TC1920

Telephone/Analog Extender over Ethernet (10/100Base-T)

User Manual

MNL-19200-01-03

TC COMMUNICATIONS
FIBER OPTIC CONNECTIVITY

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Record of Revisions

Revision	Date	Description of Changes
1.1	04/20/2018	Initial Release.
1.2	09/01/2020	Firmware version update. LED defintion update
1.3	06/18/2021	Feature update.

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Guide to Alert Symbols

These alert symbols are used in Caution, Warning, and Danger notes.

Symbol	Meaning
	Pinching or crushing hazard.
	Electrical hazard.
	Equipment alert: be careful of damage from static electricity.
	A general alert: used for all other hazardous conditions (referring to people, not equipment).

Guide to Safety Notes

Important	*Important* is used for information that helps you: • Handle equipment efficiently • Avoid losing work in a software program • Increase reliability
Notice	*Notice* is used for information that helps you prevent damage to equipment.
Notice 	*Notice* with the static electricity alert symbol is used for information that helps you prevent damage to equipment from static electricity.
Caution 	*Caution* is used to alert you to a possible hazard which could cause a minor injury. Caution notes include an alert symbol, such as this general alert.
Warning 	*Warning* is used to alert you to a possible hazard which **could** cause a serious injury or even death. Warning notes include an alert symbol, such as this pinching hazard alert, indicating that there is a serious pinching or crushing hazard.
Danger 	*Danger* is used to alert you to an imminent hazard which, if not avoided, **will** result in death or serious injury. This word is reserved for only the most extreme conditions, when following procedures correctly is a matter of life or death. *Danger* is used especially for conditions where there are limited safeguards in place. Danger notes include an alert symbol, such as this electrical hazard alert, indicating that there is danger of severe shock or electrocution.

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Chapter 1 Introduction

1.1 General Information

This manual is intended to describe the features and functionality in addition to aiding in the planning, configuring, commissioning, and maintaining of the TC1920 Telephone/Analog over IP extender.

1.2 Product Description

The TC1920 Ethernet Telephone/Analog Extender enables telephone service over an Ethernet network via 10/100Base-T connections. It has built-in codecs that digitize voice and converts to packets for transmission between local and remote TC1920s, with designated IP addresses, as well as other SIP-based Voice over IP (VoIP) devices. It is compatible with PBX and Key Systems (POTS).

LAN connections can be made by most types of Full Duplex Ethernet devices, including switches, routers, bridges, transceivers, etc. A web-based management user interface is provided monitoring, maintenance, and configuration of the unit.

1.2.1 Front and Back Panels

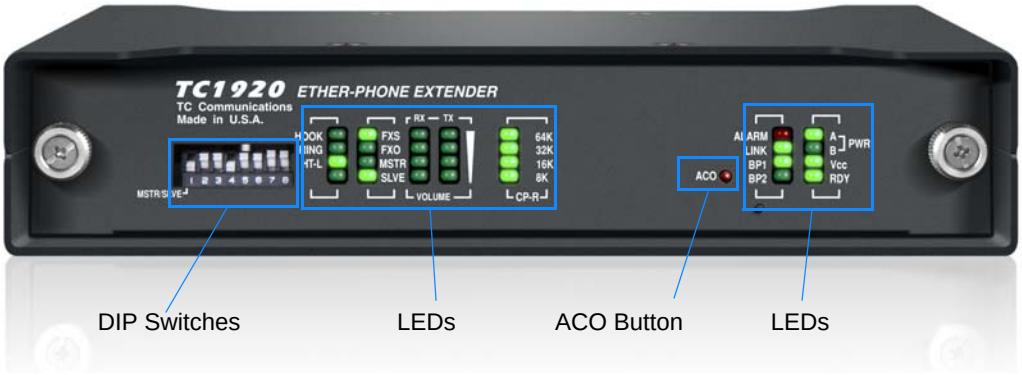


Figure 1-1 TC1920 Front Panel

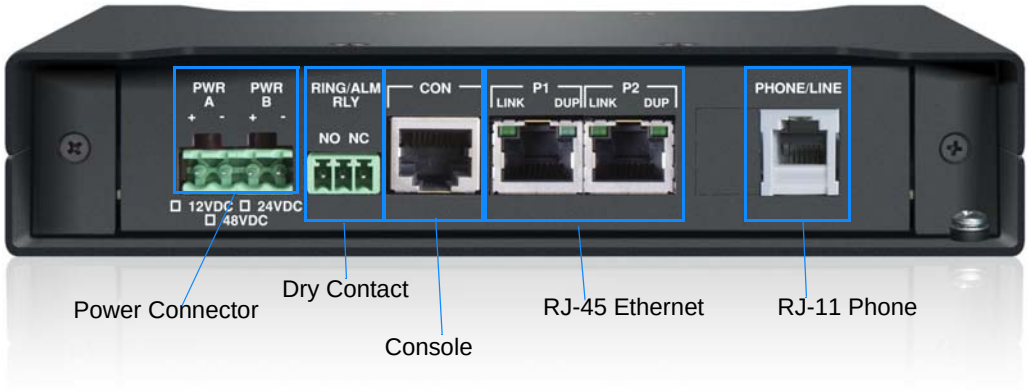


Figure 1-2 TC1920 Back Panel

1.2.2 Hardware

This card has the following:

- Serial Console port
- Two FastEthernet ports
- One FXS port
- One Dry Contact relay
- Temperature Options (-20°C to +70°C or -40°C to +80°C)

1.2.3 Features

The TC1920 is a complete telephony solution to address customer communications needs. By simply connecting to your existing LAN, you have added the flexibility of a phone system in even your most remote location.

- The TC1920 Telephone/Analog over IP is a complete call processing center in a compact package with no central hub required.
- Compatible with analog phones, the TC1920 is able to utilize QoS prioritization to guarantee toll quality voice regardless of network traffic or congestion.
- Although TC1920 is designed for the LAN environments often found in the industrial automation arena, but it could also work over the Internet, preferably in a VPN setting to have better voice quality.

This card has the following features:

- Master/Slave Mode for Quick Start
- Internal Address Book or SIP Server
- Hot Link with Heartbeat
- Group Hunting or Dialing
- Volume Control, Mute
- Caller ID
- Echo Cancellation (ITU-T G.168)
- Fax support (T.38)
- SRTP and TLS

1.2.4 Applications

The TC1920 is intended to provide reliable telephone/analog service over Ethernet networks. It is often used as critical phone links in a campus environment such as:

1. Utility Substation Networks.
2. Airport service stations
3. Rail side maintenance stations
4. Highway roadside phones
5. Military compound
6. Parking lot entrance

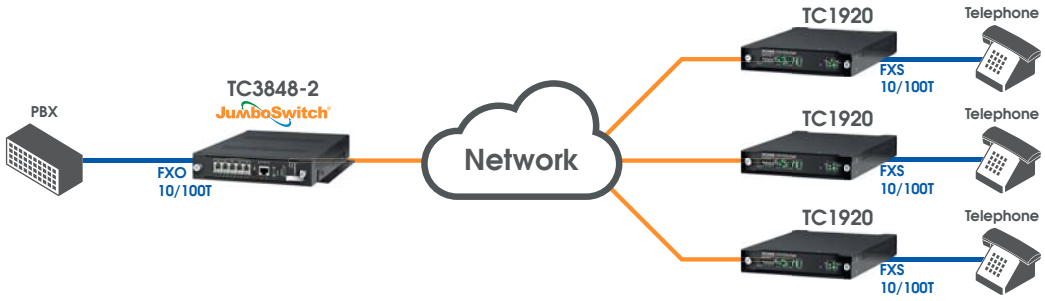


Figure 1-3 Typical Application Using TC1920s to Extend Telephone Service via an Ethernet Network in a Substation Environment

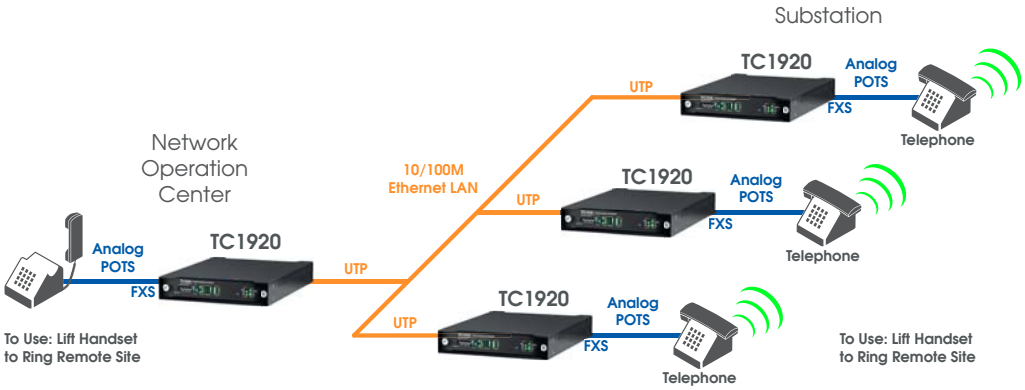


Figure 1-4 Typical Application Using TC1920s to Provide Hotlink Service to Multiple Remote Locations

1.2.5 Compliance

This card complies with the following standards:

- IEEE 802.3 and 802.3u
- Compliant with SIP
- Compliant with SDP
- Media support: RTP Control Protocol
- Codecs supported:
  - G.711 µ-Law/A-Law
  - G.726-32, G.726-16
  - G.729A
  - T.38
- IEC 61850-3
- IEEE 1613 and NEMA TS-2

1.2.6 Environment

The standard operating temperature of the card falls within most environmental conditions (i.e. -20°C to +70°C). However, the TC1920 is also offered with an extreme temperature option for harsher conditions (i.e. -40°C to +80°C). There is no cooling fan or filtering devices.

1.2.7 Administration and Management

The TC1920 can be remotely managed through the following features:

- Web-based graphical user interface (WebUI)

1.2.8 Power

There are several power supply options available. See *Power,* on page 1-5.

- The power supply comes with the unit.
- Internal sensor determine the type of power supply installed an adjusts the unit automatically.
- LEDs indicate if power is present.

NOTE	The dual load-sharing power supplies feature automatically switches over in the event of a power failure.

1.3 Specifications

Data Rates	
Ethernet	10/100 Mbps

Capacity	
Ethernet	2 back ports
Telephone/Analog	1-FXS

Telephone/Analog	
FXS Connectors	RJ-11

Ethernet	
Ethernet Standards	IEEE 802.3, 802.3u
Ethernet Connectors	RJ-45

Visual Indicators	
System LEDs	PWR A/B, Vcc, RDY, Alarm, Link, BP1, BP2
Ethernet LED	Link, Dup
Phone LEDs	Ring, Hook

Power Supply Type	Input Range		Power Consumption
	Min	Max	
12 VDC	10 VDC	18 VDC	< 10W
24 VDC	18 VDC	36 VDC	
-48 VDC	36 VDC	72 VDC	

General Data	
Weight	(0.43 kg) 0.95 lbs

Physical Dimensions	
Height	(3.15 cm) 1.24 inches
Width	(17.68 cm) 6.96 inches
Depth	(22.61 cm) 8.90 inches

1.3.1 Default Software Configuration

Network Management (WebUI)	
Configuration	Default
IP Address	192.168.1.1 (Master) 192.168.1.2 (Slave)
Subnet Mask	255.255.255.0
Gateway IP	0.0.0.0
Username	admin
Password	admin

Telephone/Analog		
Configuration	Options	Default
SIP Option	SIP Server, Address Book	Address Book
Codecs	G.711 µ-Law, G.711 A-Law, G.726-32, G.716-16, G.729A	G.711 µ-Law, G.711 A-Law, G.726-32, G.726-16, G.729A

1.3.2 Environmental & EMI Compliance

	Test	Industrial Standards	TC Communications - JumboSwitch Type Test and Levels	
			Power Supply Unit (PSU)	RJ-45 & Signal
Temperature/Humidity	Low Temperature Use	IEC 61850-3, IEEE 1613, NEMA TS-2	IEC 60068-2-1; Ae; -40°C; 16 hour	
	Low Temperature Storage	IEC 61850-3, IEEE 1613, NEMA TS-2		
	High Temperature Use	IEC 61850-3, IEEE 1613, NEMA TS-2	IEC 60068-2-2; Be; +80°C; 16 hour	
	High Temperature Storage	IEC 61850-3, IEEE 1613, NEMA TS-2	IEC 60068-2-2; Bd; +85°C; 16 hour	
	Damp Heat	IEC 61850-3, IEEE 1613, NEMA TS-2	IEC 60068-2-30; Db; +55°C; 95%; 96 hours	
Mechanical	Vibration	IEC 61850-3, IEEE 1613, NEMA TS-2	IEC 60068-2-6; Fc; 3 - 150 Hz; 7.5 mm; 2 g; 10 sweeps per axis	
	Shock	IEC 61850-3, IEEE 1613, NEMA TS-2	IEC 60068-2-27; Ea; 30g; 11ms	
ElectroMagnetic Compatibility	Electrostatic Discharge Immunity	IEEE 1613	IEC 61000-4-2; 8kV contact; 15 kV air	
	Radiated RF Immunity	IEC 61850-3, IEEE 1613	IEC 61000-4-3; 80 MHz - 2000 MHz; 10 V/m; AM 80% 1 kHz	
	EFT/Burst Immunity	IEC 61850-3, IEEE 1613	IEC 61000-4-4; 4 kV CM; TM	IEC 61000-4-4; 4 kV CM; TM
	Surge Immunity	IEC 61850-3	IEC 61000-4-5; 4 kV LG; 2 kV LL	IEC 61000-4-5; 4 kV LG; 2 kV LL
	Conducted RF immunity	IEC 61850-3	IEC 61000-4-6; 150 kHz - 80 MHz; 10 V; AM 80% 1 kHz	IEC 61000-4-6; 150 kHz - 80 MHz; 10 V; AM 80% 1 kHz
	Magnetic Field Immunity	IEC 61850-3	IEC 61000-4-8; 50 Hz; 100 A/m cont.; 1000 A/m 1 s	
	Damped Oscillatory Magnetic Field Immunity	IEC 61850-3	IEC 61000-4-10; 100 kHz; 30 A/m	
	Damped Oscillatory Magnetic Field Immunity	IEC 61850-3	IEC 61000-4-10; 1 MHz; 30 A/m	
Power Supply Unit (PSU) Variations	AC Voltage Dips	IEC 61850-3	IEC 61000-4-11; 30% & 100%, 0.5s	NA
	DC Voltage Dips	IEC 61850-3	IEC 61000-4-29; 40% & 70%, 0.1s	NA
	Damped Oscillatory Wave	IEC 61850-3	IEC 61000-4-12; 2.5 kV CM, 1.0 kV DM @1MHz	IEC 61000-4-12; 2.5 kV CM, 1.0 kV DM @ 1MHz
	Conducted PF CM Voltage	IEC 61850-3	IEC 61000-4-16; 50 Hz; 30 V cont.; 300 V 1s	IEC 61000-4-16; 50 Hz; 30 V cont.; 300 V 1s
	Conducted Emission	IEC 61850-3	CE/FCC/CISPR22 class A	CE/FCC/CISPR22 class A
	Radiated Emission	IEC 61850-3	CE/FCC/CISPR22 class A	
Dielectric	Dielectric 50 Hz Test	IEEE 1613	IEC 60255-5; 2 kV	IEC 60255-5; 0.5 kV
	Impulse Voltage Test	IEEE 1613	IEC60255-5; 5 kV	IEC 60255-5; 5 kV

Chapter 2 Installation

2.1 Unpacking

Before unpacking any equipment:

- Inspect all shipping containers for evidence of external damage caused during transportation
- Inspect for damage after it is removed from the containers

IMPORTANT

Any claims concerning shipping damage should be made directly to the pertinent shipping agencies. Any discrepancies should be reported immediately to the Customer Service Department at TC Communications, Inc. at (949) 852-1973.

2.2 Equipment Location

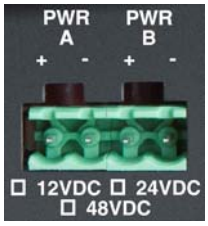
The TC1920 should be located in an area that provides adequate light, work space and ventilation.

IMPORTANT

Avoid locating it next to any equipment that may produce electrical interference or strong magnetic fields, such as elevator shafts or heavy duty power supplies.

As with any electronic equipment, keep the unit from excessive moisture, heat, vibration and freezing temperatures.

2.3 Power Supply



The TC1920 can be powered by an external DC power adapter rated 12 VDC @300mA. There are two terminal block connectors labeled "PWR A" and "PWR B" only one is required to power up the unit. Since each TC1920 card is equipped with a power redundancy capability, the power LEDs on the front panel will light according to which power jack (A or B) is connected. Both LEDs will light when power redundancy is utilized.

IMPORTANT

Read and only connect a supply voltage that corresponds to the type plate of your device. Make sure that the contact load capacity of the signal contact is not exceeded.

2.4 Dry Contact Alarm Relay (DCAR)

A terminal block connector at the rear panel provides for the Dry Contact Alarm Relay. This relay can be used in NO (Normal Open) or NC (Normal Close) configuration.

When used in NO (Normal Open) configuration, the relay will close if the unit loses power completely or the Alarm is on. The relay remains open during normal operation.

When used in NC (Normal Close) configuration, the relay will open if the unit loses power completely or the Alarm is on. The relay remains close during normal operation.

2.5 System Start Up

Apply the power by plugging the power plug into a power jack (both PWR A & PWR B for dual power units).

After power is applied, all LEDs (except PWR & VCC LEDs) will flash momentarily and the following LED status should be observed from the front and back panels:

1. The Power "A" and/or "B" and VCC LEDs should be lit.
2. The "FXS" LED will be solid on.
3. The "LINK" LED of the Ethernet ports on the back panel will be on or flashing indicating that the Ethernet connection is established. This is normal when an Ethernet cable is connected to an Ethernet port.

2.6 System Configuration

The TC1920 has been pre-tested and switches have been set per factory specifications. Refer to *5.4.1 Using Front Panel Indicator LEDs For Diagnostics,* on page 5-5 for detailed LED descriptions.

