



Perle IRG7440 5G/LTE Cellular Router



Preface

Audience

This guide is for the network or computer technician responsible for installing the Perle IRG7440 5G/LTE Cellular router also generically referred to as the IRG7440 within this document. Familiarity with the concepts and terminology of Cellular Networks, GNSS, Ethernet, and LAN (local area networks) is required.

Purpose

Perle routers provide users, networking equipment, as well as M2M & IoT appliances with network connectivity for fixed locations (i.e. buildings, POS, Kiosks, ...etc.) and mobile (i.e. vehicle, trains, robots) applications. In vehicular applications, the router provides connectivity and does not interact with the vehicle's operation or vehicle operators.

This document describes the hardware and physical characteristics of the Perle IRG7440 router. It covers hardware features as well as installation and operation. This document does not cover how to configure your Perle IRG7440 router. Information to configure your Perle router can be found in the Perle IRG7000/5000 5G/LTE Router User's Guide and the Perle IRG7000/5000 5G/LTE Router Command Line Reference Guide on the Perle website. Quick Start information can be found in the 7440 that comes with your product.

Key Features

- Supports bridging/switching, and routing
- Support for 5G Sub-6 GHz: n1, n2, n3, n5, n28, n41, n66, n71, n78, n79
- 4G LTE: B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B18, B19, B20, B21, B25, B26, B28, B29, B30, B32, B34, B38, B39, B40, B41, B42, B43, B46, B48, B66, B71
- Routing with Primary/Backup route
- 5G/LTE and VPN Fail-over
- Provides network connectivity via LTE,5G, Ethernet, and USB-C
- Active GPS for tracking equipment
- Low voltage Standby function to prevent battery drain
- One GPIO pin for remote monitoring/control and one IGN (Ignition) pin
- Two digital Inputs and one Relay contact
- RS485 half-duplex capabilities
- Security via remote authentication (Radius/RadSec and TACACS+)
- Processor Power Saving Mode—this feature optimizes idle power consumption, saving energy by reducing performance where possible
- Power Saving Features including; LED power saving mode, Smart Standby Mode, Power saving strategies such as turning off unused interfaces (USB, Serial, Ethernet), turning off GPS and adjusting the Ethernet rate
- Meets industry-grade certifications

Additional Documentation

Document	Description
Perle IRG7000/5000 5G/LTE Router User's Guide	User's guide explaining how to configure the IRG7440 features using the Web Manager application. New users should use this method to configure the router.
Perle IRG7000/5000 5G/LTE Router Command Line Reference Guide	Command Line Interface Reference Guide using CLI commands to configure the IRG 7440 (this is an advanced way to configure the router).

Document Conventions

This document contains the following conventions:

Most text is presented in the typeface used in this paragraph. Other typefaces are used to help you identify certain types of information. The other typefaces are:

Note: *Means reader take note:* notes contain helpful suggestions.

Caution: Means reader be careful. In this situation, you might perform an action that could result in equipment damage or loss of data.

Warning: IMPORTANT SAFETY INSTRUCTIONS

Means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when cellular devices such as the Perle IRG7440 Series Routers are used in a normal manner with a well-constructed network. The Perle IRG7440 Series Routers should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Perle accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using our products.

Safety and Hazards

The driver or operator of any vehicle should not operate the IRG7440 while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. The IRG7440 is Listed to UL121201 and CSA C22.2 No. 213.

The following warnings and instructions apply:

Limitation of Liability

The information in this manual is subject to change without notice and does not represent a commitment on the part of Perle for any and all direct, indirect, special, general, incidental, consequential, punitive or exemplary damages including, but not limited to loss of profits or revenue or anticipated profits or revenue arising out of the use or inability to use any Perle IRG7440 series router even if Perle has been advised or the possibility of such damages or they are foreseeable or for claims by any third party.

Notwithstanding the foregoing, in no event shall Perle aggregate liability arising under or in connection with the Perle product, regardless of the number of events, occurrences, or claims giving rise to liability, be in excess of the price paid by the purchaser for the Perle product.

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General cautions and warnings

13		IEC 60417-5041 (2002-10)	“WARNING: HOT SURFACE. DO NOT TOUCH.” / ATTENTION: Surface chaude. Ne pas toucher.”
14			Refer to manual/safety

Warning: Power sources must be off prior to beginning the power connection steps. Read the installation instructions before you connect the unit to its power source.

Avertissement: Les sources d'alimentation doivent être éteintes avant de commencer les étapes de connexion d'alimentation. Veuillez lire les instructions d'installation avant de connecter l'appareil à sa source d'alimentation.

Warning: Ensure that the voltage and current ratings of the intended power source are appropriate for the IRG7440 Series of Routers as indicated on the product label.

Avertissement: Assurez-vous que les valeurs nominales de tension et de courant de la source d'alimentation prévue conviennent aux routeurs de la série IRG7440, comme indiqué sur l'étiquette du produit.

Warning: Ensure that the installation and electrical wiring of the equipment is performed by trained and qualified personnel and that the installation complies with all local and national electrical codes.

Avertissement: Assurez-vous que l'installation et le câblage électrique de l'équipement sont effectués par du personnel formé et qualifié et que l'installation est conforme à tous les codes électriques locaux et nationaux.

Warning: This equipment must be used in the matter specified by the manufacturer.

Avertissement: Cet équipement doit être utilisé dans les matières spécifiées par le fabricant.

Warning: In case of malfunction or damage, no attempts at repair should be made by the user. Do not dismantle this product. In case of malfunction or damage, contact Perle Technical support at

https://www.perle.com/support_services/support_request.aspx

or email at

https://www.perle.com/support_services/support_request.aspx#form

Avertissement: En cas de dysfonctionnement ou de détérioration, aucune tentative de réparation ne doit être effectuée par l'utilisateur. Ne démontez pas ce produit. En cas de dysfonctionnement ou de dommage, contactez le support technique de Perle à l'adresse

https://www.perle.com/support_services/support_request.aspx

ou par courrier électronique à

https://www.perle.com/support_services/support_request.aspx#form

Warning: “Equipment is intended for installation in Restricted Access Area when equipment is installed in ambient exceeding 50°C (122°F)”. The unit should be installed in a restricted access loca-

tion where access can only be gained by service personnel or users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and access is through the use of a tool or lock and key, or any means of security, and is controlled by the authority responsible for the location.

