Nextiva S4100 Series User Guide

Covering the S4100 and S4100-2V

Firmware Release 5.00

January 2008

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User Guide

Verint Video Intelligence Solutions **Revision: B**

www.verint.com/videosolutions

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Contents

Preface

The *Nextiva S4100 Series User Guide* presents the information and procedures for installing, configuring, and using the Nextiva™ S4100 series wireless video systems.

Who Should Read this Guide

This guide is intended for managers, IT system administrators, engineers, and technicians who will use the S4100 series edge devices. It provides conceptual information on how to configure, install, and operate the devices.

This guide assumes that you are familiar with:

- Installation and manipulation of electronic equipment
- General use of computers
- Local area networks (LANs) and basic IP data communication concepts and practices
- Radio frequency (RF) platforms
- Microsoft Windows operating systems

How to Use this Guide

The *Nextiva S4100 Series User Guide* contains all the information needed to install, configure, and use an S4100 device.

Conventions

The following typographic conventions are used throughout this guide:

Visual cue	Meaning
Connect	The name of an interface element you have to act on. A key to press. The value of an interface element.
connection_name	Text that must be replaced by a user-supplied value. Text representing variable content.
`C:\Program Files`	The name of a command, file, or directory. Text that appears on the screen. Examples of user-supplied values.

Related Documentation

In addition to this guide, the following documentation is also available:

- *Nextiva S4100 Series Installation Guide*
- *Verint SConfigurator User Guide*
- *Nextiva S4100 Series Release Notes*

All these documents are contained on the *Utilities* CD shipped with the device. Furthermore, a paper copy of the installation guide is included with your order.

Related Verint Products

You can use the S4100 devices with the Nextiva S4300-RP device. For more details about this product, visit our web site. For pricing information, call your dealer.

Support

Verint® Systems Inc. is a leading global provider of analytic software-based solutions for enterprise optimization and security. Verint solutions help organizations make sense of the vast voice, video, and data available to them, transforming this information into actionable intelligence™ for better decisions and highly effective performance.

Since 1994, Verint has been committed to developing innovative solutions that help global organizations achieve their most important objectives. Today, organizations in over 100 countries use Verint solutions to enhance security, boost operational efficiency, and fuel profitability.

For information about the Nextiva line of products, visit www.verint.com/videosolutions.

To request the latest versions of firmware and software or to download other product-related documents, you need access to the Verint Video Intelligence Solutions partner extranet. To register, go to http://vvs.verint.com.

If you encounter any type of problem after reading this guide, contact your local distributor or Verint representative. For the main service and support page on the Verint web page, visit www.verint.com/videoservice. For assistance, contact the customer service team:

Location	Telephone	Opening hours	E-mail
USA and Canada	1-888-747-6246	8:00 am to 8:00 pm (EST) Monday to Friday	vvssupport@verint.com
Central and Latin America	+1-631-962-9202		vvssupport@verint.com
Europe, Middle East, and Africa	+44 (0) 845-843-7333	8:30 am to 5:30 pm (GMT) Monday to Friday	customersupport.emea@verint.com
	+49 (0) 4321-269 81 36		mobilesupport@verint.com (Transit applications only)

Location	Telephone	Opening hours	E-mail
Asia/Pacific Hong Kong Singapore	 +852 2797 5678 +65-68266099	9:00 am to 6:30 pm (Monday to Thursday); 9:00 am to 5:30 pm (Friday)	APAC_VIS_Services@verint.com

Warranty

Each product manufactured by Verint Systems is warranted to meet all published specifications and to be free from defects in material and workmanship for a period of two (2) years from date of delivery as evidenced by the Verint Systems packing slip or other transportation receipt. Products showing damage by misuse or abnormal conditions of operation, or which have been modified by Buyer or repaired or altered outside Verint Systems factory without a specific authorization from Verint Systems shall be excluded from this warranty. Verint Systems shall in no event be responsible for incidental or consequential damages including without limitation, personal injury or property damage.

The warranty becomes void if the product is altered in any way.

Verint Systems responsibility under this warranty shall be to repair or replace, at its option, defective work or returned parts with transportation charges to Verint Systems factory paid by Buyer and return paid by Verint Systems. If Verint Systems determines that the Product is not defective within the terms of the warranty, Buyer shall pay all handling and transportation costs. Verint Systems may, at its option, elect to correct any warranty defects by sending its supervisory or technical representative, at its expense, to customer's plant or location.

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Equipment shipped ex works (Verint Systems factory) shall become the property of Buyer, upon transfer to the common carrier. Buyer shall communicate directly with the carrier by immediately requesting carrier's inspection upon evidence of damage in shipment.

Buyer must obtain a return materials authorization (RMA) number and shipping instructions from Verint Systems prior to returning any product under warranty. Do not return any Verint Systems product to the factory until RMA and shipping instructions are received.

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Overview

The S4100 is a professional video transmission product designed for the CCTV (closed circuit television) market. It allows digital video transmission over license-free and licensed bands. It delivers high-quality MPEG-4-based video at 30 frames per second in NTSC (25 in PAL). This wireless system is built on open standards to provide long-term investment protection.

Note: The S4100 series devices require professional installation.

About the S4100

Each S4100 series system consists of a video encoder/transmitter (-T) and a video decoder/receiver (-R) device. These outdoor devices cover the 2.4 GHz and 5 GHz frequency bands in North America and Europe, as well as the 4.9 GHz public safety band in the United States.

Key Features

The S4100 series offers the following models to cover your system needs:

Model	Device	Number of video I/Os	Alarm and audio (with optional cable)
S4100	S4100-T	1 input	✓
	S4100-R	1 output	✓
S4100-2V	S4100-2V-T	2 inputs	
	S4100-2V-R	2 outputs	

You can also purchase each device for the 4.9 GHz public safety band (the suffix *-49* is added to the product name, for example *S4100-2V-49*).

Unless otherwise specified, the word *S4100* refers to any of these devices.

The S4100 offers the following additional key features:

- Integration of a multiband radio, video encoder or decoder, and antenna into small outdoor rated enclosures, for convenient, discreet, secure, and reliable installation in real-world video security applications
- Integrated antenna covering the 2.4 GHz (8.5 dBi gain), 4.9 GHz (12 dBi gain), and 5 GHz (12 dBi gain) bands
- Specific design for wireless video security applications (integrated video, bidirectional audio, data, and I/Os)
- Codec optimization for typical outdoor video surveillance scenes, to reduce the required bit rate without impacting video quality
- Wireless MAC/protocol enhancements specific to wireless video security applications
- Resolution of limitations of standard WiFi technology for wireless video security applications (hidden nodes, latency, range, and QoS)
- Low-latency communication to avoid problems such as PTZ over control
- 12V DC or 24V AC input power
- MPEG-4 ISO 14496-2 compliant and MJPEG support
- RTC (Real-Time Clock) and NTP (Network Time Protocol) support
- Ethernet port for configuring the device or connecting an IP camera

- On the S4100-2V-T, transmission of serial data to the two analog cameras in an RS-485 context
- Default serial port settings compatible with the most popular camera data port configuration (4800 baud, 8 data bits, no parity, 1 stop bit)

Security

Every S4100 device comes with the SDCF (SmartSight Distributed Coordinated Function) security feature. This proprietary MAC (Media Access Control) protocol uses AES encryption with key rotation over the wireless link to secure the audio, video, and data communication between the devices.

Video

The available video frame rates of each encoder of the transmitter are:

- NTSC—1 to 7, 10, 15, or 30 frames per second (fps)
- PAL—1 to 6, 8, 12, or 25 fps

The video resolutions supported by the S4100 device are:

Resolution	Number of columns	Number of lines	
	NTSC/PAL	NTSC	PAL
QCIF	176	128	144
CIF	352	240	288
2CIFH	704	240	288
4CIF	704	480	576
All lines	352	480	576
2/3 D1	480	480	576
VGA	640	480	576

Each performance value includes:

- A video resolution
- A frame rate expressed in frames per second (fps) using the NTSC/PAL format
- A bit rate expressed in kilobits per second (kbps)

The recommended performances for each video encoder/decoder of the S4100 series are:

Device	Performance
S4100	4CIF, 30/25 fps, 3000 kbps
S4100-2V input/output 1	2CIFH, 30/25 fps, 2000 kbps
S4100-2V input/output 2	CIF, 30/25 fps, 1000 kbps

You should ensure that the S4100-T is configured so that its data throughput is not higher than what the S4100-R can receive.

Installation Kit

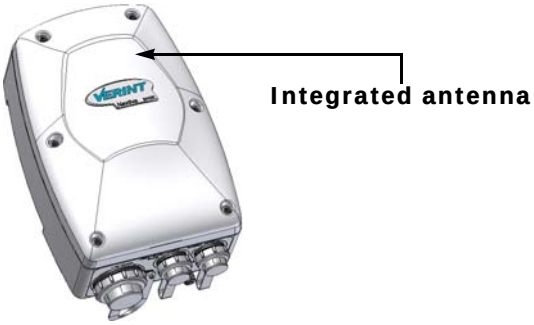
The package contents are:

Item	Description
Wireless system	S4100 or S4100-2V, each made of a receiver and transmitter. Each device includes an integrated antenna.
Mounting assembly set	One set per device for installation on a wall or pole
Cable for video, serial port, and power	Two cables for the S4100, four cables for the S4100-2V
CD	*Utilities* CD containing the release notes and documentation for the pair as well as the SConfigurator application
Printed material	The *S4100 Series Installation Guide*
Options	
High-gain antenna	An external antenna; the available antennas vary depending on the frequency band and the country.
CABAA cable	A cable for alarm or audio
CABET-25 cable	An 82-foot (25-meter) outdoor Ethernet cable with a weatherproof connector
CABET-50 cable	A 164-foot (50-meter) outdoor Ethernet cable with a weatherproof connector
CABPV cable	A cable for video, serial port, and power
PS2440 power supply	An indoor-only 24V AC power supply

Note: You must use only antennas certified by Verint. Doing so ensures that the combined transmission power of the device and antenna does not exceed the maximum value established by your country's regulations. For more information, see page 24 and page 103.

Hardware Overview

The S4100 electronics are enclosed in a weather-tight cast aluminum module with an integrated wide-band antenna located in the top of the casing. All cable entries are mounted on the underside of the module to maintain its weatherproof properties.



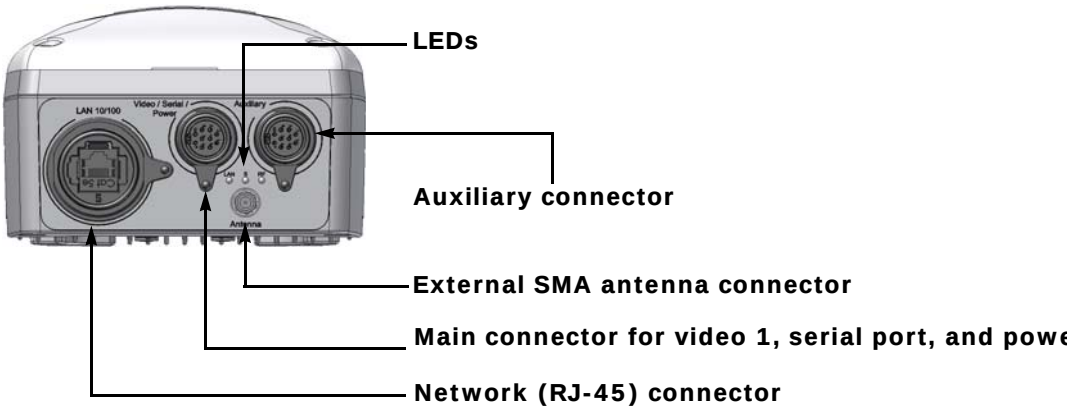
The underside consists of:

- A network (RJ-45) connector
- A main connector for video 1, serial port, and power
- An auxiliary connector for:

Device	Usage
S4100-T and S4100-R	Alarm and audio
S4100-2V-T	Video input 2 and serial data
S4100-2V-R	Video output 2

- An external SMA antenna connector

- Three LEDs


LEDs
LAN 10/100
Video / Serial / Power
Auxiliary
Antenna
Auxiliary connector
External SMA antenna connector
Main connector for video 1, serial port, and powe
Network (RJ-45) connector

2

System and RF Planning

For best operation, you must carefully plan the setup and location of your radio systems and antennas. Planning is especially required if you want to install many systems in the same area, in order to prevent radio interference between the colocated devices. In all cases, follow the recognized RF installation practices.

One radio system is a receiver and a transmitter using the same wireless passkey.

To help you with your planning, you may consult the Verint Video Intelligence Solutions extranet:

- The *Wireless System Margin Calculator* is a tool based on an Excel spreadsheet designed to simplify the creation of RF systems. To locate it: Tech Support > Downloads > Utilities and Tools.
- The *Nextiva Wireless Devices Whole Product Primer* provides standardized information about the design, features, and benefits of the Nextiva wireless devices. To locate it: Tech Support > Product Specifications > Product Technical Briefs.

Frequency Bands and Channels

The S4100 supports communications in the following frequency bands, in North America and Europe:

- 2.4 GHz OFDM, also known as 802.11g
- 4.9 GHz OFDM, a public safety band available in the United States only
- 5 GHz OFDM, also known as 802.11a

To meet local regulations, you must use only antennas that conform to the requirements specified in the “Compliance” appendix on page 103.

2.4 GHz Band

The 2.4 GHz band provides 11 channels in North America and 13 in Europe. In these two regions, only channels 1, 6, and 11 are independent (that is, non-overlapping); in most countries, they can be used indoors or outdoors. For more information on the availability of these channels depending on the countries, see the “Compliance” appendix on page 103. The center frequencies of the channels are:

Channel	Frequency (GHz)	Channel	Frequency (GHz)
1	2.412	8	2.447
2	2.417	9	2.452
3	2.422	10	2.457
4	2.427	11	2.462
5	2.432	12	2.467 (Europe only)
6	2.437	13	2.472 (Europe only)
7	2.442		

4.9 GHz Band

The 4.9 GHz band is a licensed band for entities providing public safety services focused on the protection of life, health, or property in the United States. This band provides license holders with an interference-free, secure channel for robust and secure broadband technologies, including wireless video surveillance systems.

For more detailed information concerning the regulations governing licensing and use of frequencies in the 4.9 GHz band, see Subpart Y of the FCC document, Memorandum Opinion and Order and Third Report and Order at:

http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-99A1.pdf

The 4.9 GHz band has a width of 50 MHz (4940 to 4990 MHz). Since the standard channel width is 20 MHz, only two independent channels can co-exist in the band. However, the S4100 supports channel fragmentation, allowing narrower channels of 5 MHz and 10 MHz. You can have up to four independent channels with a 10 MHz width, and up to 10 with a 5 MHz width. All these channels are for indoor or outdoor use.

The available channels are:

Channel	Frequency (GHz)	Channel width
3	4.9425	5 MHz
6	4.9475	5 MHz
7	4.9525	5 MHz or 10 MHz
7	4.950	20 MHz
8	4.9575	5 MHz
9	4.9625	5 MHz or 10 MHz
10	4.9675	5 MHz
11	4.9725	5 MHz or 10 MHz
11	4.970	20 MHz
12	4.9775	5 MHz
13	4.9825	5 MHz or 10 MHz
16	4.9875	5 MHz

5 GHz Band

In the 5 GHz band, the number of available channels and sub-bands vary depending on the country of operation.

Most European countries adhere to the DFS (Dynamic Frequency Selection) and TPC (Transmit Power Control) regulations established by the European Telecommunications Standards Institute (ETSI); these regulations apply to the 5 GHz frequency band only. To know which bands are available in your country of operation and whether your country adheres to DFS and TPC, see the “Compliance” appendix on page 103.

In North America, five channels are available in the 5 GHz band, all independent and for indoor or outdoor use. The center frequencies of these channels are:

Channel	Frequency (GHz)
149	5.745
153	5.765
157	5.785
161	5.805
165	5.825

In Europe, the 11 independent channels, for indoor or outdoor use, are:

Channel	Frequency (GHz)	Channel	Frequency (GHz)
100	5.50	124	5.62
104	5.52	128	5.64
108	5.54	132	5.66
112	5.56	136	5.68
116	5.58	140	5.70
120	5.60		

Wireless Cells

A wireless network is designed such that information can travel back and forth between two points without the need for wires. Wireless devices are grouped into *wireless cells*. The devices in a cell communicate together on the same frequency channel and share the same wireless passkey.

The S4100 automatically adjusts the transmission speed with the current RF conditions.

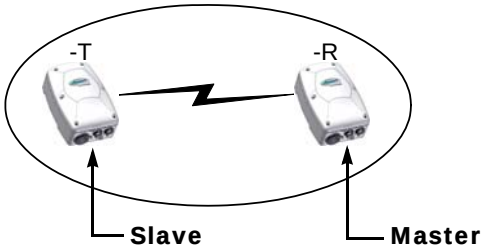
Devices in a wireless cell can have two MAC (Media Access Control) roles, master or slave:

- A master device controls the access over the wireless medium. It takes care of channel selection and slave authentication to provide access to the wireless medium.
- Slave devices need a master to access the wireless medium to transfer data. The S4100 devices are always slaves.

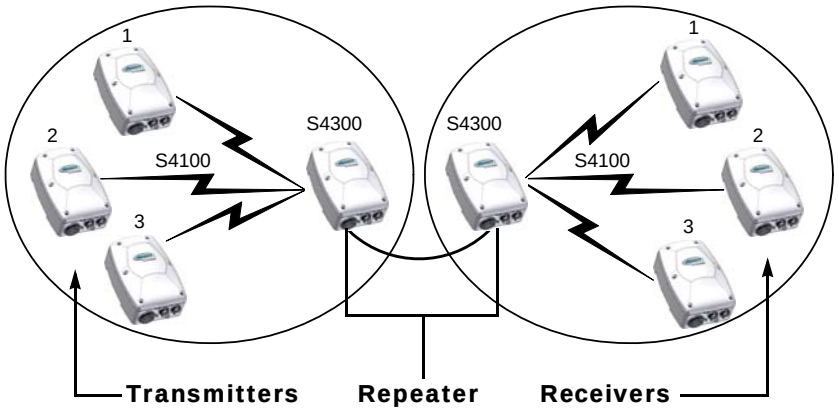
The S4100 receiver is the master, and the transmitter is the slave.

You can use the S4100 devices in two types of applications:

- Point-to-point system, which requires a single wireless cell



- Point-to-point repeater using S4300 devices, which is the combination of two wireless cells:



When planning your wireless systems, you have to take into account the firmware versions of the involved devices:

- The two S4100 devices making up a pair must have the same firmware version.
- In a point-to-point repeater, it is recommended that the S4100 devices have the same firmware versions as their associated S4300 device.

In a point-to-point repeater, you update the firmware the following way:

1. Update the firmware of all S4100 pairs, starting with the remote device.
2. Update the firmware of the two S4300 devices.

Using IP Cameras with the S4100

With the introduction of an Ethernet port on the S4100 as well as the optional two-camera models, many new configurations are possible. Although video data from more than a single camera can be transmitted from one S4100 transmitter, you must take several factors into account: the total throughput available from the S4100, the available bandwidth for the wireless cell, and the total amount of bandwidth used by each link in the cell.

If using a single S4100 for multiple camera transmission, it is important to remember that the onboard processor has a finite amount of processing power available. For instance, you can achieve 4CIF resolution at 30 fps with a single analog camera connected to an S4100 transmitter; however, if an IP camera is connected to the Ethernet port of the S4100, some processing power is required to transport the data stream of the IP camera from the Ethernet port out to the radio for transmission to the S4300 access point.

