

Administrations, operators and vendors discuss the 6 GHz opportunities for 5G and its evolution at the MWC 6 GHz Forum.

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European operators serving more than 50 countries in Europe, Middle East, Africa and LATAM (BT, Vodafone, Deutsche Telekom, Orange, Telefonica, and Telia Company) together with leading global suppliers (Ericsson, Huawei, Nokia), and GSMA Intelligence, jointly hosted discussions on the future use of the 6 GHz band, expressing very clearly the need for additional mid-band spectrum starting from the medium term and the unique opportunity that the 6 GHz band provides in meeting such demand to support the future global digitalization through the sustainable development of 5G and its evolution. Key contributions were made to the discussions through interventions from important policy makers from Finland, France, Kenya, Tunisia and the UAE.

During the opening keynote, **Luiz Felipe Zoghbi from the GSMA** explained the average need for a total of 2 GHz of mid-band spectrum (for all operators in one country and including currently available spectrum) in densely populated areas as a pillar required to achieve the [Vision for 2030](#). “Sustainability is key: in case of insufficient spectrum assignments, IMT-2020 requirements will be at risk, significantly more base stations would be needed generating a larger carbon footprint (by 1.8 to 2.9 times). The additional spectrum in mid-bands will allow for affordable fixed wireless access allowing each cell site to support more homes (by 3.5 to 6 times)”. The GSMA also highlighted the special role of mid-bands for 5G [estimating](#) a contribution of USD 610 bn by 2030 in terms of socio-economic benefits.

Looking at the specific socio-economic benefits associated with the 6 GHz band, **Kalvin Bahia from GSMA Intelligence** has presented the outcomes from GSMA Intelligence recent [cost-benefit analysis](#) for different assignment options for the 6 GHz band. According to the analysis, “the licensed use of the full 6 GHz band (5925-7125 MHz) will deliver the largest benefits across all the 12 addressed countries if fixed broadband technologies do not provide maximum available speeds above 5 Gbit/s, the licensed use of the full 6 GHz band will still deliver the largest benefits across most countries if fixed broadband provides maximum use speeds up to 10 Gbit/s and if a portion of Wi-Fi traffic is offloaded to the 60 GHz band. The split use of the 6 GHz band (700 MHz assigned to licensed use; 500 MHz assigned to unlicensed use) will deliver the largest benefits if FTTH/B and cable broadband adoption is widespread, they support maximum use speeds of 10 Gbps to all users and the 60 GHz band is not utilised by Wi-Fi. The unlicensed use of the full 6 GHz band was not found to be the most beneficial allocation in any of the considered analyses”.

Eric Fournier from the Agence Nationale des Fréquences (ANFR – France), chairman of the RSPG, turned his attention to the on-going sharing studies in relation to the protection of incumbent services at 6 GHz in preparation for WRC-23. He highlighted the protection of Fixed Satellite Service uplink as the key international issue, with the caveat that the upper 6 GHz is not expected to be used much for satellite uplink in Europe given that the paired downlink portion is already used today by 5G and the military. Fournier also said that France’s “neutral” simulations and modelling of interference from future IMT deployments indicate that the protection of satellite can be ensured in the upper 6 GHz. With reference to the other services without allocation status, Fournier highlighted that Earth Exploration (sea/ocean surface temperature) needs a solution, maybe with alternative band/allocation. Fixed links, FSS downlink (few sites for NGSO Feeder links) are more “national” issues. Fournier said that if WRC-23 confirms the possibility of IMT in the upper 6 GHz, this would allow large spectrum blocks and good propagation for 5G extension or launch of 6G, noting that higher mid-bands at 7 and 8 GHz are not readily available for IMT. Fournier closed his intervention by saying “it is clear that IMT identification at WRC-23 would provide a good opportunity for Europe, and the final choice between RLAN and IMT will then be in 2024; it will not be decided before.”

