450 alliance.org

promoting the advancement of 450MHz worldwide.

25 May 2020

NKom
E-mail: firmapost@nkom.no

Reference: *Høring om fremtidig bruk av ledige frekvensressurser i 410-430 MHz*

Dear Madam, Sir,

We are writing to you on behalf of the 450 MHz Alliance in response to your call for input on the future use of available frequency resources in 410-430 MHz.

The 450 MHz Alliance is an industry association that represents the interests of stakeholders in wideband systems in the frequency range of 380 – 512 MHz. Our members include traditional wireless industry companies such as wireless license holders, carriers and major equipment manufacturers, as well as companies representing various vertical markets for machine-to-machine communication.

In this document we wish to share our vision on 400 MHz communications and reflect on some of your observations and plans, hoping that it will support your decision making. We want to express our appreciation for this opportunity to be offered.

Wideband communications at 400 MHz

Wideband communications in the 400 MHz band can be described by the following characteristics:

- **Coverage & capacity:** thanks to the physical properties of these lower frequencies, very good coverage and very good indoor penetration is obtained with a relatively low number of sites. On the other hand: channel bandwidths above 5 MHz are not available with standardized equipment. This makes the 400 MHz band very suitable for services with high demands on coverage and low to moderate demands on capacity.
- **Reliability:** thanks to the limited number of sites needed, high protection of radio sites (such as long lasting battery backup) is economically feasible. Hence, 400 MHz networks can be built according to much higher reliability standards than networks at higher frequencies.
- **Private Networks:** reliable networks with high coverage and moderate capacity are less suitable to serve mass market communication needs. Instead, we see this band to be mainly used as PAMR (Public Access Mobile Radio) networks in the B2B and B2G segments for critical services.
- **Security**: as critical applications also impose high security demands, it is important to have stand-alone networks that operate independently and have no direct connections with public networks and the internet.
- **Economical**: global (3GPP) standards apply to major parts of these bands, allowing for economies of scale in the ecosystems. Moreover, the standards combine high spectral efficiencies with a wide and flexible range of features, so that the spectrum is optimally used.

Typical applications we find around Europe and elsewhere are communications for critical infrastructures like Smart Grids, Smart Metering, Smart Health and PPDR.

The development of a new mobile ecosystem for the 400 MHz band is a topic of great interest and is driven by the members of the 450 MHz Alliance. Historically, CDMA was globally used and a mature ecosystem exists, albeit at the end of its lifecycle. With LTE being the natural and future proof successor, standardization and operationalization of LTE400 technology has been a focal point for the 450 MHz Alliance for years already.

At 450 MHz, we now see the development to have full traction as the emergence of Machine to Machine communications (M2M) has become the game changer for this ecosystem. The M2M applications for PMR/PAMR use cases including those for operators of critical infrastructures in energy, transport and health, provided an outlook on volumes of millions and even tens of millions. For the major chipset and module vendors this was the trigger to get engaged in 400 MHz. Furthermore, voice and group communication are possible with dedicated 400 MHz push-to-talk phones offering a highly resilient solution for emergency communication.

Recently, several European countries assigned spectrum in the 410 – 430 MHz range for critical communications by Electricity Grid Operators (Ireland, Poland) or PPDR (Czech Republic). Greece recently organized a Public Consultation for this frequency band as well. Supported by advancing standardization efforts, this will further boost the ecosystem development in this frequency range.

Standardization and Harmonization

The 450 MHz Alliance strongly believes in the potential of the 400 MHz frequency band and advocates harmonization and standardization in this field. Members of the Alliance actively contribute to standardization and harmonization in 3GPP, ITU, ETSI and ECC.

In the 400 MHz range, 3GPP defined five different bands for LTE FDD communication, see figure 1. Band 87 and 88 were accepted in 2019. Standards on conformance testing and equipment are yet to be detailed. The 450 MHz Alliance pushes hard to get all this being done as quick as possible.

