TSDM
Telecome System Design & Manufacturers Association

Comments on TRAI Consultation Paper on "Spectrum, Roaming and QoS Related Requirements in M2M communication"

B. Identification of Spectrum Bands suitable for M2M Communications

Question 4: In your opinion what should be the quantum of spectrum required to meet the M2M communications requirement, keeping a horizon of 10-15 years? Please justify your answer.

Response 4: The quantum of spectrum required to meet the M2M / IoT communication requirement is somewhere between 10 – 12 MHz of Bandwidth. According to the study undertaken by TEC as per their technical report of 'M2M enablement in Power' an additional spectrum is required for all M2M/IoT/IoE/Smart Cities applications since it has been concluded that the existing de-licensed frequency band of 865-867 MHz would not be sufficient to cater to the billions of connected/smart devices that would be deployed in the near future [1].

After undergoing a comprehensive quantitative analysis, it has been recommended to allocate a band of 10-12 MHz which will serve the horizon of 10 to 15 years for all M2M / IoT applications.

The deployment options for the Cellular IoT solutions are different and depend on the mobile operator's installed base. Some operators may have GSM deployed in the 900 MHz band without enough spectrums to deploy 1.4 MHz LTE-M in the band. In such cases, EC-GSM could enable sharing of the carrier capacity in the band. Alternatively, a refarmed GSM carrier would enable deployment of NB LTE-M operating in 200 kHz spectrum. All these options of choice of technology – existing and evolving, for the M2M deployment will allow the micro layer i.e. institutional captive networks to be integrated with macro layer of existing service provider.

In order to build and co-exist micro (captive M2M network of an enterprise) and macro layer deployments (municipality or city level), the de-licensing of spectrum is inevitable.

[1].*http://tec.gov.in/pdf/M2M/Spectrum%20requirements%20%20for%20PLC%20and%20Low%20power%20RF%20communications.pdf*

Question 5: Which spectrum bands are more suitable for M2M communication in India including those from the table 2.3 above? Which of these bands can be made delicensed?

Response 5: Frequency band selection for M2M / IoT applications has now become the utmost important thing. The sub-GHz frequency bands offer compelling advantages as compared to other (higher) frequency bands.

After undergoing a comprehensive quantitative analysis, it has been recommended that 10-12 MHz of band will be required to cater to billions of devices spread across multiple use cases which can be classified basis: bandwidth requirement, latency, deployment scenario – inside or outside, deployment mode – private/autonomous or public.

The available un-licensed spectrum can be used for low power wireless applications though it is apprehended that India would not be able to cater to the billions of devices that would be deployed in the M2M/IoT/IoE/Smart Cities initiatives.

A reactive approach of adding up a spectrum cannot be blindly followed as the network may get congested and lot of interoperability issues can also show up.

Hence, rather than taking a reactive approach by allocating additional spectrum 'as and when required', a proactive approach is needed by acting in advance and allocating an optimum amount of de-licensed spectrum.

We propose that it need to be done in a sliced manner, across multiple spectrum bands, which will cater to wide spectrum of audience and use-cases, already deployed and future deployments. We strongly recommend the de-licensing of Spectrum band(s) is the key factor for implementing all variety of M2M applications. Our recommendation is as follows:-

A. 865-867 MHz allocated for M2M applications plays a vital role however it has its own technological constraints with respect to the hardware where the installed devices may not have the capability to operate in the additional spectrum that would be allocated. In order to let the existing deployments to remain effective this shall be kept delicensed.

B. De-licensing spectrum of bandwidth 2 to 5 MHz, for low power devices with short range,inGSM cellular frequency band either in 850 MHz, 1900MHz owing to the fact that 900 and 1800 MHz have already been occupied by the incumbents or from band 869 – 889 MHz which is earmarked for cellular telecommunication systems, including WLL. There are few countries like Netherlands and Sweden that have de-licensed 1800MHz band (DECT Guard band) chunk of 5MHz. There are many pure M2M deployments(Micro-Layer : autonomous and captive network. which is in control of enterprise) across these countries for required use-cases across industries, ports, hospitals etc.This band allows the usage of both GSM and LTE (LTE-M, NB-LTE) technologies and hence gives flexibility to enterprise and/or system integrators, service providers to offer the most relevant solution depending upon the requirement of an enterprise.The impact for this is near term to medium term and will be helpful in reaching the growth phase till M2M deployments move to scaling phase.

