

3GPP 4G/5G Band Designation Upper 700 MHz A Block

Project Overview

March 5th, 2021



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3GPP Band Standardization – Upper 700 MHz A Block

Puloli, Select Spectrum, and Access Spectrum (in partnership, the “Project Team”), have launched an initiative to obtain a channel designation from the Third Generation Partnership Project (“3GPP”) for the Upper 700 MHz A Block (“700A”) spectrum. The Project Team seeks to expand the ecosystem of standards-based suppliers, enhance the value of 700A and secure the spectrum for long-term reliable service provision to end users such as utility and critical infrastructure organizations.

This project is being undertaken with the goal of obtaining an official 3GPP band number designation and to update the relevant 3GPP technical specifications to ensure 700A becomes one of the standard bands that is supported in many future IoT (Internet of Things) chipsets, enabling interoperability between base stations and remote units from various suppliers, and minimizing the chance of adjacent band interference.

700A is a block of 1+1 MHz (1 MHz uplink + 1 MHz downlink)¹ spectrum currently not designated within 3GPP’s band plan. The spectrum bands immediately below and above 700A, Bands 13 and 14, are already part of 3GPP’s band plan (see Figure 1 below for more details). 700A is situated between the Upper 700 MHz C and D blocks, which map to 3GPP Band 13 and Band 14, respectively. In the U.S., these blocks are held and used by Verizon Wireless and FirstNet² (operated by AT&T), respectively.

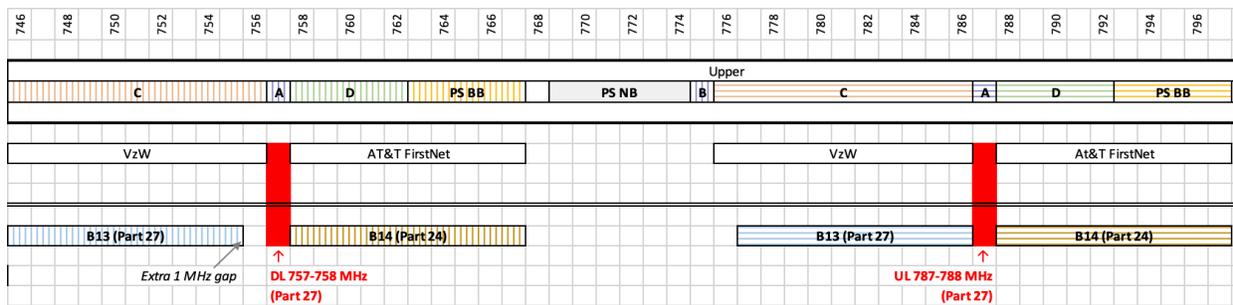


Figure 1 - 700 MHz Upper A Block

Comprising a total of 1x1 MHz, 700A cannot be utilized by 3GPP standard 4G/5G broadband equipment, which requires a minimum bandwidth of 2.8 MHz. The applicable 3GPP specification for 700A is NB-IoT³. Obtaining a 3GPP band designation based on NB-IoT will not disrupt existing deployments that utilize non-3GPP technologies including radios supplied by multiple industrial radio suppliers. The 3GPP NB-IoT designation is an additional option providing more flexibility to existing license holders.

FCC Part 27 regulations already cover this frequency range. There are devices and network equipment implementing this NB-IoT scheme that have undergone successful FCC certifications.

¹ Note that flexible use is allowed, and both the lower 1 MHz and the upper 1 MHz may be used for uplink, downlink or both, for example in Time Division Duplex “TDD” operation, but in the case of 3GPP standards, the lower 1 MHz portion of the band would be downlink only and paired with the uplink-only upper 1 MHz.

² The First Responder Network Authority is an independent authority within the U.S. Department of Commerce. FirstNet has contracted with AT&T to operate the network using spectrum licensed to FirstNet.

³ Abbreviation defined by 3GPP for Narrow Band Internet of Things applications

What is NB-IoT?

NB-IoT is a low power, wide area technology based on 3GPP's LTE specifications ideally suited for utility and critical infrastructure radio access networks.

- 100 million+ devices worldwide
- Efficient spectrum utilization
- Private LTE cellular network
- Highly secure
- IoT at Scale - massive machine type communications
- Carrier grade reliability
- Long range, excellent indoor coverage
- Robust, low-cost ecosystem
- No vendor lock in
- Optimized for battery powered devices, with line power as an option

NB-IoT supports a wide number of use cases for electric, water and gas utilities.

