Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
http://www.rheintech.com

Client: Harris Corporation
Model: SG5300-800
ID's: OWDTR-0063-E/3636B-0063
Standards: FCC Part 90
Report #: 2011065

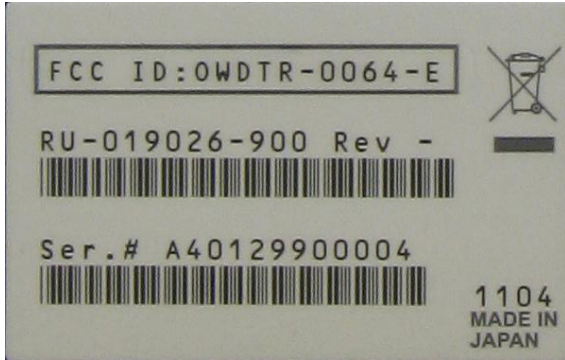**Appendix L: Manual**

Please refer to the following pages.

HARRIS®

*assured*communications®
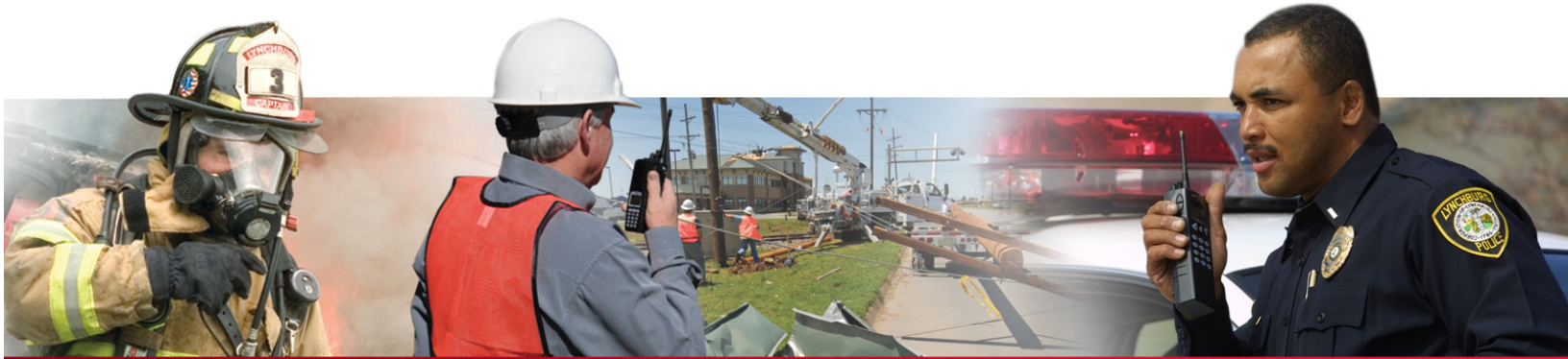
OpenSky2

SG5300 Data Modem
800 MHz and 900 MHz

MANUAL REVISION HISTORY

REV	DATE	REASON FOR CHANGE
-	Jul/11	Initial release.


```
FCC ID:0WDTR-0064-E

RU-019026-900 Rev -

Ser.# A40129900004

1104
MADE IN
JAPAN
```

CREDITS

Harris, assuredcommunications, EDACS, and OpenSky are registered trademarks and NetworkFirst is a trademark of Harris Corporation.
Conxall and Multi-Con-X are registered trademarks of Conxall Inc.
Band-it is a registered trademark of BAND-IT-IDEX, Inc. A Unit of IDEX Corporation
All other brand and product names are trademarks, registered trademarks, or service marks of their respective owners.

NOTICE!

The material contained herein is subject to U.S. export approval. No export or re-export is permitted without written approval from the U.S. Government. Rated: EAR99; in accordance with U.S. Dept. of Commerce regulations 15CFR774, Export Administration Regulations.

Information and descriptions contained herein are the property of Harris Corporation. Such information and descriptions may not be copied or reproduced by any means, or disseminated or distributed without the express prior written permission of Harris Corporation, PSPC Business, 221 Jefferson Ridge Parkway, Lynchburg, VA 24501.

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitutions of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

This product conforms to the European Union WEEE Directive 2002/96/EC. Do not dispose of this product in a public landfill. Take it to a recycling center at the end of its life.

This manual is published by **Harris Corporation** without any warranty. Improvements and changes to this manual necessitated by typographical errors, inaccuracies of current information, or improvements to programs and/or equipment, may be made by **Harris Corporation** at any time and without notice. Such changes will be incorporated into new editions of this manual. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose, without the express written permission of **Harris Corporation.**

SOFTWARE LICENSE AGREEMENT

THE SOFTWARE PROGRAM PROVIDED WITH THIS DOCUMENT IS FURNISHED UNDER A LICENSE AND MAY BE USED ONLY IN ACCORDANCE WITH THE FOLLOWING LICENSE TERMS.

Harris Corporation RF Communications Division, hereafter referred to as COMPANY, grants to you, hereafter referred to as USER, a non-exclusive, paid up license to use the accompanying Software, the media on which it is recorded, and Programming Guide, all hereafter referred to as PRODUCT, for use under the following terms and conditions:

1. The techniques, algorithms, and processes contained in the PRODUCT constitute trade secrets of COMPANY. USER agrees not to provide or otherwise make available any PRODUCT to any third party and to take all measures reasonable and necessary to protect the confidentiality of the PRODUCT and COMPANY's rights herein. The foregoing shall not apply to any PRODUCT which USER can show was in its possession prior to the disclosure made by COMPANY, or which subsequently came into its possession through channels independent of COMPANY, or was independently developed by employees of USER who had not had access to PRODUCTS, or which appears in a printed publication other than as a breach of any obligation owed to COMPANY, or with the prior written permission of COMPANY.

2. USER shall not reproduce or copy the PRODUCT, make or permit any change or modification, in whole or in part, in its original or any other language, or permit anyone else to do so for any purpose whatsoever, except as necessary for the USER:

    a. This PRODUCT is for use on the single computer for which it is licensed here under.

    b. Except for Key Loader – to use it within the organization on multiple computers for which it is licensed here under.

3. USER shall not transfer the PRODUCT or any part thereof. This license does not include the right to sublicense and may not be assigned.

4. The PRODUCT is copyrighted under United States and International laws by COMPANY. USER agrees not to remove any COMPANY copyright, trademark or other notices or PRODUCT identification.

5. If USER does not comply with all of the terms and conditions of this license agreement, COMPANY may terminate this license and require USER to return the PRODUCT. USER's liability shall include, but not be restricted to, all costs incurred by COMPANY in recovering the PRODUCT and all damages arising from USER's default.

6. USER shall be solely responsible for determining the appropriate use to be made of the PRODUCT in USER's own operations. PRODUCTS ARE DISTRIBUTED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED.

7. USER is responsible to insure that use of the PRODUCT to install or repair COMPANY equipment meets all standards and regulations required by federal, state and local governments and that the operator of that mobile radio communications equipment is legally licensed for the use of the frequencies programmed into the radio equipment.

8. In no event, whether on warranty, contract or negligence, shall COMPANY be liable for special, incidental, indirect or consequential damages including, but not limited to, loss of profits or revenue, loss of use of any equipment, cost of capital, or any other loss that may result directly or indirectly from use of PRODUCTS or from failure of PRODUCTS to operate as intended.

9. The COMPANY cannot support software unless the specifications on the machine comply with COMPANY requirements in the COMPANY Software Release Notes.

ECR-7378B

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 REGULATORY AND SAFETY INFORMATION

1.1 REGULATORY APPROVALS

1.1.1 Transmitter

The transmitting devices listed below have been tested and meet the following regulatory requirements:

MODEL	DESCRIPTION	FCC ID (PART 90)	INDUSTRY CANADA (RSS-119)
SG5300-800	RU-019026-800 Radio Unit	OWDTR-0063-E	3636B-0063
SG5300-900	RU-019026-900 Radio Unit	OWDTR-0064-E	3636B-0064

1.1.2 Receiver

This receiver associated with this transmitting device has been tested and declared to meet the regulatory requirements defined in the following sub-sections. Associated FCC labelling may be found on page 2.

1.1.3 FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation.

1.1.4 Industry Canada

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et

2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

WARNING

The installer of this SG5300 must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Heath Canada's website www.hc-sc.gc.ca/rpb.

HARRIS®

1.2 SAFETY SYMBOL CONVENTIONS

The following conventions may be used in this manual to alert the user to general safety precautions that must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Harris Corporation assumes no liability for the customer's failure to comply with these standards.

WARNING	**The WARNING symbol calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING symbol until the conditions identified are fully understood or met.**
CAUTION	The **CAUTION** symbol calls attention to an operating procedure, practice, or the like, which, if not performed correctly or adhered to, could result in a risk of danger, damage to the equipment, or severely degrade the equipment performance.
NOTE	The **NOTE** symbol calls attention to supplemental information, which may improve system performance or clarify a process or procedure.
	The **ESD** symbol calls attention to procedures, practices, or the like, which could expose equipment to the effects of **E**lectro-**S**tatic **D**ischarge. Proper precautions must be taken to prevent ESD when handling circuit modules.
	The electrical hazard symbol is a WARNING indicating there may be an electrical shock hazard present.
	This symbol indicates the presence of a potential RF hazard.

1.3 RF ENERGY EXPOSURE INFORMATION

To ensure that exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use, always adhere to the following guidelines:

- DO NOT operate the SG5300 without a proper antenna attached, as this may damage the SG5300 and may also cause the FCC RF exposure limits to be exceeded. A proper antenna is the antenna supplied with this SG5300 by Harris Corporation or an antenna specifically authorized by Harris for use with this SG5300.

- DO NOT transmit for more than 50% of total RADIO use time ("50% duty cycle"). Transmitting more than 50% of the time can cause FCC RF exposure compliance requirements to be exceeded. The SG5300 is transmitting when the "TX" indicator appears in the display.

- Always transmit using low power when possible.

1.3.1 Safety Training Information

YOUR HARRIS SG5300 GENERATES RF ELECTRO-MAGNETIC ENERGY DURING TRANSMIT MODE. THIS SG5300 IS DESIGNED FOR AND CLASSIFIED AS "OCCUPATIONAL USE ONLY," MEANING IT MUST BE USED ONLY IN THE COURSE OF EMPLOYMENT BY INDIVIDUALS AWARE OF THE HAZARDOUS RF ENERGY AND THE WAYS TO MINIMIZE EXPOSURE. THIS STATION IS NOT INTENDED FOR USE BY THE "GENERAL POPULATION" IN AN UNCONTROLLED ENVIRONMENT. IT IS THE RESPONSIBILITY OF THE LICENSEE TO ENSURE THAT THE MAXIMUM PERMISSIBLE EXPOSURE LIMITS ARE OBSERVED AT ALL TIMES DURING TRANSMISSION. THE STATION LICENSEE IS TO ENSURE THAT NO BYSTANDERS COME WITHIN THE RADIUS OF THE LIMITS.