C. De-licensing 2-5 MHz in other cellular frequency, like APT-700, 800Mhz, or any other so as to use technology like LTE-M, NB-LTE M, EC-GSM. The solutions for LTE-M and EC-GSM will equally operate in spectrum shared with existing LTE or GSM networks, LTE-M and NB LTE-M would be supplementary solutions addressing different use cases with higher capacity on LTE-M and slightly lower cost and better coverage on NB LTE-M. Impact of this will be more in medium term to long-term. De-licensing the spectrum of IMT bands and allocating it for machine to machine communication will be highly lucrative considering the growing futuristic demand for M2M communication.

The right policy decision at this time will help in harmonization in medium to long term, as new NFAP due in coming times, with clear slot(may be 2MHz) for M2M application in IMT band.

The ideal recommendation will be to allocate 10-12 MHz either from 700 APT Band or de-license any frequency to specifically dedicate it for M2M/IoT/IoE devices that will be deployed in smart cities for smart city applications. This will be able to cater the billion of connected/smart devices that would be deployed in the near future. In addition, the permissible channel spacing may be increased to 400 KHz (maximum) for reducing adjacent channel interference and to achieve higher data rates.

De-licensing of spectrum will pave way for competition and accord lot of opportunities for system integrators, to move up in the value chain by offering full turnkey solution to enterprises putting their own robust communication infrastructure for M2M use-case. At the same time this will allow the enterprises to own and control this infrastructure like the way they do for their complete enterprise IT infrastructure, hence maintaining the required security and privacy of their data.

India should take the lead and set an example by thinking different though holistic in its approach towards M2M deployments. With economies of scale, the flexible but firmly defined policies will pave the way for successful M2M/IoT deployments in India.

Question 6: Can a portion of 10 MHz centre gap between uplink and down link of the 700 MHz band (FDD) be used for M2M communications as delicensed band for short range applications with some defined parameters? If so, what quantum? Justify your answer with technical feasibility, keeping in mind the interference issues.

Response 6: Yes, centre gap of 10 MHz between uplink and downlink of 700 MHz band can be utilized for M2M communication because 2 MHz of frequency between the unlicensed spectrum of 865 -867 MHz would not be sufficient to cater to the billions of connected/smart devices that would be deployed in the near future for M2M/IoT/IoE initiatives. Even if the additional 1 MHz in the 433-434 MHz band available for indoor applications is considered, it is apprehended that India would not be able to cater the requirement.

The APT-700 MHz band will majorly serve the requirement in its broader context and fits into the layered approach, point C, suggested above in response to question 5.

Technically, the centre gap can be used in similar manner as that of licensed APT-700 frequency band. The limitations, if any, on various factors of usage like transmit power, usage-mode (indoor or outdoor, captive or integrated), carrier bandwidth (1.4, 3, 5 MHz) etc, shall be an informed decision basis RF co-existence study considering that the APT-700 licensed band is already in use. This study shall be undertaken by independent body and reviewed by committee comprising regulators, industry representative and subject matter experts.

Based on the quantitative analysis of spectrum keeping in mind different technical parameters that are taken into consideration like 'Type of Unit cell', 'Expected Number of M2M/IoT/IoE devices operating in one unit cell (2 Sq Km)', 'Expected data traffic in one unit cell', 'Expected Bandwidth required', and how much can we achieve in existing 2 MHz band (865-867 MHz band) it is derived that this has become indispensable to introduce more bandwidth especially from the un-licensed spectrum so as to witness no or less congestion and interoperability issues. The calculation derived from the above technical parameters suggests the fact that complete 10 MHz centre gap of 700 MHz band can be used for short-range applications as well as medium to long range applications, basis the transmit power allowed, because of its sub-GHz property

The center gap of 10 MHz frequency may not be very useful in near future and will only start to impact, with its business viability as well considering the whole ecosystem is developed around this band, in medium term to long term. However as per the growing demand for smart city applications this will be highly constructive since the sub-GHz band is most effective for smart city applications, majority of the devices will be operating in this band. While the telecom ecosystem for Machine to Machine and IoT applications is still developing, earmarking and delicensing the bandwidth in this band as suggested in Response 5c, with long term perspective will be beneficial especially for bigger projects like smart city.

*****