NXP Comments to TRAI Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)

Version 2 (This version replaces the NXP submission dated November 14, 2023 on this public inquiry).

Date: November 24, 2023

Authors:

Hitesh Garg, Country Manager NXP India, hitesh.garg@nxp.com, +91 80 69128220

Marnix Vlot, Director of Standardization, CTO-Office, marnix.vlot@nxp.com, +31634309034

Introduction.

Scope

This document provides comments on TRAI Consultation Paper No 22/2023 “Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)” as issued by the Telecom Regulatory Authority of India, 27.09.2023 from NXP India. The questions in the above consultation paper are addressed in sequence.

NXP comments relate to unlicensed use in the 57-71 GHz band (V-band) for wireless interface, and only address a small number of the questions in the consultation paper.

NXP

NXP Semiconductors N.V. (NASDAQ: NXPI), an S&P500 company, enables a smarter, safer, and more sustainable world through innovation. As the world leader in secure connectivity solutions for embedded applications, NXP is pushing boundaries in the automotive, industrial & IoT, mobile, and communication infrastructure markets. Built on more than 60 years of combined experience and expertise, the company has ~31.000 employees including 11,000 engineers in R&D who created 9,500 patent families in more than 30 countries and posted revenue of $13.21 billion in 2022.

Based on the expertise in the field of high-performance mixed signal NXP drives innovation in the automotive, identification, and mobile electronics industries as well as in the fields of vehicle communication and automated driving. Core areas of the portfolio are sensors, microprocessors, (cyber-)security technology as well as wired and wireless communication. As a world leader in automotive semiconductors, NXP offers advanced solutions for vehicle sensor systems and driver assistance systems and short-range high-speed data communication solutions.

NXP India

NXP’s presence in India goes back more than 50 years and is one of NXP’s largest design centers. Our Center of Excellence functions from four sites across India with more than 2500 engineers and over 500 patents, and is focused on innovations for the Automotive, IoT, Industrial and Mobile markets.

Noida is one of NXP’s largest sites. It is a Center of Excellence for hardware and software design, validation and enablement specifically around edge processing and automotive processing. NXP Bengaluru is a hub of innovation for NXP’s connectivity, security, advanced analog and radio frequency products with the automotive and IoT markets as key drivers. The Pune site focuses on end-to-end solutions for Wireless LAN, and Bluetooth® connectivity. Established in 2007, it becomes part of NXP through the acquisition of Marvell’s wireless business in 2019. Our design center in Hyderabad is focused on NXP’s edge processing and advanced analog businesses.

Wireless interface applications

Wireless Interface (Wi-INT) is a new innovative communication technology aiming to transmit 11 Gbit/s in the 60 GHz spectrum for near field communication. As the communication technology is intended for short distances (< 5 cm distance), the transmission power is very low and the radiation levels get confined to space between the transmitter and receiver (near field).

Wireless Interface technology brings significant benefits for customers, enabling new and more flexible use cases. Wi-INT has a wide range of applications, ranging from Consumer applications such as Smartphones, Computing devices, Smart Watches and Wireless docking stations (to name a few), to Industrial/Automotive applications such as connector replacement for factory automation, robotic articulations communication and medical applications.

NXP expects a large ecosystem to be created around this technology in combination with Smartphones OEMs, Computing OEMs, system integrators and partners, creating a large business potential. NXP estimate a sizable /substantial market size by 2030.

Sustainability is at the core of the Wi-INT technology as the technology is intended to replace connectors, reducing the carbon footprint and ultimately, reducing the amount of e-waste generated when the solution/device reaches the end of its life.

NXP is working on Wi-INT technology development with a global team (America, Europe and Asia). NXP India is at the core of this new and exciting technology with more than 50 engineers working on architectural definition and implementation.

NXP offer to provide further background

NXP would be glad to provide additional information on the potential of these SRD applications to provide a deeper understanding of unlicensed use of the 57-71 GHz band (V-band) for wireless interface.

Answers to questions in as far NXP can provide relevant input

Q23. What quantum of spectrum in E-band (71-76 / 81-86 GHz) and V-band (57-64 GHz) is required to meet the demand of TSPs with Access Service License/ Authorization? Whether spectrum in E-band and V-band is also required by the TSPs other than Access Service License/ Authorizations, and other entities (non-TSP, for non-commercial/ captive/ isolated use)? Information on present demand and likely demand after five years may kindly be provided as per the proforma given below:

NXP's interest is in unlicensed use of SRD applications in the V-band. Fixed link operation should be able to coexist with low power SRD in the 57-71 GHz band. In should furthermore be noted that from evidence provided by Ericsson in the Consultation Paper it appears that fixed link operation in the V-Band is not in practice.

Q27. Whether Frequency Division Duplexing (FDD) or Time Division Duplexing (TDD) based configuration should be adopted for V-band carriers? In case you are of the opinion that FDD based configuration should be adopted, detailed submissions may be made with band plan, ecosystem availability, and international scenario.

From a perspective of fixed links causing interference to low power SRDs, having pure FDD assignment is slightly preferable.

Q46. In case it is decided to allow low powered indoor consumer device-to-consumer device usages on license-exempt basis in V-band (57-64 GHz),

(a) Whether it should be permitted in entire band or part of the band? Kindly provide detailed response including the frequency carriers, which should be considered for license exemption with justification.

For high speed, very low power wireless interface, it is essential that at minimum permission should be available for 57-64 GHz. There is substantial value in providing higher bandwidth for wireless interface functions so ad to increase the bandwidth by aligning the band to the US FCC 57-71 GHz.

(b) Whether there is a need to define such indoor use? If yes, what should be the definition for such indoor use?

For power levels below 20dBm (100mW) average EIRP there is no need to constrain application to indoor use only: i.e. outdoor use should be permitted.

Current FCC regulations permit SRD operation with a maximum of 40dBm average and 43dBm peak in 57-71 GHz (https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15/subpart-C/subject-group-ECFR2f2e5828339709e/section-15.255). This is substantially more than what is required for wireless interface. Use is not restricted to indoor use.

Current ECC regulations provide more modest 100mW (20dBm) equivalent isotropic radiated power (EIRP), 10mW (10dBm) output power as defined in ECC Rec.70.03 (https://docdb.cept.org/download/4358), Annex 1 for general use, but also 40 dBm EIRP, for non-fixed outdoor applications in annex 3, based on study ECC Report 288 (https://docdb.cept.org/download/1365) . This includes studies of interference between such services and fixed link services. From the cases studies in ECC Report 288 it should be fairly apparent that 100mW SRDs will not create interference to fixed link services.

(c) What technical parameters should be prescribed including EIRP limits? Suggestions may kindly be made with supporting justification and international scenario.

It is suggested to adopt a limit of 20dBm average EIPR in 57-71 GHz, with no constraints on outdoor operation. Some care is recommended to plan primary or secondary applications in this band so as to avoid creating large scale interference with locally deployed SRD applications, in particular if these are based on ubiquitous locally deployed transmitters with around 33dBm EIRP or more, potentially co-located with these low power SRDs.