Avertissement: L'équipement est destiné à être installé dans une zone d'accès restreint lorsque l'équipement est installé dans une température ambiante supérieure à 50 °C (122 °F). L'unité doit être installée dans un emplacement à accès restreint, auquel seul le personnel de service ou les utilisateurs informés des raisons des restrictions appliquées peuvent accéder. sur le lieu et sur les précautions à prendre; et l'accès se fait au moyen d'un outil ou d'un verrou et d'une clé, ou de tout moyen de sécurité, et est contrôlé par l'autorité responsable du lieu.

Warning: The working voltage inputs are designed for operation with Safety extra low Voltage (SELV). Connect only to SELV circuits with voltage restrictions in line with IEC/EN 62368-1.

Avertissement: Les entrées de tension sont conçues pour fonctionner avec une tension de sécurité très basse (SELV). Connectez uniquement aux circuits SELV avec des restrictions de tension conformes à IEC / EN 62368-1.

Warning: For equipment installed within the same end-product enclosure ensure leads are segregated or insulated the leads from different circuits.

Avertissement: Pour les équipements installés dans le même boîtier de produit final, assurez-vous que les conducteurs sont séparés ou isolés des conducteurs de circuits différents.

RF Exposure

In accordance with FCC/IC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20 cm should be maintained from the antenna and the user's body.

Conformément aux exigences de la FCC/IC relatives à l'exposition humaine aux champs de radiofréquences, l'élément de rayonnement doit être installé de manière à ce qu'une distance de séparation minimale de 20 cm soit maintenue par rapport à l'antenne et au corps de l'utilisateur.

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS GUIDE ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS GUIDE ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with this hardware guide may cause harmful interference to radio communications.

Modifications to this product not authorized by Perle could void the FCC approval and negate your authority to operate the product.

Perle reserves the right to make changes without further notice, to any products to improve reliability, function, or design.

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Dec 2020	A.12.31.2020	Updates
June 2021	A.03.06.2021	Update to label
Jan 2022	A.01.30.2022	Added IRG7440 model (5G) and updates to other models
March 2022	A.03.17.2022	Updated Hot warning
April 2022	A.04.08.2022	Updated Restricted Access Area warning
Oct 2022	A.10.06.2022	Updated incorrect instructions for antennas
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Overview

The Perle IRG7440 router is a compact, rugged, fully featured communications platform for real-time wireless capabilities. The Perle IRG7440 router is generically referred to as the IRG7440 in this guide. It has multiple communication ports including Serial, Ethernet, and a USB port. It supports 5G/LTE wireless solutions for both fixed and mobile applications (IoT). The 5G/supports peak download rates of 4.5 Gbps and uploads speeds of 660 Mbps. It offers global coverage of frequency bands, supports Cat-20 technology with automatic fall-back to 4G and 3G (HSPA+, UMTS) networks. The IRG7440 includes integrated GNSS receiver (GPS, GLONASS, Beidou, and Galileo) satellite support.

Application uses:

- Monitoring and controlling remote equipment such as pipelines, meters, pumps, and valves in energy, utility, or industrial applications
- Tracking the location of heavy equipment and assets in the field
- Providing reliable Internet access to a mobile workforce

What's Included

The following components **may** be included with your product. Components will vary depending for each model. See the Perle website for updates.

- The router
- Quick Start Guide that came with your product
- 5G/LTE antenna pack (#08000530)
- GPIO Cable with 4 Pin plug (#2500468)
- GPIO Cable with 8 Pin plug (#2500476)
- 12VDC/2A 4 Pin (NA-#08000150, EU #08000160, UK #08000170, #08000180) power supply

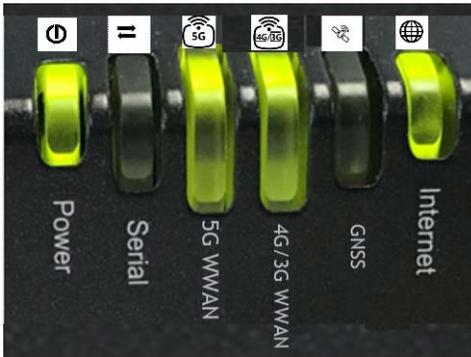
What You Need to Supply

Before you can begin, you need to have the following:

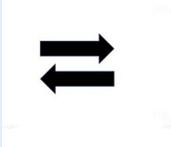
- A SIM card (provided by your mobile network operator)
- #1 Phillips screwdriver (if you are installing the SIM card)
- Computer or laptop computer with Ethernet interface and cable
- An Ethernet CAT5e or CAT6 10/100/1000BASE-T cable/to connect the router to the network

Hardware

LEDs



Power LED 	Function	Normal	Low Power Mode	Meaning
	No Power	Off	N/A	
	Boot	Red—solid	N/A	
	Green— Blip	N/A	N/A	
	Powering up	Amber—flashing	N/A	
	Normal Operation	Green—solid	Green—blip starting after a boot is complete	
	Normal operation but no config	Green—flashing		Unit is powered up normally—unit has no config. Unit is in Safe mode or Factory default mode.
	Fatal error	Red—solid	Red—solid	
	Setup Mode	Amber—solid	Amber—solid	When you press and hold the reset button for 5 seconds. The solid amber led indicate the time to release to initiates setup mode.

	Factory Reset	Red—solid	Red—solid	When you press and hold the reset button for 20 seconds. The solid red indicates the time to release to imitate reset to factory.
	Overheat Standby	Red—blip	Red—blip	Overheat caused the unit to go into Standby mode. Router will restart when temp is below the threshold.
	No Config	Green-flashing	N/A	Unit is powered up normally—unit has no config. Unit is in safe mode or factory default mode.
Serial 	Function	Normal	Low Power Mode	Meaning
	Disabled or not in use	Off	Off	Always off in power saving mode.
	Serial port/s TX/RX	Green—flashing	Off	
5G WWAN 	Function	Normal	Low Power Mode	Meaning
	Disabled	Off	Off	
	Connected—good signal	Color—solid	Off—once connection is established, it will come on for 5 secs the go off	Colour will depend on signal strength. Green = Good signal—>+80dBm Amber = Fair signal—>-94dBm <-80dBm Red = Poor signal—<= 94dBm
	Connection in progress	Green, amber or red flashing	Off	Signal strength flash.

