



All-IP CDMA2000®

iCell® QuadPAC IP-RAN

EV-DO QuadPAC Installation and Initial Configuration Guide

Part Number D02698GS Rev A1

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EV-DO QuadPAC Installation and Initial Configuration Guide

Part Number D02698GS Rev A1



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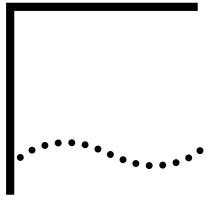
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ABOUT THIS GUIDE

This chapter contains an overview of this guide and of the iCell® QuadPAC IP-RAN. This chapter also lists the guide conventions and related documentation, lists the order in which initial configuration tasks should be completed, and describes how to contact customer service.

This guide is intended for those who are responsible for installing and initially configuring the QuadPAC.

This chapter includes:

- [Product Overview](#)
- [Order of Tasks](#)
- [Conventions](#)
- [Related Documentation](#)
- [Technical Support](#)
- [Warranty Support](#)
- [Contacting Technical Documentation](#)



Release notes are issued with some products. If the information in the release notes differs from the information in this guide, follow the instructions in the release notes.

Product Overview

The QuadPAC is part of the Star Solutions All-IP CDMA2000® network.

All-IP CDMA2000® System Architecture

The All-IP CDMA2000® network is an end-to-end, all-Internet-Protocol (IP)-based, wireless communication solution. The CDMA2000® system provides the mobility and media control traditionally associated with a circuit-switched Mobile Switching Center (MSC), but in a packet-based environment.

The All-IP CDMA2000® system is 2G- and 3G-capable, supporting cdmaOne and CDMA2000 1x and Evolution Data Optimized (EV-DO) networks. By deploying the CDMA2000® system in 2G and 3G environments, network operators gain the efficiency inherent in packet-based networks, while building a network core that is capable of supporting 3G standards.

All-IP CDMA2000® system benefits include:

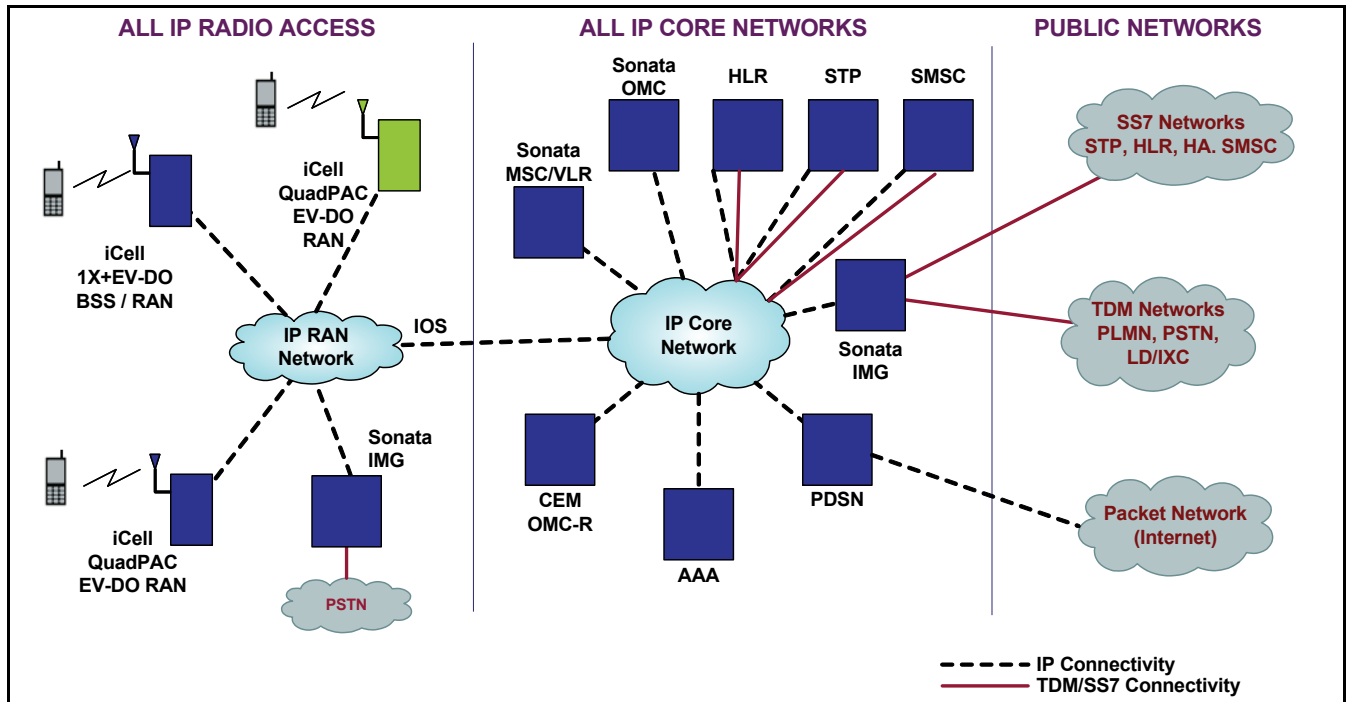
- A network core that supports both voice and data traffic, eliminating the need to operate separate Time Division Multiplexing (TDM) and packet backbones.

- Distributed switching for efficient call routing from endpoint to endpoint.
- Centralized control of distributed switching for cost-effective scalability, security, and ease of operation.
- Voice carried in native air-interface format across the packet core for maximum bandwidth efficiency, with Pulse Code Modulation (PCM) vocoding done by the Media Gateways at the network edge for Public Switched Telephone Network (PSTN) connectivity.
- Support for ANSI IS-41 requirements.
- 3G architecture for CDMA2000 EV-DO.
- 3G architecture for EV-DO.

The All-IP CDMA2000® network enables the evolution to an all-IP network while delivering a reduced cost of construction and ownership compared to traditional TDM networks.

Figure 1 shows a high-level architecture example for the All-IP CDMA2000® network, including the QuadPAC. The features and functionality of the All-IP CDMA2000® network are not discussed here.

Figure 1 All-IP CDMA2000® Network Architecture

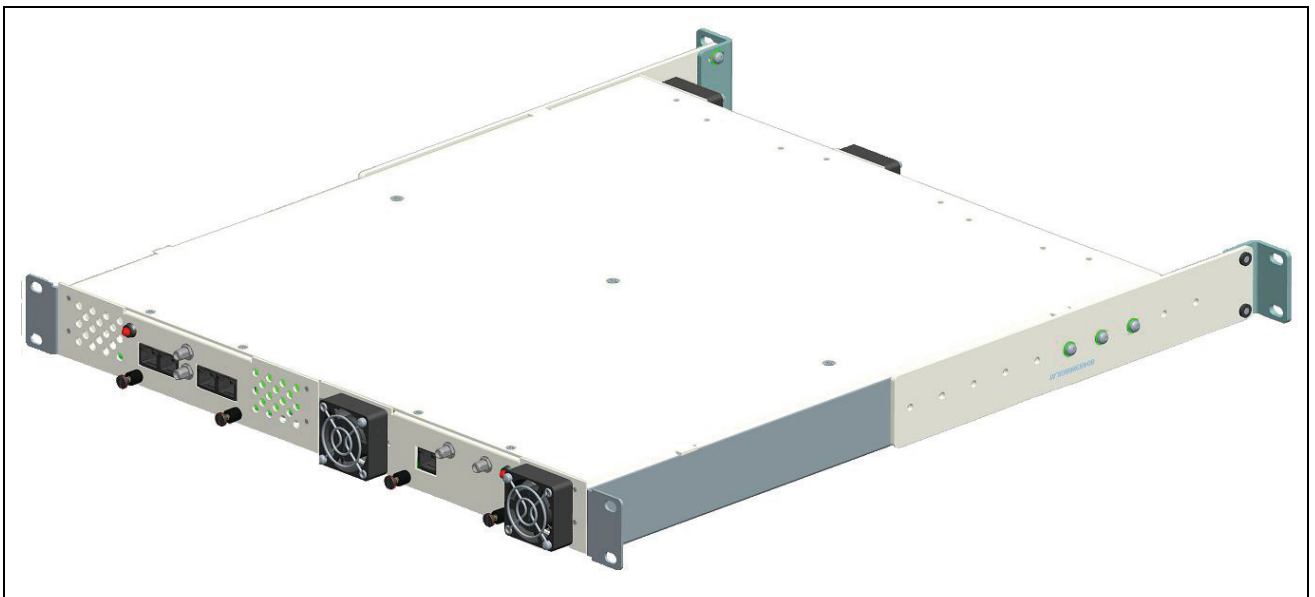


QuadPAC Functionality The iCell™ QuadPAC IP-RAN is a configurable 1RU rackmount basestation solution for CDMA2000™ EV-DO picocell deployment requirements. The QuadPAC unit is designed to house an EV-DO BTS Module, a Power Supply Module, a timing source module (either a clock (higher-performance OCXO) module or a GPS receiver module), and an optional CPU Network Module that enables CDMA network functionality such as the RNC, PDSN, and Wireless Call Manager.

The QuadPAC provides single-carrier, single-sector coverage with a 32 channel-element capacity.