When licensed by the FCC, this device complies with the FCC RF exposure limits when persons are beyond the MPE radius of the antenna (see Table 1-1). In addition, your Harris SG5300 installation complies with the following Standards and Guidelines with regard to RF energy and electromagnetic energy levels and evaluation of such levels for exposure to humans:

FCC OET Bulletin 65 Edition 97-01 Supplement C, Evaluating Compliance with FCC Guidelines for Human Exposure to RADIO Frequency Electromagnetic Fields.

American National Standards Institute (C95.1 – 1992), IEEE Standard for Safety Levels with Respect to Human Exposure to RADIO Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

American National Standards Institute (C95.3 – 1992), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave.

HARRIS®

Table 1-1: MPE Table

Antenna		Safe Distance, Rsafe, (cm)	
		Controlled Environment	Uncontrolled Environment
800 MHz	AN-225001-001 3 dBd (5.15 dBi) dual band roof mount antenna	20	20
	AN-225001-002 3 dBd (5.15 dBi) dual band elevated feed point antenna	20	20
	AN-225001-003 3 dBd (5.15 dBi) dual band elevated feed point antenna	20	20
	AN-225001-004 2 dBd (4.15 dBi) low profile antenna	20	25
	AN-225001-005 5 dBd (7.15 dBi) dual band roof mount	20	20
900 MHz	AN-225005-001 3 dBd (5.15 dBi) roof mount	20	20
	AN-225005-002 3 dBd (5.15 dBi) elevated feed roof mount antenna	20	20
	AN-225005-003 3 dBd (5.15 dBi) elevated feed roof mount antenna	20	20
	AN-225005-004 2 dBd (4.15 dBi) low profile antenna	20	25

⚠️ **CAUTION**

To ensure that your exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use, do not operate the station in a manner that would create an MPE distance in excess of that allowable by the FCC.

⚠️ **CAUTION**

Changes or modifications not expressly approved by Harris Corporation could void the user's authority to operate the equipment.

1.3.2 Contact Information

For additional information on exposure requirements or other information, contact Harris Corporation at 1-800-528-7711 or at http://www.pspc.harris.com.

1.3.3 Occupational Safety Guidelines and Safety Training Information

To ensure bodily exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use. Always adhere to the following basic guidelines:

1. The SG5300 should only be used for necessary work-related communications.

2. The SG5300 should only be used by authorized and trained personnel.

3. Do not attempt any unauthorized modification to the SG5300. Changes or modifications to the SG5300 may cause harmful interference and/or cause it to exceed FCC RF exposure limits. Only qualified personnel should service the SG5300.

4. Always use Harris authorized accessories (antennas, control heads, speakers/mics, etc.). Use of unauthorized accessories can cause the FCC RF exposure compliance requirements to be exceeded.

The information listed above provides the user with information needed to make him or her aware of a RF exposure, and what to do to assure that this SG5300 operates within the FCC exposure limits of this radio.

2   INTRODUCTION

2.1   ABOUT THIS MANUAL

This manual is written for the communications professional responsible for installing and maintaining the SG5300 Data Modem.

2.2   GLOSSARY OF TERMS

The following Table is a list of terms used in this manual.

Table 2-1: Glossary of Terms

TERM	DEFINITION
AES	Advanced Encryption Standard
RSA	Rivest, Shamir, and Adleman (creators of RSA Encryption format)
DES	Digital Encryption Standard
DHCP	Dynamic Host Configuration Protocol
EDACS	Enhanced Digital Access Communications System
GPS	Global Positioning Satellite
IEEE	Institute of Electrical & Electronics Engineers
LMR	Land Mobile Radio
MIB	Management Information Base
QoS	Quality of Service
SNMP	Simple Network Management Protocol
TAC	Technical Assistance Center
TFTP	Trivial File Transfer Protocol
UAS	Unified Administration System
UGS	Unsolicited Grant Services
VIDA	Voice, Interoperability, Data, and Access
WAN	Wide Area Network

3 DESCRIPTION

The SG5300 Data Modem is part of the OpenSky® suite of products which delivers very high capacity, end-to-end digital data communication. The small and lightweight unit is housed in a plastic case for mounting indoors or in a NEMA enclosure and is designed to provide reliable, secure, and cost effective data communications to and from remote locations.

Figure 3-1: SG5300 Data Modem

3.1 MULTIPLE APPLICATIONS

The SG5300 is suitable for a wide range of applications. The substantial coverage of an OpenSky private wireless network means that the SG5300 can be useful to collect or distribute data messages in locations where other wireless technologies are either not available or not reliable enough. Utilities will find it an excellent means of communication with line reclosers, capacitor banks, and other devices on the grid. Transportation applications include automated signs, bus stop kiosks, and connection with remote traffic flow and weather sensors. Public safety agencies can use it to send alarms for public notification of severe weather, emergencies, or for a host of other applications.
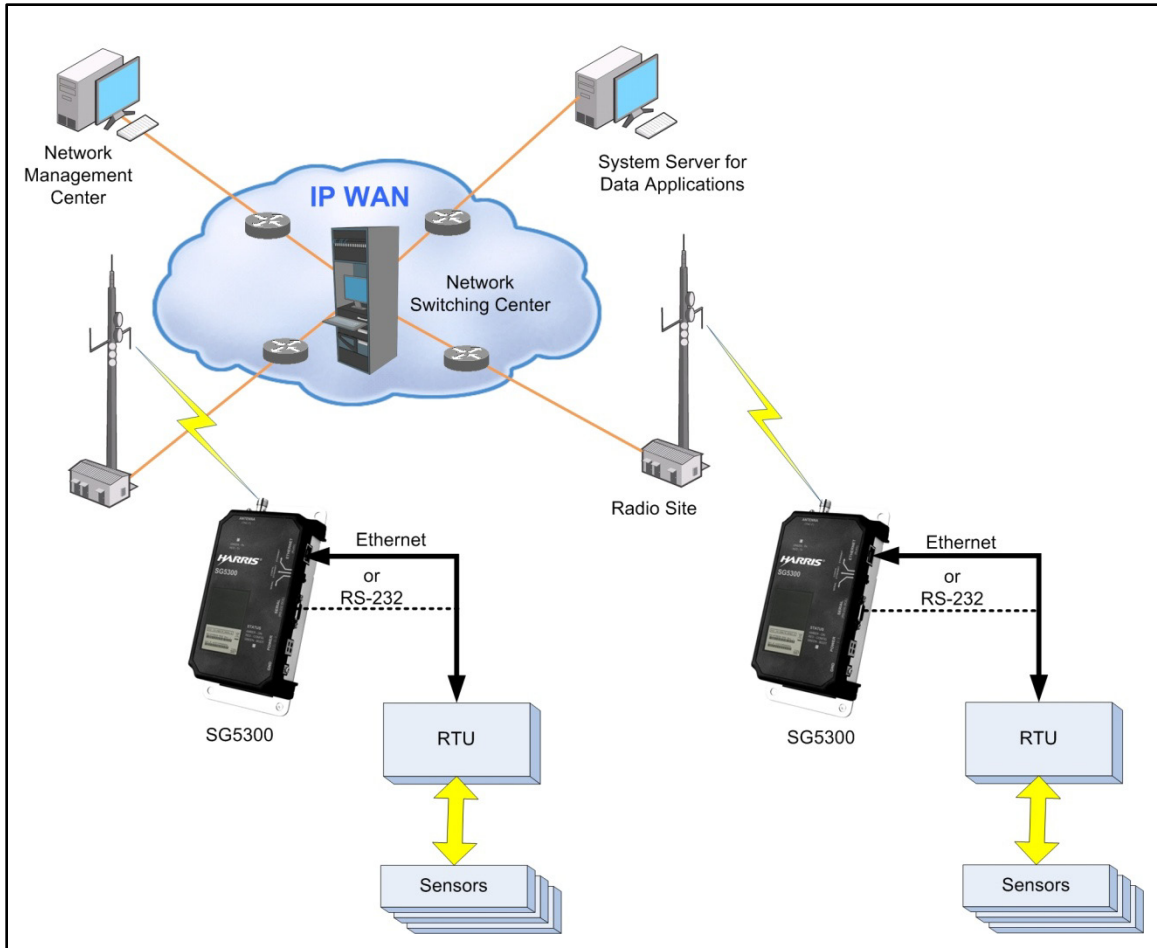
Figure 3-2: SG5300 System Application

The SG5300 provides a choice of Ethernet (RJ45) or Serial (DB9) interface to remote terminals. Its 3-Watt RF output makes it a compact and cost-effective wireless link that can easily fit alongside Remote Terminal Units (RTUs) and other devices.

The SG5300 is capable of interfacing to RTUs via an Ethernet 10/100Base-T interface port or TIA/EIA-232 Serial interface port. The Ethernet port is capable of operating as a data interface between the SG5300 and external devices with MTU size of 1400 bytes or less. The Serial port is capable of operating as the data interface using SLIP or PPP between the SG5300 and external devices (RTUs). The SG5300 is configured so that the data interface is with either the Ethernet port or the Serial port, but not both simultaneously.

The Serial port is also used as a maintenance port to configure the RF radio, software loading, and configuration of the Ethernet port. However, the Serial port is not available for maintenance use while external devices are connected to the Ethernet port.

3.2 OVER-THE-AIR PROGRAMMING

As an OpenSky radio, the SG5300 benefits from a flexible, software-based design. Features, profiles, and system updates are software-defined and can be reprogrammed over the air.

3.3 VERSATILE MOUNTING

The SG5300 is designed to be mounted indoors or in a NEMA enclosure.