	Not connected or not connecting	Green, amber, or red blips	Off	Signal strength blip.
4G/3G WWAN 	Function	Normal	Low Power Mode	Meaning
	Disabled	Off	Off	
	Connected—good signal	Color—solid	Off—once connection is established, it will come on for 5 secs then go off	Colour will depend on signal strength. Green = Good signal—>+80dBm Amber = Fair signal—>-94dBm <-80dBm Red = Poor signal—<= 94dBm
	Connection in progress	Green, amber or red flashing	Off	Signal strength flash.
	Not connected or not connecting	Green, amber, or red blips	Off	Signal strength blip.
GNSS 	Function	Normal	Low Power Mode	Meaning
	Disabled	Off	Off	No GPS activated or in power saving mode.
	Initializing	Green—blip	Off	
	Attempting to get a fix or unable to get a fix	Amber—flashing	Amber—blip	
	GPS fix	Green—solid	Off—green solid for 5 seconds then off	

WLAN 	Function	Normal	Low Power Mode	Meaning
	5.0GHz	Green—solid	Off	Client mode connected—AP Radio mode.
	5.0 TX/RX	Green—flashing	Off	Client or AP activity.
	2.4GHz	Amber—solid	Off	Client mode connected—AP-radio active.
	2.4 TX/RX	Amber—flashing	Off	Client or AP activity.
	No connection	Off	Off	Client mode—no connection; AP mode not enabled.
Internet 	Function	Normal	Low Power Mode	Meaning
	Disconnected	Off	Off	No connection by intention <ul style="list-style-type: none"> • disabled or radio off • disconnect requested
	Connected	Green—solid	Off	<ul style="list-style-type: none"> • 5G/LTE primary if no WAN • Primary connection if WAN
	Backup mode	Amber—solid	Off	Backup connection if WAN.

	Connection failure	Red—solid	Red—blip	<p>A connection was attempted, but it failed.</p> <ul style="list-style-type: none"> • APN incorrect • SIM card missing • insufficient signal • no service • modem failure • data connection failed—waiting to retry • Pin incorrect SIM blocked, bad unlock code • SIM locked • SIM blocked, unblock code incorrect
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SIM Card

The IRG7440 supports one SIM card. See [Inserting the SIM card](#) for the installation procedure.

Antenna/s

The IRG7440 has four SMA antenna connectors, Main, Div/GNSS1, MIM01 and MIM02. For more information on connecting the antennas see the Technical Specifications section [Connecting the 5G/LTE Antenna/s](#).

USB-C Port

In console mode, the IRG USB port provides direct access to the Command Line Interface (CLI) as well as provides statuses, logging, and troubleshooting information.

See [Connecting to the Serial Port](#) and [Connecting the Power](#).

Ethernet LAN Ports

Once the port are connected and the link is established, the speed LED will turn on. The LED indicates a 10, 100, or 1000 Mbps link on the Ethernet port.

Ethernet Link Status

Link/Speed Indicator		Description
Left LED Green	Link + Flashing with activity	1000 Mbps
Both LEDs	Link + Flashing with activity	100 Mbps
Right LED Green	Link + Flashing with activity	10 Mbps
Off	Off	No LAN connected

GNSS Connector

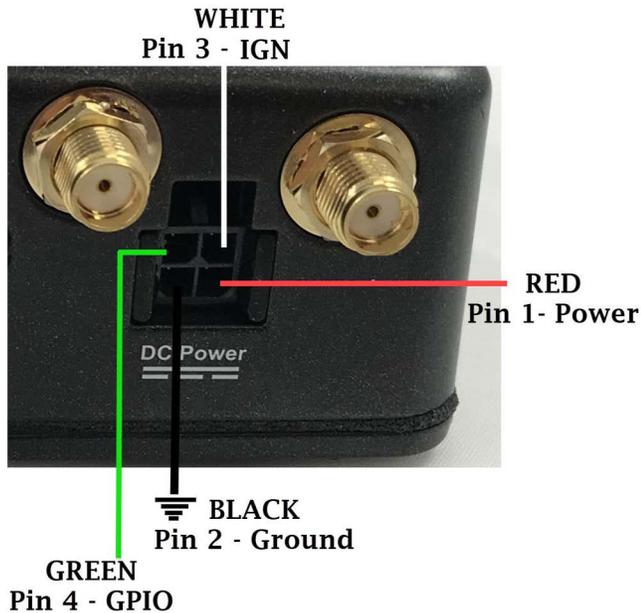
GPS+GLONAS+GAILEO

See [Appendix A—Technical Specifications](#) for electrical details.

Connecting the Power

Some models ship with a DC power cable or a pigtail cable.

The GPIO connector can be configured as a high side pull-up/dry contact digital input, analog input, low side current sink output, digital output/open drain, or pulse counter depending on your application. Pin 3—IGN can be configured as vehicle ignition sense or as analog input.



Warning: Before servicing this product ensure the power source has been disconnected.

Pin	Name	Associated DC Cable Wire color	Description	Type
1	Power	Red	Main power supply for device. <i>Note: If you want to turn the IRG on/off using a control line, such as a vehicle ignition line, we recommend that you connect the control/ignition line to Pin 3 and apply continuous power On Pin 1</i>	PWR
2	Ground	Black	Main device ground.	GND
3	IGN	White	Connect to the vehicle ignition or an external switch. This input can be configured to put the router into a Standby mode when the signal goes low and take it out of Standby mode when it goes high. Alternatively it can be used simply as an analog input.	IGN

Pin	Name	Associated DC Cable Wire color	Description	Type
4	GPIO	Green	User configurable digital input/output or analog voltage sensing input. Connect to switch, relay or external device.	GPIO

AUX/IO

The AUX/IO connector allows a connection for an RS485 device, 2 digital input devices (A and B), and 1 relay device. The two digital input connectors allow (NO) normally open relay.



Pin Numbers	8	7	6	5
Pin Description	RS485 -	GND	Input B	Relay NO (normally open)
Pin Numbers	4	3	2	1
Pin Description	RS485 +	GND	Input A	Relay NO (normally open)

Warning: Before connecting wiring, ensure the power source has been disconnected.

Relay Alarm

The Router has one Normally Open (NO) relay (Pin 5 and Pin 1). The relay switch can be connected to an external powered device such as a siren or light to provide visual or audible notification of an alarm status.

Ensure the power source is off prior to connection.

Installation

The steps for a typical installation are:

1. Inserting the SIM card. See [Inserting the SIM card](#).
2. Connecting the antenna/s. See [Connecting the 5G/LTE Antenna/s](#).
3. Connecting the Ethernet Ports. See [Ethernet LAN Ports](#).
4. Connecting to the Console Port in Console Mode. See [Female Serial Pin out](#).
5. Using the Console port as a virtual Ethernet port. See [Connecting the Power](#).
6. Connecting the power. See [Connecting the Power](#).
7. Logging into the IRG See [Fast Setup](#) or [Female Serial Pin out](#).

Inserting the SIM card

The IRG7440 comes with one SIM socket for amini-SIM (2FF) card.

Note: Ensure the power is disconnected before you insert the SIM card.

