



Wave Server Installation Guide

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Revision History

Release	Date	Documentation Changes	Page No.
2.5	10/11	GENERAL RELEASE:	
		The preferred configuration for all Wave Servers is now one solid-state drive (SSD) and one large-storage hard disk drive (HDD). All new Wave Servers ship with this configuration.	3-3, 4-2
		Added section "Wall mounting the Wave IP 500 Server" .	3-8
		Microsoft Internet Explorer 8.0 is now supported on the administrator PC.	5-2
		Modified the procedure to add the Wave Server to the Internet Explorer Local Intranet group. This step should always be performed.	5-6
		Added section "About ViewPoint automatic updates" , describing how ViewPoint can now be updated automatically on all user PCs whenever an updated version of ViewPoint is installed on the Wave Server	9-2
		Added section "Installing as a LOCAL ADMINISTRATOR in Windows."	9-3
		Removed note: Do not install ViewPoint on the Wave Server. You can now install ViewPoint on the Wave Server for administrative purposes only.	9-3
		In section "Installation steps", removed step to install the Archive Recording Service in a custom location. In this version, you must install in the default location.	10-5
		Added section "Assigning required access right to run the Recording Archive Service" .	10-8
		Added entry "Pages remain open indefinitely" to section "Troubleshooting ViewPoint problems".	F-9
2.0 SP1	02/11	SERVICE PACK RELEASE:	
		Added important note: Do not install ViewPoint on the Wave Server.	9-3
		Added entry "Firewall problems may prevent ViewPoint from starting" to section "Troubleshooting ViewPoint problems".	F-8
		Renamed Chapter 9 to "Installing ViewPoint and Other Wave Workstation Applications" to emphasize ViewPoint installation process.	9-1

Revision History

Release	Date	Documentation Changes	Page No.
2.0	09/10	GENERAL RELEASE:	
		Updated Uniform Service Order Code (USOC) table to include new VWU-8AT-W and VWU-1T1S-M modules.	1-8
		All Wave IP 500 Servers now ship with dual (redundant) SATA hard disk drives configured from the factory which will further increase overall reliability. This new configuration (VW5-IP500-STD2) replaces the single hard disk drive configuration (VW5-IP500-STD2) which has been discontinued.	---
		DSS Console devices , associated with a user's digital phone, provide "switchboard" capability by expanding the number of extension buttons available to a digital phone user. See the following sections for more information: <ul style="list-style-type: none"> • "Connecting a DSS Console" on a Wave IP 500 Server • "Connecting a DSS Console" on a Wave IP 2500 Server For information about configuring a DSS Console for a user, see section "Phone dialog \ DSS Consoles tab" in Chapter 4 in the <i>Wave Global Administrator Guide</i> .	3-27 4-30
		New licenses are required in Wave ISM 2.0. Wave ISM 2.0 supports scalability and edition-based licensing . The table of supported Wave license types has been updated with the new license titles introduced in Wave ISM 2.0.	8-2 8-3 8-4
		You can now view the status of the licenses on your Wave system by running the License Status report (in addition to using the Software Licenses applet). This report reports on all Wave installed licenses by product name and version, and lists the license key, quantity, type, status, activation date (blank for a trial license), and expiration date (if applicable) for each license. For more about using the Report Generator to run this report, see Chapter 29 in the <i>Wave Global Administrator Guide</i> .	---

Revision History

Release	Date	Documentation Changes	Page No.
		Updated link to Microsoft Download Center to obtain SQL Server 2005 Express Edition SP2 as part of the Wave Recording Archive Service installation.	10-5
		Updated Troubleshooting chapter with symptoms/solutions for the following issues: <ul style="list-style-type: none"> • Pressing a Call Appearance button to answer a call on a 5-series Aastra SIP phone may not route audio to the phone’s speaker. • Firewall problems may prevent ViewPoint from starting. • Long distance prefix added incorrectly on a system with a locale of “Spanish (Spain)”. 	F-5 F-8 F-8
		Removed Appendix H, “Wave Software License Agreement”. This information is now covered in Appendix B in the <i>Wave Global Administrator Guide</i> .	---
1.5 SP3	08/09	SERVICE PACK RELEASE:	
		Added information on the Quad BRI module . See the following sections: <ul style="list-style-type: none"> • “Expansion cards and modules” • “Connecting the Quad BRI module” • “About cable connections” (table) 	3-7, 4-4 3-24, 4-27 3-17, 4-21
		Updated list of Wave license types to reflect support for WaveNet and Call Classifier.	8-3
1.5 SP2	05/09	SERVICE PACK RELEASE:	
		Updated table in section “Federal Communication Commission (FCC) statement” to include the new 1-Port T1/PRI Module (VW5-T1-M).	1-8
		Added information on the new 1-Port T1/PRI Module (VW5-T1-M) in the chapters on installing the Wave IP 500 Server and Wave IP 2500 Server.	3-1, 4-1
		Added Important note to the procedure documented in section “Resetting the Wave Server IP addresses to the factory defaults” in the Troubleshooting Appendix.	F-1
1.5 SP1	02/09	SERVICE PACK RELEASE:	
		The title page and footers have been modified to reflect support for the current software version. No manual content has changed.	---

Revision History

Release	Date	Documentation Changes	Page No.
1.5		GENERAL RELEASE:	
	01/09	The Wave IP 500 Server is now supported . Installation instructions for the Wave IP 500 and Wave IP 2500 are described in separate chapters.	3-1 , 4-1
	11/08	Added note to the FCC Part 68 compliance statement regarding if a facility has specially-wired alarm equipment connected to the telephone line.	1-6
		Added section "Physical specifications" listing Wave Server dimensions and weight.	2-4
		Added section "About cable connections", including instructions on how to connect the 2 types of RJ-21X cables. See Chapter 3 or Chapter 4, depending on your Wave Server model.	3-17 , 4-21
		Updated PC requirements sections to include all supported Windows operating systems.	5-2 , 9-4 , 10-3
		Clarified how an IP address is assigned to the client modem in section "Connecting to the Wave ISM via a modem."	5-10
		Added a new chapter that explains how to use the Installation Wizard when setting up a new Wave ISM system.	6-1
		Added section "Performing a composite upgrade vs. individual upgrades."	7-2
		E1 EuroISDN expansion module is now supported. It provides a single E1 ISDN digital trunk, features an integrated CSU/DSU, and allows shared data and voice services over a single E1 circuit.	4-26
		Expanded section "Adding the Wave Server to your Windows domain".	7-7
		Updated "Digital Station Card port descriptions and pinouts" table to cover both the 12-port and 24-port models.	B-10
		Updated Status LED information.	C-1
		Added Expected time column to the System LED tables.	starting on page C-3
		Terminology change: "Redboot boot loader" is now referred to as the "ISC1 boot loader".	F-1
		Added section "Troubleshooting Management Console problems".	F-6
		Added section "Troubleshooting ViewPoint problems".	F-8
		Added section "Troubleshooting workstation application problems".	F-10

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Release	Date	Documentation Changes	Page No.
1.0 SP2	02/08	SERVICE PACK RELEASE:	
		Removed list of supported modems from “Administrator PC requirements” section. The latest list of client modems certified for use with Wave Server is available from Wave providers.	5-2
		Added note to close and restart browsers on other PCs that had been running the Global Administrator after restarting the Wave Server.	7-12
		Added instructions on how to change the default Locale for non-North American systems as part of setting basic system information.	7-15
		Added section about entering station IDs when installing Wave workstation applications.	9-6
1.0 SP1	12/07	SERVICE PACK RELEASE:	
		License activation proxy server section added.	8-16
		Software Licenses applet: Updated screenshots and procedures to reflect changes to the Import and Activate processes.	8-5, 8-10, 8-12
1.0	10/07	GENERAL RELEASE:	
		Initial Release	---

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About Wave ISM

Welcome to Wave ISM—a unified platform designed for scalability, reliability, and ease of use that delivers comprehensive communication support, including PBX voice capability, multiprotocol router capabilities, full LAN/WAN connectivity, and a suite of communication applications.

Getting the most out of this guide

This guide provides detailed instructions for installing the Wave Server and Wave ISM and performing initial system configuration. See “Installation roadmap” on page 2-1 for details on the required and optional installation steps.

Note how the following terms are used in this guide:

- “Wave ISM” refers to the Wave software infrastructure—Wave Integrated Services Manager.
- “Wave Server” refers to the physical server PC on which Wave ISM runs. Most of the information in this guide applies to all Wave Server models. When information applies to a specific Wave Server model, the model is identified, for example “Wave IP 2500” or “Wave IP 500”.
 - For more about the Wave IP 500, see Chapter 3.
 - For more about the Wave IP 2500, see Chapter 4.
- “The Wave ISM” refers to your Wave phone system as a whole.

Using Help

The Wave ISM Help provides both online and context-sensitive Help. To access each type of Help, use the following methods:

- Online Help—From the Wave Global Administrator Management Console, press the Help icon located in the top right corner of the screen, then select a topic from either the Contents tab or the Index tab.
- Context-sensitive Help—From each Global Administrator Management Console applet or dialog where you see a Help button, click it to directly access the relevant Help topic.

Conventions used in this guide

In the course of describing product features and functions, this guide uses the conventions described in this section.

Special messages

Note: A note expands on information in the text.

Hint: A hint suggests a way to work smarter or helps you perform a task.

Important: An Important note relays information that is of special interest.

Caution: A caution highlights information that helps you prevent damage to the equipment or to data, and tells you how to avoid the problem.

Warning: **A warning alerts you to a situation that could cause you physical harm.**

Terms used

Term	How to Interact
Click	Click the left mouse button.
Right-click	Click the right mouse button.
Shift-click	Hold down the Shift key, and simultaneously click the left mouse button.
Ctrl-click	Hold down the Ctrl key, and simultaneously click the left mouse button.
Ctrl+another key	Hold down the Ctrl key, and simultaneously press one or more additional keys, for example Ctrl+Q.
Enter	Press the Enter key, or click OK.
Type	Type the indicated text, but do not press the Enter key or click OK until you are directed to do so.
Press	Press the indicated key or keys.
Check	Place a check mark in the check box.
Select	Choose an option from a menu, drop-down list, or list of radio buttons.

Type conventions

Type Convention	Used to Indicate
<i>italics</i>	Book titles, variables, and word emphasis
<code>courier font</code>	Screen text and user-typed command line entries
Initial Caps	Menu titles, window names, button names, file names, and directories

Related reading

For information about this version of Wave ISM, including new features, known issues, and other late-breaking information, see the Release Notes included on the Documentation CD.

The following additional documents are included with the Wave Server in Acrobat format, and can be found on the Documentation CD.

Manuals

Wave ISM System Recovery Guide—Describes how to use the Wave ISM System Recovery Disk or System Recovery USB Thumbdrive to restore your Wave Server to its original factory settings for emergency recovery.

Wave Global Administrator Guide—Task-based instructions on how to use all aspects of the Wave Global Administrator Management Console.

Wave ViewPoint User Guide—Task-based instructions on how to use ViewPoint, including call control, working from remote locations, participating in a contact center, and so forth.

Wave Phone User Guide—Describes how to use SIP phones, digital phones, analog phones, and SIP softphones with Wave.

Wave Server Hardware Reference Guide—Detailed technical information about the Wave Server hardware components.

Quick Reference Guides

Wave Analog Phone Quick Reference Guide—Instructions for Wave analog phone users.

Wave Digital Phone Quick Reference Guide—Instructions for Wave digital phone users.

Wave SIP Phone Quick Reference Guide—Instructions for Wave SIP phone users.

Wave Voice Mail Quick Reference Guide—Instructions for using Wave ISM Voice Mail features.

For more information

See the Wave IP dashboard on V-Connect for the latest news and information highlights about Wave, as well as a variety of other resources.

<http://vconnect.vertical.com/>

After logging in, choose **Products > Wave IP**.

You can also contact your Vertical Wave provider, call 1-877-VERTICAL, or visit the Vertical corporate Web site:

<http://www.vertical.com>

Support services

Vertical Communications, Inc. has worked diligently to produce the highest quality communications system possible. In the course of installing or customizing a system, however, customers may require personal attention.

For technical support, contact your Vertical Wave provider.

System security

You are responsible for the security of your Vertical Wave system. Unauthorized use of the Vertical Wave system could result in toll fraud. You must read all system administration documentation to understand which configuration options can introduce the risk of toll fraud, and which configuration options can be activated or deactivated to prevent fraud.

For more information, see Appendix A, “Protecting your Phone System Against Toll Fraud” in the *Wave Global Administrator Guide*.

Note: Vertical Communications, Inc. does not warrant that the configuration software is immune from or will prevent unauthorized use of common-carrier telecommunications facilities and services accessed through or connected to the Wave Server. Vertical Communications, Inc. is not responsible for any charges that could result from unauthorized use.

Compliance statements

Federal Communication Commission (FCC) statement

The following statements are provided in accordance with the Federal Communications Commission (FCC) regulations. Please read these statements carefully before installing your system.

FCC Part 15

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by Vertical Communications, Inc. could void your authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Part 68

This equipment complies with Part 68 of the FCC rules. Located on the equipment is a label that contains, among other information, the FCC registration number and Ringer Equivalence Number (REN). If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to determine the maximum REN for the calling area.

This equipment cannot be used on the telephone company-provided coin service. Connection to Party Line Service is subject to State tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If problems are experienced with this equipment, please contact your reseller.

If the problem is causing harm to the telephone network, the telephone company may require you to remove the equipment from the network until the problem is resolved.

It is recommended that the customer install an AC surge arrester in the AC outlet to which this device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

If your facility has specially wired alarm equipment connected to the telephone line, ensure the installation of Vertical equipment does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult your telephone company or a qualified installer.

This equipment is Hearing-Aid Compatible (HAC).

Wave Server models

The following table lists the FCC registration number and REN for each supported Wave Server model.

Wave Server	FCC registration number	REN
Wave IP 2500	6FJ-USA-33307-PF-E	0.9
Wave IP 500	6FJ-USA-33307-PF-E	0.9

Embedded processors, expansion cards, and modules

This equipment uses the following Uniform Service Order Code (USOC) jacks and codes:

Model Name	Facility Interface Code	REN or Service Order Code	Jack Type
VWU-8AT-M	02LS2	0.2B	RJ-21X
VWU-8AT-M	02GS2	0.2B	RJ-21X
VW-IS1-C	02LS2	0.2B	RJ-21X
VW5-IS2-C	02LS2	0.2B	RJ-11
VWU-IT1S-M, VW5-T1-M	04DU9-BN	6.0Y	RJ-48C
VWU-IT1S-M, VW5-T1-M	04DU9-DN	6.0Y	RJ-48C
VWU-IT1S-M, VW5-T1-M	04DU9-1KN	6.0Y	RJ-48C
VWU-IT1S-M, VW5-T1-M	04DU9-1SN	6.0Y	RJ-48C
VWU-IT1S-M, VW5-T1-M	04DU9-1SN (PRI)	6.0Y	RJ-48C
VWU-8x8AU-M	02LS2	0.2B	RJ-21X
VWU-8x8AU-M	02GS2	0.2B	RJ-21X
VWU-8x8AU-M	02RV2-T	AS.2	RJ-21X

Direct Inward Dialing (DID) interfaces

Allowing this equipment to be operated in such a manner as to not provide for proper answer supervision is a violation of Part 68 of the FCC rules.

Proper answer supervision is when:

- The equipment returns answer supervision to the Public Switched Telephone Network (PSTN) when Direct Inward Dialing (DID) calls are:
 - Answered by the called station
 - Answered by the attendant
 - Routed to a recorded announcement that can be administered by the Customer Premise Equipment (CPE) user
- The equipment returns answer supervision on all DID calls forwarded to the PSTN. Permissible exceptions are:
 - A call is unanswered
 - A busy tone is received
 - A reorder tone is received

Underwriter's Laboratory

Underwriter's Laboratory (UL) & Canadian Underwriter's Laboratory (CUL)

This equipment is Safety Listed by MET Laboratories, Baltimore, Maryland and complies with Underwriters Laboratories Standard UL 60950-1 (USA) and CSA C22.2 No. 60950-1. MET Laboratories may be contacted at 800-638-6057 or www.metlabs.com.

To reduce the risk of fire: use 26 AWG line cords that have been evaluated as Communication Circuit Accessories, UL 1863, for all telephone connections. This statement applies to all cards and modules that connect to telephones or the Public Switched Telephone Network (PSTN).

Industry Canada

This section describes the requirements for end users in accordance with CS-03.

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements documents. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in certain situations

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Ringer Equivalence Number (REN) for each device (card or module) is listed in the appropriate chapter.

The standard connecting arrangement (telephone jack type) for each card or module is listed in the appropriate chapter.

Before You Begin

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Site preparation	2-3
Safety requirements	2-6

Installation roadmap

You must perform the tasks listed in the following table in the order specified. This list is only an overview of the tasks you must perform. Detailed instructions for each task are presented in the indicated chapters.

Important: All steps are required unless otherwise noted.

Step	Description	See
1	Read the Release Notes for important late-breaking information about this version of Wave ISM, including installation tips, known issues and workarounds.	Documentation CD included with Wave ISM
2	Prepare the site where the Wave Server will be installed.	This chapter
3	Install the Wave Server. Tasks include mounting and grounding procedures; connecting the Wave Server to power and to your LAN; connecting to your service provider's voice or data trunks; connecting digital and analog phones; installing and connecting expansion components if you are using them; and connecting a music-on-hold (MOH) system and/or paging system.	Chapter 3 (Wave IP 500) or Chapter 4 (Wave IP 2500)

Step	Description	See
4	Configure and connect the administrator PC. Tasks include configuring TCP/IP on the PC that you will use to administer Wave ISM, connecting to the Wave ISM via your LAN or a modem, installing client caching to improve performance, and verifying installed hardware components.	Chapter 5
5	For new Wave ISM systems only: Configure your system via the Installation Wizard. If you are upgrading an existing system, you cannot use the Installation Wizard	Chapter 6
6	Set up the Wave Server for initial configuration. Tasks include obtaining and applying all required HotFixes; identifying the Wave Server on your LAN; power-cycling the Wave Server; setting the dial-in default IP address pool; performing basic system configuration tasks, including entering information about your system, setting the system date and time, and configuring the time service used by Wave ISM; and adding Wave ISM user and administrator accounts.	Chapter 7
7	Enter and activate your Wave licenses to enable full system functionality.	Chapter 8
8	Optionally, install ViewPoint and other Wave workstation applications on the PCs of users who need to run them: ViewPoint, TAPI Service Provider, Contact Manager Assistant, and Archived Recording Browser. (See Appendix A if you plan to install the workstation applications on an applications server running on Microsoft Terminal Services or Citrix® MetaFrame.)	Chapter 9
9	Optionally, install the Wave Recording Archive Service to allow users to search for and manage archived recordings using the Wave Archived Recording Browser.	Chapter 10
10	Optionally, configure the Windows firewall for the Wave workstation applications. If you installed the Wave workstation applications or Wave Recording Archive service, this appendix applies to you.	Appendix E

Where to go next

After you complete the tasks described in this manual, your Wave ISM is fully operational. You are now ready to configure and customize your phone system, for example:

- Set system-wide Wave ISM options, such as business hours and holidays, voice mail options, password security to prevent toll fraud, and so forth.
- Connect and configure analog and digital trunks and stations.
- Set up IP telephony.
- Configure your dial plan, inbound and outbound call routing, hunt groups, and so forth.
- Add and configure users, roles, and workgroups.
- Set up auto attendants.

