



March 7, 2017

Karlene Fine, Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

Dear Ms. Fine,

Packet Digital is submitting the enclosed grant application to request funding in support of the Renewable Energy Project, "Portable Solar Array Modules" in the amount of \$500,000. This funding will be used as a match for the nine-month project which will run from June 1, 2017, to March 1, 2018, and has a total budget of \$1,000,000. Other partners in this project include Nishati Inc., and Chiptronics Inc.

The development of a reliable, portable power system with robust battery storage powered by clean, renewable energy will have a very significant impact on North Dakota and the world over. Any customers who live or operate beyond the reach of the electrical grid, where dependency on fossil fuel generators is unreliable or expensive or in situations where grids fail will benefit from this new technology. We will market to the military, municipalities, security teams and first responders, media broadcasters, disaster relief organizations (e.g. Red Cross, FEMA), construction and natural resources, and under-serviced or off-grid towns and villages around the world.

If you have questions I can be reached at 701-365-4421 or terri.zimmerman@packetdigital.com

This letter sets forth a binding commitment on behalf of Packet Digital to complete the project as described in the application. Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "T. Zimmerman", is written over a circular stamp or seal.

Terri Gunn Zimmerman
CEO
Packet Digital, LLC
201 N 5th St, Suite 1500
Fargo, ND 58102

enc



Application

Project Title:

Portable Solar Array Modules

Applicant:

Packet Digital, LLC

Principal Investigator:

Andrew Paulsen

Date of Application:

March 1, 2017

Amount of Request:

\$500,000

Total Amount of Proposed Project:

\$1,000,000

Duration of Project:

9 months - June 1, 2017 to Feb 28, 2018

Point of Contact (POC):

Terri Zimmerman

POC Telephone:

701-365-4421

POC Email:

terri.zimmerman@packetdigital.com

POC Address:

201 5th St. N, Ste 1500, Fargo ND

Renewable Energy Program

North Dakota Industrial Commission

TABLE OF CONTENTS

Abstract	3
Project Description	4
Standards of Success	10
Background/Qualifications	11
Management	14
Timetable	14
Budget	15
Confidential Information	15
Patents/Rights to Technical Data	15

ABSTRACT

Objective: To develop and commercialize transportable solar power generation modules capable of delivering up to 1kW for remote military installations, emergency shelters and camps, and a variety of commercial uses; and to eliminate the fuel requirement and noise and reduce the life cycle cost of standard electromechanical power generation.

Expected Results: Packet Digital, LLC, aims to develop the value-added electronic components to be integrated into portable solar arrays developed by Nishati, Inc., based in McLean, Virginia. Nishati produces several models of transportable solar modules mainly targeted at remote military bases and encampments to provide sustainable device charging and power for equipment, while eliminating any fuel requirement and noise signatures. Packet Digital has created power conversion circuitry for Nishati products in the past and developed advanced Maximum Power Point Tracking (MPPT) and other hardware as part of previous NDIC projects. The partnering companies will combine their expertise to develop a portable solar power generation module that can be transported by small trailer or pickup truck and is capable of delivering up to 1kW of power at remote, off-grid locations. The military, municipalities, security teams and first responders, media broadcasters, disaster relief organizations (e.g. Red Cross, FEMA), construction and natural resources, and under-serviced or off-grid towns and villages around the world all stand to benefit from this new technology. The project will create and sustain highly skilled jobs in the fields of electrical engineering and electronics manufacturing and assembly in North Dakota, especially in otherwise economically disadvantaged areas of the state.

Duration: 9-month project beginning June 1, 2017.

Total Project Cost: \$1,000,000

Participants: Packet Digital LLC, Fargo, ND; Nishati, Inc., McLean, VA; U.S. Naval Research Laboratory, Washington, D.C.; Chiptronics, Inc., Dunseith, ND; Farasis Energy, Hayward, CA.