3.4 DNP3

A common protocol used between the System Server and RTUs is DNP3. DNP3 (Distributed Network Protocol) is intended for communications between RTU, IED, and controller devices in SCADA networks. It is a more general protocol than IEC 60870-5-104 and is used in the electrical distribution, water infrastructure, oil and gas, waste water, and security industries.
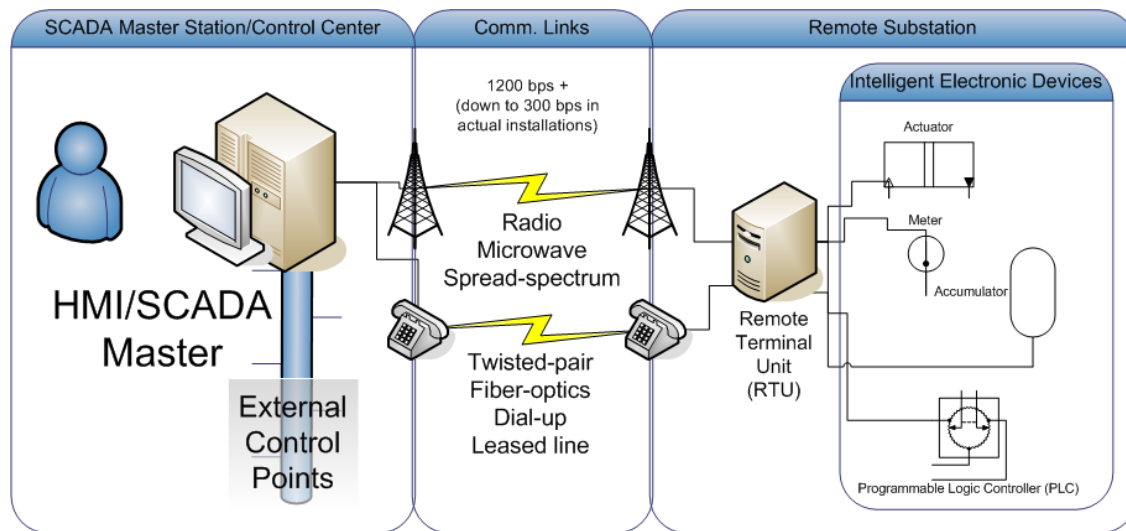
Figure 3-3: DNP3 Protocol Example

In 1993 GE-Harris Canada used the partially completed IEC 60870-5 protocol specification as the basis for an open and immediately implementable protocol that specifically catered to North American requirements. This new protocol became DNP3. Today DNP3 has a strong following worldwide except for Europe where IEC 60870-5 dominates.

DNP3 is a layer 2 protocol which is commonly tunneled through TCP/IP, with an Ethernet interface.

MM-018623-001

4 OPERATION

In-service operation of the SG5300 is completely automatic. Once the unit is properly installed and configured, local unit operation can be observed by viewing the Status LEDs for proper operation.

After properly installing the unit, operational control and monitoring can be made from the Network Management Center and the Centralized System Server.

4.1 STARTING SG5300

Start the radio operation by following these steps:

1. Apply DC power to the transceiver.

2. Observe the Status LEDs for the proper indications (Table 4-1).
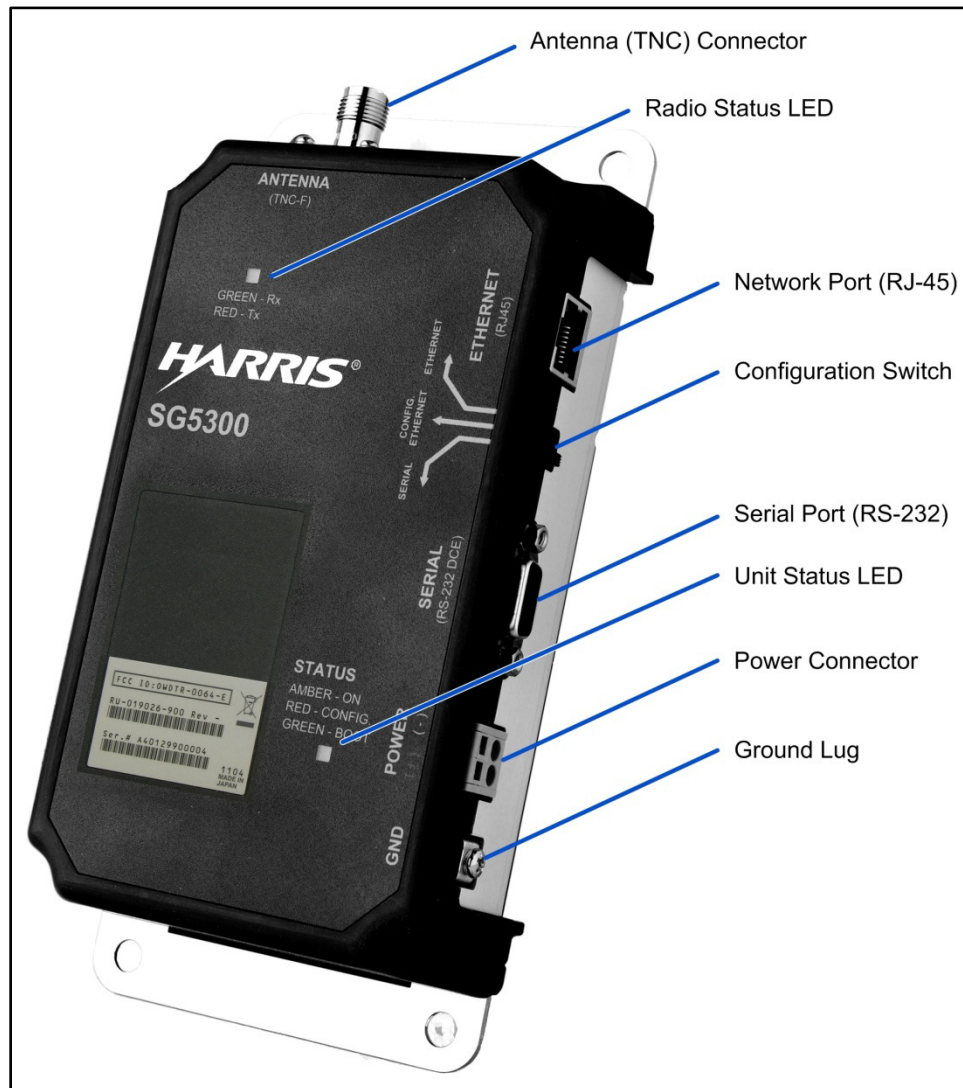
Figure 4-1: SG5300 Controls and Indicators

15

4.2 INDICATORS

The SG5300 RF Radio unit has two tri-color LEDs which indicate its operating status. The Unit Status LED, located near the power connector, indicates Power On or Normal Operation (amber or orange). It also indicates when the unit is in the Configure Ethernet mode (red) or is booting up (green).

The Radio Status LED, located near the antenna connector, indicates the operational status of the radio section. This LED indicates whether data is being transmitted (red), received (green) or other support functions (orange).

Table 4-1: Indicators and Controls

INDICATOR	INDICATOR COLOR		DESCRIPTION
Radio Status LED	OFF	⬤	No Status
	Blinking GREEN	⬤	Receiving RF Signal
	Blinking RED	⬤	Transmitting RF Signal
	Blinking AMBER	⬤	Data Registration Failure and/or Loss of Sync
	Solid AMBER	⬤	Offline
Unit Status LED	OFF	⬤	No Power Applied
	AMBER	⬤	Normal Operation
	GREEN	⬤	Booting Up
	RED	⬤	Configure Ethernet
CONTROL	**POSITION**		**DESCRIPTION**
Configuration Switch (Config)	Ethernet		Selects Ethernet Port for data interface.
	Config Ethernet		Allows you to configure the Ethernet port settings using an RS-232 terminal.
	Serial		Selects Serial Port for data interface.

5 UNPACKING AND CHECKING EQUIPMENT

Before unpacking, installing, or operating the SG5300, read this section of the manual thoroughly. It contains detailed unpacking and handling instructions, and safety precautions to protect users and equipment.

5.1 UNPACKING EQUIPMENT

The SG5300 may be shipped in separate transit packages. The associated cabling and accessories for each unit, if any, may also be shipped in separate containers.

When unpacking the equipment, check the contents against the packing list. Contact your Harris representative and the carrier if any discrepancies are noted.

NOTE	Save the shipping cartons and packing materials in case the equipment needs to be shipped back to the Harris for service.

5.2 INSPECTING AND INVENTORYING EQUIPMENT

Carefully unpack the equipment and examine each item. If there is any damage to the equipment, contact the carrier immediately and have their representative verify the damage. If you fail to report the shipping damages immediately, you may forfeit any claim against the carrier.

CAUTION	After removal from the carton, examine the SG5300 for broken, damaged, loose, or missing parts. Examine the RF connector(s), power connector, and ground lug for cracks, bent or damaged threads, or damage to any paint or seals. If any are noted, contact the Harris Customer Care center immediately. Any unauthorized attempts to repair or modify this equipment will void the warranty and could create a safety hazard.

5.3 ITEMS INCLUDED

The following items are included in the SG5300 package:

- RU-019026-800 Radio Unit (800 MHz)

    or

- RU-019026-900 Radio Unit (900 MHz)

    and

- SG5300 Data Modem Quick Guide (14221-6100-1000)

5.4 OPTIONS AND ACCESSORIES

MODEL/OPTION NUMBER	DESCRIPTION
Transceiver	
SG5300-800	SG5300, Data Only, 800 MHz
SG5300-900	SG5300, Data Only, 900 MHz
Antennas	
AN-225001-001	764-870 MHz, Dual band 3 dB gain roof mount antenna
AN-225001-002	764-870 MHz, Dual band 3 dB gain elevated feed point antenna
AN-225001-003	764-870 MHz, Dual band 3 dB gain elevated feed point antenna
AN-225001-004	764-870 MHz, Dual band 2 dB gain low profile antenna
AN-225001-005	764-870 MHz, Dual band 5 dB gain roof mount antenna
AN-225005-001	900 MHz, 3 dB gain roof mount antenna
AN-225005-002	900 MHz, 3 dB gain elevated feed roof mount antenna
AN-225005-003	900 MHz, 3 dB gain elevated feed roof mount antenna
AN-225005-004	900 MHz, 2 dB gain low profile antenna

6 INSTALLATION

6.1 GENERAL PLANNING

Careful planning and preparation of any installation will always benefit the end result.

1. Always read and follow all installation instructions, local and national building and electrical codes, and general safety rules.

2. Before beginning the installation, collect information from the Site Deployment Order (SDO) specific to the site access such as:

    - Permission to access the site.

    - Important contact names and telephone numbers.

    - Location of and directions to the site.

    - Keys and/or lock combinations to access the site and equipment shelter (if any), or points of contact to obtain them.

    - Site entry alarm system pass-codes and/or disable keys.

    - Information about work practices needed to work safely at the site.

3. Other important information that may or may not be included on the SDO includes:

    - Type of mounting—NEMA case, interior wall, etc.

    - Drawing or description of each site showing how and where the equipment is being installed.

    - Applicable inspections completed (electrical, local build code, etc.).

    - Installer must be aware of other transmitters and receivers on site that could cause interference to, or be interfered with, by the equipment. Strong signals from, or to, co-located equipment may inflict permanent damage to either device.

4. We recommend pre-staging the equipment to become familiar with the specific hardware and cabling, tooling, and supplies that are needed to complete the installation.

6.2 SITE GROUNDING

Installers should review the recommended grounding procedures in the *Site Grounding and Lightning Protection Guidelines Manual, AE/LZT 123 4618/1* and ensure a suitable ground is installed between the SG5300's ground lug and earth ground. Grounding must also be in compliance with any local and national electrical codes.