The S4100 processor has the ability to forward an Ethernet stream equal to the maximum available bandwidth on the wireless link. Obviously, using the maximum available bandwidth only for the Ethernet port leaves no bandwidth for the video streams from the encoders. Also, to attain good encoding performance for the analog cameras connected to the S4100, the maximum amount of Ethernet traffic from the Ethernet port should not exceed 2 Mbps; exceeding this value will seriously affect the performance of the encoders. If maximum encoder performance is required (4CIF 30 fps), the total amount of Ethernet traffic being sent from the S4100 should not exceed 4 Mbps.

For example, consider a wireless cell with four cameras using two S4100 transmitters. If this system is designed such that the distances dictate a channel data rate of 12 Mbps, the total amount of video bandwidth for the entire wireless cell will be 5.6 Mbps at distances of less than 3.1 miles (5 km).

The video bandwidth will be divided equally between the two transmitters, therefore providing 2.8 Mbps for each pair of cameras in the wireless cell. This equates to a total of 1.4 Mbps per camera, which can accommodate the following resolution and frame rate (NTSC/PAL) combinations, with either two analog cameras or a combination of one analog and one IP camera:

- 4CIF at 10/8 fps
- 2CIF at 15/12 fps
- CIF at 30/25 fps

As the number of multicamera links increases, the video bandwidth available for each camera reduces. With the previous example and four transmitters instead of two, the bandwidth available for each camera is 700 Kbps (5.6 Mbps divided by four transmitters divided by two cameras per transmitter).

As link distances increase, the total available video bandwidth will decrease due to free space loss and other attenuating factors. If this is not taken into account in the design phase, problems will surface which will have a detrimental effect on the total system performance.

To help you plan your system, here are typical scenarios, where:

- The maximum number of analog cameras is connected on the device (one for the S4100 and two for the S4100-2V).
- There is clear RF line-of-sight, with an RF margin of 15 dB or better to maintain the data rate specified.
- The video performances supplied include a video resolution, a frame rate expressed in frames per second (fps), and bit rate expressed in kilobits per second (kbps).

The first scenario proposes a channel data rate of 6 Mbps and a maximum video bandwidth available of 4.2 Mbps:

Analog cameras	IP camera on S4100	IP camera on S4100-2V
1 camera at 4CIF, 30/25 fps, 3 Mbps	1 IP camera at CIF, 15/12 fps, 512 Kbps	N/A
2 cameras at 4CIF, 30/25 fps, 6 Mbps	N/A	Available bandwidth is exceeded
1 camera at 4CIF, 15/12 fps, 2 Mbps	1 IP camera at CIF, 30/25 fps, 1 Mbps	N/A
2 cameras at 4CIF, 15/12 fps, 4 Mbps	N/A	All available bandwidth is used
1 camera at 2CIFH, 30/25 fps, 2 Mbps	1 IP camera at CIF, 30/25 fps, 1 Mbps	N/A
2 cameras at 2CIFH, 30/25 fps, 4 Mbps	N/A	All available bandwidth is used
1 camera at CIF, 30/25 fps, 1 Mbps	1 IP camera at 4CIF, 30/25 fps, 4 Mbps	N/A
2 cameras at CIF, 30/25 fps, 2 Mpbs	N/A	1 IP camera at 4CIF, 15/12 fps, 2 Mbps
0 camera	1 IP camera at 4CIF, 30/25 fps, 4 Mbps	N/A

The second scenario proposes a channel data rate of 54 Mbps and a maximum video bandwidth available of 18.9 Mbps:

Analog cameras	IP camera on S4100	IP camera on S4100-2V
1 camera at 4CIF, 30/25 fps, 3 Mbps	1 IP camera at CIF, 15/12 fps, 512 Kbps	N/A
2 cameras at 4CIF, 30/25 fps, 6 Mbps	N/A	Not enough processing power
1 camera at 4CIF, 15/12 fps, 2 Mbps	1 IP camera at 4CIF, 15/12 fps, 2 Mbps	N/A
2 cameras at 4CIF, 15/12 fps, 4 Mbps	N/A	Not enough processing power
1 camera at 2CIFH, 30/25 fps, 2 Mbps	1 IP camera at 4CIF, 15/12 fps, 2 Mbps	N/A

Analog cameras	IP camera on S4100	IP camera on S4100-2V
1 camera at CIF, 30/25 fps, 1 Mbps	1 IP camera at 4CIF, 30/25 fps, 6 Mbps	N/A
2 cameras at CIF, 30/25 fps, 2 Mpbs	N/A	1 IP camera at 4CIF, 30/25 fps, 6 Mbps
0 camera	1 IP camera at 4CIF, 30/25 fps, 6 Mbps	N/A

TPC

If the country of operation of the S4100 device requires conformity to the TPC (Transmit Power Control) rules, the maximum EIRP (effective isotropic radiated power) is reduced by 3 dBm from the allowed maximum value; for example, if the maximum EIRP is 30 dBm in the band and region of operation, the maximum EIRP in the device will be set to 27 dBm.

The combined transmission power of the device and its antenna must not exceed this maximum value. For that reason, you must specify the antenna gain during configuration; the device will automatically take it into account and adjust its own transmission power accordingly at startup. This adjustment is done in all wireless devices (masters and slaves).

To meet local regulations, you must use only antennas that conform to the requirements specified in the “Compliance” appendix on page 103.

DFS

In countries following the DFS (Dynamic Frequency Selection) regulations, frequency channel selection is performed by the master device. Frequency channel selection can be automatic (default) or manual; manual selection allows a better RF planning.

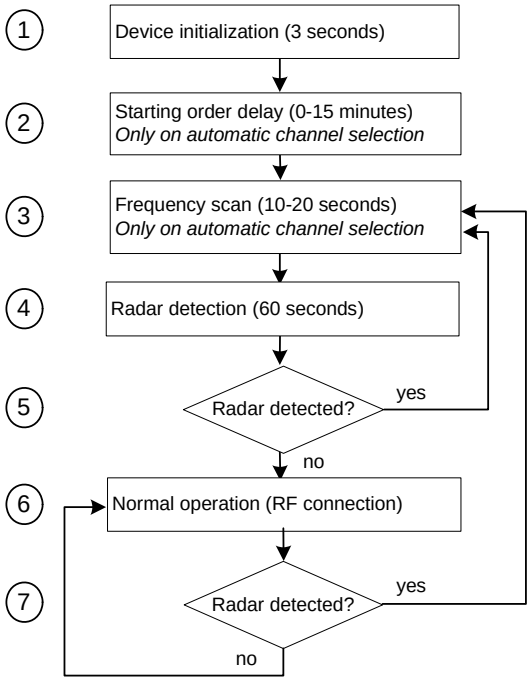
Note: DFS is required only in the 5 GHz band.

The radar detection mechanism (including channel availability check and non-occupancy period) can be performed on all wireless devices (master and slave); it also allows for better RF planning and optimal wireless network performance. The procedure is the same regardless of the type of frequency channel selection.

Note: To minimize the false radar detection problem in colocated systems using adjacent frequency channels, see page 20.

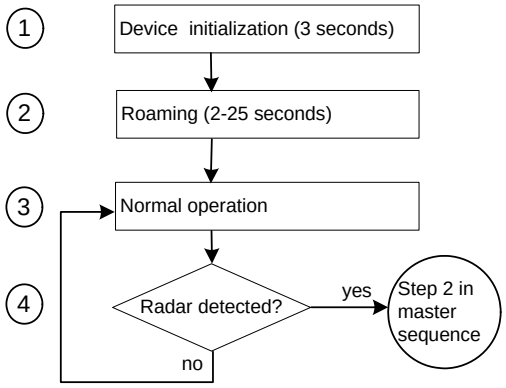
You should start the master first, then power the slave when the other device is in normal operation.

A master device in DFS mode goes through the following sequence when booting up:



1. The device goes through the standard startup procedure.
2. If automatic channel selection is active, the starting order delay ensures that colocated masters will not select a frequency channel at the same time, therefore minimizing the possibility that they choose the same one. For more information about the starting order, see page 50.
3. If automatic channel selection is active, the device scans the available frequencies (based on the selected country) and automatically selects a channel; in the selection process, channels already used by colocated masters will be discarded at first.
4. The device listens for 60 seconds on the selected channel to detect possible radar interference.
5. If a radar is detected on the channel, the device returns to the scan process, even if the channel was manually selected. The manual selection is no longer available: The device will automatically choose another frequency channel. It will not return to scan the channel in which the radar was detected for the next 30 minutes. If no radar is detected, the device continues its bootup procedure.
6. The RF connection is established; the device runs normally.
7. If a radar is detected, the device stops transmission on that channel and immediately goes back to the scan process to select another one. It will not return to scan the channel in which the radar was detected for the next 30 minutes.

The boot sequence of slave devices is:



1. The device goes through the standard startup procedure.
2. The device roams through the channels in the available frequency bands to locate its master; it does not transmit any data.
3. When the master is located, the slave runs normally on the selected frequency channel.
4. If the slave detects a radar on the channel during normal operation, it informs the master then stops operation. Upon reception of this message, the master starts its radar detection process.

   Radar detection on slave devices can be disabled; for more information, see page 21.

Colocated Systems

When installing colocated systems, you have to carefully plan the position of the devices in order to prevent radio interference. You can operate many wireless cells in the same location, provided you follow guidelines relative to frequency band and channel, distance, wireless passkey, and location.

The wireless passkeys of colocated cells must be different from one another, regardless of their frequency channels.

Distance Limitations

The distance limitations between devices are:

- The minimum distance between two devices is 3 feet (1 meter), regardless of the band or channel used.
- To avoid material damages, you must never power any two devices while their antennas are facing one another with a distance of less than 10 feet (3 meters).
- If using adjacent channels, see page 81 for the recommendations on the minimum distances to respect.
- To reduce radio interference possibilities between two adjacent frequency channels, ensure that the maximum margin between the emission of the two wireless cells is 25 dB; for more information, see Appendix D on page 81.

2.4 GHz Band

In the 2.4 GHz band in North America and Europe, you can use the three independent channels (1, 6, and 11) to colocate wireless cells.

Up to Three Point-to-Point Systems

As long as you follow the recognized RF installation practices, you can colocate three S4100 point-to-point systems without special consideration for antenna placement and type. You simply have to:

1. Assign a unique wireless passkey to each system.
2. Assign channel 1 to one system, channel 6 to the second system, and channel 11 to the last system. For example:

Device	Channel	Wireless passkey
S4100-T 1	1	1dfi340mndpha23v
S4100-R 1	1	1dfi340mndpha23v
S4100-T 2	6	pvaeodmq820pasqs
S4100-R 2	6	pvaeodmq820pasqs
S4100-T 3	11	moxsa41o0s3n7azx
S4100-R 3	11	moxsa41o0s3n7azx

Up to Six Point-to-Point Systems (< 180° Coverage)

You can install up to six S4100 receivers on the same side of a building or on the same mast, with their antennas pointing within the same direction (within a 180° angle of each other). You have to:

1. Assign a unique wireless passkey for each system.
2. Assign the same channel to two adjacent pairs of devices. Assign the channels in the following order: 1, 11, 6.

   For example:

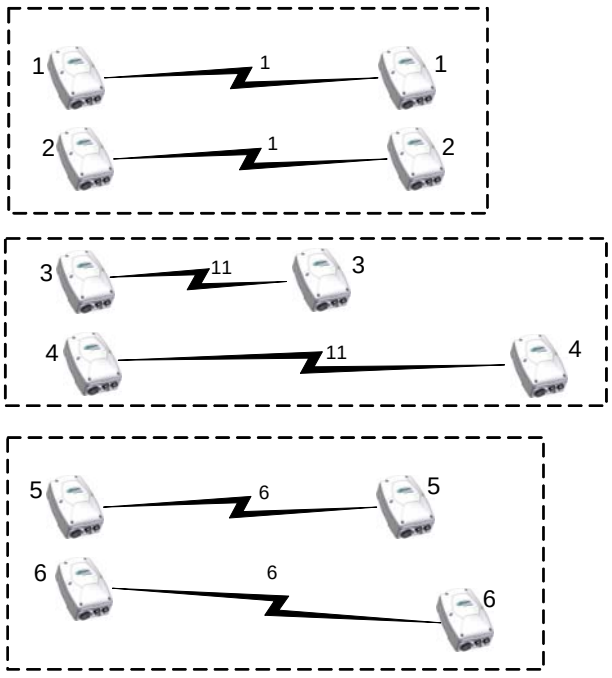
Device	Channel	Wireless passkey
S4100-T 1	1	1570fullummtlh2k
S4100-R 1	1	1570fullummtlh2k
S4100-T 2	1	270citehullj8y2h
S4100-R 2	1	270citehullj8y2h

Device	Channel	Wireless passkey
S4100-T 3	11	yyyypu76leplep11
S4100-R 3	11	yyyypu76leplep11
S4100-T 4	11	jyjyjypkpkpkbxbx
S4100-R 4	11	jyjyjypkpkpkbxbx
S4100-T 5	6	zxcvbnmlkjhgfdsa
S4100-R 5	6	zxcvbnmlkjhgfdsa
S4100-T 6	6	qwertyuioplkjhgf
S4100-R 6	6	qwertyuioplkjhgf

3. Set the RF bit rate of each system sharing a channel to a high enough value to accommodate the cumulative video throughput configured in both systems.

This higher value is required because the systems sharing the same channel will also share the available radio channel bandwidth.

4. Install the individual receivers that share a channel as close as possible to each other; do the same for the two corresponding transmitters. All devices sharing a channel must have a clear RF line of sight to each other (that is, no “hidden node”); they must also “hear” each other. For instance, transmitter 1 must be able to hear both receivers and transmitter 2.



If the distance between the transmitters sharing a channel is greater than 300 feet (91.5 meters), call the customer service team for assistance.

4.9 GHz Band in the United States

Depending on the channel width (20, 10, or 5 MHz), you can colocate 2, 4, or 10 point-to-point systems respectively. As long as you follow the recognized RF installation practices, you can install these systems in colocation mode, on the same pole or on different sides of a building, without sharing channels. For the available channels in each of the three scenarios, see page 9.

You need to:

1. Ensure that there is a 25 dB separation between two adjacent frequency channels. For more information, see page 81.
2. Assign a unique wireless passkey to each system.
3. Assign an available channel to each required system.

5 GHz Band in North America

All channels in the 5 GHz band are independent.

Up to Five Point-to-Point Systems

As long as you follow the recognized RF installation practices, you can install up to five S4100 point-to-point systems in colocation mode, on the same pole or on different sides of a building, without sharing channels.

You need to:

1. Assign a unique wireless passkey to each system.
2. Assign an available channel to each required system.

Up to 10 Point-to-Point Systems (< 180° Coverage)

Theorically, you can install up to 10 S4100 receivers on the same side of a building or on the same mast. To do so, the receivers must be pointing within the same direction (within 180° direction of each other). Consult the customer service team for assistance.

For the installation steps, adapt the procedure described on page 17, “Up to Six Point-to-Point Systems (< 180° Coverage)”, with the 5 GHz band data.

5 GHz Band in Europe

The variety of supported colocalization setups is limited in Europe because of:

- DFS regulations, mainly with the automatic channel selection that forces the master devices to see each other.
- False radar detection that can happen when using adjacent channels. By default, only half the frequency channels are available, therefore ensuring that no adjacent channels are used; however, you can make all channels available (for more information, see page 20).

It is suggested to limit the number of colocated cells to six in the 5.40–5.725 GHz band. By respecting the following steps, you can assume that the cells will not share the same frequency channel, making the complete bandwidth available for each one. You have to:

1. Assign a different wireless passkey to each cell.

   Ensure that all S4100 masters “see” one another. For the procedure, see Appendix C on page 77.This step is mandatory if automatic frequency channel selection is selected, and strongly suggested for manual selection.

2. Position the devices so that there is at least 3 feet (1 meter) between each antenna.
3. If automatic channel selection is used, set a different starting order in each master device: 1 for the first device, 2 for the device next to it, 3 for the third one, and so on.

Installing more than six cells in the 5.40–5.725 GHz band requires the use of adjacent channels. This situation demands greater distances between the antennas to reduce potential radio interference and false radar detection. Therefore, you should contact the customer service team for assistance.

False Radar Detection

The design of wireless systems in a DFS context becomes difficult because not only can the master devices cause an interference, but the slaves on an adjacent channel can also generate interferences that can cause false radar detection. Therefore, it is strongly suggested to limit the number of colocated cells to six.

To avoid false radar detection caused by an adjacent channel, the signal level of a potential interfering device on the first adjacent channel must not exceed -50 dB, -36 dB on the second channel, and -32 dB on the third channel; for example, if you use channel 100, 104 is the first adjacent channel, 108 the second channel, and 112 is the third channel.

In addition, the following features help reduce the possibility of false detection events:

- Half channel selection—This feature eliminates the possibility of using adjacent channels. Enable this feature on all masters in a new installation to avoid the potential conflict of having two masters on adjacent channels; in the web interface, the parameter is called DFS/TPC Adjacent Channel Removal. By default this feature is enabled.

  If this feature is enabled, the channel list becomes:

  100(DFS), 108(DFS), 116(DFS), 124(DFS), 132(DFS), 140(DFS), 254(Auto DFS/TPC)

  The full channel list is:

  100(DFS), 104(DFS), 108(DFS), 112(DFS), 116(DFS), 120(DFS), 124(DFS), 128(DFS), 132(DFS), 136(DFS), 140(DFS), 254(Auto DFS/TPC)

- Slave radar detection management—This feature allows you to disable radar detection on slave devices; in the web interface, the parameter is called Enable Radar Detection on Slave. In a typical DFS environment, the slave can detect a radar and alert its master to change the frequency channel. This situation can cause a major problem because it increases the number of nodes that can detect false radar events caused by adjacent channel interferences.

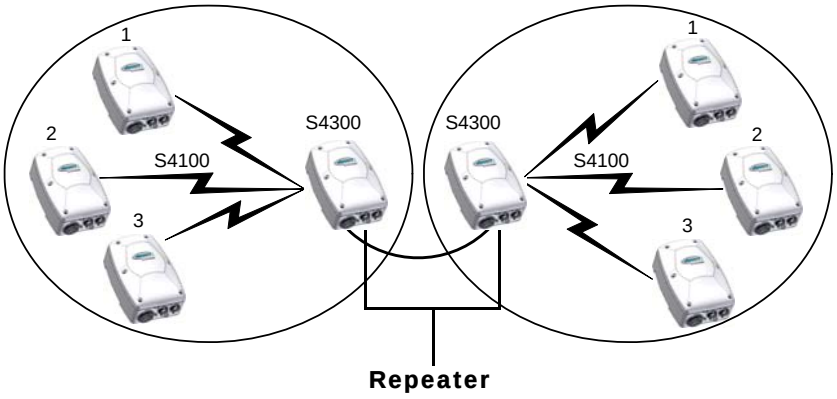
  The default value is Disabled, meaning that the slave does not detect radars; in this case, the slave EIRP is reduced from 30 to 23 dBm and the Tx power is automatically reduced to meet the new maximum EIRP requirement.

Finally, manually selecting a frequency channel helps reduce the use of adjacent channels.

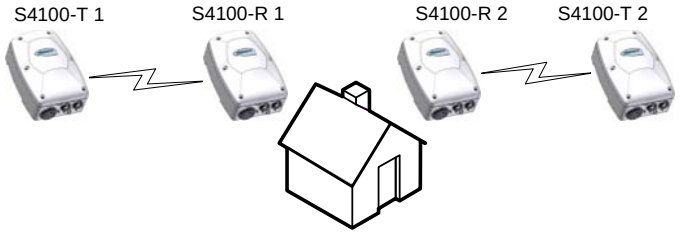
Preferred Setups

In the 5.40–5.725 GHz band, the following colocated systems are the only ones supported when automatic frequency channel selection is enabled, since the master devices must see each other. In the manual channel selection mode, safe setups are:

- A point-to-point repeater for one or more pairs of S4100 devices, with or without hidden nodes. Both master devices see each other.



