efforts will give broadcasting the assurance of continued operation without interference.

The decision by the WRC doesn't force anybody to use the band for mobile instead of the incumbent, it just opens it up for a chance to be used.

L-band (1427MHz - 1518MHz) - has seen great progress in all ITU regional preparations for WRC-15. Things are converging on this band and it's one of the most likely candidate bands with great consensus.

With 2.7-2.9GHz the consensus is that the band is not used intensively but is occupied by important radar services, so in that sense it is 'used'. So it may be possible to use it in countries where it is not used at all, and perhaps also in countries where it is used as well, through other solutions. And there is also the possibility of some financial compensation here to refarm part of that spectrum for mobile use. This has proven to be an efficient solution in the past - to refarm the bands used by the incumbent if you want to accelerate the transition of the incumbent to a new technology. It is reasonable to expect that the mobile service pays for this transition, since it will benefit from it.

10. The C-band is a wide contiguous band - how important are these wider bands?

It's important for the mobile industry to have wide bands and the C-band is a good candidate for this. But again you have to take into account the incumbents and you also have to consider that at 4GHz the coverage area of a base station is significantly smaller - 16 times smaller with the same power than what you have at 1GHz - so it's certainly not a band that can be used for wide mobile coverage. It is essentially for urban areas and there it may even be confined to in-building coverage with outdoor connectivity using another solution. But with small cells and indoor base stations there's a potential win-win scenario with satellite, although there is a problem in sub-tropical areas, where you will see existing satellite earth stations on every rooftop, so it's very difficult to share in this situation.

11. How do high data usage countries like Korea and Japan relate to the Pacific Islands for example where C-band is so core?

Obviously spectrum requirements in Korea and Japan are different from those in the Pacific Islands. I am sure that, at the upcoming conference, every country will consider the situation of the other countries, so tropical countries and non-tropical countries will find a solution which takes into account each other's requirements. Cooperation is key.

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