Note: If you used the Installation Wizard as described in Chapter 6, you may already have performed some or all of these tasks.

For more information on these topics and more, see the *Wave Global Administrator Guide*. The *Wave Global Administrator Guide* includes information for readers at a variety of levels. To get the most out of the documentation, start by reading the parts that are most relevant to your level of experience. See “Where to start” in Chapter 1 for more information.

Site preparation

It is important to set up your site properly before installing the Wave Server. Before removing the Wave Server from the packing material do the following:

- Determine the location where the Wave Server will reside. The Wave Server requires a dust-free location with heating, air conditioning, and ventilation. See “Environmental requirements” on page 2-4.
- Install all punchdown blocks and patch panels.
- Purchase and install an EIA- or IEC-compliant, 19-inch equipment rack, if you plan to rack mount the Wave Server.
- Install TIA/EIA-568A standard cabling (for example, Category 3 for voice, or Category 5 for voice and data.)

Caution: An Uninterruptible Power Supply (UPS) is strongly recommended in case of a site power failure. See Appendix C in the *Wave Server Hardware Reference Guide* for specifications.

Physical specifications

Wave IP 500

Dimensions	2.6 inches high x 17.6 wide x 13.8 inches deep (6.4 x 44.7 x 34.9 cm), 1.5U rack height)
Weight	14 pounds (6.4 kg)

Wave IP 2500

Dimensions	Base unit: 4.4 inches high x 17.6 wide x 17.9 deep (11.1 x 44.7 x 45.5 cm), 2.5U rack height EXU: 2.6 inches high x 17.6 wide x 17.9 deep (6.4 x 44.7 x 45.5 cm), 1.5U rack height
Weight	Base unit: 26 pounds (11.8 kg) EXU: 19 pounds (8.6 kg)

Environmental requirements

For the Wave Server to operate properly, the environmental specifications in the following table must be met

All models.

Requirement	Value or range
Operating temperature	32° to 104° F (0° to 40° C)
Operating humidity	80% maximum relative humidity, noncondensing
Operating altitude	Up to 10,000 ft (3050 m)
Storage temperature	-4° to 140° F (-20° to 60° C)
Storage humidity	85% maximum relative humidity, noncondensing
Clearance for servicing	Minimum 24 in (61 cm) front and back
Clearance for cooling	Minimum 4 in (10 cm) on all sides
AC power requirements, E1 internal power supply	Base unit: 100-240 VAC, 50/60 Hz, 9A EXU: 6A

Wave IP 500-specific.

Requirement	Value or range
Heat emitted	Maximum 1980 BTU/hour
Power consumption	Maximum 580W
AC power source	Dedicated 15-amp circuit
AC power requirements, T1 internal power supply	100-240 VAC, 50/60 Hz, 9A
AC power requirements, 180W external digital phone power supply	100-240VAC, 50/60Hz, 2.4-1.2A

Wave IP 2500-specific.

Requirement	Value or range
Heat emitted	Base unit: Maximum 2830 BTU/hour Each EXU: 910 BTU/hour
Power consumption	Base unit: Maximum 830W Each EXU: 560W
AC power source	Base unit: Dedicated 15-amp circuit Each EXU: 10-amp dedicated circuit
AC power requirements, T1 internal power supply	Base unit: 100-120 VAC, 50/60 Hz, 9A EXU: 6A

Required tools

You need the following tools to install the Wave Server:

- #1 and #2 Phillips screwdriver
- Flat-head screwdriver
- Antistatic mat to protect electronic components from static electricity damage
- Antistatic wrist strap attached to a grounded, antistatic leash

Safety requirements

Refer to the following cautionary procedures to help ensure your safety and avoid damaging the Wave Server:

- Protective grounding
- Electrical safety
- Proper lifting

Protective grounding

Caution: For your safety and to avoid damaging sensitive electronic components, be sure to do the following.

- Ground the Wave Server according to the instructions in Chapter 3 or Chapter 4 (depending on your Wave Server model).
- To prevent electrostatic discharge:
 - Always work at a static-safe area that includes an anti-static mat and an antistatic wrist strap that has been adhered to a grounded surface, such as a mounting rack or the Wave Server face plate.
 - Keep electronic components inside static-safe packaging until you are ready to use them.
 - Unpack electronic components in a static-free area.
 - Store spare parts in the original static-safe packaging or in static-safe containers.

Electrical safety

- Power off the Wave Server and disconnect the power cable whenever you remove, replace, or install hardware components.
- Never touch bare conductors or wires on telephony ports or other interfaces.

Proper lifting

Caution: Lift the Wave Server (and any EXUs, if you are using a Wave IP 2500) with assistance whenever possible to prevent possible injury to yourself or damage to the system. See “Physical specifications” on page 2-4 for weight specifications.

To safely lift the Wave Server from the ground:

1. Position your feet at shoulder width.
2. Keep your back straight.
3. Bend at your hips and knees.
4. Grasp the Wave Server by opposite corners, and position your body so the weight is centered over your feet.
5. Lift the chassis slowly with your leg muscles.
6. Avoid twisting motions.
7. Bend at your hips and knees to put the chassis down.

Setting Up the Wave IP 500 Server

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Important: This chapter applies to you if you are installing a Wave IP 500 Server. If you are installing a Wave IP 2500 Server, go to Chapter 4.

About the Wave IP 500 Server

The Wave IP 500 Server consists of the following components. Each is described in the following sections.

- Wave Server chassis components. See the next section.
- Power supply. See page 3-5.
- Expansion options, including expansion modules and the Media Resource Module (MRM). See page 3-6.

Important: Note that a monitor, keyboard, and mouse are not included with and are not supported on the Wave Server. You use the administrator PC, described in Chapter 5, to configure and manage the Wave ISM.

Maximum phone capacity

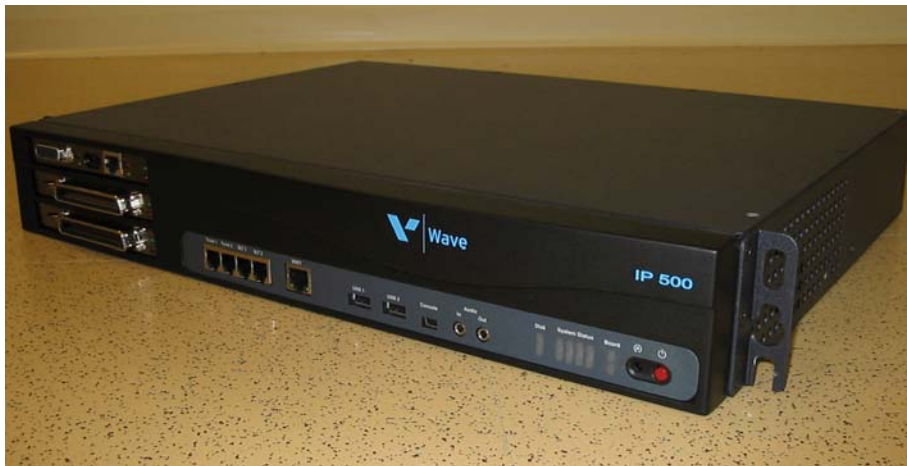
The Wave IP 500 Server supports the following:

- A maximum of 50 analog, digital, and SIP phones in a mixed configuration.
- A maximum of 50 SIP phones in a SIP-only configuration (with no digital or analog phones)
- A maximum of up to 48 digital phones in a digital-only configuration (with no SIP endpoints or analog phones)

Wave IP 500 Server components

The Wave IP 500 Server consists of the following:

- 19-inch rack-mountable chassis that includes room for expansion.



- VAM (1GHz Celeron, 1GB memory)
- Power supply
- Integrated Services Card 2 (ISC2), an embedded processor that provides primary system control including voice processing and packet switching elements.
- One solid-state drive (SSD) and one large-storage hard disk drive (HDD).

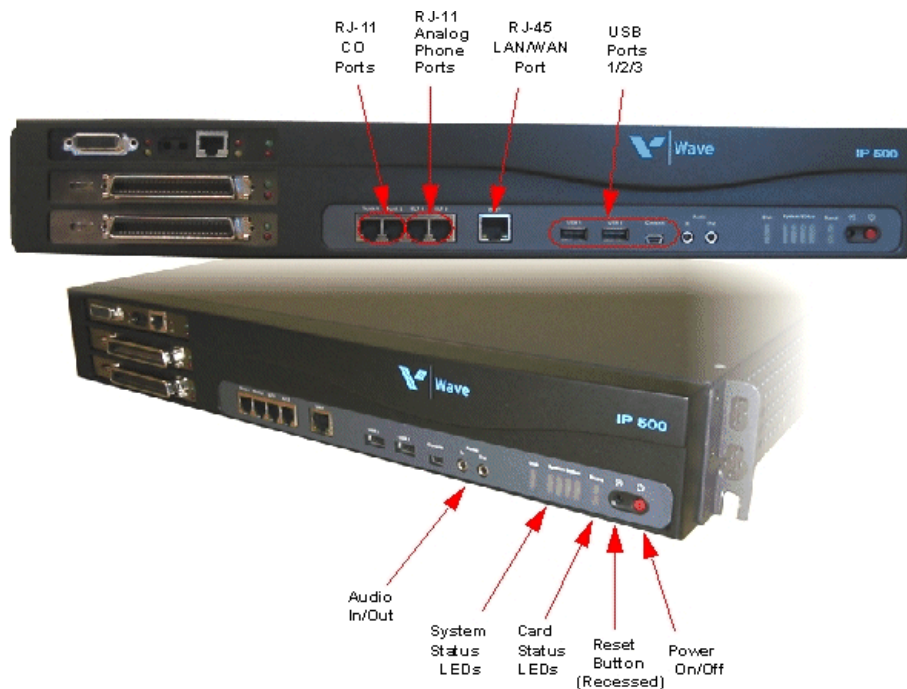
Important: This dual-drive configuration is provided on all new Wave Servers, and is the preferred configuration for all Wave Servers going forward. Contact your Wave provider for information about available upgrade paths for existing Wave Servers.

About the ISC2

The ISC2 includes the following:

- Embedded Intel IXP processor
- Fault Monitor Module
- Digital Signal Processor (DSP)
- Media Resource Module (MRM) connector for an optional MRMA module for expanded DSP functionality
- 2 analog station ports (RJ-11 connectors)
- 2 analog trunk ports, loop-start only (RJ-11 connectors)
- 1 external Ethernet switched port, 10/100Base-T.
- 2 USB host ports for communication to the VAM (type A connectors)
- 1 USB device port for service console connection to the embedded processor (type mini-B connector)
- 1 audio input port for an external music-on-hold source
- 1 audio output port for an external paging system
- 4 system status LEDs and 2 module status LEDs, described in detail in Appendix C
- Power on/off button
- Reset button
- Internal 56K soft modem
- 1 station to trunk power fail connection relay
- 1 alarm relay

The following diagram illustrates the system ports, LEDs, and buttons on the ISC2:



Power supply

The Wave IP 500 Server chassis is equipped with one power supply.

If a power failure occurs, an optional Uninterruptable Power Supply (UPS) can provide several minutes of system power, allowing the Wave Server to be properly shut.

A UPS is not provided by Vertical Communications, but can be purchased from a third-party source. For information about recommended UPS specifications, refer to Appendix C in the *Wave Hardware Reference Guide*.

External power supply for digital phones

Because the Wave IP 500 Server does not provide power to digital phones directly, An external power supply is required.

The 180W 36V external power supply supports up to 48 Comdial or LGN digital phones (all currently-supported models.)

Important: Note the following:

- You must use the external power supply supplied by Vertical—do not substitute a power supply obtained elsewhere.
- The external power supply should only be connected and disconnected from the Wave Server when the Server is powered off. Also, be sure to connect the AC cord before powering the Wave Server on.

For more information about the external power supply for the Wave IP 500, see the *Wave Hardware Reference Guide*.

Wave IP 500 Server expansion options

The ISC2 is the minimum requirement for a Wave IP 500 system.

There are several ways to expand the Wave Server to handle additional users and increased traffic, and support a wide variety of trunk and station configurations:

- Expansion modules
- Media Resource Module (MRM)

For technical specifications for these expansion components, see the *Wave Hardware Reference Guide*.

Expansion modules

Up to 3 modules can be installed in the Wave IP 500 Server chassis.

The following modules are available:

- **Analog trunk module.** Supports 8 analog FXO loop start or ground start trunk ports. See page 3-20.
- **Analog universal module.** Supports 8 analog FXS station ports and 8 analog FXO loop start or ground start trunk ports. See page 3-20.
- **Digital station module.** Depending on the specific model, supports 12 or 24 digital station ports. See page 3-21.
- **T1 module with serial interface.** Supports a single T1 ISDN PRI digital trunk. It features an integrated CSU/DSU, and allows shared data and voice services over a single T1 circuit. See page 3-22.
- **T1 module (without serial interface).** Supports a single T1 ISDN PRI digital trunk. See page 3-23.
- **E1 EuroISDN module with serial interface.** Supports a single E1 ISDN digital trunk. It features an integrated CSU/DSU, and allows shared data and voice services over a single E1 circuit. See page 3-23.
- **Quad BRI module.** Supports 4 ISDN Basic Rate Interface (BRI) digital trunks and up to 8 simultaneous voice calls, and provides connectivity between the Wave Server and Central Office (CO) equipment supporting Euro-ISDN BRI communication protocols. See page 3-24.

For installation instructions, see page 3-15.

Media Resource Module (MRM)

Each Wave ISM system is pre-configured to support a specific number of users and concurrent voice applications. To expand the system's core telephony, voice processing, and VoIP capabilities you can add a Media Resource Module. The MRM is a mezzanine-style daughter board that is installed on the Integrated Services Card (ISC2).

You can install one MRM on the Wave IP 500 Server. The MRM model (MRMA) supported on the Wave IP 500 Server provides up to 128 additional voice processing channels.

Note: An MRM is required if you plan to use Quality of Service (QoS) settings with IP resources for VoIP calls. Contact your Wave provider for more information.

For installation instructions, see page 3-15.

Mounting the Wave IP 500 Server

The Wave IP 500 Server can be rack mounted, wall mounted, or table mounted. See “Environmental requirements” on page 2-4 for specific requirements on how to prepare the site the where the Wave Server will reside.

Caution: Due to the weight of the Wave IP 500 Server, mount it with assistance whenever possible. Review “Proper lifting” on page 2-7 before rack mounting.

Important: Note the following:

- Do not place anything on or against the chassis that prevents proper ventilation. Be sure to allow a minimum cooling clearance of 4 inches on all sides of the Wave Server.
- To prevent the fans from pulling dust into the chassis, mount the Wave Server at least 2 feet (0.5 meters) above the floor. Do not operate the Wave Server at floor level.

Rack mounting the Wave IP 500 Server

The Wave Server is shipped ready to be rack mounted. The Wave Server requires an EIA- or IEC-compliant, 19-inch rack for proper mounting. See “Physical specifications” on page 2-4 for the dimensions of the Wave Server, including rack height.

To rack mount the Wave IP 500 Server:

1. Insert a rack mounting screw loosely into each side of the rack.
2. Slide the Wave Server into the rack and hang it onto the screws using either the keyhole or slot on each mounting bracket. (This frees you from having to hold the chassis in place as you continue.)
3. Tighten the screws, and then insert and tighten a second rack mounting screw in each bracket.

Wall mounting the Wave IP 500 Server

You can mount the Wave Server onto a wall by first attaching a piece of prepared plywood to studs in the wall, then attaching the base unit to the plywood.

Caution: Do not attach the Wave IP 500 Server directly to a wall without using the plywood as a support—the plywood must be firmly attached to wall studs in order to support the weight of the base unit.

To wall mount the Wave IP 500 Server:

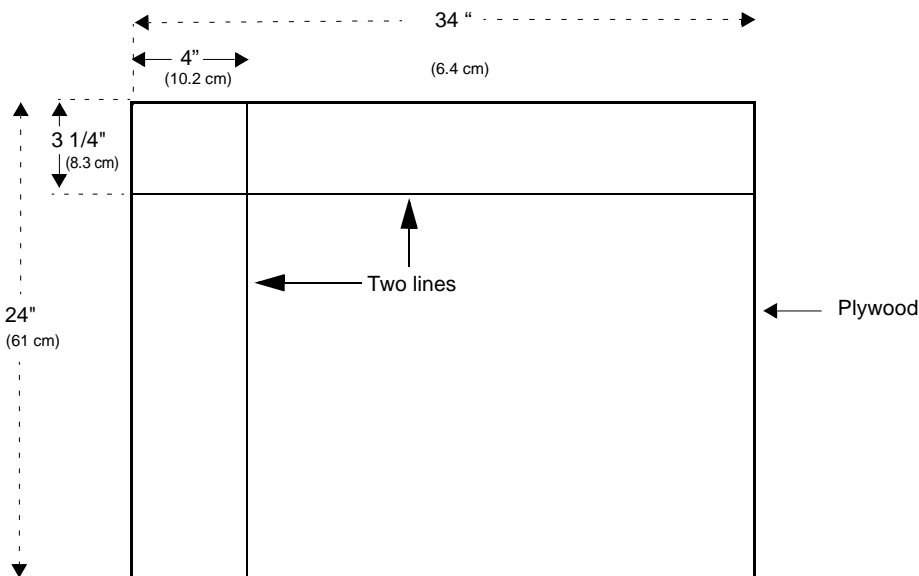
1. Prepare a piece of plywood that meets the following minimum dimensions for proper ventilation and service access:

Thickness—0.75 inches (2 cm)

Height—24 inches (61 cm)

Width— 34 inches (86.4 cm)

2. Draw a vertical line on the plywood 4 inches (10.2 cm) from the left edge, and a horizontal line 3-1/4 inches (8.3 cm) from the top edge:



3. Locate supporting studs in your wall, and firmly attach the prepared piece of plywood to the studs using the appropriate screws.

4. If mounting brackets are currently installed on the front of the Wave IP 500 Server, remove them.
5. Position the mounting brackets at the bottom of each of the Wave IP 500 Server's side panels. Use a #2 Phillips screwdriver to fasten each mounting bracket to the Server with the screws provided.
6. With another person's assistance, lift the Wave IP 500 Server and place it against the wall-mounted plywood. Line up the left side of the Server with the vertical line that you drew on the plywood, and line up the top of the Server with the horizontal line that you drew.

Important: According to the directions in this step, the face plate will be facing to the right (see the following illustration.) You can rotate the base unit before attaching it to the wall-mounted plywood so that the face plate faces to the left, in order to avoid power outlets or other obstructions. **However, the face plate cannot face up or down once the Wave IP 500 Server is mounted to the wall.**

7. Insert and tighten two self-threading 1/4-20 screws through each mounting bracket to securely attach the base unit to the plywood. When successfully wall-mounted, the Wave Server base unit looks like this.

Table mounting the Wave IP 500 Server

Table mounting is a convenient solution for temporary or mobile operation requirements of the Wave Server. Do not place the Wave Server on the floor.