PROJECT DESCRIPTION

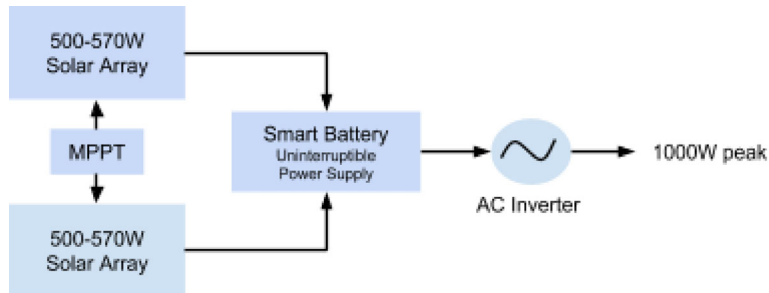
Objectives:

1. Specify, select, and test a 1kW inverter.
2. Evaluate and develop the smart battery.
3. Create the MPPT charge controller.
4. Evaluate and develop additional hardware, custom enclosures, and transport cases.
5. Final system integration and testing.
6. Develop, document, transition, and implement the manufacturing plan.

Methodology: This nine-month project will build on Packet Digital's previous research and development of power conversion circuitry for transportable, stand-alone Nishati solar power modules. The company plans to modify its design to optimize power delivery, efficiency, and robustness in the 1kW modules. It will apply its experience engineering MPPT to maximize the power extracted from the solar array and smart batteries to provide uninterrupted power.

Nishati produces lightweight solar arrays targeted for military use. The arrays incorporate a revolutionary mono-crystalline technology, which improves cell and module electrical efficiency, thermal and mechanical robustness, lifetime performance and reliability, and enables new aesthetic qualities and lightweight packaging. Nishati's solar arrays are comprised of rugged, tri-fold panels.

The next evolution of this technology is a rugged panel that can be easily transported. The 1kW target output for these systems we believe is achievable by connecting two 500W systems in parallel in a robust frame that will stand up to wind, weather, and the stress of transport. These self-contained power generators will include an MPPT to optimize solar energy harvesting, a 1kW inverter to power computers and AC systems, and battery storage for uninterrupted power.



Packet Digital will serve as the primary electronics developer and integrator for this transportable solar generator project. The company will apply its extensive expertise in power management to add efficiency and optimize the product. Packet Digital has developed novel methods for achieving MPPT, the role of which is to adjust the load voltage of the solar array to maximize the power that can be extracted. This is a dynamic process that must respond to changes in the environment such as changes in solar insolation and array temperature. Packet Digital has also developed a smart battery capable of solar charging and cell-level monitoring and balancing, and has begun commercializing the technology through a collaboration with Farasis Energy of Hayward, California.

Packet Digital will establish a manufacturing plan with Chiptronics, Inc., a certified Small Disadvantaged and HUBZone business adjacent to the Turtle Mountain Indian Reservation in Dunseith, ND.

Packet Digital will establish global distribution partnerships for commercialization with potential customers such as municipalities, security teams and first responders, media broadcasters, disaster relief organizations (e.g. Red Cross, FEMA), construction and natural resources, and under-served or off-grid towns and villages around the world where portable, off-grid power is necessary, but fuel may be inconvenient or not cost-effective for the mission duration or noise is a limiting factor for electromechanical generator use. Through Nishati's military experience and relationships, including Nishati CEO Robert Charette Jr.'s previous role as the Director of the Expeditionary Energy Office, we will identify procurement offices and demonstrations for military agencies. During our product concept, preliminary discussions have occurred with military agencies, disaster relief agencies and international governments with underserved or off-grid communities, and there is a significant need and interest in these Portable Solar Array Modules.

OBJECTIVE 1: Specify, select and test a 1kW inverter.

Task 1 – Evaluate Commercial Off-the-Shelf (COTS) inverters for output, efficiency and overall cost-effectiveness to determine whether any would be sufficient, would require modification, or if a completely customized inverter is required for optimum power delivery based on target cost.

Task 2 – Complete necessary modifications or custom inverter research, development and testing in preparation for final product integration.

OBJECTIVE 2: Evaluate and/or modify a smart battery.

Task 1 – Packet Digital and Farasis Energy will evaluate their lithium-ion smart batteries against other existing battery technology – including lead-acid cells – to determine the best performance, output and longevity based on target cost.