[Figure 2](#) shows an external view of the QuadPAC.

Figure 2 External Front View of QuadPAC



QuadPAC Configuration The iCell QuadPAC hardware configuration consists of a base configuration with additional optional modules that can be installed depending on the deployment scenario.

The base configuration consists of:

- DO-BTS Module
- Power Supply Module
- Timing source module, with 2 options:
 - GPS Module - Provides a frequency reference 1PPS signal via a GPS antenna
 - Clock Module - Provides a stand-alone frequency reference if a GPS signal is not readily available

The additional optional module is:

- CPU Module - Enables CDMA network functionality such as the RNC, PDSN, and Wireless Call Manager (wCM). (Contact Star Solutions sales for additional information.)

Technical Specifications [Table 1](#) lists the QuadPAC technical specifications.

Table 1 QuadPAC Technical Specifications

Capacity/Performance	
RF configuration	1FA/1S
RF output power	Up to 50mW (optional configuration up to 125mW)
CDMA technology	EV-DO Rev A, Rev B
Channel elements	64
Packet data rate (peak burst)	EV-DO peak data rates: Rev A - 3.1 Mbps Fwd / 1.8 MBbps Rev Rev B – 4.9 Mbps Fwd / 1.8 MBbps Rev (per carrier)
Frequency Bands	
Band Class 0	Tx: 869–894 MHz Rx: 824–849 MHz
Band Class 1	Tx: 1930-1990 MHz Rx: 1850-1910 MHz
Band Class 5, Block A	Tx: 462.5-467.5 MHz Rx: 452.5-457.5 MHz
Protocol Support	
DO-BTS/RNC interface signaling	Abis, A10, A11, A12, A13
Packet data	GRE/IP
Operations, Administration, and Maintenance interface	SNMP v2c
Hardware	
Dimensions	1U H x 15 in W x 20 in D
Nominal input voltage:	
ANSI standard C84.1 / CAN3-235	120V(+10, 10%) at 60 Hz
European	230V(+6, 10%) at 50 Hz
Power consumption	100W (in typical operating conditions)
Operating temperature	0 to 40 degrees Celsius



The QuadPAC supports iCell EV-DO software release 8.1.0 or higher.

Order of Tasks

This QuadPAC *Installation and Initial Configuration Guide* describes all the tasks required to install and configure a QuadPAC. This guide has three main sections:

- [Pre-Installation](#)
- [Installation](#)
- [Initial Configuration](#)

Follow the tasks in the order that they are presented to successfully install and configure the QuadPAC.

Pre-Installation Task Outline [Pre-Installation](#) tasks are tasks that should be done before the QuadPAC arrives on site.

Installation Task Outline [Installation](#) tasks are tasks that are done after all pre-installation tasks are completed and the QuadPAC is on site.





Initial Configuration Task Outline [Initial Configuration](#) tasks are tasks that are done after all installation tasks are completed.

Conventions

This guide may contain notices, figures, screen captures, and certain text conventions.

Notices [Table 2](#) lists notice icons used in this guide.

Table 2 Notice Icon Descriptions

Icon	Notice Type	Description
	Information Note	Information that contains important features or instructions but is not hazard-related.
	Caution or Warning	<p>Cautions are preceded with the word Caution. This type of caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also alert against unsafe practices and potential program, data, system, or device damage.</p> <p>Warnings are preceded with the word Warning. This type of warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p>
	Caution or Warning due to potential electrical hazard	<p>Cautions due to potential electrical hazards are preceded with the word Caution. This type of caution indicates a potential electrical hazard. This hazard, if not avoided, may result in minor or moderate injury. It may also alert against unsafe practices and potential program, data, system, or device damage.</p> <p>Warnings due to potential electrical hazards are preceded with the word Warning. This type of warning indicates a potential electrical hazard. This hazard, if not avoided, could result in death or serious injury.</p>
	ESD	Information that indicates proper grounding precautions are required before handling a product.

Figures and Screen Captures This guide provides figures and screen captures as examples. These examples contain sample data. This data may vary from the actual data on an installed system.

Text [Table 3](#) lists text conventions in this guide

Table 3 Text Convention Descriptions

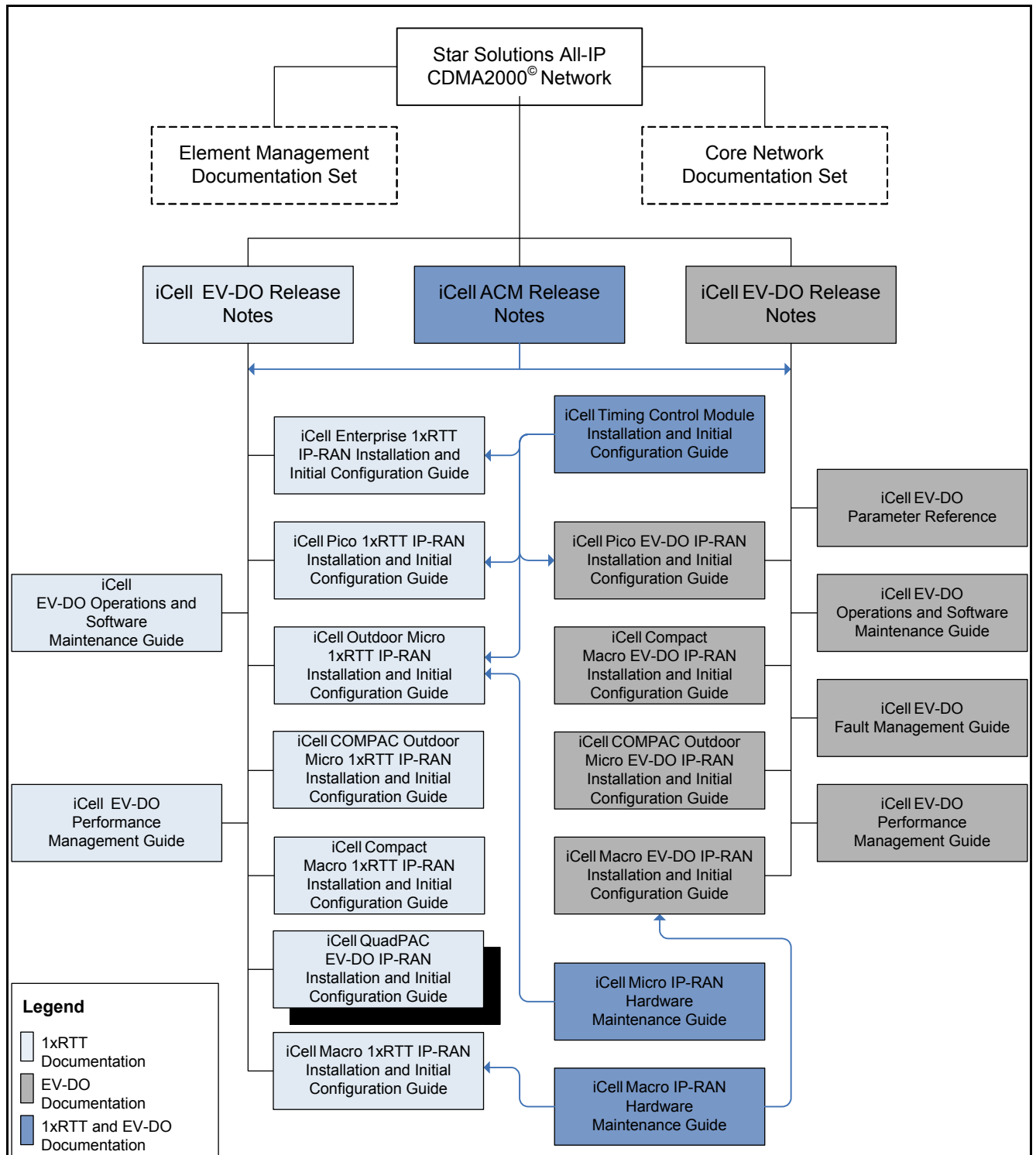
Convention	Description
Text representing a screen display	This typeface represents text that appears on a terminal screen, for example login: .
Text represented as user entry .	This typeface represents commands entered by the user, for example, cd \$HOME .
Text represented as menus, sub-menus, buttons, tabs, directories, and field names	This typeface represents all menus, sub-menus, buttons, tabs, directories, and field names within procedures, for example: On the File menu, click New .
Text represented by <variable>	This typeface represents a required variable, for example: <filename>

Related Documentation

The iCell products are part of the All-IP CDMA2000® network product line for CDMA2000®. The iCell QuadPAC documentation is part of the documentation for the entire All-IP CDMA2000® network product line.

The relationship of the *iCell QuadPAC EV-DO Installation and Initial Configuration Guide* to other All-IP CDMA2000® network documentation is displayed in the All-IP CDMA2000® network document roadmap shown in [Figure 3](#).