Caution: Ensure that the table supports the weight of your Wave Server. See "Proper lifting" on page 2-7 for system weight specifications.

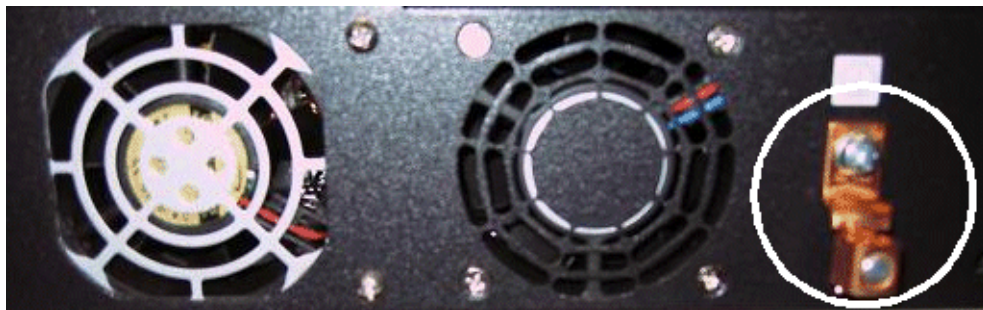
Grounding the Wave IP 500 Server

Warning: The protective ground lug (earth contact) on the Wave Server must be permanently connected to earth.

Warning: The National Electrical Code requires that the telephone and electrical services have a common ground. If separate grounds are used for telephone and electrical services, a voltage differential could develop between the two services. This could expose you to an electrical shock and damage the equipment.

To ground the Wave IP 500 Server:

1. Locate the ground lug on the back of the Wave Server.



2. Loosen the slotted screw on the ground lug with a flat-head screwdriver.
3. Insert a 10- or 12-gauge stranded grounding wire into the ground lug opening.
4. Tighten the slotted screw.
5. Connect the other end of the grounding wire to one of the following ground types:
 - Power service ground
 - Building steel ground
 - Metallic cold water pipe that is bonded to a power ground (if permitted by local building codes)
 - Ground rod that is 5 feet long and 5/8 inch in diameter. (Use this option only if none of the other options are available.)

Connecting the Wave IP 500 Server to power and powering on

Connect the Wave Server to a dedicated circuit using the supplied power cord. Do not use any other power cord.

Note: There are 2 power cord models, one for use in the US and one for International (EU) use. See Appendix D in the *Wave Hardware Reference Guide* for voltage and current specifications.

If you are using digital phones on the Wave IP 500, you must also connect the external power supply used to power the phones. The external power supply does not require a dedicated circuit. Be sure you are using the correct external power supply for your digital phone configuration. See “External power supply for digital phones” on page 3-6 for more information.

To connect the Wave Server to power and power on:

1. Locate the power outlet and power toggle switch on the back of the Wave Server.



2. Set the power supply rocker switch to the off position.
3. Connect the power cable to a dedicated circuit.
4. If you are using an external power supply to support digital phones, locate the connector to the right of the ground lug.



5. Connect the external power supply cable to the connector, and then connect the cable to power. If the external power supply has a power switch on it, turn it to the On position.
6. Power on the Wave Server by toggling the rocker switch to the On position.
7. Observe the status LEDs on the front of the Wave Server chassis to ensure that the system initialization completes successfully and that there are no component failures.

For complete details of the information provided by the status LEDs, see Appendix C, “Integrated Services Card Status LEDs.”

Connecting the Wave IP 500 Server to your LAN

This section describes how to connect the Wave Server to your LAN using a standard Ethernet cable.

Note: The cabling for your LAN should be installed by a network cabling professional before the arrival of the Wave Server.

To connect the Wave IP 500 Server to your LAN:

1. Locate the 8-pin modular RJ-45 Ethernet port labeled ENET on the front of the ISC2.



2. Connect one end of a standard, straight-through Ethernet cable to the ENET port.
3. Connect the other end of the cable to your LAN's Ethernet switch or to a patch panel connected to an Ethernet switch.

Connecting to trunk and station ports on the ISC2

The RJ-11 ports on the ISC2 provide the following:

- 2 analog FXO trunk ports that support loop start trunks only.
- 2 analog FXS station ports.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-11 interface port descriptions and pinout pairs for the ISC2.

To connect to analog trunk and station ports on the ISC2:

1. Locate the RJ-11 ports (labeled Trunk 1-2 and SLT 1-2) on the ISC2.



2. Using standard phone cables, connect station and trunk ports directly to phone or wall jacks or a patch panel.

Power failover support

Wave provides failover telephone service (power failure lifeline) in the event of a power failure.

If the power fails, the analog phone connected to the SLT 1 port on the ISC2 automatically connects to the analog trunk plugged into the Trunk 1 port, enabling that analog phone to make calls even if the Wave Server is not functioning.

When using that analog phone during a power failure, you do not need to dial an outside access digit (for example 9) to place an outside call.

Hint: When setting up your telephones, locate the analog telephone connected to the SLT 1 port in a convenient area, such as the lobby or front desk, so that it is easily accessible during a power failure.

Installing expansion components

This section describes how to install the following components to expand the Wave IP 500:

- Media Resource Module (MRM). See the next section.
- Expansion modules. See page 3-15.

For technical specifications for these expansion components, see the *Wave Hardware Reference Guide*.

Installing a Media Resource Module

Only one MRM (an MRMA) can be installed on the ISC2.

Important: Your Wave Server may come with an MRM, or you can order and install an MRM at a later time. If you do add an MRM at a later time, be sure to review the note on page 7-7 for important information about updating default IP network settings for the new MRM.

To install an MRM:

1. Unplug the Wave Server's power cord, but do not disconnect the grounding wire.
2. Remove the top cover.
3. Align the MRM over the standoffs, and then fasten the 4 retention screws in the corner holes.
4. Plug the MRM ribbon connector into connector P2 (the light-blue 40-pin socket) on the ISC2.
5. Replace the top cover and reattach it with the original screws.
6. Reconnect the Wave Server to power.

Installing expansion modules

This section provides guidelines for installing all modules. See "About connecting modules" on page 3-17 for information on connecting trunks, stations, and other devices to specific modules after you have installed them.

Caution: The Wave Server's analog station interface is not designed to withstand surges commonly associated with wires that are exposed to the external environment. Do not route the wires connecting analog station modules to stations outside the building where the Wave Server is located.

Note: Because the required steps are different, installing a Media Resource Module is covered separately on page 3-15.

To install modules:

1. Unplug the Wave Server's power cord, but do not disconnect the grounding wire.
2. Remove the plastic bezel that covers the front of the Wave IP 500. To do so, grasp the tabs of the bezel on both sides and pull forward.
3. Remove the blank module faceplate.
4. Insert modules and cards carefully.
5. Seat the module properly for good electrical connection. Engage the module by pressing gently on it—be sure to press on the faceplate, not a connector or component on the module.
6. Install blank faceplates on all unused slots.
7. Replace the plastic bezel on the front by aligning it and pressing on both ends until it snaps into place.
8. Reconnect the Wave Server to power.

Module status LEDs

Each module has a pair of LEDs that indicate the component's status:

Status	Red LED	Green LED
System is in an early boot phase.	off	off
System boot is in progress, or a firmware flash update is in progress.	Blinking red	off
System is operational with no errors.	off	Blinking green
System shutdown is in progress.	Blinking red	Blinking green
Error condition exists on the system.	Red	off
System upgrade is in progress.	Blinking red	Green
Hard drive imaging in progress (via the Wave System Recovery Disk.)	Red	Green

T1/E1 module alarm indicators

The T1 module with serial interface and E1 EuroISDN module with serial interface have additional alarm indicators, one set for the T1/E1 port and one set for the serial port, located to the left of the module status LEDs. See “Alarm indicators” in Chapter 15 in the *Wave Hardware Reference Guide* for more information.

About connecting modules

This section provides general information about connecting trunks, stations, and other devices to modules. Instructions for connecting specific modules are described in subsequent sections.

Important: Before connecting modules, ensure that the following tasks have been completed, depending on your configuration:

- The punchdown block or patch panel has been properly wired.
- Analog and T1 trunks have been installed by your service provider.
- Incoming analog DID trunks have been tested to ensure no voltage is present, as well as to verify that they are DID trunks.

About cable connections

Modules and cards use standard cable connectors and jacks, as listed in the following table:

Module	RJ-11	RJ-21X	RJ-45	RJ-48C	3.5 mm audio	USB
Integrated Services Card (ISC2)	4		1		2	3
Analog trunk module		1				
Analog universal module		1				
Digital station module		1				
T1 module with serial interface				1		
T1 module (without serial interface)				1		

Module	RJ-11	RJ-21X	RJ-45	RJ-48C	3.5 mm audio	USB
E1 EuroISDN module with serial interface				1		
Quad BRI module			4			

Note: Some modular connectors look alike. Verify that your cables use the standard connectors specified for a particular module.

Connecting an RJ-21X cable

Important: In order to ensure a secure fit when connecting an RJ-21X (25-pair amphenol) cable to a station or trunk module, you should use 3/4-inch 4-40 captive (partially threaded) pan head screws. Be aware that some RJ-21X cables may come with screws that are too short, and you should replace them with 3/4-inch screws.

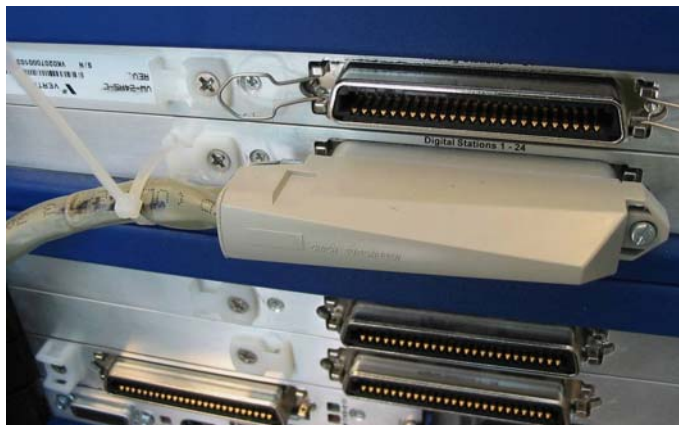
To connect an RJ-21X cable to a module:

1. Connect the cable(s) to the connector(s). There are 2 kinds of RJ-21X cables:
 - **180° cable**—The cable comes straight out the back of the connector.



You can connect a 180° cable using the bale clips on the module to connect to a slot on the cable housing, or using screws.

- **90° cable**—The cable comes out of the side of the connector and then makes a 90° turn.



You can connect a 90° cable on only one side using a screw. On the other side, use a tie down on the module or card to secure the cable to the board with a tie wrap.

2. Make sure that the cables are securely connected. The tabs on modular connectors click in when the cables are secure. Secure the cable to an RJ-21X connector with the cable strap.

About connecting specific modules

See the following sections for information about connecting each of the supported modules:

- Analog trunk module. See page 3-20.
- Analog universal module. See page 3-20.
- Digital station module. See page 3-21.
- T1 module with serial interface. See page 3-22.
- E1 module with serial interface. See page 3-23.
- Quad BRI module. See page 3-24.

Caution: Ensure that only analog phones are connected to analog station ports and only digital phones to digital station ports. This will prevent damage to the analog circuitry.

Connecting the analog trunk module

The analog trunk module provides 8 analog FXO loop start or ground start trunk ports. It is a partial-width module that can be installed in any module slot.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-21X interface port descriptions and pinout pairs for the analog trunk module.

To connect the analog trunk module:

1. Locate the RJ-21X port on the module.
2. Connect the RJ-21X (25-pair amphenol) cable to the port. (See "Connecting an RJ-21X cable" on page 3-18.)
3. The cable can then be punched down, most commonly to a patch panel port, but it can also be punched down to a punchdown block where it is then cross-connected to the station cabling or analog circuits.

Connecting the analog universal module

The analog universal module provides the following:

- 8 analog FXO trunk ports, supporting loop start, ground start, and analog DID trunks (analog DID trunks support inbound calling only).
- 8 analog FXS station ports.

The analog universal module is a partial-width module that can be installed in any module slot.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-21X interface port descriptions and pinout pairs for the analog universal module.

To connect the analog universal module:

1. Locate the RJ-21X port on the module.
2. Connect the RJ-21X (25-pair amphenol) cable to the port. (See "Connecting an RJ-21X cable" on page 3-18.)
3. The cable can then be punched down, most commonly to a patch panel port, but it can also be punched down to a punchdown block where it is then cross-connected to the station cabling or analog circuits.

Connecting the digital station module

Depending on the specific model, the digital station module provides 12 or 24 digital station ports (see the *Wave Hardware Reference Guide* for details.) It is a partial-width module that can be installed in any module slot.

See Appendix B for RJ-21X interface port descriptions and pinout pairs for the digital station module.

To connect the digital station module:

1. Locate the RJ-21X port on the module.
2. Connect the RJ-21X cable from your punchdown block or patch panel to the port. (See “Connecting an RJ-21X cable” on page 3-18.)

Connecting the external power supply for digital phones

You must use an external power supply to provide power to digital phones. See “External power supply for digital phones” on page 3-6 for details.

To connect the external power supply:

1. Locate the power outlet on the back of the Wave IP 500.



2. Connect the power cord on the external power supply to the outlet.

Connecting the T1 module with serial interface

Note: This section describes how to connect the T1 module with serial interface. For information about installing the 1-port T1 module, see page 3-23.

The T1 module with serial interface and built-in CSU/DSU supports one T1 or ISDN PRI digital trunk to provide shared data and voice services over a single T1 circuit.

There are 3 connectors on the T1 module:

- The RJ-48C port is used to connect to the T1 or ISDN PRI network interface.
- The DB-60 port provides V.35 serial communications for data connections, for example to connect to the DB-60 cable from an external router.
- The bantam jack located to the right of the RJ-48C port accepts a 3-conductor Bantam cable. It is provided for diagnostic purposes and is to be used only by an authorized technician.

The T1 module is a partial-width module that can be installed in any module slot.

See the note on page 3-17 for information about alarm indicators specific to this module.

To connect the T1 module with serial interface:

1. Locate the RJ-48C port and DB-60 connector on the module.
2. Connect the T1 cable to the RJ-48C port.
3. Connect the serial cable from your external router to the DB-60 port.

The serial cable may be either a DB-60 male to DB-60 male cable, or a DB-60 male to V.35 female DCE cable. In either case the DB-60 male connector goes to the DB-60 female port on the T1 module.

Caution: Use care when connecting or disconnecting the serial cable. Because of the connector's small size and high pin count, pins on the cable connector can be easily bent and the DB-60 port may be damaged.

Connecting the T1 module (without serial interface)

Note: This section describes how to connect the 1-port T1/PRI module without serial interface. For information about installing the 1-port T1 module with serial interface, see page 3-22.

The T1 module supports one T1 or ISDN PRI digital trunk.

There are 2 connectors on the T1 module:

- The RJ-48C port is used to connect to the T1 or ISDN PRI network interface.
- The bantam jack located to the right of the RJ-48C port accepts a 3-conductor Bantam cable. It is provided for diagnostic purposes and is to be used only by an authorized technician.

The T1 module is a partial-width module that can be installed in any module slot. This module has one alarm indicator for the T1 port. See “Alarm indicators” in Chapter 15 in the *Wave Hardware Reference Guide* for more information.

To connect the T1 module:

1. Locate the RJ-48C port on the module.
2. Connect the T1 cable to the RJ-48C port.

Connecting the E1 EuroISDN module with serial interface

The E1 EuroISDN module with serial interface and built-in CSU/DSU supports one E1 ISDN digital trunk to provide shared data and voice services over a single E1 circuit.

There are 3 connectors on the E1 EuroISDN module:

- The RJ-48C port is used to connect to the E1 ISDN network interface.
- The DB-60 port provides V.35 serial communications for data connections, for example to connect to the DB-60 cable from an external router.
- The bantam jack located to the right of the RJ-48C port accepts a 3-conductor Bantam cable. It is provided for diagnostic purposes and is to be used only by an authorized technician.

The E1 EuroISDN module is a partial-width module that can be installed in any module slot. See the note on page 3-17 for information about alarm indicators specific to this module.

To connect the E1 EuroISDN module:

1. Locate the RJ-48C port and DB-60 connector on the module.
2. Connect the E1 cable to the RJ-48C port.
3. Connect the serial cable from your external router to the DB-60 port.

The serial cable may be either a DB-60 male to DB-60 male cable, or a DB-60 male to V.35 female DCE cable. In either case the DB-60 male connector goes to the DB-60 female port on the E1 module.

Caution: Use care when connecting or disconnecting the serial cable. Because of the connector's small size and high pin count, pins on the cable connector can be easily bent and the DB-60 port may be damaged.

Connecting the Quad BRI module

The Quad BRI Module supports ISDN Basic Rate Interface (BRI) digital trunks, and provides connectivity between the Wave Server and Central Office (CO) equipment supporting Euro-ISDN BRI communication protocols. The Quad BRI Module supports 4 Euro-ISDN BRI trunks and up to 8 simultaneous voice calls.

There are 4 RJ-45 connectors on the Quad BRI module.

The Quad BRI module is a partial-width module that can be installed in any module slot or in any universal slot via a module converter.

To connect the Quad BRI module:

1. Locate the RJ-45 ports on the module.
2. Connect each port to a Euro-ISDN BRI trunk cable.

Connecting a music-on-hold (MOH) system

A music-on-hold device plays prerecorded music or messages to callers—either from a tape or CD—when they are placed on hold or while being transferred.

The Wave Server is compatible with most standard music-on-hold devices that connect via a 3.5 mm stereo plug. If a cable is not provided, you must purchase one separately.

Note: Although a stereo cable is required, music on hold only plays in mono.

Caution: Always follow the instructions supplied by the manufacturer of your music-on-hold device when installing and connecting the device to avoid possible injury to yourself or damage to the equipment.

To connect a music-on-hold device:

1. Locate the audio input port (labeled Audio In) on the ISC2.



2. Connect the cable from your music-on-hold device to the port.
3. Enable music on hold in the General Settings applet of the Global Administrator Management Console. See the *Wave Global Administrator Guide* for more information.

Connecting a paging system

A paging system allows Wave users to make public announcements over a loudspeaker.

The Wave Server is compatible with most standard paging systems that connect via a 3.5 mm stereo plug. If a cable is not provided, you must purchase one separately.

Note: Although a stereo cable is required, only one channel is used for paging.

Caution: Always follow the instructions supplied by the manufacturer of your paging system when installing and connecting the system to avoid possible injury to yourself or damage to the equipment.

To connect a paging system:

1. Locate the audio output port (labeled Audio Out) on the front of the ISC2.



2. Connect the cable from your paging system to the port.
3. Enable paging in the General Settings applet of the Global Administrator Management Console. See the *Wave Global Administrator Guide* for more information.

Connecting a DSS Console

The Edge 700 Direct Station Selection (DSS) 48-Button Console expands a receptionist's digital phone with 48 additional flexible buttons with LEDs to connect to system endpoints such as user extensions. Up to 5 DSS Consoles can be associated with a single digital phone, providing up to 240 additional buttons.