6.3 EQUIPMENT INSTALLATION

Below are the basic steps for installing the SG5300. In most cases, these steps alone are sufficient to complete the installation. Each step references more detailed instructions contained in this manual.

1. Mount the SG5300 to a stable surface. Refer to Section 6.4 for dimensions.

2. Connect the RTU equipment to the appropriate data interface connector.

    (See Section 6.5.3 for Ethernet interface or 6.5.4 for a serial interface.)

ⓘ
NOTE
> Only one data interface connection can be used at a time.

3. Select the interface using the Configuration switch.

4. Connect the SG5300 to a suitable power source (see Section 6.5).

5. Install and orient the antenna as required (see Section 6.6).

6. Configure the SG5300 as required. Refer to Section 7 for instructions.

ⓘ
NOTE
> The operating frequencies are not set at the factory. Determine the transmit and receive frequencies to be used, and follow the instructions in Section 7 to program them.

6.4 MOUNTING THE SG5300

The SG5300 is typically installed in an outdoor enclosure that protects the unit from weather and where temperature is not typically controlled. The unit may also be mounted indoors in equipment closets.

Outdoors, the SG5300 should be mounted in a customer-supplied NEMA type enclosure that can supply the required voltage as well as the appropriate environmental conditions. See Specifications in Section 11.1 for environmental requirements.

Indoors, the SG5300 can be mounted using the mounting holes on the housing in areas of appropriate environmental conditions.

Figure 6-1 shows the SG5300 mounting dimensions.

ⓘ
NOTE
> The SG5300 should be mounted at least three (3) feet from human traffic.
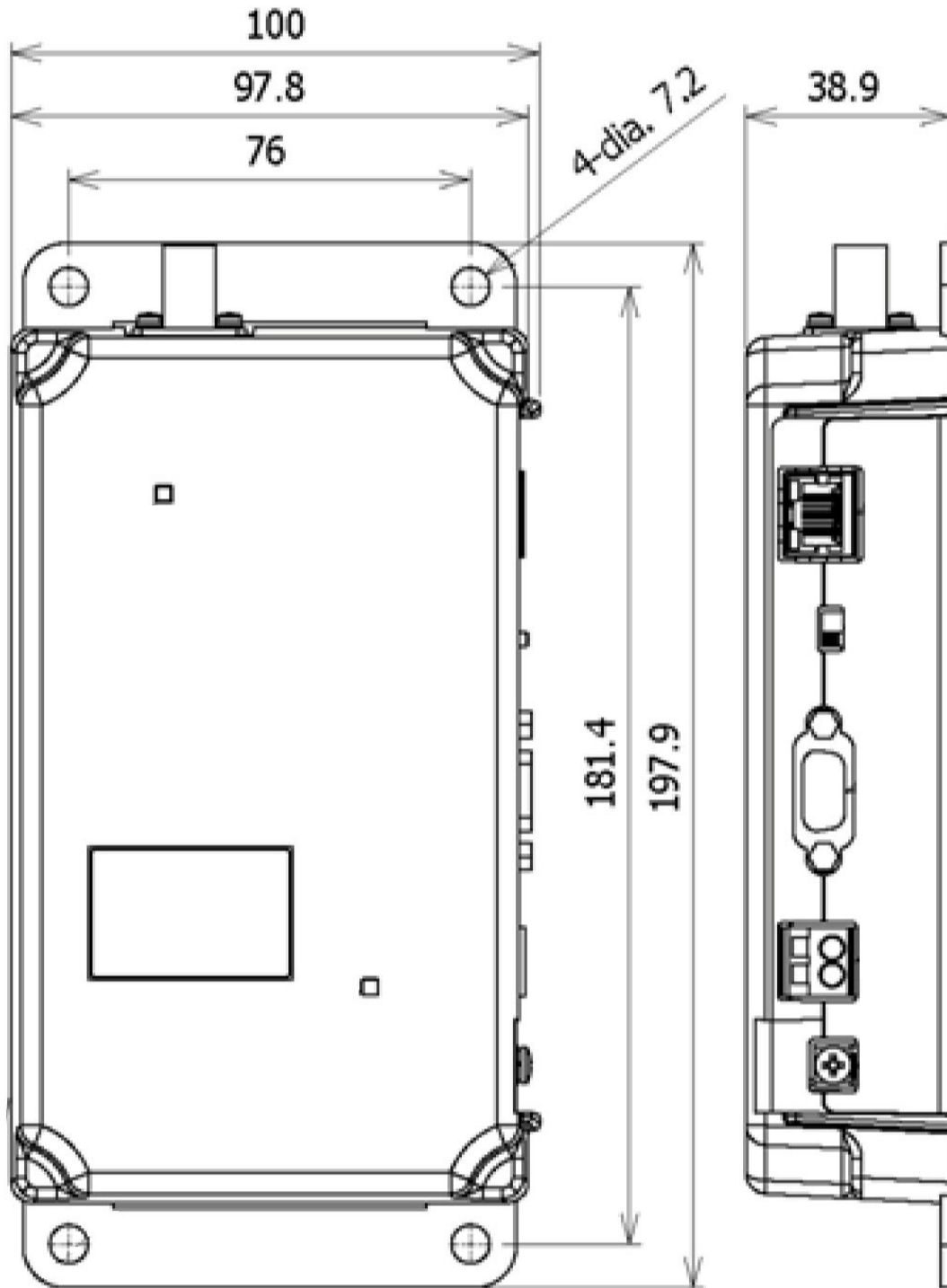
Unit: mm

Figure 6-1: SG5300 Physical Dimensions

6.5   CONNECTIONS

CONNECTION	DESCRIPTION
Input Power:	WAGO, 2-pin connector for DC Power (9 to 57 VDC)
Ethernet Interface:	Ethernet connector (RJ-45)
Serial Interface:	Serial RS-232 connector (DB-9F)
Antenna:	RF connector (TNC-F)

6.5.1   Power Connections

The SG5300 is compatible with any well-filtered 9.0 to 57 VDC power source.

CAUTION

Exceeding the maximum input voltage of 57 Volts may cause permanent damage to the equipment.

The power interface meets the following requirements:

- Connector Type: WAGO, 2-pin
- Connector Part Number: 231-602/017-000-2
- Mating Wire: AWG 12-18 (red and black)
- Maximum Power: 20 Watts
- Input Voltage Range: 9 to 57 VDC

Use the following procedure to connect the power cable wires to the SG5300. The red wire (12-18 AWG) on the power cable is the positive lead; the black wire (12-18 AWG) is negative.

Black
(−)

5/16"

Red
(+)
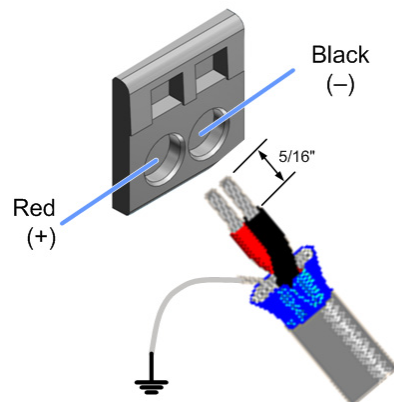
1. Route the power cable between the SG5300 and the power source.

2. At the SG5300, strip off 5/16-inch (8-9 mm) of insulation from each wire.

3. Using a small flat-head screwdriver, insert the screwdriver blade ① into the power connector release port to open the spring clamp.
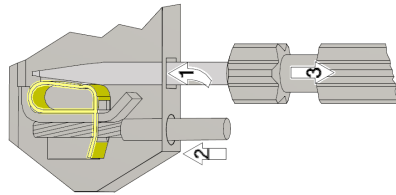
4. Insert the stripped wire end ② into the power connector wire opening.

5. Remove the screwdriver ③ and the spring clamp will secure the wire. This can be verified by gently tugging in the wire.

6. Repeat the process for the other wire.

7. Connect shield directly to ground or the grounding lug.

NOTE	Remember to connect the shield wire to ground.

8. Connect the other end of the power cable to the power source as required.

6.5.2   Safety/Earth Ground

To minimize the chances of damage to the SG5300 and RTU equipment, a good safety ground is recommended which bonds the antenna system, the SG5300, power source, and connected data equipment to a single-point ground. For safety purposes, earth ground and lightning protection connections should be made as required by local ordinances and the *Site Grounding and Lightning Protection Guidelines Manual, AE/LZT 123 4618/1*.

Normally, adequate ground is provided if the SG5300 is mounted to a grounded metal surface. If the SG5300 is not mounted to a grounded surface, connect a safety ground to the SG5300 using the grounding lug or one of the four mounting screws.

NOTE	To prevent equipment damage, ensure all equipment is connected to a single-point ground system and keep all grounds leads as short as possible.

6.5.3 Ethernet Data Interface Connection

The SG5300 Ethernet interface is used for connecting to an RTU. The unit's Ethernet Interface meets the following requirements:

- Connector Type: RJ-45 Receptacle
- Electrical Protocol: 10/100Base-T
- Data Rate: 10/100 Mbps
- Data Format: Ethernet IEEE 802.3

Table 6-1:   Ethernet Interface Signals

	Signal Name	Dir	Pin	Primary Function
	TX+	Out	1	Transmit Data +
	TX-	Out	2	Transmit Data –
	RX+	In	3	Receive Data +
	RX-	In	6	Receive Data –
	Not Used		4	Terminated
	Not Used		5	Terminated
	Not Used		7	Terminated
	Not Used		8	Terminated
	SHIELD			Chassis Ground

Table 6-2:   Ethernet LEDs

Link LED (Left Side)		Activity LED (Right Side)	
Color	Meaning	Color	Meaning
Off	No Link	Off	No Activity
Amber	10 Mbps	Amber	Half-Duplex
Green	100 Mbps	Green	Full-Duplex

6.5.4 Serial Data Interface Connection

The SG5300 serial interface is used for Serial Line Internet Protocol (SLIP) or Point to Point Protocol (PPP) data as well as for unit configuration and maintenance support. The serial interface can be configured to operate as a full duplex DCE EIA/TIA-232 port and meets the following requirements:

- Connector Type: DB-9F Receptacle
- Mating Part Number: DEMM9 Plug
- Electrical Protocol: EIA/TIA-232 Full Duplex
- Data Rate: 9.6 kbps for 900 MHz, 19.2 kbps for 800 MHz
- Data Format: 8 bits/character, No Parity, 1 stop bit

Table 6-3: Serial Interface Signals

	Pin Number	Signal Name
	1	Not Connected (NC)
	2	Receive Data (RD)
	3	Transmit Data (TD)
	4	Not Connected (NC)
	5	Signal Ground (GND)
	6	Not Connected (NC)
	7	Request-To-Send (RTS)
	8	Clear-To-Send (CTS)
	9	Not Connected (NC)

6.6 ANTENNA INSTALLATION

Screw the antenna or antenna cable onto the antenna connector on the top of the SG5300 by turning it clockwise into the TNC female connector.