Tariq Al Awadhi from the Telecommunications and Digital Government Regulatory Authority (TDRA – United Arab Emirates), chairman of the ASMG, began by highlighting the growing numbers of mobile subscriptions world-wide and economic value added by mobile networks. He noted that by 2027 5G is expected to be the dominant mobile access technology, and that the challenge is to maintain this sustained growth. In this context, he cited the GSMA studies which indicate a need for 2 GHz of mid-band spectrum in the 2025-2030 timeframe, and how a lack of such spectrum would result in higher network costs and higher carbon footprint. Mr. Al Awadhi described UAE’s strategy for 5G as informed by collaboration with industry ecosystem partners. He also highlighted extensive industry involvement in two ASMG working groups which are handling preparation towards WRC-23 and the need for new frequency bands for emerging technologies. He encouraged industry to follow up with these activities to assist Arab regulators towards making informed decisions. He finally emphasized the importance of sharing studies at ITU-R for the protection of existing services, and that the efficient completion of these studies is critical in enabling the delegates at WRC-23 to make a balanced decision on 6 GHz.

Heidi Himmanen, from the Finnish Transport and Communications Agency (Traficom – Finland) stated: “we support the upper 6 GHz band for IMT and we hope other regulators in Europe will agree with this. We believe the 6 GHz band can play an important role for the future of 5G and the introduction of 6G. Europe has played an important role for the 3.5 GHz 5G band and can maybe also play an important role for the promotion of the upper 6 GHz band.”

Olfa Jammeli from the Frequency National Agency (ANF – Tunisia) outlined Tunisia’s recent public consultations on the 6 GHz band since 2019. She highlighted fixed service microwave links as the key incumbents in Tunisia in this band, and expressed her administration’s interest in sharing studies between IMT and microwave links in order to assess the possibility of allocation of the upper 6 GHz to IMT. Accordingly, all new applications for 6 GHz microwave links in Tunisia have been postponed to after WRC-23. Jammeli stressed that Tunisia has no interest in allocating the upper 6 GHz band to unlicensed Wi-Fi 6, since the administration’s focus is to reinforce Tunisia’s mobile and transport networks. She explained that the administration had allocated the 5 GHz band for Wi-Fi in 2017 and that the exploitation of this band had fallen well below expectation. She emphasised that the 5 GHz unlicensed spectrum needs to be first optimally utilised before Tunisia considers allocating any new spectrum to Wi-Fi, perhaps in the lower 6 GHz.

Daniel Obam from the National Communications Secretariat (Kenya) underlined that only the portion up to 3.6 GHz of the C-band was identified for IMT in WRC-15. The 6 GHz band was therefore seen as an important band to compensate for the lack of mid-band spectrum in our Region. “In principle ATU countries would like to see this band identified for IMT, but the final details will come up as the ITU studies will continue.”

According to Jan-Hendrik Jochum from Deutsche Telekom, the less investment-friendly regulatory environment lead to 5G investment challenges in Europe (compared to US). He noted that the ambitious political goals from the European Commission targeting all populated areas covered by 5G by 2030 are challenged by the declining revenues in Europe (rising revenues in US) resulting in an EU 5G investment gap of €150bn leading to lower 5G adoption in Europe. Jochum therefore stated the importance of future mid-bands spectrum assignments with affordable fees to encourage economically sustainable network investments. He then underlined that the 6 GHz band is the only possible mid-band spectrum available to meet this need. According to Jochum, the implications of not allocating 6 GHz for IMT are that “Europe’s digitization will further fall behind other regions in particular US and China. while an allocation of the upper 6 GHz for unlicensed use further weakens the European telco industries’ capability to deliver very high capacity networks. Outdoor 5G deployment in Europe will suffer from inadequate capacity and thus poor quality of service. Spectrum scarcity will also drive up spectrum prices. As consequence, mobile operators will not be able to deliver the required 5G outdoor capacity in an economical viable manner.”