Figure 3 Document Roadmap



iCell Documentation The following documents contain information on how to install, operate, maintain, and manage the QuadPAC and related components:

- *iCell EV_DO Release Notes*
- *iCell QuadPAC EV-DO Installation and Initial Configuration Guide (this guide)*
- *iCell EV-DO Operations and Software Maintenance Guide*
- *iCell EV-DO Performance Management Guide*

Technical Support

The Star Solutions Product Support Team delivers the support services required for business and professional needs. Our product experts deliver Tier 1, 2 and 3 technical support directly to new and contract-entitled customers including the following services:

- Basic Support Package: Non-emergency technical support
- Premium Support Package: 24 hours a day, 7 days a week, and 365 days a year Emergency technical support

The *Star Solutions Service Guide* outlines the specific details for obtaining technical support. The guide is available from a sales account manager. Refer to the Service Guide for services and options specific to individual support plans, including guidelines for problem severity and the technical resolution escalation process.

Obtaining Technical Assistance Star Solutions maintains a global presence through its Technical Response and Service Centers. These centers are available for technical telephone support to entitled customers during normal business hours.

Before contacting technical support, have this information available:

- Product information
 - Software and hardware revisions
 - Serial numbers
- Problem description
 - Symptoms
 - Known causes
- Trouble locating and clearing attempts.

For information about customer service, including support, training, code releases and updates, contracts, and documentation, contact us at:

<http://www.starsolutions.com/support/support-portal>

Service Centers Operational Hours

- North America/CALA Region:
 - 09:00–18:00 Pacific Time (UTC-8:00)
- EMEA/Asia Pacific Region:

- 09:30–18:30 Indian Standard Time (UTC+5:30).

Warranty Support

Star Solutions provides its customers warranty support per the terms of the Star Solutions Warranty Statement for their equipment. Customers who require warranty support should contact the Star Solutions Customer Service Center as specified in the customer service guide or at:

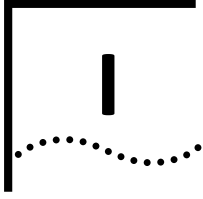
<http://www.starsolutions.com/support/support-portal>

Contacting Technical Documentation

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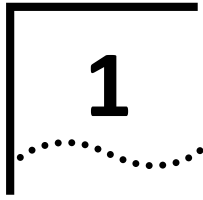
Please include the name and part number of the guide being referenced. If applicable, provide the chapter and page number.



PRE-INSTALLATION

[Chapter 1 Prerequisites](#)

[Chapter 2 Site Preparation](#)



PREREQUISITES

About This Chapter

This chapter describes the prerequisites for installing the QuadPAC.

This chapter includes:

- [Installer Requirements](#)
- [Engineering Planning Requirements](#)
- [Passwords and Usernames](#)

Installer Requirements

This section includes:

- [Required Skills](#)
- [Supporting Documentation](#)
- [Required Tools](#)
- [Test Client Hardware](#)
- [Cables](#)

Required Skills The installer should be experienced in the installation and configuration of telecommunications equipment with a basic knowledge of IP networking.

Supporting Documentation The following documents are required to install, configure, integrate, and test a QuadPAC:

- *QuadPAC Installation and Initial Configuration Guide* (this guide)
- *Site Engineering Planning Document*

Engineering specifications for the site are required for configuration of CDMA2000[®] parameters after installation and initial configuration. The *Site Engineering Planning Document* also provides the necessary inputs to [Engineering Planning Requirements](#).

Required Tools The tools required for the installation of the QuadPAC are listed in [Table 4](#)

Table 4 Tools Required for Installation

Tool
SMA torque wrench (maximum 8lbs / in)
#2 Phillips screwdriver
#1 Phillips screwdriver

Test Client Hardware A laptop PC, known as the *test client*, is required for the installation, configuration, verification, and network integration of the QuadPAC. The recommended requirements for the test client are listed in [Table 5](#).

Table 5 Test Client Requirements

Component	Recommended
Processor	1.3 GHz
Operating System	Microsoft® Windows® XP Pro/Vista/7
Memory	512 MB
Hard Drive	10 GB
CD ROM Drive	48X
USB Port	Optional
Ethernet Port and Card	10/100

Cables Several cables are required throughout the installation, configuration, and verification process.

[Table 6](#) lists cables that should be supplied by the network operator to support the installation and operation of the QuadPAC.

Table 6 Cables Supplied by the Network Operator

Cable	Description
Antenna cables	Main and diversity with SMA male connectors.
Grounding Cable	20 AWG (minimum) with a crimp lug on one end
Backhaul Ethernet cable	CAT-6 or CAT-5 Ethernet cable with RJ-45 connector ends. Refer to Ethernet / LAN Connections on page 42 .

Engineering Planning Requirements

This section includes:

- [IP Address Assignment](#)

IP Address Assignment This section includes:

- [Test Client IP Addressing](#)
- [Access Network IP Addressing](#)

Test Client IP Addressing

The test client is used to connect to the QuadPAC for the initial configuration and must be on the same subnet as the QuadPAC factory default IP (see [Table 17](#)).

[Table 7](#) shows an example of the test client IP address, netmask, and default gateway assignment.

Table 7 Example of Test Client IP Addressing

Test Client	Value
IP address	10.10.10.100
Netmask	255.255.255.0
Default gateway	10.10.10.1

Access Network IP Addressing

[Table 8](#) lists the IP addressing information required for the IP and parameter configuration covered in this guide.

Table 8 Required IP Addressing

RNC	Value
DO-BTS IP Address	DO-BTS IP address assigned to the QuadPAC.
RNC IP Address	RNC IP address assigned to the QuadPAC.
PDSN IP Address	IP address of the PDSN.
AAA IP Address	IP address for AAA server

Passwords and Usernames The icell EV-DO software deployed on the QuadPAC has default usernames and passwords configured.

[Table 9](#) and [Table 10](#) list the usernames and passwords used to connect to the QuadPAC.

Table 9 ssh Login Information

RAN Component	Default Username	Default Password
RNC	rnc	Contact Star Solutions support engineering for password information.
	root	Contact Star Solutions support engineering for password information.
PDSN (ssh)	tc3000	Contact Star Solutions support engineering for password information.

Table 10 HTTP Login Information

RAN Component	Default Username	Default Password
RNC	icell	Contact Star Solutions support engineering for password information.
DO-BTS	icell	Contact Star Solutions support engineering for password information.



The default HTTP username/password can be changed based on operator requirements. Contact Star Solutions support for additional information.

2

SITE PREPARATION

About This Chapter

The QuadPAC has specific structural, electrical, and telecommunications requirements. When selecting and preparing a site, specific personnel and documents must be available to ensure the device is installed correctly and safely.

This chapter describes how to prepare the site for the installation of the QuadPAC.

This chapter includes:

- [Site Requirements](#)
- [Site Installation Checklist](#)

Site Requirements

The QuadPAC is designed to be mounted in a 19 inch rack.

The network operator is responsible for supplying supporting components, cabling, and the necessary operating environment for the QuadPAC.



Caution:

The network operator is responsible for site power, grounding, lightning protection, fire protection, and safety precautions. Verify that all grounding, power connections, and lightning, fire protection and safety precautions meet or exceed local standards.

This section includes:

- [Mounting Options](#)
- [Power Requirements](#)
- [Site External Grounding Requirements](#)
- [Other Cable Grounding](#)
- [GPS Receiver Protection](#)
- [Space Requirements](#)
- [Inspecting and Verifying Site Requirements](#)

The required tools, hardware, and network information are outlined in [Chapter 3](#) on [page 29](#).

- Mounting Options** The QuadPAC is designed to be mounted in a 19 inch rack and must be installed in an indoor environment.
- Power Requirements** The AC QuadPAC site must be cabled with sufficient AC power. It accepts voltages of 120 @ 60Hz to 230 VAC @ 50Hz.
- Site External Grounding Requirements** External grounding requirements include:
- [Site Grounding Responsibility](#)
 - [Ground Rods](#)
 - [AC Power Grounding](#)
 - [Ground Testing](#)
- Site Grounding Responsibility**
- Grounding of the site is the responsibility of the customer. All grounding and power connections should be made according to local standards.
- Ground Rods**
- Several factors affect external grounding. The most significant factor is the resistance of ground rods, which is directly related to soil resistivity in the immediate vicinity of the rod. The resistivity of the soil determines how many rods are needed and their dimensions.
- AC Power Grounding**
- The AC power ground conductor must be bonded to the ground rod located at the service entrance. Ground lugs provided in all service entrance equipment must be bonded to the service ground conductor. The system ground and neutral must be bonded at one location only, as close as is practical to the service entrance.
- All service grounding must conform to local electrical codes.
- Ground Testing**
- The external ground systems must be tested separately after installation and each resistance-to-earth ground must be less than 5 ohms.
- Tests must be performed twice per year to ensure ground system integrity.
- Other Cable Grounding** All other cables such as telephone cables, data cables, and power cables must be connected to the single-point ground and must employ impulse/surge suppressors.



A messenger cable is made of stranded steel and supports aerial cables between poles.

GPS Receiver Protection The QuadPAC may connect to the roof-mounted GPS antenna and should be protected with a surge suppressor that is attached to the exterior of the building and installed in the cabling pathway.



This is applicable only when the GPS Module is deployed with the QuadPAC.

Space Requirements The QuadPAC requires sufficient area clearance to provide adequate space for the bending radius necessary for the required RF cables.