Task 2 – Complete necessary modifications and testing of selected battery cells in preparation for final product integration.

OBJECTIVE 3: Modify the MPPT.

Task 1 – Packet Digital will modify its existing MPPT hardware and algorithms to be optimized for the portable solar generator device and prepare them for final product integration.

OBJECTIVE 4: Evaluate and develop additional hardware, custom enclosures and transport cases.

Task 1 – Identify, develop and test additional hardware, including voltage converters, wiring harnesses, embedded power distribution systems and other electronics.

Task 2 – Packet Digital will work with Red E of West Fargo, N.D., to design sleek, rugged, dirtproof and weatherproof enclosures for its electronics components.

Task 3 – Packet Digital and Nishati will develop a custom case to house and transport the portable solar generator product.

OBJECTIVE 5: Final system integration and testing.

Task 1 – Integrate inverter, smart battery, MPPT, and systems hardware into a solar panel developed by Nishati. Document the integration with the end goal of efficient manufacturing.

Task 2 – Packet Digital, Nishati and the U.S. Naval Research Laboratory (NRL) will thoroughly test the fully integrated system under both lab and real-world conditions. Data collected from system testing will be used to refine the finished product.

OBJECTIVE 6: Develop, document, transition and implement the manufacturing plan.

Task 1 – In order to support commercial sales of the portable solar generator unit, a manufacturing plan will be established. Chiptronics has the facilities and resources to perform the electronics and system assembly, as well as shipping and handling. Packet Digital will work closely with Chiptronics to define the required plans, procedures, testing, and quality assurance programs.

Task 2 - Establish global distribution for commercialization and identify procurement offices and demonstrations for military agencies. (Preliminary discussions are underway with military agencies and disaster recovery agencies.)

Anticipated Results: The project will result in a tested and manufacturing-ready portable 1kW solar power system with Packet Digital power electronics hardware and established commercial distribution channels. Packet Digital, Nishati and NRL will execute on system integrations and testing and establish a manufacturing plan for Chiptronics to consistently reproduce the electronic systems and potentially the complete portable solar generator units.

Facilities: Development and commercialization activities will occur at Packet Digital's facility in Fargo, N.D. Packet Digital is fully equipped for the design and development of the prototype circuitry defined herein. A full tool suite of computer-aided design software and laboratory equipment is in place for conceptual design, debug, and integration.

Nishati, headquartered in McLean, Virginia, primarily utilizes contract manufacturing to provide the necessary state-of-the-art capabilities required to produce innovative and adaptive solar energy products. These facilities are located throughout the U.S., including use of multiple specialty solar panel manufacturers and panel assembly at RMS Assembly in Lafayette, CO. Electronics development and assembly will take place at Packet Digital and Chiptronics, respectively, in North Dakota. Product development and testing is conducted at the Nishati Test and Evaluation Center (NTEC) in Vienna, VA. Testing and research will be done at NRL.

NRL has expertise in optoelectronic device modeling, design, growth, fabrication, and characterization. NRL maintains a III-V semiconductor growth and processing facility with three Molecular Beam Epitaxy (MBE) reactors as well as a state-of-the-art solar cell material and device characterization laboratory including solar simulators providing high spectral fidelity. NRL also maintains an extensive capability in the design, fabrication, and testing of solar cells and panels.

Manufacturing facilities are available through Chiptronics in Dunseith, ND. Chiptronics' facilities are located in a certified HUBZone and include a 55,000 sq. foot building equipped for electronics assembly and testing. The facility includes a class 100,000 clean room, ESD flooring, and a state-of-the-art PCB assembly line. The facilities can accommodate rigid PCB, flex circuit, full system, and custom electronics assembly and testing. Chiptronics is ISO 9001:2008 registered and ITAR compliant.

Additionally, facilities providing test equipment at North Dakota State University are available through a professional relationship.