1. Using your Phillips screwdriver, removed the cover from the panel covering the SIM slot. Gently pry the cover loose from the opening.
2. Align the SIM card so that the SIM card will slide into the slot. The SIM card has a notched corner for orientation and the SIM card can only be inserted the correct way. You will hear an audible click when the SIM is inserted correctly.
3. Align the SIM cover plate and secure the plate with the screws.



Note: Do not force the SIM card in or you may damage the card or your IRG7440 router.

Connecting the 5G/LTE Antenna/s

The IRG7440 has four female SMA connectors.

- ANT1
 - ANT2
 - ANT3/GNSS L1
 - ANT4
1. Connect the antenna Main to the connector labeled ANT1.
 2. Connect the antenna MIMO1 to the connector labeled ANT2.
 3. Connect the antenna Diversity/GNSS to the connector labeled ANT3/GNSS L1
 4. Connect the antenna MIMO2 to the connector labeled ANT4.

When attaching the antennas to the SMA connectors, line the inner hole within the antenna, then slide onto the pin encased in the connector on the router, gently push to connect, then turn only the securing ring and not the antenna to secure it to the router.



Note: When attaching the antennas to the SMA connectors hand tighten only (do not use tools to tighten (maximum torque is 7Kgf-cm/1.1 N-m(10 in-lb)).

Connecting to the Ethernet Ports

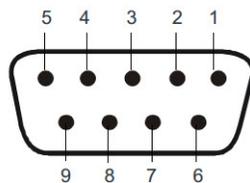
The Ethernet RJ45 ports provides the standard Ethernet interface speeds of 10/100/1000 Mbps through twisted pair (UTP) cables of up to 100 meters (328ft) in length. Cat5e or Cat6 cables are recommended for 1000 Mbps connections.

Connecting to the Serial Port

The serial port has a 9-pin female port connector allowing you to directly connect to most computers or devices with a standard serial straight-through cable.

It is used for:

- Connect a serial device
- Connect as a console port
- As a GNSS output device



Note: When connecting to a DCE device, a crossover cable is needed.

Female Serial Pin out

Name	Pin	Description	Type
DCD	1	Data Carrier Detect	OUT
TXD	2	Transmit Data	OUT
RXD	3	Receive Data	IN
DTR	4	Data Terminal Ready	IN
GND	5	Ground	GND
DSR	6	Data Set Ready	OUT
RTS	7	Request to Send	IN
CTS	8	Clear to Send	OUT
RI	9	Not Connected	-

Connecting to the USB-C port in Console Mode

By default, the USB-C port is set to console mode.

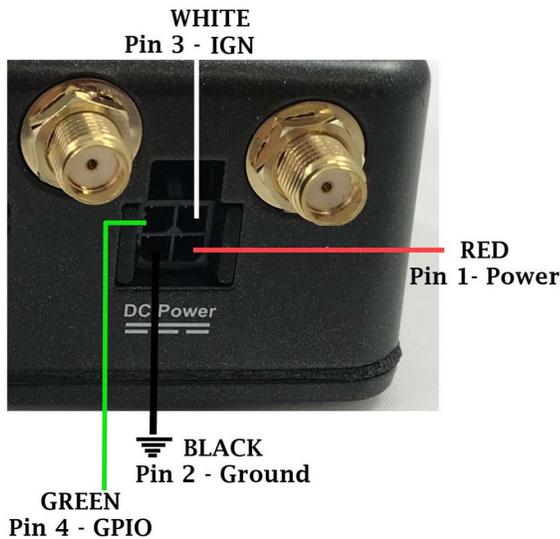
In this mode, the USB-C port acts as a console port.

1. Connect the power. See [Connecting the Power](#).
2. Allow the router to complete the boot up sequence.
3. Connect a USB cable to the PC's USB port, then connect the other end of the cable to the router's USB-C connector.
4. On the PC Choose Start -> Control Panel -> Hardware and Sound (or equivalent) on the Windows Operating System. Choose the Device Manager, and expand the Ports section. The assigned COM port can be identified.
5. Start a terminal emulation program (such as Putty or SecureCRT) on the com port where you have connect the cable to the PC.
6. Press the Enter key on the keyboard and the prompt will display.

See the Perle IRG7000/5000 5G/LTE Router CLI Reference Guide for more information on using CLI commands.

Connecting the Power

The wire colors shown are for the power/GPIO cable that is included with the IRG7440. Other wiring setups may have different colors. See [Appendix A—Technical Specifications](#)



If you are using a cable that is longer than two meters, we recommend the following:

Wire gages (AWG):

- 22 gauge wire or up to 4 meters (13ft)
- 20 gauge wire for up to 6 meters (20ft)
- 18 gauge wire for up to 12 meters (40ft)

Molex part number 2451320420 or equivalent

Rectangular socket to socket 6.56' (2.00m)

Cable and connector must be rated for minimum 76°C (168.8°F)

Note: Before servicing this product ensure the power source has been disconnected. Electrical installations should be performed by personnel thoroughly trained in safe electrical wiring procedures.

Operation

Reset / Factory Default / Safe Mode / DHCP/BOOTP (ZTP mode)

This table below shows how the reset button is used.

Reset Button

Mode	Description	LEDs	System Status
Restart	In router normal running state, press and Release the Reset button	Power LED will begin to blink amber	Reboots. All configuration and files will remain the same.
Factory Default	In router normal running state, press the Reset button and Hold for 10 seconds	When all LEDs flash Amber, release the Reset button, Power LED flashes Amber	Reboots and resets the configuration to the Perle factory default configuration. All configuration, User IDs, passwords, and security certificates are deleted.
DHCP/BOOTP (ZTP mode)	Set router in factory default mode, press and hold the reset button for 5 seconds	All LEDs will flash green, then release the reset button	Reboots the router into Fast setup DHCP/BOOTP (ZTP mode) running config will be copied to startup configuration router sends out DHCP client requests until it get a DHCP offer
Safe Mode	Press the Reset button while powering up	All LEDs, except Power blink Amber	<ul style="list-style-type: none"> • Saves the startup config • Boots with no config file • Allows you to do setup mode

Fast Setup

Fast Setup mode allows you to quickly configure basic operating parameters on your router.

Your Perle router has been shipped to you in Factory Default mode. On power up, your router is in “Fast Setup” mode with the Power LED flashing green. Make a connection to your router via the console port or a Web browser, then answer basic setup operating parameters such as your initial user ID and password.

To connect to the console port, follow the instructions provided in—*Connecting to the Serial Port*.