2.6.1 TC1920 Front Panel

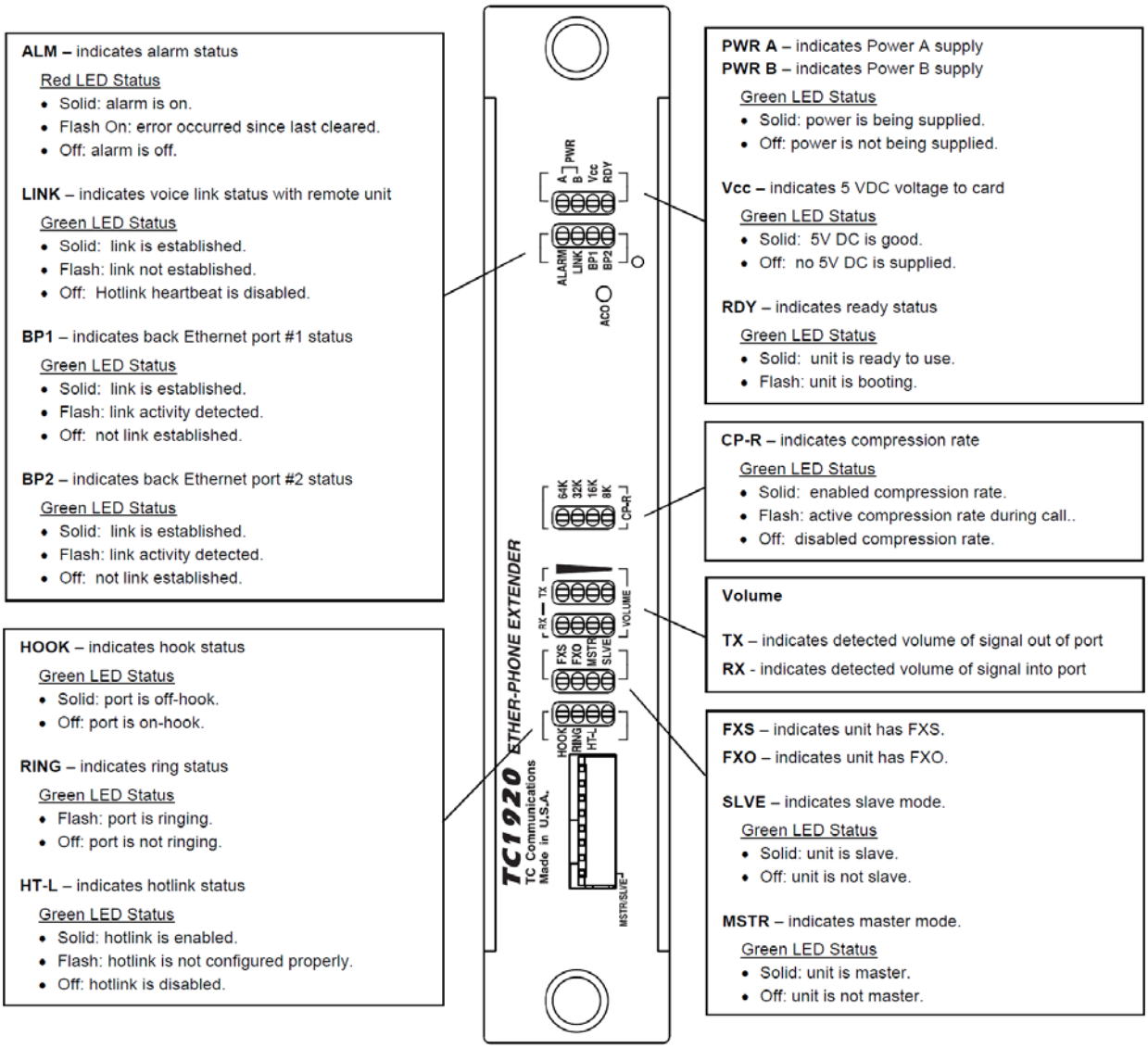


Figure 2-1 TC1920 Front Panel

2.6.1.1 Front Panel DIP Switch Functions

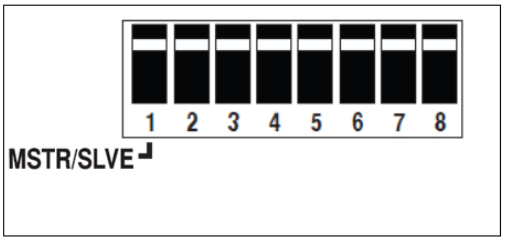


Figure 2-2 Front Panel Dip Switch

The DIP Switch functions on the TC1920 are described below.

- **MSTR/SLVE** selects the default pairing mode. Up position sets Master and down position sets Slave.

NOTE	The selected mode will only be used when unit is restored to default. The default settings may not be used if configuration changes are made through the user interface.

2.6.2 TC1920 Rear Panel

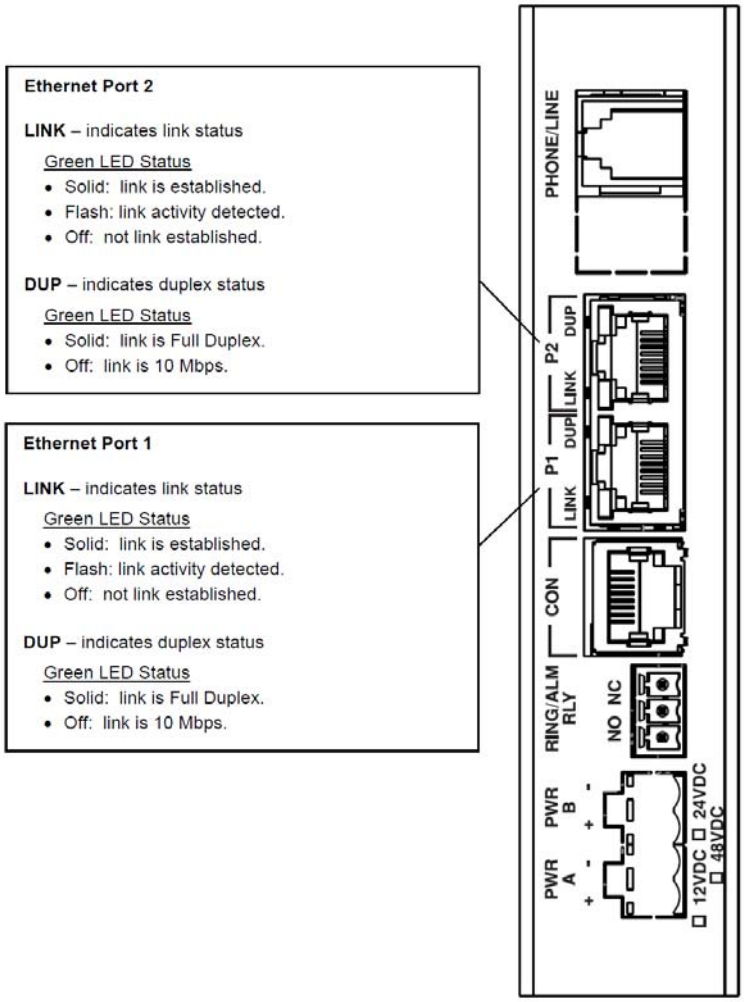


Figure 2-3 TC1920 Rear Panel

2.7 Unit Power

2.7.1 Turning on the unit

After powering up the unit, there will be thirty seconds of internal circuit testing.

2.8 Cabling

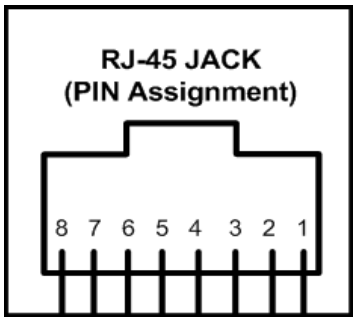
The TC1920 has 4 ports on the back panel:

- 1x Telephone/Analog port
- 1x RJ-45 9600-baud serial console port
- 2x FastEthernet ports

2.8.1 Console Port

This port allows you to manage the unit through CLI using a RS-232 serial interface.

DB-9 to RJ-45 Serial Data Console Cable	

Console Cable RJ-45 Pin Assignment	
1 - N/A	
2 - N/A	
3 - Tx	
4 - GND	
5 - GND	
6 - Rx	
7 - N/A	
8 - N/A	

Serial Console Port Specifications	
Baud Rate	9600 bps
Databits	8
Parity	None
Stopbits	1
Flow Control	None

2.8.2 Telephone/Analog Port

This port is used to connect to end devices (FXS).

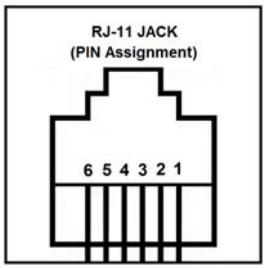
FXS Port RJ-11 Pin Assignment	
1 - N/A	
2 - N/A	
3 - Ring	
4 - Tip	
5 - N/A	
6 - N/A	

Figure 2-4 RJ-11 Pin Assignments

2.8.3 FastEthernet Ports

These ports are used for management and connecting to the Ethernet network.

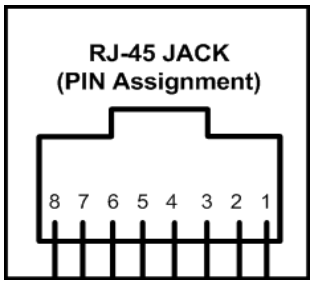
Ethernet Port RJ-45 Pin Assignment	
1 - Output, Tx+	
2 - Output, Tx-	
3 - Input, Rx+	
4 - N/A	
5 - N/A	
6 - Input, Rx-	
7 - N/A	
8 - N/A	

Figure 2-5 RJ-45 Pin Assignments

Chapter 3 Quick Start Guide

3.1 Introduction

The TC1920 is designed for quick and easy installation and validation. After the mechanical installation (see *2.3 Power Supply, on page 2-1*), this quick-start chapter describes how to perform the TC1920 initial setup in a basic network application.

3.2 Master/Slave Pairing Modes

As a quick and easy tool to setup and validate the TC1920 on a LAN, the Master and Slave pairing modes were created.

Each mode consists of preset configurations that allow two units to be quickly setup to paired and operating with one another immediately after boot-up.

Once boot-up has completed, LEDs should indicate that the units have linked with each other. At this point calls can be made between the two units. If the units indicate link and calls can be made, then this is a quick validation that the network is able to support the TC1920.

3.2.1 Master Presets

The following are the basic presets for a unit in Master mode.

IP Address:	192.168.1.1
Subnet Mask:	255.255.255.0
Phone Number:	101
Hotlink Number:	201

3.2.2 Slave Presets

The following are the basic presets for a unit in Master mode.

IP Address:	192.168.1.2
Subnet Mask:	255.255.255.0
Phone Number:	201
Hotlink Number:	101

3.3 Procedure

This section will guide you through the basic setup and initialization for a pair of TC1920 units.

NOTE	The following procedure assumes that the units have been restored to default, and are running factory default settings.

To install and setup the units

1. Set Unit #1 as Master by setting dip switch 1 to MSTR (up position). Set Unit #2 as Slave by setting dip switch 2 to SLVE (down position).
2. Power up both units.
3. After booting is complete, each unit should be running at their respective default pairing modes (as set by the dip switches).

3.4 Setup and Configuration Verification

The following procedure helps you determine if there are any corrections to be made to the setup.

To verify the unit installation

1. Connect the TC1920 units' P1 ports together through an Ethernet connection with phone stations connected to TC1920 Phone/Line ports.
2. The BP1 LEDs of each unit should turn on and flash occasionally.
3. After a few seconds, the unit should indicate that their are linked with one another.
4. Check the following LEDs to verify both units are operating properly:

RDY	Solid ON
LINK	Solid ON
FXS	Solid ON
MSTR	Solid ON (Unit 1 Master)
SLVE	Solid ON (Unit 1 Slave)
HT-L	Solid ON

5. FXS ports will perform a quick ring test after initialization has completed.

Figure 3-1 TC1920 Master (Top) & Slave (Bottom) Units

Chapter 4 Management through the Web

4.1 Introduction

TC Communications' web-based management is an integrated, user-friendly interface on-board the unit. This interface can be accessed through the Ethernet Port on the back of the unit, or over your IP network.

The web interface can be accessed remotely over your IP network if the unit has been integrated with your local area network using standard Ethernet cabling.

This reference chapter defines each page's status, configurations, and describes the parameters of the options you can choose.

NOTE	WebUI is supported on the following web browsers: • Google Chrome • Mozilla Firefox 4 or later • Microsoft Edge • Microsoft Internet Explorer 9 or later • Apple Safari

4.2 Setup

Connect by typing the IP address assigned to the interface card into a web browser's address field. Setup, diagnostics, and management is accessible via HTTP.

To connect a PC

1. Using a CAT-5E or CAT-6 cable, connect the PC to the Ethernet port or any Ethernet port on the JumboSwitch® network
2. Access the PC web browser and enter the TC1920 IP address.
3. Login with default username "*admin*" and password "*admin*" or use the password and user name assigned to you by the administrator.

4.3 Screens

This reference section defines each screen in TC1920 and describes the parameters of the options you can choose with descriptions of the configurations. The Navigation Menu and section tabs provide access the screens that operate the unit. This section begins with a chart that shows the order in which each screen or page appears.

Web Management Page

4.3.1 Overview

Features and options associated with the TC1920 are located in the menu area on the left side of the web page display. This area displays breadcrumb style information of the current option selected and other available options.

The home page displays summary information of the TC1920. The Settings tab allows for basic settings to be configured.

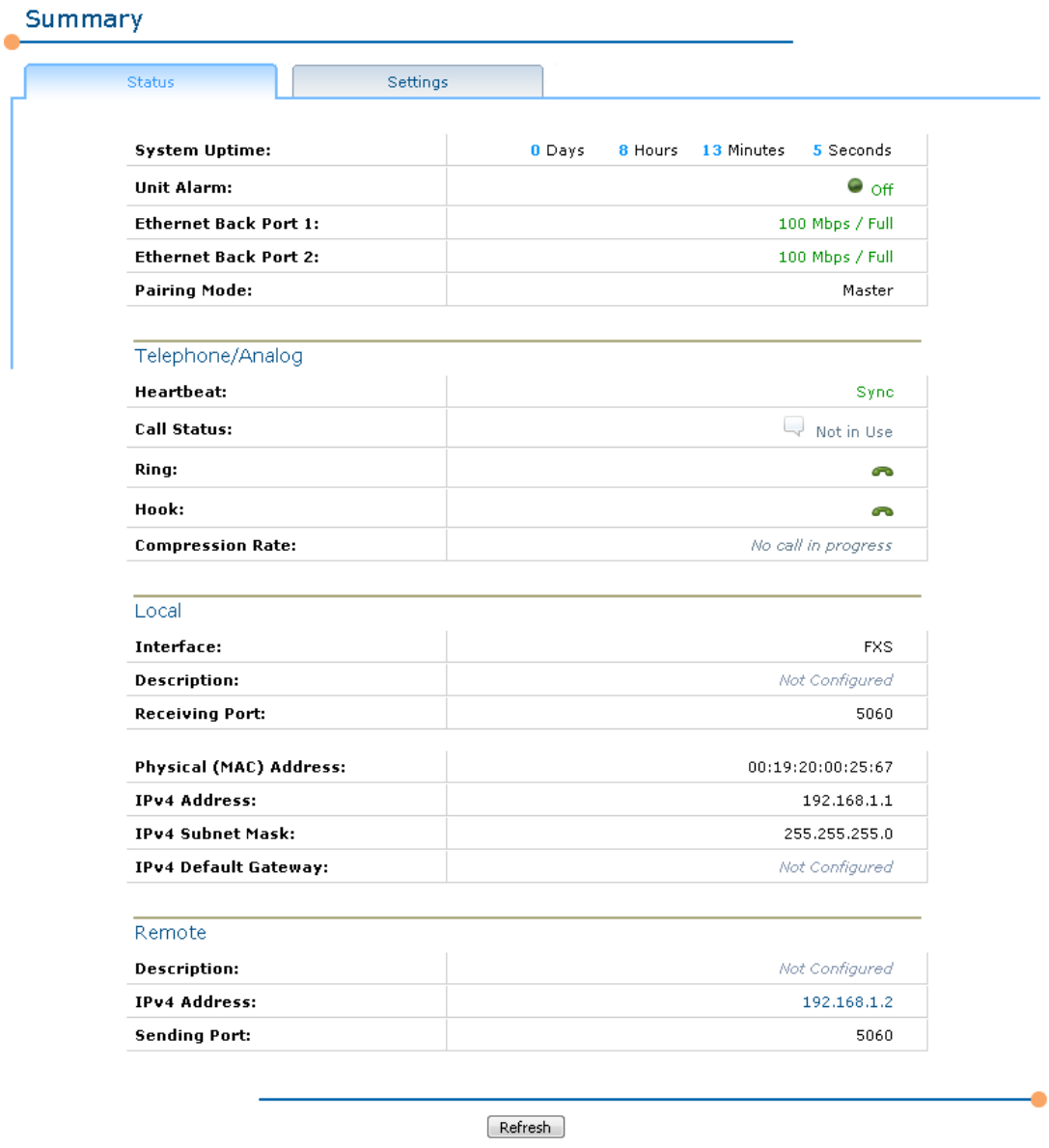


Figure 4-1 Summary Status

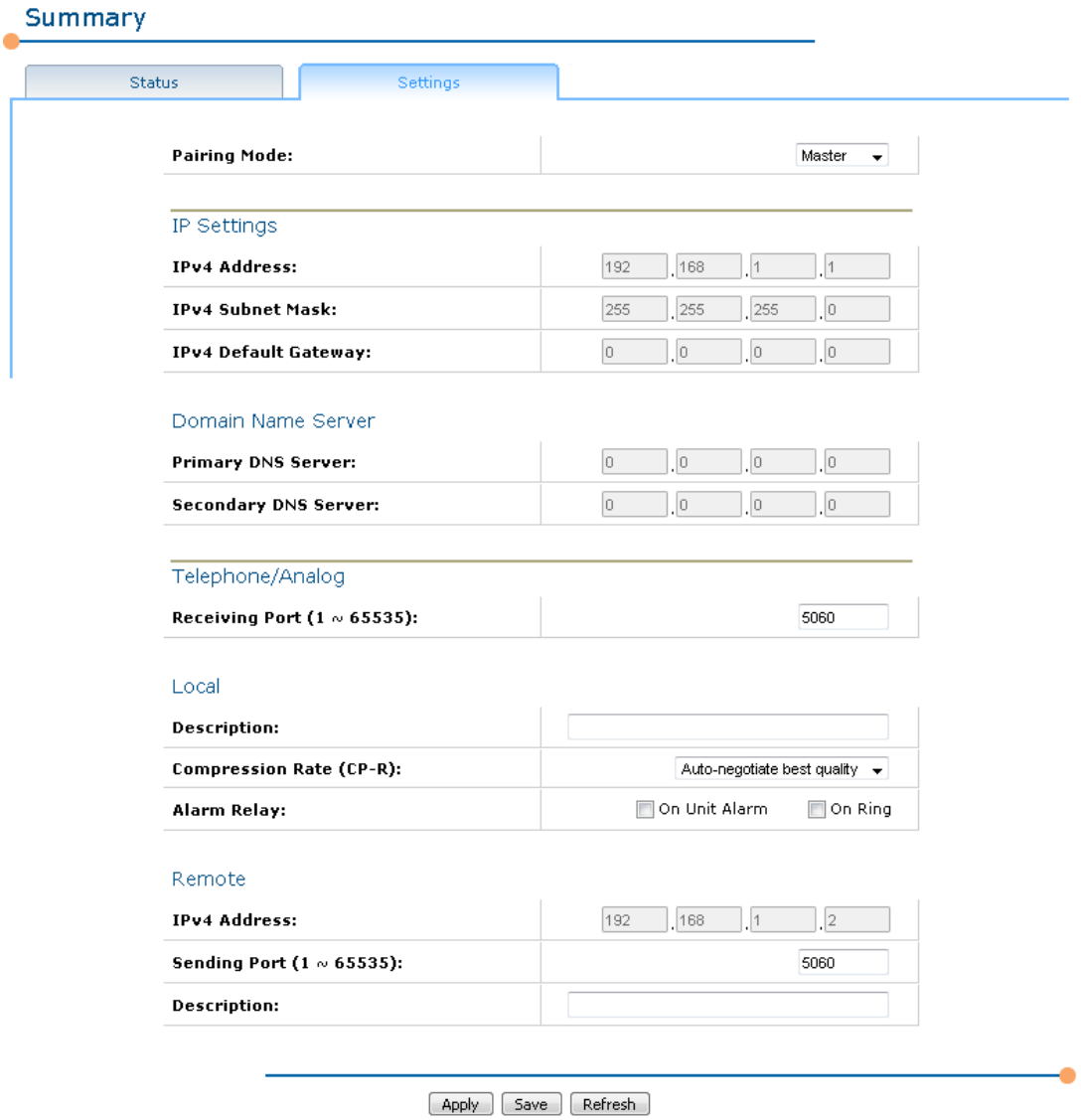


Figure 4-2 Summary Settings

4.3.2 System Settings

This section provides general system-wide settings.