Roberto Rodriguez Dorrego from Telefónica recalled the operator large base of fixed and mobile customers (128 and 261 millions respectively) across their operations in 12 countries in Europe and LATAM. Rodriguez illustrated the still limited fixed broadband penetration in many countries. Particularly in LATAM, where it hardly reaches 25% and where broadband speeds are between 10 and 100 Mbit/s. Even Germany or UK still have a high percentage of population being served at below 100 Mbps. Telefonica is deploying fibre in those countries, evolving to fibre speeds up to 1 Gbit/s. Dorrego noted that Wi-Fi services rely on fixed broadband connections. Wi-Fi speeds are therefore limited by the fixed broadband connections, and the effectiveness of wider Wi-Fi channels and technology upgrades is dictated by the pace of fixed network upgrades. Limited power and localised indoor usage of Wi-Fi allows for a high frequency reuse and diminishes the spectrum needs of Wi-Fi spectrum needs, while public mobile networks serving wide areas need more spectrum as mobile penetration is much higher and is becoming the main means of broadband connectivity in many countries. Even for advanced fixed broadband countries, like Spain, and the expected evolution of fixed broadband, allocating 500 MHz of the lower 6 GHz band to unlicensed (Wi-Fi) is enough to ensure high quality home services. Furthermore, when no fixed broadband connection is available, Wi-Fi will be on-loading to 5G networks. He further observed that the mm-wave 60 GHz band spectrum would also be available for further Wi-Fi capacity. Rodriguez concluded by stating “Telefonica urge administrations to ensure the upper band (6425 to 7125 MHz) will be available for public mobile networks towards 2030 to enable the digital society future”.

Santiago Tenorio from Vodafone recalled Vodafone’s fixed and mobile operations in 21 countries including Kenya through Safaricom, and that as a convergent operator with the biggest footprint in NGN broadband access, Vodafone cares about fixed as much as it cares about mobile, and that “we are probably the single biggest consumer of Wi-Fi ourselves”. He said that it is super important to keep a balanced approach in the 6 GHz band. “Densification in the urban areas in Europe is a myth, small cells are not economically viable. That is the reality. We are seeing a significant growth in traffic rate, nearly doubling every year when you count fixed and mobile. That growth can be accelerated by other applications such as AR/VR and metaverse. We think the 3.5 GHz will be congested before the end of the decade. The 5G role

in boosting innovation in the economy of this region is out of question: the whole MWC is around digitalization of society which relies on mobility, not only on fixed connectivity and Wi-Fi. If we let 5G exhaust its capacity that will slow down digitalization of society and that will be a terrible mistake that would only push this region backwards increasing the gap with the economy of other regions. A balanced approach is the only way to go”

Ulrich Dropmann from Nokia stated the importance of the 6 GHz band to fuel the “5G-Advanced world” in the second half of the decade when the 5G vision will be completed. Dropmann highlighted that the availability of 5G Advanced products is expected from 2025 (the standard will be finalized in 2023/2024) which would nicely fit with the assignment of the first 6 GHz licenses (the ongoing work in 3GPP for the definition of the 3GPP licensed 6 GHz Band is expected to be finalized by June '22). Dropmann has also highlighted the possibility for the future 6 GHz deployments to exploit 700 MHz of contiguous spectrum while reusing the available 3.5 GHz site grid allowing citywide high capacity coverage. According to Dropmann, the ongoing studies in ITU revealing spectrum sharing opportunities between the 5G deployments and satellite / fixed links with good protection margins. With reference to the Wi-Fi spectrum needs, Dropmann added that the additional 500 MHz in the lower part of the 6 GHz band would be sufficient to address Wi-Fi growth in homes and offices, considering that RLAN should also rely on 60 GHz millimeter wave band.