There are two ways to connect the DSS Console:

- **To a digital station port** on any of the following modules or cards on the Wave IP 2500:
 - 12-Port Digital Station Module (VW-12DS2-M)
 - 24-Port Digital Station Module (VWU-24DS2-M)
 - 48-Port Digital Station Card (VW-48DS2-C) for Edge 700/Vodavi Phone support

Connecting a DSS Console to a digital station port requires a separate digital station port for the digital phone associated with the DSS Console. In this configuration, there is no physical connection between the DSS Console and the user's digital phone.

- **Directly to an Edge 700 - 24 button digital phone.** In this configuration, the digital phone and DSS Console share a single cable run from the user's desk to the Wave Server. Only one digital station port is required.

Note: Only one DSS Console can be connected directly to the digital phone. Up to 4 additional DSS Consoles that are each connected to a digital station port as described above can be associated with that digital phone.

For instructions on how to configure a DSS Console for a user, see “The Phone \ DSS Consoles tab” in Chapter 11 in the *Wave Global Administrator Guide*.

To connect a DSS Console to a digital station module or card:

1. Locate an unused port on the digital station module or card.
2. Connect the DSS Console to the digital station port using an RJ-11 cable. The maximum cable length between the Wave Server and the DSS Console is 1968 feet (600 m).

To connect a DSS Console directly to an Edge 700 - 24 button digital phone:

1. On the back of the digital phone, locate the port labeled ADP.
2. Connect the DSS Console to the ADP port using an RJ-11 cable.

Setting Up the Wave IP 2500 Server

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Important: This chapter applies to you if you are installing a Wave IP 2500 Server. If you are installing a Wave IP 500 Server, go to Chapter 3.

About the Wave IP 2500 Server

The Wave IP 2500 Server consists of the following components.

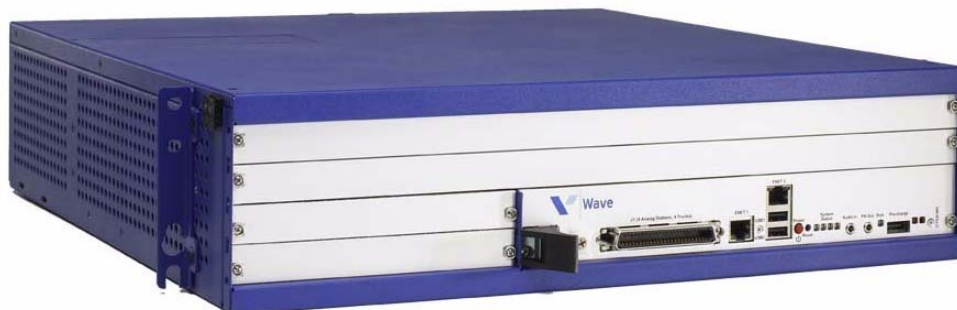
- Wave Server base unit. See the next section.
- Power supply. See page 4-4.
- Expansion options, including expansion cards and modules, Expansion Units (EXUs), and the Media Resource Modules (MRMs). See page 4-4.

Important: A monitor, keyboard, and mouse are not included with and are not supported on the Wave Server. You use the administrator PC, described in Chapter 5, to configure and manage Wave. Connecting a monitor and keyboard or mouse to the Wave Server may be advised by Vertical Technical support for troubleshooting purposes only.

About the Wave IP 2500 Server base unit

The Wave IP 2500 Server base unit consists of the following:

- A 19-inch rack-mountable chassis that includes room for expansion.



- The Wave Integrated Services Card (ISC1), an embedded processor that provides primary system control including voice processing and packet switching elements.
- One solid-state drive (SSD) and one large-storage hard disk drive (HDD).

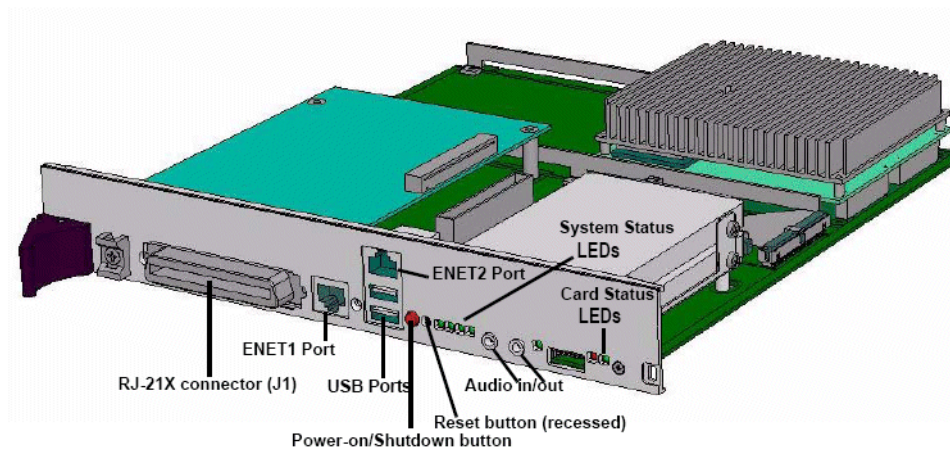
Important: This dual-drive configuration is provided on all new Wave Servers, and is the preferred configuration for all Wave Servers going forward. Contact your Wave provider for information about available upgrade paths for existing Wave Servers.

- Integrated Services Card (ISC1), an embedded processor that provides primary system control including voice processing and packet switching elements.

The ISC1 includes the following:

- 4 SIP Gateway ports
- 4 analog FXO trunk ports
- 4 analog FXS station ports
- 2 10/100 Mbps Ethernet ports (see “About the Ethernet ports on the Wave IP 2500 Server” on page 4-13 for important information about using these ports.)
- 2 partial-width slots that can accommodate 2 expansion modules
- 2 full-width universal slots that can accommodate 2 expansion cards or modules
- 1 USB device port
- 1 USB host port
- RJ-21X connector (with embedded FXS and FXO ports)
- Audio port for an external music-on-hold source
- 1 port for an external paging system
- V.34 Fax modem
- Status LEDs (described in detail in Appendix C)

The following diagram illustrates the system ports, LEDs, and buttons on the front of the ISC1:



Power supply

The Wave IP 2500 Server is equipped with one power supply.

If a power failure occurs, an optional Uninterruptable Power Supply (UPS) can provide several minutes of system power, allowing the Wave Server to be properly shut.

A UPS is not provided by Vertical Communications, but can be purchased from a third-party source. For information about recommended UPS specifications, refer to Appendix C in the *Wave Server Hardware Reference Guide*.

Wave IP 2500 Server expansion options

The ISC1 is the minimum requirement for a Wave IP 2500 system.

There are several ways to expand the Wave IP 2500 Server base unit to handle additional users and increased traffic, and support a wide variety of trunk and station configurations:

- Expansion cards and modules
- Expansion Units (EXUs)
- Media Resource Modules (MRMs)

For technical specifications for these expansion components, see the *Wave Server Hardware Reference Guide*.

Expansion cards and modules

The Wave IP 2500 Server supports two kinds of expansion boards—modules and cards.

- **Modules** are partial-width boards that can be installed in module slots in the base unit or in Expansion Units (EXUs, described on page 4-5).

Modules can also be installed in universal card slots in the base unit or in EXUs using the IP 2500 Module Conversion Kit (VW-IP2500-CONV), a mechanical assembly which attaches to a module.

The following modules are available:

- **Analog trunk module.** Supports 8 analog FXO loop start or ground start trunk ports. See page 4-23.
- **Analog universal module.** Supports 8 analog FXS station ports and 8 analog FXO loop start or ground start trunk ports. See page 4-24.

- **Digital station module.** Depending on the specific model, supports 12 or 24 digital station ports. See page 4-24.
- **T1 module with serial interface.** Supports a single T1 ISDN PRI digital trunk. It features an integrated CSU/DSU, and allows shared data and voice services over a single T1 circuit. See page 4-25.
- **T1 module (without serial interface).** Supports a single T1 ISDN PRI digital trunk. See page 4-26.
- **E1 EuroISDN module with serial interface.** Supports a single E1 ISDN digital trunk. It features an integrated CSU/DSU, and allows shared data and voice services over a single E1 circuit. See page 4-26.
- **Quad BRI module.** Supports 4 ISDN Basic Rate Interface (BRI) digital trunks and up to 8 simultaneous voice calls, and provides connectivity between the Wave Server and Central Office (CO) equipment supporting Euro-ISDN BRI communication protocols. See page 4-27.
- **Cards** are full-width boards that support more ports than modules do. Cards can be installed in the universal card slots in the base unit or in EXUs.
The following cards are available:
 - **Analog station card.** Supports 24 analog FXS station ports. See page 4-28.
 - **Digital station card.** Supports 24 or 48 digital station ports. See page 4-28.

For installation instructions, see page 4-19.

Expansion Units (EXUs)

An EXU provides 2 universal slots that can each support one module or card. Up to 4 modular EXUs can be mounted on top of the Wave Server base unit. A fully expanded system with 4 EXUs provides 8 additional universal slots.

For installation instructions, see page 4-16.

Media Resource Modules (MRMs)

Each Wave ISM system is pre-configured to support a specific number of users and concurrent voice applications. To expand the system's core telephony, voice processing, and VoIP capabilities you can add a Media Resource Module. The MRM is a mezzanine-style daughter board that is installed on the Integrated Services Card (ISC1).

You can install one MRM on the Wave IP 2500 Server. There are 3 available MRM models (MRMA, MRMB, and MRMC) that provide up to 128, 256, or 384 additional voice processing channels.

Note: At least one MRM is required if you plan to use Quality of Service (QoS) settings with IP resources for VoIP calls. Contact your Wave provider for more information.

For installation instructions, see page 4-17.

Mounting the Wave IP 2500 Server

The Wave IP 2500 Server can be rack mounted, wall mounted, or table mounted. See "Environmental requirements" on page 2-4 for specific requirements on how to prepare the site the where the Wave Server will reside.

Caution: Due to the weight of the Wave Server, mount it with assistance whenever possible. Review "Proper lifting" on page 2-7 before rack mounting.

Important: Note the following:

- Do not place anything on or against the base unit that prevents proper ventilation. Be sure to allow a minimum cooling clearance of 4 inches on all sides of the Wave Server.
- To prevent the fans from pulling dust into the base unit, mount the Wave Server at least 2 feet (0.5 meters) above the floor. Do not operate the Wave Server at floor level.

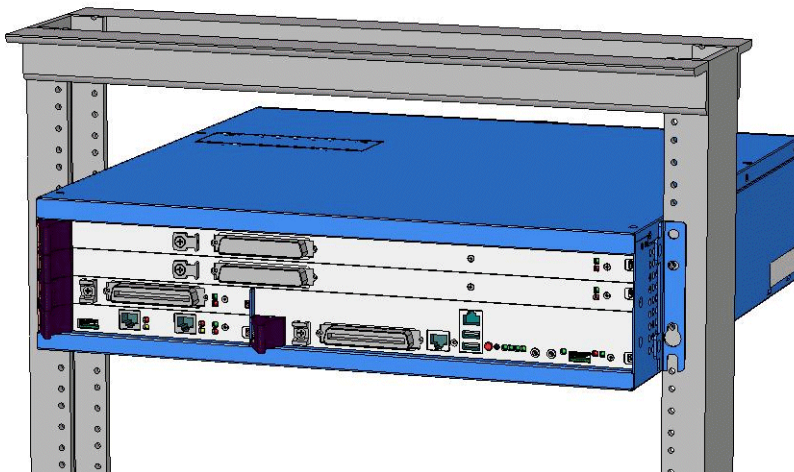
Rack mounting the Wave IP 2500 Server

The Wave IP 2500 Server is shipped ready to be rack mounted. The Wave Server requires an EIA- or IEC-compliant, 19-inch rack for proper mounting. See “Physical specifications” on page 2-4 for the dimensions of the Wave Server, including rack height.

To rack mount the Wave IP 2500 Server:

1. Insert a rack mounting screw loosely into each side of the rack.
2. Slide the Wave IP 2500 Server base unit into the rack and hang it onto the screws using either the keyhole or slot on each mounting bracket. (This frees you from having to hold the base unit in place as you continue.)
3. Tighten the screws, and then insert and tighten a second rack mounting screw in each bracket.

When successfully rack-mounted, the Wave Server base unit looks like this:



Wall mounting the Wave IP 2500 Server

You can mount the Wave IP 2500 Server base unit onto a wall by first attaching a piece of prepared plywood to studs in the wall, then attaching the base unit to the plywood.

Note: You can only wall mount the Wave IP 2500 Server base unit itself—wall mounting is not an option if you are using one or more EXUs.

Caution: Do not attach the Wave IP 2500 Server base unit directly to a wall without using the plywood as a support—the plywood must be firmly attached to wall studs in order to support the weight of the base unit.

To wall mount the Wave IP 2500 Server base unit:

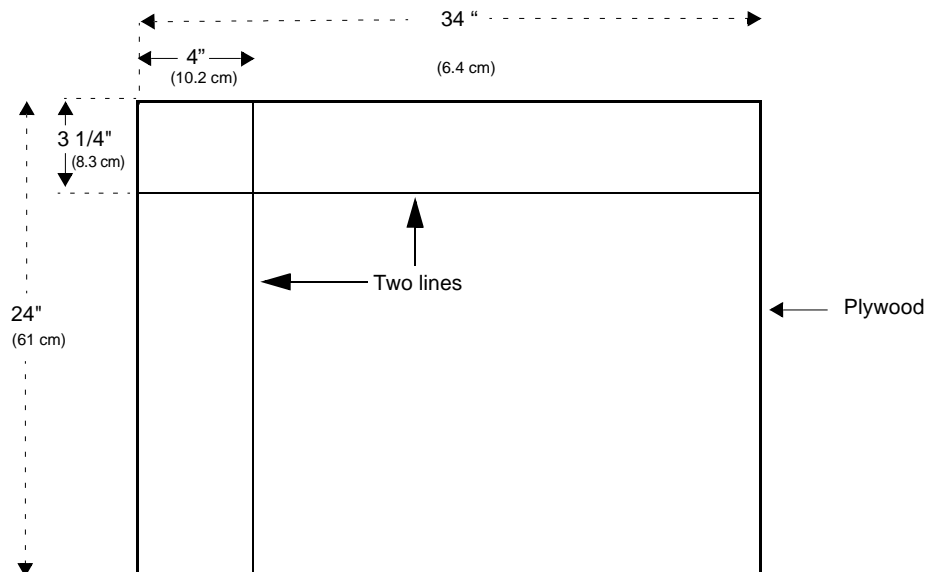
1. Prepare a piece of plywood that meets the following minimum dimensions for proper ventilation and service access:

Thickness—0.75 inches (2 cm)

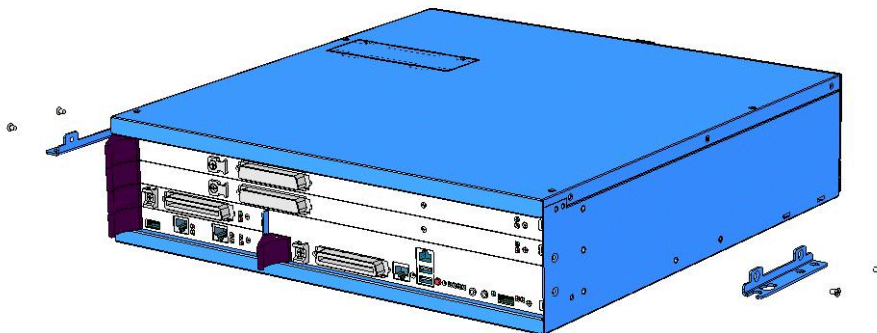
Height—24 inches (61 cm)

Width—34 inches (86.4 cm)

2. Draw a vertical line on the plywood 4 inches (10.2 cm) from the left edge, and a horizontal line 3-1/4 inches (8.3 cm) from the top edge:



3. Locate supporting studs in your wall, and firmly attach the prepared piece of plywood to the studs using the appropriate screws.
4. If mounting brackets are currently installed on the front of the Wave Server, remove them.
5. Position the mounting brackets at the bottom of each of the base unit side panels. Use a #2 Phillips screwdriver to fasten each mounting bracket to the base unit with the screws provided.



6. With another person's assistance, lift the base unit and place it against the wall-mounted plywood. Line up the left side of the base unit with the vertical line that you drew on the plywood, and line up the top of the base unit with the horizontal line that you drew.

Important: According to the directions in this step, the face plate will be facing to the right (see the following illustration.) You can rotate the base unit before attaching it to the wall-mounted plywood so that the face plate faces to the left, in order to avoid power outlets or other obstructions. **However, the face plate cannot face up or down once the base unit is mounted to the wall.**

7. Insert and tighten two self-threading 1/4-20 screws through each mounting bracket to securely attach the base unit to the plywood. When successfully wall-mounted, the Wave IP 2500 Server base unit looks like this:

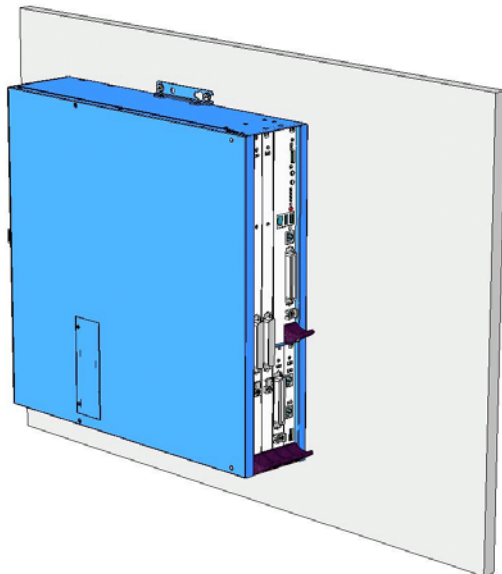


Table mounting the Wave IP 2500 Server

Table mounting is a convenient solution for temporary or mobile operation requirements of the Wave IP 2500 Server. Do not place the Wave Server on the floor.

Caution: Ensure that the table supports the weight of your Wave Server including any EXUs. See “Proper lifting” on page 2-7 for system weight specifications.

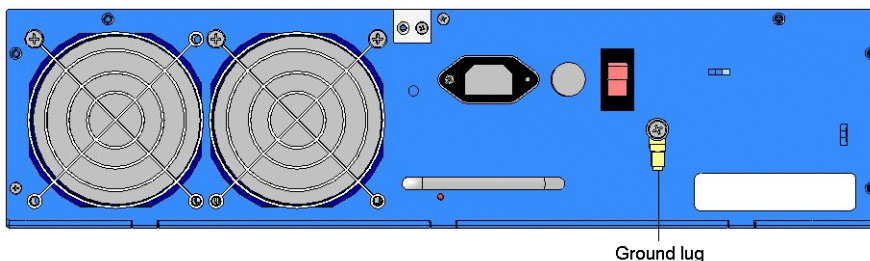
Grounding the Wave IP 2500 Server

Warning: The protective ground lug (earth contact) on the Wave Server base unit must be permanently connected to earth.

Warning: The National Electrical Code requires that the telephone and electrical services have a common ground. If separate grounds are used for telephone and electrical services, a voltage differential could develop between the two services. This could expose you to an electrical shock and damage the equipment.