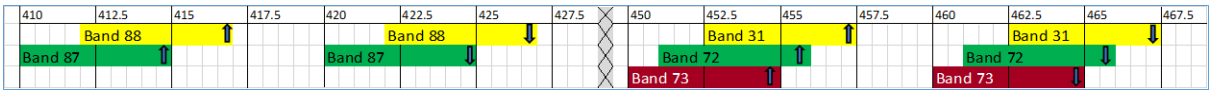

Figure 1: current 3GPP defined bands between 380 and 512 MHz

Responses to your questions

1. **What services will such a provision to mobile communication enable? Could a smaller bandwidth for mobile communications, such as NB-IoT and 200 kHz channel bandwidths, be appropriate?**

   In case of Machine to Machine (M2M) communications, we see that the number of devices within the range of a radio cell can add up to very high numbers. Modern LTE and LTE-M based FDD networks are optimized to support M2M applications with these large UE densities. That means that a bandwidth of 2x 1.4 MHz, 2x 3 MHz or 2x 5 MHz is required. Given the 2x 1.8 MHz bandwidth available in Norway, the best solution for an operator would be to deploy 2x 1.4 MHz for LTE or LTE-M, with two NB-IoT channels in addition which can be used in an integrated setup.

As described above, such deployment would be particularly useful for critical M2M connectivity services, for which resilience and security against reasonable costs are the primary demands. Smart grids and smart meters are currently the driving applications, but other applications with stringent security and availability demands will follow.

The LTE network could also be used to deliver an emergency voice service, with guaranteed access for a limited number of voice devices. For a full PPDR service the available bandwidth is probably not sufficient, but as a backup system for Push-to-Talk communications with field engineers during calamities, such LTE networks may be suitable.

Splitting the band completely into multiple NB-IoT channels is less attractive as several LTE specific capabilities, such as those related to Priorisation or Quality of Service control, would be not or less available.

The possibilities for an operator would significantly increase in case the bandwidth made available could be expanded from 2x 1.8 MHz to 2x 3 MHz. Then the available spectrum can be fully utilized by a 3 MHz LTE FDD system, in a very efficient manner. It would already be of help if such expansion could be granted on a regional basis only. Although we realize that spectrum is scarce in this band, we do recommend to consider this option.

2. **Will it be appropriate to divide the frequency band and regionalize resources? What prevalence (local, regional or national) will be applicable to achieve?**

   Generally speaking, spectrum and other resources are most efficiently used if radio planning and network realization can be done on a national scale. In that case there are no internal borders that imply restrictions on network topology and radio parameters.

   If spectrum usage will be dedicated to specific vertical markets with regional organisations, such as regional electricity grid operators, regonalisation may be an alternative to consider. We see however that regulators worldwide choose for national rather than regional licenses for wideband communications in the 400 MHz band, to our knowledge with only a few countries in Region 2 as an exception. Also for Norway we consider a national license the best option.

3. **Status of availability of equipment (ecosystem) and in case of any inaccessibility, when will equipment be commercially interesting and mature?**

   The 3GPP bands 87 and 88 are relatively new. Nevertheless, many vendors of network equipment, chipsets, modules and devices have products for these bands on their roadmaps and some first products already entered the market in the past year: a pair of chipsets and several modules and routers integrating them. A prototype hand terminal was released as well.
   The new networks in the 410-430 MHz band in Poland, Czech Republic and Ireland are strong drivers for ecosystem development. Since many of the ecosystem products for Band 87 and 88 will basically be an extension of Band 31 and Band 72 products, we expect that a mature market for devices and network equipment will be in place already in 2021 or 2022.

4. **In the event of a lack of interest and ecosystem at this time, when should any new interest hearing take place?**

Given the rapid developments in the ecosystem and the growing interest especially from energy grid operators in reliable dedicated networks for monitoring and control, we would assume that two years from now the situation will be so much different that a new public consultation in 2022 would be useful.

Conclusion

The 450 MHz Alliance believes the spectrum available in the 410-430 MHz band may prove to be very valuable for the operators of critical applications needing extremely reliable and secure wireless communications. Given the 2x 1.8 MHz bandwidth that is available, a 2x 1.4 MHz FDD LTE or LTE-M system combined with 2 NB-IoT channels would be optimal to provide nation wide secure and resilient services, basically M2M and emergency voice. This would be in line with global developments and is supported by standardization and ecosystem development.

Dear madam, sir, the 450 MHz Alliance remains at your disposition for any further questions.

Yours Sincerely,

Igor Virker
Managing Director

Gösta Kallner
Chairman

Consent: the 450 MHz Alliance has no objections to integral publication of this memo.