To connect using a Web browser, connect your PC’s Ethernet cable directly to an Ethernet port on the router. Configure the PC to use DHCP for obtaining its IP address. The router will act as a DHCP server and assign an IP address to the PC. Next, launch the Web browser and browse to “http://192.168.0.1”. The Fast Setup screen appears.

Refer to the Quick Start Guide or the Perle IRG7000/5000 5G/LTE Router User’s Guide for more information on setup instructions.

Managing the IRG7440

The IRG7440 can be configured, operated, and monitored using any of the following methods. See the Perle IRG7000/5000 5G/LTE Router User's Guide for more details on these methods.

WebManager

The Perle WebManager—an embedded Web based application provides an easy to use browser interface for configuring and managing the IRG7440. The WebManager is accessible through any standard desktop web browser. Configured a valid IP address on the IRG7440 before connecting with the WebManager.

CLI

A text-based Command Line Interface based on industry standard syntax and structure. The CLI is accessed from the console port. Once a valid IP address is configured on the IRG7440, Telnet, SSH, or the WebManager interface is used to access the IRG7440 for administration purposes. See the Perle IRG7000/5000 5G/LTE Router CLI Reference Guide for more information.

SNMP

The IRG7440 can be managed with an SNMP compatible management station that is running platforms such as HP OpenView.

Fast Setup Mode

If your router is in “Factory Default” mode, when you first connect, you will be in “Fast setup mode”. For more details, see—[Fast Setup](#).

PerleView

A Windows server-based centralized management package that simplifies the configuration, administration, monitoring, and troubleshooting of Perle Managed Media Converters, Ethernet Copper Extenders, Industrial Switches, IOLAN SCR/SCG and the IRG Series of Perle Routers. Your internet browser can securely access PerleVIEW and manage 10's, 100's or 1000's of Perle devices from a centralized server.

Power Management

Power Modes

The router has three operating power modes:

- Standard Mode
- Ignition Mode
- Smart Standby Mode

Standard Mode (default mode)

When power is applied to the router, it powers up. Both GPIO and IGN power inputs are ignored.

Ignition Mode

This mode monitors the ignition voltage input. When the voltage on the ignition input goes below a set pre-defined threshold, the router powers down into Standby mode. When the voltage on the ignition input goes above the router's pre-defined value it returns to normal operating mode (Wakeup).

Smart Standby Mode

You can configure a combination of one or two user defined conditions to determine when the router is powered up and when it goes into Standby mode.

Power Saving Options

Feature	Notes
Processor power savings	This feature optimizes idle power consumption, saving energy by reducing performance where possible.
LED power savings	Minimize use of LEDs, showing only alerts.
USB power saving	USB shutdown.
Ethernet power savings	Ethernet port savings can be achieved by; 1) Lowering Ethernet speed. 2) Ensuring EEE (Energy Efficient Ethernet) is enabled. 3) Shutting down unused Ethernet ports.
Serial Power savings	Shutting down serial port if it is not being used.
GNSS power savings	Shutting down GNSS if it is not being used.
Ignition shutdown delay	When powered by battery (car battery), the router can use the ignition sense pin on the DC power cable to shutdown after a user configured delay (i.e. once the ignition is turned off)
Low voltage standby	The router will enter standby mode if the voltage reaches a user defined threshold. This is intended as a battery saving feature.
Standby	When the router is not required for a specific time period or when the analog/digital inputs are in a particular state, it can be put into standby where minimal power will be consumed. When these conditions change, the router will automatically wake up and resume normal operations.

Power Saving Scenarios

Idle Mode setup

- Cellular connected (no activity)
- Ethernet connected (no activity)
- Serial disabled •USB connected (no activity)
- GPS enabled - active antenna
- CPU power savings mode disabled
- LED power savings mode disabled

Typical Mode setup

- Cellular connected
- Ethernet connected
- WIFI active
- Serial disable
- USB enabled
- GPS enabled - active antenna
- CPU power savings mode disabled
- LED power savings mode disabled

Standby mode setup

Cellular disconnected

- Ethernet disconnected
- Serial disabled •
- USB disconnected •
- GPS disconnected •
- CPU power savings mode enabled
- LED power savings mode enabled

Power consumption was measured at 12 V.

Sample Power Saving Scenarios

Model	Idle Mode		Typical Use		Standby	
	Current (A)	Power (W)	Current (A)	Power (W)	Current (mA)	Power (mW)
IRG7440 (4 Eth, 5G, LTE-A)	0.32	3.86	0.34	4.07	3.9	46.8

Power consumption was measured at 12 V.

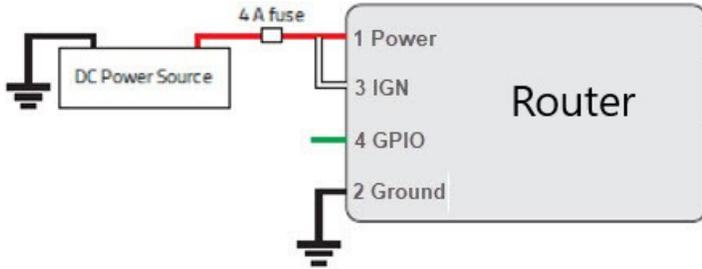
Note: up to 0.08A 1W more in power savings can be achieved through shutting down the USB port, LEDs, GPS as well as turning down router processor speed.

Note: To configure Power Modes, more information can be found in the Perle IRG7000/5000 5G/LTE Router User's Guide found on the Perle website.

IRG7440 Router Deployment Modes

Fixed Installation without I/O

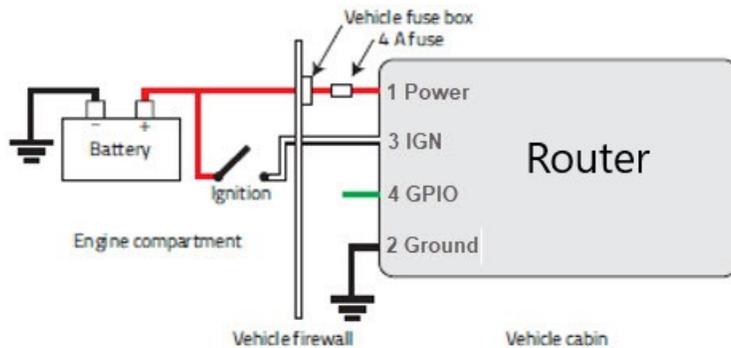
For fixed installations, connect the wires as shown in the figure below. You configure Low Voltage Standby Mode (LVS) to force the IRG7440 into Standby mode on low voltage. Voltage is monitored on Pin 3 and 4.