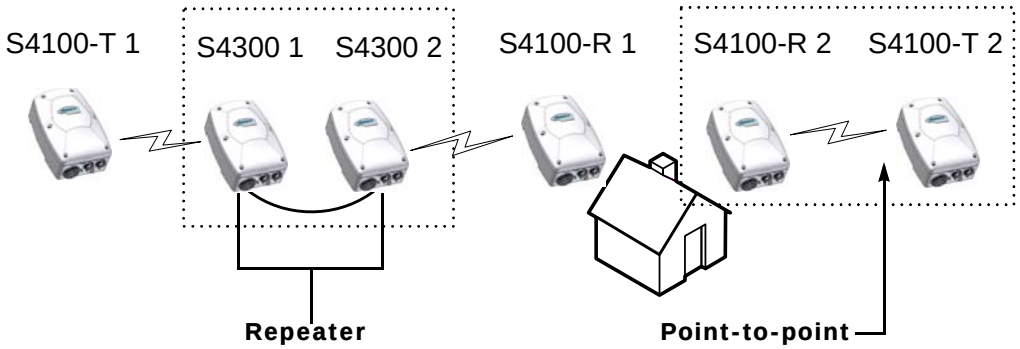
- Multiple point-to-point applications. The S4100 master devices (the receivers) see each other.



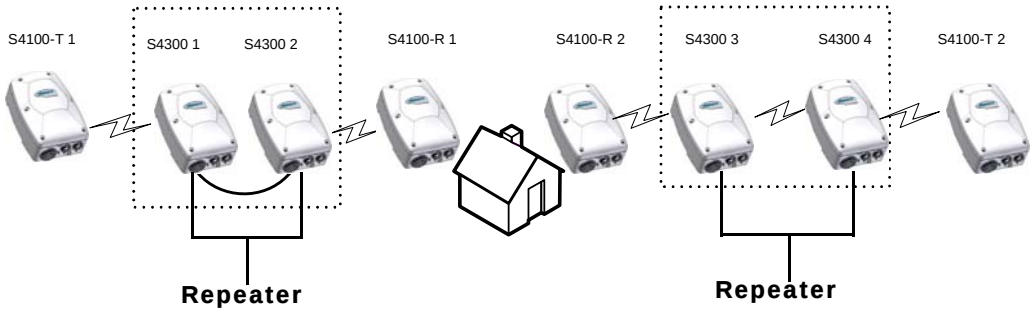
Risky Setups

In the 5 GHz band in Europe, the following colocated systems are not supported if the automatic frequency channel selection is enabled, or are risky with manual selection mode if a radar is detected:

- A point-to-point repeater with a point-to-point link. In this setup, two masters do not see each other, S4300 2 and S4100-R 2, while the two receivers do.



- Multiple point-to-point repeaters. The S4300 2 and S4300 3 masters do not see each other, while the two receivers do.



RF Planning

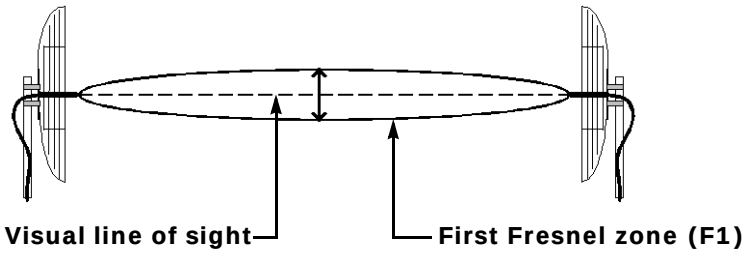
Successful operation of a wireless link depends on proper RF path planning and antenna installation. You have to install the devices in such a way that there is a clear RF line of sight between the two antennas.

Location Evaluation

The path between the two antennas must be free of obstacles that could disturb propagation. For very short link distances—less than 500 feet (152 meters)—you may be able to establish a working link despite partial path obstruction. However, radio waves will be in part absorbed and in part diffracted by the obstacles, therefore affecting link reliability. Because the reliability of such an installation is highly unpredictable, Verint does not recommend it. A path free of any obstacle is called an *RF line-of-sight path*.

To establish an RF line-of-sight path, you must take into account the spherical nature of the radio signal transmitted between the two antennas. This spherical signal spreads out from both ends of the communication path and creates a three dimensional elliptical area immediately surrounding the visual line of sight. This elliptical area varies in width depending on the length of the line of sight; the longer the length, the thicker the elliptical area becomes.

The region outlined by this elliptical area is known as the *first Fresnel zone*. The Fresnel zone is always thicker at the mid-point between the two antennas. Therefore what appears to be a perfect line-of-sight path between the base and a remote station may not be adequate for a radio signal; this is the difference between "visual" and "RF" line of sight.



In practice, it has been determined that a radio path can be considered an RF line-of-sight path if it has a clear opening through 60% of the first Fresnel zone (or *0.6 F1*). Here are values for 0.6 F1 for various signal path distances and frequency bands:

Distance		Values for 60% of the first Fresnel zone								Earth curvature effect	
		2.45 GHz		4.9 GHz		5.3 GHz		5.8 GHz			
mile	km	ft	m	ft	m	ft	m	ft	m	ft	m
1	1.6	14	4.2	9.8	3.0	9.5	2.9	8.9	2.7	0	0
4	6.5	27	8.4	19.5	5.9	18.7	5.7	18	5.5	2	0.6

Distance		Values for 60% of the first Fresnel zone								Earth curvature effect	
		2.45 GHz		4.9 GHz		5.3 GHz		5.8 GHz			
mile	km	ft	m	ft	m	ft	m	ft	m	ft	m
7	11.3	37	11	25.8	7.9	25	7.6	23.6	7.2	6	1.8
15	24	53	16	37.8	11.5	36.4	11.1	35	10.6	29	8.8

For distances under 7 miles, the earth curvature effect is negligible. However, for greater distances, you need to consider it in your calculations; for instance, for a 15-mile link in the 2.4 GHz band, the two antennas must be located 82 feet higher than the highest obstacle in the RF line of sight between them (that is, 53 feet for the Fresnel zone plus 29 feet for the earth curvature effect). Consult the customer service team for assistance.

A common problem encountered in the field and related to the 0.6 F1 clearance rule is building obstruction. The proposed visual path may just barely clear a building but the RF line of sight will not. In such a case, the signal will be partially absorbed and diffracted. Increasing the height of the two antennas or the gain of the antennas are the only alternatives to improve the link quality.

Note: At 2.4, 4.9, and 5 GHz, radio waves are highly attenuated by dense foliage. A link established in the fall or winter season may be adversely affected in the spring and summertime, if it is established below tree level.

Antenna Requirements

Verint offers many antennas to meet various distance requirements. You need to consider many factors when choosing an antenna, including the distance to cover, the RF bit rate, the radiated power (EIRP), and the frequency band. For systems located in North America on the 5 GHz band, you can use the *Wireless System Margin Calculator* located on the Verint Video Intelligence Solutions extranet (Technical Support > Downloads > Utilities and Tools).

You must use only antennas certified by Verint. They meet the local regulations regarding the maximum antenna gain allowed. The certified antennas are listed in the “Compliance” appendix on page 103.

To ensure that the device meets the maximum EIRP in the region of operation, enter the antenna gain in the device (in the advanced wireless parameter section of the SConfigurator tool); the device will automatically take it into account and adjust its own transmission power accordingly at startup.

For fixed point-to-point applications in the 5.725 GHz–5.850 GHz in USA and Canada, 19 dBi and 23 dBi antennas can be used without transmission power reduction. It is the responsibility of the installer to ensure that the system is used exclusively for fixed point-to-point operation.

Note: Connecting an antenna with a gain higher than the value for which the device is certified for the frequency band and region of operation is prohibited. It is your responsibility to ensure that you respect the regulations in place.

Antenna installation must be performed by certified professionals.

Interference

The 2.4 GHz band is a license-free band, not regulated by a government agency; this absence of frequency coordination can result in interference between various systems. For instance, if a link with an RF line of sight is subject to excessive video delay and very low frame rate (or possibly breakdown of video images), it could be due to interference. Fortunately, you have ways of adapting your setup to avoid interference:

- RF channel selection—The S4100 has 11 or 13 channels to choose from. In case of interference, it is recommended to change channels until you find a clean one.
- Antenna selection—Replacement of the integrated antenna with one that produces a higher gain can significantly lower the interference from other radio systems and reduce the number of signals that are picked up. Consider replacing the antenna if switching channels does not correct the problem or if all channels must be used to colocate several systems.

There should not be any interference in the 4.9 GHz band, since it is a licensed band with limited usage to public safety.

The 5 GHz band, which is also a license-free band, is less cluttered than the 2.4 GHz band, resulting in less potential interference from other wireless systems.

RF Exposure Considerations

In order to comply with the RF exposure requirements of CFR 47 part 15 in North America, the devices must be installed in such a way as to allow a minimum separation distance of 12 inches (30 cm) between antennas and persons nearby.

Other countries may have different regulations. Please consult with local regulations prior to installation.

3

Configuring and Installing the Device

The steps required to prepare your S4100 device for operation are:

- Basic configuration
- Physical installation in its final location
- Alarm and audio configuration, if required

Two types of applications are covered:

- Point-to-point system between a transmitter and a receiver
- Point-to-point repeater, with the S4300-RP devices

Configuring the Wireless System

To configure the device, you need the proprietary SConfigurator tool. It is included on the *Utilities* CD shipped with your device; you can also find its latest version on the Verint Video Intelligence Solutions extranet (Technical Support > Downloads > Utilities and Tools). You have to copy its executable file (`SConfigurator.exe`) to the hard disk of your computer.

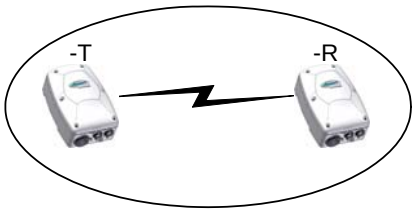
Note: Prior to deployment in the field, this wireless device requires configuration and testing.

The minimum hardware and software requirements for the host computer needed to configure the edge device are:

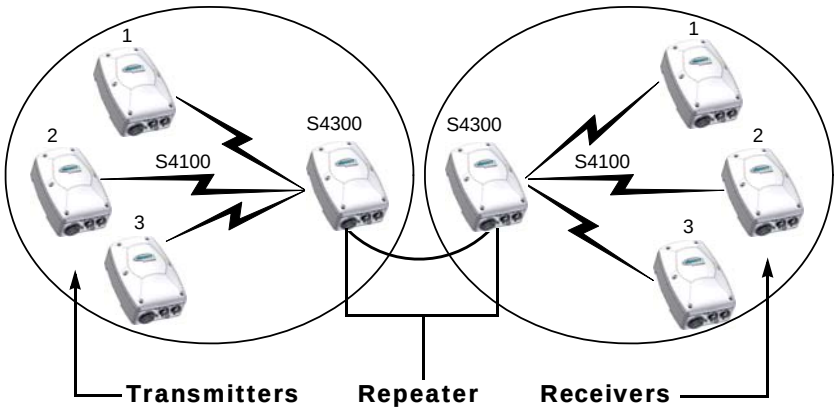
- An Ethernet network card
- Windows 2000 Service Pack 2 or higher, or Windows XP Service Pack 2 or higher

The two applications that you can set up with the S4100 devices are:

- Point-to-point system between a transmitter and a receiver



- Point-to-point repeater, with the S4300-RP devices



A point-to-point repeater is used as a range extender for wireless links, when you need a device to retransmit the signals coming from one or many S4100 transmitters to their corresponding receivers. The S4300-RP repeater is made up of two S4300 devices.

The initial configuration steps are the same for both types of applications:

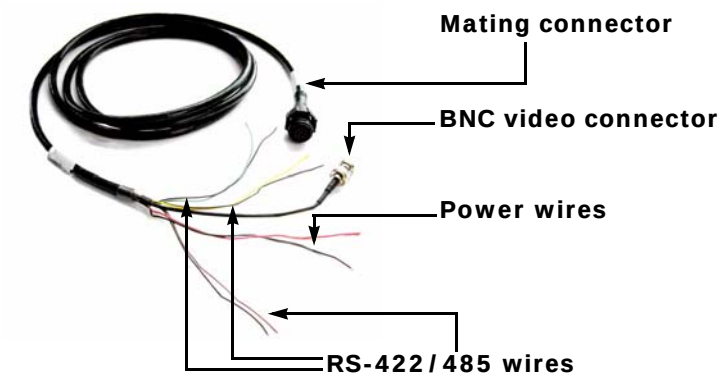
1. Changing the IP address of the computer running SConfigurator.

2. Powering the device and accessing SConfigurator.
3. Assigning initial parameters.
4. Changing the IP address of the computer to its original value.

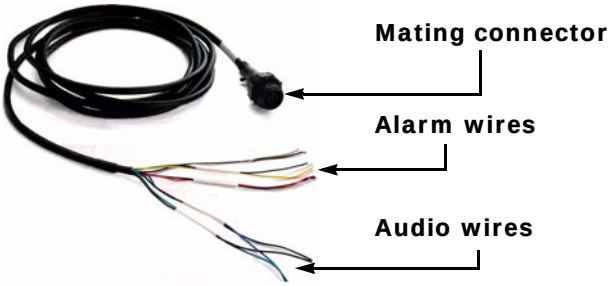
Supplied Cables

Your S4100 shipment comes with the following cables:

- Two or four video/serial/power cables, depending of the model (four cables for a *-2V*)



- Two alarm/audio cables (CABAA), if the alarm and audio option was selected



Changing the IP Address of the Computer

To access the S4100 devices with SConfigurator, you need to temporarily change the IP address of your computer. The temporary address must be in the 172.16.23.255 subnet. The procedure varies depending on your operating system (Windows 2000 or Windows XP).

The recommended temporary IP settings are:

- IP address: 172.16.23.1
- Subnet mask: 255.255.0.0
- Default gateway: 172.16.23.1

To change the IP address under Windows 2000:

1. From the desktop, right-click **My Network Places**, then choose **Properties**.

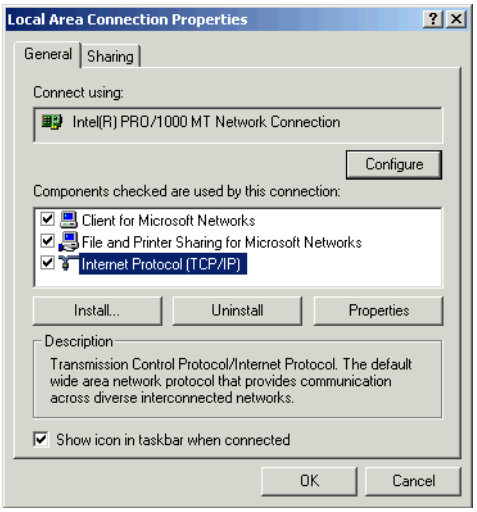
   The Network and Dial-up Connections window appears.

2. Double-click **Local Area Connection**.

   The Local Area Connection Status window appears.

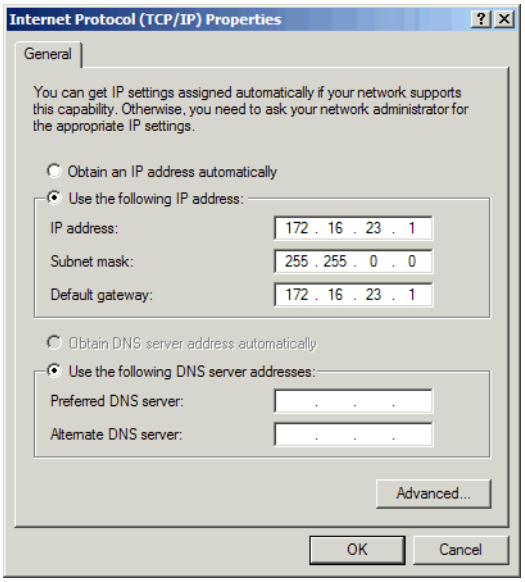
3. Click **Properties**.

   The Local Area Connection Properties window appears.



4. In the component list, select **Internet Protocol (TCP/IP)**, then click **Properties**.

   The Internet Protocol (TCP/IP) Properties window appears.



5. If **Use the following IP address** is selected, write down the information displayed in the box: the IP address, subnet mask, and default gateway.

   You will need these addresses to put back your computer in its initial state once the configuration process is completed.

6. If **Obtain an IP address automatically** is selected, click **Use the following IP address**.

7. Enter the desired IP address, subnet mask, and default gateway (the temporary values when you are starting the configuration procedure, or the initial values when the work is over).

8. Click **OK** to close all windows.

To change the IP address under Windows XP:

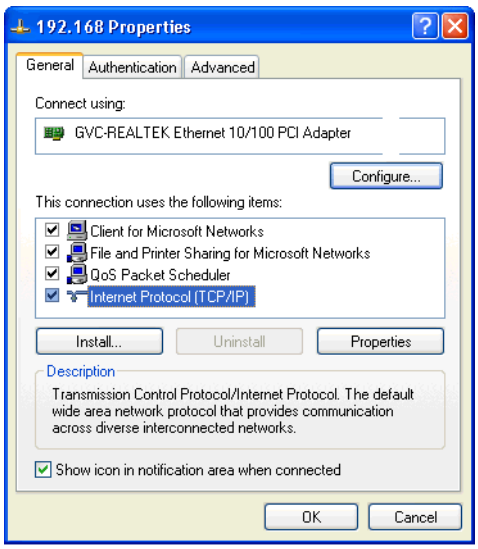
1. In the Windows Start menu, select **Control Panel**.

2. If the classic view is enabled, select **Network Selection**. In the category view, select **Network and Internet Connections**, then **Network Connections**.

3. Double-click your active LAN or Internet connection.

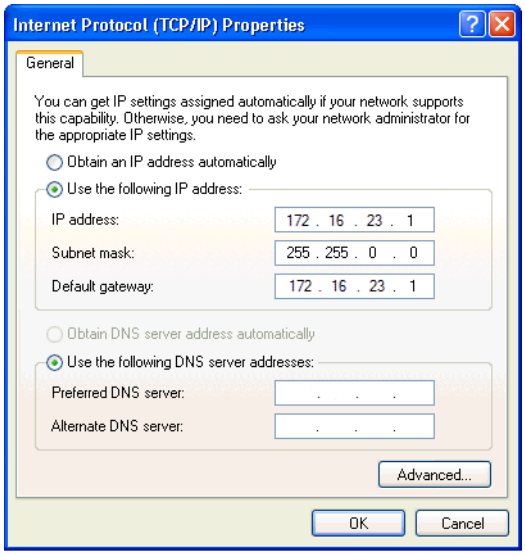
4. Click **Properties**.

   A Properties window appears.



5. In the General tab, select the **Internet Protocol (TCP/IP)** item, then click **Properties**.

   The Internet Protocol (TCP/IP) Properties window appears.



6. If **Use the following IP address** is selected, write down the information displayed in the box: the IP address, subnet mask, and default gateway.

   You will need these addresses to put back your computer in its initial state once the configuration process is completed.

7. If **Obtain an IP address automatically** is selected, click **Use the following IP address**.

8. Enter the desired IP address, subnet mask, and default gateway (the temporary values when you are starting the configuration procedure, or the initial values when the work is over).

9. Click **OK** to close all windows.

Powering the Devices and Starting SConfigurator

You use SConfigurator to configure your wireless system. For more information about this tool, refer to the *Verint SConfigurator User Guide*.

Note: You can configure only one pair of S4100 devices at a time, because all S4100 pairs have the same IP addresses (172.16.23.20 for the receivers and 172.16.23.10 for the transmitters).