To ground the Wave IP 2500 Server:

1. Locate the ground lug on the back of the Wave Server base unit.



2. Loosen the slotted screw on the ground lug with a flat-head screwdriver.
3. Insert a 10- or 12-gauge stranded grounding wire into the ground lug opening.
4. Tighten the slotted screw.
5. Connect the other end of the grounding wire to one of the following ground types:
 - Power service ground
 - Building steel ground
 - Metallic cold water pipe that is bonded to a power ground (if permitted by local building codes)
 - Ground rod that is 5 feet long and 5/8 inch in diameter. (Use this option only if none of the other options are available.)

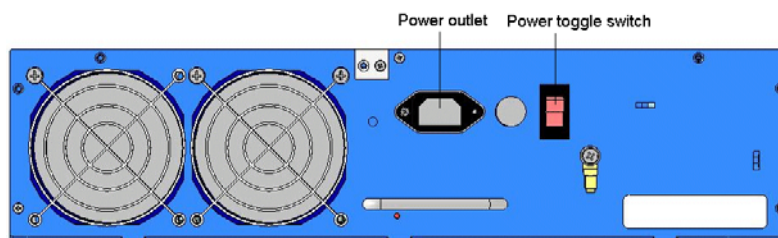
Connecting the Wave IP 2500 Server to power and powering on

Connect the Wave IP 2500 Server to a dedicated circuit using the supplied power cord. Do not use any other power cord.

Note: There are 2 power cord models, one for use in the US and one for International (EU) use. See Appendix D in the *Wave Server Hardware Reference Guide* for voltage and current specifications.

To connect the Wave IP 2500 Server to power and power on:

1. Locate the power outlet and power toggle switch on the back of the Wave Server base unit.



2. Set the base unit power supply rocker switch and any EXU power switch rocker switches located on the back of the Wave Server base unit to the off position.
 3. Connect the power cables from the base unit and any EXUs to dedicated circuits.
 4. Set each EXU's rocker switch to the On position. (The EXU will not actually power on until the base unit is powered on.)
 5. Power on the base unit by toggling the rocker switch.
 6. Observe the status LEDs on the front of the Wave Server base unit to ensure that the system initialization completes successfully and that there are no component failures.
- For complete details of the information provided by the status LEDs, see Appendix C, "Integrated Services Card Status LEDs."

Connecting the Wave IP 2500 Server to your LAN

This section describes how to connect the Wave IP 2500 Server to your LAN using a standard Ethernet cable.

Note: The cabling for your LAN should be installed by a network cabling professional before the arrival of the Wave Server.

About the Ethernet ports on the Wave IP 2500 Server

There are 2 Ethernet ports located on the front of the ISC1, labeled ENET 1 and ENET 2.

Important: ENET 1 and ENET 2 are connected to an embedded switch in the ISC1 which does not currently support the Spanning Tree algorithm. Consequently, **ENET 1 and ENET 2 must not both be simultaneously connected to another switch on your network.** Connecting both Ethernet ports to a switch on your network creates a loop that makes the embedded switch inoperable, and the Wave Server will be cut off from your network.

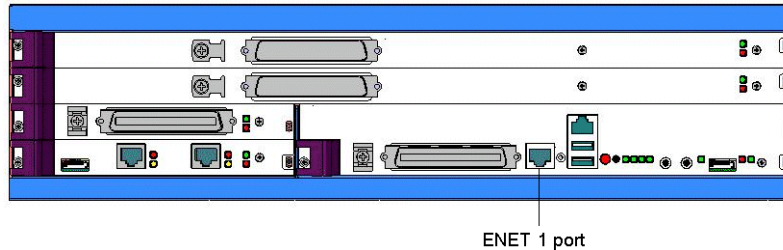
- ENET 1 is the Wave Server's primary interface and under normal conditions it is the *only interface that should be connected to your network*. You use ENET 1 to connect the Wave Server to your network to make Wave ISM functionality available to a system administrator on the network, for example access to the Global Administrator Management Console, ViewPoint, VoIP station and trunk resources, and so forth.
- ENET 2 should only be used in the following special circumstances:
 - To allow an onsite technical support representative to directly connect the administrator PC to the Wave Server, to avoid disconnecting the Wave Server's normal network connection.

Important: In this scenario, the technician's laptop **MUST** be connected to ENET 2, and ENET 2 must **NOT** be connected to the network. *ENET 1 and ENET 2 should NEVER be connected to the same network at the same time.*

- As a backup in case ENET 1 is not functional. You can use ENET 2 to connect the Wave Server to your network, *as long as ENET 1 is not used for the same purpose.*
- For troubleshooting or diagnostic purposes, for example internal packet sniffing. All packets exchanged between the Vertical Application Module (VAM) and the embedded processor are copied to ENET 2 for diagnostic purposes. (Note that packet copying does not significantly add to network traffic.)

To connect the Wave IP 2500 Server to your LAN:

1. Locate the 8-pin modular RJ-45 Ethernet port labeled ENET 1 on the ISC1.



2. Connect one end of a standard, straight-through Ethernet cable to the ENET 1 port.
3. Connect the other end of the cable to your LAN's Ethernet switch or to a patch panel connected to an Ethernet switch.

Connecting to trunk and station ports on the ISC1

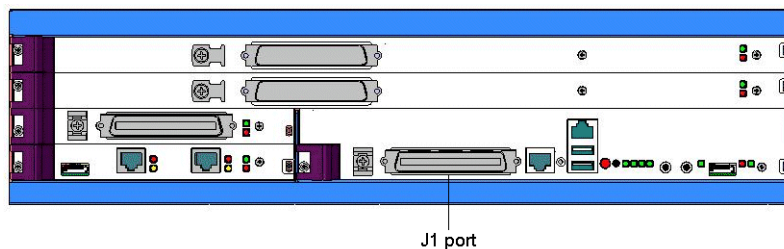
The RJ-21X port on the ISC1 provides the following:

- 4 analog FXO trunk ports that support loop start trunks only.
- 4 analog FXS station ports.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-21X interface port descriptions and pinout pairs for the ISC1.

To connect to analog trunk and station ports on the ISC1:

1. Locate the RJ-21X port (labeled J1) on the ISC1.



2. Connect the 25-pair male amphenol cable to the RJ-21X port. The amphenol cable can then be connected in a variety of ways:
 - The individual pairs may be punched down to a patch panel or telco block.
 - The cable may terminate in another RJ-21X to a panel or block where it is cross-connected to wiring for the analog trunks and stations.See “10/100Base-T Ethernet port specifications” in Chapter 12 in the *Wave Server Hardware Reference Guide* for connector pinouts for trunks and stations.
3. punched down, most commonly to a patch panel port, but it can also be punched down to a punchdown block where it is then cross-connected to the station cabling or analog circuits.

Power failover support

The Wave IP 2500 Server provides failover telephone service (power failure lifeline) in the event of a power failure.

If the power fails, the analog phone connected to Station Port 1 on the ISC1 automatically connects to the analog trunk plugged into Trunk Port 1, enabling that analog phone to make calls even if the Wave Server is not functioning.

When using that analog phone during a power failure, you do not need to dial an outside access digit (for example 9) to place an outside call. Any calls made during a power failure will not be logged or recorded.

Hint: When setting up your telephones, locate the analog telephone connected to Station Port 1 in a convenient area, such as the lobby or front desk, so that it is easily accessible during a power failure.

Installing expansion components

This section describes how to install the following components to expand the Wave IP 2500 Server base unit:

- Expansion Unit (EXU). See the next section.
- Media Resource Module (MRM). See page 4-17.
- Expansion cards and modules. See page 4-19.

For technical specifications for these expansion components, see the *Wave Server Hardware Reference Guide*.

Installing EXUs on a Wave IP 2500 Server

You can install up to 4 EXUs on a Wave IP 2500 Server. EXU's cannot be wall-mounted.

To install an EXU:

1. Unplug the Wave IP 2500 Server's power cord, but do not disconnect the grounding wire.
2. Remove the connector hatch retention screws on the top of the Wave Server base unit, and then remove the connector hatch.
3. Remove the backplane terminator from the base unit using both hands to pull it straight up and out.

Caution: Make a note of the direction that the backplane terminator is facing when you remove so that you can replace it the same way. A reversed backplane terminator can cause malfunctions and damage equipment.

4. Open the side and rear latches on the EXU.
5. Stack the EXU on top of the base unit or another EXU, aligning pins and electrical connectors on the bottom of the EXU with the pins on the lower unit.



6. Press down gently to engage the backplane connector.
7. Engage the side and rear latches to secure the EXU.
8. If the base unit is rack-mounted, attach the EXU using 2 rack screws per side. If this is the top-most EXU, go to step 10.

9. To install another EXU, remove the connector hatch from the top of the EXU that you just installed. Repeat steps 4-8 to stack up to 4 EXUs.
10. Secure the backplane terminator to the topmost EXU.
Caution: Be sure to replace the backplane terminator facing the same direction it was when you removed it. Also, pay careful attention to pin alignment. Connector pin A1 must align with slot pin A1. DO NOT power on the Wave Server until you are certain that the backplane terminator is installed correctly.
11. Replace the connector hatch on the topmost EXU and secure it with the retention screws.
12. Connect each EXU to power and ground it.
13. Reconnect the Wave Server to power.

A Wave IP 2500 Server base unit with 1 EXU is shown below.



Installing a Media Resource Module

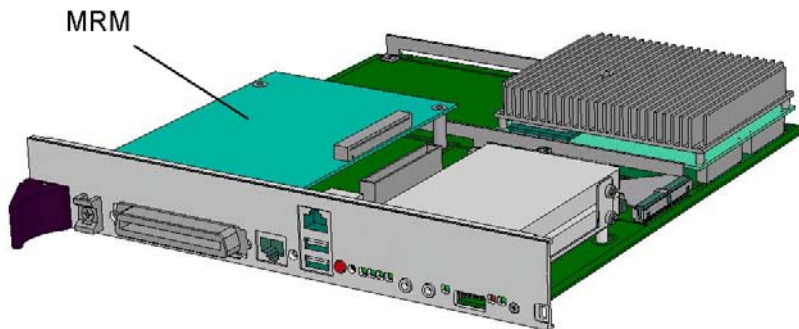
Only one MRM can be installed on the ISC1.

Important: Your Wave Server may come with an MRM, or you can order and install an MRM (or upgrade to a different MRM model) at a later time. If you do add or upgrade an MRM at a later time, be sure to review the note on page 7-7 for important information about updating default IP network settings for the new MRM.

To install an MRM:

1. Unplug the Wave IP 2500 Server base unit's power cord, but do not disconnect the grounding wire.

2. Remove the ISC1 from the Wave Server base unit. To do so:
 - Label or note the position of any cables connected to the ISC1 faceplate.
 - Disconnect all cables from the faceplate.
 - Loosen the retention screws.
 - Open the insertion lever at the left side of the faceplate, then pull firmly on the lever to disengage the ISC1 from its slot.
3. Place the ISC1 on a static-safe work area.
4. Install the MRM standoffs on the ISC with the screws provided.



5. Align the MRM over the standoffs, and then fasten the 4 retention screws in the corner holes.
6. Plug the MRM ribbon connector into connector P4 (the light-blue 40-pin socket) on the ISC1.
7. Re-install the ISC1 in the Wave Server base unit. To do so:
 - Slide the ISC1 back into its slot.
 - Engage the insertion lever.
 - Fasten the retention screws.
 - Reconnect cables to the faceplate.
8. Reconnect the Wave Server to power.

Installing expansion modules and cards

This section provides guidelines for installing all modules and cards. See “About connecting modules and cards” on page 4-20 for information on connecting trunks, stations, and other devices to specific modules and cards after you have installed them.

Caution: The Wave Server’s analog station interface is not designed to withstand surges commonly associated with wires that are exposed to the external environment. Do not route the wires connecting analog station cards or modules to stations outside the building where the Wave Server is located.

Note: Because the required steps are different, installing a Media Resource Module is covered separately on page 4-17.

To install modules and cards:

1. Unplug the Wave Server base unit’s power cord and the power cords of all EXUs, but do not disconnect the grounding wires.
2. Remove the blank module or universal slot faceplate.
3. Insert modules and cards carefully.
 - Note the position of the circuit board installation guides—there are 2 guides per slot:
 - Modules align with the bottom guide.
 - Cards align with the top guide.
 - Note the position of slot connectors:
 - The ISC1 slot and module slots have a single slot connector.
 - Universal slots have 2 slot connectors.
 - Modules connect to the bottom slot connector.
 - Cards connect to the top slot connector
4. Seat the module or card properly for good electrical connection. Engage the black insertion lever, and tighten all faceplate mounting screws.
5. To install a partial-width module in a full-width universal slot, use a Wave IP 2500 module converter. First, screw the module into the converter, and then insert the converter into the universal slot.
6. Install blank faceplates on all unused slots.
7. Reconnect the Wave Server base unit and all EXUs to power.

Module and card status LEDs

Each module and card has a pair of LEDs that indicate the component's status:

Status	Red LED	Green LED
System is in an early boot phase.	off	off
System boot is in progress, or a firmware flash update is in progress.	Blinking red	off
System is operational with no errors.	off	Blinking green
System shutdown is in progress.	Blinking red	Blinking green
Error condition exists on the system.	Red	off
System upgrade is in progress.	Blinking red	Green
Hard drive imaging in progress (via the Wave System Recovery Disk.)	Red	Green

T1/E1 module alarm indicators

The T1 module with serial interface and E1 EuroISDN module with serial interface have additional alarm indicators, one set for the T1/E1 port and one set for the serial port, located to the left of the module status LEDs. See “Alarm indicators” in Chapter 15 in the *Wave Server Hardware Reference Guide* for more information.

About connecting modules and cards

This section provides general information about connecting trunks, stations, and other devices to modules and cards. Instructions for connecting specific modules and cards are described in subsequent sections.

Important: Before connecting modules and cards, ensure that the following tasks have been completed, depending on your configuration:

- The punchdown block or patch panel has been properly wired.
- Analog and T1 trunks have been installed by your service provider.
- Incoming analog DID trunks have been tested to ensure no voltage is present, as well as to verify that they are DID trunks.

About cable connections

Modules and cards use standard cable connectors and jacks, as listed in the following table:

Module or card	RJ-11	RJ-21X	RJ-45	RJ-48C	3.5 mm audio	USB
Integrated Services Card (ISC1)		1	1		2	2
Analog trunk module		1				
Analog universal module		1				
Digital station module		1				
T1 module with serial interface				1		
T1 module (without serial interface)				1		
E1 EuroISDN module with serial interface				1		
Quad BRI module			4			
Analog station card		1				
Digital station card		1				

Note: Some modular connectors look alike. Verify that your cables use the standard connectors specified for a particular card or module.

Connecting an RJ-21X cable

Important: In order to ensure a secure fit when connecting an RJ-21X (25-pair amphenol) cable to a station or trunk module or card, you should use 3/4-inch 4-40 captive (partially threaded) pan head screws. Be aware that some RJ-21X cables may come with screws that are too short, and you should replace them with 3/4-inch screws.

To connect an RJ-21X cable to a module or card:

1. Connect the cable(s) to the connector(s). There are 2 kinds of RJ-21X cables:

- **180° cable**—The cable comes straight out the back of the connector.



You can connect a 180° cable using the bale clips on the module or card to connect to a slot on the cable housing, or using screws.

- **90° cable**—The cable comes out of the side of the connector and then makes a 90° turn.



You can connect a 90° cable on only one side using a screw. On the other side, use a tie down on the module or card to secure the cable to the board with a tie wrap.

2. Make sure that the cables are securely connected. The tabs on modular connectors click in when the cables are secure. Secure the cable to an RJ-21X connector with the cable strap.

About connecting specific modules and cards

See the following sections for information about connecting each of the supported modules and cards:

- Analog trunk module. See page 4-23.
- Analog universal module. See page 4-24.
- Digital station module. See page 4-24.
- T1 module with serial interface. See page 4-25.
- E1 module with serial interface. See page page 4-26.
- Quad BRI module. See page 4-27.
- Analog station card. See page 4-26.
- Digital station card. See page 4-28.

Caution: Ensure that only analog phones are connected to analog station ports and only digital phones to digital station ports. This will prevent damage to the analog circuitry.

Connecting the analog trunk module

The analog trunk module provides 8 analog FXO loop start or ground start trunk ports. It is a partial-width module that can be installed in any module slot or in any universal slot via a module converter.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-21X interface port descriptions and pinout pairs for the analog trunk module.

To connect the analog trunk module:

1. Locate the RJ-21X port on the module.
2. Connect the RJ-21X (25-pair amphenol) cable to the port. (See "Connecting an RJ-21X cable" on page 4-21.)
3. The cable can then be punched down, most commonly to a patch panel port, but it can also be punched down to a punchdown block where it is then cross-connected to the station cabling or analog circuits.

Connecting the analog universal module

The analog universal module provides the following:

- 8 analog FXO trunk ports, supporting loop start, ground start, and analog DID trunks (analog DID trunks support inbound calling only).
- 8 analog FXS station ports.

The analog universal module is a partial-width module that can be installed in any module slot or in any universal slot via a module converter.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-21X interface port descriptions and pinout pairs for the analog universal module.

To connect the analog universal module:

1. Locate the RJ-21X port on the module.
2. Connect the RJ-21X (25-pair amphenol) cable to the port. (See "Connecting an RJ-21X cable" on page 4-21.)
3. The cable can then be punched down, most commonly to a patch panel port, but it can also be punched down to a punchdown block where it is then cross-connected to the station cabling or analog circuits.

Connecting the digital station module

Depending on the specific model, the digital station module provides 12 or 24 digital station ports (see the *Wave Server Hardware Reference Guide* for details.) It is a partial-width module that can be installed in any module slot or in any universal slot via a module converter.

See Appendix B for RJ-21X interface port descriptions and pinout pairs for the digital station module.

To connect the digital station module:

1. Locate the RJ-21X port on the module.
2. Connect the RJ-21X cable from your punchdown block or patch panel to the port. (See "Connecting an RJ-21X cable" on page 4-21.)

Connecting the T1 module with serial interface

The T1 module with serial interface and built-in CSU/DSU supports one T1 or ISDN PRI digital trunk to provide shared data and voice services over a single T1 circuit.

There are 3 connectors on the T1 module:

- The RJ-48C port is used to connect to the T1 or ISDN PRI network interface.
- The DB-60 port provides V.35 serial communications for data connections, for example to connect to the DB-60 cable from an external router.
- The bantam jack located to the right of the RJ-48C port accepts a 3-conductor Bantam cable. It is provided for diagnostic purposes and is to be used only by an authorized technician.

The T1 module is a partial-width module that can be installed in any module slot or in any universal slot via a module converter.

See the note on page 4-20 for information about alarm indicators specific to this module.

To connect the T1 module:

1. Locate the RJ-48C port and DB-60 connector on the module.
2. Connect the T1 cable to the RJ-48C port.
3. Connect the serial cable from your external router to the DB-60 port.

The serial cable may be either a DB-60 male to DB-60 male cable, or a DB-60 male to V.35 female DCE cable. In either case the DB-60 male connector goes to the DB-60 female port on the ISC1.