Information

This page allows the system administrator to customize the definitions so that the unit can be readily identified when managing the unit.

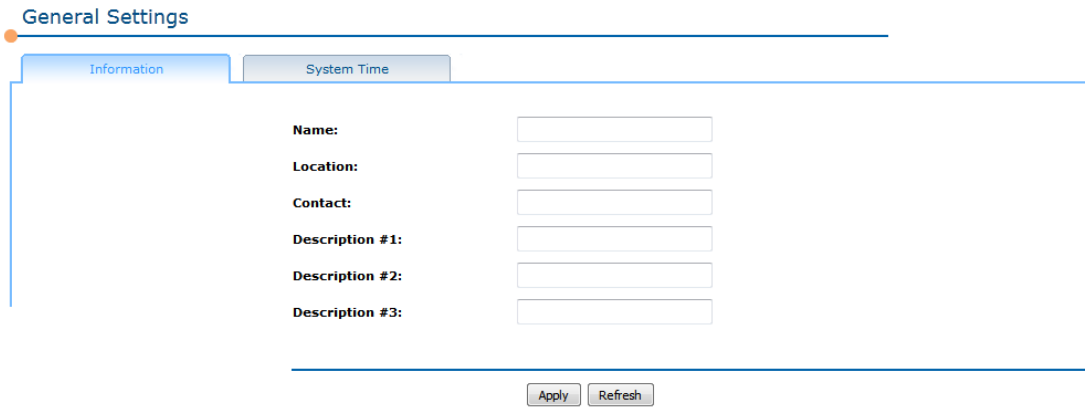


Figure 4-3 System Information

Name	Label of unit
Location	Location of unit
Contact	Contact information of administrator od unit
Description #1-3	Additional information regarding the unit

NOTE	The name and location will appear on the login and navigation sidebar for convenient identification of the unit.

System Time

This page allows the administrator to configure the system time manually.

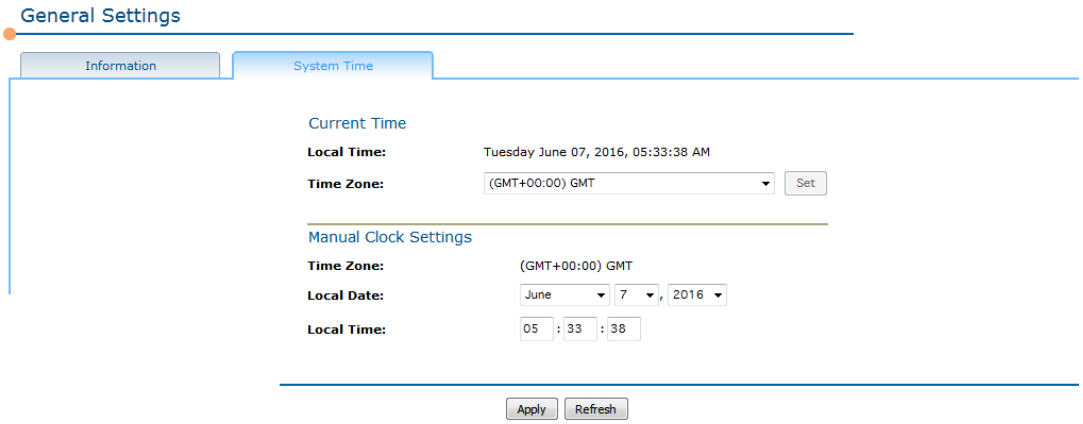


Figure 4-4 System Time

Current Time

Local Time	Displays the current local time of the unit.
Time Zone	Designates the time zone for the unit.

Manual Clock Settings

Time Zone	Displays the current time zone configured for the unit.
Local Date	Manually configure the date of the unit.
Local Time	Manually configure the time of the unit.

4.3.3 IP Settings

This page provides the ability to configure the static IP address and DNS servers of the unit

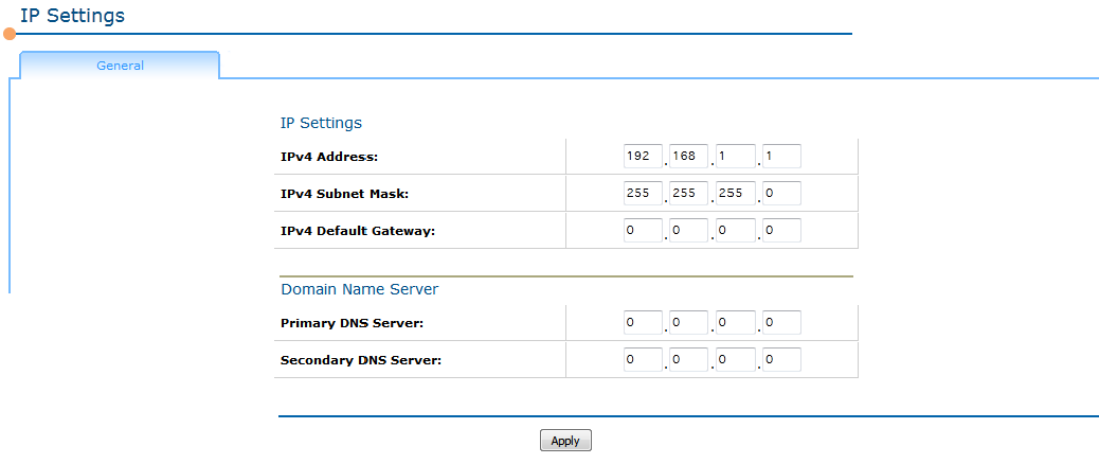


Figure 4-5 IP Settings

4.3.4 Unit Alarm

This page displays the current and previous unit alarm conditions, providing quick identification of problems. It provides users the ability to enable alarm features, define alarm trigger criteria, and clear the alarm status. An error is color-coded red to indicate an alarm condition and green to indicate no alarm.

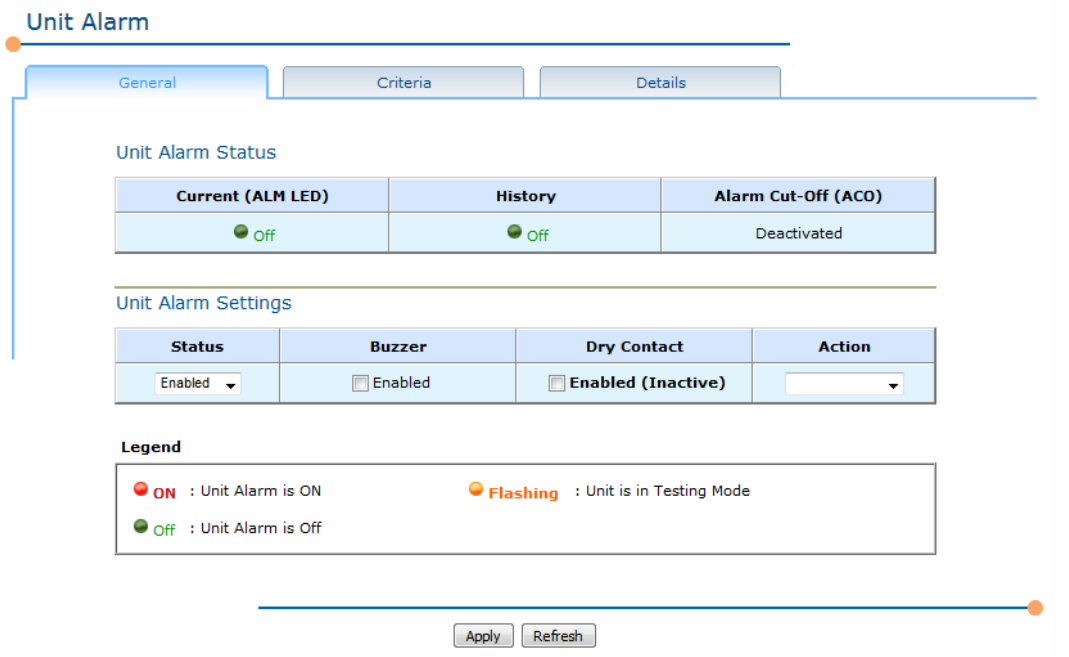


Figure 4-6 Unit Alarm General Settings

Unit Alarm Status

Current	Displays the current status of the Unit Alarm.
History	Displays if the Unit Alarm was triggered since last cleared.
Alarm Cut-Off (ACO)	Silences the Unit Alarm indicators until the next criteria triggers the alarm.

Unit Alarm Settings

Status	Enable or disable the Unit Alarm.
Buzzer	Enable or disable the alarm buzzer (audio indicator) when the Unit Alarm has been triggered.
Dry Contact	Enable or disable the alarm relay (remote indicator) when the Unit the Alarm has been triggered.
Action	Active the ACO or clear the alarm history.

Unit Alarm Criteria

Unit Alarm Criteria are defined by selecting the *Criteria* tab from the Unit Alarm page. This action will bring up the Unit Alarm Criteria page where the user may select the alarm criteria to be monitored by enabling the associated check box. Criteria are divided into categories, which include:

- Telephone/Analog

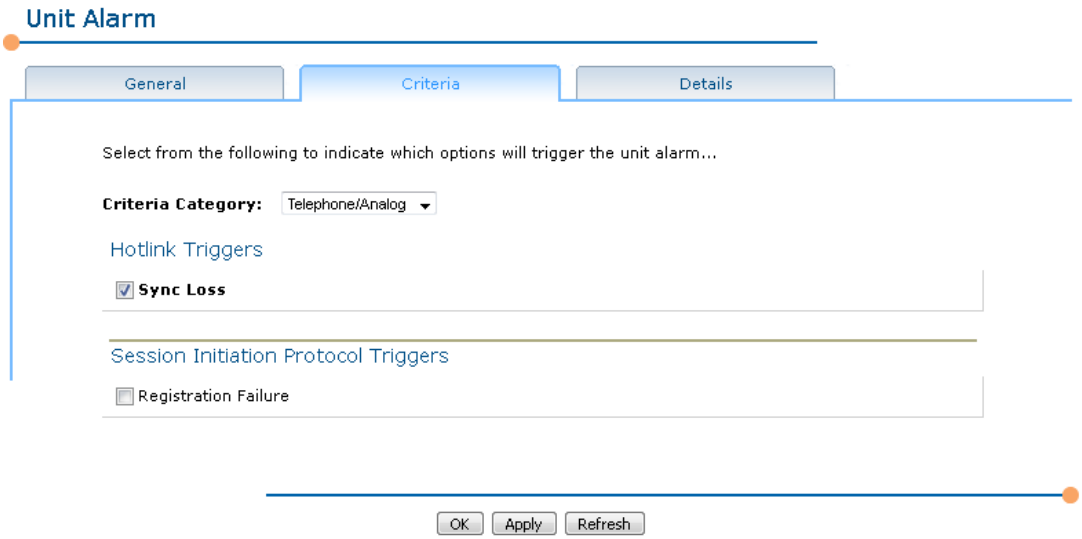


Figure 4-7 Unit Alarm Criteria

Unit Alarm Details

Unit Alarm Details display what alarm criteria are currently triggering the Unit Alarm. A history of the criteria that triggered the Unit Alarm since last cleared can also be viewed from this page.

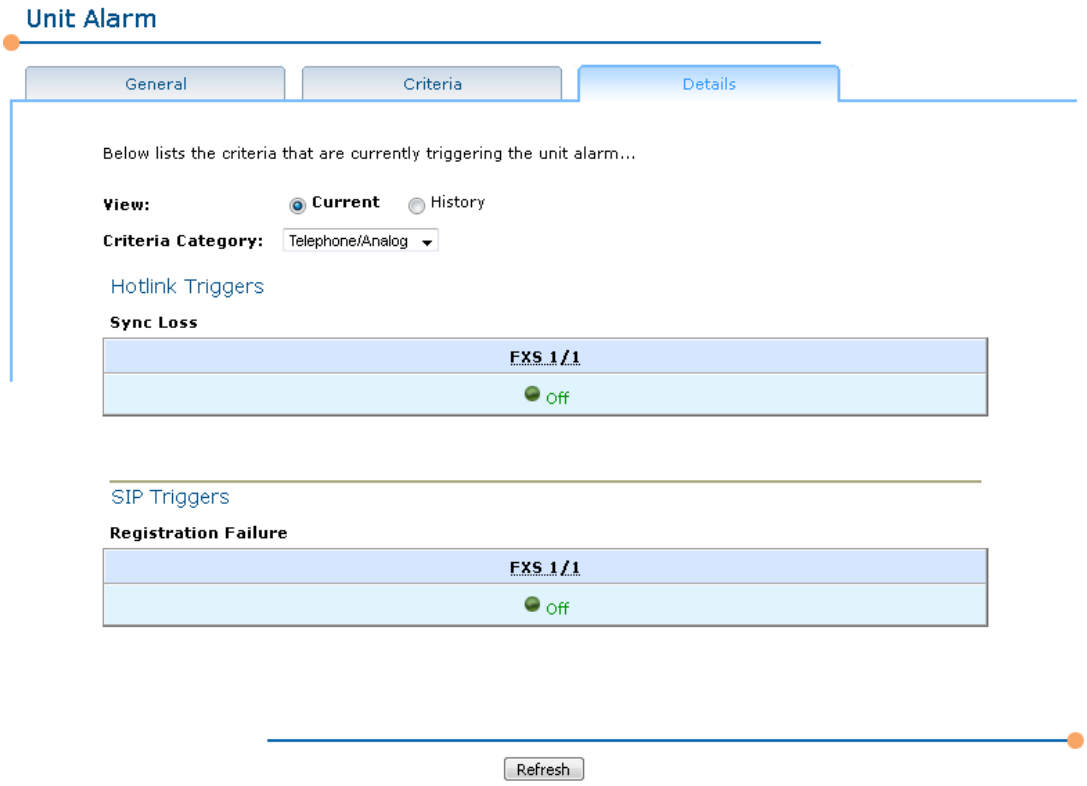


Figure 4-8 Unit Alarm Details Current

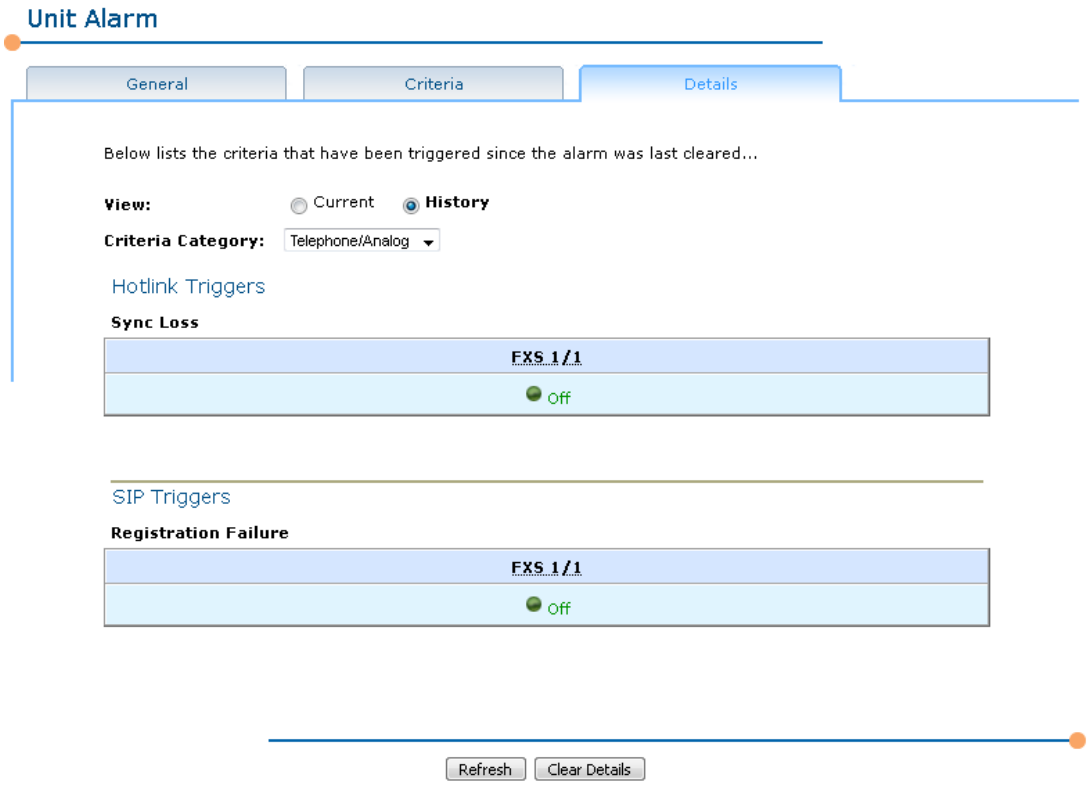


Figure 4-9 Unit Alarm Details History

4.3.5 Advanced

This page provides access to specialized functions. There are icons that link to functions such as: reboot, display product information, and firmware upgrade.

