Marktconsultatie 26 GHz band met het oog op toekomstige uitgifte voor nieuwe generatie draadloze netwerken

GSA Response

GSA would like to thank the Ministry of Economic Affairs and Climate (*Ministerie van Economische Zaken en Klimaat*) in the Netherlands for the opportunity to provide comments on its enquiries concerning the 26 GHz band (24.25 – 27.5 GHz).

GSA do believe that the 26 GHz band offer a tremendous opportunity for the deployment of 5G services in the Netherlands and support the progressive release of the band starting with the 26.5 – 27.5 GHz range where a global eco-system of equipment, chipsets and devices has already been developed and is widely available. Indeed, GSA believes that availability of new spectrum in both sub-6 GHz spectrum and the upper 1 GHz in the 26 GHz band is key to unlocking the full potential associated with 5G. GSA believe that availability of suitable spectrum in both EU pioneer bands(3.5 GHz and 26 GHz) is key to unlocking the full potential associated with 5G and recommend the Ministry to take all the possible actions to make available to the market at least the 26.5 – 27.5 GHz band in 2020.

GSA appreciates also the challenges of 5G co-existing with existing Point to Point and Point to Multipoint Links in the lower 24.25-26.5 GHz spectrum. Given their significant number in the Netherlands, in this portion of the band this is a challenging issue. Ideally the fixed links should be moved over time while 5G zones could be identified and made available earlier also in this part of the 26 GHz band. Moreover, considering that the 3.4-3.8 GHz band is not available in the short term for 5G deployments in the Netherlands, access to the 26 GHz range is of critical relevance.

[What are the use cases for the Netherlands?]

GSA expects initial use cases to focus on enhanced Mobile BroadBand (eMBB) and Ultra Reliable Low Latency Communications (URLLC) usage scenarios for indoor hotspots in enterprises and factories and outdoor mobile broadband in dense urban and urban areas, using high mmW bands (like 26GHz) and mid sub-6GHz bands, as well as Fixed wireless access (FWA) in suburban and rural macro scenarios, using mid sub-6GHz bands and low band (like 700MHz) . Applications such as Mobile Virtual/Augmented Reality and Ultra High Definition Video, 5G fixed wireless access services and smart home, smart manufacturing, autonomous vehicle, Health care will all benefit from 5G deployments.

The multi-gigabit data rates possible with 5G using mmWave spectrum bands and the wide bandwidths available in 26 GHz will likely enable new use cases benefiting from high instantaneous data rates. On one hand, end users, who could be individual consumers and machines, will be able to download large amounts of data very quickly e.g., a movie before boarding a flight, fiber like services on always on laptops, or a high definition map update to a vehicle. On the other hand, the network will be able to serve a lot of more highly demanding end points as the high instantaneous peak rates combined with Massive MIMO (M-MIMO) will dramatically increase network capacity and hence facilitate traffic offload to the existing 4G networks.

Capacity will be an important metric for 5G, as the amount of traffic will be burgeoning in the coming years with the more widespread adoption of competitive data plans comprising unlimited use of popular apps, video streaming or even full unlimited data usage. The capacity increase, however, will not be uniform across the network, it will rather be concentrated in specific hotspots (cafes, venues, public squares, city centers, etc.) and aligned with the strategic deployment of high-capacity small cells covering the hotspot area.

5G at mmWave spectrum bands brings the benefits of Massive MIMO down to a small-cell scale, hence maximizing small cell capacity at hotspots. Deployments will encompass venues (e.g., stadiums) and locations within city centers. The latter case could be the most challenging one, as it would entail covering an area of 1... 2 km^2. However, depending on traffic patterns, it could be even enough to cover only the main public squares and roads within the city center, as those would be the locations where most traffic is consumed.

[In what period should you, as far as you are concerned, see the 26 GHz band? How much frequency space must then be made available and why? Which part of the band should become available and why?]

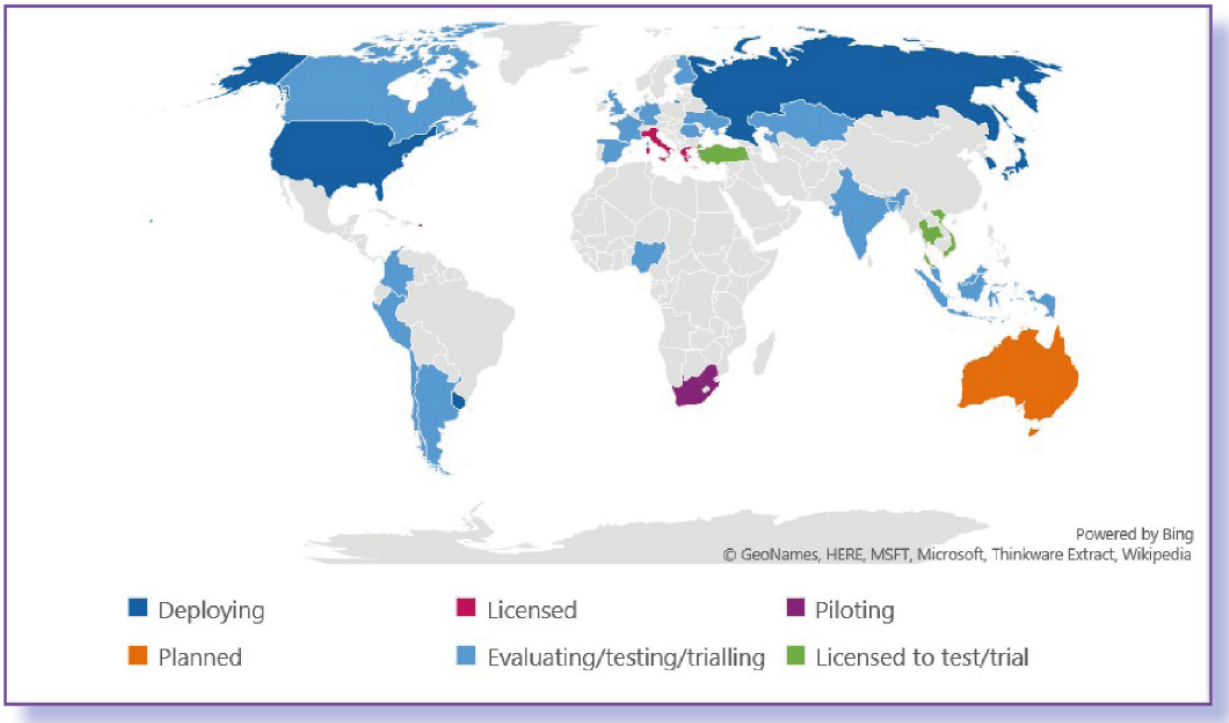
GSA recommend the Ministry to take all the possible actions to make available to the market at least the 26.5 – 27.5 GHz band in 2020. 5G NR equipment supporting the 26.5 – 29.5 GHz band (3GPP TDD band n257) is already widely available and commercial deployments of 5G end-to-end system at mmWave has already started or is about to start in several countries in the world including the US, Korea, Japan, Russia, Italy and many others.