Proper installation also requires adequate mechanical clearance.

Inspecting and Verifying Site Requirements Inspect the physical location where the QuadPAC is to be installed, to verify the location meets the minimum requirements.

This section includes:

- [Safety Precautions](#)
- [Fire Protection](#)
- [Verifying Temperature Control](#)
- [Inspecting and Verifying Site Conditions](#)

Safety Precautions

The installer should take appropriate safety precautions as specified by local standards, such as:

- Providing on-site fire extinguishers. See [Fire Protection](#).
- Using appropriate safety equipment and clothing.
- Ensuring on-site first aid support is available, and so on.

Fire Protection



Fire protection only applies to indoor installations.

Possible types of fixed fire suppressions equipment are:

- Halon gas system
- Carbon dioxide (CO₂) system
- Sprinkler system (Star Solutions recommends using "dry pipe" sprinkler systems that remove all power to a room before filling the overhead sprinklers with water.)



Warning:

In addition to the fixed suppression equipment, have at least two 5-lb ABC class portable fire extinguishers on the premises before equipment installation begins.

If there is no fire suppression equipment installed, contact the site manager or facility representative.

Verifying Temperature Control

Verify the functionality of the air conditioning units to ensure the QuadPAC will never be subjected to temperatures and humidity levels outside the ranges listed in [Table 11](#).

Table 11 Temperature and Humidity Ranges

Temperature / Humidity Condition	Range
Operating temperature	32° to 104° F (0° to 40° C)
Operating humidity	0 to 95% (non-condensing)
Non-operating shipping and storage temperature	-13° to +167° F (-25° to +75° C)
Non-operating shipping and storage humidity	0 to 100% (non-condensing)

Inspecting and Verifying Site Conditions

The site should be clean and free of obstructions.



Do not place components or other equipment directly on the ground.



If site conditions do not comply, contact the site manager or facility representative.



If the installer is not responsible for correcting noted shortfalls, notify responsible individuals of any deficiencies as soon as possible. Deficiencies must be corrected before commencing installation.

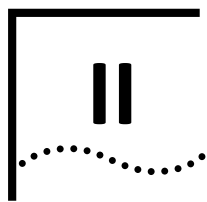


Installation of ancillary equipment (for example: power supplies, cable racks, batteries) is the responsibility of the installer.

Site Installation Checklist

The following checklist is provided to assist in the site planning procedure. After completing the required steps, check them off, or refer back to this list, to ensure all site planning requirements have been met:

- Review personnel requirements
- Gather related documentation
- Verify power
- Verify the grounding
- Verify site conditions
- Verify temperature control
- Review standard equipment rack location specifications
- Review equipment mounting guidelines
- Prepare the site for the QuadPAC



INSTALLATION

Chapter 3 [QuadPAC Installation](#)

Chapter 4 [Interface Connections](#)

3

QUADPAC INSTALLATION

About This Chapter

This chapter includes:

- [Unpacking the Shipment](#)
- [Installing the QuadPAC](#)

Unpacking the Shipment

Inspect the packing container immediately on arrival at the installation site to verify that no damage has occurred during shipment.



Warning:

Do not open the casing. No user serviceable parts are inside. Refer servicing to qualified service personnel.

If any damage is observed, notify the shipper immediately to begin the insurance claim process. Do not open or unpack the container until an insurance adjuster has inspected the containers for exterior damage.

If the container appears to be in satisfactory condition, open it and carefully unpack the equipment. Verify the contents and quantities against the packing list.

Notify Star Solutions immediately if any discrepancies are discovered, to verify whether the complete shipment has been received.

[Table 12](#) lists components in the QuadPAC shipping package.

Table 12 Component List

Item	Quantity
QuadPAC unit	1
Rack rails with screws, pre-assembled, pre-packed	1
AC power cord	1
Ferrite Bead (260ohm @100MHz)	1
1 ft Ethernet patch cable	1 (only if Clock Module included)
GPS antenna	1 (only if GPS Module included)



Do not discard the shipping carton. Use the shipping carton if units need to be returned for repair and replacement.

Installing the QuadPAC

This section includes:

- [Installing the Mounting Ears](#)
- [Mounting the QuadPAC into the Rack](#)



Warning:

Remove power to the unit before removing or installing the QuadPAC.

Installing the Mounting Ears To install the mounting ears onto the QuadPAC unit:

- 1 Screw the bracket (80483868GS) to the mounting ear (80483869GS), using the KXX01336GS and KXX01337GS washers and KXX02013GS Phillips pan-head screws as shown in [Figure 4](#).
- 2 Repeat for the second bracket and mounting ear.
- 3 Connect the bracket and mounting ear (Assembly A) to the QuadPAC using the KXX01336GS (flat) and KXX01337GS (locking) washers and KXX02013GS Phillips pan-head screws. See [Figure 5](#).



The locking washer should always be in-between the screw and the flat washer.

Figure 4 Attaching Bracket to Mounting Ear

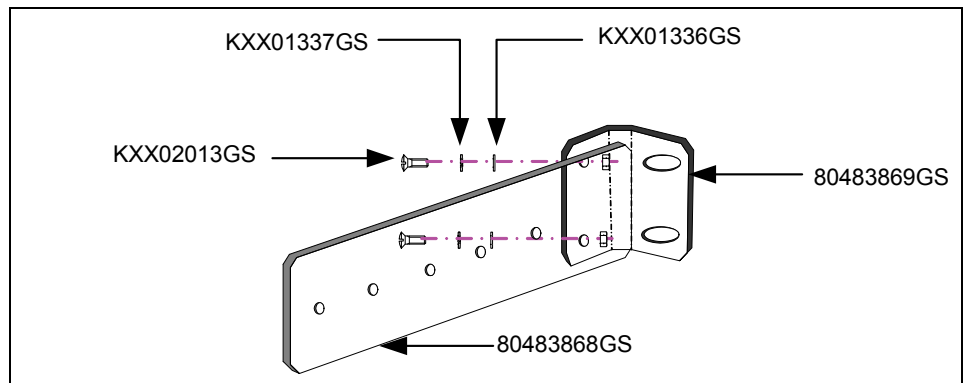
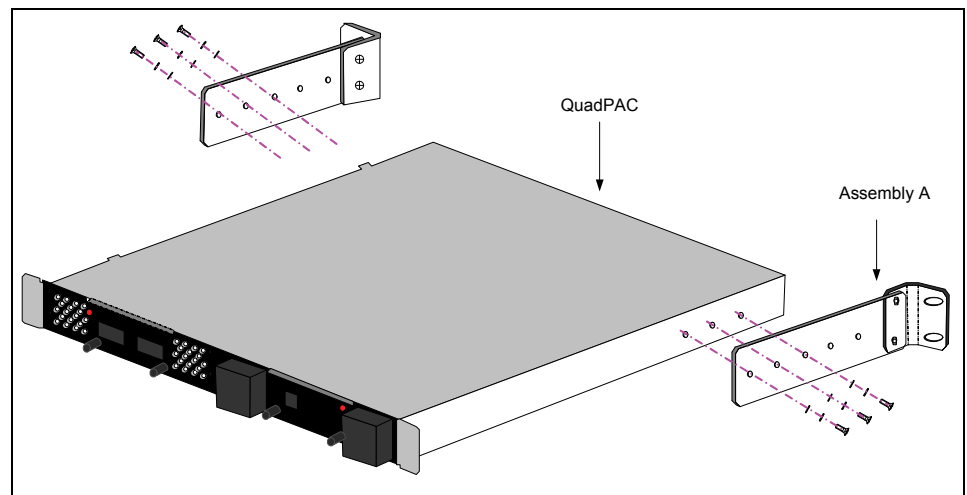


Figure 5 Attaching Mounting Ear Assembly to QuadPAC



Mounting the QuadPAC into the Rack Refer to [Figure 6](#) and [Figure 7](#) for the following instructions.

To mount the QuadPAC in the rack:

- 1 Tilt the QuadPAC unit, put the unit inside the rack and ensure the mounting ears are outside the rack. See [Figure 6](#).
- 2 Lift the QuadPAC unit up to the correct horizontal position. See [Figure 7](#)
- 3 Using a Phillips #2 screw driver, connect the QuadPAC unit to the rack with the flat washer, lock washer and M6 screws. Use 2 screw sets per corner.
- 4 Ensure all four corners are attached using a total of 8 screws.



The locking washer should always be in-between the screw and the flat washer.