Resources. Packet Digital, with power management expertise and mixed signal ASIC design experience, will develop the inverter, battery charging, MPPT, and high-efficiency power management solutions. Nishati, with experience manufacturing portable solar arrays, will develop the main solar array unit. Chiptronics has a labor force skilled in electronics manufacturing and will assemble the electronics and components and ship the completed system. NRL has a global reputation for optoelectronics and solar research and a keen interest in developing solar solutions for military purposes, including its recent demonstration of GaAs-based, multi-junction (MJ) solar cells for use in portable systems for the U.S. Marine Corps. NRL is providing matching dollars for this project and will perform laboratory and outdoor testing on sample solar power systems from the Nishati/Packet Digital team.

Techniques to Be Used, Their Availability and Capability: The components and techniques to be used in this project will be understood and familiar to Packet Digital, Nishati, and NRL. Although these components and techniques will be applied to a new application, their engineering teams are confident the solution is attainable. Packet Digital will be required to develop specialized power algorithms for the MPPT to optimize the solar energy. The production process will be well documented in order to create an efficient manufacturing process that can be easily transferred to Chiptronics.

Environmental and Economic Impacts while Project is Underway: This project is focused on using clean, renewable solar energy to eliminate the fossil fuels requirement, carbon emissions, and noise associated with existing portable power generation solutions. The economic impact will be significant with four to six persons being employed for the duration of the project.

Ultimate Technological and Economic Impacts: This project will create a new product in North Dakota in solar technology creating jobs and an increased manufacturing. In addition, this project will eliminate the environmental impacts and fuel requirements associated with traditional electromechanical power generation units while adding portability and versatility to otherwise heavy and cumbersome, ground-based solar energy harvesting technology. These capabilities are expected to provide significant new opportunities and benefits for military, municipal and commercial use.

The solar arrays can deliver portable power generation to military encampments without the need for fuel. This provides a number of benefits, including reducing the expense and danger of fuel supply routes and/or transporting instead other more important troop supplies, thereby supporting more boots on the ground and more effective military operations.

Municipalities can use the solar power generators to provide emergency power during outages or major security initiatives like public sporting events. Disaster relief organizations can cleanly and quietly power mobile shelters and camps during floods and other incidents where fuel may otherwise be in short supply. Mobile offices like those used by construction, mobile laboratories, media broadcasters and other commercial sectors could also benefit from renewable solar power where ROI can be achieved by eliminating fuel costs.

Navigant Research forecasts the global portable solar market will grow from \$550M in 2014 to \$2.4B in 2024 (~15.87 CAGR). Globally, the 1.2B people living without access to the power grid spend about \$27B annually on lighting and mobile-phone charging with kerosene, candles, battery torches or other fossil-fuel powered stopgap technologies. World Bank Group's Lighting Global Off-Grid Solar Market Trends Report 2016 estimates the number of households relying on off-grid solar as their primary or secondary energy source will rise from 25M in 2015 to 99M (more than one-third of off-grid households globally) by 2020.

If Packet Digital and Nishati can capture just 0.5% of this market, it would result in about 1,000 units sold in the first year and revenue of about \$3M. If we can secure 2.5% of the global portable solar market by 2024, it would mean \$60M in annual revenue.

The solar power management technology developed with this project also has potential to improve any application that currently uses solar technology. The high-performance MPPT and increased-efficiency electronics that are being proposed for this project could be used for homes, remote warning systems, traffic signals or any number of applications where a battery needs to be charged using solar energy.

Why the Project is Needed: Portable solar energy not only eliminates air and noise pollution caused by common gas and diesel generators, but also eliminates several of the logistical impediments to their operation. In most situations where portable and emergency power is necessary, fuel supplies are constrained. Overseas military installations would no longer be required to transport fuel along hostile trade routes. Disaster relief shelters and homeowners would not fall victim to price gouging or fuel shortages as they endure hurricane, flood, or wildfire events. With solar power systems, there is no need to store fuel on site, where space may be limited and the fuel may degrade over time. The fuel cost savings ensures an ROI – potentially many times over – throughout the product's lifecycle. Also, there are no interruptions in productivity due to refueling. Once the solar power generator is set in place, its solar cells and batteries can supply uninterrupted power for the entirety of the mission or event.