The 24.25 – 29.5 GHz range covering the overlapping bands n257 (26500–29500 MHz), n258 (24250–27500 MHz) and n261 (27500–28350 MHz) has been the most-used 5G mmWave spectrum range to date above 6 GHz with:

- 113 operators in 39 countries that are investing in 5G (in the form of trials, licences, deployments or operational networks) across this spectrum range
- 66 operators licensed to deploy 5G in this range
- 12 operators understood to be actively deploying 5G networks using this spectrum.

Please see the picture below from taken from GSA spectrum report.

Figure 1: Use of 5G spectrum between 24.25 GHz and 29.5 GHz, countries plotted by status of most advanced operator activities



[Licenses]

a. Should frequency authorizations be regional or national?

GSA would like to highlight that 5G is a new technology and a new market which requires global scale to gain market lift-off during the launch phase. Mobile operators play a key role in order to help generate a competitive equipment market. Thus, mobile operators' role in the commercial deployments in the mmWave spectrum is very important and critical in the early phase of establishing a new technology with scale and developing a competitive equipment ecosystem. GSA has discussed ways to allocate spectrum on a regional/local basis, however, in order to help establish the 5G market in the first take-off phase, it has concluded that it would be important for operators to have access to the 26 GHz with a footprint as wide as possible, ideally at national level. Mobile operators are expected to deliver consistent services in all "hot spots" (trade fare areas, airport, train stations, main squares etc), as well as being able to offer tailored services to businesses based on the 5G "slicing" technology. GSA therefore sees a need to support business models in the 26 GHz band to support such services.

This could be handled via nationwide licenses or certain preferential treatment within the application procedures for local and regional licenses. In addition, there may be additional licensing considerations on how to use the band in areas where mobile operators do not plan or are not in a position to roll out services.

An interesting authorization model worth investigating further is the one adopted by the Italian regulator AGCOM in its 26.5 – 27.5 GHz auction rules whereby 5 lots of 200 MHz each for the 26.5 – 27.5 GHz with a cap at 400 MHz have been offered. In particular, for the 26 GHz band, the regulator has adopted an innovative sharing model based on club use whereby winners could use up to 1 GHz of spectrum in a dynamic way when the other operators in the club do not use spectrum in any given location.

[Licensing arrangements]

GSA recommends Netherlands' Ministry of Economic Affairs and Climate to license the 26.5 – 27.5 GHz band in a way that could enable the deployment of 5G mmWave networks over large contiguous spectrum of at least 400 MHz.

a. Synchronisatie [Synchronization]

When it comes to most appropriate synchronization framework for 5G mmWave TDD bands, it is widely recognised that mmWave propagation is affected by much higher losses compared to sub 6GHz frequencies. In addition, beamforming at both the transmitter and receiver side will limit the amount of interference that a given transmission will cause on nearby users and base stations. Furthermore, mmWave frequencies enjoy a very good indoor/outdoor isolation thanks to the high building entry/exit losses. This implies that outdoor and indoor networks might operate independently. In general, compared to typical sub 6GHz deployment in which synchronization or semi-synchronization is preferable across TDD networks, for mmWave frequency ranges asynchronous deployment might be implemented when adequate network planning is possible. In the most challenging scenarios, semi-synchronization might help to mitigate the interference between networks adjacent in frequency and space. As a consequence, in addition to synchronization and semi-synchronization, an additional option would be to allow asynchronous deployments for 5G mmWave TDD bands whenever there is no reason to expect excessive interference. Regarding the UL/DL ratio and other parameters related to the synchronization and semi-synchronization framework, they should be defined in concert with the license-holders in order to meet their specific deployments needs. That said, as we think it will often be quite realistic for mmWave networks to operate also in a largely unsynchronized and independent fashion, and it should thus be up to each operator to choose the most suitable configuration. Even within the network of a single operator, we envision different mmWave clusters to use different TDD configurations, and possibly adapt such configuration dynamically, depending on the time-variant DL/UL load ratio. This will be of pivotal importance to exploit the increase in UL capacity and peak bitrates.