Figure 6 Tilting the QuadPAC to get it into the Rack

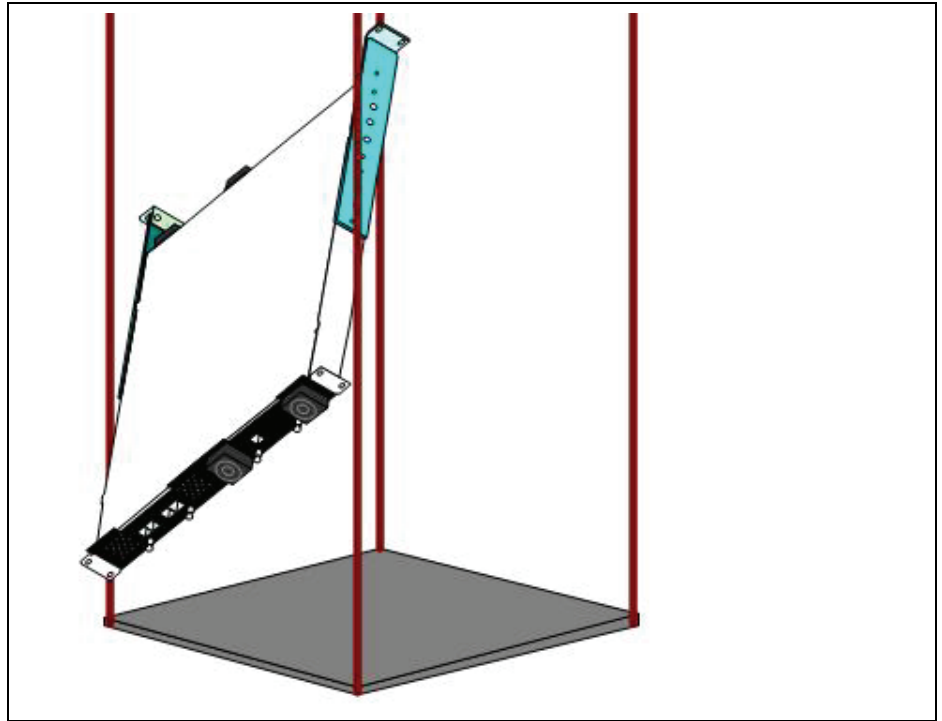
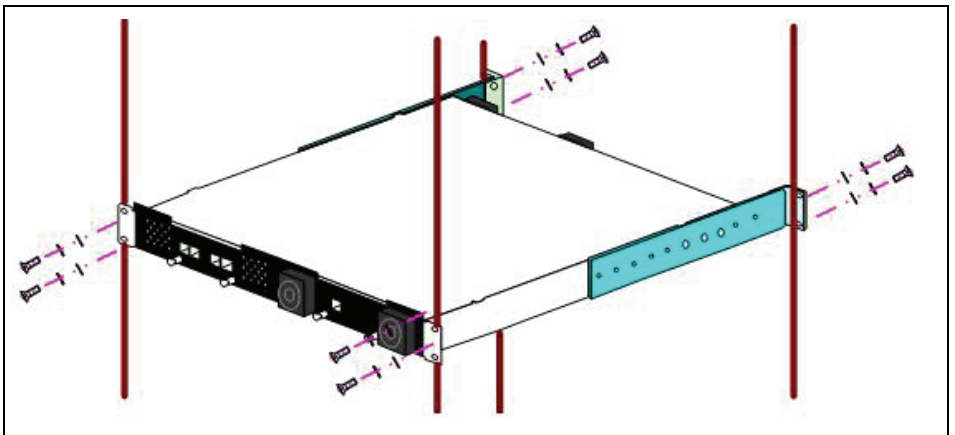


Figure 7 Mounting the QuadPAC in the Rack



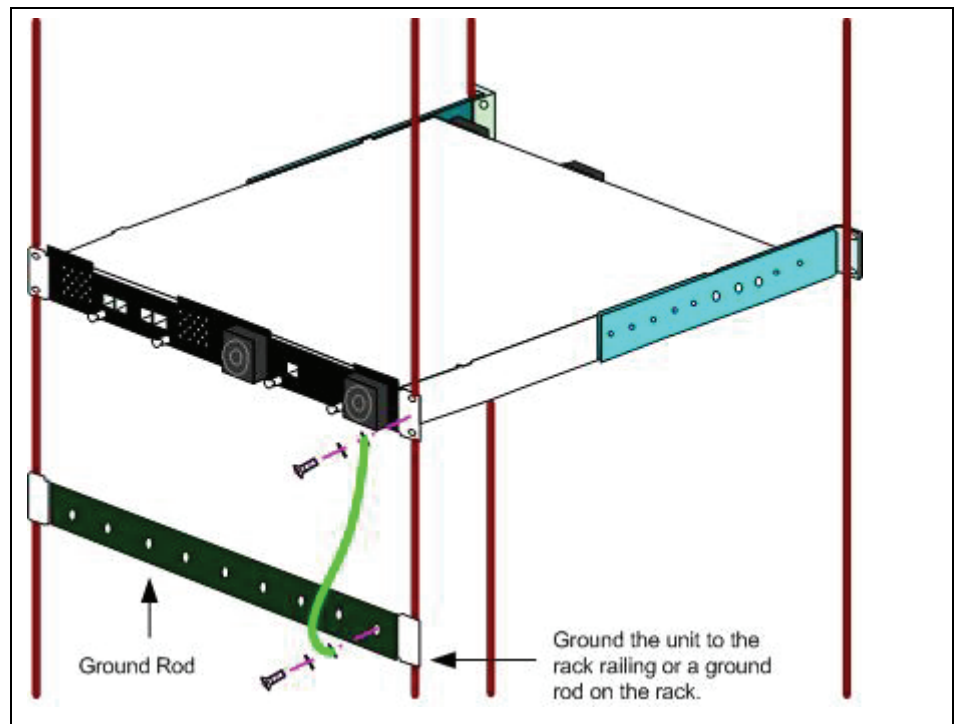
Grounding

Ground the QuadPAC using the 1U chassis.

To ground the QuadPAC:

- 1 Using the #2 Phillips screwdriver, remove one of the sets of rack mount screws, lock washers and flat washers.
- 2 Replace the flat washer with the ground cable slug.
- 3 Using the #2 Phillips screwdriver, re-install the screw, lock washer and ground cable slug. (See [Figure 8.](#))
- 4 Using the #2 Phillips screwdriver, screw the other side of the ground cable into the grounding rod.

Figure 8 Grounding





INTERFACE CONNECTIONS

About This Chapter

This chapter includes:

- [Front / Rear Panel Interface Connections](#)
- [Ethernet / LAN Connections](#)
- [RF Antenna Connections](#)
- [RF Antenna Connections on DO-BTS Module](#)
- [Power Connection](#)
- [Reset Button](#)
- [Status LED](#)



Warning:

All connectors that are not connected must be terminated. The shielding of all coaxial connections must be grounded.

Front / Rear Panel Interface Connections

The QuadPAC can be ordered in several configurations (see [QuadPAC Configuration](#) on [page 15](#)). The panel interface connections vary depending on the hardware configuration that was ordered.

[Figure 9](#) and [Figure 10](#) show two different QuadPAC front panel views, depending on the QuadPAC hardware configuration. [Table 13](#) lists the front panel interface connections.

Figure 9 QuadPAC Front View - Clock Module and DO-BTS Module

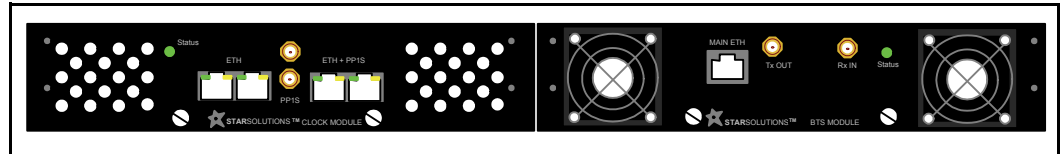


Figure 10 QuadPAC Front View - DO-BTS Module and GPS Module

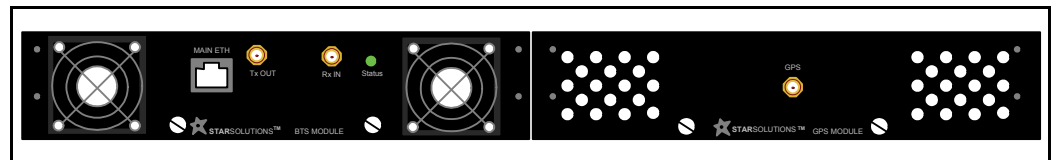


Table 13 QuadPAC Front Panel Interface Connections

Connection	Type	Notes
Clock Module		
Status	Operational status indicator LED	See Status LED on page 51 .
ETH	RJ45	Interface for backhaul connectivity. See Ethernet / LAN Connections on page 42 .
ETH + PP1S	RJ45	Interface for LVDS connectivity. See Ethernet / LAN Connections on page 42 .
PP1S	Female SMA	Plush per one second output.
DO-BTS Module		
Status	Operational status indicator LED	See Status LED on page 51 .
MAIN ETH	RJ45	Interface for backhaul connectivity. See Ethernet / LAN Connections on page 42 .
Tx OUT	Female SMA	Tx antenna connection. See RF Antenna Connections on page 49 .
Rx IN	Female SMA	Rx antenna connection. See RF Antenna Connections on page 49 .
GPS Module		
GPS	Female SMA	GPS antenna connection. See RF Antenna Connections on DO-BTS Module on page 49 .

[Figure 11](#) and [Figure 12](#) show two different QuadPAC rear panel views, depending on the QuadPAC hardware configuration. [Table 14](#) lists the rear panel interface connections.