STANDARDS OF SUCCESS

The project goal is to develop and commercialize transportable, stand-alone solar power modules to eliminate the fuel requirement and reduce life cycle cost of standard, electromechanical power generation.

Project Deliverables:

- Power electronics and hardware for a portable 1kW solar power system, including 1kW inverter, smart batteries, and MPPT
- Innovative MPPT algorithm for extracting maximum charging capacity from the solar cells
- Custom enclosures for individual electronic components and integrated system
- Documented results of system testing
- Manufacturing ready for a commercially viable, portable 1kW solar power system

- Commercialization partners and distribution

The value to North Dakota: This project will create a new solar technology product, more jobs, and increased manufacturing in North Dakota. This product could be the beginning of a line of portable solar solutions that would help solidify North Dakota's reputation as one of the country's energy leaders, not just for fossil fuels production, but as an advocate of a diverse energy portfolio, including portable solar power, leading the way to energy independence.

This research and development will employ four to six persons for the duration of the project and add new permanent jobs for the manufacturing of the components. The final manufacturing and assembly of will be conducted at Chiptronics, Inc., a certified Small HUBZone Business in Dunseith, ND, adjacent to the Turtle Mountain Indian Reservation. This partnership will employ and promote highly technical job skills in one of the state's economically disadvantaged areas.

This North Dakota project will enhance education and research of new techniques to develop portable solar power with the most advanced power management and peak power tracking electronics on the market. The local colleges and universities, including NDSU, UND, and NDSCS, can assist with testing, analysis, research, and fabrication design on this and future projects relevant to portable and/or grid-connected solar power generation.

This investment and focus on solar energy production within the state has the potential to attract supporting companies to develop and produce peripheral equipment and accessories or completely new technologies related to the solar industry.

Potential for Commercial Use: In addition to military use, these portable 1kW solar power generator units will be useful for municipalities, security teams and first responders, media broadcasters, disaster relief organizations (e.g. Red Cross, FEMA), construction and natural resources, and under-served or off-grid towns and villages around the world where portable, off-grid power is necessary, but fuel may be inconvenient or not cost-effective for the mission duration or noise is a limiting factor for electromechanical generator use.

BACKGROUND/QUALIFICATIONS

Packet Digital has developed power management integrated circuits and technology to extend battery life or reduce power consumption in a number of applications. Our patented On-Demand Power® technology addresses the shortcomings of software-based power management by moving the control out of the microprocessor and placing the intelligence inside the power management integrated circuits (PMICs). One of the key differentiators of our technology is that it offers *active* power savings, meaning the circuitry does not have to be put into a sleep mode to save power. This is critical in solar applications because of the importance of maintaining full functionality during changing insolation conditions. With our technology, we have extended battery life 400% in wireless sensors, 40% in a portable radio for the military, and reduced power consumption by 20% in data center servers. Packet Digital will bring its expertise in building power-efficient systems and intelligent power management algorithms to develop the most power-efficient portable solar power generation.

In collaboration with NRL, Packet Digital has developed novel methods for achieving MPPT and has also developed a smart battery, capable cell-level monitoring and balancing, which it has begun commercializing through a collaboration with Farasis Energy.

Nishati produces lightweight and portable solar array modules targeted for military use. Nishati approached Packet Digital to design a voltage boost converter for its much smaller Endurance™ 25 Multi-Voltage Solar Charging System. The 25W panel includes USB charging for tablets and smartphones and a two-pin SAE connector to interface with charger controllers, AC inverters, batteries, and DC loads. At just 1.9 lbs, the 22.0" x 13.7" x 0.72" deployed panel tri-folds down into a 13.7" x 7.25" x 0.97" self-contained case with integrated cable/connector stowage that easily fits in a backpack, briefcase or tote. Packet



The Endurance™ 25 charges electronics and powers devices at 5V or 12V+. It can be deployed standing or hanging and folds into a self-contained case weighing 1.9 lbs with cable/connector stowage to fit in a backpack or tote.