Caution: Use care when connecting or disconnecting the serial cable. Because of the connector's small size and high pin count, pins on the cable connector can be easily bent and the DB-60 port may be damaged.

Connecting the T1 module (without serial interface)

Note: This section describes how to connect the 1-port T1/PRI module without serial interface. For information about installing the 1-port T1 module with serial interface, see page 4-25.

The T1 module supports one T1 or ISDN PRI digital trunk.

There are 2 connectors on the T1 module:

- The RJ-48C port is used to connect to the T1 or ISDN PRI network interface.
- The bantam jack located to the right of the RJ-48C port accepts a 3-conductor Bantam cable. It is provided for diagnostic purposes and is to be used only by an authorized technician.

The T1 module is a partial-width module that can be installed in any module slot. This module has one alarm indicator for the T1 port. See “Alarm indicators” in Chapter 15 in the *Wave Server Hardware Reference Guide* for more information.

To connect the T1 module:

1. Locate the RJ-48C port on the module.
2. Connect the T1 cable to the RJ-48C port.

Connecting the E1 EuroISDN module with serial interface

The E1 EuroISDN module with serial interface and built-in CSU/DSU supports one E1 ISDN digital trunk to provide shared data and voice services over a single E1 circuit.

There are 3 connectors on the E1 EuroISDN module:

- The RJ-48C port is used to connect to the E1 ISDN network interface.
- The DB-60 port provides V.35 serial communications for data connections, for example to connect to the DB-60 cable from an external router.
- The bantam jack located to the right of the RJ-48C port accepts a 3-conductor Bantam cable. It is provided for diagnostic purposes and is to be used only by an authorized technician.

The E1 EuroISDN module is a partial-width module that can be installed in any module slot or in any universal slot via a module converter.

See the note on page 4-20 for information about alarm indicators specific to this module.

To connect the E1 EuroISDN module:

1. Locate the RJ-48C port and DB-60 connector on the module.
2. Connect the E1 cable to the RJ-48C port.
3. Connect the serial cable from your external router to the DB-60 port.

The serial cable may be either a DB-60 male to DB-60 male cable, or a DB-60 male to V.35 female DCE cable. In either case the DB-60 male connector goes to the DB-60 female port on the ISC1/ISC2.

Caution: Use care when connecting or disconnecting the serial cable. Because of the connector's small size and high pin count, pins on the cable connector can be easily bent and the DB-60 port may be damaged.

Connecting the Quad BRI module

The Quad BRI Module supports ISDN Basic Rate Interface (BRI) digital trunks, and provides connectivity between the Wave Server and Central Office (CO) equipment supporting Euro-ISDN BRI communication protocols. The Quad BRI Module supports 4 Euro-ISDN BRI trunks and up to 8 simultaneous voice calls.

There are 4 RJ-45 connectors on the Quad BRI module.

The Quad BRI module is a partial-width module that can be installed in any module slot or in any universal slot via a module converter.

To connect the Quad BRI module:

1. Locate the RJ-45 ports on the module.
2. Connect each port to a Euro-ISDN BRI trunk cable.

Connecting the analog station card

The analog station card provides 24 analog FXS station ports. It is a full-width card that can be installed in any universal slot.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-21X interface port descriptions and pinout pairs for the analog station card.

To connect the analog station card:

1. Locate the RJ-21X port on the card.
2. Connect the RJ-21X cable from your punchdown block or multiport adapter to the port on the Wave Server base unit using a male RJ-21X connector. See "Connecting an RJ-21X cable" on page 4-21.

Connecting the digital station card

The digital station card provides 24 or 48 digital station ports. It is full-width card that can be installed in any universal slot.

See Appendix B, "Trunk and Station Ports and Pinouts" for RJ-21X interface port descriptions and pinout pairs for the digital station card.

Note: The 48-port digital station card has two RJ-21X connectors with 24 ports available on each.

To connect the 24- or 48-port digital station card:

1. Locate the RJ-21X port(s) on the card.
2. Connect the RJ-21X cable(s) from your punchdown block or multiport adapter to the port(s). See "Connecting an RJ-21X cable" on page 4-21.

Connecting a music-on-hold (MOH) system

A music-on-hold device plays prerecorded music or messages to callers—either from a tape or CD—when they are placed on hold or while being transferred.

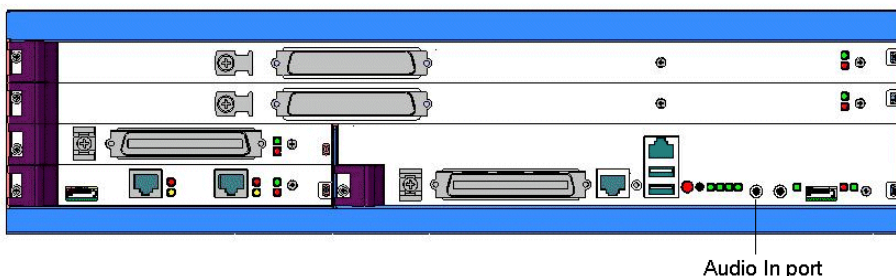
The Wave Server is compatible with most standard music-on-hold devices that connect via a 3.5 mm stereo plug. If a cable is not provided, you must purchase one separately.

Note: Although a stereo cable is required, music on hold only plays in mono.

Caution: Always follow the instructions supplied by the manufacturer of your music-on-hold device when installing and connecting the device to avoid possible injury to yourself or damage to the equipment.

To connect a music-on-hold device:

1. Locate the audio input port (labeled Audio In) on the ISC1.



2. Connect the cable from your music-on-hold device to the port.
3. Enable music on hold in the General Settings applet of the Global Administrator Management Console. See the *Wave Global Administrator Guide* for more information.

Connecting a paging system

A paging system allows Wave users to make public announcements over a loudspeaker.

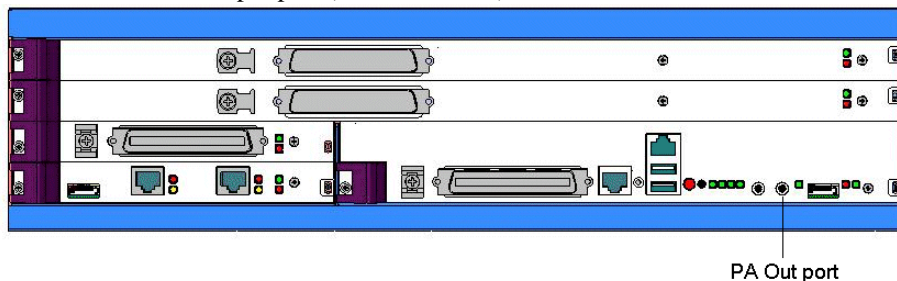
The Wave Server is compatible with most standard paging systems that connect via a 3.5 mm stereo plug. If a cable is not provided, you must purchase one separately.

Note: Although a stereo cable is required, only one channel is used for paging.

Caution: Always follow the instructions supplied by the manufacturer of your paging system when installing and connecting the system to avoid possible injury to yourself or damage to the equipment.

To connect a paging system:

1. Locate the audio output port (labeled PA Out) on the front of the ISC1.



2. Connect the cable from your paging system to the port.
3. Enable paging in the General Settings applet of the Global Administrator Management Console. See the *Wave Global Administrator Guide* for more information.

Connecting a DSS Console

The Edge 700 Direct Station Selection (DSS) 48-Button Console expands a receptionist's digital phone with 48 additional flexible buttons with LEDs to connect to system endpoints such as user extensions. Up to 5 DSS Consoles can be associated with a single digital phone, providing up to 240 additional buttons.



There are two ways to connect the DSS Console:

- **To a digital station port** on any of the following modules or cards on the Wave IP 2500:
 - 12-Port Digital Station Module (VW-12DS2-M)
 - 24-Port Digital Station Module (VWU-24DS2-M)
 - 48-Port Digital Station Card (VW-48DS2-C) for Edge 700/Vodavi Phone support

Connecting a DSS Console to a digital station port requires a separate digital station port for the digital phone associated with the DSS Console. In this configuration, there is no physical connection between the DSS Console and the user's digital phone.

- **Directly to an Edge 700 - 24 button digital phone.** In this configuration, the digital phone and DSS Console share a single cable run from the user's desk to the Wave Server. Only one digital station port is required.

Note: Only one DSS Console can be connected directly to the digital phone. Up to 4 additional DSS Consoles that are each connected to a digital station port as described above can be associated with that digital phone.

For instructions on how to configure a DSS Console for a user, see "The Phone \ DSS Consoles tab" in Chapter 11 in the *Wave Global Administrator Guide*.

To connect a DSS Console to a digital station module or card:

1. Locate an unused port on the digital station module or card.
2. Connect the DSS Console to the digital station port using an RJ-11 cable. The maximum cable length between the Wave Server and the DSS Console is 1968 feet (600 m).

To connect a DSS Console directly to an Edge 700 - 24 button digital phone:

1. On the back of the digital phone, locate the port labeled ADP.
2. Connect the DSS Console to the ADP port using an RJ-11 cable.

Connecting to the Wave ISM from the administrator PC

CHAPTER CONTENTS

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Obtaining all required HotFixes

Important: Although you will not apply HotFixes until the next chapter, contact your Vertical representative at this point to obtain any required HotFixes and other critical information. The latest updates are available to authorized dealers on the V-Connect website (<http://vconnect.vertical.com>.)

Once you have obtained the required HotFix CAB files from your Vertical representative, place them in one of the following locations:

- On the hard drive of the administrator PC that you will use to administer Wave
- On a network share
- On a removable flash drive or CD/DVD drive.

See “Upgrading the Wave Server” in Chapter 23 in the *Wave Global Administrator Guide* for more information about these options.

Important: If you plan to place the HotFix CAB files on the hard drive of the administrator PC, be sure to do so before performing the steps in “Configuring the administrator PC” on page 5-3, where you will change the IP address of the administrator PC. Once you change the IP address of the administrator PC, that PC will be dedicated to communicating with the Wave ISM and you will no longer be able to access your network or go out on the Internet from it to retrieve the HotFix CAB files.

Administrator PC requirements

The administrator PC must meet the following requirements:

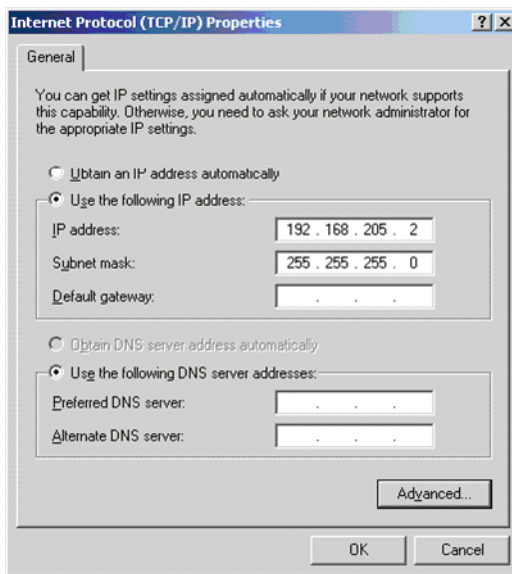
- **Operating system:** The following operating systems can be used:
 - Microsoft Windows 2000
 - Windows Server 2003, base release or higher
 - Windows XP SP2 or higher
 - Windows Vista, base release or higher
 - Windows 7 (32- and 64-bit versions), base release or higher
- **Note:** You should have your Microsoft operating system disks on hand in case you need to install any Windows components required to connect to the Wave Server.
- **Processor:** Minimum Pentium 233 MHz PC.
- **Memory:** Minimum 64 MB RAM.
- **Network connection:** TCP/IP connection to the Wave Server via an Ethernet card or modem.
- **Software:**
 - **Microsoft Internet Explorer 6.0 SP1, 7.0, or 8.0:** Other browsers have not been tested. Be sure that Internet Explorer is configured to connect directly to the Internet—do not connect using a defined proxy server.
 - **Browser pop-up blocker software:** Some of the Wave Global Administrator Management Console applets display dialogs and warnings automatically. If you have installed browser pop-up blocker software on the administrator PC, or pop-up blocker software is enabled by default in your browser, these pop-ups may not be displayed. You can usually configure pop-up blocker software to allow pop-ups from specific domains or IP addresses.
 - **Java Runtime Environment:** Be sure to use the version of Java Runtime Environment (JRE) that came with your Wave Server—do not upgrade to a newer version that you obtain elsewhere. Failure to use the correct version of JRE may result in a variety of problems, including not being able to import and activate licenses, not being able to access certain Wave dialogs, Windows displaying blank or incorrect information, and other user interface problems.

- **Modem:** If you will use a modem to connect to the Wave Server from the administrator PC (as opposed to connecting via your network), contact your Wave provider for the latest list of client modems that have been certified for use with Wave Server. (Other modems may also work, but only the models listed in that document have been certified so far by Vertical.)

For more information about connecting to the Wave Server via a modem, see page 5-10.

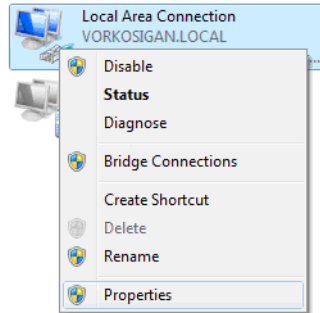
Configuring the administrator PC

1. Do one of the following:
 - **Windows XP and Windows Server 2003:**
 - a. Click **Start > Control Panel > Network Connections**.
 - b. Right-click **Local Area Connection** and then click **Properties**. The Local Area Connection Properties dialog opens.
 - c. Select the entry for **Internet Protocol (TCP/IP)**, and then click **Properties**. The Internet Protocol (TCP/IP) Properties dialog opens.

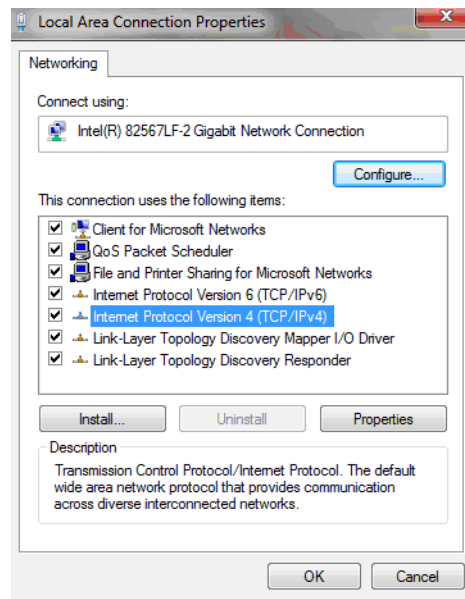


- d. Go to step 2.

- **Windows 7 and Windows Server 2008:**
 - a. Click the **Start** button. Type **View Network Connections** and then press **Enter**.
 - b. Right-click on your network connection. (Some computers have multiple network connections—choose the connection that is connected to the Wave Server.)



- c. Click **Properties**. (You must have administrator rights to the computer you are using or be able to enter a password that gives you administrator access.) The Local Area Connection Properties dialog opens.
- d. Double-click **Internet Protocol Version 4 (TCP/IPv4)**.



2. On the General tab, click **Use the following IP address**, and enter the following information:
 - IP address:** 192.168.205.x. “x” can be any number between 2 and 254, except for 10-13:
 - 10 is reserved for the IP address of the Integrated Services Card (ISC1 or ISC2, depending on the Wave Server model).
 - 11, 12, and 13 are reserved for the IP address(es) of the Media Resource Module (MRM). Depending on the model, an MRM requires 1, 2, or 3 IP addresses. Note that on the Wave IP 500, only the MRMA model is supported, which requires 1 IP address.
 - Subnet mask:** 255.255.255.0
3. Click **OK** to save your changes, and again to exit the Local Area Connection Properties dialog.
4. If you are prompted to restart the your computer, do so.

Connecting to the Wave ISM

After configuring TCP/IP on the administrator PC, you are ready to connect to the Wave ISM for initial configuration. (Initial configuration steps are is described in detail in the next chapter).

You can connect to the Wave ISM from the administrator PC in any of the following ways:

- Network connection. See the next section.
- Local or remote modem connection. See page 5-10.

Although you can perform all Global Administrator Management Console tasks via a modem connection, HotFix upgrades will be very slow, possibly taking several hours to complete, and software upgrades will take even longer. HotFix or software upgrades will run much faster if you connect to the Wave ISM via your network. Disconnects or very low throughput due to unreliable phone line connections may make connecting via a modem an unreliable option.

You can enhance Global Administrator Management Console performance, especially for a slow modem connection, by installing client caching as described on page 7-27.

Connecting to the Wave Server via your network

This section describes how to connect to the Wave ISM from the administrator PC using a standard Ethernet cable. (You can also connect using a network hub, switch, or router.)

1. Connect one end of a standard, straight-through Ethernet cable to the network card in the administrator PC. Connect the other end of the cable to the RJ-45 Ethernet port, labeled ENET 1 on the front of the ISC1 (Wave IP 2500), or ENET on the front of the ISC2 (Wave IP 500).

Important: On the Wave IP 2500, ENET 1 is the Wave Server's primary interface and under normal conditions it is the *only interface that should be connected to your LAN*. The port labeled ENET 2 is only used in special circumstances, as described in "About the Ethernet ports on the Wave IP 2500 Server" on page 4-13.

2. Launch Microsoft Internet Explorer. If the administrator PC is running Windows XP SP2 or higher, go to step 3. Else, go to step 5.

3. **Warning: In Windows XP SP2, Microsoft enhanced the default browser security in Internet Explorer. These security defaults affect the functionality of the Global Administrator Management Console (for example, by disabling or hiding some applets). To ensure that you do not encounter any problems when using the Management Console, perform the following steps:**

1. On the administrator PC, in Internet Explorer choose **Tools > Internet Options**.
2. On the Privacy tab, click **Settings** in the Pop-up Blocker section. (If **Settings** is disabled, select the **Block pop-ups** checkbox first.)
3. In the Pop-up Blocker Settings dialog, enter one of the following in the **Address of Web site to allow** text box:
 - **IP address.** Enter the the default IP address of the Vertical Application Module (VAM) in the Wave Server (192 . 168 . 205 . 1), or the VAM's IP address on your system if you have changed it).

- **DNS-resolvable name.** For example, `yourservername`

Note: Do not preface your entry with "http://".

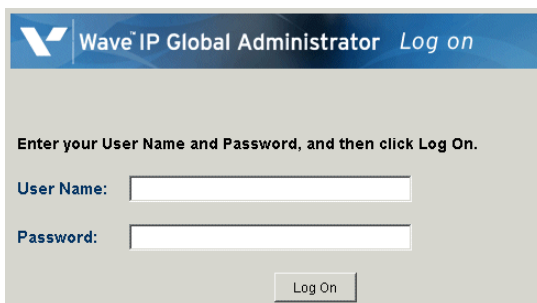
4. Click **Add** and then **Close** to save your changes.

4. Add the Wave Server to the Internet Explorer Local Intranet group. To do so:
 1. On the administrator PC, in Internet Explorer choose **Tools > Internet Options**.
 2. On the Security tab, click **Local intranet** in the **Select a zone...** box, and then click **Sites**.
 3. In the Local Intranet dialog, click **Advanced**.
 4. In the **Add this website to the zone** text box, enter the IP address of the Wave Server without prefacing it with `http://` or `ftp://`, for example 192.168.205.1.
 5. Click **Add** to add the new entry to the **Websites** list. (You do not need to preface the IP address with “`http://`”.)
 6. Click **Close**, and then click **OK** twice to close all dialogs.

