	Description: MINUSTAH Telecommunication Equipment
Picture or Logo	UNITED NATIONS NATIONS UNIES MINUSTAH
Purchasing Authority	Chief Finance Officer MINUSTAH Port au Prince.
Contract Title	Still a requisition.
Sustainability Criteria	**865-1015 - Xantrex XW Power Distribution Panel (XW PDP)** The Distribution Panel is factory-wired and labeled to support a code compliant single-inverter installation. With a field-reversible door and multiple conduit knockout locations, the PDP should be configurable to mount on either side of the inverter/charger. Amounting Plate and Conduit Box is supplied with each PDP. • PDP dimensions (H x W x D): 30 x 16 x 8.25” (761 x 406 x 210 mm) • Shipping Dimensions (H x W x D): 48 x 21 x 13.5” (1220 x 533 x 343 mm) • Shipping Weight: 67.2 lb (30.5 kg) Power Distribution Panel Enclosure with a field-reversible panel door, pre-wired with: • Three 60 A, 120/240 Vac, two-pole, Square-D, Type QOU, DIN-rail mounted AC breakers for AC input, Bypass, and AC Load • One GJ250A 160 Vdc, 3/8” stud DC breaker • One ground terminal bus bar • One neutral terminal bus bar • One battery negative terminal bus bar • One pair #4/0 AWG Arctic Ultraflex Blue™ Battery Cables (factory installed and labeled, ready to connect) • #6 AWG Arctic Ultraflex Blue™ AC wiring (factory installed and labeled, ready to connect) • Room to Expand - Five additional AC Breaker positions for two-pole, 60 A Square D, Type QOU breakers; 10 additional DC Breaker positions (eight for charge controller breakers and two for large GJ inverter breakers) • Mounting Plate • XW Conduit Box **865-1030 - Xantrex XW Solar Charge Controller** The Solar Charge Controller is a photovoltaic (PV) charge controller that tracks the electrical maximum power point of a PV array to deliver the maximum available current for charging batteries. When charging, the SCC regulates battery voltage and output current based on the amount of energy available from the PV array and state-of-charge of the battery.

	The SCC can be used with 12, 24, 36, 48, and 60-volt DC battery systems and is able to charge a lower nominal-voltage battery from a higher nominal-voltage array. For example, the SCC can charge a 12-volt battery from a 36-volt array. The SCC incorporates a dynamic Maximum Power Point Tracking (MPPT) algorithm designed to maximize energy harvest from the PV array. Features: • Maximum Power Point Tracking (MPPT) delivers maximum available power from PV array to battery bank • Integrated PV ground-fault protection • Ultra-reliable, convection-cooled design does not require a cooling fan – large, aluminum, die-cast heat-sink allows full output current up to 45°C without thermal derating • Selectable two or three-stage charging algorithms with manual equalization to maximize system performance and improve battery life • Configurable auxiliary output • Two-line, 16-character liquid crystal display (LCD) and four buttons for configuration and system monitoring • Input over-voltage and under-voltage protection, output over-current protection, and backfeed (reverse current) protection (warning and fault messages appear on LCD when unit shuts down as a protective measure) • Over-temperature protection and power derating when output power and ambient temperature are high • Battery Temperature Sensor (BTS) included – automatically provides temperature compensated battery charging. **865-1050 - Xantrex XW System Control Panel (SCP)** The XW System Control Panel features a graphical, backlit LCD display that provides system configuration and diagnostic information for devices connected to the Xanbus™-enabled network. The XW SCP gives a single point of control to setup and monitor an entire system, which may consist of multiple XW Inverter/Chargers, XW Solar Charge Controllers and other components. The XW System Control Panel can be flush-mounted or surface-mounted. Mounting brackets are provided for each. Operational Features: • Compatibility – connects to additional Xanbus™-enabled XW System devices without requiring additional hubs, control cards, or other device-specific control panels • Internal clock – keeps time for the entire system • Audible alarm – when enabled, alerts users when a fault condition arises • Low power consumption – automatically turns off backlight after a period of inactivity • Non-volatile memory – preserves System Control Panel settings if network power is interrupted or network communication is disrupted • Graphical 128 x 64 pixel, backlit LCD screen • Large, tactile keypad buttons • Intuitive onscreen menu system (basic and advanced) • Xanbus™-enabled **BP Solar SX 3200B, 200 Watt 16 Volt nominal PV Module** High-efficiency photovoltaic module using silicon nitride multi-crystalline silicon