Digital's voltage boost converter allowed Nishati to use inexpensive, low-voltage photovoltaic cells to keep overall panel costs low while still being able to boost that voltage to effective 5V and 12V+ levels to supply power. In addition, multiple panels can be connected in parallel to provide up to 100W of power. Nishati and Packet Digital are pursuing a joint patent.

Packet Digital and Nishati will combine their expertise and expand on their collaborative relationship to develop the rugged 1kW solar power generator unit for transport in a truck or trailer.

Management Team: Andrew Paulsen, Director of Advanced Technology for Packet Digital, was a key leader in the initial development of PowerSage® technology. He leads the engineering team, developing new products and technology. Paulsen has extensive research, testing, and product development expertise in the power field. He has significant experience in solar-powered vehicles, battery charging, and motor controls from many years leading the electrical group of the NDSU solar racing team.

Terri Zimmerman, Packet Digital CEO, has over 20 years of experience developing, incubating, and commercializing new technologies. She has raised over \$500M in capital to launch new products and services in global markets and has grown companies to significant revenues resulting in successful exits. She has been appointed to a state economic development board by two North Dakota governors.

Nishati: Robert Charette Jr., is CEO of Nishati. During his 28-year career as a former Marine Corps officer, he led development and implementation of the Marine Corps Expeditionary Energy Strategy, driving institutional changes in thinking about expeditionary energy, the introduction of solar, hybrid, and energy efficient technologies to the battlefield, and guided a \$352M investment portfolio.

Naval Research Laboratory: Dr. Rob Walters has over 20 years of photovoltaic experience and is currently managing three solar cell development efforts and has a recent patent on novel multi-junction solar cell design. He also has extensive experience and expertise in fielding solar cell experiments, including five space experiments and an underwater solar experiment. He is executing a flexible solar array development project under Department of Defense funding.

Chiptronics: Linus Morin, Co-Founder and Majority Owner of Chiptronics, was an integral part of the company's startup in 1977. He has over 35 years of manufacturing experience and over 20 years of

inventory and logistics management experience. Linus was a key member of the team that achieved ISO 9001:2008 registration in 2012.

MANAGEMENT

Management Plan: Packet Digital will lead the effort with significant collaboration of Nishati and support from NRL, Chiptronics, Farasis, Red E, and the universities. Teams will work in parallel and interact directly as needed. Weekly status meetings will be held via teleconference, however, face-to-face meetings will be scheduled quarterly to ensure team cohesiveness. The development schedule and financial reports will be updated on a monthly basis. Major schedule items will include systems requirements definition, design and development activities, prototype development, integration and test, and final delivery.

Quality Assurance & Systems Engineering: Existing validated software and hardware will be leveraged as much as possible. A tailored systems engineering approach will be utilized for this development effort to efficiently execute the development while ensuring proper due-diligence is maintained. A risk management approach will be utilized including a matrix to track requirements that are deemed to have high risk.

TIMETABLE

The following table shows the schedule for the technical aspects of this product development. The timeline includes developing and testing discrete prototypes of the various systems as well as extensive lab and field testing of the integrated system.

Task	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Objective 1									
Evaluate inverters	█	█	█						
Inverter mods, devel., testing		█	█	█	█				
Objective 2									
Evaluate Farasis Li-ion batteries	█	█	█						
Battery mods, devel., testing		█	█	█	█	█			
Objective 3									
MPPT modification, testing		█	█	█	█	█			
Objective 4									
Additional hardware development		█	█	█	█	█			
Custom enclosure design		█	█	█	█	█			
Identify/develop transport case		█	█	█	█	█			
Objective 5									
System integration					█	█	█	█	
System testing							█	█	█
Objective 6									
Implement manufacturing plan							█	█	█
Commercialization	█	█	█	█	█	█	█	█	█
Interim/Final Reports				█					

BUDGET

Project Associated Expense	NDIC Share	Nishati Share	NRL Share	Total
Total Personnel Cost	\$480,000 ¹	\$60,000	\$325,000	\$865,000
Software and Materials	\$20,000	\$15,000	\$100,000	\$135,000
Total	\$500,000	\$75,000	\$425,000	\$1,000,000

¹ Direct personnel costs plus indirect overhead and G&A

The \$1,000,000 budget is based on estimates for the time, material, and software for the tasks detailed above in the timeline. Above labor, material, and software costs of \$500,000 are estimated for the Renewable Energy Council Grant. NRL and Nishati have committed to matching funds of \$500,000 or 50% of the total project cost over the nine-month period. Nishati and NRL will be partnering with Packet Digital on the design, development and testing of the portable solar array modules. NRL will also assist Packet Digital with the optimal solar design and selection and in the manufacturing plan with Chiptronics.