1. Connect the antenna feedline (if antenna is not connected directly to the SG5300) between the antenna and the SG5300 antenna connector.

2. Install surge protectors as required.

6.7 SURGE PROTECTION

When installing an SG5300, you should always install external surge protectors to protect the unit from lightning or transient damage. Table 6-4 lists surge protectors that have been tested and are available from Harris.

Table 6-4: Surge Protection Options

PART NUMBER	DESCRIPTION
PT-016508-002	RF Surge Protector, Coax, TNC.
PT-016508-003	Cat5e, RJ-45, Data Port Surge Protector.
PT-016508-005	Surge Protector, DC, Wire, 54 Vdc.

7 CONFIGURATION

Configuration of the SG5300 is performed with an external computer attached to the DB9 serial port. Your Network Administrator should configure the SG5300. Changes to the configuration, if required, can also be made over-the-air if this option has been purchased.

There are three primary considerations when setting up an SG5300. These include configuration and software loading of either the RF Radio or the Ethernet port.

7.1 EQUIPMENT REQUIRED

Service PC

7.2 CONFIGURING THE RF RADIO

To configure the SG5300 RF Radio unit through a serial connection between a console terminal or PC and the SG5300's Serial port:

1. Connect a console terminal or PC running a terminal emulation program (i.e., HyperTerminal) to your unit's serial port. The default serial port settings are **19200 baud, 8 bits, no parity, 1-stop bit, no flow control**.

2. Toggle the SG5300's Configuration Switch from and back to the **Serial** position. This will reset and re-boot the RF-Radio which results in a software version banner being sent to the terminal display.

NOTE	If the banner is not output, it maybe necessary to enter the off-line escape commands into the terminal (i.e., **+++** or **✱✱✱**).

3. Enter the following user/system specific configuration setting commands into the SG5300:

NOTE	The SG5300 RF Radio responds with an **OK** message after each accepted command entry.

Commands:	Description:
at@ar1	Auto Reg where 1=enable, 0=disable.
at\u xxx.xxx.xxx.xxx	Service IP Address (xxx.xxx.xxx.xxx).
at\p x	Service Port number.
at\s yyy.yyy.yyy.yyy	Radio IP Address (yyy.yyy.yyy.yyy).
at\b zzz.zzz.zzz.zzz	Broadcast IP Address (zzz.zzz.zzz.zzz).
at@c x,x,x,x	Loads Band, Chan#1, Chan#2, RF Protocol. Where: Band = 7 (900 MHz) or 8 (800 MHz) Chan#1 = 0 to 830 (at@c? lists channels) Chan#2 = 0 (N/A) RF Protocol = 3 (OTP, 2-slot) or 4 (OTP 4-slot)
at@h x,x,x,x	Selects home site, Chan#1, Chan#2, RF Protocol. (Same parameters as at@c)
at@vreg 0	Enables (1) or disables (0) voice registration.
at@mdp_type x	Configures serial port. 0 - Sets the data type for the serial connection to SLIP. 1 - Sets the serial connection to PPP so the radio will look for PPP packets from the host.

4. Enter the **atz** command to reboot the SG5300 RF Radio.

   In a few moments the software version banner appears along with the RF radio's network registration and connection information.

> **NOTE**
>
> Configuration and wireless network connectivity is verified from the output registration and connection information.

5. Toggle the SG5300's Configuration Switch into either the Serial or Ethernet position, as required for normal operation.

7.3 CONFIGURING THE ETHERNET PORT

To configure the SG5300 Ethernet port through a serial connection between a console terminal or PC and the SG5300's Serial port:

1. Connect a console terminal or PC running a terminal emulation program (i.e. HyperTerminal) to your unit's serial port. The default serial port settings are **9600 baud, 8 bits, no parity, 1-stop bit, no-flow control.**

2. Toggle the SG5300's Configuration Switch from and to the Config-Ethernet position. Within three (3) seconds of setting the switch, enter three lowercase x characters (**xxx**).

> **NOTE**
>
> The easiest way to enter Setup Mode is to hold down the **x** key at the terminal (or emulation) while switching the unit into Config-Ethernet. **You must do this within three seconds of setting the SG5300's Configuration Switch into the Config-Ethernet position.**

The terminal should display a firmware version banner similar to the following example:

```
*** SLIP Server ***
MAC address xxxxxxxxxxxx
Software version V6.5.SLIP   (090507) CPK6500_XPTEX
Press Enter for Setup Mode
```

3. Within 5 seconds, press the Enter key to enter the Ethernet Setup Mode.

The terminal should display the current configuration settings followed by the Change Setup menu:

```
Change Setup:
  0  Server configuration
  1  Channel 1 configuration
  5  Expert
  6  Security
  7  factory defaults
  8  exit without save
  9  save and exit            Your choice ?
```

4. From the Change Setup menu, enter **0** for Server configuration after the "**Your choice ?"** and press the **Enter** key.

5. Set the entry fields (as shown on the next page) where the IP Address *xxx.xxx.xxx.xxx* is replaced with the desired IP Address for the SG5300 Ethernet port.

> **NOTE**
>
> After every entry field, a respective default or previously set value will be displayed within the parenthesis. If the displayed value is correct, simply press the **Enter** key.

HARRIS®

IP Address : (0) *xxx.*(0) *xxx.*(0) *xxx.*(0) *xxx*
Set Gateway IP Address (N) ?
Netmask: Number of Bits for Host Part (0=default) (8)
Change telnet config password (N) ?

6. From the Change Setup menu, enter **1** for Channel 1 configuration after "**Your choice ?"** and press the **Enter** key.

7. Set the entry fields as shown below where the Local Serial IP address *xxx.xxx.xxx.xxx* is replaced with the previously set SG5300 Ethernet port IP address and the Peer Serial IP address *yyy.yyy.yyy.yyy* is replaced with the previously set SG5300 RF Radio IP address.

> **NOTE** After every entry field, a respective default or previously set value will be displayed within the parenthesis. If the displayed value is correct, simply press the **Enter** key.

Baudrate (19200)
I/F Mode (4C) ?
Flow (00) ?
Enable passive mode (N) ?
Enable bridge mode (N) ?
Local Serial IP address: (255) *xxx.*(255) *xxx.*(255) *xxx.*(255) *xxx*
Peer Serial IP address: (255) *yyy.*(255) *yyy.*(255) *yyy.*(255) *yyy*
NAT IP address: (000) .(000) .(000) .(000)
NAT IP address offset: (16) ?
DNS Server IP address: (000) .(000) .(000) .(000)
Allow broadcasts in (Y) ?
Monitor Connection Control (N) ?
SLIP Client Mode (N) ?

8. From the Change Setup menu, enter **9** for Save and exit after "**Your choice ?"** and press the **Enter** key.

9. After all values are stored into nonvolatile memory, the terminal should display the "Parameters stored ..." message.

10. Toggle the SG5300's Configuration Switch into either the Serial or the Ethernet position for the desired normal operation of the SG5300.

8 SOFTWARE INSTALLATION

This section provides instructions for installing software in the SG5300.

8.1 DOWNLOAD SOFTWARE

8.1.1 <u>Set Server IP Address</u>

1. Connect the SG5300 to the PC serial port.

   If working with a DTE device a null modem cable or adapter will be required.

2. Place SG5300 serial interface selector switch in the **Config Ethernet** position.

3. Connect power to the device being configured while depressing the "x" key (must be lower case).

4. The following message should appear:

   > *** SLIP Server ***
   > MAC address 00204AB1EA34
   > Software version V6.5.SLIP   (090507) CPK6500_XPTEX
   > Press Enter for Setup Mode

5. Press the **Enter** key to enter Setup Mode.

   The following message should appear:

   > Change Setup:
   >   0 Server configuration
   >   1 Channel 1 configuration
   >   5 Expert
   >   6 Security
   >   7 factory defaults
   >   8 exit without save
   >   9 save and exit   Your choice ?

6. Proceed to next section to install software.

8.1.2 <u>Install Software</u>

1. If this is a new install and the device has yet to be configured, enter "**7**" to load factory defaults.

2. Enter "0" to configure server.

3. When prompted for an IP Address, enter the desired IP address (i.e., 192.168.1.254).

4. When asked to set Gateway IP Address (N): Press the **Enter** key.

5. When prompted for a Netmask, enter: **8**

6. Change telnet config password (N): Press the **Enter** key.

7. When the following menu appears:

> Change Setup:
>   0 Server configuration
>   1 Channel 1 configuration
>   5 Expert
>   6 Security
>   7 factory defaults
>   8 exit without save
>   9 save and exit   Your choice ?

8. Enter "9" to exit configuration mode and start normal operation.

9. Connect the Ethernet port of the slip converter to the Ethernet port of the PC containing the FTP server and code for the device being configured.

10. Set the TFTP PC's IP address to 192.168.1.5.

11. Place the code to be downloaded in the directory C:\Code.

12. Place the serial selector switch in the "**Ethernet**" position.

13. Open a DOS command prompt window.

14. Enter the following command:

    tftp –i (IP Address of SG5300) PUT c:\code\xpteslps6.7.SLIP.0.rom X5

    (i.e. tftp –i 192.168.1.254 PUT c:\code\ xpteslps6.7.SLIP.0.rom X5)

15. Wait for the transfer to complete (about 8-10 seconds) and then set the needed IP addresses for the serial ports and the translation tables.

8.2 CONFIGURATION

8.2.1 <u>Set Server IP Address</u>

1. Connect the SG5300 to the serial port of the PC and place the serial interface selector switch in the **Config Ethernet** position.

2. Connect power to the device being configured while depressing the "x" key (must be lower case) When the following message appears :

    *** SLIP Server ***
    MAC address 00204AB1EA34
    Software version V6.5.SLIP   (090507) CPK6500_XPTEX
    Press Enter for Setup Mode

3. Press the **Enter** key to enter Setup Mode.

   The following message appears:

   > Change Setup:
   > 0 Server configuration
   > 1 Channel 1 configuration
   > 5 Expert
   > 6 Security
   > 7 factory defaults
   > 8 exit without save
   > 9 save and exit   Your choice ?

4. Enter "0" followed by the enter key.

5. When prompted for an IP Address: enter the desired IP address of the Ethernet server port (i.e., 192.168.1.254), placing a period between the octets or press the **Enter** key to move to the next octet.

6. When asked to set Gateway IP Address (N): Press then **Enter** key.

7. When prompted for a Netmask, enter the number of bits for Host Part (0): **8**

8. When prompted to change the telnet config password (N) ?: Press the **Enter** key.

9. When the following menu appears:

   > Change Setup:
   > 0 Server configuration
   > 1 Channel 1 configuration
   > 5 Expert
   > 6 Security
   > 7 factory defaults
   > 8 exit without save
   > 9 save and exit   Your choice ?