- Remote sensing: Pressure, Vacuum, Methane, Temperature, Humidity, Tilt, Facility Access
- Grid modernization: AMI, Extended SCADA, Distribution Automation, Distributed Energy Resources, Street Lighting
- Value-add services: IoT-based services provided in their service area

Benefits to Current and Prospective License Holders

Obtaining a 3GPP band designation provides multiple benefits to license holders:

- Expands the ecosystem by encouraging manufacturers to develop endpoint and network equipment utilizing mass production chipsets based on globally accepted specifications
- Reduces FCC workload and timeline associated with device certification by leveraging commercial "off the shelf" communications modules
- Minimizes vendor lock in by leveraging a "plug and play" approach to radio access networks
- Enhances the intrinsic value of the spectrum for future applications or in the event of future partitioning, leasing or resale by the utility
- Assists in addressing interference from adjacent bands by working within global 3GPP and regional ATIS⁴ specifications
- Enables long term technology strategy and stability for core use cases

Participation by Current and Prospective License Holders

Given the benefits listed above, the Project Team encourages participation from the existing and prospective 700A license holders and users in the 3GPP standardization project. Participation may range from co-signing or submitting a letter to technical contributions at the standards meetings to participating in field measurements and other to be determined ways to support the project. Exact steps in the process are still being defined and a draft overview is provided in Appendix A.

The project team offers to coordinate regular briefings and seek input from spectrum holders on a regular basis throughout the project.

⁴ The Alliance for Telecommunications Solutions "ATIS" is the North American Organizational Partner for 3GPP and is accredited by the American National Standards Institute

Appendix A: Process Overview and Key Steps

The overall project involves multiple steps, submissions, and stakeholder interactions that will take several months. The Project Team would like to complete this project as soon as possible while maximizing likelihood of success. The steps identified below may expand or contract as needed.

Strategy & Planning

The Radio Access Network (RAN) Plenary is the primary organization within 3GPP responsible for granting band designations. The first step is to gather information on what is required for work item submission for the RAN Plenary, study previous recent band designation work items, socialize and secure support from stakeholders, formulate a channelization scheme with highest likelihood of passage, and put together a coalition of co-sponsors.

The Project Team has secured support from a major device chipset vendor that is a leader at the 3GPP, to co-sponsor this work item, and possibly author some of the device side contributions. In addition, the Project Team is working towards assembling an industry consortium representing US-based utilities and other critical infrastructure industries to support this effort.

The project team has already identified expert consultants to support this effort and committed financial support. Beginning this June, the Project Team will attend one or more RAN Plenaries and selected RAN Working Groups (WG) to continue to develop the work item strategy. The strategy will describe the chosen approach, chosen band plan and channelization scheme, supporters, any anticipated opposition, risks, and timeline for work item filing.

Work Item Submission and Approval by the RAN Plenary

Once the strategy and high-level plans are in place, the next major step will be to draft a submission to the RAN Plenary. There may be some intermediate steps required, including possibly a liaison letter from RAN WG4 (Radio performance and protocol aspects) to the Plenary stating the basic feasibility of the work item. The submission will propose starting work on a Work Item that would lead to creation of a new band number designation for 700A NB-IoT operation. It will lay out the rationale, technical scope, co-sponsors, timeline, and the specific Release number. As stated above, there will be no obligation for operators to choose or operate 3GPP compliant equipment, this only presents additional options on how to use the spectrum. The main outcome of the step is the approval by the 3GPP of the Work Item.

Technical Specifications, System Modeling and Simulation

The initial work will involve gathering a list of all the Technical Specification that require modifications, and therefore contributions to the respective WGs.

Also, system modeling and simulation may be required for some of the submissions. If needed, equipment vendors, chipset vendors and spectrum license holders may be engaged to help create the system model.

Authoring and Submitting Contributions

Once the needed simulations have been completed (if necessary), then the work will focus on sequencing the contributions primarily to RAN4 and RAN1, though other Working Groups might have few Technical Specifications that need minor updates as well. Following that, detailed individual contributions will need to be submitted, presented, and get approved.

Final Approval by the RAN Plenary

The final step is to obtain liaison letters from each Working Group chair to the RAN Chair stating all the necessary contributions for this new band have been approved. This will lead to final contribution to the Plenary asking for formal approval of the new band designation.

At the conclusion of this step, 700A would become an official band in the 3GPP supporting NB-IoT.