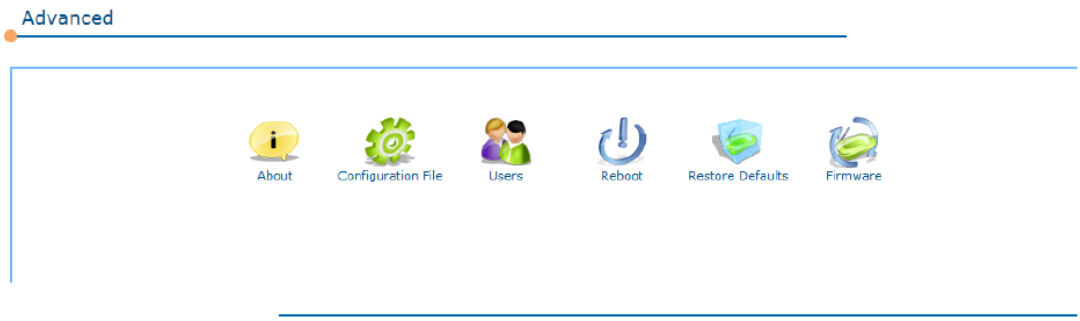


Figure 4-10 Advanced Settings

About

This page provides you with factory information about the interface card including Product Number, Software Version, Hardware Version and Hardware Serial Number along with TC Communications' contact information.

Figure 4-11 About

Configuration File

This page provides configuration file options for management. Most configuration changes will saved to the Running Configuration file and will take effect immediately after being applied. The Running Configuration must be saved to the Startup Configuration to ensure that changes remain in effect every time the unit goes through a cold or warm start.

The unit's configurations may be saved and exported to a network location or other storage device. In this way, it is possible to rapidly restore a failed card during troubleshooting by loading the saved configuration file into the unit.

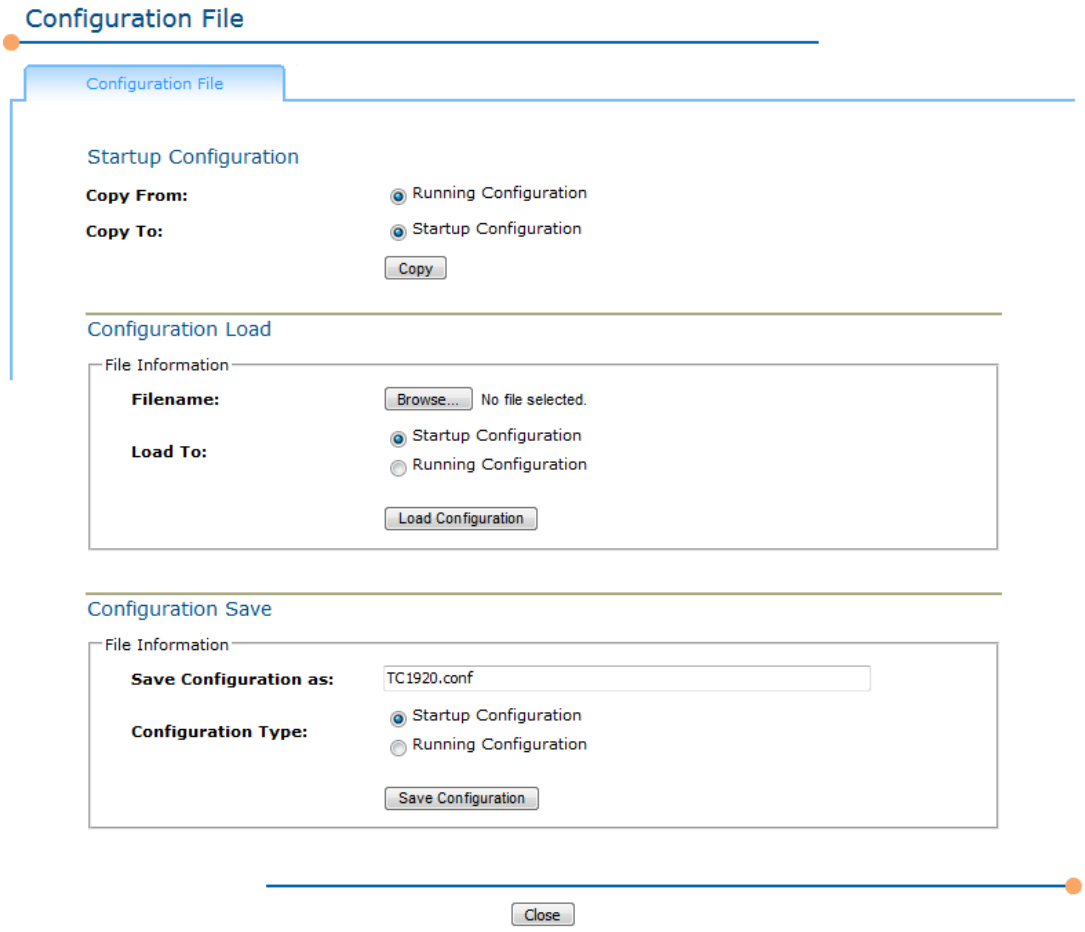


Figure 4-12 Configuration Files

Users

This page allows the user to update the Username and Password to access the web management interface.

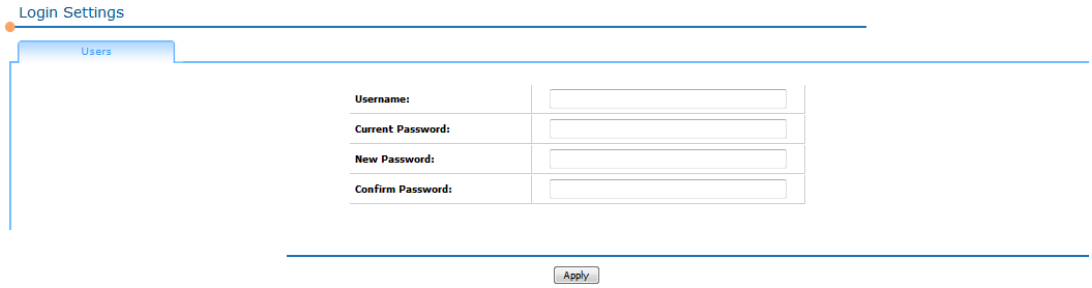


Figure 4-13 Login Settings

Reboot

This command initiates a reboot of the unit.

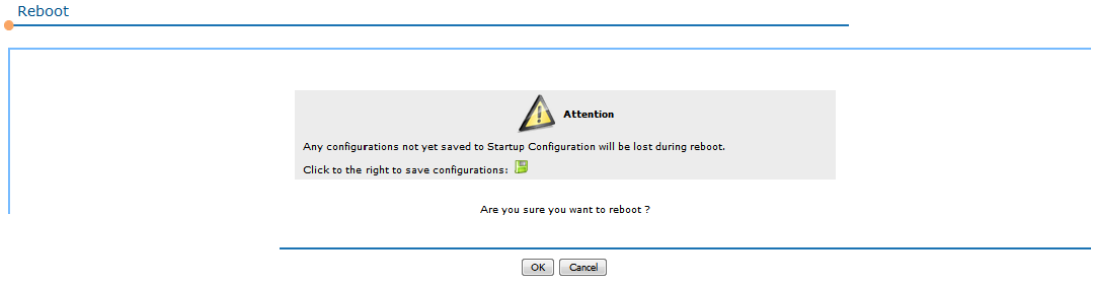


Figure 4-14 System Reboot

Restore Defaults

You can use this command to reset the unit to factory default settings.

NOTE	Initiating the Restore Defaults option will reset the card to the default IP Address (See *1.3.1 Default Software Configuration,* on page 1-7)

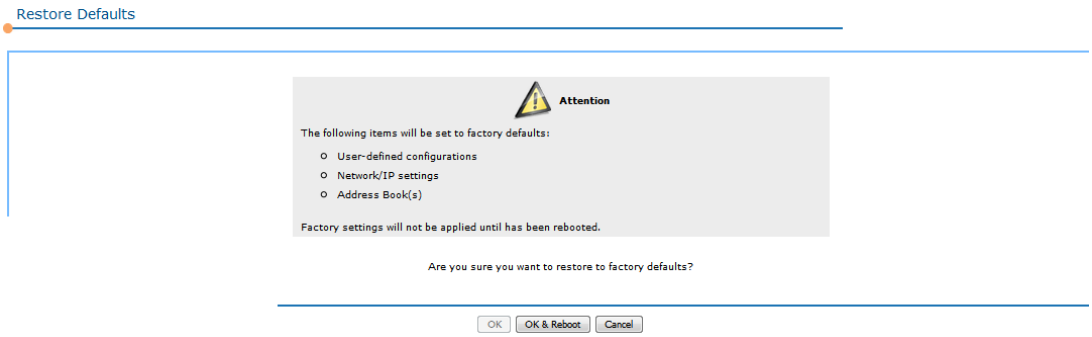


Figure 4-15 Restore Defaults

Firmware

This page provides TC Communications with a method to continuously improve products through feature and reliability firmware upgrades.

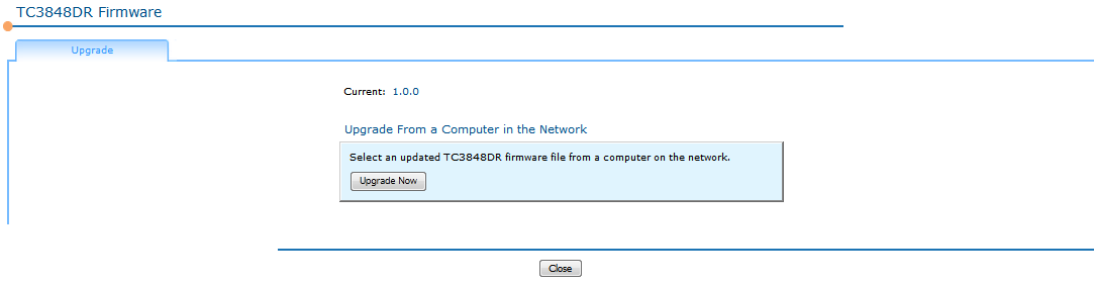


Figure 4-16 Firmware - Upgrade

4.3.6 Telephone/Analog

4.3.6.1 Telephone/Analog > Status

The telephone/analog status includes the call status, Hotlink Heartbeat status, and server status.

Call Status

This page provides the call statuses for the unit.

Figure 4-17 Telephone/Analog Status

Hook	Displays the on-hook/off-hook status of the port.
Ring	Displays the ringing status of the port.
Call Status	Displays the current call status including the Caller ID of the remote port.
Codec	Displays the codec used during a call in progress.

Hotlink

This page provides the hotlink information and statuses for the unit.

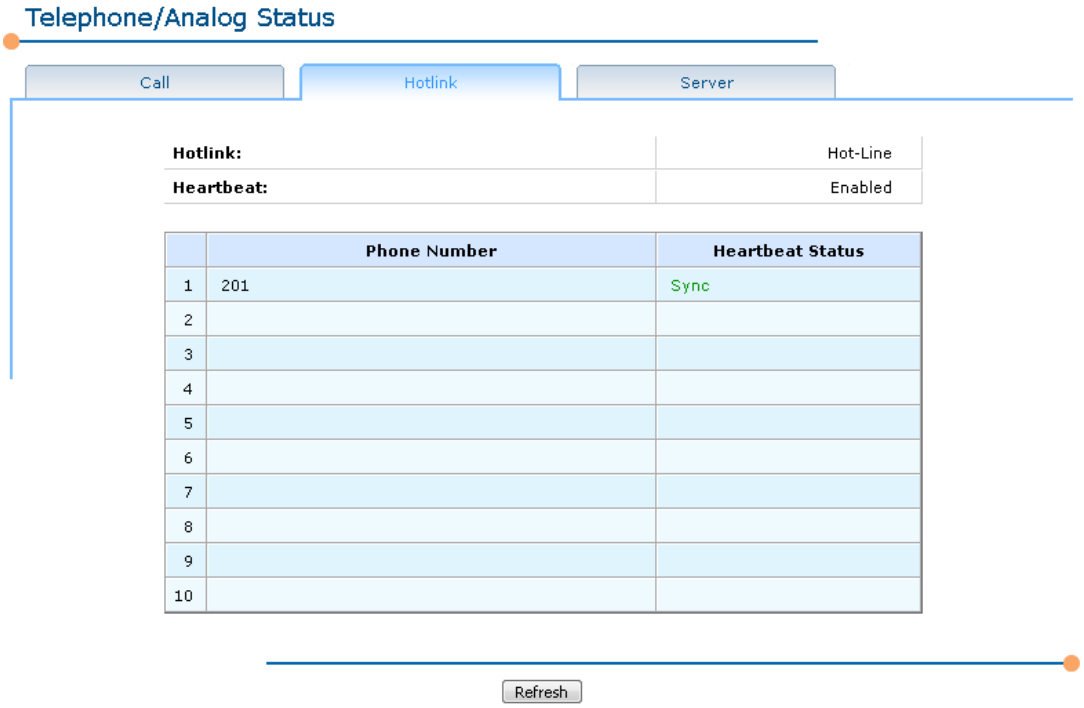


Figure 4-18 Telephone/Analog Hotlink Status

Hotlink	Displays the hotlink mode of the port.
Heartbeat	Displays the heartbeat setting of the port.
Phone Number	Displays the hotlink phone numbers of the port.
Heartbeat Status	Displays the heartbeat status of the hotlink phone numbers.

Server

This page provides the server statuses of the unit.

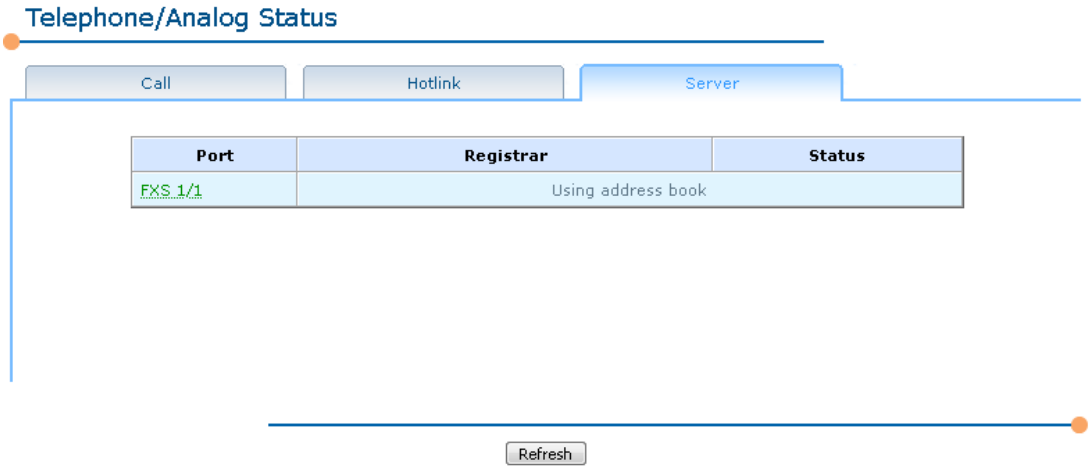


Figure 4-19 Telephone/Analog Server Status

Registrar	Displays the network address of the Registrar server for the port.
Status	Displays the registration status with the server for the port.

4.3.6.2 Telephone/Analog > General Settings

The general telephone/analog configurations include SIP, phone number, and server settings.

Global Settings

This page provides the global general telephone/analog configurations for the unit.

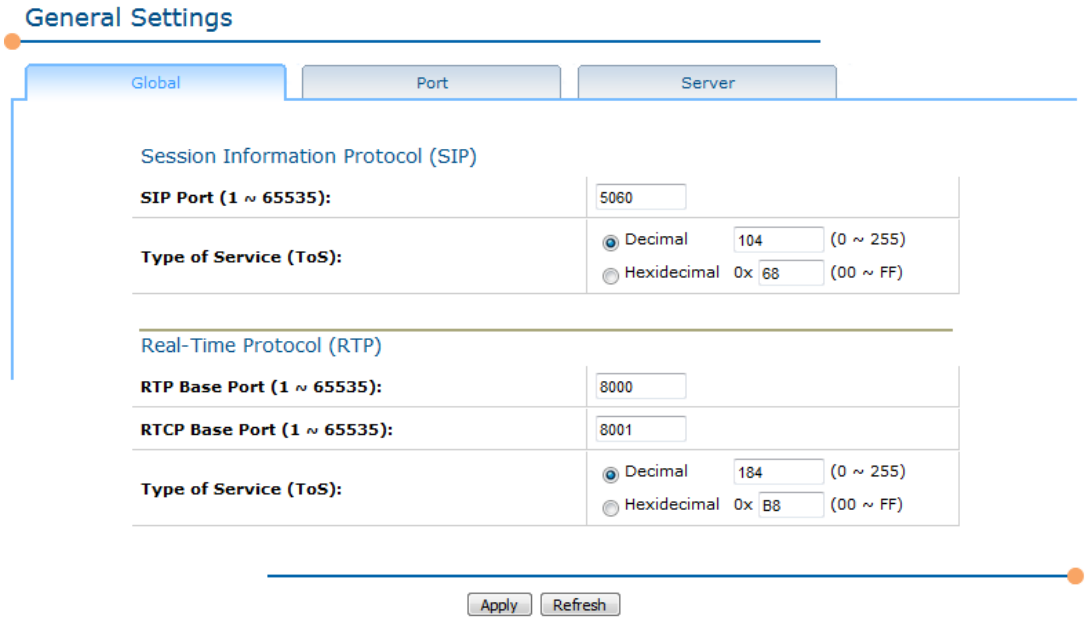


Figure 4-20 Telephone/Analog General Settings - Global

Session Information Protocol (SIP)

SIP Port	Configure the listening port for SIP messages. **Note:** this is the value should be unique for telephone/ analog functionality, i.e. not used by any other process on the platform. When using the Address Book mode, ensure this matches the destination port of the caller set in Address Book. When using SIP Server mode, the server will take care of it automatically. Default is 5060. (This is the standard SIP port. Value should not be changed unless needed for special applications).
Type of Service (ToS)	Configure the DSCP/DiffServ priority for SIP packets.

Real-Time Protocol (RTP)

Real Time Protocol (RTP) Base Port	Configure the base RTP port. The base RTP port indicates the starting RTP port number. Default is 8000.
RTCP Base Port	Configure the base RTP control port. The base RTCP port indicates the starting RTCP port number. Default is 8001. Ensure there is no overlap between SIP and RTP ports.
Type of Service (ToS)	Configure the DSCP/DiffServ priority for RTP/RTCP packets.

Port Settings

This page provides the general telephone/analog configurations for a port.

