

Exhibit 1: Description of NorthWestern Corporation Program of Research and Experimentation

NorthWestern Corporation, doing business as NorthWestern Energy (“NWE”) respectfully requests an experimental license authorizing the deployment of the equipment with the operating parameters specified in this application. NWE is responsible for providing electricity and natural gas to approximately 665,000 customers in 299 communities covering two-thirds of the State of Montana, eastern South Dakota and Yellowstone National Park in Wyoming.

The requested license will allow NWE to conduct research and experimentation using a small portion of vacant spectrum in the television broadcast bands (the “TV White Spaces”). This experimentation is supported by a smart grid grant from the Department of Energy (the “DoE”) (Award No. DE-OE0000190) as part of the American Rescue and Recovery Act. This grant funds the Pacific Northwest Smart Grid Demonstration Project (“PNW SGDP”). NWE is one of several major utility participants in this project and the site or sites established pursuant to the license sought by this application will be used in that project. The overall project is coordinated by The Battelle Memorial Institute, Pacific Northwest Division, located in Richland, WA. The contact information for the project leads from the respective organizations at NorthWestern Energy, Battelle and the DoE, is provided at the end of this exhibit.

As part of the PNW SGDP, NorthWestern Energy will work with Battelle to test the usefulness of these frequencies for real time communications to remote smart grid devices. This includes point-to-multipoint wireless communications to capacitor banks, reclosers, voltage regulators and voltage sensors. This specific project is focused on improving power quality, power efficiency and outage restoration to rural customers in Montana along an unusually long distribution line. NWE has already installed smart grid devices which behave autonomously along the line without communications. Although power quality has improved, the line continues to experience problems. The expectation is that real time communications coordinated among the existing smart grid devices will improve power quality and efficiency. In addition, this distribution line is subject to frequent outages due to falling trees. Today, isolating an outage requires a lineman to drive along the line with a spotlight looking for the tree and broken line. Remote access to power monitoring devices will allow the division engineers to rapidly locate the section of line that has the fault and thereby dramatically reduce the time to resolve outages.

NWE has chosen the frequencies subject to this application because of its extensive distribution electrical grid, and these frequencies provide the signal reach required to more efficiently conduct this experimentation by using NWE’s existing land mobile radio and microwave towers (rather than needing to construct new costly towers) and existing backhaul facilities. This experimentation will not involve the sale, rental or distribution of devices to consumers or end users, or any commitment by any consumer or end user. It will be solely used to test and evaluate the ability of the system to support NWE’s private remote data needs.

The management of NWE’s electrical grid involves challenges not encountered by companies serving either flat or densely populated areas. NWE has one of the most challenging

service territories in the United States. The utility’s electric system has more than 30,500 miles of transmission and distribution lines and its natural gas system includes approximately 7,800 miles of transmission and distribution pipelines and storage facilities. In large portions of this territory, there are no viable communications options that meet the core requirements. The experimentation in the TV White Spaces frequencies will assist NWE in determining whether lower band terrestrial radio facilities can efficiently support these modern distribution control systems.

To conduct this experimentation, NWE requests the use of up to 4 (500 kHz) channels between 174 and 216 MHz. The equipment will be TDD, IP-based and will provide actual test data on the usefulness of these frequencies in supporting smart grid devices. The experimentation will involve a base station at NWE’s tower location listed below communicating with 7 temporary-fixed units.

<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>
Rumsey Mountain 10 Miles East Of Philpsburg, Montana	46-15-44.7 N	113-14-50.2 W

Each temporary-fixed station will communicate with the base station at the Rumsey Tower Location. A temporary-fixed station may be as far as 60 km from the base station and will use a directional, yagi or similar antenna mounted on a utility pole to communicate with the base station.

NWE is working jointly with Full Spectrum, Inc., a Santa Clara County-based manufacturer of radio systems designed for electric power grid control. All of the radios used in the experimental program will be provided by Full Spectrum Inc.

The base station radio is the FullMAX BS1000. The temporary-fixed service station is the FullMAX FS4000. Each operates at a maximum TPO of 4 watts. Base stations will use 120° sector antennas up to 10.65 dBi. Temporary-fixed stations will use directional or yagi or similar antennas providing gains of up to 11.15 dBi. Below is a list of the pertinent technical parameters:

Station Class	Emission Designator	Authorized Power
Temporary-Fixed station	500KA7D	17.873 W (ERP)
Base Stations	500KA7D	15.930 W (ERP)

In the Form 442 application, the temporary-fixed stations are listed as mobile.

NWE’s choice of the specific TV White Spaces frequencies requested in this application is based upon a thorough review of frequency usage that may be impacted by the proposed experimentation. NWE has satisfied itself that the use of the requested frequencies, as proposed in this application, will not cause harmful interference to incumbent television stations. NWE recognizes the secondary nature of operations conducted pursuant to the requested experimental license and NWE will not transmit on any channel or in a manner that causes harmful interference to the reception of an incumbent television station licensee. NWE also recognizes

the requirement to prior coordinate its use of these frequencies with the Society of Broadcast Engineers in Indianapolis and NWE will abide by that requirement.

Contacts:

NorthWestern Energy

June Pusich-Lester

NorthWestern Energy, Lead Engineer, Smart Grid

june.pusich-lester@northwestern.com

406-497-2329

Department of Energy

Mario Sciulli

DOE Project Officer

National Energy Technology Laboratory

Pittsburgh, PA

412-386-5435

Battelle Group

Ronald B. Melton, Ph.D.

Project Director

Pacific Northwest Smart Grid Demonstration

ron.melton@battelle.org

509-372-1677 (Office)

509-531-5562 (Cell)