To start the configuration of a device pair:

1. In a lab, unpack the receiver and the transmitter and set them on a table.

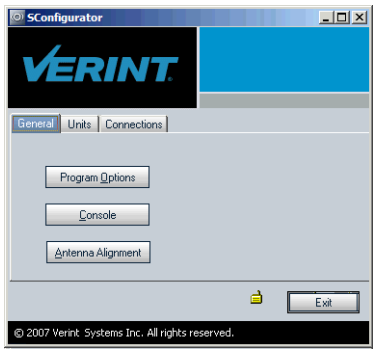
2. Write down the serial numbers of the devices in a safe place.
3. Plug the supplied video/serial/power cable into the main connector of the S4100-R.
4. Power the S4100-R using the red and black wires of the video/serial/power cable.

> Warning: To avoid material damages, you must never power any two devices while their antennas are facing one another with a distance of less than 10 feet (3 meters).
>
> On an S4100-2V or S4200-AS-2V, do not use the red and black wires of the second video/serial/power cable.

> Note: CE and FCC compliance testing has been performed with the MTA572415 (CE 24V AC) and MA572416 (24V AC North America) power supplies respectively. They correspond to the PS2440 power supply offered as an option by Verint.
>
> Power supplies other than the approved ones require verification of operation with the S4100 before use.
>
> If you are using a power supply other than the one supplied by Verint, you need to ensure that it has a minimum capacity of 1.6A (for 12V DC) or 25 VA (for 24V AC).

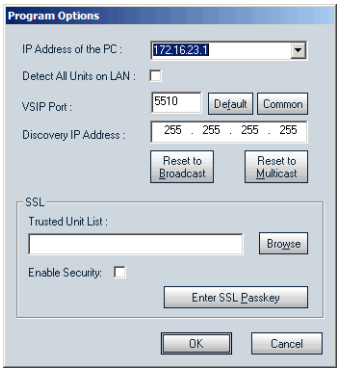
   a. In 12V DC, connect each power wire of the power cable to the corresponding wire of the power supply: the red wire to the input (+) wire and the black wire to the ground wire (-). For more information, refer to the power supply documentation.
   b. In 24V AC, connect each power wire of the supplied cable to a wire on the power supply. Both wires are used for power.
   c. Connect the electrical plug into the outlet.
5. Connect an Ethernet cable between the network (RJ-45) connector on the S4100-R and the computer.
6. When the boot sequence of the receiver is completed, power the S4100-T (repeat step 4).
7. Start SConfigurator by double-clicking `SConfigurator.exe` on your hard disk.

   The SConfigurator window appears.



8. In the General tab, click **Program Options**.

The Program Options window appears.



9. In the **IP Address of the PC** list, select **172.16.23.1**. If it does not appear in the list, it may be because you did not temporarily change the IP address of your computer; see page 29 for the procedure.

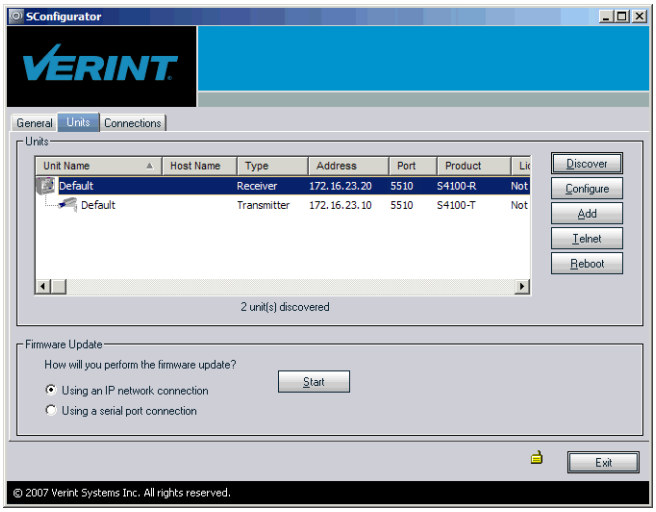
10. Ensure that the **VSIP Port** is 5510; otherwise, click **Default**.

11. Ensure that the **Discovery IP Address** is 255.255.255.255; otherwise, click **Reset to Broadcast**.

12. Click **OK**.

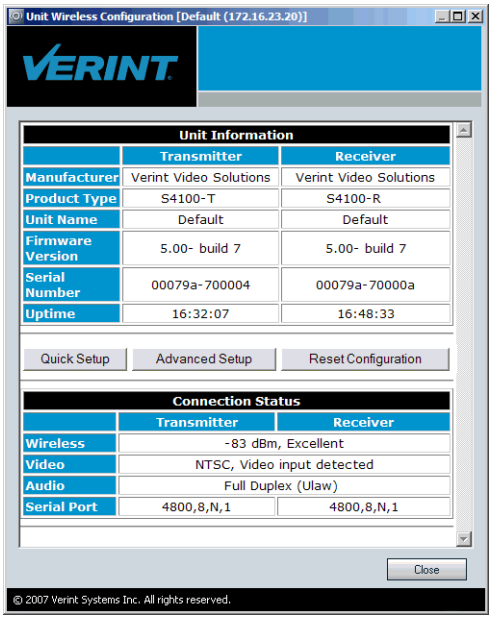
13. Select the **Units** tab, then click **Discover**.

The two devices appear in the Units list.



14. Select the S4100-R device, then click **Configure**.

The Unit Wireless Configuration window appears.



15. Click **Quick Setup**.

Assigning Initial Parameters

You can easily set up your radio system by providing a minimal set of parameters. The parameters vary depending on your application (point-to-point system or point-to-point repeater).

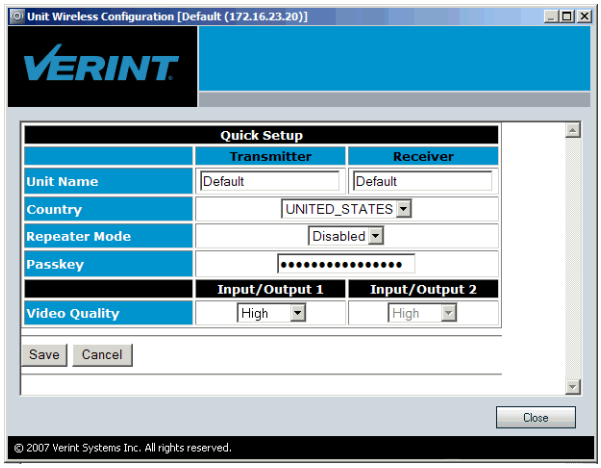
When selecting the video quality of the S4100 device, it is recommended to use one of the following five preset video qualities:

Parameters	Very High	High	Medium	Low	Very Low
Resolution	4CIF	All lines	CIF	CIF	CIF
Frame rate in NTSC/PAL (frames per second)	30/25	30/25	30/25	7/6	4/3
Bit rate (kbps)	3000	2046	1024	512	256
Min. quantizer	2	2	2	2	2
Max. quantizer	15	15	15	15	15

Parameters	Very High	High	Medium	Low	Very Low
Input filter	None	Low	Low	Low	Low
Deblocking filter	On	On	On	On	On

To set the parameters for a point-to-point system:

1. In the **Unit Name** boxes of the Quick Setup window, provide a meaningful name for the devices.



2. In the **Country** box, select the country of operation of the pair of devices.

   You must assign the proper country to comply to the DFS/TPC regulations, if applicable, to respect the maximum EIRP, and to use the proper set of frequency channels.

3. Ensure that the **Repeater Mode** value is **Disabled**.

4. In the **Passkey** box, enter the wireless passkey common to the transmitter and receiver.

   This user-supplied passkey is case sensitive and must have exactly 16 characters.

5. In the **Video Quality** box (two boxes are available for a -2V product), select the desired video quality. The following preset values are available: Very Low, Low, Medium, High, and Very High.

6. Click **Save**.

   The S4100-T receives its configuration through the wireless network. The devices reboot.

7. In the Unit Wireless Configuration window, click **Close**.

8. In the SConfigurator window, click **Exit**.

9. Unplug the Ethernet cable from the S4100-R device, then put back the dust cap on the network (RJ-45) connector.

10. Connect the monitor and camera to the devices; ensure that RF and video communication works properly in your wireless system.

The initial configuration is now complete for the two devices. You can now install them in their final location.

To set the parameters for a point-to-point repeater system:

1. In the **Unit Name** boxes of the Quick Setup window, provide a meaningful name to the two devices.
2. In the **Country** box, select the country of operation of the pair of devices.

   You must assign the proper country to comply to the DFS/TPC regulations, if applicable, to respect the maximum EIRP, and to use the proper set of frequency channels.
3. In the **Repeater Mode** box, select **Enabled**.
4. In the **Passkey** box, enter two different passkeys, one per wireless cell.

   These user-supplied passkeys are case sensitive and must have exactly 16 characters.
5. In the **Video Quality** box (two boxes are available for a -2V product), select the desired video quality.
6. Click **Save**.

   As soon as these settings are saved, the devices are not communicating anymore, since they have different wireless passkeys. The RF and video communication will be re-established after the repeater is fully configured.

   The S4100-T receives its configuration through the wireless network. The devices reboot.
7. In the Unit Wireless Configuration window, click **Close**.
8. In the SConfigurator window, click **Exit**.
9. Unplug the Ethernet cable from the S4100-R device, then put back the dust cap on the network (RJ-45) connector.
10. Configure the two S4300 devices making up the repeater. For the procedure, refer to the *Nextiva S4300-RP Installation Guide*.
11. Connect the monitor and camera to the devices; ensure that RF and video communication works properly in your wireless system.

The initial configuration is now complete for the two devices. You can now install them in their final location.

Installing the Equipment

After successfully configuring your S4100 devices, you are ready to install them in their final location. To optimize your system radio performance, carefully review the site planning information presented in Chapter 2 on page 7.

Installing a system includes:

1. Installing the transmitter and the receiver.
2. If required, installing external high-gain antennas.
3. Connecting the RS-422/485 serial port.
4. If required, configuring the I/Os.

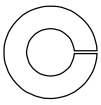
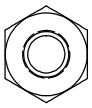
Installing the S4100 Devices

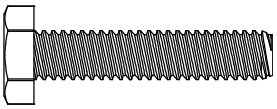
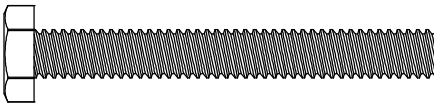
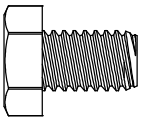
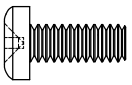
You can install an S4100 on a wall or pole using a mounting assembly set that is included in your shipment. The mounting assembly set includes:

- A mounting bracket
- A pole/wall pivot mount
- A pole clamp
- Two stainless steel straps

Note: You must install the mounting assembly on the S4100. It is required to properly mount and securely ground the wireless device.

The following fasteners are also part of the set:

Item	Description	Scale drawing
1	Lock washers for the pole clamp (2) and the pole/wall mount pivot (2)	
2	Lock washers for the mounting bracket (4)	
3	Nuts for the pole clamp (2) and the pole/wall mount pivot (2)	

Item	Description	Scale drawing
4	Hex screws (7/16 inch) for the pole/wall mount pivot (2)	
5	Hex screws (7/16 inch) for the pole clamp (2)	 Not a scale drawing. Real length is 3.5 inches (89 mm).
6	Hex screw (0.5 inch) for the ground lug (1)	
7	Screws (Phillips) for the mounting bracket (4)	

To install the mounting assembly, you need the following equipment:

- Phillips #2 screwdriver
- 0.5-inch (13-mm) wrench
- 7/16-inch (11-mm) wrench
- Four screws if the device is installed on a wall

The pole diameter can vary from 1.0 to 6.5 inches (2.55 to 16.5 cm).

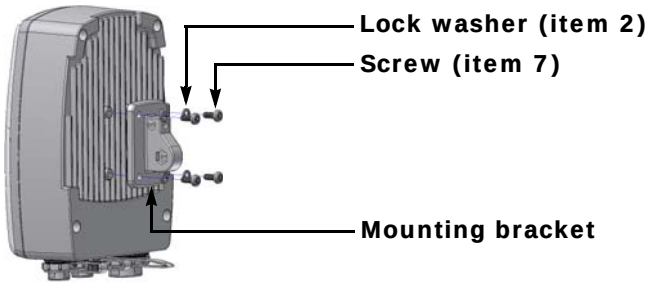
Warning: When installing colocated wireless systems, you have to take into account the distance limitations listed on page 16.

Always mount the device with the mating connectors pointing downwards. Otherwise moisture may penetrate the device; the associated repair costs would not be covered by the warranty.

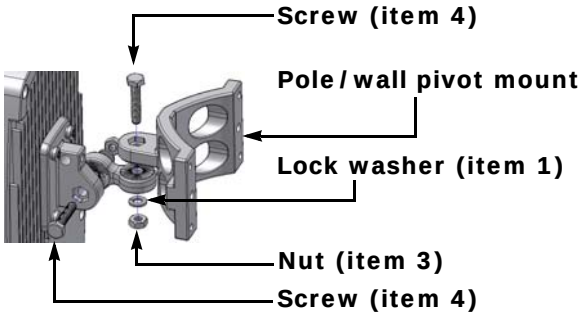
Note: If you are not installing a high-gain antenna, position the device so that its integrated antenna has a clear RF line of sight with the antennas of its corresponding device (S4100 or S4300).

To mount an S4100 on a pole or wall:

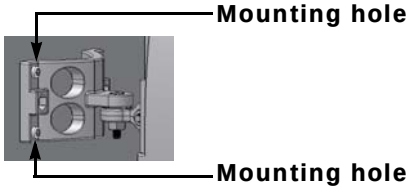
1. Install the mounting bracket on the rear of the device with a Phillips screwdriver, using the four screws (item 7) and the four lock washers (item 2). The recommended torque is 23 lbf-inch (2.6 N-m).



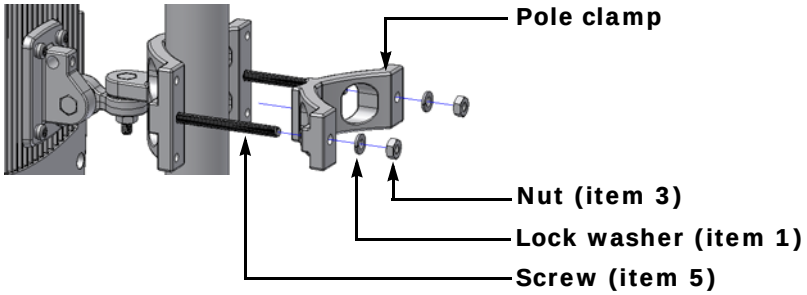
2. Attach the pole/wall pivot mount to the mounting bracket with a 7/16-inch (11-mm) screwdriver, using the two screws (item 4), two lock washers (item 1), and two nuts (item 3). The recommended torque is 70 lbf-inch (7.9 N-m).



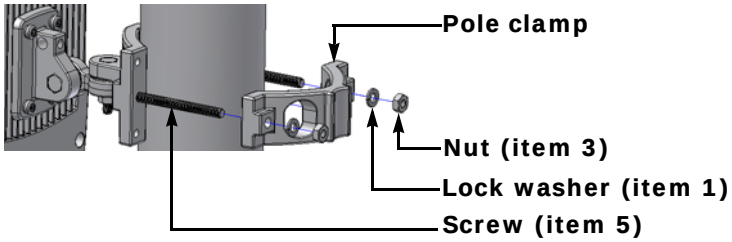
3. To install the device on a wall, use four screws (not supplied) in the four mounting holes located at the ends of the pole/wall pivot mount.



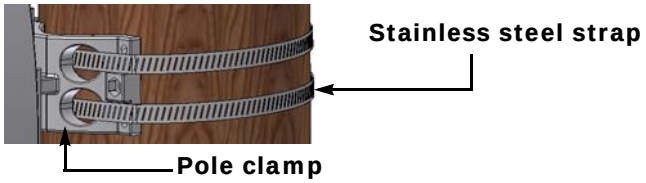
4. To install the device on a small pole (1–2.25 inch, or 2.55–5.7 cm diameter), position the device and the pole clamp the following way, then use a 7/16-inch (11-mm) screwdriver to put in place the two screws (item 5) with two nuts (item 3) and two lock washers (item 1). The recommended torque is 70 lbf-inch (7.9 N-m).



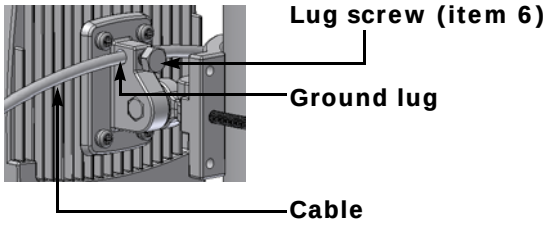
5. To install the device on a pole with a 2.25–3.25 inch diameter (5.7–8.25 cm), position the device and the pole clamp the following way, then use a 7/16-inch (11-mm) screwdriver to put in place the two screws (item 5) with two nuts (item 3) and two lock washers (item 1). The recommended torque is 70 lbf-inch (7.9 N-m).



6. To install the device on a pole with a 4.5–6.5 inch diameter (11.4–16.5 cm), use the supplied stainless steel straps.



7. Connect the device to the ground by inserting a cable into the ground lug, then screw in the lug screw (item 6) using a 0.5-inch (13-mm) wrench. Use a large diameter wire (minimum AWG 10; maximum AWG 1), and make it as short as possible. Then ground the cable.



8. Remove the dust caps from the main (Video/Serial/Power) and optionally the auxiliary connectors.
9. Plug the video/serial/power cable on the main connector of the S4100 device. To properly install the cable connector on the device, use your hands and turn until it blocks. Do not use pliers.
10. Plug the BNC video connector of the video/serial/power cable on the target equipment associated to video 1.
11. Perform the serial connection to the target equipment (see page 44).
12. If your device is a *-2V* model:
    a. Connect the second video/serial/power cable to the Auxiliary connector of the S4100 device.
    b. Plug the BNC video connector of the second video/serial/power cable on the target equipment associated to video 2.
    c. Perform the serial connection to the target equipment.
13. If you purchased the alarm/audio option, plug the supplied alarm/audio cable into the Auxiliary connector of the device.
14. If required, install an external antenna (see page 43).

Tip: If you are installing the S4100 equipment in a lightning prone environment or in a site where large AC mains power fluctuations are a common occurrence, add additional external surge protection to all vulnerable connections. Vulnerable connections are those that run for a long distance between the S4100 and the connected equipment. For more information about surge protection, see Appendix B on page 75.

Tip: If the S4100 is directly exposed to the sun in an environment likely to reach 122°F (50°C), install a sun shield. Otherwise, reduce the maximum operating temperature by 18°F (10°C) to protect the equipment; that is, without a sun shield, the maximum temperature should be 104°F (40°C).

Tip: For easy maintenance, it is strongly recommended to plug the outdoor Ethernet cable on the network (RJ-45) connector of the device and to run the cable down the pole. Do not connect the other end to any equipment while the S4100 is working normally. Add lightning protection at both ends.

15. To properly fuse the power supplied to the wireless device, install a fuse between the power source and the power cable. The fuse must have the following ratings: UL Listed, 250V, 2.5A, Fast-Acting.

16. Power up the S4100 device (see page 33).

> Note: Power supplies other than the approved ones (PS2440) require verification of operation with the S4100 before use.
>
> If you are using a power supply other than the one supplied by Verint, you need to ensure that it has a minimum capacity of 1.6A (for 12V DC) or 25 VA (for 24V AC).

17. Repeat step 1 to step 16 for the second device.
18. To improve the signal level between the devices, use the antenna alignment utility from SConfigurator.

Installing an External Antenna

If you bought a high gain antenna, install it after the S4100 is in place.

> Note: You can only use antennas certified by Verint. For the list, see the “Compliance” appendix on page 103.
>
> The antenna requires professional installation.
>
> The installer must enter the proper antenna gain in the device so that the transmission power is automatically adjusted. It is the responsibility of the installer to ensure that the proper antenna gain is configured. For fixed point-to-point applications in the 5.725 GHz–5.850 GHz in USA and Canada, 19 dBi and 23 dBi antennas can be used without transmission power reduction. It is the responsibility of the installer to ensure that the system is used exclusively for fixed point-to-point operation.