Important: If you are now using a different Windows XP SP2 administrator PC to connect to the Wave Server, see “Troubleshooting Management Console problems” in Appendix G in the Wave Server Installation Guide for important required steps to prevent problems while running Management Console applets.

To connect to the Wave ISM via your network:

5. On the administrator PC, browse to the following location to open the Global Administrator Management Console:
`http://192.168.205.1/iadmin`
6. If this is the first time that you are logging on to Wave ISM from this administrator PC and you are prompted to install a specific version of the Java Runtime Environment, do so. Failure to install the correct version may prevent some Global Administrator Management Console features from working correctly.
7. The Log On screen opens in your browser:



Wave IP Global Administrator Log on

Enter your User Name and Password, and then click Log On.

User Name:

Password:

Log On

8. Enter the following defaults, and then click Log On. (Note that Password is case-sensitive.)

User Name: GlobalAdministrator

Password: Vertical4VoIP!

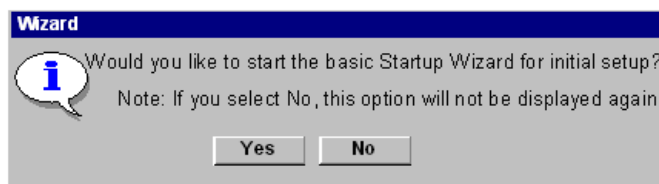
Note the following:

- If any other users are logged on to Wave ISM, a list of logged-on users is displayed here (this will not be the case when you log on to Wave ISM for initial configuration, since at that point you are the only user). Click **OK** to close the dialog and continue.
- If you are upgrading your Wave ISM from Wave ISM 1.5 or you are resetting the Wave ISM using the Wave System Recovery USB Flash Drive, a dialog opens displaying two warnings. Note the warnings and delete them to avoid seeing them again in the future.

9. The Global Administrator Management Console opens. You are now successfully connected to the Wave ISM.



10. The first time that you log on to the Wave Global Administrator, you have the option to start the Wave Installation Wizard:



Important: The Installation Wizard simplifies initial configuration of your Wave system by presenting a step-by-step walkthrough of the tasks, rather than requiring that you run the configuration applets individually from the Management Console. Using the Installation Wizard is highly recommended for installers or administrators who are unfamiliar with the Wave ISM platform. Using the Installation Wizard is optional, and you can run the applets individually, if you prefer.

- Click **Yes** to start the Installation Wizard. Go to Chapter 6.
- Click **No** if you do not want to start the Installation Wizard.

Important: If you click **No**, you will not be able to start the Installation Wizard again.

For more information about the individual applets on the Global Administrator Management Console, see the *Wave Global Administrator Guide*.

Connecting to the Wave ISM via a modem

You can use a local or remote modem connection to connect to the Wave ISM from the administrator PC.

The following terms are used throughout this section:

- **Wave modem:** The *answering* modem, included with the Wave Server and located on the ISC1 or ISC2 (depending on the Wave Server model). The Wave modem can be reached through any trunk port or any analog station port on the Wave Server. The IP address of the Wave modem is always 192.168.210.1.
- **Client modem:** The *calling* modem, installed on the administrator PC. The IP address of the client modem will be automatically assigned when a connection is made (if requested by the client modem), and will typically be in the range of 192.168.210.2 to 192.168.210.10.

For a list of certified modems, see page 5-3. If you choose to use another modem and experience problems, see “Troubleshooting modem problems” on page F-3.

- **Remote connection:** A modem connection made through a trunk port on the Wave Server. By default, the Wave modem is configured to answer on hunt group extension 570. You can use the Hunt Groups and Trunk Groups applets in the Global Administrator Management Console to configure the Wave modem to answer on a different hunt group extension.

Note: Modem throughput will often be much better on a digital trunk.

- **Local connection:** A modem connection made through an analog station port on the Wave Server. Although less useful than a remote connection, a local modem connection can be made through any analog station port on the Wave Server. The default Wave modem extension is 570.

Important: Before proceeding, install the modem on the administrator PC according to the manufacturer's documentation.

Note: The procedures in this section describe the steps to perform on an administrator PC running Windows XP. The steps may be different on a PC running another Windows operating system.

To configure the client modem on the administrator PC:

1. On the administrator PC, in the Windows Control Panel choose **Network Connections > Create a new connection**. When the New Connection Wizard starts, click **Next** to continue.
2. In the Network Connection Type screen, select **Connect to the network at my workplace**, and then click **Next**.
3. In the Network Connection screen, select **Dial-up connection** and then click **Next**.
4. In the Connection Name screen, enter a **Name** for the connection, for example, Wave Modem Connection. Click **Next** to continue.
5. If you have another device (besides the client modem) connected to the administrator PC, in the Select a Device screen, select the checkbox for the modem that you added. Click **Next** to continue.
6. In the Phone Number to Dial screen, enter the **Phone number**:
 - For a remote connection, enter the 7 or 10 digit phone number that will ring the desired trunk.
 - For a local connection, enter the extension number for the Wave modem (the default is 570).Click **Next** to continue.
7. In the Connection Availability screen, specify whether this connection will be available to all users or just to yourself. Choose **Anyone's use** or **My use only**, depending on your security requirements. Click **Next** to continue.
8. In the final screen, click **Finish**. The Connect dialog opens automatically after a few moments. Go to the next section.

To connect to the Wave ISM via a local modem connection:

1. Select **Start > Settings > Network Connections** and then click the new connection (for example, Wave Modem Connection).
2. In the Connect dialog, enter the following information, and then click **Connect**.
 - **User name:** GlobalAdministrator
 - **Password:** Vertical4VoIP!

Note: Password is case-sensitive.
3. Once you have established the connection, you can do the following:
 - To establish a Remote Desktop session on the Wave ISM via the modem connection, start Remote Desktop and then enter 192.168.210.1 (the IP address of the Wave modem) in the **Computer** field.
 - To start the Global Administrator on the Wave ISM via the modem connection, point your browser to 192.168.210.1 (the IP address of the Wave modem.) Then, perform steps 6-9 on page 5-7.

Using the Wave Installation Wizard

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Running the Wave Installation Wizard	6-2
Configuring the Wave ISM using the Installation Wizard	6-2

About the Wave Installation Wizard

This chapter explains how to use the Wave Installation Wizard when you are installing a new Wave ISM system. If you are upgrading an existing system, you cannot use the Installation Wizard and you should skip this chapter.

The Installation Wizard simplifies initial configuration of your Wave system by presenting a step-by-step walkthrough of the tasks, rather than requiring that you run the configuration applets individually from the Management Console.

Installation Wizard steps include applying available HotFixes; changing default IP network settings; adding and activating Wave licenses; setting up extension length, extension ranges, and local area code information; creating users, ViewPoint Groups, and auto attendants; configuring trunk groups and inbound routing; setting up SIP trunking, and more.

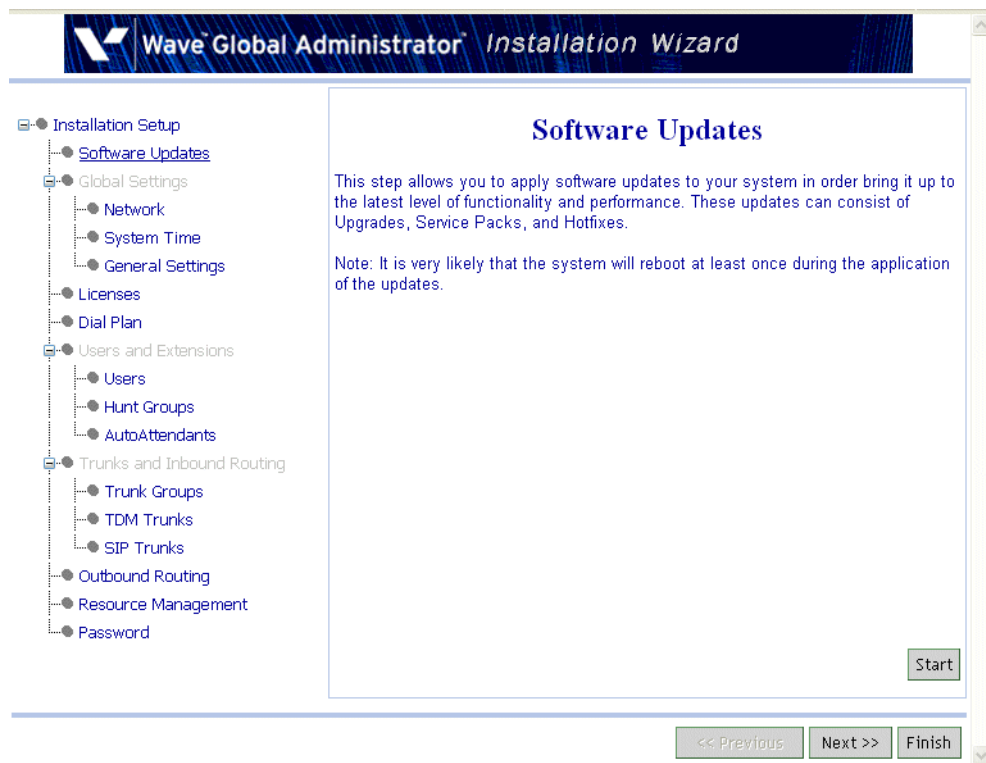
Using the Installation Wizard is highly recommended for installers or administrators who are unfamiliar with the Wave ISM platform. Using the Installation Wizard is optional, and you can run the applets individually, if you prefer.

Running the Wave Installation Wizard

Important: The Installation Wizard is only available the **first time** that you log on to the Global Administrator on a Wave ISM system. It can only be run once, and once you click **Finish** and confirm that you are done, the Wizard cannot be restarted. However, until you finish, if you close your browser window or make a change that you make requires a system restart, the Wizard will resume when you log back on to the Global Administrator.

Configuring the Wave ISM using the Installation Wizard

1. When the Installation Wizard starts, a list of all available configuration tasks is displayed in the left pane.



Note the following:

- Initially, all the items in the left pane are disabled except **Software Updates**. As you complete the steps in the Wizard, additional items will be enabled.
 - Once an item has been enabled, you can jump between that item and any other enabled item by clicking it.
 - All the steps in the wizard are optional and you can skip an item and go to next step by clicking **Next**.
 - Click **Help** where available for more information.
2. Select a task in the left pane, and then click **Start** to begin. If you are prompted to do so, re-enter your **User Name** and **Password** to log on.
- **Software Updates**—Apply software updates to your system in order bring it up to the latest level of functionality and performance. These updates can consist of Upgrades, Service Packs, and Hotfixes. Note that when you upgrade software, the system may restart one or more times. See “Upgrading the Wave Server” in Chapter 23 in the *Wave Global Administrator Guide* for more information.
 - **Global Settings:**
 - **Network**—Change the default IP addresses for the Vertical Wave Application Module (VAM), Integrated Services Card (ISC1 or ISC2, depending on the Wave Server model), and any Media Resource Module (MRM) installed on the Wave Server; verify that gateway and DNS servers have external access to support one-click license activation; add or remove the Wave Server from your Windows domain; and change the default host name of the Wave Server. Note that changing the host name or joining/leaving the Windows domain will cause the system to be restarted. See “Identifying the Wave Server on your LAN” on page 7-6 for details on how to make these changes.
 - **System Time**—Verify or change the date, local time, time zone, and daylight savings time on the system. See “Setting the system date and time” on page 7-19 for details on how to make these changes.
 - **General Settings**—Enter your company name and phone number, customize the system locale to enable appropriate locale-specific system settings, and other basic system information. See “Entering basic system information” on page 7-15. for details on how to make these changes.

You can also do the following here:

- Specify a time server that is polled by the Wave ISM time service to keep accurate time for Wave ISM components. See “Configuring the time service used by Wave ISM” on page 7-20.
- Specify External Caller ID settings.
- Specify Music On Hold settings.
- **Licenses**—Add or import Wave licenses. Doing so enables additional Installation Wizard tasks in the left pane so that you can configure users, add SIP trunks, configure SIP phones, and so forth. It is also recommended that you activate your Wave licenses as part of this step in order to avoid the disruptions described in “Before your licenses are activated” on page 8-8. For more about Wave licensing, see Chapter 8.
- **Dial Plan**—Specify the dial plan for your system, which includes setting up extension length, starting digit for extensions, local area code information, and the access code for external dialing. For more about setting up a dial plan, see Chapter 7, “Initial Call Routing Configuration” in the *Wave Global Administrator Guide*.
- **Users and Extensions:**
 - **Users**—Add users, assign extensions, and set user options. For more about adding users, see Chapter 11, “Managing Users and Roles” in the *Wave Global Administrator Guide*.
 - **Hunt Groups**—Create and configure station hunt groups and add members added to them. For more about creating hunt groups, see “Configuring hunt groups of extensions” in Chapter 10 in the *Wave Global Administrator Guide*.
 - **AutoAttendants**—Create and configure Auto Attendants, including recording greetings, defining actions for each button press, and setting up scheduled greetings and actions. For more information, see Chapter 13, “Configuring Auto Attendants” in the *Wave Global Administrator Guide*.
- **Trunks and Inbound Routing:**
 - **Trunk Groups**—Create trunk groups and configure inbound routing. For more about setting up trunk groups, see Chapter 5, “Configuring Analog and Digital Trunks” in the *Wave Global Administrator Guide*. For more details on configuring inbound call routing, see Chapter 8 in the *Wave Global Administrator Guide*.

- **TDM Trunks**—Assign analog and digital trunks to trunk groups and set configuration options to match the settings your trunk service provider has provisioned on your trunks. For more about setting up analog and digital trunks, see Chapter 5 in the *Wave Global Administrator Guide*.
 - **SIP Trunks**—Set up Signaling Control Points and other IP telephony settings. Note that the Installation Wizard checks for SIP Trunk licenses before launching this applet—if you have not yet added any to your system via the Licenses option, the SIP Trunks option will not be available. For more about setting up SIP trunks, see Chapter 6, “IP Telephony Configuration” in the *Wave Global Administrator Guide*.
 - **Outbound Routing**—Configure outbound routing rules and dialing permissions for users. For more about configuring outbound routing, see Chapter 9 in the *Wave Global Administrator Guide*.
 - **Resource Management**—Allocate DSP resources on your Wave ISM system. Launches the Resource Management Advisor, which asks you a series of questions, for example how many phones will be connected, how many simultaneous calls need to be supported, and so forth. Based on your answers and the cards, modules, and Wave licenses installed on your Wave Server, the Resource Manager Advisor then lists the recommended resources that need to be allocated to support the specified phone, trunk, conference, and call recording requirements. For more about the Resource Management Advisor, see “Managing Wave system resources” in Chapter 23 in the *Wave Global Administrator Guide*.
 - **Password**—Allows you to change the default password for the factory-supplied Wave user. Changing the default password is highly recommended for security reasons.
3. Click **Done** to return to the Installation Wizard screen.
 4. Continue selecting tasks in the left pane. When you are done, click **Finish**, and then confirm that you are done. Since you cannot re-run the Installation Wizard be sure that you have made all of your changes before exiting.

Note: You can run the various applets directly from the Global Administrator Management Console at a later time to make further changes. For more information about all of the configuration and customization options available in Wave, see the *Wave Global Administrator Guide*.

Initial Configuration

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If you chose and configured **Software Updates** via the Installation Wizard as described in Chapter 6, you do not need to perform the steps in this section, unless you now need to apply additional required HotFixes.

Important: You must apply all required HotFixes before performing any subsequent configuration steps described in this chapter. See “Obtaining all required HotFixes” on page 5-1.

Applying HotFixes

This section describes how to use the Software Upgrade applet to apply one or more HotFixes to upgrade the Wave ISM. Once you have obtained the required HotFix CAB files from your Vertical representative, place them in one of the following locations:

- On the hard drive of the administrator PC that you will use to administer the Wave ISM
- On a network share
- On a removable USB flash drive.

See “Upgrading the Wave Server” in Chapter 23 in the *Wave Global Administrator Guide* for more information about these options and how to use the Software Upgrade applet.

Note the following:

- Applying a HotFix may require that you restart the Wave ISM—this will be detailed in the release notes associated with the HotFix. If you are applying multiple HotFixes in a composite upgrade, multiple restarts may be required.
- Applying a large HotFix or a Service Pack may involve significant system downtime so plan accordingly.

Issues that can prevent or affect an upgrade

Before the upgrade process begins, the Software Upgrade applet runs several checks to verify that the Wave ISM is ready to be upgraded.

- If the company name entered in the General Settings applet in the Global Administrator Management Console includes quotation marks (“”), the upgrade of Call Detail Report data cannot proceed. Be sure you don't use quotation marks in the Company Name field.
- If there are any problems (such as bad sectors) detected on the hard drive on which you are applying the upgrade, you may receive a message directing you to restart the Wave Server before performing the upgrade. This is a maintenance task to protect the integrity of your system. The restart process will take considerably longer than normal—30 to 45 minutes is not uncommon, because the CHKDSK procedure is an in-depth procedure.
- If the Software Upgrade applet encounters problems with the database or detects certain critical errors in the event log, the upgrade will not proceed. If the upgrade process fails to proceed as expected, contact your Vertical representative for assistance.

Performing a composite upgrade vs. individual upgrades

If you need to apply multiple HotFixes, you can apply them all in a composite upgrade (a single upgrade procedure) unless the Release Notes for a particular HotFix instruct you to apply it individually. You should always review all of the Release Notes for each HotFix you plan to apply, to ensure that a composite upgrade is possible.

Performing a composite upgrade will generally be faster than performing individual upgrades, and you will avoid running into problems that are fixed in subsequent HotFixes.

A composite upgrade can consist of just HotFixes, or a base release plus HotFixes.

Important: General Hotfixes (with CAB filenames that start with “GHF”) contain upgrades and security fixes relevant to the operating system, database structures or BIOS on the Wave Server. Vertical recommends as best practice that you always install General Hotfixes individually instead of as part of a composite upgrade.

To apply one or more HotFixes

1. Do one of the following:
 - From the administrator PC, log on to the Global Administrator Management Console according to steps 6-9 on page 5-7,
 - If you are using Remote Desktop to access Wave, launch the browser from the Wave desktop and point the browser at <http://localhost> to access the Global Administrator application.
2. Click **Software Upgrade** in the General Administration section. The Software Upgrade applet starts, and the Upgrade button is automatically active.

The screenshot shows the 'Software Upgrade' applet window. At the top, there is a title bar 'Software Upgrade' and a menu bar with buttons for 'Upgrade', 'Downgrade', 'Delete', and 'History'. Below the menu bar, the text reads 'Running Wave ISM 2.5 (7126)' and 'Upgrades will be installed in the order that they are in the Upgrade List. Select a Upgrade CAB file to add to the Upgrade List.' Under 'File Transfer Options', there are two radio buttons: 'Network Share (Access from Wave server)' and 'Upload', with 'Upload' selected. Below this is a 'File Name:' label, a text input field, and a 'Browse...' button. There are also 'Add >>' and 'Add and Start Upgrade' buttons. The 'Upgrade List' section contains a table with a header 'File Name' and a large empty area below it. To the right of the table are 'Up' and 'Down' buttons. Below the table is a 'Remove' button. At the bottom of the applet are 'Start', 'Done', and 'Help' buttons.