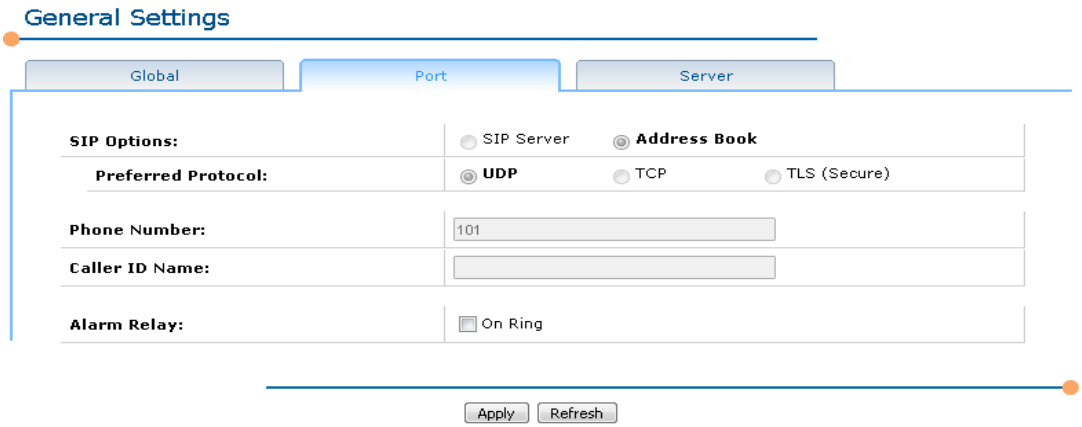


Figure 4-21 Telephone/Analog General Settings - Port

SIP Options	Configure one of two options, Address Book or SIP Server. Address Book uses the internal address book to dial to other numbers on the network. SIP Server uses a central SIP server on the network to dial to other numbers.
Preferred Protocol	Configure the format for SIP packets.
Phone Number / SIP User Name	Configure the phone number assigned to each port. It also acts as the SIP User Name when registering to the Registrar Server that requires authentication.

Authentication ID	Configure the authentication ID for registering to Registrar Server. (SIP option is "SIP Server" only)
Password	Configure the password for registering to Registrar Server. Along with SIP User Name (Phone Number) and Authentication ID, these settings need to match those on the Registrar Server if authentication is required. (SIP option is "SIP Server" only)
Display Name (Caller ID Name)	Configure the Caller ID Name information to be displayed on the receiving phone station.
Alarm Relay	Configure the phone status to trigger the dry contact alarm relay.

Server Settings

This page provides the telephone/analog server configurations for a port.

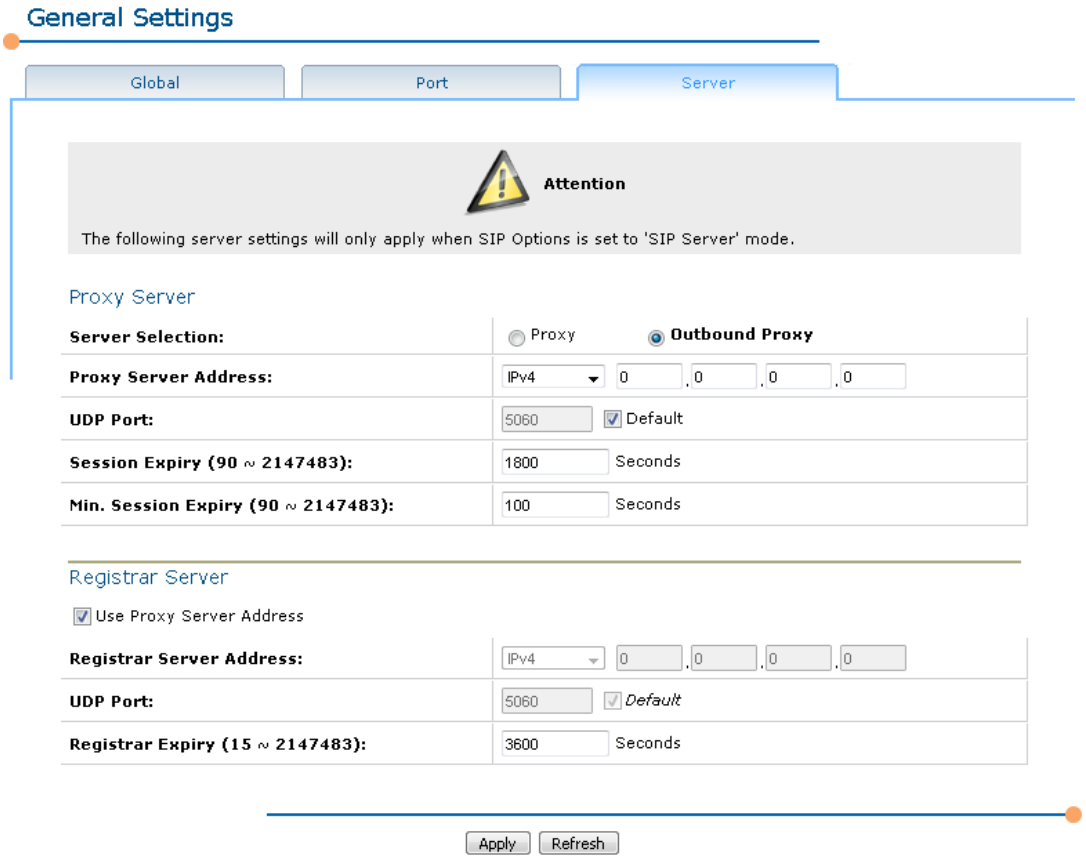


Figure 4-22 Telephone/Analog General Settings - Server

Proxy Server

Server Selection	Proxy (or Proxy Server) is used to establish, modify, and terminate call sessions. The TC1920 needs to register to the Registrar Server first, which usually has the same address as the Proxy Server. Outbound Proxy is a proxy server that receives requests from clients, even though it may not be the server resolved by the Request-URI. It is similar to Proxy except it receives a request from TC1920 even if the Request-URI of the message indicates another server. In short, all messages from TC1920 must pass through Outbound Proxy if it is set. In some cases, the Outbound Proxy is placed alongside the firewall and is the only way to allow SIP traffic to pass from the internal private network to the Internet therefore acting as a gatekeeper.
Proxy Server Address	Configure the address of the Proxy Server or Outbound Proxy Server as an IP address or hostname.
UDP Port	Configure the UDP port number of the proxy server listening port. The value setting here should match the SIP Port. Default is 5060.
Session Expiry	Configure the refresh duration of the session. The TC1920 will resend "INVITE" every other time which is approximately half of “Session Expiry” value and negotiated Session-Expires header will be seen in 200 OK reply of first INVITE message. Default is 1800.
Min. Session Expiry	Configure the minimum expiry interval that can be used for a session. Default is 100.

Registrar Server

Use Proxy Server Address	Check to use the Proxy Server address for the Registrar Server address. If the Registrar server address and Proxy server address are different then the REGISTER message will not pass through Proxy, but if Outbound Proxy is configured then the REGISTER message must pass through Outbound Proxy.
Registrar Server Address	Configure the address of the Registrar server address as an IP address or hostname.
UDP Port	Configure the UDP port number of the Registrar Server listening port. Default is 5060.
Registrar Expiry	Configure the expiry time in seconds for the registration with SIP Server. The TC1920 will resend REGISTER message to the Registrar Server based on the time configured.

4.3.6.3 Telephone/Analog > Address Book

This page provides the telephone/analog internal address book configurations for the unit.

NOTE	The SIP Options must be set to “Address Book” in the Telephone/Analog general port settings page (see *Port Settings,* on page 4-22).

Entries

The address book is used instead of the SIP Server phone number assignment and allows each of the individual TC1920 Telephone/Analog units to communicate with each other over the Ethernet network. For each unit that is installed in the network, annotate the IP address of the unit and compare this IP Address with the phone numbers definitions assigned to the FXS ports.

NOTE	To enable the address book for your network, it is necessary to define the phone number ranges of the installed TC1920s and corresponding mapped IP Addresses. To simplify this operation, the option of saving your address book to file allows the loading of multiple units with the required information.

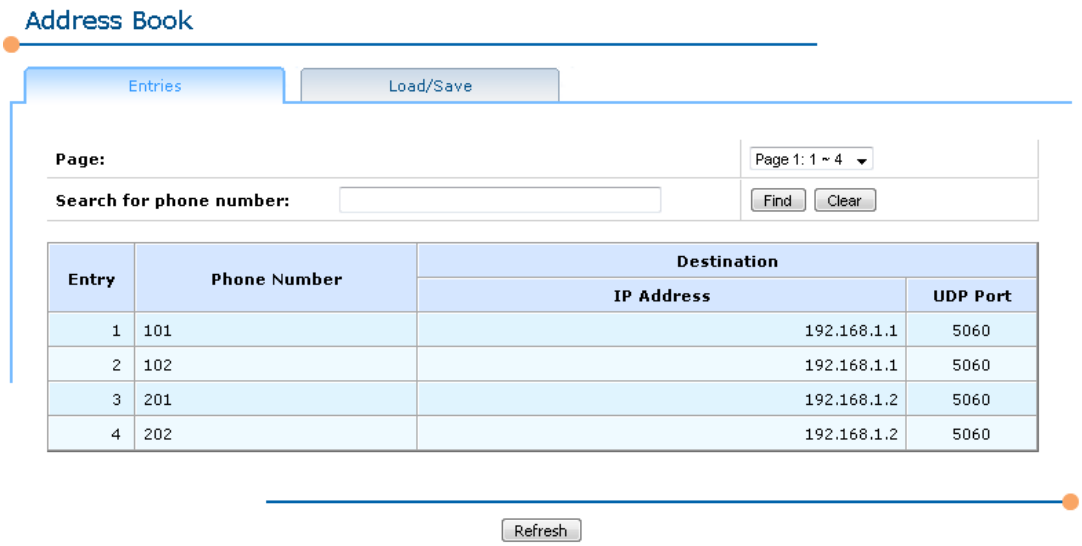


Figure 4-23 Telephone/Analog - Address Book Entries

Page	Select the page number of the address book to display.
Entry	Address book entry number.
Phone Number	Displays the phone number of the address book entry.
Address	Displays the destination address of the address book entry.
UDP Port	Displays the UDP port number of the address book entry.

NOTE	Apply button must be clicked on the main address book page for changes to take effect.

Entry Add/Edit

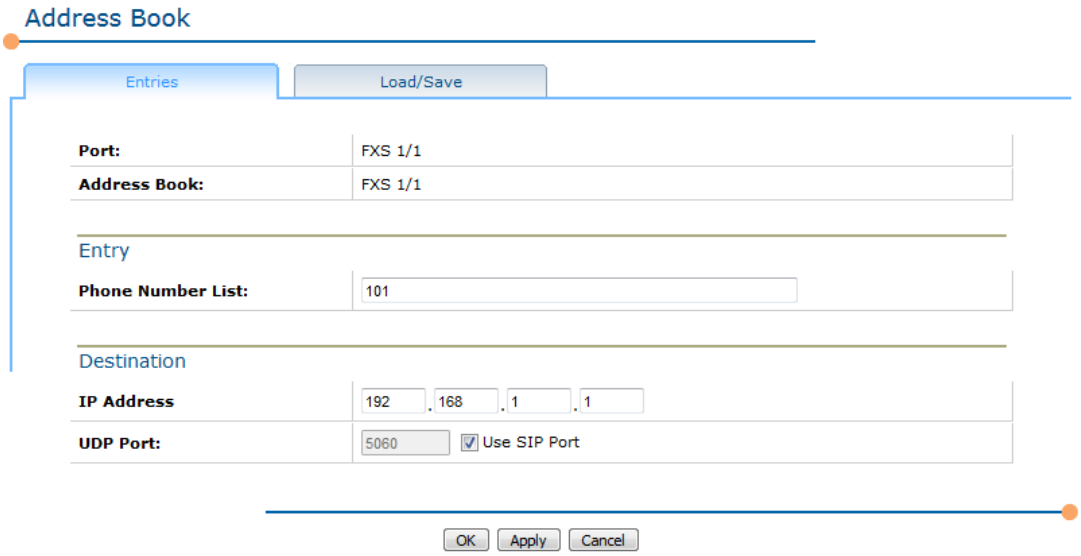


Figure 4-24 Telephone/Analog Address Book Entry Add/Edit

Address Book	Displays the port number of the address book entry.

Entry

Phone Number List	Configure the list phone number(s) dialed locally

Destination

IP Address	Configure the address of the destination for the phone number(s) specified.
UDP Port	Configure the UDP port number of the packets sent out.

Load/Save

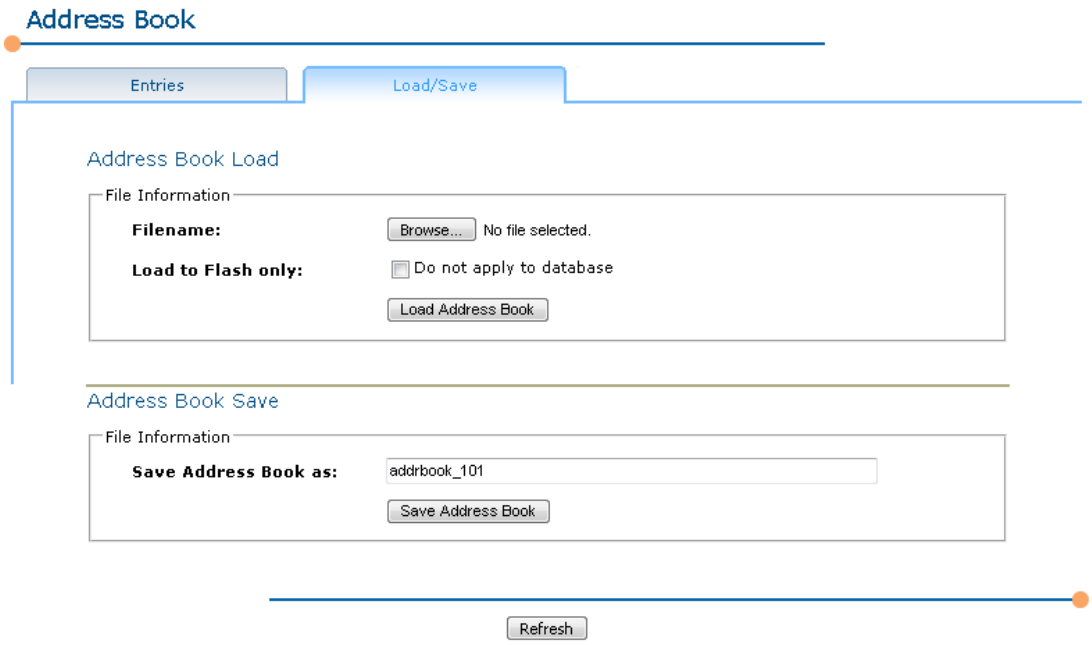


Figure 4-25 Telephone/Analog Address Book Load/Save

Address Book Load	Download an address book file from the local PC to the port.
Address Book Save	Upload an address book file to the local PC from the port.

4.3.6.4 Telephone/Analog > Dial Features

This page provides configurations for dialing features on the unit.

Hotlink

Hot links are lines that are set to automatically connect to the caller when the calling line goes “Off-Hook” based on a pre-defined hierarchy. Using the Hot Links function, you may define up to ten numbers that will have priority connect hierarchy when making a call.

When the user picks up a phone, it will automatically dial the pre-defined phone numbers set for the corresponding port shown on this page. A maximum of ten numbers can be entered, they will all ring simultaneously (if not busy), and whoever answers first will establish connection.

Up to ten phone numbers can be called simultaneously, and the first to answer establishes connection and all other lines will be released.

NOTE	All numbers listed should be FXS only or FXO only to prevent connection issues.

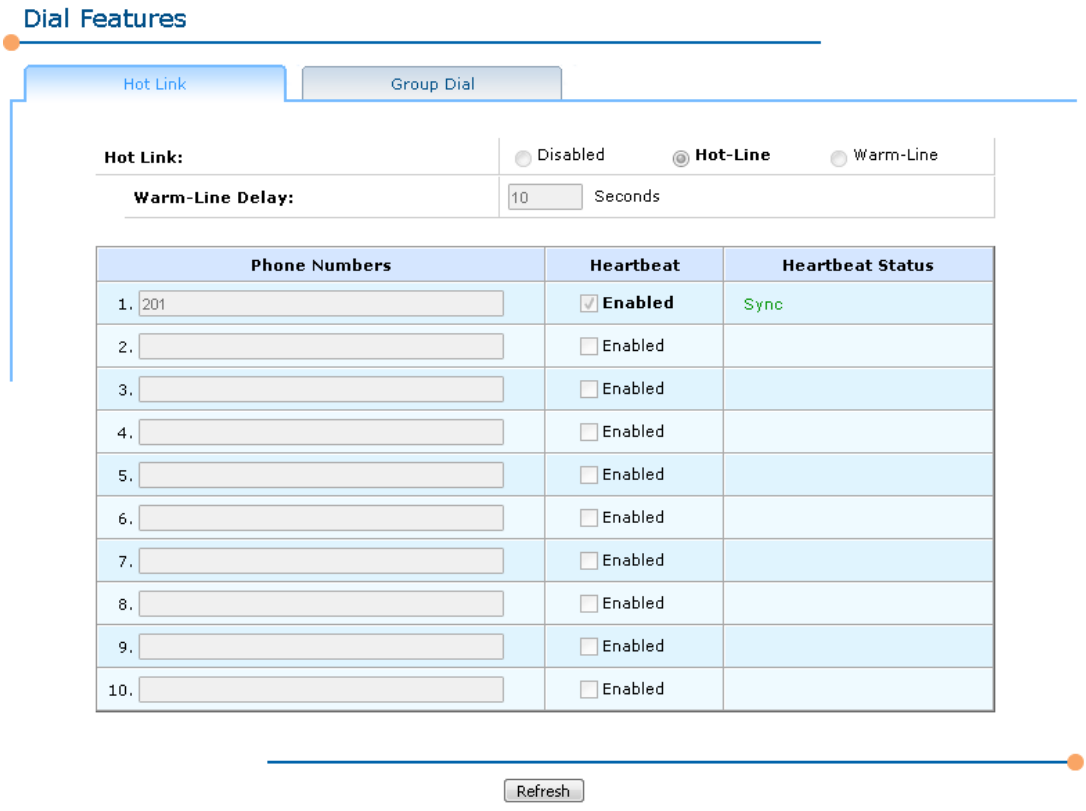


Figure 4-26 Telephone/Analog Hot Link

Hot Link	Enable Hot-Line or Warm-Line to automatically dial phone numbers pre-defined in the table when a port goes off-hook. Hot-Line will auto-dial phone numbers immediately after off-hook. Warm-Line allows for a delay, in seconds, after off-hook to dial a phone number before auto-dialing phone numbers.
Phone Numbers	The phone numbers entered in the table are automatically dialed after the port goes off-hook.

Hotlink Heartbeat

This feature checks if the hotlink phone numbers are alive and responsive. Phone numbers that do not respond and timeout are considered lost. The heartbeat status can be used to trigger an alarm.

Heartbeat	Enable the heartbeat monitoring for each hotlink phone number.
Heartbeat Status	Displays the heartbeat status of each hotlink phone number.

Group Dial

Group Dial assigns a group phone number to a list of phone numbers.

When the user dials the group phone number, it will automatically dial the pre-defined phone numbers set for the corresponding port shown on this page. A maximum of ten group numbers can be created, and up to twenty numbers can be entered for each group, they will all ring simultaneously (if not busy), and whoever answers first will establish connection and all other lines will be released.