To install an external antenna:

1. Install the antenna above the S4100 device. If you bought your antenna from Verint, use the supplied pole mount bracket.
2. Remove the cap from the antenna connector on the S4100.
3. Screw the SMA connector of the antenna cable to the antenna connector on the S4100 and tighten it with a 0.25-inch (0.6 centimeter) wrench.

> Warning: Do not over-tighten to avoid damaging the connector. The recommended torque is 8 lbf-inch (100 N-cm). You could use a calibrated SMA torque wrench (for instance, from the Pasternack company, available at www.pasternack.com).
>
> Never leave the antenna connector without either the cap or the SMA connector. The antenna connector must be terminated to avoid damaging the device radio.

4. Apply two or three layers of electrical tape around all RF connections.

   The antenna cable and connectors are weather-tight; however, vibration caused by the wind will over time loosen the connectors and reduce the efficiency of the gaskets. The electrical tape will prevent this situation.

5. With SConfigurator, enter the new antenna gain and change the antenna selection from Integrated to External (see page 51).

6. Carefully align the antenna with that of the other device so that they have a clear RF line of sight.

7. To improve the signal level between both devices, use the antenna alignment utility from SConfigurator.

Connecting the RS-422/485 Serial Port

The Nextiva edge devices support only the RS-422 and RS-485 asynchronous protocols. For any other protocol, you may need a converter.

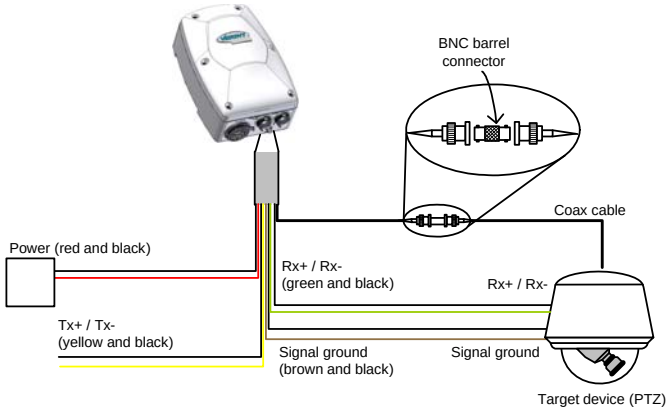
On an S4100-2V transmitter, you can transmit serial data to two PTZ cameras if the protocol is RS-485. The corresponding PTZ keyboard must be able to reference each camera individually. In this context, you perform the serial connections on both cables.

With RS-422, you can have one PTZ camera and one fixed camera.

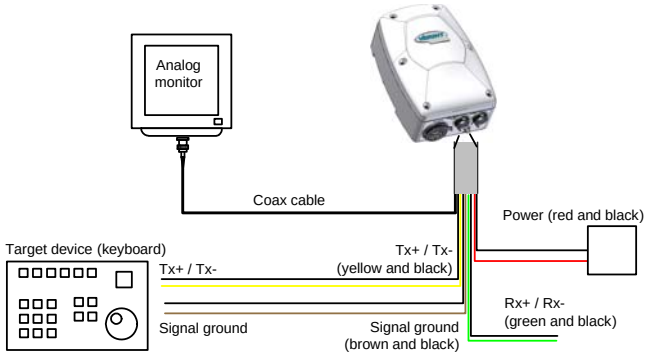
Use the video/serial/power cable to properly connect the device to a serial peripheral. Here is the wiring scheme for the four-wire RS-422 or RS-485 protocol:

Cable			**Peripheral**
Signal name	**Wire pair**	**Wire color**	**Signal name**
Rx+	green/black	green	Rx+
Rx-		black	Rx-
Tx+	yellow/black	yellow	Tx+
Tx-		black	Tx-
Signal ground	brown/black	brown	Signal ground
Signal ground		black	Signal ground

These connections apply on both transmitter and receiver devices. For example, here is an S4100 transmitter connected to a PTZ camera in an RS-422 2-wire context:



The corresponding receiver side is:



For a two-wire, half-duplex RS-485 connection:

1. Use the following wiring scheme on both devices:

Cable			Peripheral
Signal name	**Wire pair**	**Wire color**	**Signal name**
Data+	green/black	green	Data+
Data-		black	Data-
Signal ground	brown/black	brown	Signal ground
Signal ground		black	Signal ground

2. Set the operating mode to RS-485 2 Wires (see page 54).

Configuring the I/Os

You can program alarms (or events) or use the audio features of devices with a single video input, using the supplied alarm/audio cable (CABAA).

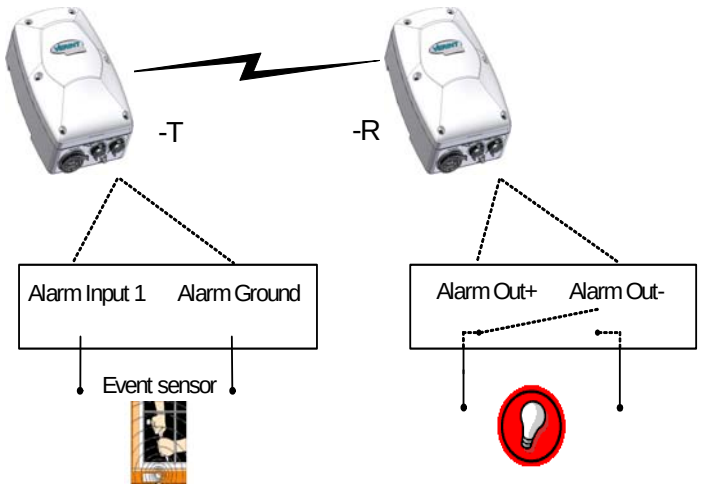
The S4100 supports two alarm inputs, one alarm output, one audio input, and one audio output. Each signal has a dedicated purpose:

Signal	Color	Purpose
Alarm Input 1	yellow/black	Either an alarm link or PTL (push-to-listen) audio transmission mode. To switch between the two, see page 53.
Alarm Input 2	white/black	Push-to-talk (PTT) audio transmission mode
Alarm Output	red/black	Relay for the input 1 signal in point-to-point alarm mode
Audio Input	green/black	Connection to the line-out connector of a pre-amplifier
Audio Output	blue/black	Connection to a speaker

You cannot program PTT/PTL audio and alarms at the same time, since alarm input 1 is used in both contexts.

Alarms

The S4100 receiver and transmitter can generate and receive alarms. Typically, an alarm is generated on a transmitter and acknowledged on a receiver. To generate an alarm on an S4100 transmitter, you have to short the alarm input 1 and alarm ground signals. The relay output on the receiver is configured to close the contact between the two alarm output pins (up to 48V at 100 mA) upon alarm activation. For example:



Audio

Two transmission modes for audio data are available, provided audio is supported everywhere in your system:

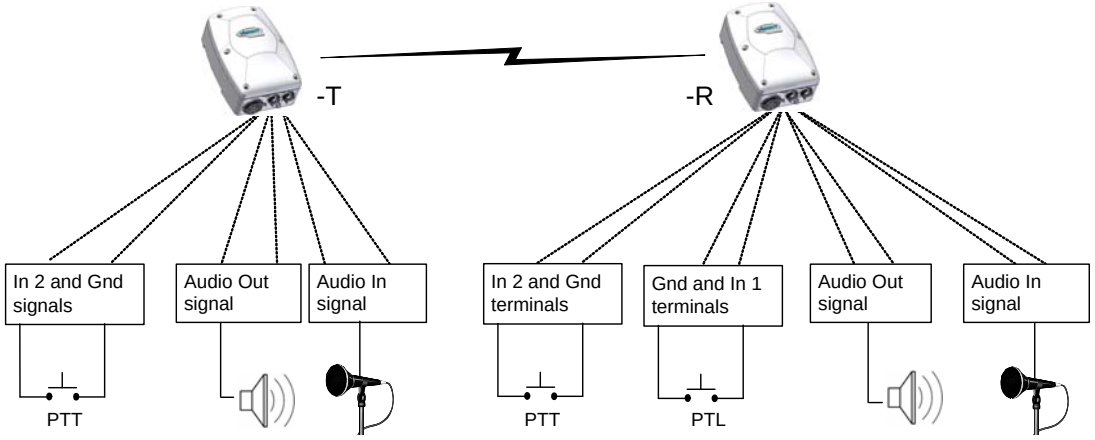
- Full duplex—Data is transferred in both directions simultaneously. The I/Os are available for alarms.
- PTT/PTL—The push-to-talk/push-to-listen is a half-duplex mode that allows you to control audio communication between two devices by using a button to switch from voice reception to transmission mode.

The PTT/PTL transmission mode uses the I/O pins; therefore, you cannot program alarms and PTT/PTL at the same time. PTT/PTL requires a specific hardware configuration:

- To activate the audio reception circuit (for PTL) on receiver devices, you have to short the alarm input 1 dry contact and the alarm ground signal. You cannot activate PTL on transmitters. Remember to change the input 1 setting for audio use (see page 53).
- To activate the audio transmission channel (for PTT), you must trigger an activation switch (for example, a button) that is based on the shorting of the alarm input 2 and alarm ground signals.

If the PTT switches of both the transmitter and receiver are activated at the same time, the receiver will have precedence: Audio will be transferred from the receiver to the transmitter. If the receiver PTL and PTT functions are activated at the same time, PTT will be activated and PTL will be ignored.

Here is a typical PTT/PTL application:



Regardless of the transmission mode, the connections for the audio equipment are:

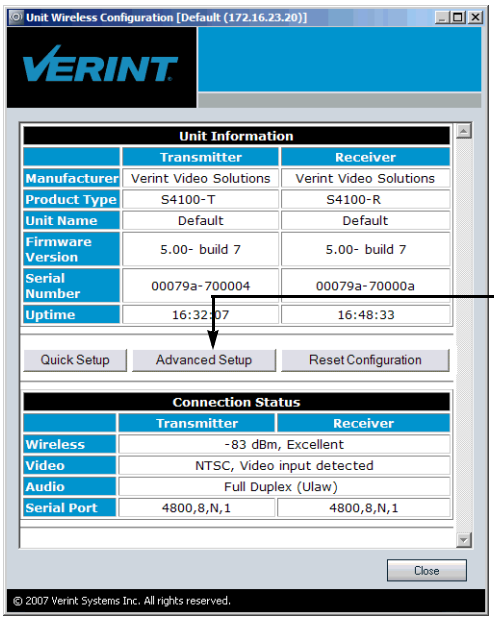
- You plug the audio input signal of the device to the Line-out connector on a pre-amplifier. Then you plug a microphone on the pre-amplifier.
- You plug the audio output signal of the device to the Line-in connector on an amplifier. Then you plug a speaker on the amplifier.

The audio input/output specifications are:

Mode	Gain	Impedance	Frequency range
Input	-20 to -3 dBV	30 kohm	300–3600 Hz
Output	-45 to -3 dBV	8 ohms min.	

Performing an Advanced Configuration

In addition to the Quick Setup window in SConfigurator, you have access to a more elaborate set of parameters (general, wireless, video, audio, and serial port). You can use them to fine tune the configuration of your devices (for instance if you are colocating many systems) or to troubleshoot your devices with a customer service specialist.



Access to advanced parameters

Also, the Connection Status area provides the current state of the device pair:

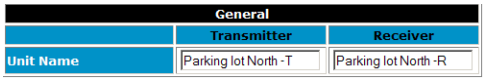
- Wireless: the signal level and the communication quality
- Video: the video format and the state of the video signal
- Audio: the state of the audio signal
- Serial Port: the bit rate, number of data bits, parity, and number of stop bits

General

You can change the names of the devices.

To change the general parameter of the devices:

1. In the Unit Wireless Configuration window in SConfigurator, click **Advanced Setup**.
2. Locate the **General** area.



3. In the **Unit Name** boxes, enter meaningful names for the devices.
4. If you are finished with the changes, scroll down the window, then click **Save**.

   The devices reboot.

Wireless

The available wireless parameters are:

- Country—The country of operation of the devices.

  You must assign the proper country to comply to the DFS/TPC regulations if applicable, to respect the maximum EIRP, and to use the proper set of frequency channels.
- Repeater Mode—The indication of whether the S4100 is part of a point-to-point repeater system.
- Passkey—A unique, 16 character, case-sensitive identifier enabling secure and encrypted RF communication between the two wireless devices:
  - If the devices form a point-to-point system, enter the passkey common to the transmitter and receiver.
  - If the devices are in repeater mode, enter two different passkeys.

  For the wireless connection to be secure, do no enter a known name (like a street name), but instead use a mix of digits and letters. Do not disclose the passkey. The connection security is based on the secrecy and uniqueness of the passkey.
- Pair Number—A unique number to assign to the devices when more than one pair are used with the same S4300-RP repeater.
- RF Band—The frequency band used by the device. The available values are:
  - 802.11a (5 GHz OFDM)
  - 802.11g (2.4 GHz OFDM)
  - public safety 4.9 GHz

- Channel—The RF channel used by the S4100 device. You can either manually select the channel or use the automatic channel selection (default).

  Tip: To simplify channel management, especially if your system involves colocated cells, you should manually assign a channel to the S4100, not use the automatic channel selection.

  Once the devices are installed in their final location, you should perform a site survey to select the proper frequency channel. For the procedure, see page 68.

- Channel Bandwidth—The width of the frequency channel; this parameter only applies to the 4.9 GHz public safety band. You can change the channel width to be able to install more systems in the same area. The available values are 5 MHz, 10 MHz, and 20 MHz (default). The list of available channels vary depending on the chosen bandwidth.
- Bit Rate—The transmission data rate at which the device operates. The Auto value represents the best possible value (with an RF margin of 15 dB) automatically assigned when the connection was established with the other device. It is the default value.

  Once the device is operating properly, Verint strongly recommends to change the configured bit rate from Auto to the actual bit rate of the connection. This way, the wireless communication will be more stable in the presence of changing atmospheric conditions or other RF interferers. To know the actual bit rate of the connection, look in the Advanced > Communication Status and Statistics > Wireless Status menu of the CLI. If the quality of the RF link degrades severely, the actual bit rate could be lower than the manually configured one.

  The available bit rates vary depending on the frequency band:

Band	Channel bandwidth	Bit rates (Mbps)
2.4 GHz	N/A	6, 9, 12, 18, 24, 36, 48, and 54
4.9 GHz	5 MHz	1.5, 2.25, 3, 4.5, 6, 9, 12, and 13.5
	10 MHz	3, 4.5, 6, 9, 12, 18, 24, and 27
	20 MHz	6, 9, 12, 18, 24, 36, 48, and 54
5 GHz	N/A	6, 9, 12, 18, 24, 36, 48, and 54

- Starting Order—A sequence number, used during the boot-up process of a master S4100, to delay its startup. This value is used in a DFS context when frequency channel selection is automatic (see the Channel parameter). The receiver device waits a specific number of seconds based on the value of this parameter. This wait period will ensure that no two receivers will start at the same time and select the same frequency channel. The starting order delay is: (*order* - 1) multiplied by 80 seconds.

  The default starting order is 1; every colocated system should have a different value for this parameter if frequency channel selection is automatic.

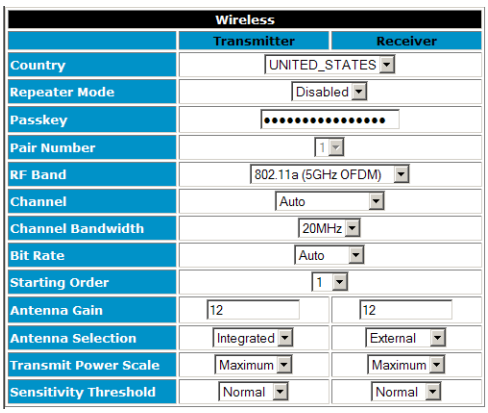
- Antenna Gain—The gain of the antenna on the device (in dBi). You need to enter the gain if you use an external antenna with your device; this way, the device will be able to automatically change its transmission power so that the total power (device and antenna) does not exceed the maximum value established by your country's regulations. For more information, see page 24. If you use the integrated antenna, you should also validate that the proper value for the selected RF band is displayed; the gain is 8.5 dBi in the 2.4 GHz band and 12 dBi in the 4.9 GHz and 5 GHz bands.

  Note: Providing a gain lower than the actual gain of the antenna you are using is prohibited.

- Antenna Selection—The type of antenna on the device: External if you installed a high-gain antenna on the device; Integrated otherwise.
- Transmit Power Scale—The level of emitting power of the device radio. You may need to reduce it from the Maximum value (default) if the total transmission power (device and antenna) exceeds the maximum value established by your country's regulations. The available values are:
  - Maximum
  - 50%—The power is reduced by 3 dB.
  - 25%—The power is reduced by 6 dB.
  - 12.5%—The power is reduced by 9 dB.
- Sensitivity Threshold—The minimum signal level perceived by the radio of the device. Reducing the sensitivity of the radio enables unwanted "noise" to be filtered out. A safe value is 10 dB below the current received signal level; this signal level is displayed in the Wireless connection status (-83 dBm in the illustration on page 48). The default value, **Normal**, represents the most sensitive context. You must be careful not to reduce the sensitivity to a level where the device would not "hear" its legitimate correspondent. The available values are Normal, -80 dBm, -75 dBm, -70 dBm, and -60 dBm.

To change the wireless parameters of the devices:

1. In the Unit Wireless Configuration window, click **Advanced Setup**.
2. Locate the **Wireless** area.



3. Change the desired values.
4. If you are finished with the changes, scroll down the window, then click **Save**.

   The devices reboot.

Video

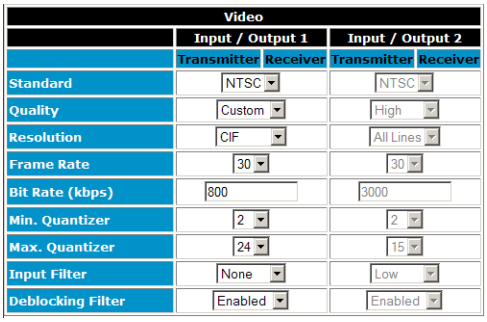
The video parameters are the same for both devices in the S4100 system. On a -2V system, you have access to a second set of parameters, for the second video input/output. The parameters are:

- Standard—The video standard: either NTSC or PAL.
- Quality—A predefined set of video settings. Each quality represents a predefined set of video settings. Five presets are available: Very Low, Low, Medium, High, and Very High; for their definition, see page 35. If you select a video quality preset, the next parameters in the Video section are unavailable. To change these parameters manually, you have to select the Custom quality.
- Resolution—The measure of how clear and crisp the video image appears. Each resolution corresponds to a specific number of pixels (columns * lines) for each picture of the video sequence.
- Frame Rate—The maximum number of frames per seconds (fps) that will be encoded and transferred by the transmitter. This parameter can be set to 1 to 7, 10, 15, or 30 fps in NTSC mode and 1 to 6, 8, 12, or 25 fps in PAL mode.
- Bit Rate (kbps)—The maximum number of bits per second generated by the device. Valid bit rates range from 9 to 6000 kbps.
- Min. Quantizer—The high video quality boundary. The lower the value, the higher the video quality and the file size. The available values are in the 2–31 range.
- Max. Quantizer—The low video quality boundary. A higher quantizer value means less video quality but a smaller file size. The available values are in the 2–31 range.
- Input Filter—The level of filtering applied to the video signal before it is encoded, helping to remove high frequency noise from lower quality cameras or noisy video feeds. The available values are: None, Low, Medium, and High.
- Deblocking Filter—The indication of whether the deblocking filter is activated. This filter attempts to reduce the blocky artefacts present at the edge of blocks (8x8 pixels).