Figure 11 QuadPAC Rear View - CPU Module and Power Supply Module

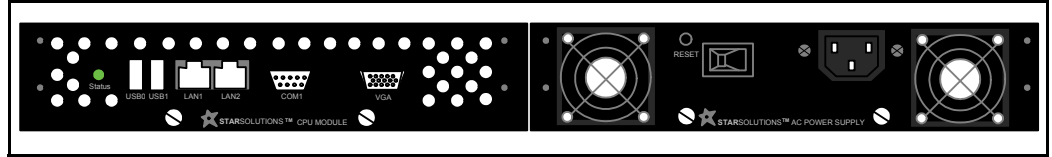


Figure 12 QuadPAC Rear View - Power Supply Module

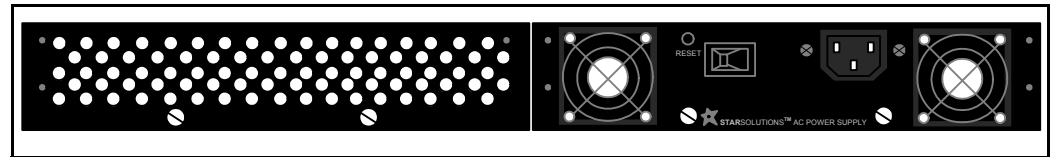


Table 14 QuadPAC Rear Panel Interface Connections

Connection	Type	Notes
Power Supply Module		
Power	AC Plug	Nominal 230V (+6,-10%) at 50Hz Nominal 120V (+10,-10%) at 60Hz
Reset button	Push button	Factory reset button. See
Power switch	Breaker ON/OFF switch	ON – system is powered on and operational OFF – system is powered off
CPU Module		
Status LED	Operational status indicator	See Status LED on page 51 .
USB0, 1	Standard Universal Serial Bus port	Mouse USB connection.
LAN1, 2	RJ45	Interface for backhaul connectivity.
COM1	Male DE-9 connector	Keyboard serial connection.
VGA	Female DE-15 connector	Monitor connection.

Ethernet / LAN Connections

The QuadPAC can be connected to the network in several ways, depending on the QuadPAC hardware configuration and the deployment requirements.

There are two ports on the QuadPAC modules, labeled as follows to indicate the ports to use for IP connectivity to the network:

- **Ethernet** on the DO-BTS and Clock modules
- **LAN** on the CPU module

Connecting the QuadPAC to the Network

The two main architectures for network connectivity are described in this section:

- [“Typical” connection mode](#)
- [“All In One” connection mode](#)

“Typical” connection mode

The “Typical” connection setup allows the applications to connect to the network independently, directly from the QuadPAC module interface.

This connection setup is used for most deployment scenarios.

[Figure 13](#) and [Figure 14](#) show the “Typical” connection setup for the hardware configurations of a QuadPAC with a GPS Module and a QuadPAC with a Clock Module, respectively. [Figure 14](#) shows the use of the Ferrite Bead when connecting the DO-BTS module directly to the network.

Figure 13 "Typical" Connection Setup for QuadPAC with GPS Module

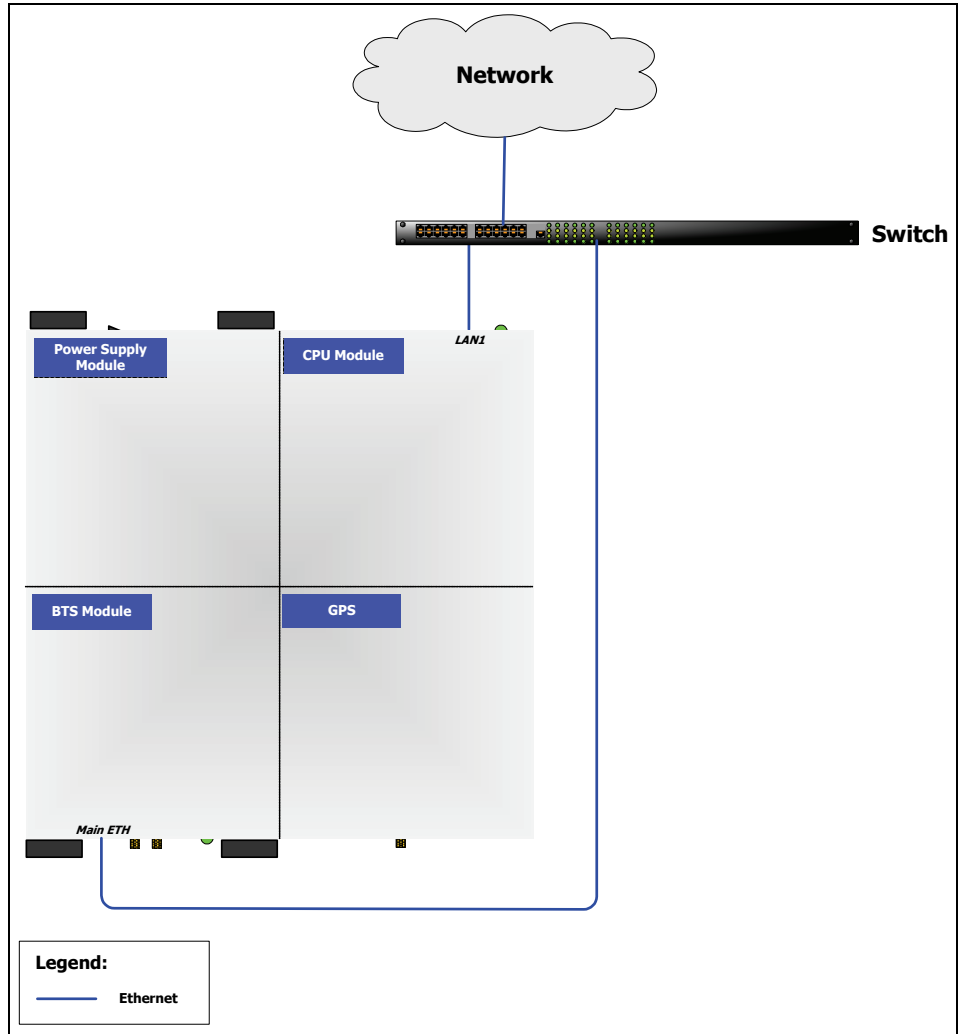
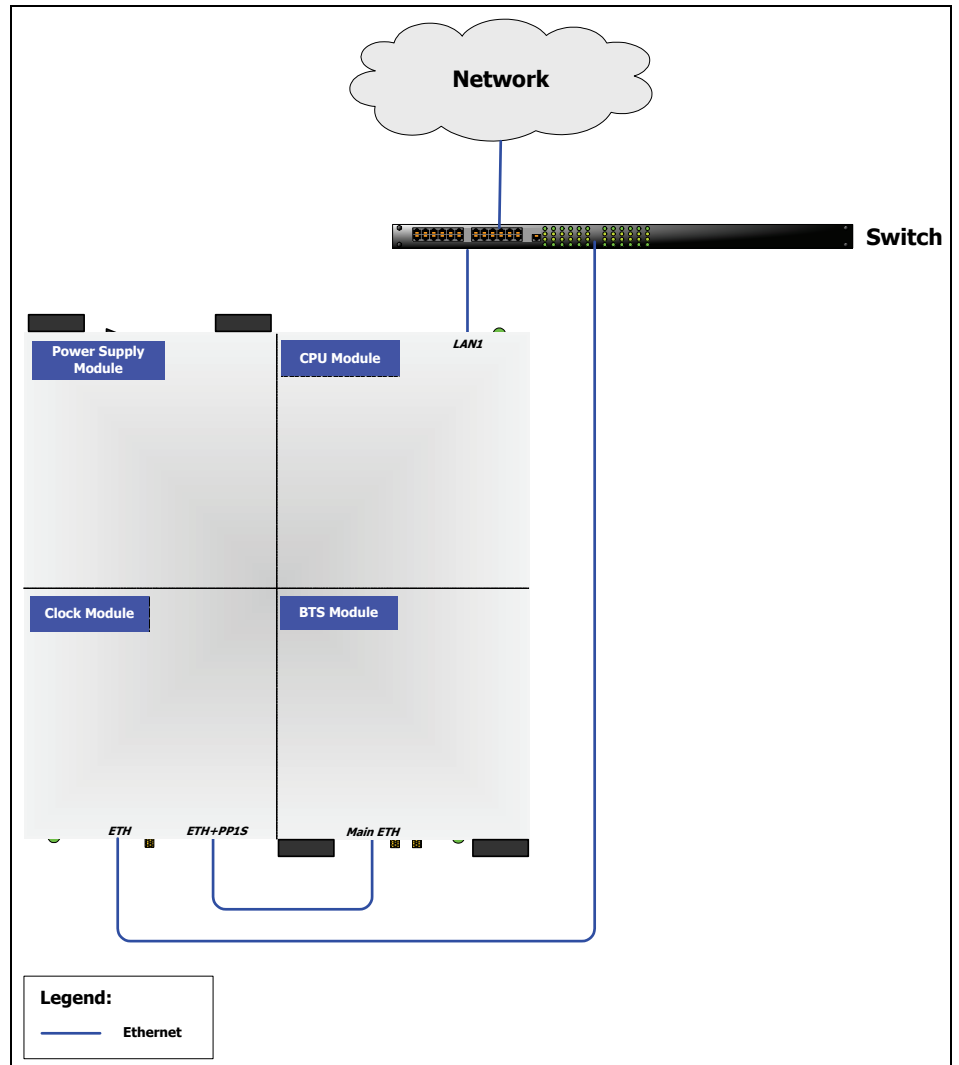
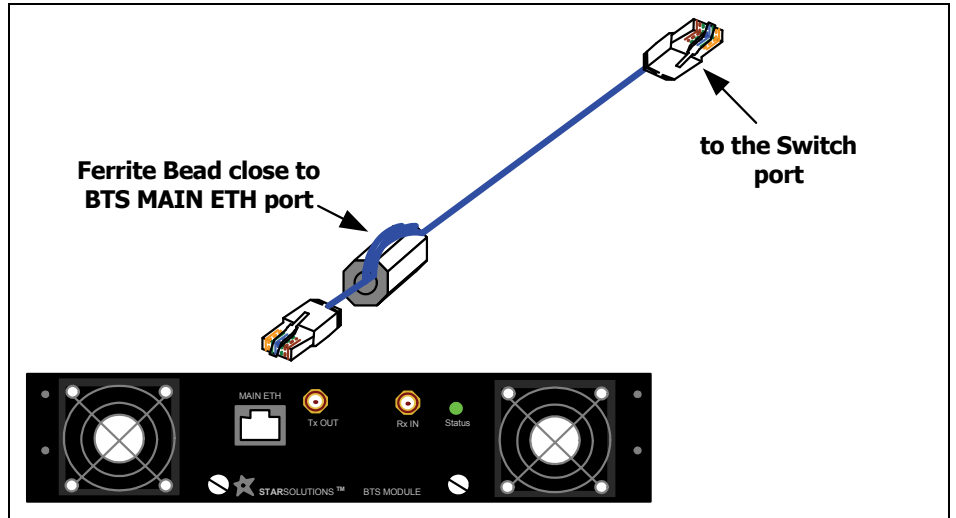


