

North Dakota Renewable Energy Program Status Report

Recipient: Packet Digital LLC

Contract Number: R-032-041

Report for time period of: September 01 - November 30, 2018

Description of Project

Packet Digital LLC, Nishati, and the U.S. Naval Research Laboratory (NRL) are collaborating to develop and commercialize transportable solar power generation modules capable of delivering up to 1kW, when setup in parallel, for remote military installations, emergency shelters and camps, and a variety of commercial uses such as but not limited to outdoors activities (RV campers, remote cabins, etc.), household backup power generation, and remote job sites. The end product will eliminate the fuel requirement and noise and reduce the life cycle cost of standard electromechanical power generation.

Project Tasks

Significant progress has been made on this project, primarily focusing on the electronics design activities with as well as preliminary mechanical design discussions followed by three dimensional mechanical modeling of the electronics enclosure.

- Objective 3 for MPPT modification is completed, objective 4 for additional hardware, custom enclosures and transport cases evaluation and development is in progress.
- Modification implemented on the high level architecture to better fit the applications. The changes are to allow the solar panels to be disconnected from the electronics for direct connection with external legacy US military MPPT controller. The updated architecture still support integrated battery chargers, USB charging ports, a power sharing port, a main controller, and a maximum power point tracker. Proprietary details are outlined in appendix A.
- Inoperational mechanical model of Expedition 570 solar panel has been received by Packet Digital and being used for mechanical fit and test of the electronics module. This mechanical model accommodates the discussion between Packet Digital and Nishati regarding the overall layout design and and placement of the electronics module and interface.
- Previously identified hardware developments such as bidirectional buck/boost power converters, USB charger, firmware update support, and communication with smart batteries have completed schematic design stage and moving into PCB layout design state.
- Space claim analysis is complete, locations and size of the electronics enclosure and battery trays have been identified and decided. This may be further refined in the next interim as mechanical design progresses.
- Overall solar generation system layout with electronics module placement location within the solar panel fixture has been discussed, identified, and decided. A more detailed description

showing the preliminary layout of the solar generation system with all the electronics module on the back of the solar panels is provided in appendix A.

- Some of the electronic support blocks have completed PCB layout design and moving into PCB production and assembly.

Deliverables

Please describe the progress on project deliverables, as stated in your contract, achieved during the reporting period:

- Power electronics hardware design is complete, individual block schematic and layout designs are completed and moving to the PCB assembly stage.
- Hardware design MPPT is complete, this includes the schematic design and PCB layout design. PCB assembly is in progress.
- Discussion about custom enclosure design for individual electronic components and integrated system with a third party mechanical design firm is ongoing. The mechanical design work is currently in progress.
- Documentation of system testing is pending system completion
- Transition to manufacturing readiness is pending system test and verification
- Commercialization partner identified (Nishati) and distribution is pending system test and verification