To change the video parameters of the devices:

1. In the Unit Wireless Configuration window, click **Advanced Setup**.

2. Scroll down to locate the **Video** area.



3. Change the desired values. On a *-2V* model, the second column is available for the second video input/output.
4. If you are finished with the changes, scroll down the window, then click **Save**.

   The devices reboot.

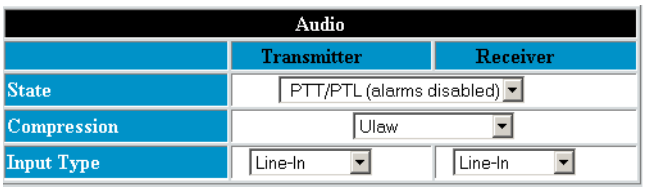
Audio

The audio parameters are:

- State—The purpose of Alarm Input 1:
  - Full Duplex (alarms enabled)—Data is transferred in both directions simultaneously. The Alarm Input 1 wire is available for alarms.
  - PTT/PTL (alarms disabled)—A half-duplex mode that allows you to control audio communication between two devices by using a button to switch from voice reception to transmission mode.
  - Audio Disabled (alarms enabled)—There is no audio transfer. The Alarm Input 1 wire is available for alarms.
- Compression—The transfer mode for audio data. The available values are:
  - No Compression—The PCM mode
  - ULaw
  - GSM 6.10
- Input Type—The type of the audio source. The only value is Line-In.

To change the audio parameters of the devices:

1. In the Unit Wireless Configuration window, click **Advanced Setup**.
2. Scroll down to locate the **Audio** area.



3. Change the desired values.
4. If you are finished with the changes, scroll down the window, then click **Save**.

   The devices reboot.

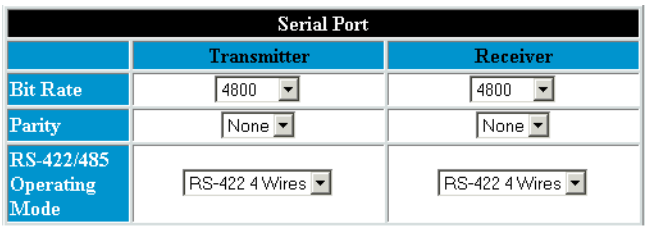
Serial Port

The serial port parameters allowing communication with the target equipment (camera, monitor, and so on) are:

- Bit Rate—The data rate that the serial equipment operates at, in bits per second.
- Parity—The type of parity check. The available values are Odd, Even, or None.
- RS-422/485 Operating Mode—The way the RS-422/485 serial equipment will interface with the device. The available values are: RS-422 4 Wires, RS-485 2 Wires, and RS-485 4 Wires.

To change the serial port parameters of the devices:

1. In the Unit Wireless Configuration window, click **Advanced Setup**.
2. Scroll down to locate the **Serial Port** area.



3. Change the desired values.
4. If you are finished with the changes, click **Save**.

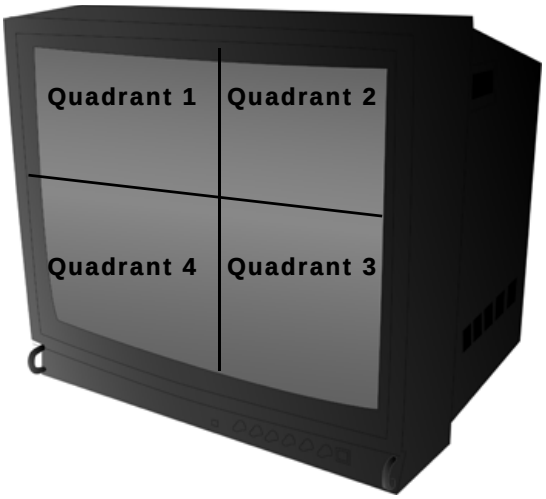
   The devices reboot.

4

Understanding the On-Screen Display

The S4100 receiver devices display information on a video monitor.

The on-screen display (OSD) information presented on the video monitor can be broken down into four quadrants as follows:



Quadrant 1 and 4 are unused.

In a working environment (that is, when a transmitter is sending video data to a receiver), if a camera suddenly gets disconnected from a transmitter, quadrants 1 and 4 turn to red and quadrants 2 and 3 become blue/black.

Quadrant 2: Nextiva Logo

In quadrant 2, when the device is powering up, the Nextiva logo will be displayed for 30 seconds.

Quadrant 3: Receiver Settings

Quadrant 3 displays basic configuration details of the receiver, including firmware version, serial port, and RF data. This information is displayed for 30 seconds every time the connection is established with the transmitter. For example:

```
VRU Local Unit
S4100
Ver: 5.00- build 12
Comm: 4800, 8, N, 1
RF Status: Connected
RF Channel: Auto
RF Bit Rate: 6 Mbps
RF Signal Level: -66 dBm
```

Here is the description of the `Comm` line:

Serial port	Description
4800	Bit rate
8	Number of data bits
N	Parity: None
1	Number of stop bits

5

Maintaining and Troubleshooting the System

You can perform maintenance and troubleshooting tasks on the S4100 system. Specifically:

- Updating the firmware
- Detecting a duplicate master
- Finding a lost S4100
- Performing a reset
- Presenting the status LED conditions
- Using the command line interface (CLI)
- Selecting a frequency channel

Updating the Firmware

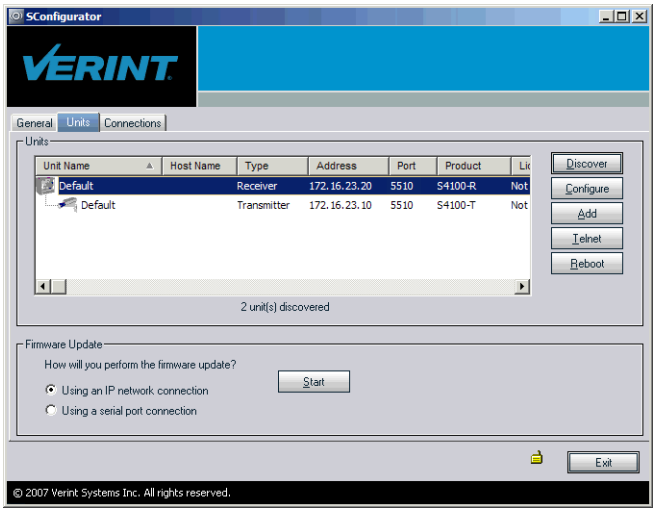
You may need to update the S4100 to have access to improved firmware or new features. Updating the firmware of a device retains its configuration. Many tools are available to perform the update: the SConfigurator utility.

The latest firmware files are available on the Verint Video Intelligence Solutions extranet (Technical Support > Downloads > Firmware Upgrades).

Note: Firmware downgrade is not supported on any device. If you perform a downgrade, any problem encountered will not be covered by your product warranty.

To update the firmware:

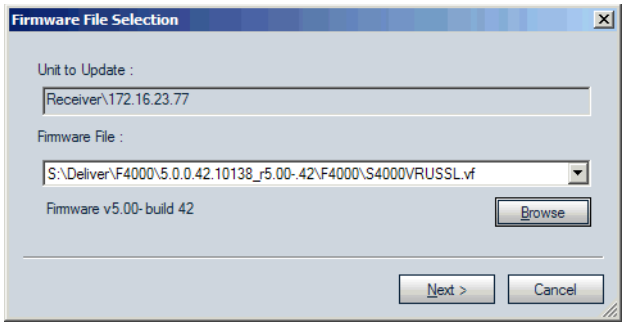
1. Start SConfigurator.
2. Select the **Units** tab, then click **Discover**.
3. In the Units list, select the device to update.



4. In the **Firmware Update** box, select **Using an IP network connection**.
5. Click **Start**.

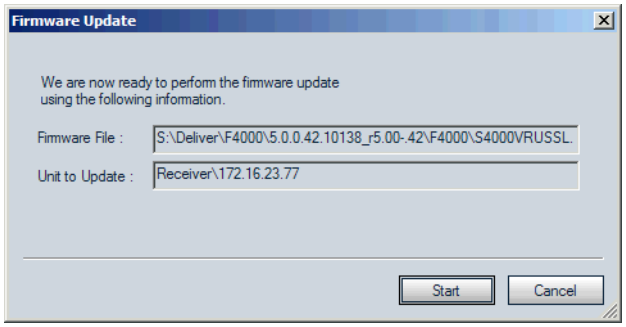
   The Firmware File Selection window appears.

6. Click **Browse**, then select the desired firmware file.



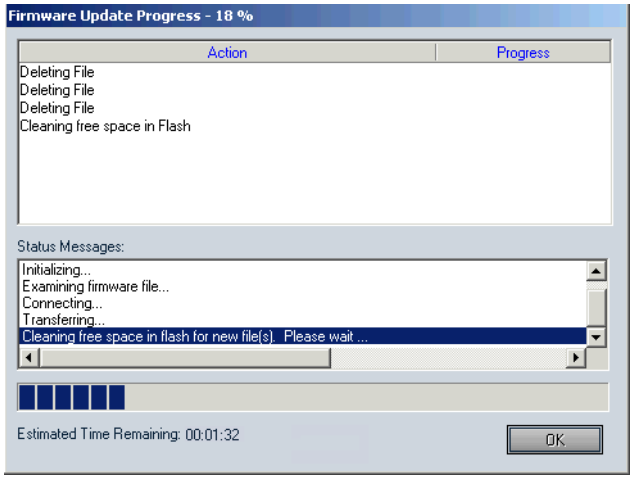
7. Click **Next**.

   The Firmware Update window appears.



8. Click **Start**.

   The Firmware Update Progress window appears.



   The update procedure may take several minutes to complete. For a list of status messages, refer to the *Verint SConfigurator User Guide*.

If the update procedure fails:

1. Restart the same procedure immediately.
2. If the problem persists, reboot the device, then restart the update procedure.
3. If the problem persists, connect an Ethernet cable between the device and the network used by the host computer; then start again the update procedure.
4. If the problem persists, look at the status LEDs for an abnormal behavior.

You should take into consideration the following facts regarding firmware update using the IP network:

- It can be deactivated in the command line interface (CLI).
- Ensure that the IP link is stable before starting the procedure; therefore it is not recommended to perform it over the Internet.

Detecting a Duplicate Master

The duplicate master detection problem occurs when two S4100 master devices are using the same frequency channel and are seeing each other.

More specifically, the problem is detected when the second S4100 is booting up. This device refuses to start its wireless operations (to prevent any interference with the working setup) and makes its three LEDs flash red (1-second intervals). In the CLI of the device, the Current SPCF Connection Status parameter turns to Duplicate master detected (accessed through Advanced > Communication Status and Statistics > Wireless Status). Furthermore, an error message is logged in the device.

The already running master will not change its behavior. You must change the frequency channel of the second master.

Finding a “Lost” S4100

The only way to access a device is through an Ethernet or wireless connection. You may have difficulty accessing it if you do not remember its IP address or VSIP port. For instance, if you enabled security on the device, you cannot access it with Telnet; if you lost its VSIP port, you cannot locate it with SConfigurator.

To find a “lost” S4100 device, you need to use SConfigurator and the common VSIP port.

To find a lost S4100:

1. Open SConfigurator.
2. From the General tab, click **Program Options**.
3. Click **Common** to set the common VSIP port, then **OK**.
4. Click the **Units** tab.

5. Click **Discover**.

   All devices on the network, regardless of their configurable VSIP ports, appear in the Units list. Locate the lost S4100 and write down its VSIP port and IP address in the form located at the end of its installation guide.

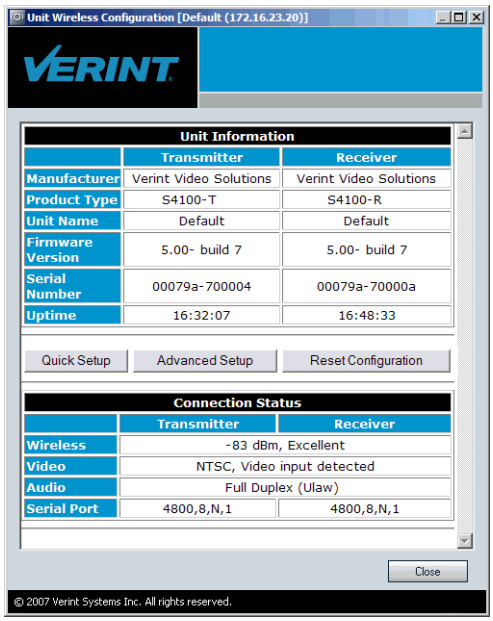
6. Go back to the **Program Options** tab to assign the proper VSIP port.

Performing a Reset

If the wireless system does not react the way it should, you can load the default configuration in both devices and reboot them. This operation will assign the factory default settings to each device (listed in Appendix A on page 71). All user-defined values will be lost.

To load the default configuration in the two devices:

1. Start SConfigurator.
2. Select the **Units** tab, then click **Discover**.
3. Select the S4100-R, then click **Configure**.



4. In the Unit Wireless Configuration window, click **Reset Configuration**.
5. In the confirmation window that appears, click **OK**.

   Both devices receive their default configuration, then they reboot.

Presenting the Status LED Conditions

The S4100 device comes with three bicolor (green-red) LEDs that provide detailed information on the device activity. Each LED can go through three phases:

1. Warmup period if the internal temperature is too low
2. Bootup
3. Normal operation

The three LEDs are:

- LAN—For the Ethernet network (802.3) status:

Condition	Indication	-T	-R
Warmup		✓	✓
Red blinks (2.0 sec. intervals)	The internal temperature of the device is too low.	✓	✓
Bootup		✓	✓
Steady red (10 sec.)		✓	✓
Steady green (4 sec.)		✓	✓
Normal operation		✓	✓
Steady green	The device is connected to the Ethernet network.	✓	✓
Flashing green (1-sec. flash every 3 sec.)	The device is in normal operation but is not connected to the network.	✓	✓
Flashing green (0.1 sec. off for each packet)	A packet is received.		✓
	A packet is transmitted.	✓	
Red blink (0.1 sec.)	There is a communication error.	✓	✓
Flashing red (1 sec. intervals) happening simultaneously on all LEDs	On a master device: There is another master currently running on the same frequency channel; for more information, see page 62.		✓

- RF—For the wireless LAN (802.11) status:

Condition	Indication	-T	-R
Warmup		✓	✓
Red blinks (2.0 sec. intervals)	The internal temperature of the device is too low.	✓	✓
Bootup		✓	✓
Steady red (14 sec.)		✓	✓
Normal operation		✓	✓
Flashing green (1-sec. flash every 3 sec.)	The device is in normal operation without an RF connection.	✓	✓
Steady green	The device is in normal operation with an RF connection.	✓	✓
Flashing green (0.1 sec. off for each packet)	A packet is received.		✓
	A packet is transmitted.	✓	
Red blink (0.1 sec.)	There is a communication error.	✓	✓
Flashing red (1 sec. intervals) happening simultaneously on all LEDs	On a master device: There is another master currently running on the same frequency channel; for more information, see page 62.		✓

- System status—For the general device status:

Condition	Indication	-T	-R
Warmup		✓	✓
Red blinks (2.0 sec. intervals)	The internal temperature of the device is too low.	✓	✓
Bootup		✓	✓
Steady red (14 sec.)		✓	✓
Normal operation		✓	✓
Flashing green (1 sec. intervals)	The device is in normal operation.		✓
		✓	

Condition	Indication	-T	-R
Flashing red (1 sec. intervals)	The IP address of the device is already assigned to another device on the network. or On a master device: There is another master currently running on the same frequency channel; for more information, see page 62. This condition happens simultaneously on all LEDs.	✓	✓ ✓
Flashing green-red (1 sec. intervals)	The device is undergoing a firmware update.	✓	✓
Green blink (1 sec. intervals)	On a master device: The master is scanning for a channel in a DFS context.		✓

The following power-up conditions on the three status LEDs are abnormal:

- LED not lit—Check the power supply and cabling. If power is available and the LED stays off, call Verint Video Intelligence Solutions technical support for assistance.
- Steady red or green LED for more than 30 seconds—There is an internal error that prevents the device from starting normally. Power down the device, wait 30 seconds, then power it up. If the condition persists, call Verint Video Intelligence Solutions technical support.

Using the Command Line Interface

You may need to access the command line interface (CLI) of an edge device to perform troubleshooting tasks, typically with the assistance of a Verint customer service specialist. The CLI is hierarchically organized, with menus, sub-menus, and individual options representing configuration parameters.

The available troubleshooting tasks include creating a serial connection in UDP.

Accessing the CLI

You can access the CLI with the SConfigurator tool, through the Telnet utility.

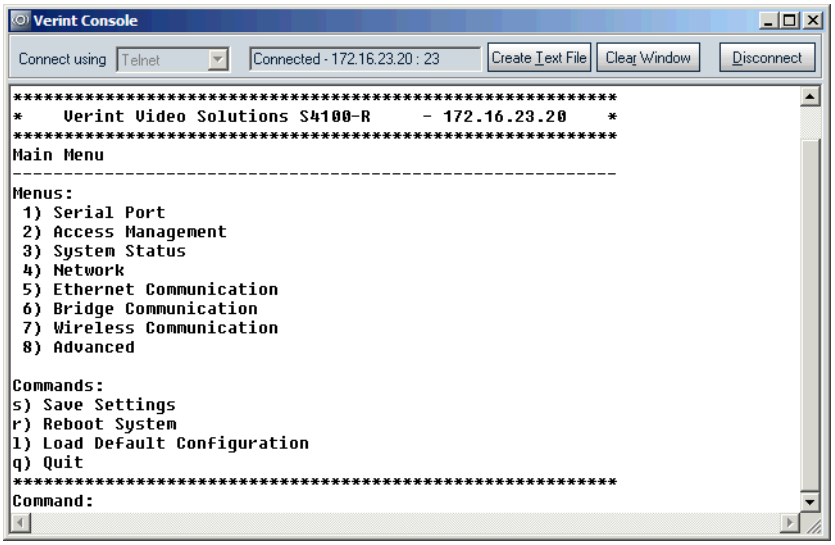
To enter the CLI with Telnet:

Note: Ensure that your computer and the S4100 device are in the same IP subnet.

1. Open SConfigurator.
2. Click the **Units** tab.
3. Click **Discover**.

4. Select the desired device, then click **Telnet**.

   The CLI main menu appears in the Verint Console window.



   The CLI has a timeout that is triggered after three minutes of inactivity. When the timeout occurs:

   - You lose access to the command line.
   - The “Thank you for using the Verint CLI” message appears at the command line.
   - The Verint Console window becomes disabled.
   - The Disconnect button switches to Connect.

5. To reactivate the CLI after a timeout, click **Connect**.
6. To work through the CLI menu structure, follow these guidelines:
   - To execute a command or open a menu, type in the corresponding letter or number, then press **Enter**.
   - To return to the previous menu, enter **p**.
7. To end the CLI work session:
   a. Save the settings by entering **s** at the main menu, then pressing **Enter**.
   b. Exit the CLI by entering **q** at the main menu, then pressing **Enter**.

      Depending on the changed settings, the device may perform a soft boot.
   c. Close the Verint Console window.

> Note: Do not use the Disconnect button to exit the CLI, since it does not save your settings.

Creating a Serial Connection in UDP

The serial connection between the two devices in the S4100 system is automatically performed with the TCP protocol. Since this protocol may induce lag time on a slow wireless connection, you can change it to UDP.

You have to perform this change in both devices.

To change the serial connection protocol to UDP:

1. Access the CLI of the device.
2. From the main menu, select **Advanced > Serial Port (IP)**.
3. Change the value of **Initial Streaming State** to Enabled.
4. Change the value of **Current Streaming State** to Enabled.
5. Ensure that the IP address in **Remote IP Address** is the address of the other device.
6. Assign a value to **UDP Port**. This value must not be 5510 or a port already used.
7. Assign the UDP port value to **Local UDP Port** and **Remote UDP Port**.
8. Change the value of **Connection Type** to UDP.