NOTE	All member phone numbers listed should be FXS only or FXO only to prevent connection issues.

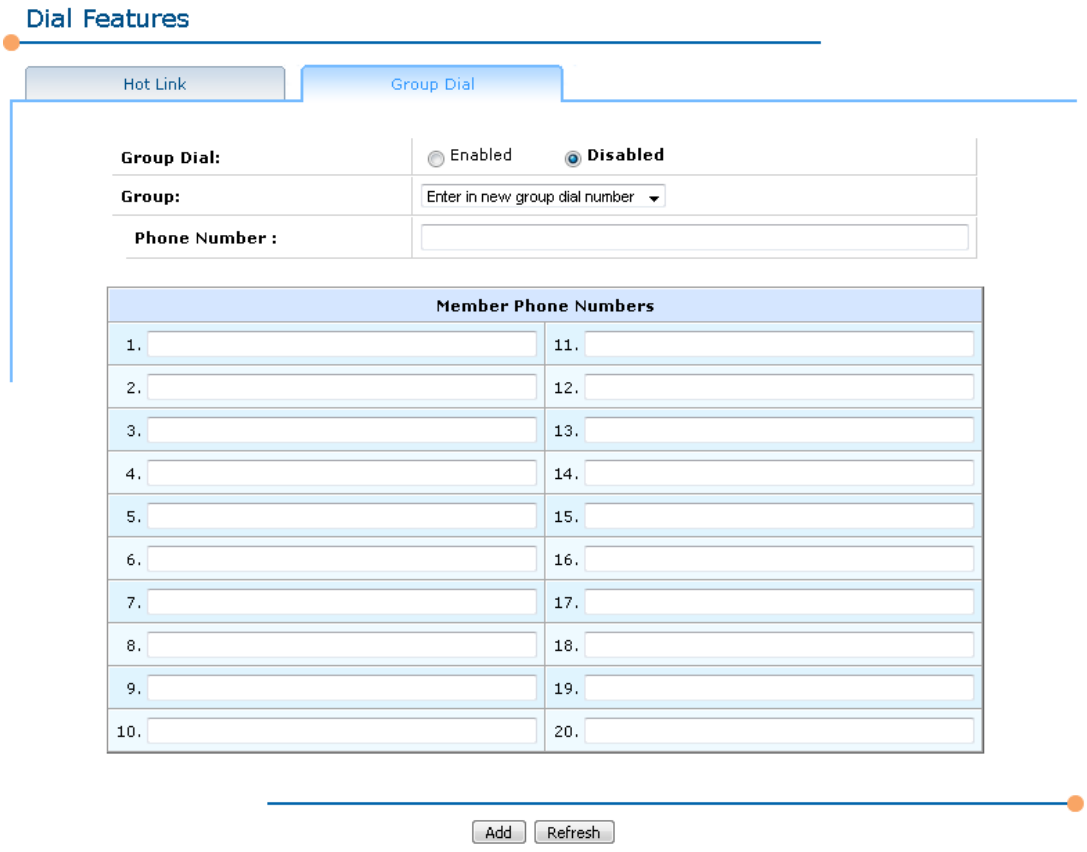


Figure 4-27 Telephone/Analog Group Dial

Group Dial	Enable or disable group dialing for the port.
Group	Select the group phone number to configure.
Phone Number	Appears when a new group number is being configured to set the phone number of the group.
Member Phone Numbers	The phone numbers entered in the table are rung when the group phone number is dialed.

4.3.6.5 Telephone/Analog > Codecs

In telephone/analog the analog voice signal is digitalized and compressed using a codec algorithm.

Global Settings

This page provides configurations for the codecs supported on the unit.

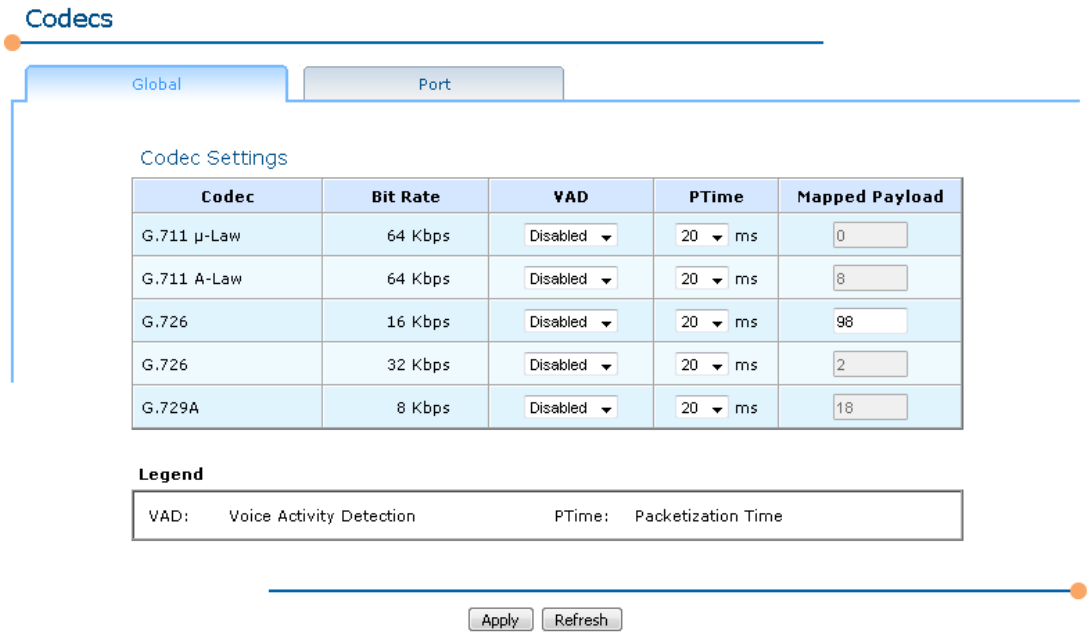


Figure 4-28 Telephone/Analog Codec Settings

Codec Settings

Bit Rate	Displays the bit rate of the codec.
VAD	Voice Activity Detection separates conversational speech and silence. It is used to reduce bandwidth usage during idle periods of a conversation. Comfort Noise will be generated to fill the silence in a transmission.
PTime	Packetization Time is the time length of each voice packet.
Mapped Payload	Configure the dynamic variable payload of the codec. G.711 µ-law, G.711 A-Law, G.726-32, G.726-16, and G.729A are codecs that are assigned with static payload, so the configuration is grayed out.

Port Settings

Codecs may be assigned independently to each port.

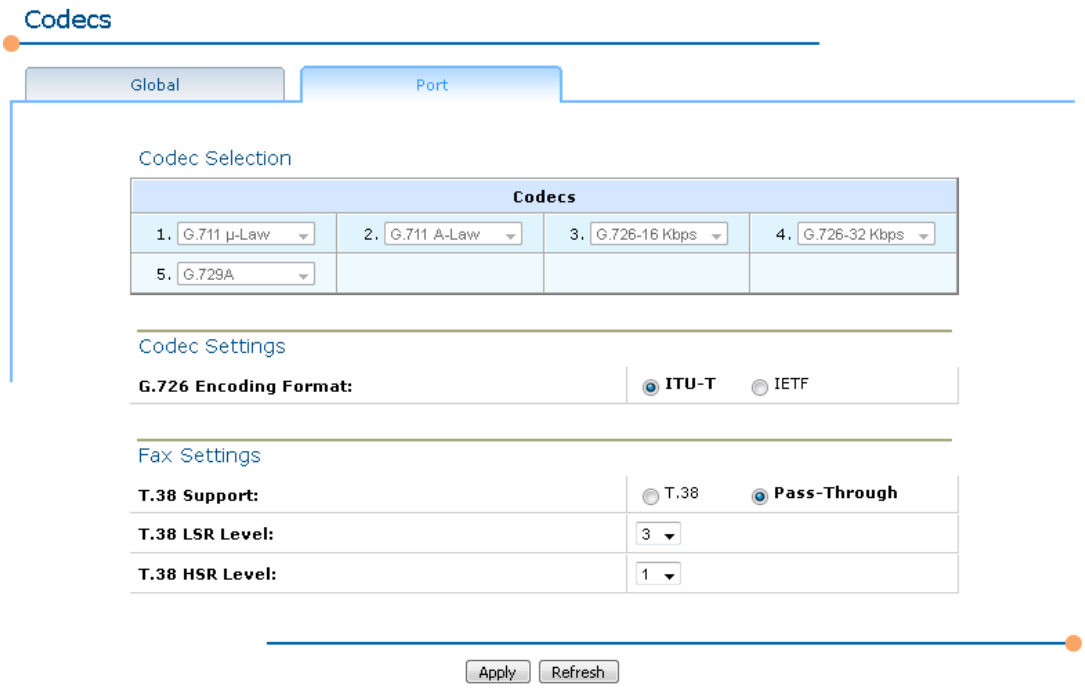


Figure 4-29 Telephone/Analog Port Codec Settings

Codec Selection

Codecs	Select the codecs in order according to preference. The matching codec will be negotiated between caller and callee.

Codec Settings

G.726 Encoding Format	Configure either ITU-T or IETF encoding format for G.726 codec. These are two different format of encoding/decoding G.726 packets defined by IETF standard and ITU-T standard.

Fax Settings

T.38 Support	If T.38 is disabled, fax packets will be sent in pass-through mode with the selected codec. If T.38 is enabled, fax packets will be sent following the T.38 protocol. T.38 only works with fax machines that support G3 protocol. If the fax machine supports Super G3 protocol, disable T.38 to fax in Pass-Through mode. Fax Rate is fixed at 14.4 kbps.
T.38 LSR Level	Configure the recovery level for V21 handshake data.
T.38 HSR Level	Configure the recovery level for high speed image data.

LSR and HSR parameters are useful to recover from fax transfer error due to loss of packets in a network. Higher values allow better chance of recovery from error.

4.3.6.6 Telephone/Analog > Call Features

This page provides calling features on the unit.

Global Settings

This page provides global calling feature configurations.

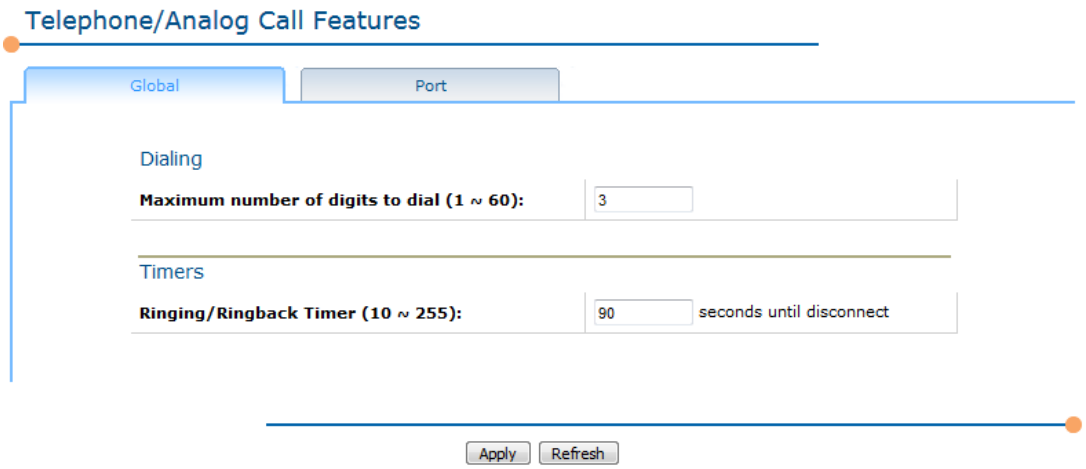


Figure 4-30 Telephone/Analog Call Features Settings

Dialing

Maximum number of digits to dial	The maximum number of digits that are allowed to be entered before dialing. If a number with fewer digits is dialed, then # can be entered to start dial immediately.

Timers

Ringing/Ringback Timer	The number of seconds a call can ring before getting disconnected.

Port Settings

This page provides calling feature configurations for the port.

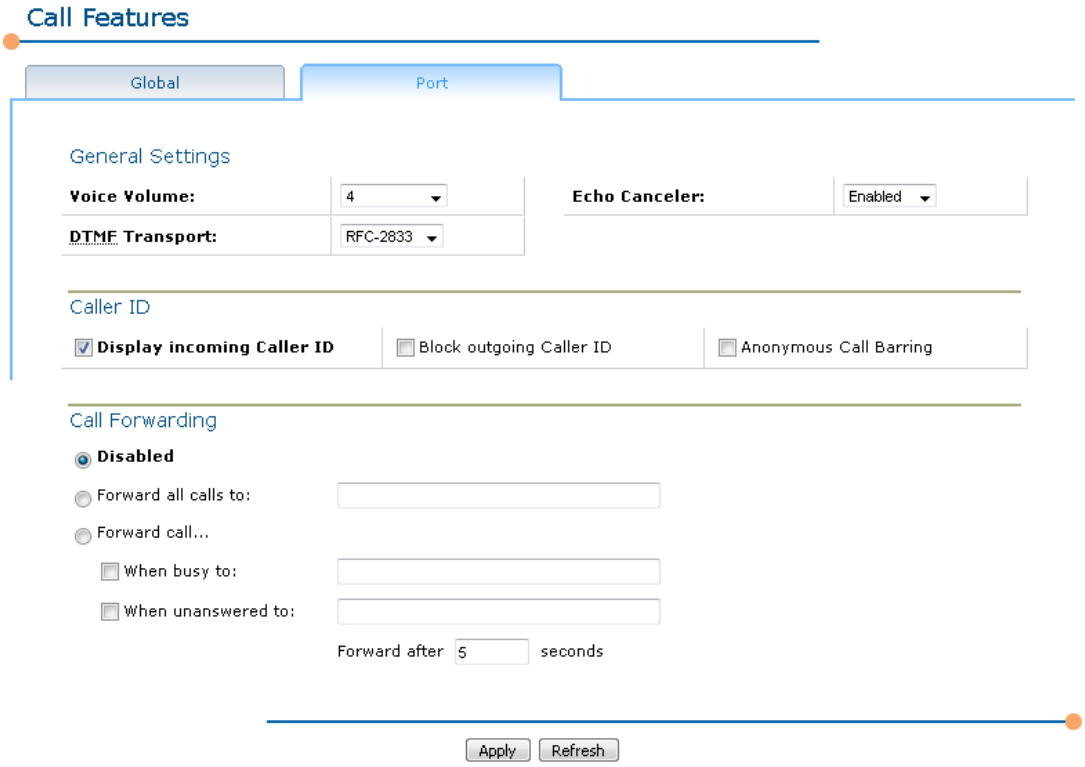


Figure 4-31 Port Call Features Settings

General Settings

Voice Volume	Configure the voice volume during a call. Higher value increases the volume.
Echo Canceler	Enable or disable echo cancellation.
DTMF Transport	Select how dialed digit information is transmitted during a call.

Caller ID

Display incoming Caller ID	Enable to display Caller ID of incoming call.
Block outgoing Caller ID	Enable to make calls anonymously.
Anonymous Call Barring	Enable to block anonymous incoming calls.

Call Forwarding

Forward all calls	Forward all incoming calls to the phone number configured.
Forward calls when busy	During a call, forward all incoming calls to the phone number configured.
Forward calls when unanswered	Forward all unanswered calls to the phone number configured.

4.3.6.7 Telephone/Analog > Security

Telephone/Analog can be secured with authentication and encryption.

SRTP

Secure Real-Time Protocol adds authentication and encryption to voice communication.

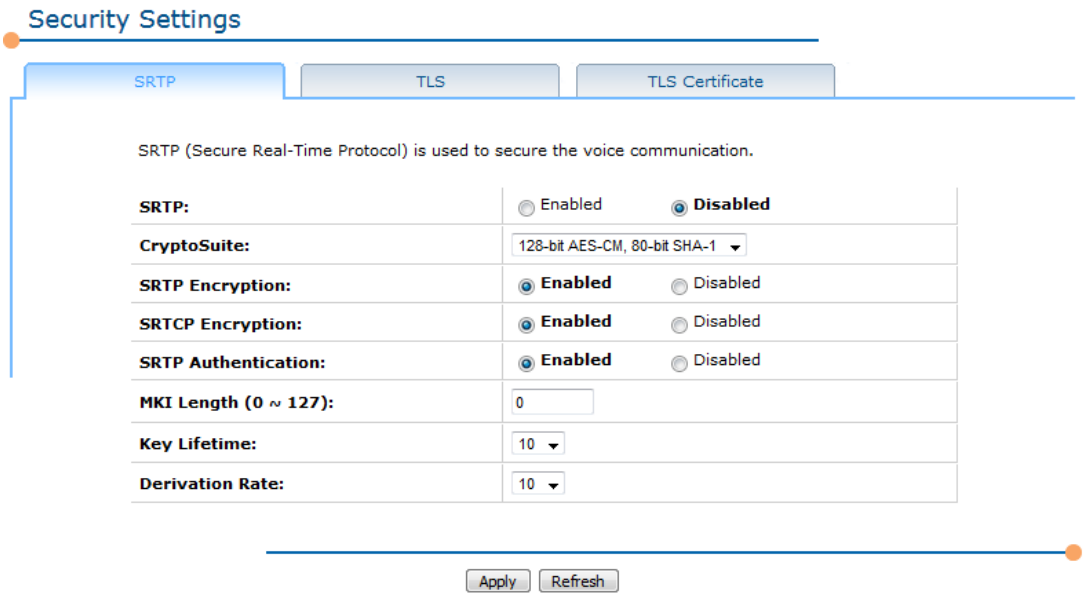


Figure 4-32 Telephone/Analog SRTP Settings

SRTP	Enable or disable voice security.
CryptoSuite	Select the security method.
SRTP Encryption	Enable or disable encryption of SRTP.
SRTCP Encryption	Enable or disable encryption of SRTCP.
SRTP Authentication	Enable or disable authentication of SRTP.
MKI Length	Configure the master key identifier length.
Key Lifetime	Configure the maximum key length.
Derivation Rate	Configure the derivation rate of the key.

TLS

Transport Layer Security adds authentication and encryption to SIP communication.