10. If this was the last item to configure then enter "9" followed by the **Enter** key.

8.2.2   Serial Channel and Network configuration

> **NOTE**
>
> Both the serial converter and the SG5300 have the capability to perform PAT/NAT translations. Before starting a configuration the user should have a good understanding of what device(s) are going to be connected to the Ethernet port. The mapping contained in the static table is a very important piece of the configuration.

1. From the main menu, enter "**1**" followed by the **Enter** key.

2. When prompted for the "Baudrate (19200)": Enter **19200** or press the **Enter** key.

3. When prompted for the "I/F Mode (4C) ?": Press the **Enter** key.

4.   When prompted for the "Flow (00) ?": Press the **Enter** key.

5.   When prompted for to "Enable passive mode (N) ?": Press the **Enter** key.

6.   When prompted for the "Enable bridge mode (N) ?": Press the **Enter** key.

7.   When prompted for the "Local Serial IP address": Enter the desired IP address of the local serial port (i.e., 10.248.15.85), placing a period between the octets or press the **Enter** key to move to the next octet.

8.   When prompted for the "Peer Serial IP address": Enter the IP address assigned to the radio serial port (i.e., 10.248.15.86), placing a period between the octets or press the **Enter** key to move to the next octet.

9.   When prompted for the "NAT IP address (000.000.000.000)": Leave set to 000.000.000.000 placing a period between the octets or press the **Enter** key to move to the next octet.

10. When prompted for the "NAT IP address offset: (16) ?": Press the **Enter** key.

11. When prompted for the "DNS Server IP address: address (000.000.000.000)":   Leave set to 000.000.000.000, placing a period between the octets or press the **Enter** key to move to the next octet.

12. When prompted for the "Allow broadcasts in (N) ?": Press the **Enter** key.

13. When prompted for the "Monitor Connection Control (N) ?": Press the **Enter** key.

14. When prompted for the "SLIP Client Mode (N) ?": Press the **Enter** key.

```
    Static Map Table
      PROTO   [Cloud Socket]        [Ethernet Socket]
    01: ICM 010.000.000.001:00000 <-> 192.168.001.001:00000
    02: UDP 010.000.000.001:00000 <-> 192.168.001.001:00000
    03:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    04:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    05:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    06:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    07:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    08:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    09:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    10:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    11:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    12:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    13:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    14:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
```

15. When prompted for to "Change Map Table? (N) ?": Enter **Y** and press the **Enter** key.

16. When prompted for to "Clear Map Table? (N) ?": Press the **Enter** key.

17. When prompted for to "Edit entry # (0 to exit): (0) ?: Enter **1**

18. When prompted for the "Map Cloud TCP, UDP or ICMP to Ethernet IP & Port T(CP) or U(DP) or (I)CMP": Enter:

- **I** for ICMP traffic
- **U** for UDP traffic
- **T** for TCP traffic

19. When prompted for the "Cloud Port #: (0) ?": Enter the port number that was assigned at the source of the message i.e., (telnet port 23, HTTP port 80).

20. When prompted for the"Tto Port #: (0) ?": Enter the port number that the destinstion application will want to see.

    If it is the same number assigned at the source of the message (i.e. telnet port 23, HTTP port 80), enter 0 for the cloud port and to port numbers. When both the cloud and two port numbers are set to zero no port translation takes place.

21. When prompted for the "At IP address": Enter the destination IP address, (where you want the data sent to on the Ethernet port network.), placing a period between the octets or press the **Enter** key to move to the next octet.

22. When prompted for the "Edit entry # (0 to exit): (1) ?":   Enter 0 if all entries have been completed or the next table position to be configured.

23. If 0 was entered, you will be given the current static map table and asked if you wish to make changes. Review the entries, if correct enter "**N**;" otherwise, enter "**Y**" and make any needed corrections.

    ```
    Static Map Table
      PROTO   [Cloud Socket]        [Ethernet Socket]
    01: ICM 010.000.000.001:00000 <-> 192.168.001.001:00000
    02: UDP 010.000.000.001:00000 <-> 192.168.001.001:00000
    03:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    04:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    05:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    06:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    07:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    08:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    09:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    10:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    11:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    12:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    13:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    14:     --- 000.000.000.000:00000 <-> 000.000.000.000:00000

    Change Map Table? (N) ?
    ```

24. When the following information is displayed select menu item "**9**" followed by the **Enter** key to save changes and exit.

    ```
    *** basic parameters
    Hardware: Ethernet TPI
    ```

IP addr 192.168.1.254, no gateway set,netmask 255.255.255.0
*** Security
SNMP is   enabled
SNMP Community Name: public
Telnet Setup is   enabled
TFTP Download is   enabled
Port 77FEh is   enabled
Web Server is   enabled
Web Setup is   enabled
ECHO is   disabled
Enhanced Password is disabled

***************** Channel 1 *****************
Baudrate 19200, I/F Mode 4C, Flow 00
CPU performance : Standard
Local Serial IP address 10.0.0.2
Peer Serial IP address 10.0.0.1
NAT IP address 0.0.0.0
NAT IP address offset 16
DNS Server IP address 0.0.0.0
Passive Mode: disabled
Bridge Mode: disabled
Allow broadcasts: disabled
Monitor Connection Control: disabled
SLIP Client Mode: disabled

Static Map Table
   PROTO   [Cloud Socket]   [Ethernet Socket]
01: ICM 010.000.000.001:00000 <-> 192.168.001.001:00000
02: UDP 010.000.000.001:00000 <-> 192.168.001.001:00000
03:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
04:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
05:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
06:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
07:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
08:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
09:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
10:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
11:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
12:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
13:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000
14:    --- 000.000.000.000:00000 <-> 000.000.000.000:00000

*** Expert

CPU performance: Regular
Monitor Mode @ bootup : enabled
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

> Change Setup:
>   0 Server configuration
>   1 Channel 1 configuration
>   5 Expert
>   6 Security
>   7 factory defaults
>   8 exit without save
>   9 save and exit   Your choice ?

8.2.3   Load Factory Defaults

1. When the following menu appears, enter "**7**" followed by the **Enter** key.

> Change Setup:
>   0 Server configuration
>   1 Channel 1 configuration
>   5 Expert
>   6 Security
>   7 factory defaults
>   8 exit without save
>   9 save and exit   Your choice ?

2. After selecting factory defaults, select menu item "**9**" followed by the **Enter** key to exit and save changes.

8.3 IMPLEMENTATION

1. Once the new slip code is loaded you will receive a message similar to the following when you connect to the SG5300:

> *** SLIP Server ***
> MAC address 00204ACDBE06
> Software version V6.7.SLIP.0 (101220) CPK6702_XPTEX
> Press Enter for Setup Mode
>
>
> *** basic parameters
> Hardware: Ethernet TPI
> IP addr 10.248.15.109, no gateway set,netmask 255.255.255.0
> *** Security
> SNMP is   enabled
> SNMP Community Name: public
> Telnet Setup is   enabled
> TFTP Download is   enabled
> Port 77FEh is   enabled
> Web Server is   enabled
> Web Setup is   enabled
> ECHO is   disabled
> Enhanced Password is disabled

***************** Channel 1 *****************
Baudrate 9600, I/F Mode 4C, Flow 00
CPU performance : Standard
Local Serial IP address 255.255.255.255
Peer Serial IP address 255.255.255.255
NAT IP address 255.255.255.255
DNS Server IP address 255.255.255.255
Passive Mode: enabled
Bridge Mode: enabled
Allow broadcasts: enabled
Monitor Connection Control: enabled
SLIP Client Mode: enabled

Static Map Table
   PROTO   [Cloud Socket]   [Ethernet Socket]
01: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
02: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
03: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
04: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
05: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
06: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
07: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
08: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
09: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
10: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
11: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
12: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
13: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
14: --- 000.000.000.000:00000 <-> 000.000.000.000:00000

*** Expert

CPU performance: Regular
Monitor Mode @ bootup : enabled
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

Change Setup:
  0 Server configuration
  1 Channel 1 configuration
  5 Expert
  6 Security
  7 factory defaults
  8 exit without save
  9 save and exit   Your choice ?

2. If this is to be a new installation, select menu option "**7**" followed by menu option "**9**."

   If you selected menu option "7," you will get the following configuration the next time you connect to the SG5300:

   • An address for the server port has been set to 192.168.1.254 with a subnet mask of 255.255.255.0.

   • The serial ports have been assigned along with basic static table entries.

   ```
   *** basic parameters
   Hardware: Ethernet TPI
   IP addr 192.168.1.254, no gateway set,netmask 255.255.255.0
   *** Security
   SNMP is            enabled
   SNMP Community Name: public
   Telnet Setup is    enabled
   TFTP Download is   enabled
   Port 77FEh is      enabled
   Web Server is      enabled
   Web Setup is       enabled
   ECHO is            disabled
   Enhanced Password is disabled


   ***************** Channel 1 *****************
   Baudrate 19200, I/F Mode 4C, Flow 00
   CPU performance  : Standard
   Local Serial IP address 10.0.0.2
   Peer Serial IP address 10.0.0.1
   NAT IP address 0.0.0.0
   NAT IP address offset 16
   DNS Server IP address 0.0.0.0
   Passive Mode: disabled
   Bridge Mode: disabled
   Allow broadcasts: disabled
   Monitor Connection Control: disabled
   SLIP Client Mode: disabled

   Static Map Table
     PROTO   [Cloud Socket]         [Ethernet Socket]
   01: ICM 010.000.000.001:00000 <-> 192.168.001.001:00000
   02: UDP 010.000.000.001:00000 <-> 192.168.001.001:00000
   03: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   04: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   05: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   06: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   07: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   08: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   09: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   10: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   11: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
   ```

12: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
13: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
14: --- 000.000.000.000:00000 <-> 000.000.000.000:00000

*** Expert

CPU performance: Regular
Monitor Mode @ bootup : enabled
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

Change Setup:
  0 Server configuration
  1 Channel 1 configuration
  5 Expert
  6 Security
  7 factory defaults
  8 exit without save
  9 save and exit   Your choice ?