Personnel Detail: The technical managers are budgeted 4 weeks, combined, for project oversight and will be involved with architectural design, reviews, documentation, and design verification. The engineering team is budgeted 24 months, combined, for power conversion prototype boards, schematic design, layout, integration, and testing. Sales and marketing is budgeted 4 months, combined, for documentation, research, and marketing asset production. The CEO is budgeted two weeks for oversight and commercialization.

CONFIDENTIAL INFORMATION

No confidential information has been included in this document.

PATENTS/RIGHTS TO TECHNICAL DATA

Packet Digital reserves the right to file patents related to the intellectual property generated from this proposal and will work with legal counsel to determine if additional patents could be filed. Our power management algorithms and methodology are protected by our patent portfolio. We also have copyrights and our registered trademarks include On-Demand Power[®], PowerSage[®], and Packet Digital[®].



February 24, 2017

North Dakota Industrial Commission
Renewable Energy Council
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

N.D. Renewable Energy Council Members,

Nishati, Inc., is providing this letter of support in reference to Packet Digital's proposal to the N.D. Industrial Commission (NDIC) for portable solar power solutions. We are excited to continue our collaborative relationship with Packet Digital and are committed to providing up to \$75,000 in matching funds in support of this project.

Nishati manufactures, tailors and sells high-performance photovoltaic (PV) solar modules and racking systems for portable, semi-permanent, and fixed applications for military and other customers who live or operate beyond the reach of the electrical grid, where dependency on fossil fuel generators is unreliable or expensive.

Over the past year, Nishati has tapped Packet Digital's extensive expertise in power management to add voltage boost and charging circuitry to our new line of Endurance™ 25W portable panels. We have been impressed by Packet Digital's professionalism, quality and innovative engineering. With their help, we have already begun test deployments of our technology to troops overseas and early product commercialization.

We would like to once again join forces with Packet Digital to address the needs of much larger off-grid power consumers. The 1kW solar power generator units described in the proposal will have significant impact on military operations as well as municipalities, first responders, disaster relief organizations, media broadcasters, natural resources and other industries. We see this as an important investment in the development of clean, renewable, portable solar power generation, and a real opportunity for North Dakota to arrive at the forefront of this product niche.

We look forward to working with Packet Digital and the NDIC on this unique project.

Sincerely,

A handwritten signature in black ink that reads "Robert J. Charette".

Robert J. Charette Jr.
CEO



MEMORANDUM

U.S. Naval Research Laboratory Code 6810

DATE: 3/6/17

REPLY TO
ATTN. OF: Dr. Robert J. Walters

SUBJECT: NRL Letter of Support for Joint Nishati/Packet Digital Solar Project

TO: Ms. Terri Zimmerman

CC:

Dear Ms. Zimmerman,

After working with the Packet Digital team the past two years, I've gained an understanding of Packet Digital's innovative, "On-Demand Power®" technology. With over 20 years of photovoltaic/solar experience and currently managing multiple solar cell development efforts, I am keenly interested in Packet Digital's research in power management and bringing that innovativeness to solar energy. My team has been developing solar power for off-grid applications, and there is a clear need to develop robust, high end-to-end power efficiency, for solar power systems. We have worked with both Nishati and Packet Digital on various projects, and we were involved in bringing the two companies together in this partnership to deliver unique solar products to market through joint collaboration.

The Naval Research Laboratory (NRL) has funding to collaborate with Packet Digital on this Portable Solar Project. The NRL has a minimum of match funds of \$425,000 that we can dedicate to this project. For NRL's participation, we expect to receive samples of the solar power systems from the Nishati/Packet Digital team, and NRL will preform laboratory and out door testing upon them.