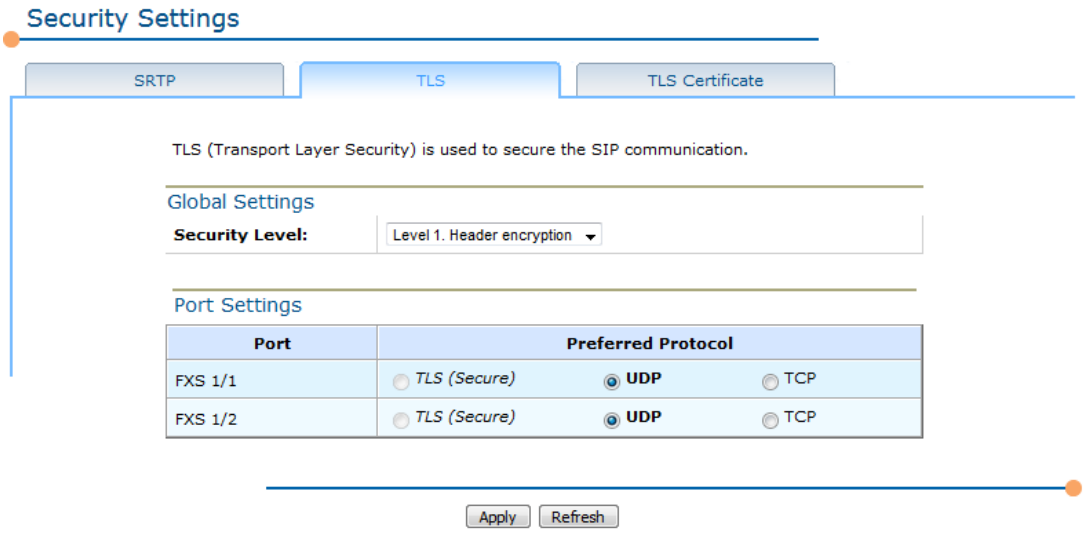


Figure 4-33 Telephone/Analog TLS Settings

Global Settings

Security Level	Level 1 security encrypts the SIP header. Level 2 security encrypts the entire SIP message.

Port Settings

Preferred Protocol	Shortcut to the configuration described in Section (General Port Settings).

TLS Certificate

This page provides the upload and download options for the TLS certificates.

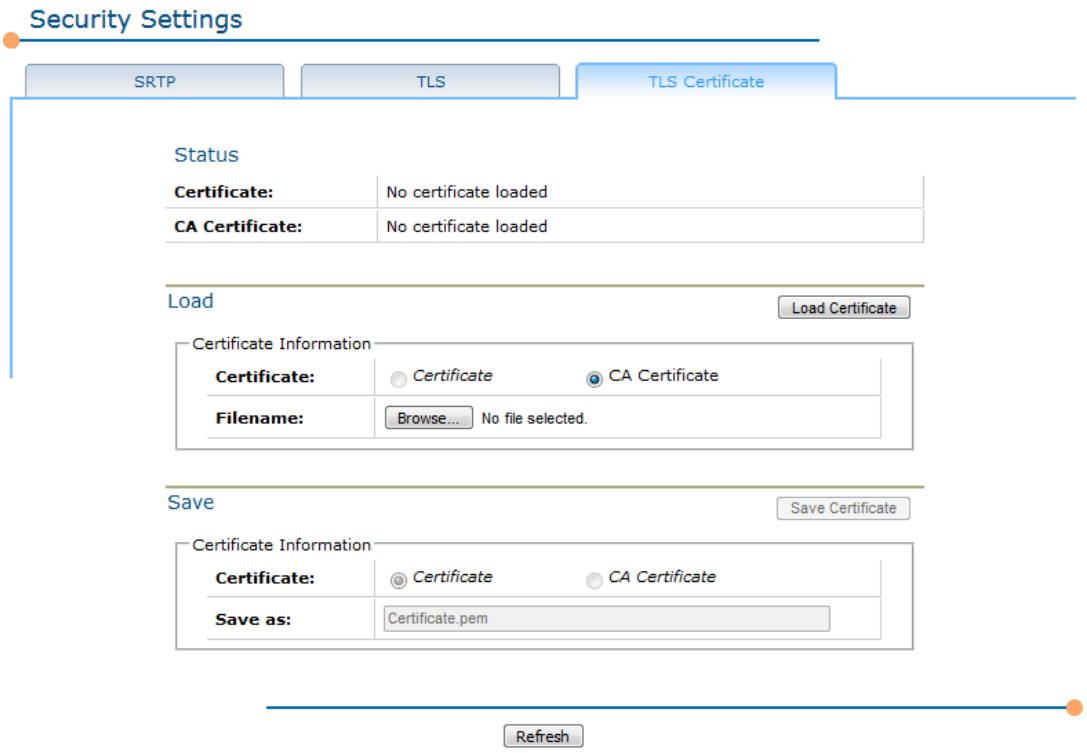


Figure 4-34 Telephone/Analog TLS Certificate Status/Load/Save

Status

Certificate	Displays the status of the certificate loaded to the unit.
CA Certificate	Displays the status of the certificate authority used for validating the certificate.

Load

Certificate	Select whether to download the certificate or certificate authority from the local PC to the unit.
Filename	Browse for the certificate (.pem) on the local PC.

Save

Certificate	Select whether to upload the certificate or certificate authority to the local PC from the unit.
Save as	Enter in the filename of the certificate to be downloaded as to the local PC.

4.3.6.8 Telephone/Analog > Tones

The tones used on the device can be configured.

General

This page provides general settings for the tones.

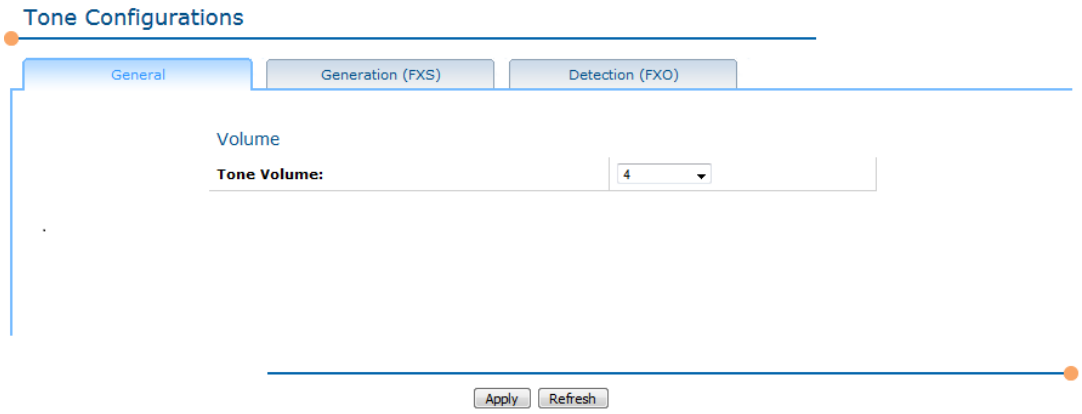


Figure 4-35 Telephone/Analog Tones Settings

Volume

Tone Volume	Configure the volume the tones. Higher value increases the volume.

Generation

This page provides configurations for the tones generated. All tones can be set to preset country tones or customized.

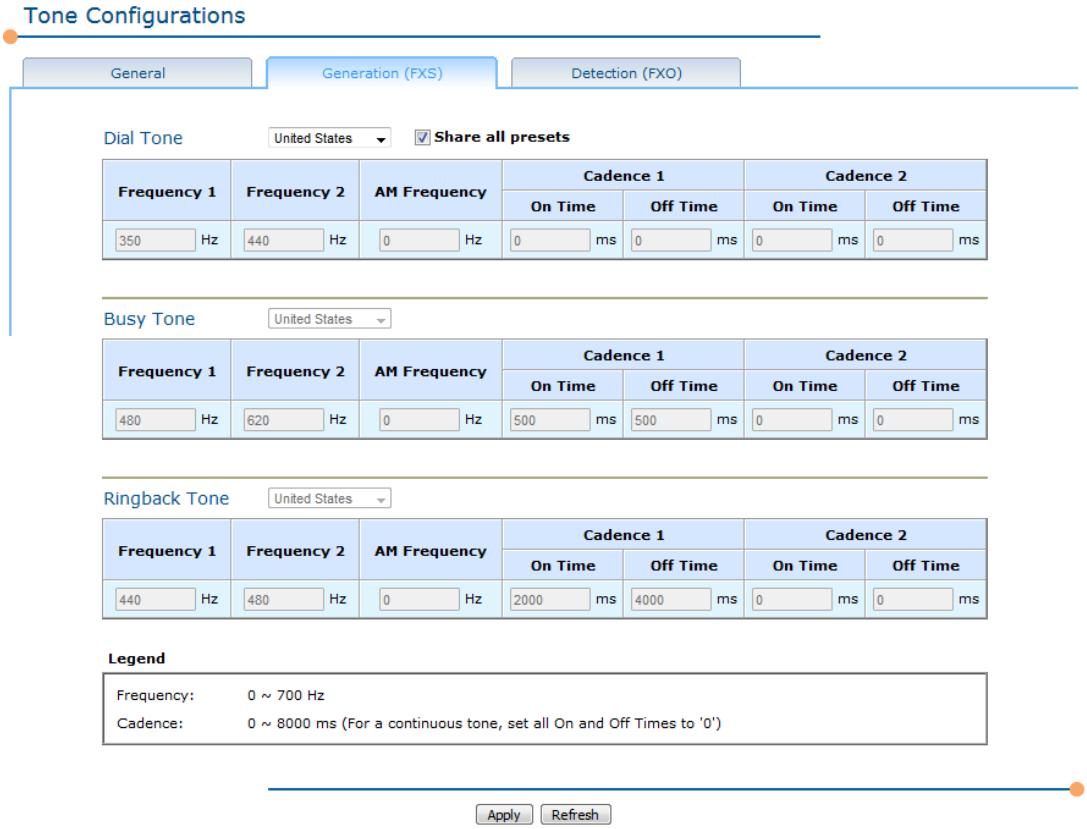


Figure 4-36 Telephone/Analog Tones Generation Settings

Dial Tone	The tone heard before a phone number is dialed.
Busy Tone	The tone heard when a dialed line is busy.
Ringback Tone	The tone heard after a phone number is dialed and the remote phone is ringing.

Detection

This page provides configurations for the tones detected. All tones can be set to preset country tones or customized.

Busy, Reorder, and two custom tones can be configured detect when a call should be disconnected.

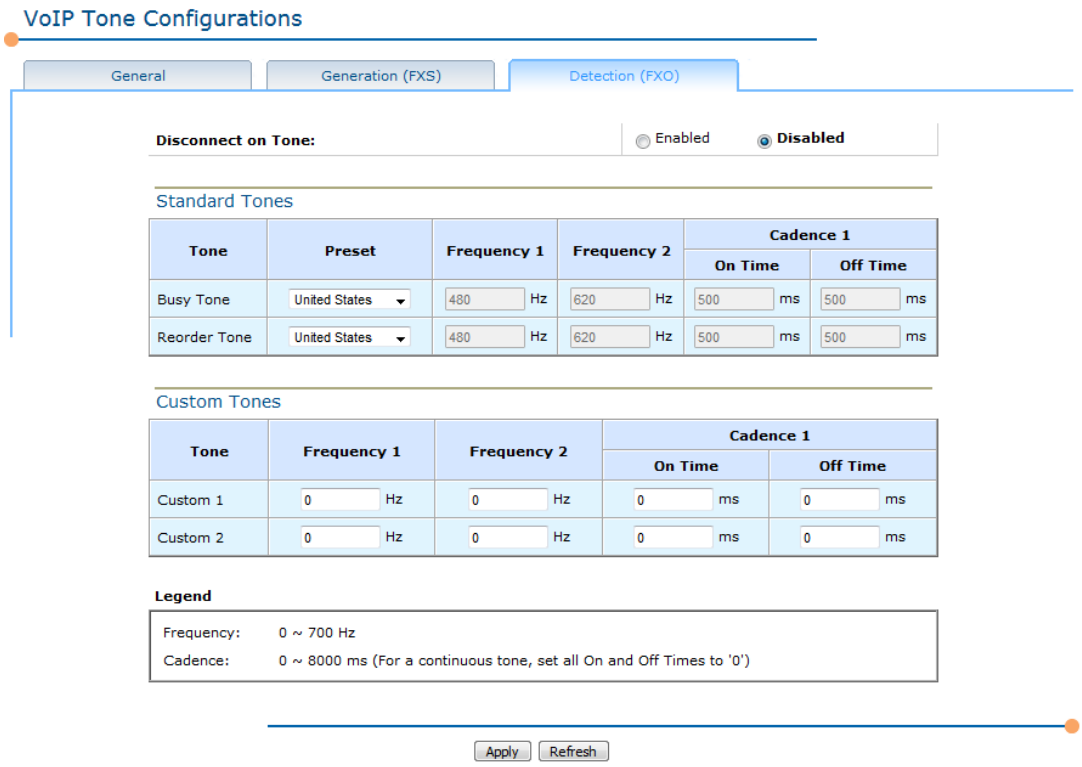


Figure 4-37 Telephone/Analog Tones Detection Settings

Disconnect on Tone	Enable and disable disconnect on tone detection.

Chapter 5 Troubleshooting

5.1 Introduction

Troubleshooting involves a systematic approach to isolate an observed problem and then determine the action needed to fix the problem. This process usually reveals several possible causes and solutions. Select the most probable cause and test the solutions.

This chapter has several sections to aid the technician in troubleshooting problems or errors.

- The first step is to use the LED front and back panel indicators for power, serial connections and operation alarms.
- The second step is using TC Communication's web management application which shows alarms conditions and error message pop ups.
- The third step is to inspect is mechanical problems that and may involve cables or equipment the TC1920 is connected to such as the fax machines, phones, Ethernet hubs, etc.

5.2 Strategy for Troubleshooting

A good troubleshooting strategy involves a systematic approach that starts with:

- isolating the problem
- determining the likely cause
- implementing a solution to the problem
- verify the unit configurations are correct

This manual does not cover every possible problem. The intent is to guide you to possible solutions when experiencing a particular problem.

NOTE	If the problem is too complex for the instructions contained in this chapter, call TC communications customer service for assistance.

Troubleshooting strategy:

a. Determine the most likely category of the failure.

b. Read the manual for suggestions on possible causes and solutions.

c. Test the most likely causes and solutions to eliminate the obvious (example: swap out bad cables, use a DVM to test input voltages).

d. If you have more than one TC1920, does the problem occur on more than one unit?

e. If one unit works properly and another does not, test the suspected component to determine if the problem repeats itself.

The following approach helps narrow the scope of the problem:

- Was the change sudden, or a gradual decline past the threshold of acceptable performance?
- Determine whether the problem was caused by the unit or for example, by a change in the any settings. outside the system that may cause a problem (i.e. fax machines, telephone handsets, etc.)
- Was a unit replaced and the original settings not duplicated exactly on the replacement unit.
- Is the problem limited to one unit, or has it shown up on many?
- Did the problem develop after a string of quick-fix failures?
- Perform the following:

  a. Document any event that preceded the failure or error.

  b. Check the list of *Common Problems,* on page 5-2 and determine if the problem is consistent with the items listed.

NOTICE Do not, for any reason, open the TC1920 unit. If you suspect of any problems with the unit, contact the Technical Support Department at TC Communications, Inc. for assistance. If the unit is opened without prior authorization from TC, it will result in the loss of warranty.

5.2.1 Common Problems

Most problems usually can be grouped in the following categories:

- *Mechanical,* on page 5-3
  - *Environment,* on page 5-3
  - *Cabling,* on page 5-3
- *Electrical,* on page 5-5
  - *Power Supplies,* on page 5-11
- *Software,* on page 5-12

5.3 Mechanical

This section will inform you about the types of problems associated with environmental or cabling issues that lead to replacing and installing the component or housing.

5.3.1 Environment

The location and the environmental condition can contribute to problems encountered with system operation.

Table 5-1: Environmental Errors

Symptoms	Possible Cause	Actions
Intermittent signal or power loss with an alarm.	Indications of damage to the cable or connectors.	a. Replace the cables.
There is a front panel alarm and verification on Unit Alarm Status shown as a temperature alarm.	The operating area is not free from extremes of temperature or humidity beyond the specifications.	Provide protection from extreme conditions as shown in *Specifications,* on page 1-6 or replace with upgraded model.

NOTICE If copper cable(s) connected to TC1920 unit(s) are located outside buildings or enclosures (even at minimal distances), TC1920 units may be damaged by lightning and/or electrical power surges.

Adding protective devices (surge suppressors/lighting protectors) to each copper cable that is exposed to potential lightning strikes or power surges is highly recommended. Please be aware that adding such protective devices can't guarantee 100 percent protection for connected electronic equipment. You should contact a professional lightning/surge protection consultant for specific questions regarding your application.

5.3.2 Cabling

There are two types of interface connectors used on the TC1920 front panel.

- RJ-11 (Registered Jack) is used for the FXS lines. The standard connector is used on 2-pair (4-wire) telephone lines.
- The RJ-45 socket fits an 8-position modular connector that looks like a large phone plug. The connector is the weak point in any ethernet cable. See *Ethernet Port RJ-45 Pin Assignment,* on page 2-7.

Table 5-1: Cable Configurations

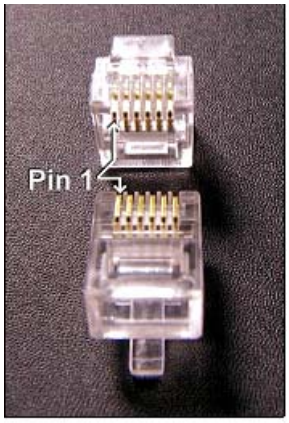
RJ-11 FXS connectors are used for modular telephone and LAN	
RJ-45 Ethernet connection	

Table 5-2: Cables

Symptoms	Possible Cause	Actions
• Intermittent signal with an alarm. • Front panel LED is Off.	The port is not working.	Try the following steps; • Inspect for physical damage. • Use A DVM to test the cable signal output at the connector. • Replace the cable with a known good cable.
	The cable has been damaged internally.	
	The connector is damaged or the plug is fouled with contamination.	
Intermittent signal or power loss with an alarm.	Indications of damage to cable or connectors.	b. Replace the cables.
No FXS dial tone on line.	Defective connector.	Replace the cable.
	Defective telephone handset.	Replace the unit and ensure the is a dial tone.

5.4 Electrical

Often the quickest way to troubleshoot is to replace components and check the results. Use known good components for the replacement, and keep track of which original components belong to a specific rack and their settings. Individual settings may prevent or interfere with operations in another TC1920 unit.

5.4.1 Using Front Panel Indicator LEDs For Diagnostics

Unit LEDs include:

- *Power Source A and B (PWR) on page 5-6*
- *Power On (Vcc) on page 5-6*
- *Alarm on page 5-7*
- *Link on page 5-7*
- *BP1 and BP2 on page 5-7*
- *Compression Ratio (CP-R) on page 5-8*
- *Volume TX and RX on page 5-8*
- *FXS on page 5-8*
- *Master/Slave on page 5-9*
- *Telephone/Analog Panel Ports on page 5-9*

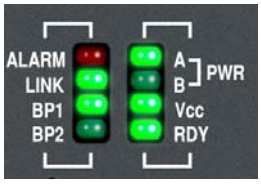
NOTE	There is the possibility that the LED itself has failed and is not showing the current condition. Call TC Communications customer service for assistance if you suspect this to be the case.