- Pin 1 (Power)—Use the Red wire in the DC cable to connect Pin 1 to the power source. Include a 4.0A fast acting fuse to the input line. A continuous (unswitched) DC power source is recommended.
- Pin 2 (Ground)—Use the Black wire in the DC cable to connect Pin 2 to Ground.
- Pin 3 (IGN–Ignition)—Connect to Power for voltage sensing.

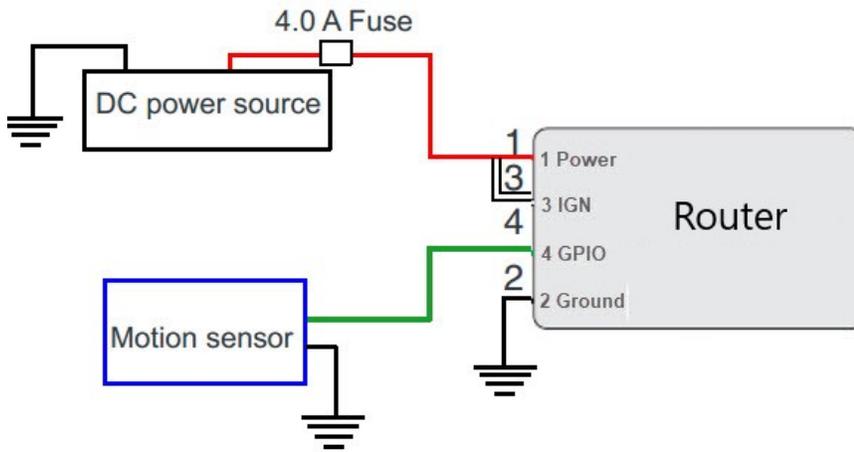
Recommended Vehicle Installation (Ignition Mode)

For vehicle installations, connect the white IGN wire to the vehicle’s ignition switch as shown in the diagram below. This allows the IRG7440 to operate with the vehicle. When the vehicle’s ignition is off the IRG7440 enters Standby mode. Configure a time delay between the vehicle’s ignition shut off, and the time the IRG7440 goes into Standby mode. A delayed Standby is used if you want to maintain a network connection while the vehicle’s engine is shut off for short periods of time—such as in a delivery vehicle.



- Pin 1 (Power)—Use the Red wire in the DC cable to connect Pin 1 to the power source. Include a 4.0A fast acting fuse in the input power line. continuous (unswitched) DC power source is recommended.
- Pin 2 (Ground)—Use the Black wire in the DC cable to connect Pin 2 to Ground.
- Pin 3 (IGN–Ignition)—It is recommended to use the IGN wire (Pin 3) to initiate Standby mode on the IRG7440

Fixed Installation with Analog Input



- Pin 1 (Power)—Use the Red wire in the DC cable to connect Pin 1 to the power source. Include a 4.0 fast acting fuse in the input power line. continuous (unswitched) DC power source is recommended.
- Pin 2 (Ground)—Use the Black wire in the DC cable to connect Pin 2 to Ground.
- Pin 3 (IGN—Ignition)—Connect to Power.
- Pin 4 (GPIO)— In this example, the GPIO (green) used as an analog input to enter and exit Standby Mode.

For more information on configuring Standby Mode, Timed Standby Mode and Event Handling see the Perle IRG7000/5000 5G/LTE Router User's Guide.

I/O Configurations

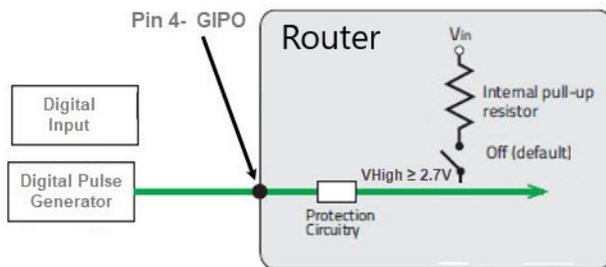
You can configure Pin 4 (GPIO) green wire as:

- Pulse counter
- Digital input
- High side pull-up/dry contact switch input
- Analog input
- Digital Output / Low Side Current Sink
- Digital Output/Open Drain

Pulse Counter / Digital Input

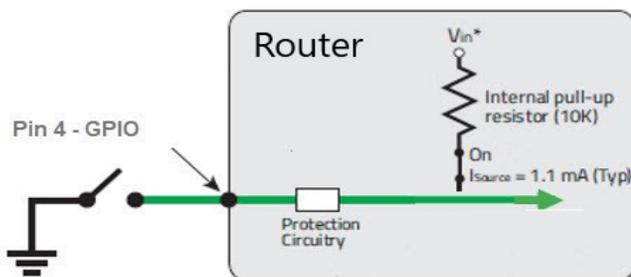
You can connect pin4–GPIO:

- a pulse counter to monitor frequencies up to 512 Hz, with duty cycle between 25%-75%
- a digital input to detect the state of a switch
- a monitor to an external device such as a motion detector, a remote solar panel, or a remote camera.



Input Range	State
0 - 1V	Low
2.7 - 36V	High

High Side Pull-up / Dry Contact Switch Input

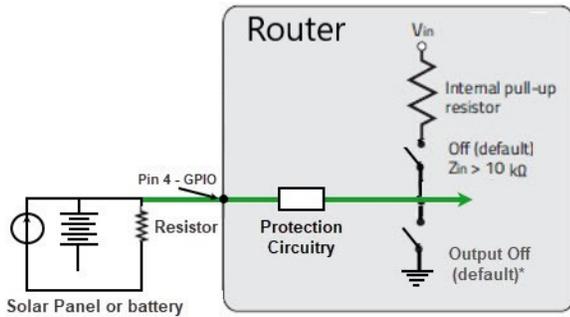


The voltage on Pin 4 when the high side pull-up is enabled (depends on the V_{in} and power consumption).

	Minimum	Typical	Maximum	Units
Source Current	0.6 V _{in} = 7 V	1.1 V _{in} = 12 V	3.5 V _{in} = 36 V	mA

Analog Input

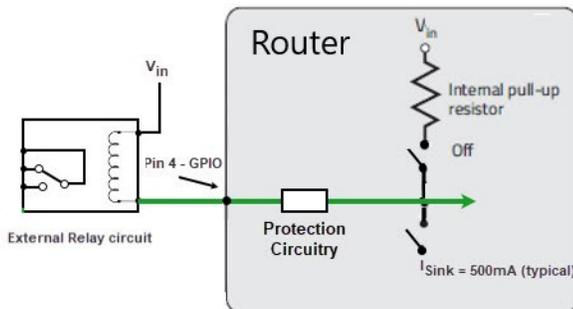
Connect the green wire—GPIO to an analog source. The router monitors voltages from the input source and transform them into analog values. Pin 4 can detect inputs of 0.5–36 V referenced to ground. By transforming the voltages, with the user defined formulas, the GPIO Pin can monitor measurements such as temperatures, sensors, or input voltages.