Thank you very much for providing us this opportunity, and we look forward to continuing to work with your team.

A handwritten signature in black ink, appearing to read "Robert Walters".

Robert Walters
Head, Optoelectronics and Radiation Effects Branch
NRL Code 6818

February 24, 2017



North Dakota Industrial Commission
Renewable Energy Council
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

N.D. Renewable Energy Council Members,

I am writing in support of Packet Digital's proposal to the N.D. Industrial Commission (NDIC) to develop portable solar solutions.

Chiptronics is a Native American Owned Company and has been serving the Aerospace and Defense Industry for over 35 years. We have access to one of the most experienced manufacturing workforces in the country.

Over the past year, we have had the opportunity to work with Packet Digital, assembling the power conversion and charging module and integrating it into the Nishati Endurance™ 25 panel. We also serve as the primary shipping and logistics partner for the product. The project has helped sustain revenue and jobs at Chiptronics and has been a mutually beneficial partnership for all the companies involved.

We look forward to further developing our relationship with Packet Digital. The 1kW solar generator unit described in this proposal is a high-value item with significant market potential that could greatly impact our business. Our talented employees are eager to showcase their talents for this solar manufacturing opportunity, and we are dedicated to another successful product rollout.

Please consider Packet Digital's proposal and the significant impact it will have on our state.

Sincerely,

A handwritten signature in black ink that reads "Linus Morin". The signature is written in a cursive, flowing style.

Linus Morin

President

Chiptronics Inc

NDSU NORTH DAKOTA STATE UNIVERSITY

April 14, 2017

Mr. Andrew Paulsen
Director of Advanced Technologies
Packet Digital, LLC
201 5th St. N, Suite 1500
Fargo, ND 58102

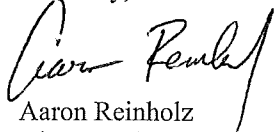
Subject: Letter of Support for Portable Solar System Project

North Dakota State University's Research Operations group working under the Office of Research and Creative Activity is very interested to support Packet Digital, LLC with testing of power electronics for a portable solar system. The Research Operations team is part of NDSU's core lab facilities whose purpose is to provide services to support research and development at NDSU and with external collaborators such as Packet Digital. We have capabilities in microelectronics prototype fabrication, testing, and failure analysis that would be well suited to supporting the objectives on this project. Test capabilities include temperature, humidity, thermal shock, drop shock, salt fog, vibration, and others. In addition, we have an extensive set of instruments to conduct failure analysis including cross-sectioning equipment, an x-ray imaging station system, a scanning acoustic microscope, a scanning electron microscope (SEM), and a microCT.

The Research Operations laboratories were established in 2002 at NDSU for the purpose of conducting large-scale, multidisciplinary research for government and industry. These resources are located in two state-of-the-art research buildings that have been constructed in the NDSU Research & Technology Park. The 75,000 square foot Research 2 (R2) facility was opened in 2004 and includes cleanroom, laboratory, and office space. The R2 building houses the research operations focus areas in microfabrication, device packaging, device testing, and reliability/failure analysis. The installed equipment investment is approximately \$10M. The 35,000 square foot Research 1 Addition (R1A) was opened in 2013. It houses a comprehensive set of tools for materials synthesis, processing and characterization. The overall equipment investment exceeds \$20M.

The facilities, skilled staff, and capital equipment base comprising the Research Operations group are supporting a wide range of government and private-sector sponsored research and development projects. We look forward to the possibility of collaborating with Packet Digital on technology research and development for power electronics in portable solar systems.

Sincerely,



Aaron Reinholz
Director of Research Operations
NDSU Office of Research and Creative Activity

OFFICE OF THE VICE PRESIDENT FOR RESEARCH AND CREATIVE ACTIVITY
NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.6542 | Fax 701.231.6736 | www.ndsu.edu/research

Shipping address: 1735 NDSU Research Park Drive, Fargo, ND 58102