5.4.1.1 Power-up LED Verification Sequence

The LEDs, except PWR A, PWR B, and Vcc, will flash for 3 seconds during power up. If an LED does not flash, it has most likely failed.

5.4.1.2 Power Source A and B (PWR)

Power modules A and B are continuously monitored. The system uses both power supplies simultaneously, and in the event of the loss of one power supply, will continue to operate on the other power supply.

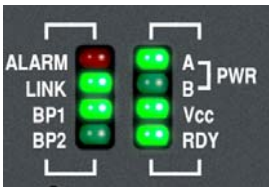


PWR LED Behaviors

LED	Condition
Solid	Power is being supplied from module.
Off	Power is not being supplied from module.
	Power module has failed.
	Fuse on card has burned.

5.4.1.3 Power On (Vcc)

The Vcc LED indicates the unit is receiving enough voltage for proper operation.

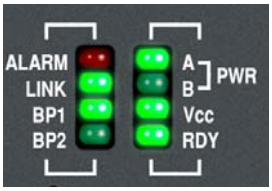


Vcc LED Behavior

LED	Condition
Solid	5 VDC is good.
Off	No 5 VDC is supplied.

5.4.1.4 Ready (RDY)

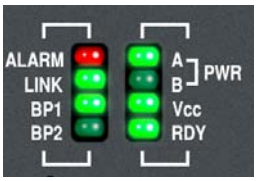
The RDY LED indicates when the unit has finished initialization and is operating properly.



RDY LED Behavior

LED	Condition
Solid	Unit is ready for use.
Fast Flash	Flash operation in progress. Do not power off unit until operations have completed.
Slow Flash	Unit is booting.

5.4.1.5 Alarm



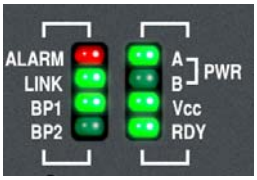
The LED will illuminate solid red, and the dry contact relay (if present) will close when an alarm condition is detected. The user can configure which types of alarms will trigger the unit alarm.

Normally in the OPEN position, any alarm condition will trigger the switch to the CLOSED position. The switch position is controlled by a relay inside the TC1920.

ALM LED Behaviors

LED	Condition
Solid	Unit Alarm is triggered.
Off	Unit Alarm is not triggered.
Flash On	Unit Alarm has been triggered since last cleared.
Steady Flash	Unit is in testing/diagnostic mode.

5.4.1.6 Link

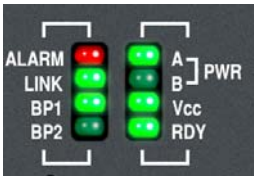


The LED indicates the link status summary between the local and remote units.

LINK LED Behaviors

LED	Condition
Solid	Link established with remote unit.
Flash	Unable to establish link with remote unit.
Off	Hotlink heartbeat is disabled.

5.4.1.7 BP1 and BP2



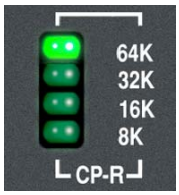
These LEDs indicates the link status of the Ethernet ports on the back of the unit.

BP1 and BP2 LED Behaviors

LED	Condition
Solid	Ethernet link is established.
Flash	Ethernet Tx/Rx activity detected.
Off	Ethernet link not established.

5.4.1.8 Compression Ratio (CP-R)

These LEDs indicate the compression rate enabled on the unit, as well as the rate used during a call in progress. Auto-negotiation of the compression rate is indicated by all LEDs solid.



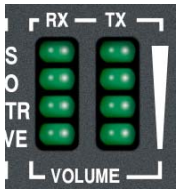
CP-R LED Behaviors

64K/32K/16K/8K LED	Condition
Idle	
Solid	Compression rate is enabled and available for use during a call.
Off	Compression rate is disabled
Call in Progress	
Flash	The compression rate used during a call
Off	Compression rate is not in use.

5.4.1.9 Volume TX and RX

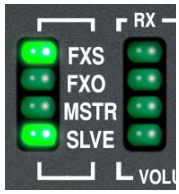
The **TX** LED displays the detected volume of the signal coming out of port from the remote side.

The **RX** LED displays the detected volume of signal going into port from at the local side.



5.4.1.10 FXS

The LED indicates the unit has an FXS port.

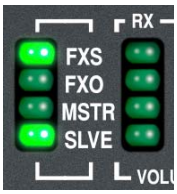


FXS LED Behaviors

FXS LED	Condition
Solid	Unit has FXS port and is ready to use.
Flash	Unit is re-configuring. Calls cannot be made during this time.
Off	Unit does not have FXS port.

5.4.1.11 Master/Slave

These LEDs indicate whether the unit is currently set in Master or Slave pairing mode.



Master/Slave LED Behaviors

MSTR LED	SLVE LED	Condition
Solid	Off	Unit is Master.
Off	Solid	Unit is Slave.
Off	Off	Unit is not in Master/Slave mode.

5.4.1.12 Telephone/Analog Panel Ports

This unit has one phone/line port that is FXS:

Figure 5-1 Phone/Line Port

Figure 5-2 Phone/Line LEDs

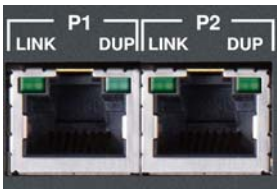
Phone/Line LED Behaviors

HOOK LED	RING LED	Condition
Solid	N/A	Port is off-hook.
Off	Fast Flash	Port is on-hook and ringing.
Solid	Flash On	Call is connecting.
Solid	Solid	Call is in progress.
Off	Off	Port is on-hook and not ringing.

HT-L LED	Condition
Solid	Hotlink is enabled and configured properly.
Flash Green	Hotlink is enabled, but not configured properly.
Off	Hotlink is disabled.

5.4.1.13 Ethernet Ports

The unit has two FastEthernet ports on the back of the unit.



Ethernet Ports LED Behaviors

LINK LED	DUP LED	Condition
Solid	Solid	Link is established at Full Duplex.
	Off	Link is established at Half Duplex.
Flash	N/A	Link activity is detected.
Off	Off	Port is not connected.
		Power is disabled.

5.4.2 Power Supplies

There are several power supply options available. See *Specifications,* on page 1-6.

To inspect the stand alone power supply

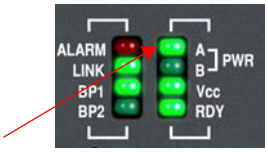
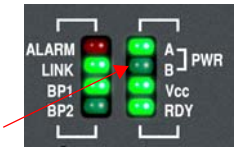
❖ When the power is applied, determine if the front panel LED is green or off.

If	Then
The power supply LED A and B are green.	Proceed.
The LED is off.	This indicates a problem with the power source, the power supply or the connector. Please see the troubleshooting section, *Power Supplies,* on page 5-11.

Figure 5-3 TC1920 Back Panel Connectors and Indicators

To inspect the power supply

❖ Determine if the front or rear panel LED is green or Off.

If	Then
The LED is green.	Proceed. 
The LED is off.	This indicates; • a problem with the power source • a problem with the power supply or the connector • the power supply port is unused. Please see *Power Supplies,* on page 5-11. 

5.5 Software

The *Management through the Web* chapter defines and describes on each screen in GUI the parameters, options, buttons and commands. This section has information on diagnosing and repairing the unit.

NOTE	TC Communications provides software upgrades to ensure improve performance, adding new features, and correct problems (bugs). Please refer to the documents that are included in your documentation package for complete details for your software revision. The upgrade procedure is in *Firmware Upgrade,* on page 5-11.

5.5.1 Default Software Configuration

The quick-start chapter describes how to perform the TC1920 unit initial setup in a typical network application. This includes software configuration.The default software configuration is detailed in the tables shown in *Default Software Configuration,* on page 1-7.

5.5.2 Resolving Software Problems

Possible causes and suggested corrective actions are listed below for some problems. You need to have Administrative access to correct some situations.

5.5.2.1 Address Book

The Telephone/Analog Address Book page provides the method of defining your phone network; phone numbers related to IP address for one or multiple SIP-compatible devices on the network.

Table 5-3: Address Book

Symptoms	Possible Cause	Actions
Phone number and IP Address entered is not showing up.	The apply button may not have been clicked.	If the correct address book was saved on the PC, use *To recover from a missing phone book address,* on page 5-13. Re-enter the phone number and IP Address again and select the Apply icon.
Dialed the number and there was a busy tone.	The phone address may not be in the book.	

To recover from a missing phone book address

1. From the Navigation Menu select the Telephone/Analog icon.
   The Advanced page appears. See Advanced, on page 5-6.
2. From the Navigation Menu select the Address Book icon.
   The Telephone/Analog Address Book page appears.
3. Select the Load command button.
4. Select the *Browse* command button.
   A *Choose File* popup appears.
5. Locate the address file from the popup, highlight it, and select Open.
6. Select the Apply command button.

5.5.2.2 Ethernet Connection

The TC1920 extends services to remote locations from the control center over existing infrastructure by interfacing with the Ethernet network via an RJ-45 Ethernet connection. For pin assignments see the table *Ethernet Port RJ-45 Pin Assignment,* on page 2-7.

Table 5-4: Ethernet Connection

Symptoms	Possible Cause	Actions
Cannot connect (ping) TC1920 units.	• Incompatible with WAN and LAN environments. • Pinged the wrong address.	• Ensure the PC is under the same subnet as the other TC1920 units. • Restore the default settings.
Link is not detected.	Cable or connector damaged.	See *Cabling,* on page 5-3.
	The TC1920 is not connected to a working Ethernet port.	Ensure the Ethernet port that the TC1920 is connected to is operating correctly.

5.5.2.3 Password

Login with default username is "*admin*" and the password is "*admin.*" The computer administrator account has full access to the TC1920 graphic user interface. Leaving the system with the default administrator settings allows open access to your computer.

Table 5-5: Password

Symptoms	Possible Cause	Actions
The password is not accepted.	The password **is** case-sensitive.	Re-enter the password. If this fails, the administrator must reset the password.
The name is not accepted.	The user name **is** case-sensitive.	Re-enter the name. If this fails, the administrator must reset the name.
Forgot the password.	N/A	Reset the card to the default settings and then reprogram the configuration settings.

Appendix A Return Policy

A.1 Return Policy

To return a product, you must first obtain a Return Material Authorization number from the Customer Service Department. If the product's warranty has expired, you will need to provide a purchase order to authorize the repair. When returning a product for a suspected failure, please provide a description of the problem and any results of diagnostic tests that have been conducted.

A.1.1 Warranty

Damages by lightning or power surges are not covered under this warranty.

All products manufactured by TC Communications, Inc. come with a five year (beginning 1-1-02) warranty. TC Communications, Inc. warrants to the Buyer that all goods sold will perform in accordance with the applicable data sheets, drawings or written specifications. It also warrants that, at the time of sale, the goods will be free from defects in material or workmanship. This warranty shall apply for a period of five years from the date of shipment, unless goods have been subject to misuse, neglect, altered or destroyed serial number labels, accidents (damages caused in whole or in part to accident, lightning, power surge, floods, fires, earthquakes, natural disasters, or Acts of God.), improper installation or maintenance, or alteration or repair by anyone other than Seller or its authorized representative.

Buyer should notify TC Communications, Inc. promptly in writing of any claim based upon warranty, and TC Communications, Inc., at its option, may first inspect such goods at the premises of the Buyer, or may give written authorization to Buyer to return the goods to TC Communications, Inc., transportation charges prepaid, for examination by TC Communications, Inc. Buyer shall bear the risk of loss until all goods authorized to be returned are delivered to TC Communications, Inc. TC Communications, Inc. shall not be liable for any inspection, packing or labor costs in connection with the return of goods.

In the event that TC Communications, Inc. breaches its obligation of warranty, the sole and exclusive remedy of the Buyer is limited to replacement, repair or credit of the purchase price, at TC Communications, Inc.'s option.

To return a product, you must first obtain a Return Material Authorization (RMA) number and RMA form from the Customer Service Department. If the product's warranty has expired, you will need to provide a purchase order to authorize the repair. When returning a product for a suspected failure, please fill out RMA form provided with a description of the problem(s) and any results of diagnostic tests that have been conducted. The shipping expense to TC Communications should be prepaid. The product should be properly packaged and insured. After the product is repaired, TC Communications will ship the product back to the shipper at TC's cost to U.S. domestic destinations. (Foreign customers are responsible for all shipping costs, duties and taxes [both ways]. We will reject any packages with airway bill indicating TC communications is responsible for Duties and Taxes. To avoid Customs Duties and Taxes, please include proper documents indicating the product(s) are returned for repair/retest).

A.1.2 Limitation of Liability

1. In no event shall the total liability of TC COMMUNICATIONS, INC. to purchaser and/or end user for all damages including but not limited to compensatory, consequential and punitive damages, exceed the total amount paid to TC Communications, Inc. by purchaser for the goods from which the claim arose, in no event shall TC COMMUNICATIONS, INC. be responsible for indirect and consequential damages.
2. In no event shall liability attached to TC COMMUNICATIONS, INC. unless notice in writing is given to TC COMMUNICATIONS, INC. within ten days of the occurrence of the event giving rise to such claim.
3. TC COMMUNICATIONS, INC. shall not be responsible for delays or non-deliveries directly or indirectly resulting from or contributed to by foreign or domestic embargoes, seizure, fire, flood, explosion, strike, act of God, vandalism, insurrection, riot, war, or the adoption or enactment of any law, ordinances, regulation, or ruling or order or any other cause beyond the control of TC COMMUNICATIONS, INC.
4. TC COMMUNICATIONS, INC. shall not be responsible for loss or damage in transit and any claims for such loss or damage shall be filed by the purchaser with the carrier.

Appendix B Safety

B.1 Overview

This manual contains instructions which must be observed to ensure your own personal safety and to avoid damage to devices and machinery.

B.2 Certified Usage

Please observe the following: The JumboSwitch may only be employed for the purposes described in the catalog and technical description, and only in conjunction with external devices and components recommended or approved by TC Communications. The product can only be operated correctly and safely if it is transported, stored, installed and assembled properly and correctly. Furthermore, it must be operated and serviced carefully.

B.2.1 Qualification Requirements for Personnel

Qualified personnel as understood in this manual and the warning signs, are persons who are familiar with the setup, assembly, startup, and operation of this product and are appropriately qualified for their job. This includes, for example, those persons who have been trained or directed or authorized to switch on and off, to ground and to label power circuits and devices or systems in accordance with current safety engineering standards.

B.2.2 National and International Safety Regulations

Ensure that the electrical installation meets local or nationally applicable safety regulations. The product can be used in living areas (living area, place of business, small business) and in industrial areas.

CAUTION

All LED components conform to the following standard; Light Emitting Diode - Class 1 Led Product.

NOTE	Appropriate testing has established that this device fulfills the requirements of a class A digital device in line with part 15 of the FCC regulations. These requirements are designed to provide sufficient protection against interference where the device is being used in a business environment. The device creates and uses high frequencies and can radiate same, and if it is not installed and used in accordance with this operating manual, it can cause radio transmission interference. The use of this device in a living area can also cause interference, and in this case the user is obliged to cover the costs of removing the interference.

B.2.3 Recycling

After usage, this product must be disposed of properly as electronic waste in accordance with the current disposal regulations of your county / state / country.

B.3 Power Supply

This device is electrically operated. Adhere strictly to the safety requirements relating to voltages applied to the device as described in the *Specifications,* on page 1-6.

B.3.0.1 General Safety Instructions

The TC 3848 is designed for operation with a safety extra-low voltage. It may only be connected to the supply voltage connections and to the signal contact with SELV circuits with the voltage restrictions in accordance with IEC/EN 60950-1. The supply voltage is electrically isolated from the housing.

- Use only undamaged systems! See *Installation,* on page 2-1.
- Relevant for North America: For Use in Class 2 Circuits. The subject unit is to be supplied by a Class 2 power source complying with the requirements of the National Electrical Code, table 11(b). If the power is redundant supplied (two individual power sources) the power sources together should comply with the requirements of the National Electrical Code, table 11 (b).
- Relevant for North America: Use 60/75°C or 75°C copper wire (CU) only.
- Relevant for North America for devices certified for hazardous locations: Peripheral equipment must be suitable for the location it is used in. Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods [Article 501-4(b) of the National Electrical Code, NFPA 70] and in accordance with the authority having jurisdiction.

- The device does not contain any service components. Internal fuses only trigger if there is a fault in the device. If the device is not functioning correctly, or if it is damaged, switch off the voltage supply and contact TC communications customer service.
- Only switch on the supply voltage to the device if the housing is closed, the terminal blocks are wired up correctly and the terminal blocks are connected to the correct type of voltage supply.

B.3.0.2 Grounding

All TC Communications products are fully grounded and are in compliance accordance with all regulations and *Specifications,* on page 1-6.

B.3.0.3 Housing

Only technicians authorized by TC Communications are permitted to open the housing and break the seal.

- Ensure that the electrical installation meets local or nationally applicable safety regulations.
- Never insert pointed objects (thin screwdrivers, wires, etc.) into the inside of the ventilation holes in the side of the housing! Failure to observe this point may result in injuries caused by electric shocks.

B.4 Environment

"Industrial Hardened" and "Industrial Ethernet" describe communications products designed to operate in industrial process control environments or geographical locations where harsh conditions are common.

To meet this level of durability, "Industrial" grade (synonyms for "industrial" commonly include "rugged," "outdoor," "hardened," and "substation hardened") TC's communications products are manufactured with special components, connectors and circuitry. This ensures reliable operation in the event of wide temperature swings, electromagnetic interference (EMI), radio interference, vibrations, or moisture and humidity fluctuations. Conformal coating is optional.

TC Communications Industrial Grade products are designed to exceed pertinent industry specifications. For example, communications equipment used in power substations are subject to extremes of temperature and humidity, as well as electrical transients from high voltage switching.

These environmental conditions are described in industrial standard specifications IEC 61850-3 and IEEE 1613 for networking devices. Similarly, equipment used for traffic control applications are required to withstand roadside vibration in addition to high/low heat and humidity. Testing standards pertinent to traffic control are described in the environmental requirements of the NEMA TS-2 standard.

Every TC Communications product passes through "live operating temperature" testing (unlike randomly selected products for statistical sampling) before it is shipped. Each unit is connected to an operating BER tester to ensure error-free operation while the temperature chamber cycles from -40ºC to 80ºC during the 24 hour testing period.

- The installation location is to be selected so as to ensure compliance with the climatic limits listed in the Technical Data.
- Ensure the following criteria in site selection;
  - Room for adequate ventilation and cable routing.
  - Reserve space at least 0.5 m at the front and rear of the unit for human access, cables, and air flow.

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Important

- Avoid locating it next to any equipment that may produce electrical interference or strong magnetic fields, such as elevator shafts or heavy duty power supplies.
- As with any electronic equipment, keep the unit from excessive moisture, heat, vibration, and freezing temperatures.