Xu Weizhong from Huawei explained that the 6 GHz particularly focuses on outdoor, and 5G is key for digital transformation. For metaverse a lot of new services will come, and such new services will need to be available both outdoor and indoor. 10 years ago no one thought that 3.5 GHz was going to be the primary 5G band but after 3 years of 5G deployments, we already have around 200 5G networks, and more that 90% of these use mid-bands. Mid-bands bring value to our customer with high performance lower cost and less power consumption. Mid-bands will play an important role in the future as well. Looking at the future whether we can identify more mid-bands in Europe, China and other regions is very essential. Last year we performed field tests using latest technology at 6 GHz together with the China regulator. We used the same site as 3.5 GHz but we used 128 TRX Massive MIMO (64 TRX for 3.5 GHz band). In this scenario 6 GHz can have the same outdoor coverage compared with 3.5 GHz along with a 15% of throughput gain. If in the future for beyond 5G and for 6G the mobile industry uses the mid-bands, we can have more affordable capacity, and lower power consumption. 6 GHz is very essential to provide outdoor coverage in the "metaverse era”.

Huawei provides 5G and Wi-Fi solutions, 5G is the engine for the future and the digital transformation. Wi-Fi is also very important. How to balance spectrum allocation is key. We think two aspects should be addressed: firstly whether a service needs more spectrum, and secondly whether this spectrum will bring more value to economy and society. Wi-Fi is an indoor solution, delivering capacity and coverage in homes, enterprise campus and public hotspots. Wi-Fi already has 2.4 and 5 GHz, very important mid-bands, and in some countries lower 6 GHz is also becoming available. Existing mid-bands spectrum can already provide very high capacity for Wi-Fi at home and enterprise. The Wi-Fi challenge is coverage, when moving from one room to another, but 6 GHz will not help with this because it's higher frequency than 2.4 and 5 GHz spectrum. The only challenge is public hotspots, but 5G has already indoor coverage solutions in public areas, And increasingly users tend not to use Wi-Fi when entering the airport to avoid using passwords. So this addresses the first question. Looking at the question of economic value, the GSMA Intelligence report has already addressed this issue.

Erika Tejedor, from Ericsson elaborated on the IMT ability to share spectrum with services that are in the 6 GHz band. The ITU-R agenda item description is about sharing and compatibility studies with the primary services in the band. In this respect, satellite uplink service was highlighted as is the main issue. Tejedor noted that many studies have been

submitted to WP5D, including from ANFR which has showed some conclusions from their side, and these studies indicate that in fact wide area city wide deployments are possible in this band and these can coexist with satellite uplink. There are other primary services which are satellite downlink and fixed links, but these are more of a national issue. There can be coordination on a case by case basis mainly considering geographical separation. Other services are not primary but are important: Earth Exploration Satellite Service (EESS) is very important globally and in Europe as well. There are studies being done, today these services are being deployed and they are in an interference environment, they need to share spectrum with satellite uplink and fixed links, but they have implemented mitigations to make sure they can work. This needs to be considered. Radio astronomy is another important issue in some countries, geographic separation can be considered in this case. Tejedor concluded by saying that "we need to keep discussing more in detail all studies submitted to ITU, but indeed we see that sharing and compatibility is possible in the band assuming citywide deployments".

Tim Frost, from MediaTek stated support for ecosystem building for both licensed and unlicensed, saying that we support spectrum availability for both. Licensed and unlicensed use of spectrum should be balanced. In Europe the lower 6 GHz has been given to unlicensed, the upper 6 GHz makes sense to be considered for licensed moving forward, in line with the WRC.23 agenda item. We think it's an important extension to 5G mid band operation particularly for outdoor urban areas and supporting 5G advanced services moving forward. In general it is technically feasible to support licensed in the upper 6 GHz and unlicensed in the lower 6 GHz in the same device. No issue there. In terms of the regional specific requirements, if there is harmonization across all regions, that make things simpler from device perspective. But that does not happen because regions have specific needs and market dynamics. Devices already support these kind of aspects, and such challenges have already been addressed in the past. We do not see the 6 GHz band to be different.