	cells. Performance Rated power (Pmax): 200 Watts Power Tolerance: ± 9% Nominal voltage: 16V Limited Warranty: 25 years Configuration B Bronze frame with output cables and polarized Multicontact (MC3) connectors Electrical Characteristics Maximum power (Pmax): 200 Watts Voltage at Pmax: 24.5 Volts Current at Pmax: 8.16 Amps Warranted minimum Pmax: 182.0 Watts Short-circuit current (Isc): 8.7 Amps Open-circuit voltage (Voc): 30.8 Volts Mechanical Characteristics Dimensions: 66.14" x 32.95" x 1.97" (1680 x 837 x 50 mm) Weight: 33.95 pounds (15.4kg) Solar Cells: 50 cells (156 x 156 mm) in a 5x10 matrix connected in series **Trojan Battery T105, 6 volt 225 Amp Hours** Exclusive multi-rib Flex-Sil separator, unique geometric design and rubber construction mean longer cycle life and reduced maintenance. Large, heavy-duty grids provide maximum daily run time. Proprietary paste formulation and processing produces plates with the industry's highest alpha content. These mass produced deep cycle batteries probably have the lowest cost per amp*hour of any battery of its type and has become the most popular 6V battery for alternative energy powered homes. Use pairs these batteries in series for 12V configuration, sets of four for 24V and so on. Life expectancy is from 3 to 5 years, assuming 250 cycles at 80% depth of discharge. Add these sets of batteries in parallel for increased amp hours. Each set (or each battery) is rated at 225 amp hours. Dimensions: 10 3/8" x 7 1/8" x 10 7/8" (264 x 181 x 276 mm) Weight: 62 lbs. (28 kg).
Cost Implications	Cost implications for this project were influenced by the initial project being proposed in concept form only. All calculations were done on proposed locations and theoretical load factors of equipment. Initial cost estimates have been reasonably precise but this was due mainly to the fact that the original cost of equipment (two years ago) has decreased substantially as the prices for solar panels has decreased. This allowed for an increased amount of equipment to be purchased and not unduly affect our initial estimate.
Challenges & Solutions	The initial challenge was obtaining permission to install our equipment on specific areas of land. Due the concept of this project (a microwave back bone) specific areas had to be obtained or the whole project would fail. Initial requests for areas did not meet the criteria and such it was approximately 18 months before a company supplied details and permission to construct services within their boundaries. It was always envisaged that we would utilize alternate power sources for this project as all locations would be remote and lack adequate security and access for generators and fuel.

	The use of alternate energy sources posed some problems in that a project of this scale had never been attempted by anyone within this mission and relative training by the UN was nonexistent (as it still is today). Research on line and the purchase of study material allowed this mission to better understand the project to the depth required to initiate an alternate power solution for deployed resources. It was recognized almost immediately that the systems contract for alternate energy products, in this case solar panels, was not technically viable. The solar panels offered were too small (in current producing capacity), the solar regulators would not be able to cope with the load and the batteries were not suitable for prolonged use on charging systems. This enabled this mission to requisition equipment outside of the specified systems contract and allowed us to produce a proto type of the system that would be deployed. The initial experiment under load conditions outlined some initial problems. The first of which was the frame required to house the solar panels was not sturdy enough to prevent theft. This was rectified with a locally produced frame made of steel (RHS) and then welded together. The second problem encountered was the use of the 6volt batteries; although these were meant for charging systems it was found that the exposure to the heat of this country reduced their life considerably. This was rectified by the use of gel filled maintenance free batteries and the placement of batteries in ventilated containers. Other faults found were the calculated elevation angle was incorrect (10 degrees), this was easily modified to the required 40 degrees. DC Fuses were replaced with contact circuit breakers to ensure that the system could be reset easily if required. Calculations of current draw of equipment were modified with practical figures and the amount of equipment required at each site modified to suit.
Benefits for the Organization	Long run costs savings; independence from the local electricity grid. Reduced carbon foot print. Maintainable by local staff. Spare parts easily available. Modifications and upgrades are easy to accomplish.
Lessons Learned	Initial calculations will never match the actual requirement. Practical setup of equipment with introduced faults (shading of panels to represent fog/cloud) will allow for a realistic solution when calculating the number of panels and batteries. This also allowed for training of installers on the correct setup. Batteries should be purchased as maintenance free. They should also allow for the maximum Amp Hours. This will be one of the costliest items as within poor countries batteries are stolen frequently. To overcome this it is suggested that large Amp hour low voltage batteries are purchased instead. This has the protection of the actual weight of the battery being formidable and therefore difficult to remove and the low voltage is not compatible with what most thieves require. The purchase of easy to use multi task devices allows for easy setup. (865-1030 - Xantrex XW Solar Charge Controller). It was envisaged that the installers may incorrectly connect devices, as such, devices that could recognize faults and in some cases overcome them without damage were purchased. The major lesson learnt was always be ready to modify you initial estimate. Allow room for expansion and keep enough spares in close proximity to your selected site.

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