> Note: The VSIP GUID parameter is not used in UDP.

9. Go back to the main menu.
10. Save the parameters, then exit the CLI.

Selecting a Frequency Channel

In large scale wireless systems, you should not use automatic channel selection. This mechanism uses a Verint best-effort algorithm that tries to avoid channel interferences. In large systems with colocated cells, the best way is to perform manual wireless planning. Verint offers system planning assistance; contact the customer service team for more information.

To help you select the appropriate frequency channels, you should perform a site survey on each device once your system is installed in its final location, to detect potential interference problems. For the detailed procedure, see page 82.

Since the site survey available in the devices covers digital signals only, you should consider performing also an analog site survey to detect potential radio or satellite signals. You perform an analog site survey with a spectrum analyzer.

The suggested procedure is:

1. Select the number of site survey iterations to perform.
2. Execute a site survey on the S4100-T while the S4100-R is working. It is important to “hear” the signals coming from the other device in the wireless cell.
3. Execute a site survey on the S4100-R while the S4100-T is working.
4. Perform an analog site survey with a spectrum analyzer.

5. Analyze the data and change the frequency channel if required.

A

Factory Default Configuration

The S4100 is programmed at the factory with the following configuration:

Type	Configuration
Serial port	■ Bit rate: 4800 bauds ■ Data bits: 8 ■ Parity: none ■ Stop bit: 1 ■ Line driver: auto-detected ■ RS-422/485 operating mode: RS-422 4 Wires
Network	■ IP address of the receiver: 172.16.23.20 ■ IP address of the transmitter: 172.16.23.10
Video settings (North America)	■ Standard: NTSC ■ Quality: high ■ Resolution: CIF (352 x 240) ■ Target frame rate: 30 fps ■ Target bit rate: 800 kbps ■ Minimum quantizer: 3 ■ Maximum quantizer: 24 ■ Input filter: low ■ Deblocking filter: on
Video settings (Europe)	■ Standard: PAL ■ Quality: high ■ Resolution: CIF (352 x 288) ■ Target frame rate: 25 fps ■ Target bit rate: 800 kbps ■ Minimum quantizer: 3 ■ Maximum quantizer: 24 ■ Input filter: low ■ Deblocking filter: on

Type	Configuration
Wireless Communication (North America)	■ Wireless passkey: ABCDEFGHIJKLMNOP ■ Frequency band: 802.11a (5 GHz OFDM) ■ Channel: Auto ■ Tx bit rate: Auto ■ Antenna gain: 11 dBi ■ Country: USA ■ Tx power scale: Maximum
Wireless Communication (Europe)	■ Wireless passkey: ABCDEFGHIJKLMNOP ■ Frequency band: 802.11a (5 GHz OFDM) ■ Channel: Auto ■ Tx bit rate: Auto ■ Antenna gain: 11 dBi ■ Country: United Kingdom ■ Tx power scale: Maximum

B

Surge Protection

Voltage and current surges can be induced by lightning strikes or power line transients. In the real world, under the right circumstances, these surges can reach sufficiently high levels to damage almost any electronic equipment. Therefore you need to add protection to your devices.

The S4100 provides basic surge protection on all electrical lines for both the transmitter and receiver devices. If you are installing the equipment in a lightning prone or heavy lightning environment, or in a site where large AC mains power fluctuations are a common occurrence, Verint strongly recommends that you add additional external surge protection to all vulnerable connections. Vulnerable connections are those that run for a long distance between the S4100 device and the connected equipment.

The video camera is usually within a short distance of the S4100 transmitter; the S4100 interface cable can be routed directly into the camera housing. Therefore, the video line (and the serial port if using a PTZ camera) will seldom need additional protection. The power feed usually runs down the mounting mast or wall for more than 20 feet (7.6 meters); it is a good candidate for additional protection in a surge prone environment. This protection will benefit both the camera and the device.

The monitoring and control station is usually far away from the S4100 receiver. In a surge prone environment, the video output and serial port connections of the device are the most vulnerable to large AC mains variations. Whether you add external protection or not, always ensure that you ground reference the serial port connection of the device by plugging its brown/black wires to the serial port ground of the target equipment in the control room. Failure to do so severely reduces the performance of the internal protection circuits of the device.

Excellent international sources for external surge protection equipment and general surge and lightning protection information are:

- Polyphaser Corporation—www.polyphaser.com
- Citel inc.—www.citelprotection.com
- Transtector—www.transtector.com

For the curious mind, a surge protector helps to clamp the surge to safe levels and divert its energy to the earthing point, preventing device damage. Experienced installers know that an effective surge protection must be installed with proper earthing and grounding.

C

RF Contact between Masters

If the country of operation of your devices requires DFS compliance, you must ensure that the master devices (S4300 and S4100-R) in colocated cells “see” one another in their permanent location. Such a contact means that RF communication can be performed between each pair of masters, therefore preventing them to choose the same frequency channel. Using the same channel would cause interference between the colocated cells and reduce channel reliability and efficiency.

Apply the following procedure to ensure that *MasterA* sees *MasterB*. You will have to access the command line interface (CLI) of at least one master; for more information, see page 66.

To ensure that two master devices see each other:

1. Take down the device name of MasterB.

   This name is displayed in the Unit page of the Unit Configuration window in SConfigurator.

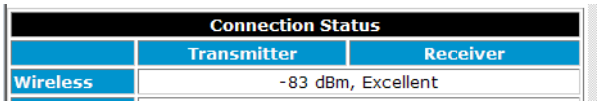
2. Shut down MasterB, then power it up.

3. Wait until MasterB has selected a frequency channel. To ensure that a channel is selected:

   - If MasterB is an S4300, go in the **Advanced > Communication Status and Statistics >Wireless Status** menu of the CLI. Wait until the value of Current SCF Connection Status is **Connected to *X* Clients and *Y* Slaves**.

```
************************************************************
Advanced \ Communication Status and Statistics \ Wireless Status
------------------------------------------------------------
Parameters:
  NIC Name                     : AT5001 WIS CM6 A,B,G 2.4-5.8 GHz
  NIC MAC Address              : 00-0B-6B-30-FA-42
  Current Channel              : 56 (5280 MHz)
  Current TX Rate              : 36 Mb/s
  Current RX Rate              : 36 Mb/s
  Average Signal Level         : -53 dBm
  Current SCF Connection Status: Connected to 1 Client and 0 Slave

  RF Communication Quality     : N/A
  RF Margin                    : N/A
  Current EIRP                 : 17 dBm
  Maximum EIRP allowed         : 30 dBm
  Indoor/Outdoor RF Regulation : Indoor/Outdoor FCCA FCC1

Commands:
l) Display link(s) Info
v) Visualize Last Site Survey Report
w) Initiate One-Time Site Survey
p) Previous Menu
************************************************************
```

   - If MasterB is an S4100, go in the **Connection Status** area of the Unit Wireless Configuration window (accessible through SConfigurator). Wait until the **Wireless** connection status is **Not Connected** or provides a communication quality; these statuses occur after **Radar Detection**.



   - If you do not have access to the connection status of MasterB and have automatic frequency channel selection, wait for the following time period: (starting order of MasterB - 1) multiplied by 80 seconds.

4. Perform a site survey in MasterA:

   a. Open the CLI of the device.

   a. Go in the **Advanced > Communication Status and Statistics > Wireless Status** menu.

   b. Execute the **Initiate One-Time Site Survey** command.

c. To see the progress of the operation, press **Enter** every second.

The site survey is completed when the value of Current SCF Connection Status returns to **Connected to *X* Clients and *Y* Slaves**, after having gone to **Site survey (100% completed)**.

d. Execute the **Visualize Last Site Survey Report** command.

e. Check that the MasterB name is listed as the Unit Name of one of the channels. You may need to scroll up the CLI window to see the beginning of the survey data.

For example, in the following site survey, MasterB has a visual connection with the MasterA device. If the MasterB name is not displayed in the site survey, it means that the two masters cannot see each other.

```
Last Site Survey Report, 4372 seconds old


Channel(1) Cost: 41
 Age  Interf.   Source MAC        Master MAC/        Rx   Unit Name/
 (s)   Type                      802.11 BSSID      (dBm) 802.11 SSID
----- --------- ----------------- ----------------- ----- -----------
   11 SPCF MSTR 00-0B-6B-30-2A-46 00-0B-6B-30-2A-46 -54   MasterB
```

D

Separation Between Devices Using Adjacent Channels

Wireless interference can occur between wireless cells using adjacent frequency channels (for example, channels 149 and 153 in the 5 GHz band). Therefore, it is preferable to avoid using adjacent channels. However, if your setup requires you to, you must follow specific guidelines regarding minimum distances between antennas and signal level margin.

Note: In the 2.4 GHz band, the adjacent channel term applies only to the three independent channels (1, 6, and 11).

If you use adjacent frequency channels, you should respect guidelines relative to the minimum separation between device antennas, to avoid interference.

To reduce radio interference possibilities between two adjacent channels, you should ensure that the maximum margin between the emission of the two wireless cells is 25 dB. To meet this objective, perform a site survey and apply minimum distance guidelines.

Performing a Site Survey

The difference in signal level between two adjacent cells must be less than or equal to 25 dB. If this margin is higher than 25 dB, there will be too much interference in the two adjacent wireless cells. To calculate this margin, you need to perform a site survey.

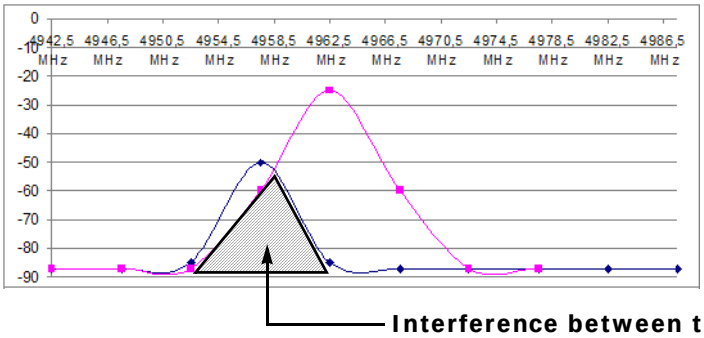
A site survey scans all frequency channels, evaluate the interference level in each channel, and allows you to choose the channel with the less interference.

```
**********************************************************
Advanced \ Communication Status and Statistics \ Wireless Status
----------------------------------------------------------
Parameters:
    NIC Name                     : AT5006X DCMA-82 A,B,G 2.4,4.9,5.x GHz
    NIC MAC Address              : 00-0B-6B-2F-F8-E5
    Current Channel              : 7 (4950 MHz) 20 MHz channel bandwidth
    Current TX Rate              : 6 Mb/s
    Current RX Rate              : 6 Mb/s
    Average Signal Level         : -65 dBm
    Current SCF Connection Status: Connected to 1 Client and 1 Slave

    RF Communication Quality     : N/A
    RF Margin                    : N/A
    Current EIRP                 : 34 dBm
    Maximum EIRP allowed         : 42 dBm
    Indoor/Outdoor RF Regulation : Indoor/Outdoor FCCA FCC1
 1) Site survey iteration        : 1

Commands:
l) Display link(s) Info
s) Start/Stop Site Survey
v) Visualize Last Site Survey Report
r) Reset Site Survey data base
p) Previous Menu
**********************************************************
```

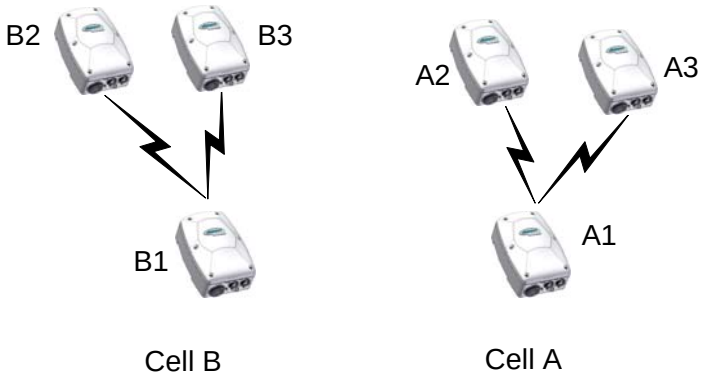
You can perform the following operations relative to RF site surveys:

- Specify the number of consecutive surveys to perform
- Start and stop a site survey
- Look at the last survey report
- Reset the survey database

Here is an example of a 25 dB margin between channels 8 and 9 in the 4.9 GHz band:



Consider the following setup in the 4.9 GHz band with 5-MHz bandwidth, where Cell B uses channel 6 and you are trying to add Cell A on channel 3 (adjacent to channel 6):



To determine if this setup is feasible, you need to conduct a site survey on device A1 (the master device in Cell A), then calculate the margin between the two cells. During the site survey, device A1 will find the other five devices. With the provided signal levels, you need to check if S2 - S1 <= 25 dB, where:

- S1 is the lowest signal level in the wireless cell of the device performing the site survey (A1 in the example).
- S2 is the highest signal level in the adjacent cell (Cell B in the example).

To calculate the emission margin between two adjacent wireless cells:

1. Open SConfigurator, then go to the **Units** tab.
2. Select the master device in the wireless cell you are adding, then click **Telnet**.

3. From the main menu of the command line interface (CLI), select **Advanced > Communication Status and Statistics > Wireless Status**, then press **Enter**.

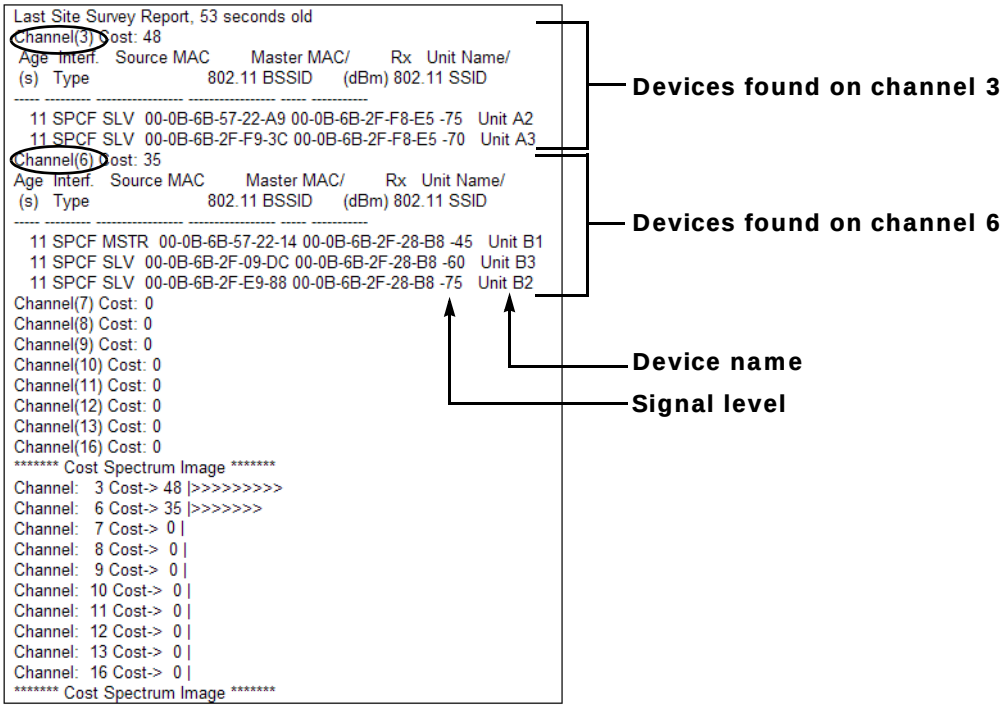
```
************************************************************
Advanced \ Communication Status and Statistics \ Wireless Status
------------------------------------------------------------
Parameters:
    NIC Name                     : AT5006X DCMA-82 A,B,G 2.4,4.9,5.x GHz
    NIC MAC Address              : 00-0B-6B-2F-F8-E5
    Current Channel              : 7 (4950 MHz) 20 MHz channel bandwidth
    Current TX Rate              : 6 Mb/s
    Current RX Rate              : 6 Mb/s
    Average Signal Level         : -65 dBm
    Current SCF Connection Status: Connected to 1 Client and 1 Slave

    RF Communication Quality     : N/A
    RF Margin                    : N/A
    Current EIRP                 : 34 dBm
    Maximum EIRP allowed         : 42 dBm
    Indoor/Outdoor RF Regulation : Indoor/Outdoor FCCA FCC1
 1) Site survey iteration        : 1

Commands:
l) Display link(s) Info
s) Start/Stop Site Survey
v) Visualize Last Site Survey Report
r) Reset Site Survey data base
p) Previous Menu
************************************************************
```

4. For a thorough scan, specify 60 site survey iterations.

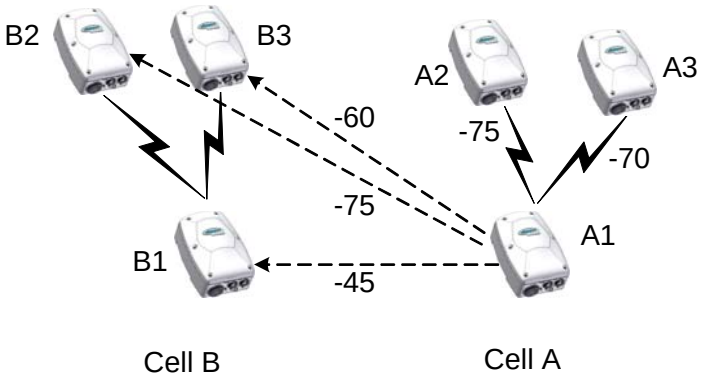
5. Start the site survey operation.

Note: During the execution, the RF link will be momentarily broken (duration varies depending on the number of iterations). The link is automatically restored when the survey is finished.

6. When the survey is complete, visualize the report. For example:



This report provides the signal levels between device A1 and the other five devices in the network.



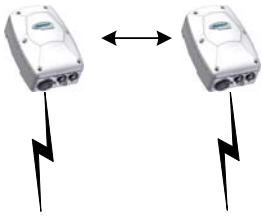
The lowest signal in Cell A is -75 (S1) and the highest signal in Cell B is -45 (S2). The result of S2 - S1 (-45 - -75) is 30. Since the margin is higher than 25 dB, there will be interference issues.

Minimum Distances

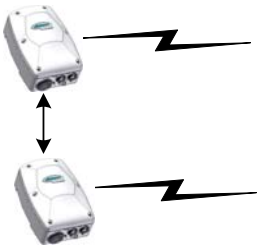
To respect the 25 dB margin between two adjacent channels, in addition to performing a site survey, you can use guidelines relative to minimum distances between the wireless devices. By respecting them, you can assume that there will not be radio interference between the devices.

Three physical setups are covered:

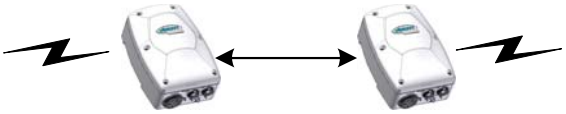
Side by side:



On top:



Back to back:



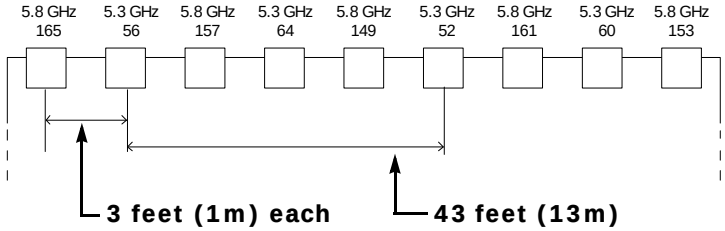
The minimum separation between devices using adjacent channels is:

Setup	5 GHz (12-dBi antenna with 40° beam width)	4.9 GHz (12-dBi antenna with 40° beam width)	2.4 GHz (8.5-dBi antenna with 60° beam width)
Side by side	43 feet (13m)	36.1 feet (11m)	55.8 feet (17m)
On top	13 feet (4m)	6.6 feet (2m)	6.2 feet (1.9m)
Back to back	7.8 feet (2.4m)	13.1 feet (4m)	15.7 feet (4.8m)

If you are using other antennas with narrower beam widths, the distances may be reduced. For assistance, contact the customer service team.