	Minimum	Maximum
Analog Input Range	0.5V	36V

Digital Output / Low Side Current Sink

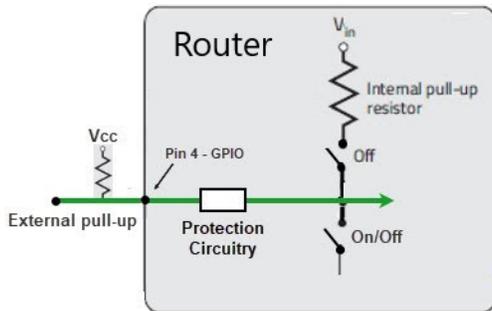
Use Pin 4 - GPIO as a low side current sink.



State	Minimum	Typical	Maximum	Comments
On	200mA	500	850mA	I_Typical = 25°C I_Min = 70°C I_Max = -40°C
Off	—	0	—	V _{in} =12

Digital Output / Open Drain

You can use Pin 4—GPIO as an open drain to drive an external digital device.



Pull-up	State	Minimum	Typical	Maximum	Units
Off	Off	Open Circuit	—	—	—
	Active Low	—	—	0.5	V

AUX I/O

Two inputs configurable as high side pull-ups/digital inputs or pulse counters. One normally open (NO) relay contact.

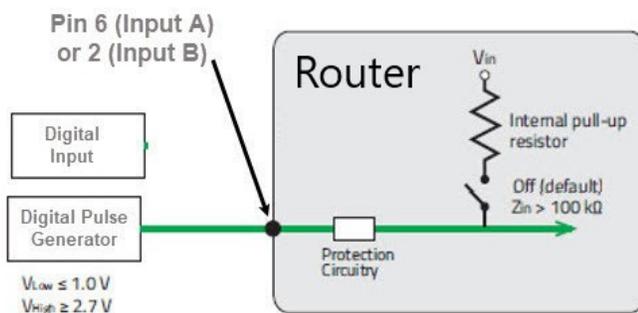


Pins	8	7	6	5
	RS485 -	GND	Input B	Relay NO (normally open)
Pins	4	3	2	1
	RS485 +	GND	Input A	Relay NO (normally open)

Warning: Before connecting wiring, ensure the power source has been disconnected.

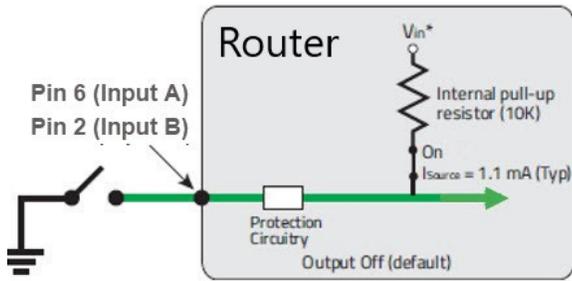
Pulse Counter / Digital Input

You can connect Pin 6 or Pin 2 - AUX/IO to a pulse counter to monitor frequencies to 140 Hz, Duty cycle 20%-40%. digital input to detect the state of a switch such as a vehicle ignition, or to monitor an external device such as a motion detector, a remote solar panel, or a remote camera. Digital input can also be used with the Standby Timer.



Pull-up	State	Minimum	Typical	Maximum	Units
Off	Low	—	—	1.0	V
	High	2.7	—	V_{in}	V

High Side Pull-up / Dry Contact Switch Input



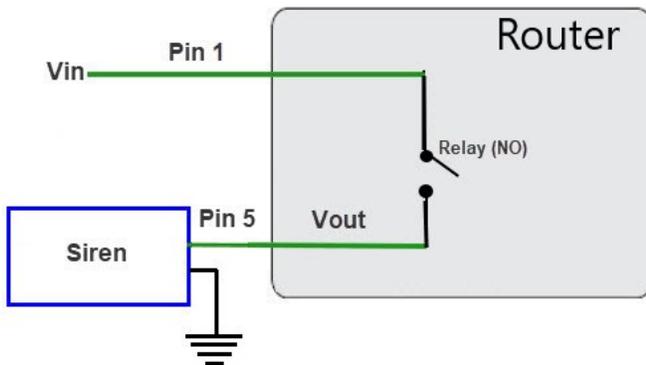
Maximum current the voltage output can provide (depends on V_{in})

The voltage on Pin 6 or Pin 2 when the high side pull-up is enabled (depends on the V_{in} and power consumption).

*Depending on the load, this value can range from V_{in} to $V_{in} - 2.5$

	Minimum	Typical	Maximum	Units
Source Current	0.6 $V_{in} = 7\text{ V}$	1.1 $V_{in} = 12\text{ V}$	3.5 $V_{in} = 36\text{ V}$	mA
V_{out}	$V_{in} - 2.5$	—	V_{in}	V

Relay Alarm



Normally Open (NO) dry contact 1A@24VDC

Appendix A—Technical Specifications

Technical Specifications			
Features	IRG7440		
Cellular	5G LTE 4.5Gbps downlink and 660Mbps uplink speeds. 4G/LTE (Cat20), 3G fallback.		
Frequency Bands	5G Sub-6 GHz n1, n2, n3, n5, n28, n41, n66, n71, n78, n79	4G/LTE Bands B1, B2, B3, B4, B5, B7, B8, B12, B13, B14, B18, B19, B20, B21, B25, B26, B28, B29, B30, B32, B34, B38, B39, B40, B41, B42, B43, B46, B48, B66, B71	
GPS/GNSS			
GPS/GNSS	Wide-band GNSS: 1559-1606 MHz GPS: 1575.42 MHz / GLONASS: 1602 MHz / BeiDou: 1561.098 MHz / Galileo: 1575.42 MHz / QZSS: 1575.42 MHz GNSS antenna support Reports: NMEA 0183 V3.0, TAIP		
GPS / GNSS Passive Antenna	GNSS Applications: GPS, Glonass, Galileo, Beidou Frequency Range: 1561MHz~1606 MHz Gain: 4 dBi (typical) Impedance: 50 Ohm Voltage Standing Wave Ratio: 2.0 (typical) Polarization: RHCP SMA (M) (straight) Dimensions: 41.9 x 47.3 x 16.3 mm / 1.65 x 1.86 x 0.64 in RG-174 Cable length: 5m / 16ft		
LAN standards	IEEE 802.11ac complaint & backward compatible with 802.11a/b/g/n		
Ignition Sense	Analog Input: 0.5V to 36V		

