

Exhibit 1 - Response to Item 7 Questions

With this application, Carnegie Mellon University (“CMU”) is seeking an experimental license to enable it to use experimental radios (LoRa-based radios, described below) operating in the 430-440 MHz and 902-928 MHz bands in conjunction with other experimental radios authorized under WI2XXL, previously granted by the Commission. That license and its proposed modification (See 0153-EX-CM-2017)¹ examine the use of use of vacant spectrum in the television broadcast bands, i.e., the “white spaces.”² The LoRa radios can also transmit in the TV white spaces. Authorization for that use has been requested in 0153-EX-CM-2017.

As explained in 0153-EX-CM-2017, CMU proposes to conduct research to demonstrate the potential of wireless “white spaces” networks in order to investigate and develop improved wireless applications and services. Such research will be conducted in three locations. The first location is within the main CMU campus of 143 acres in Pittsburgh, PA, with a radius operation of 20 km. The Campus is located at 5000 Forbes Avenue, Pittsburgh, PA 15213. The second location is within the CMU Silicon Valley Campus at the NASA Ames Research Park, Bldg. 23 (MS 23-11), Moffett Field, CA 94035, with a radius operation of 65 km. The third location is the California National Guard Base at Camp Roberts, CA 93451, with a radius operation of 10 km.

As a major engineering and science research university, CMU will conduct various short- and longer-term research, as permitted by FCC rules, which are expected increase knowledge of radio technology and potentially deliver new and innovative services using “white spaces” spectrum. The radio “network” that would be authorized through this application will serve as the “laboratory” for this research and experimentation. The overall experiment will be made more robust with the ability to transmit in the 430-440 MHz and 902-928 MHz bands

CMU expects to share the results of its research through presentations at academic conferences, other events and in scientific and engineering papers and journals. This information to be shared would include: a) The complete program of research and experimentation proposed including description of equipment and theory of operation; b) The specific objectives sought to be accomplished and c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art, or is along line not already investigated.

Attached are images of front and back sides of one such prototype LoRa device, which is an example of the family of LoRa devices that will be developed and tested. Areas related to the experimental radios are marked. They are respectively: a Semtech SX1276 Radio and corresponding reference design circuitry; and two 915 MHz chip antennas (just one type of antenna to be evaluated). The SX1276 is a standard chip found in other FCC-certified LoRa-based radios that operate in the 902-928 MHz band. CMU intends to test the same LoRa-based modulation and protocols in white space bands using a variety of hardware designs. After completing development and testing stages for these boards, CMU plans to go through the FCC Equipment Certification process for each board that will be used beyond development and testing

¹ An application similar to 0153-EX-CM-2017 will be filed in the near term.

² The FCC adopted rules that allow unlicensed radio transmitters to operate in vacant television broadcast spectrum, while protecting television broadcasters and their viewers. *Unlicensed Operation in the TV Broadcast Bands*, Second Report & Order, 23 FCC Rcd 16807 (2008); Third Memorandum & Order, 27 FCC Rcd 3692 (2012).

stages.