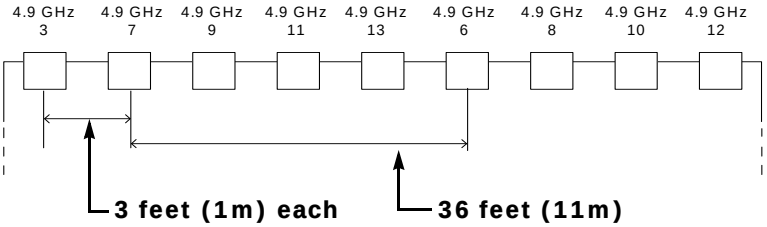
The following deployment scenarios respect these limitations:

- Using only 5 GHz channels, all on the same side of a building (Europe only):



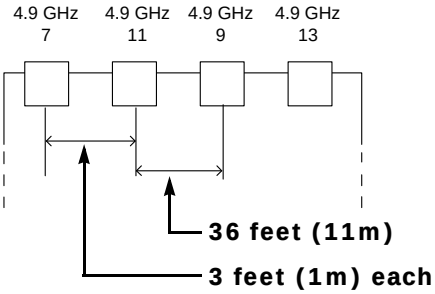
  Notice that the devices using the adjacent channels 52 and 56 are separated by the prescribed 43 feet (13m). However, you can intersperse other devices in-between, as long as they do not use adjacent channels. This way, you can increase the device density without encountering interference problems.

- In the 4.9 GHz band, using only 5 MHz channels, all on the same side of a building:



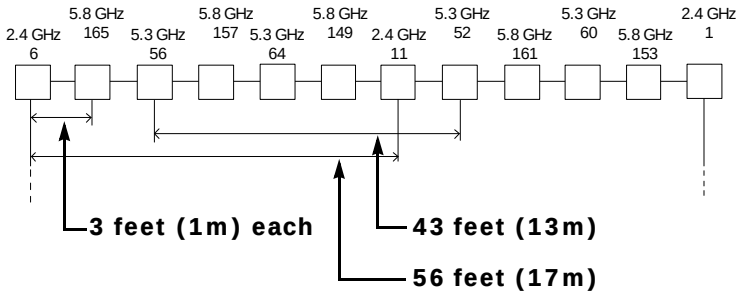
  Notice that the devices using the adjacent channels 7 and 6 are separated by the prescribed 36 feet (11m). However, you can intersperse other devices in-between, as long as they do not use adjacent channels. This way, you can increase the device density without encountering interference problems.

- In the 4.9 GHz band, using only 10 MHz channels, all on the same side of a building:



  Since only four channels are available, it is unavoidable that two adjacent channels are positioned next to each other.

- Using 5 GHz and 2.4 GHz channels, all on the same side of a building (Europe only):



The devices using the adjacent channels 6 and 11 in the 2.4 GHz are separated by the prescribed 56 feet (17m).

E

Technical Specifications

Here are the S4100 technical specifications:

Network	RF interface	SDCF
	RF bands	2.4 GHz 4.9 GHz 5 GHz
	Modulation	OFDM
	Encryption	128-bit AES
	Data rate (max. burst rate)	6, 9, 12, 18, 24, 36, 48, and 54 Mbps
	Security	SSL-based authentication
Video	Compression	MPEG-4-based, MPEG-4 ISO 14496-2 compliant, MJPEG
	Frame rate	NTSC: 1–30 fps programmable (60 fields per second) PAL: 1–25 fps programmable (50 fields per second)
	Input	1 or 2 composites, 1 Vpp into 75 ohms (NTSC/PAL)
	Output	1 or 2 composite, 1 Vpp into 75 ohms (NTSC/PAL)
Serial Port	Operating mode	Transparent: supports any asynchronous PTZ serial protocol
	Electrical level	RS-422/485
Alarm and Audio	Alarm input	2 dry contacts (1 mA max.)
	Alarm output	1 relay contact (up to 48V at 100 mA)
	Bidirectional audio	Input: 0 dBm into 600 ohms Output: -8 dBm into 600 ohms
Power	Input voltage	24V AC +/- 20% 12V DC +/- 10%
	Maximum consumption	20W (1.6 A at 12V DC), 25 VA at 24V AC

Physical	Enclosure	NEMA 4X/IP 66 powder coat painted die-cast aluminum with wall-mount assembly
	Size	8.5L x 3.5H x 5.5W inches (217L x 90H x 138W mm)
	Weight	Casing: 3.3 lb (1.5 kg) Mounting assembly: 1.3 lb (0.6 kg)
	Environment	-22ºF to 122ºF (-30ºC to 50ºC)
	Humidity	100% at 122ºF (50ºC)
Certification/ Regulation	USA	FCC CFR47 Part 15 Subpart B, C, and E (15.247, 15.407, 15.107, 15.109) FCC Part 90 DSRC-C mask certification
	Canada	Industry Canada RSS-210, RSS-139, and ICES-003
	Europe	CE marked ETSI EN 300 328 v1.7.1 (2006-10) ETSI EN 300 893 v1.3.1 (2005-08) ETSI EN 301 489-1 v1.7.1 (2007-04) ETSI EN 301 489-17 v1.3.2 (2007-06) IEC-60950-1 (2001) Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 (RoHS)

Glossary

This glossary is common to the Nextiva line of edge device products.

Access Point A communication hub for connecting wireless edge devices to a wired LAN.

AES (Advanced Encryption Standard) An encryption standard used in the WPA2 authentication method.

APIPA (Automatic Private IP Addressing) A feature of Windows-based operating systems that enables a device to automatically assign itself an IP address when there is no Dynamic Host Configuration Protocol (DHCP) server available to perform that function. Also known as *AutoIP*.

Bridge See *Wireless Bridge*.

CCTV (Closed Circuit Television) A television system in which signals are not publicly distributed; cameras are connected to television monitors in a limited area such as a store, an office building, or on a college campus. CCTV is commonly used in surveillance systems.

CIF (Common Intermediate Format) A video format that easily supports both NTSC and PAL signals. Many CIF flavors are available, including CIF, QCIF, 2CIF, and 4CIF. Each flavor corresponds to a specific number of lines and columns per video frame.

CLI (Command Line Interface) A textual user interface in which the user responds to a prompt by typing a command.

Codec (Coder/Decoder) A software library that compresses or decompresses a video stream following a specific protocol.

Configuration Assistant A proprietary graphical program used to configure and update the firmware of the S1100 edge devices.

Decoder See *Receiver*.

DHCP (Dynamic Host Configuration Protocol) A communication protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in a network.

DVR (Digital Video Recorder) A device (usually a computer) that acts like a VCR in that it has the ability to record and play back video images. The DVR takes the feed from a camera and records it into a digital format on a storage device which is most commonly the hard drive.

Edge Device A Nextiva device transmitting or receiving video signals through an IP network. The devices can be wireless or wired; some transmitters are IP cameras.

Encoder See *Transmitter*.

Ethernet A local area network (LAN) architecture using a bus or star topology and supporting data transfer rates of 10, 100, and 1000 Mbps. It is one of the most widely implemented LAN standards. The 802.11 protocols are often referred to as “wireless Ethernet.”

Firmware Software stored in read-only memory (ROM) or programmable ROM (PROM), therefore becoming a permanent part of a computing device.

IP (Internet Protocol) The network layer for the TCP/IP protocol suite widely used on Ethernet networks.

LAN (Local Area Network) A computer network that spans a relatively small area. A LAN can connect workstations, personal computers, and surveillance equipment (like edge devices). See also *WAN*.

MPEG-4 A graphics and video lossy compression algorithm standard that is derived from MPEG-1, MPEG-2, and H.263. MPEG-4 extends these earlier algorithms with synthesis of speech and video, fractal compression, computer visualization, and artificial intelligence-based image processing techniques.

Multicast Communication between a sender and multiple receivers on a network; the devices can be located across multiple subnets, but not through the Internet. Multicast is a set of protocols using UDP/IP for transport.

NTSC (National Television Standards Committee) The North American standard (525-line interlaced raster-scanned video) for the generation, transmission, and reception of television signals. In addition to North America, the NTSC standard is used in Central America, a number of South American countries, and some Asian countries, including Japan. Compare with *PAL*.

NTP (Network Time Protocol) A protocol designed to synchronize the clocks of devices over a network.

OSD (On-screen Display) Status information displayed on the video monitor connected to a receiver edge device.

PAL (Phase Alternation by Line) A television signal standard (625 lines) used in the United Kingdom, much of western Europe, several South American countries, some Middle East and Asian countries, several African countries, Australia, New Zealand, and other Pacific island countries. Compare with *NTSC*.

PEAP (Protected Extensible Authentication Protocol) A method to securely transmit authentication information, including passwords, over a wireless network.

Point-to-Point Connection The association of a transmitter and a receiver to view video coming from an analog camera on an analog monitor.

PSK (Pre-Shared Key) A mode of the WPA and WPA2 security protocols, designed for home and small office networks that cannot afford the cost and complexity of an authentication server. It is also known as *personal mode*.

PTL (Push-To-Listen) In a two-way system, the communication mode in which the listener must push a button while listening.

PTT (push-To-Talk) In a two-way system, the communication mode in which the talker must push a button while talking.

PTZ Camera (Pan-Tilt-Zoom) An electronic camera that can be rotated left, right, up, or down as well as zoomed in to get a magnified view of an object or area. A PTZ camera monitors a larger area than a fixed camera.

QoS (Quality of Service) A set of low-level networking protocols giving higher priority to more important data flows while ensuring that the less important ones do not fail.

Receiver A device converting a digital video signal into an analog form. Also called *decoder*.

Repeater A range extender for wireless links.

RF (Radio Frequency) Any frequency within the electromagnetic spectrum associated with radio wave propagation. When a modulated signal is supplied to an antenna, an electromagnetic field is created that is able to propagate through space. Many wireless technologies are based on RF field propagation.

RS-232 A standard interface approved by the Electronic Industries Alliance (EIA) for connecting serial devices.

RS-422 A standard interface approved by the Electronic Industries Alliance (EIA) for connecting serial devices, designed to replace the older RS-232 standard because it supports higher data rates and greater immunity to electrical interference.

RS-485 An Electronics Industry Alliance (EIA) standard for multipoint communications.

SConfigurator A proprietary graphical program used to configure and update the firmware of edge devices.

Serial Port An interface that can be used for serial communication, in which only one bit is transmitted at a time. A serial port is a general-purpose interface that can be used for almost any type of device.

SSL (Secure Sockets Layer) A commonly used protocol for transmitting private documents via the Internet. SSL works by using a public key to encrypt data that is transferred over the SSL connection. The SSL protocol secures the following data: I/O, serial port, and VSIP communication; it does not apply to audio and video transmission.

TKIP (Temporal Key Integrity Protocol) A security protocol used in the WPA authentication method.

TLS (Transport Layer Security) A cryptographic protocol that provide secure communications on a wireless network.

Transceiver (Transmitter/Receiver) A device that both transmits and receives analog or digital signals.

Transmitter A device sending video signals captured with a connected camera to a receiver. The transmitter converts the analog signal into a digital form before transmitting it. Also called *encoder*.

TTLS (Tunneled Transport Layer Security) A cryptographic protocol that creates a secure TLS tunnel.

VSIP (Video Services over IP) A proprietary communication protocol for sending messages between a computer and a Nextiva edge device, or between two devices.

WAN (Wide Area Network) A computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local area networks (LANs).

WEP (Wired Equivalent Privacy) A security protocol for wireless local area networks (WLANs) defined in the 802.11b standard. It is designed to afford wireless networks the same level of protection as a comparable wired network.

Wireless Bridge A link between two networks, wired or wireless.

Wireless Cell A group of wireless devices that communicate together on the same radio frequency channel and share the same wireless passkey.

Wireless Transmission A technology in which electronic devices send information to receivers using radio waves rather than wiring.

WPA (Wi-Fi Protected Access version 1) An authentication method to secure wireless systems. It is the successor of WEP. WPA implements the majority of the IEEE 802.11i standard.

WPA2 (Wi-Fi Protected Access version 2) An authentication method that implements the full 802.11i standard, but will not work with some older network cards. It is also known as *802.11i*.

Index

Compliance

The S4100 series wireless device is certified to be used in the following countries:

- USA
- Canada
- CE countries using the harmonized bands

Note: The S4100 series devices require professional installation. They should be installed in a location that would prevent the general population from approaching from 3 feet (1 meter) of the radiating element. You must use only antennas certified by Verint.

USA

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 of the device.

This equipment has been tested and found to comply with the limits for Class B Digital Device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the S4100 device
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Any changes or modifications not expressly approved by Verint Systems Inc. could void the user's authority to operate the equipment.

The compliance information for this country is:

	2.4 to 2.482 GHz	**4.940 to 4.990 GHz**	**5.725 to 5.825 GHz**
FCC identifier	VKHS4X00DCMA82	VKHS4X00DCMA82	VKHS4X00DCMA82
FCC certifications	47 CFR part 15 subpart B (15.107, 15.109) 47 CFR part 15 subpart C (15.247)	47 CFR part 15 subpart B (15.107, 15.109) 47 CFR part 90	47 CFR part 15 subpart B (15.107, 15.109) 47 CFR part 15 subpart C (15.247)
Radio	DCMA-82 HI	DCMA-82 HI	DCMA-82 HI

	2.4 to 2.482 GHz	4.940 to 4.990 GHz	5.725 to 5.825 GHz
Certified antennas	Integrated tri-band Verint antenna: 2.4 GHz with 8.5 dBi gain and 13 dBm tx power ANT-WP16-24/S: Patch antenna with 15.5 dBi gain and 10 dBm tx power	Integrated tri-band Verint antenna: 4.9 GHz with 12 dBi gain and 20 dBm tx power ANT-WP18-49: Linear, flat-panel antenna with 18 dBi gain and 20 dBm tx power ANT-WP25-49: Linear, flat-panel antenna with 25 dBi gain and 20 dBm tx power	Integrated tri-band Verint antenna: 5.x GHz with 12 dBi gain and 23 dBm tx power ANT-WS16-5x/S: Patch 90-degree antenna with 16 dBi gain and 20 dBm tx power ANT-WP19-5x/S: Patch antenna with 19 dBi gain and 17 dBm tx power ANT-WP23-5x/S: Patch antenna with 23 dBi gain and 12 dBm tx power The 19 dBi and 23 dBi antennas can use the full tx power (23 dBm) in point-to-point systems. The antennas must be installed by certified professionals only.
Rule summary	Band is for indoor/outdoor. Max EIRP: ■ 36 dBm ■ Point-to-point system: 53 dBm	Band is for indoor/outdoor. Max EIRP: 5 MHz width: 27 dBm and 27 dBi for fixed system 10 MHz width: 30 dBm and 27 dBi for fixed system 20 MHz width: 33 dBm and 27 dBi for fixed system	Band is for indoor/outdoor. Max EIRP: ■ 36 dBm ■ Point-to-point system: 53 dBm

Canada

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

The compliance information for this country is:

	2.4 to 2.482 GHz	**5.725 to 5.825 GHz**
IC identifier	7286A-S4X0082	7286A-S4X0082
Radio	DCMA-82 HI	DCMA-82 HI
Certified antennas	Integrated tri-band Verint antenna: 2.4 GHz with 8.5 dBi gain and 13 dBm tx power ANT-WP16-24/S: Patch antenna with 15.5 dBi gain and 10 dBm tx power	Integrated tri-band Verint antenna: 5.x GHz with 12 dBi gain and 23 dBm tx power ANT-WS16-5x/S: Patch 90-degree antenna with 16 dBi gain and 20 dBm tx power ANT-WP19-5x/S: Patch antenna with 19 dBi gain and 17 dBm tx power ANT-WP23-5x/S: Patch antenna with 23 dBi gain and 12 dBm tx power The 19 dBi and 23 dBi antennas can use the full tx power (20 dBm) in point-to-point systems. The antennas must be installed by certified professionals only.
Rule summary	Band is for indoor/outdoor. Max EIRP: ■ 36 dBm ■ Point-to-point system: 53 dBm	Band is for indoor/outdoor. Max EIRP: ■ 36 dBm ■ Point-to-point system: 53 dBm

Europe

The CE countries using the harmonized bands are: Austria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland , Ireland, Lativia, Lithuania, Luxembourg, Netherland, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

The compliance information for these countries is:

	2.4 to 2.482 GHz	**5.25 to 5.35 GHz**	**5.47 to 5.725 GHz**
Certifications	EN 300 328-2 (article 3.2 of R&TTE directive WLAN 2.4 GHz) EN 301 489-1 (article 3.1b of R&TTE directive EMC emissions)	EN 301 893 (article 3.2 of R&TTE directive) EN 301 489-1 (article 3.1b of R&TTE directive EMC emissions)	EN 301 893 (article 3.2 of R&TTE directive) EN 301 489-1 (article 3.1b of R&TTE directive EMC emissions)
Radio	DCMA-82 HI	DCMA-82 HI	DCMA-82 HI
Certified antennas	Integrated tri-band Verint antenna: 2.4 GHz with 8.5 dBi gain and 11 dBm tx power	Integrated Verint antenna: 5.x GHz with 12 dBi gain and 8 dBm tx power	Integrated Verint antenna: 5.x GHz with 12 dBi gain and 15 dBm tx power
Rule summary	Band is for indoor/outdoor. Max EIRP: 20 dBm  CE! France, Monaco: Outdoor restricted to channels 1 to 7. CE! Greece, Italy, Spain: Outdoor needs license. CE! Belgium: An outdoor link greater than 300m requires notification to spectrum agency.	Band is for indoor only. DFS/TPC is needed. Max EIRP: 27 dBm	Band is for indoor/outdoor. DFS/TPC is needed. Max EIRP: 27 dBm  CE! Greece, Italy: Outdoor needs license.

Declaration of Conformity

Manufacturer:

Verint Systems Inc.
1800 Berlier
Laval, Québec
H7L 4S4
Canada

Declares under sole responsibility that the product:

Product name: Wireless video transceiver
Model number: S4100-CE and S4100-2V-CE

To which this declaration relates is in conformity with the following standards or other documents:

R&TTE Directive 1999/5/EC

ETSI EN 300 328 v1.7.1 (2006-10)
ETSI EN 300 893 v1.3.1 (2005-08)
ETSI EN 301 489-1 v1.7.1 (2007-04)
ETSI EN 301 489-17 v1.3.2 (2007-06)
IEC-60950-1 (2001)

Verint hereby declares that the equipment specified above conforms to the above Directive(s) and Standard(s).

October 17th, 2007
Laval, Canada

For the official signed declaration of conformity, visit http://www.verint.com/certifications.

RoHS Declaration of Compliance

Verint believes in the importance of conducting our business in a manner that will help protect the environment as well as our employees, customers, and the public.

To that end, we are committed to bringing our existing and future product lines into EU RoHS Directive compliance.

Thus, as of July 1 2006, the following products, S4100, S4100-2V, S4100-CE, and S4100-2V-CE, will comply with the DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 (RoHS) regarding the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The S4100, S4100-2V, S4100-CE, and S4100-2V-CE products will not exceed the maximum concentrations of 0.1% by weight in homogenous materials for lead, hex chrome, mercury, PBB, PBDE, and 0.01% for cadmium. In addition, the S4100, S4100-2V, S4100-CE, and S4100-2V-CE products will qualify for the “lead in servers solders” exemption as set forth in the Directive.

This declaration is provided based on reasonable inquiry of our suppliers and represents our actual knowledge based on the information provided by our suppliers.

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