Technical Specifications	
Ethernet Port	4 Ethernet 10/100/1000 MBPS Ethernet RJ45 copper Auto-neg Isolation 1.5 kV IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-TX and 100Base-FX IEEE 802.3ab for 1000Base-T IEEE 802.3x for Flow Control
USB	1 x USB, Type-C
RS485	half-duplex
Power and Auxiliary Connectors	
GPIO	Digital Input & Pulse Counting VDC: 0 for $\leq 1V$, 1 for $\geq 2.7V$ Dry Contact Max Current range: min 0.6mA @ 7V and max 3.5mA @ 36V Current Sink Output: 0.5A @ 12V
Two Digital Inputs	Digital Input & Pulse Counting VDC: 0 for $\leq 1V$, 1 for $\geq 2.7V$
One Alarm Relay	Normally Open (NO) dry contact: 1A @ 24VDC
External Power Supply (optional)	110/220 VAC Power supply
Power Input	12/24 VDC Nominal (7-36 VDC range)
Power Line Protection	Surge: 8V (EN61000-4-5 common mode), 2KV (EN61000-4-5 differential and common modes)
Reverse polarity protection	YES
Environmental Specifications	
Operating Temperature Ranges	-40°C to 70°C (40°F to 158°F)
Storage Temperature	-40°C to 85°C (40°F to 185°F)
Operating Humidity Ranges	0% to 95% non-condensing
Storage Humidity Ranges	0% to 95% non-condensing
Operating Altitude	Up to 3,048 meters (10,000 feet)
Regulatory Approvals	
Cellular/Telecom	FCC/ICES, RED, PTCRB/CTIA,CE

Technical Specifications	
Cellular Certifications	Verizon, AT&T
Emissions	<p>FCC 47 Part 15, Subpart B, Class A</p> <p>ICES-003 Issue 6 Class A (Canada)</p> <p>ANSI C63.4 Class A (Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz)</p> <p>EN61000-3-2: 2014 (Limits for Harmonic Current Emissions)</p> <p>EN61000-3-3: 2013 (Limits of Voltage Fluctuations and Flicker)</p> <p>EN 61000-6-4:2007 + A1:2011</p> <p>CISPR 32:2015/EN 55032:2015 Class A (Electromagnetic compatibility of multimedia equipment - Emission requirements)</p>
Immunity	<p>CISPR 35:2016/EN 55035:2017 (IR)</p> <p>EN 61000-4-2:2009 (ESD)</p> <p>+/-2 kV, +/-4 kV, +/-6 kV, +/-8 kV (Contact)</p> <p>+/-15 kV (Air)</p> <p>EN 61000-4-3: 2006 + A1:2007 + A2:2010(RS)</p> <p>EN 61000-4-4:2012 (EFT) 2 KV (Criteria A)</p> <p>EN 61000-4-5:2014+AMD1:2017 (Surge) 2KV (line to earth), 1.5KV (line to line)</p> <p>EN 61000-4-6: 2013 (CS)</p> <p>EN 61000-4-8: 2009 (PFMF)</p> <p>EN 61000-4-9: 2016 (PMF)</p> <p>EN 61000-4-11: 2004 + A1:2017</p> <p>EN 61000-4-16</p> <p>EN 61000-6-2 (General Immunity for Industrial Environments)</p>
Safety	<p>UL/ULC/EN 62368-1 (including CB)</p> <p>CAN/CSA-C22.2 No. 62368-1-14</p>

Recommended Main/Diversity Antenna Specifications

Parameter	Requirements	Comments
Antenna System	(LTE/5G) External multi-band 2x2 MIMO, SMA connector antenna system	
Frequency range	704~960 /1710~2700 MHz	
	3300 MHz / 5150 ~ 5850 MHz	
Impedance	50 OHM	
Peak Gain	1.78 dBi @ 699~960 MHz 2.95 dBi @ 1710~2700 MHz 0.95 dBi @ 3300 MHz 3.07 dBi @ 5150-5850 MHz	

Appendix B—Sample Labels

	IRG7440 P/N: 08000510	Contains: FCC-ID: N7NEM91 IC: 2417C-EM91
S/N: 350-153521T00001 		
IMEI: 861824563918022 		
MAC : 004002930003 		
Input : 7-36VDC, 1000mA max.		
		 I.T.E. E160409
		
Made in Taiwan		

Appendix C—Mounting the IRG7440

Option One

1. Attached the two DIN Rail screws to the holding plate. The DIN rail can be positioned either with the snap on connector in the down or up position on the holding plate in the up position.



2. Position the router so that the top hooks of the DIN rail clip attach onto the top of the DIN rail.
3. Rotate the bottom of the router towards the rail to snap the bottom hooks of the DIN rail clip onto the bottom of the DIN rail.

Option Two

1. Attached the two DIN Rail screws to the holding plate. The DIN rail can be positioned either with the snap on connector in the down or up position on the holding plate in the up position.

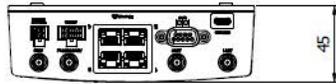
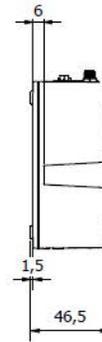
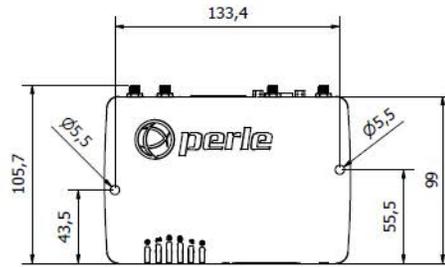
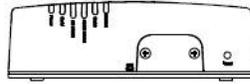
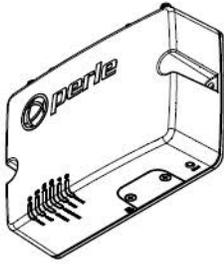


2. Slide the two screws into the holding plate, then attach that holding plate to the router. See below.



3. Position the router such that the top hooks of the DIN rail clip attach onto the top of the DIN rail.
4. Rotate the bottom of the router towards the rail. This will snap the bottom hooks of the DIN rail clip onto the bottom of the DIN rail.

Appendix D—Mechanical



Appendix E—Maintaining and Troubleshooting

Maintaining

- Ensure easy access to the cables
- Ensure cables are not bent, constricted, close to high amperages, or exposed to extreme temperatures
- Check that the Front panel LEDs are easily visible
- Wipe case clean with a dry cloth—do not use solvents or cleaning agents