8.3.1   <u>Sample Implementation, SG5300 and One Logical Network</u>

This is a sample implementation for a single device and one (1) logical network.
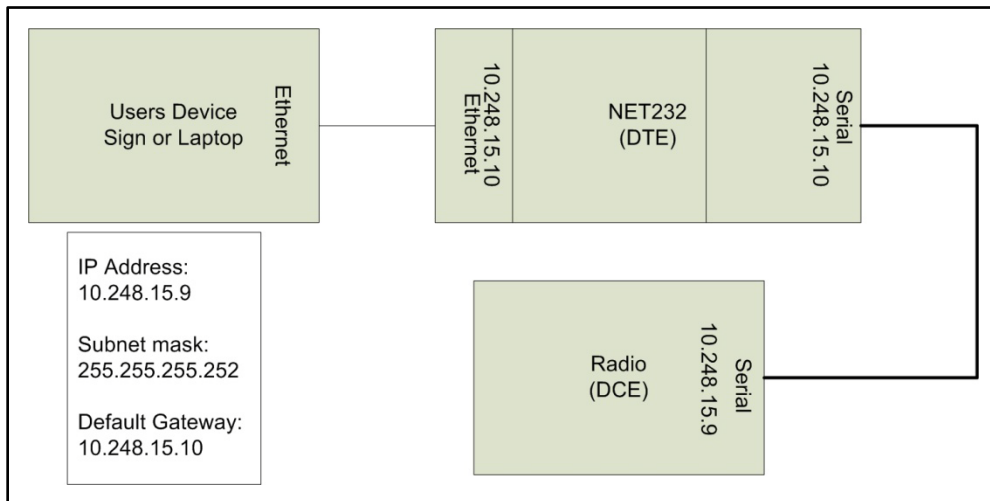
Figure 8-1: SG5300 and One logical network

For this example you would enter the following configuration:

1. Assign a Server IP Address and net mask (Menu Selection 0).

2. Assign a Serial IP Address (Menu Selection 1).

3. Assign a Peer Serial IP Address (Menu Selection 1).

4. Assign static entries into the translation table to allow UDP and ICMP traffic (Menu Selection 1 table entry).

When you have completed your configuration entries, your configuration will look like the following:

```
*** basic parameters
Hardware: Ethernet TPI
IP addr 10.248.15.10, no gateway set,netmask 255.255.255.0
*** Security
SNMP is            enabled
SNMP Community Name: public
Telnet Setup is    enabled
TFTP Download is    enabled
Port 77FEh is      enabled
Web Server is      enabled
Web Setup is       enabled
ECHO is            disabled
Enhanced Password is disabled

**************** Channel 1 ****************
Baudrate 19200, I/F Mode 4C, Flow 00
CPU performance  : Standard
Local Serial IP address 10.248.15.10
Peer Serial IP address 10.248.15.9
NAT IP address 0.0.0.0
NAT IP address offset 16
DNS Server IP address 0.0.0.0
Passive Mode: disabled
Bridge Mode: disabled
Allow broadcasts: disabled
Monitor Connection Control: disabled
SLIP Client Mode: disabled

Static Map Table
   PROTO   [Cloud Socket]        [Ethernet Socket]
01: ICM 010.248.015.009:00000 <-> 010.248.015.009:00000 (Sends all ICMP traffic from the
peer serial port to 010.248.015.009 at the Ethernet port)

02: UDP 010.248.015.010:00000 <-> 010.248.015.009:00000 (Sends all UDP traffic from the
peer serial port to 010.248.015.009 at the Ethernet port)

03: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
04: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
05: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
06: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
07: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
08: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
09: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
10: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
11: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
12: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
```

13: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
14: --- 000.000.000.000:00000 <-> 000.000.000.000:00000

*** Expert

CPU performance: Regular
Monitor Mode @ bootup : enabled
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

5.   Select menu item "9" to save your configuration and exit.

8.3.2   Sample Implementation, SG5300 and Two Logical Networks

This is a sample implementation for a single device and two (2) logical networks.
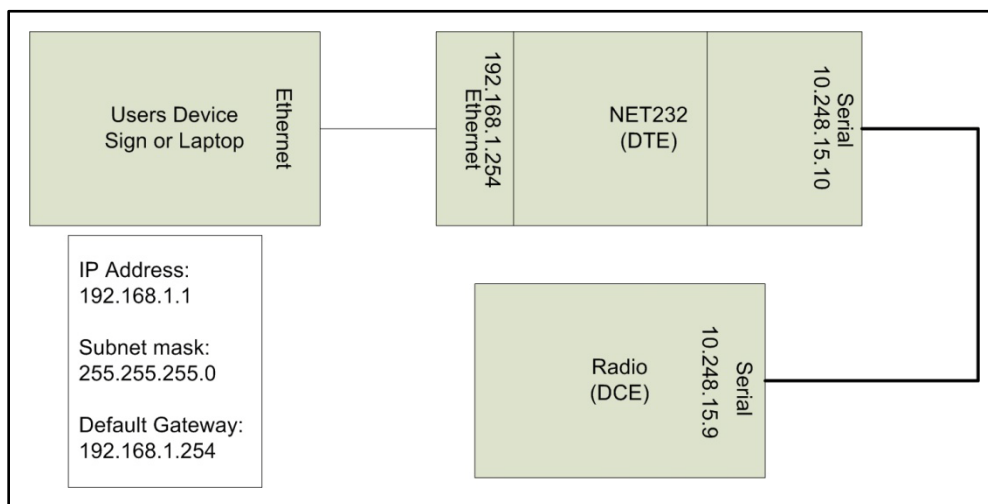
Figure 8-2: SG5300 and Two Logical Networks

For this example you would enter the following configuration:

1.   Assign a Server IP Address and net mask (Menu Selection 0).

2.   Assign a Serial IP Address (Menu Selection 1).

3.   Assign a Peer Serial IP Address (Menu Selection 1).

4.   Assign static entries into the translation table to allow UDP and ICMP traffic (Menu Selection 1 table entry).

5.   When you have completed your configuration entries, your configuration will look like the following:

*** basic parameters
Hardware: Ethernet TPI
IP addr 192.168.1.254, no gateway set,netmask 255.255.255.0

*** Security
SNMP is   enabled
SNMP Community Name: public
Telnet Setup is   enabled
TFTP Download is   enabled
Port 77FEh is   enabled
Web Server is   enabled
Web Setup is   enabled
ECHO is   disabled
Enhanced Password is disabled

**************** Channel 1 ****************
Baudrate 19200, I/F Mode 4C, Flow 00
CPU performance : Standard
Local Serial IP address 10.248.15.10
Peer Serial IP address 10.248.15.9
NAT IP address 0.0.0.0
NAT IP address offset 16
DNS Server IP address 0.0.0.0
Passive Mode: disabled
Bridge Mode: disabled
Allow broadcasts: disabled
Monitor Connection Control: disabled
SLIP Client Mode: disabled

Static Map Table
  PROTO   [Cloud Socket]   [Ethernet Socket]
01: ICM 010.248.015.009:00000 <-> 192.168.001.001:00000 (Sends all ICMP traffic to
192.168.001.001)
02: UDP 010.248.015.009:00000 <-> 192.168.001.001:00000 (Sends all ICMP traffic to
192.168.001.001)

03: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
04: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
05: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
06: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
07: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
08: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
09: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
10: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
11: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
12: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
13: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
14: --- 000.000.000.000:00000 <-> 000.000.000.000:00000

*** Expert

CPU performance: Regular
Monitor Mode @ bootup : enabled

MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

6. Select menu item "9" to save your configuration and exit.

8.3.3 Sample Implementation, SG5300, 2 logical networks, and Multiple Devices

This is a sample implementation for multiple devices and two (2) logical networks.
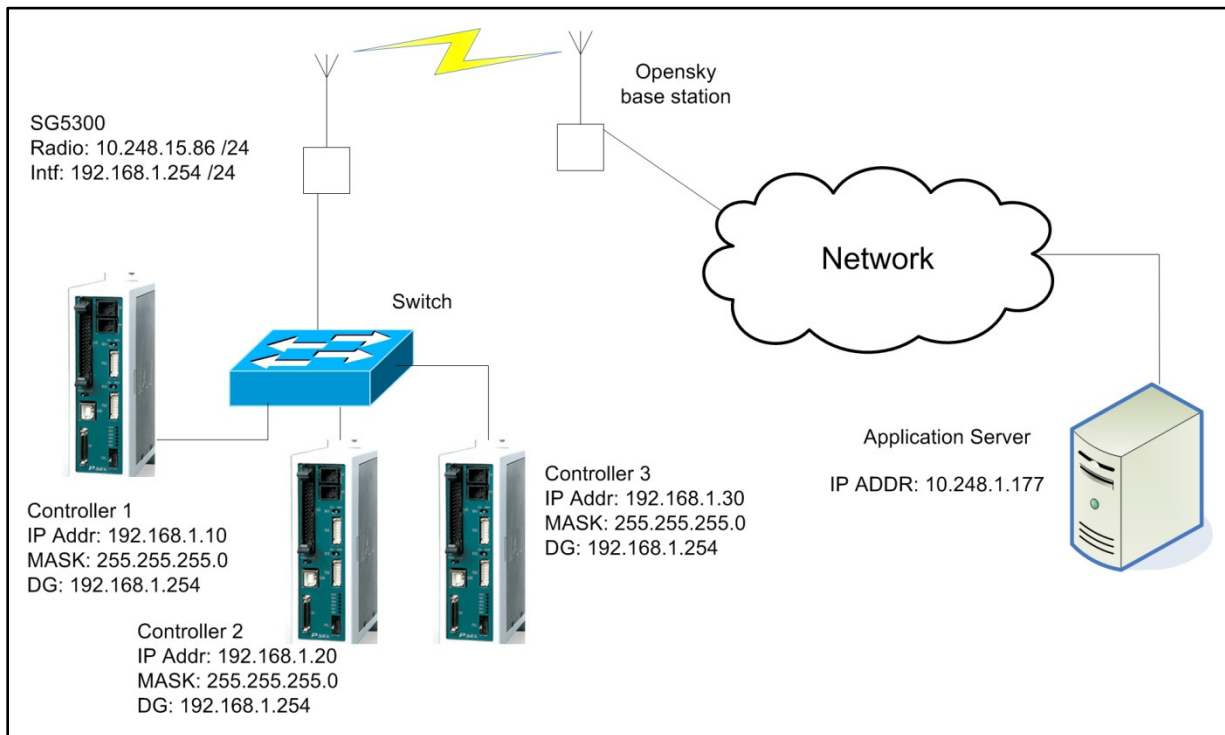
Figure 8-3: SG5300, Two Logical Networks, and Multiple Devices

In this example, the application server will need to maintain a static table that it associates the 192.x.x.x network address to a port number. Also assume the ports and IP addresses have been associated in the following manner:

- 192.168.10 = 10.248.15.86 port 5010

- 192.168.20 = 10.248.15.86 port 5020

- 192.168.30 = 10.248.15.86 port 5030

For this example you would enter the following configuration:

1. Assign a Server IP Address and net mask (Menu Selection 0).

2. Assign a Serial IP Address (Menu Selection 1).

3. Assign a Peer Serial IP Address (Menu Selection 1).

4. Assign static entries into the translation table to allow UDP and ICMP traffic (Menu Selection 1 table entry).

5. When you have completed your configuration entries, you configuration will look like the following data:

    *** basic parameters
    Hardware: Ethernet TPI
    IP addr 192.168.1.254, no gateway set,netmask 255.255.255.0
    *** Security
    SNMP is   enabled
    SNMP Community Name: public
    Telnet Setup is   enabled
    TFTP Download is   enabled
    Port 77FEh is   enabled
    Web Server is   enabled
    Web Setup is   enabled
    ECHO is   disabled
    Enhanced Password is disabled

    **************** Channel 1 ****************
    Baudrate 19200, I/F Mode 4C, Flow 00
    CPU performance : Standard
    Local Serial IP address 10.248.15.85
    Peer Serial IP address 10.248.15.86
    NAT IP address 0.0.0.0
    NAT IP address offset 16
    DNS Server IP address 0.0.0.0
    Passive Mode: disabled
    Bridge Mode: disabled
    Allow broadcasts: disabled
    Monitor Connection Control: disabled
    SLIP Client Mode: disabled

    Static Map Table
      PROTO   [Cloud Socket]   [Ethernet Socket]
    01: ICM 010.248.015.086:00000 <-> 192.168.001.010:00000 (Sends all ICMP traffic to 192.168.001.010)
    02: UDP 010.248.015.086:05010 <-> 192.168.001.010:00000 (Sends all ICMP traffic to 192.168.001.010)

    03: UDP 010.248.015.086:05020 <-> 192.168.001.020:00000 (Sends all ICMP traffic to 192.168.001.020)
    04: UDP 010.248.015.086:05030 <-> 192.168.001.030:00000 (Sends all ICMP traffic to 192.168.001.030)
    05: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    06: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    07: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    08: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
    09: --- 000.000.000.000:00000 <-> 000.000.000.000:00000

10: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
11: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
12: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
13: --- 000.000.000.000:00000 <-> 000.000.000.000:00000
14: --- 000.000.000.000:00000 <-> 000.000.000.000:00000

*** Expert

CPU performance: Regular
Monitor Mode @ bootup : enabled
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

6. Select menu item "9" to save your configuration and exit.

9 TROUBLESHOOTING AND SERVICING

> There are no user serviceable components within the SG5300 assembly. This assembly contains ESD sensitive components and should only be serviced by Harris qualified personnel.

9.1 TROUBLESHOOTING

If a unit is suspected to be faulty or need service and repair, perform the following checks:

- Visually inspect the installation for obvious defects such as worn, weathered, or frayed cabling.

- Verify that the unit is receiving sufficient voltage and current to the power input connector.

- Replace any defective antenna or power source components as required, and return any inoperable SG5300s to Harris for repairs.

9.2 SERVICING

The SG5300 is not a field repairable unit. If a unit is suspected to need servicing or re-alignment, then the unit should be removed from service and returned to Harris for repairs. Periodic checks of frequency and modulation bandwidth should be performed during routine preventative maintenance checks.

Troubleshooting the SG5300 is not difficult, but it requires a logical approach.

It is good practice to start by checking the simple things. For proper operation, the SG5300 must meet the following basic requirements:

- Proper and stable primary power. Remove power to reset the unit.

- Ensure all connections (RF, data, and power) and secure.

- Ensure the antenna system (antenna and lightning protection) are properly connected and in working order.

- Ensure the SG5300 is properly configured.

- Ensure you are using the correct interface between the SG5300 and the connected data equipment (correct cable wiring, proper data format, timing, etc.).

- The LED status indicators are an important troubleshooting tool and should be checked whenever a problem is suspected. Table 4-1 describes the function of each status LED.

> **NOTE**
>
> There are no field repairable components in the SG5300 RF Radio unit. If you suspect the SG5300 is defective, replace it with a known good unit and return the defective assembly to Harris for repair.

If troubleshooting assistance is required, contact a qualified service technician or Harris Technical Assistance Center (see Section 10).

10   CUSTOMER SERVICE

10.1 TECHNICAL ASSISTANCE

The Technical Assistance Center's (TAC) resources are available to help with overall system operation, maintenance, upgrades, and product support. TAC is the point of contact when answers are needed to technical questions.

Product specialists, with detailed knowledge of product operation, maintenance, and repair provide technical support via a toll-free (in North America) telephone number. Support is also available through mail, fax, and e-mail.

For more information about technical assistance services, contact your sales representative, or contact the Technical Assistance Center directly at:

North America:	1-800-528-7711
International:	1-434-385-2400
Fax:	1-434-455-6712
E-mail:	PSPC_tac@harris.com

10.2 CUSTOMER CARE

If any part of the system equipment is damaged on arrival, contact the shipper to conduct an inspection and prepare a damage report. Save the shipping container and all packing materials until the inspection and the damage report are completed.   In addition, contact the Customer Care center to make arrangements for replacement equipment. Do not return any part of the shipment until you receive detailed instructions from a Harris representative.

Contact the Customer Care center at http://www.pspc.harris.com/CustomerService or:

North America:

Phone Number:	1-800-368-3277
Fax Number:	1-321-409-4393
E-mail:	PSPC_CustomerFocus@harris.com

International:

Phone Number:	1-434-455-6403
Fax Number:	1-321-409-4394
E-mail:	PSPC_InternationalCustomerFocus@harris.com

11   SPECIFICATIONS

11.1 GENERAL SPECIFICATIONS

Model Number:

SG5300-800 (RU-019026-800)
SG5300-900 (RU-019026-900)

Physical Characteristics:

Electrical Power:	+9 to +57 Vdc
Power Consumption:	9.6 Watt Transmit 2.5 Watt Receive <3 Watt Average Power at 95/5
Size (H x W x D):	1.5 × 3.9 × 7.8 in (3.9 × 10.0 × 19.8 cm)
Weight:	1.6 lbs (0.7 kg) (less mounting hardware)

Environmental Specifications:

Operating Temperature:	-22 to +140°F (-30 to +60°C)
Relative Humidity:	95% @ 122°F (+50°C)
Altitude:	15000 ft (4572 m)
Color (case)	Black & Metallic

System Interfaces (Ethernet or Serial):

Ethernet - The SG5300 Ethernet interface is used for connecting to an RTU.

- Connector Type: RJ45
- Electrical Protocol: 10/100 BaseT
- Data Format: Ethernet IEEE 802.3

Serial - The SG5300 serial interface is used for data (SLIP/PPP) as well as for maintenance support. The serial interface is configurable to operate as a full duplex DCE EIA/TIA-232 port.

- Connector Type: 9-pin D Receptacle
- Electrical Protocol: EIA/TIA-232 Full Duplex
- Data Format: 8 bits/character, 1 start bit, 1 stop bit

11.2 TRANSMITTER SPECIFICATIONS

Typical performance specifications	800 MHz	900 MHz
Frequency Range (MHz):	806-809 / 809-824	896-901 / 935-940
Rated RF Power Trunked (W):	0.5-3	0.5-3
Frequency Stability (-30 to +60°C; +25°C Ref) (ppm):	±1.5 / ±2.5	±1.5
Modulation Deviation (kHz):	±3.75 / ±4.0	±1.8

11.3 RECEIVER SPECIFICATIONS

Typical performance specifications	800 MHz	900 MHz
Frequency Range (MHz):	851-870	935-940
Frequency Separation (MHz):	Full bandwidth	Full bandwidth
Channel Spacing (kHz):	25/NPSPAC	12.5
Frequency Stability (-30 to +60°C; +25 Ref) (ppm):	±1.5	±1.5

11.4 DIGITAL OPERATION

Data Rate (kbps):	19.2 for 800 MHz, 9.6 for 900 MHz
Modulation:	4-Level GFSK; M4FM

12 WARRANTY

Please register this product within 10 days of purchase. Registration validates the warranty coverage, and enables Harris to contact you in case of any safety notifications issued for this product.

Registration can be made on-line at http://www.pspc.harris.com/Service/WarrantySupport.asp.

A. Harris Corporation, a Delaware Corporation, through its RF Communications Division (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that Equipment manufactured by or for the Seller shall be free from defects in material and workmanship, and shall conform to its published specifications. With respect to all non-Seller Equipment, Seller gives no warranty, and only the warranty, if any, given by the manufacturer shall apply. Rechargeable batteries are excluded from this warranty but are warranted under a separate Rechargeable Battery Warranty (ECR-7048).

B. Seller's obligations set forth in Paragraph C below shall apply only to failures to meet the above warranties occurring within the following periods of time from date of sale to the Buyer and are conditioned on Buyer's giving written notice to Seller within thirty (30) days of such occurrence:

1. for fuses and non-rechargeable batteries, operable on arrival only.
2. for parts and accessories (except as noted in B.1), ninety (90) days.
3. for P7300, P7200, P7100^{IP}, P5400, P5300, P5200, P5100, P3300, M7300, M7200 (including V-TAC), M7100^{IP}, M5300, M3300, and SG5300s, two (2) years, effective 10/01/2007.
4. for Unity$^®$ XG-100P, three (3) years.
5. for all other equipment of Seller's manufacture, one (1) year.

C. If any Equipment fails to meet the foregoing warranties, Seller shall correct the failure at its option (i) by repairing any defective or damaged part or parts thereof, (ii) by making available at Seller's factory any necessary repaired or replacement parts, or (iii) by replacing the failed Equipment with equivalent new or refurbished Equipment. Any repaired or replacement part furnished hereunder shall be warranted for the remainder of the warranty period of the Equipment in which it is installed. Where such failure cannot be corrected by Seller's reasonable efforts, the parties will negotiate an equitable adjustment in price. Labor to perform warranty service will be provided at no charge during the warranty period only for the Equipment covered under Paragraph B.3 and B.4. To be eligible for no-charge labor, service must be performed at Seller's factory, by an Authorized Service Center (ASC) or other Servicer approved for these purposes either at its place of business during normal business hours, for mobile or personal equipment, or at the Buyer's location, for fixed location equipment. Service on fixed location equipment more than thirty (30) miles from the Service Center or other approved Servicer's place of business will include a charge for transportation.

D. Seller's obligations under Paragraph C shall not apply to any Equipment, or part thereof, which (i) has been modified or otherwise altered other than pursuant to Seller's written instructions or written approval or, (ii) is normally consumed in operation or, (iii) has a normal life inherently shorter than the warranty periods specified in Paragraph B, or (iv) is not properly stored, installed, used, maintained or repaired, or, (v) has been subjected to any other kind of misuse or detrimental exposure, or has been involved in an accident.

E. The preceding paragraphs set forth the exclusive remedies for claims based upon defects in or nonconformity of the Equipment, whether the claim is in contract, warranty, tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.

Harris Corporation
RF Communications Division
221 Jefferson Ridge Parkway
Lynchburg, VA 24501
1-585-244-5830

Harris Corporation
RF Communications Division
1680 University Avenue
Rochester, NY 14610

ECR-7047L