Figure 14 “Typical” Connection Setup for QuadPAC with Clock Module

Use the Ferrite Bead on the ETH cable when connecting the DO-BTS Module directly to the network.

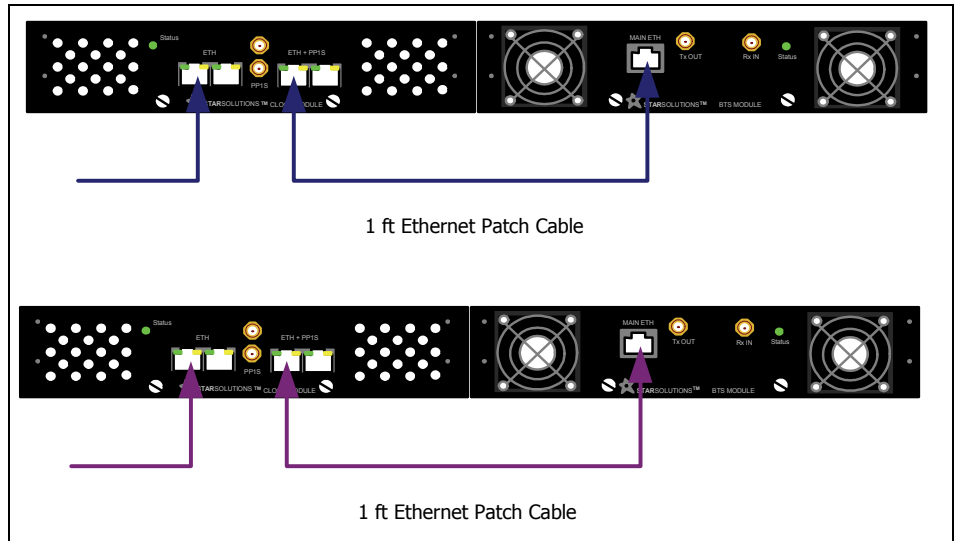
Loop the ETH cable through the Ferrite bead, close to one of the plugs, two or three times, as shown in [Figure 15](#).

Figure 15 Ferrite Bead on the DO-BTS ETH cable



i The ports on the Clock Module (ETH+PP1S from the DO-BTS and ETH to switch) should be symmetrically connected. For example, if you use the right ETH+PP1S port coming from the DO-BTS, use the right ETH port going out to the switch. See [Figure 16](#).

Figure 16 Clock Module Symmetric port connection in “Typical” connection mode.



“All In One” connection mode

The “All In One” connection setup allows a single interface from the QuadPAC to the network.

This connection setup is used when the PDSN application is configured on the CPU module or when there is only a single interface available through the network.

[Figure 17](#) and [Figure 18](#) show the “All In One” connection setup for the hardware configurations of a QuadPAC with a GPS Module and a QuadPAC with a Clock Module, respectively.

Figure 17 “All In One” Connection Setup for a QuadPAC with a GPS Module

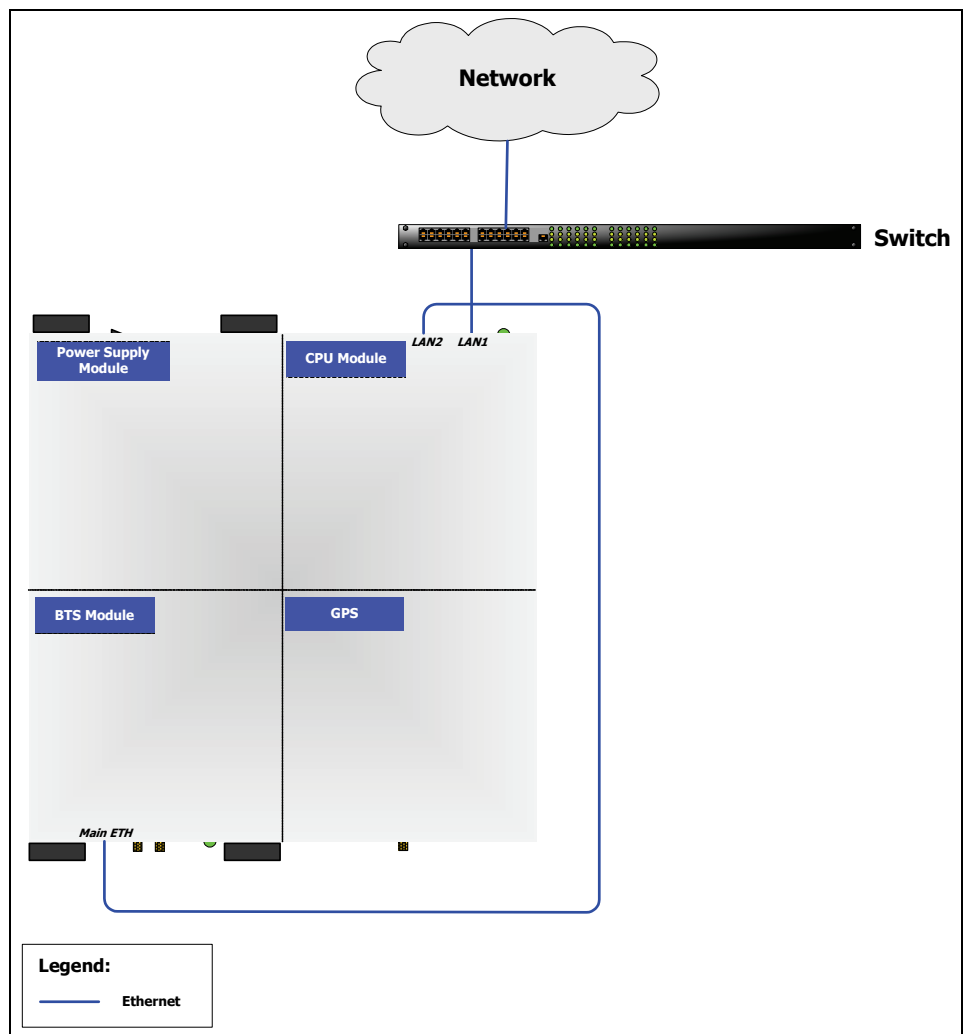
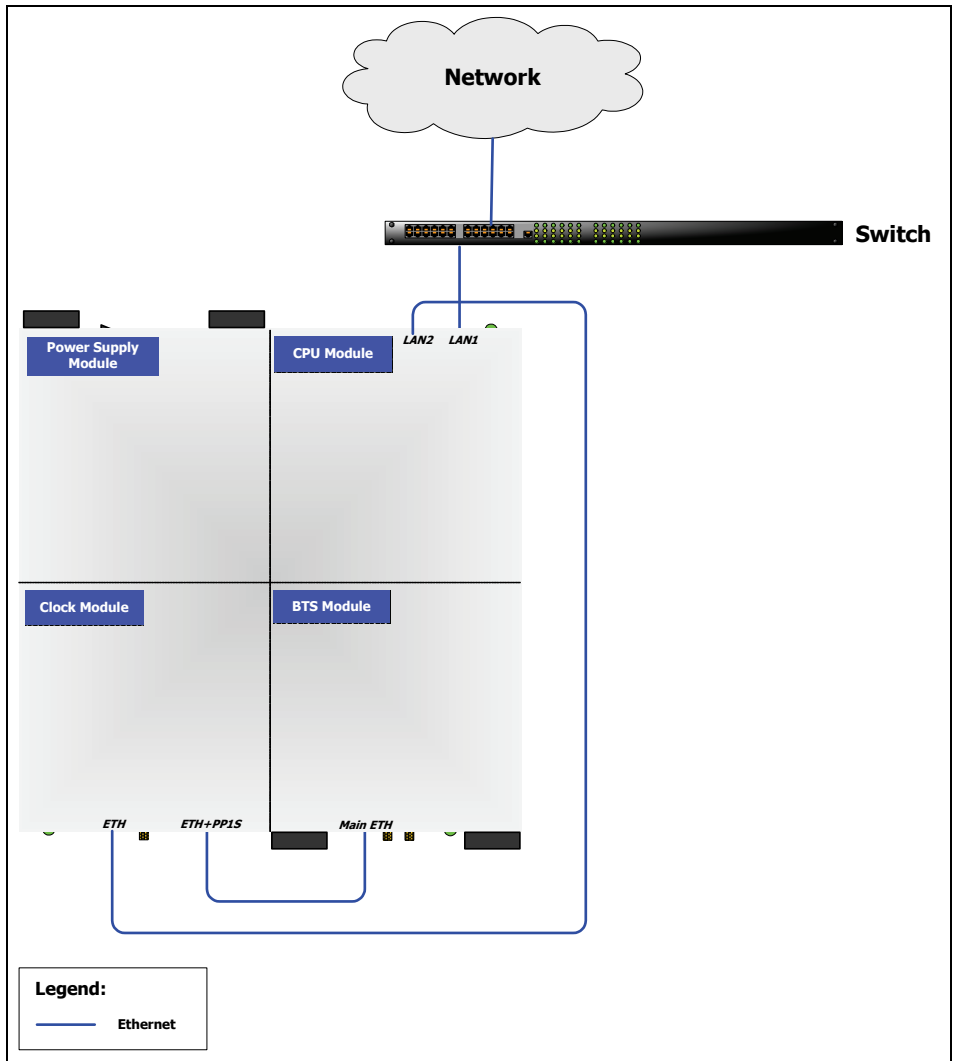


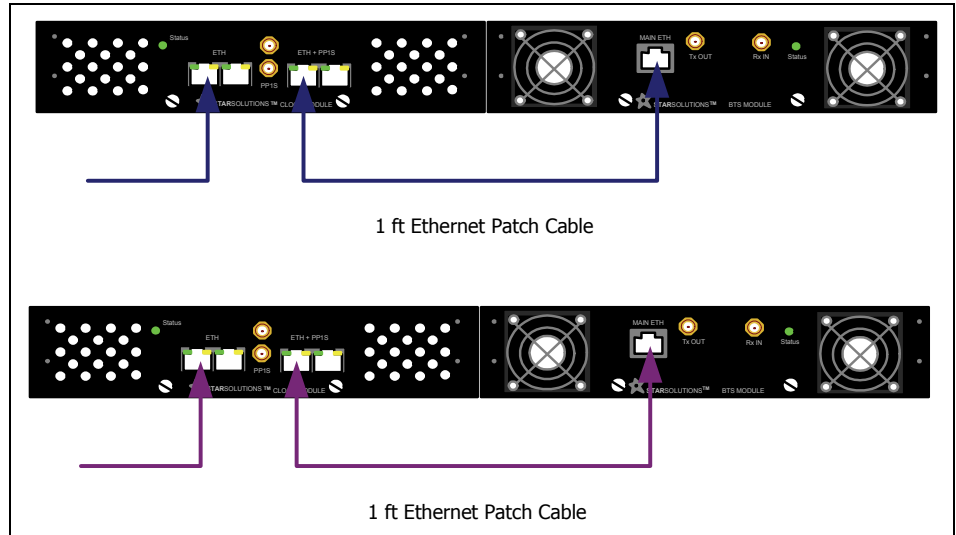
Figure 18 "All In One" connection setup for QuadPAC with Clock Module





The ports on the Clock Module (ETH+PP1S from the DO-BTS and ETH to CPU Module) should be symmetrically connected. For example, if you use the right ETH+PP1S port coming from the DO-BTS, use the right ETH port going out to the CPU Module. See [Figure 19](#).

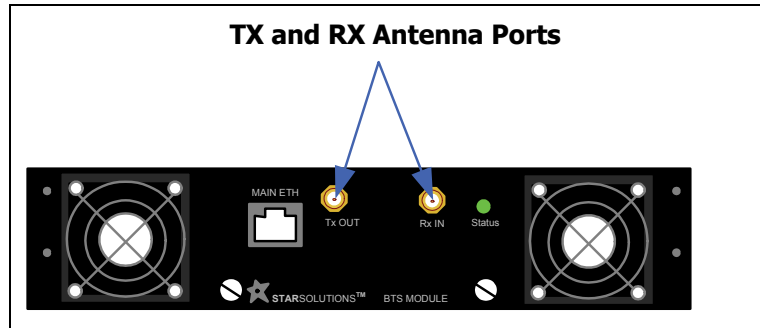
Figure 19 Clock Module Symmetric port connection in “All In One” connection mode



RF Antenna Connections

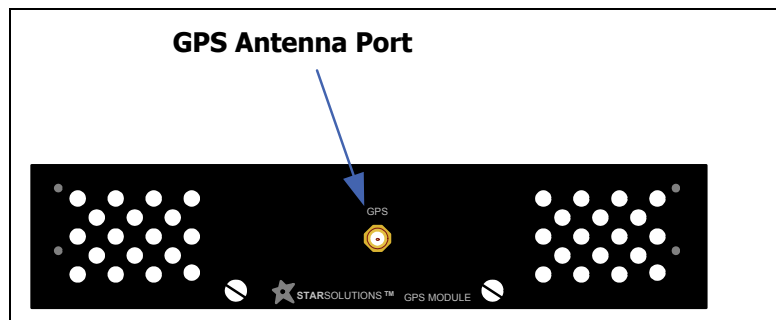
The RF antennas are connected to the Tx and Rx SMA connectors on the DO-BTS Module. See [Figure 20](#).

Figure 20 RF Antenna Connections on DO-BTS Module

**GPS Antenna Connection**

The GPS antenna is connected to the GPS SMA connector on the GPS Module. See [Figure 21](#).

Figure 21 GPS Module: GPS SMA Port



Power Connection

To connect power to the QuadPAC:

- 1 Ensure the breaker switch on the Power Supply Module is in the "OFF" position.
- 2 Connect the AC power cable.



Warning:

Power connections to the QuadPAC must comply with local safety codes.

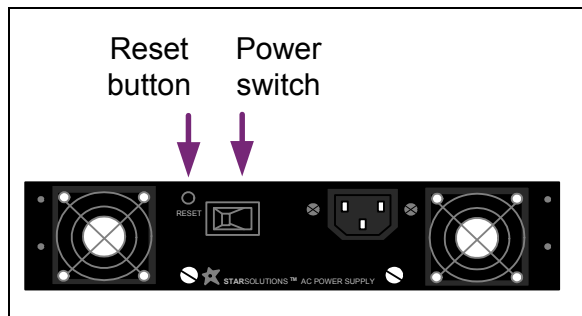


Warning:

Power connections must be performed by qualified personnel only.

To power the QuadPAC on, toggle the power switch on the Power Supply Module to the "ON" position. (See [Figure 22](#).)

Figure 22 Reset Button and Power Breaker Switch



Reset Button

The **Reset** button (see [Figure 22](#)) is used to effect different types of reset on the QuadPAC, depending on how long the reset button is held down.



Caution:

The reset button should not be pressed during power up. Doing so can cause the QuadPAC to malfunction, resulting in the potential loss of data.

[Table 15](#) lists the reset button timing during normal operations.

Table 15 Reset Button Timing

Button Hold Time (seconds)	Reset Action
1	The DO-BTS is reset.
5	The DO-BTS is power cycled. The LED goes off.
20	The unit is reset to factory default settings.

Status LED

The QuadPAC has a single external status LED that displays the state of the unit. This allows the user to determine the state of the system before other communication methods, such as an IP connection, have been established.

The QuadPAC has status LEDs on the DO-BTS, Clock and CPU Modules. The LED behavior on each module represents the status of that specific module.

[Table 16](#) lists the relationship between the LED behavior and the status of each module.

Table 16 Status LED Behavior

LED Behavior	System State	Service Provided
DO-BTS Module		
Off	Not powered.	No
Solid Red	System booting.	No
Blinking Red	System initializing.	No
Alternating Green/Red	RF initializing.	No
Blinking Green	Timing synchronizing. Cellular RF not transmitting.	No
Solid Green	Timing complete. RF transmitting.	Yes
Clock Module		
Off	Not powered.	No
Solid Red	Clock initializing.	No
Solid Green	Clock synchronized.	Yes
CPU Module		
Off	Not powered.	No
Solid Green	Powered on	Yes