3. In the File Transfer Options section, select one of the following methods to upload the HotFix CAB file(s) to the Wave Server. These options are described in more detail in “Uploading a CAB file” in Chapter 23 in the *Wave Global Administrator Guide*.
 - **Network Share.** When you choose this method, the CAB file is transferred directly from the source location to the Wave Server. If prompted, enter the network credentials (user name and password) required to access the network location.
 - **Upload.** When you choose this method, the CAB file you specify is first transferred from the source location to the PC you are using to run the Global Administrator Management Console, and then to the Wave Server. The file to upload can be a local file or a file from another network.
 - **Removable Drive.** This option is only available if a removable USB flash drive containing the CAB file has been inserted into the USB port on the Wave Server. When you choose this method, the CAB file on the drive is copied directly to the Wave Server.
4. Click **Browse** and navigate to the directory containing the HotFix CAB file(s).
5. Select the CAB file to apply and click **Open**. The CAB file is displayed in the **Filename** field.
6. Do one of the following:
 - To apply a single HotFix, click **Add and Start Upgrade**. The HotFix is uploaded to the Wave Server, and the upgrade process begins.
 - To apply multiple HotFixes in the same upgrade, click **Add**. Note that some time may elapse while the HotFix CAB file(s) are uploaded to the Wave Server. Repeat step 5 for each HotFix to be loaded.

Note: If you are uploading from a removable drive, note that a USB flash drive may contain a “packing list”, a builder-generated list of upgrades contained on the drive. If a packing list is detected on the drive, the CAB files are automatically uploaded to the Upgrade List in the order specified, so you don’t have to add the CAB files to the Upgrade List individually

The HotFixes will be installed in the order listed. To re-order the list, select a HotFix and then click **UP** or **DOWN**. When you are satisfied with the list of HotFixes, click the **Start** button below the Upgrade List to initiate the upgrade.

Important: Unless otherwise specified, best practice is to load HotFixes in numerical order and load any Add-on HotFixes last (for example, Call Navigator HotFixes.)

7. Once the upgrade process starts, you will be alerted on the progress of the upgrade via the SNMP Alarms applet.
8. Minimize the SNMP Alarms window so that you can see the next message:

“Upgrade Status upgrade request successful. Instant Office System upgrade will start momentarily.”

Click **Done** to continue.

9. Restore the SNMP Alarms window. You can monitor the progress of the upgrade by noting the messages that are displayed, for example “Unpacking Upgrade”, “Applying Upgrade”, and so forth.

The message “Connection with the System is Lost or System May be Down” is a normal part of the upgrade process, and usually indicates that Wave is executing a restart of some or all services. This message will be followed by “Connection is restored with system.”

Depending on the type of HotFix you are applying, this sequence may happen more than once, especially on a Service Pack or major software release. Allow the system to complete all upgrade processes—the final message in the SNMP window should read “Upgrade Completed.”

After the upgrade finishes, the Wave Server returns to an idle status, indicated when the blink pattern of the red LED at the far right of the ISC1 or ISC2 (depending on the Wave Server model) changes from a fast double blink to a steady single blink.

10. After the “Upgrade Completed” message, the SNMP window displays a series of “Security Audit Success” messages. You can now close the SNMP window and log back on the Global Administrator Management Console.
11. To verify that the HotFixes were applied successfully, click Software Versions in the General Administration section of the Global Administrator Management Console. The top entry shows the latest release. HotFix entries are listed in the order that they were applied, using the following format:

[Day] [Date] [Year] [Time]= [HotFix information]

Identifying the Wave Server on your LAN

Important: If you chose and configured **Global Settings / Network** via the Installation Wizard as described in Chapter 6, you do not need to perform the steps in this section, unless you now want to change any of those settings.

This section describes how to do the following.

- Change the default IP network settings on the Wave Server.
- Configure the Wave Server for one-click license activation.
- Add the Wave Server to your Windows domain.
- Change the default host name of the Wave Server.

Before performing the steps starting on page 7-8, be sure that you have successfully connected the Wave Server to your LAN as described in Chapter 3 or Chapter 4 (depending on your Wave Server model).

Changing the default IP network settings on the Wave Server

Important: Changes to IP addresses and hostname will cause an interruption in call processing and should not be performed during business hours. Be sure that any of the IP addresses you set are not already in use elsewhere in the network. If there is an IP address conflict, Wave will behave erratically.

The following IP network settings are set by default on the Wave Server:

- **IP Address** of the selected network interface. The default settings are:
 - Integrated Services Card (ISC1 or ISC2, depending on the Wave Server model): 192.168.205.10.
 - Vertical Application Module (VAM): 192.168.205.1.
 - Media Resource Module (MRM), if one is installed. Depending on the model installed, an MRM will require 1-3 IP addresses: The default settings are:
 - MRMA: 192.168.205.11 (The MRMA is the only MRM model supported on the Wave IP 500.)
 - MRMB: 192.168.205.11 and 192.168.205.12
 - MRMC: 192.168.205.11, 192.168.205.12, and 192.168.205.13.

- **Subnet Mask** for the selected network interface. The default setting for all network interfaces is 255.255.255.0.
- **Default Gateway** for the selected network interface. The default setting for all network interfaces is 0.0.0.0.

Adding or upgrading an MRM

Important: If you install a new MRM or (Wave IP 2500 Servers only) upgrade to a different MRM model after initial system configuration, the new MRM will install with the default IP network settings described above. Be sure to re-run the IP Network Settings applet and change the default settings for the new MRM if necessary to conform to the network settings you are using in your company. If you do not do so, the new MRM will not work.

Configuring the Wave Server for one-click license activation

In order to activate your Wave ISM licenses using one-click activation, the Wave Server must be able to access the Internet from the LAN, and the DNS server entries **MUST** be defined in the IP Network Settings applet, as described in “To configure the Wave Server for one-click license activation” on page 7-11. Without DNS entries, one-click activation will fail.

Note: If you have not been provided with any DNS server information by your IT department, you can define “8.8.8.8” and/or “8.8.4.4” as DNS servers. These are public DNS servers operated by Google, and will serve your purposes for activation until you receive correct DNS information from the your IT department.

Note: If your Wave Server does not meet the requirements for one-click license activation, you do not need to perform these steps—you can activate your licenses using offline license activation. (See page 8-8 for more about offline license activation.)

Adding the Wave Server to your Windows domain

You should add the Wave Server to your Windows domain if your company's end-user PCs are also part of the domain. If there is a domain mismatch between end user PCs and the Wave Server, users will be prompted to enter network credentials (an error-prone task) when installing or upgrading the ViewPoint workstation application. If end-user PCs are not part of a Windows domain, you do not need to add the Wave Server to a domain.

When you add the Wave Server to your company's Windows domain, it becomes subject to the policies and domain settings established by your IT department. Be sure to review domain policies and settings with the system administrator of the domain in order to anticipate and resolve either of the following potential problems:

- **Automatic updates:** If automatic updates are turned on in the domain, the Wave Server will download Microsoft updates automatically. These updates may affect, interfere, or hinder system operation.

Important: It is imperative that the Wave Server does not download any automatic updates from Microsoft or the domain controller—the Wave Server must be fully exempted from Group Policies. If the Wave Server receives automatic updates, it can and very likely will cause erratic behavior to the point that your system will no longer be operational. In a worst-case scenario, recovery may require that the Wave Server be returned to factory default settings and your system entirely rebuilt.

- **Internet time:** If Internet time is turned on in the domain, that setting will apply as well to the Wave Server, causing a conflict with the time server setting on the Wave Server (set via the General Settings applet).

Also, when the Wave Server is a member of your Windows domain, the Internet Time tab does not appear in the Date and Time tool in the Windows Control Panel. This issue is documented in the Microsoft support article <http://support.microsoft.com/kb/289689>.

Changing the default host name of the Wave Server

By default, each Wave Server is named “IO-DEFAULT” in the Host Name field in the IP Network Settings applet. It is important to change this not only to something meaningful to the group managing the IT infrastructure, but also to make it unique if you are using WaveNet and more than one Wave Server resides on the same network segment.

To change the IP network settings on the Wave Server:

Warning: The IP addresses used for the Wave Server's VAM, ISC and MRM (if an MRM is installed) must reside in the same subnet. Under no circumstances should a Wave Server be installed with public IP addresses, even if those IP addresses are all part of the same subnet. Using public IP addresses is a major security risk.

1. From the administrator PC, log on to the Global Administrator Management Console on the Wave Server using your Wave user name and password.
2. Select **IP Network Settings** in the Data Administration section.

3. In the IP Network Settings dialog, select the **Integrated Services Card** entry from the **Network Interfaces** drop-down list.

IP Network Settings

Host Name **DNS Domain Name**

Fully Qualified Domain Name
Use this FQDN to communicate with this server from the WAN

Network Interface:
(Slot 1) Integrated Services Card

IP Address DNS WINS

IP Address

Subnet Mask

Default Gateway

4. On the IP Address tab, accept the factory defaults for the following settings for the selected network interface, or assign different ones.
 - **IP Address**
 - **Subnet Mask**
 - **Default Gateway**

The Subnet Mask and Default Gateway settings must be the same for all network interfaces.

Important: You must update **all** entries in the Network Interfaces drop-down list before attempting to apply and save your changes. You will not be able to exit the IP Network Settings applet if these settings are not complete and correct.

5. Select the **Vertical Wave Application Module** entry from the **Network Interfaces** drop-down list, and then perform steps 3-4.
6. If an MRM is installed on your Wave Server, select the **Media Resource Module** entry from the list and perform steps 3-4.

Note: On a Wave IP 2500 with an MRMB or MRMC installed, you will see multiple **Media Resource Module** entries in the **Network Interfaces** drop-down list (2 entries for an MRMB and three entries for an MRMC). In the following example, an MRMC is installed, and there are 3 **Media Resource Module** entries, labeled A, B, and C.

IP Network Settings

Host Name
wave-42

DNS Domain Name
mydomain.com

Fully Qualified Domain Name
Use this FQDN to communicate with this server from the WAN
wave42.mycompany.com

Network Interface:
(Slot 1) Integrated Services Card
Vertical Wave Application Module
(Slot 1) Media Resource Module C
(Slot 1) Media Resource Module B
(Slot 1) Media Resource Module A
(Slot 1) Integrated Services Card

Important: You must perform steps 3-4 for each **Media Resource Module** entry. Each **Media Resource Module** entry requires its own IP address.

7. If you have no further changes to make, go to step 15.

To configure the Wave Server for one-click license activation:

8. Verify that the gateway and DNS servers have external access so that they can connect to the Internet and communicate with the Vertical Activation Server.
9. Select the **Vertical Wave Application Module** entry from the **Network Interfaces** drop-down list, and then click the DNS tab.
10. Enter the DNS server's IP address in the **DNS Service Search Order** text box, and then click **Add**.

IP Network Settings

Host Name
wave-42

DNS Domain Name
mydomain.com

Fully Qualified Domain Name
Use this FQDN to communicate with this server from the WAN
wave42.mycompany.com

Network Interface:
Vertical Wave Application Module

IP Address | **DNS** | WINS

DNS Service Search Order

192.268.1.2
192.368.1.3

Domain Suffix Search Order

mydomain.com

Join Domain Leave Domain

Restore Apply Done Help

11. If you have no further changes to make, go to step 15.

To add the Wave Server to your Windows domain:

12. If the Wave Server is not part of your Windows domain, on any tab click **Join Domain** to add it. (To remove the Wave Server from your Windows domain, click **Leave Domain**.)
13. If you have no further changes to make, go to step 15.

To change the host name of the Wave Server:

14. On any tab, type the new name in the **Host Name** text box. The new name can be a maximum of 15 alphanumeric characters and can contain hyphens (-).

To save your changes:

15. Click **Apply** and then click **Done** to save all of your changes. Note the following:
 - If you changed IP network settings or configured the Wave Server for one-click license activation, your changes take effect immediately. You do not need to restart the Wave Server.
 - If you changed the Wave Server's Host Name, your change will not take effect until the next time that the Wave Server is restarted.
16. If you are prompted to restart the Wave Server, do so.

Power-cycling the Wave Server

This section describes various shutdown and restart procedures.

Important: Whenever you restart the Wave Server, be sure to close and restart browsers on other PCs that had been running the Global Administrator to ensure that any upgrades or changes that you applied are displayed correctly.

To restart the Wave Server (without powering off):

1. In the Global Administrator Management Console, choose **Restart System** in the General Administration section.
2. In the Restart system dialog, specify how many seconds should elapse before the system restarts.
3. Click **Restart**.
4. Click **Yes** at the confirmation screen, and then click **OK** to restart the Wave Server.

To shut down and power off the Wave Server:

1. Press and hold the red button on the ISC1 or ISC2 (depending on the Wave Server model) for approximately 3-4 seconds. When LED3 begins to flash red/green, you can let go of the red button and the system will proceed with a graceful shutdown.
2. System shutdown begins, and when complete, the Wave Server powers itself off.

Note: For a detailed description of the system status LED sequence during system shutdown, see page C-6.

To restart the Wave Server after powering off:

1. On a Wave IP 2500, turn the power switch on the back of the Wave Server off, wait at least 30 seconds, and then turn the power switch back on.
On a Wave IP 500, press the red button on the front panel to power up. Note that if you are running an external power supply to support digital phones, this needs to be powered up as well.
2. When you observe the following pattern on the ISC1 or ISC2 LEDs, the system is fully operational:

Current status	Expected time	SYSTEM STATUS LEDS				CARD STATUS LEDS	
		LED1	LED2	LED3	LED4	Red LED	Green LED
System is fully booted and operational.	Indefinitely	Green	Alternating flickering red on green background / green	Slow blinking green	Blinking green	off	Blinking green

Note: For a detailed description of the system status LED sequence that is displayed during system startup, see “Normal boot sequence indicators” on page C-3.

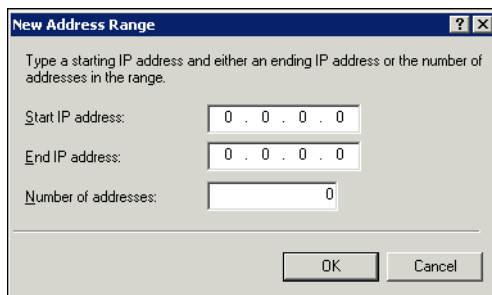
Setting the dial-in default IP address pool

Before the Wave ISM will allow dial-in connections, you must set the IP address pool for those connections. Because this is an internal pool of addresses, obtain the appropriate settings from your company's system administration group.

All Wave ISMs ship with the same default IP address pool. Enabling a routing protocol such as RIP or OSPF on the Wave ISM causes it to advertise a route to that address pool. If you choose not to change the default IP address pool, each Wave ISM will advertise a route to the same IP address pool, which may result in network problems.

To set the dial-in default IP address pool:

1. In the Global Administrator Management Console, click **Microsoft RRAS**, located in the Data Administration section.
2. Log on using your Wave username and password.
3. The Microsoft RRAS applet launches the Microsoft Routing and Remote Access application in a remote control window that allows the application running on the Wave ISM to appear on the administrator PC. (For more information, see "Remote Access Application applets" in Chapter 25 in the *Wave Global Administrator Guide*.)
Click **Yes** if you are asked if you trust the computer to which you are connecting.
4. In the Routing and Remote Access dialog, select the Wave ISM in the tree in the left pane.
5. Choose **Action > Properties**.
6. On the IP tab, select **Static address pool**.
7. Click **Add** to define the IP address pool.



New Address Range ? x

Type a starting IP address and either an ending IP address or the number of addresses in the range.

Start IP address: 0 . 0 . 0 . 0

End IP address: 0 . 0 . 0 . 0

Number of addresses: 0

OK Cancel

8. In the New Address Range dialog, enter the **Start IP address** and **End IP address**.
Note: The IP address pool is defined with a range of IP addresses. The lowest two addresses and the broadcast address (the highest address) in the range are reserved and will never be assigned.
9. Click **OK** to save your changes, and then return to the Global Administrator Management Console.

Performing basic system configuration tasks

Important: If you configured **Global Settings / General Settings** via the Installation Wizard as described in Chapter 6, you do not need to perform the steps in this section, unless you now want to change any of those settings.

This section describes how to perform the following basic tasks:

- Enter basic system information. See page 7-15.
- Set the system date and time. See page 7-19.
- Configure the time service used by Wave ISM. See page 7-20.

Entering basic system information

Note the following about the information you enter according to the following instructions:

- **Company Name** will be used for system-wide external caller ID if you select **Send Company Name and Main Number** on the the PBX tab in the General Settings applet.
Note: External Caller ID can be applied at three different levels: system-wide, user-specific, and trunk-specific. System-wide external caller ID is the lowest in the hierarchy and will be overridden by user-specific and trunk-specific settings. See “Hierarchy of external Caller ID settings” in Chapter 16 in the *Wave Global Administrator Guide* for more information.
- The Wave Server **Serial Number** is used by the Software Licenses applet to verify that a Wave software license is applied to the correct Wave ISM, and by Global Manager to identify each Wave Server uniquely. Also, your Vertical technical support representative may requests it while troubleshooting a problem.

- The **Locale** that you specify enables appropriate locale-specific system settings including ring cadence, minimum analog hook flash, tone set, line impedance, trunk locale, and so forth.
- The **Voice Mail System** defines the voice mail pilot number for the Wave ISM. The voice mail pilot number is the extension users dial, or trunk groups use, to reach the voice mail hunt group.

To enter basic system information:

1. In the Global Administrator Management Console, click **General Settings**, located in the General Administration section. When the General Settings applet starts, click the System tab.

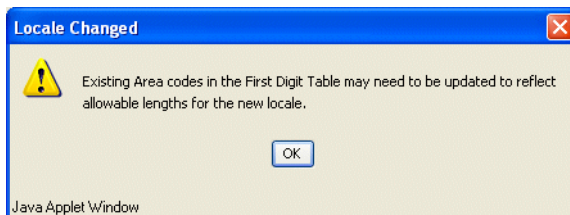
The screenshot shows the 'General Settings' applet with the 'System' tab selected. The form includes the following fields and controls:

- Company Name:
- Main Number:
- Serial Number:
- Locale: English (United States) (dropdown), Customize... (button)
- Voice Mail System: 550 - VoiceMail (dropdown)
- Notify when less than: 200 (dropdown) megabytes free.
- Buttons: Restore, Apply, Done, Help

2. Enter your **Company Name**.
3. Enter the entire **Serial Number** of the Wave Server. For most purposes, this is the serial number located on the sticker on the front of the ISC1 (Wave IP 2500) or on the side of the Wave IP 500. Generally, this number will begin with the letters “LG” followed by a number sequence.

4. If the **Locale** setting is correct for your system, go to step 5. If not, select your locale from the drop-down list.

When you change the **Locale** setting, you are reminded that you may need to update any area codes that you have already defined in the First Digit Table to reflect new area code requirements for the selected locale. (If you are installing Wave ISM for the first time, no area codes have yet been defined.)

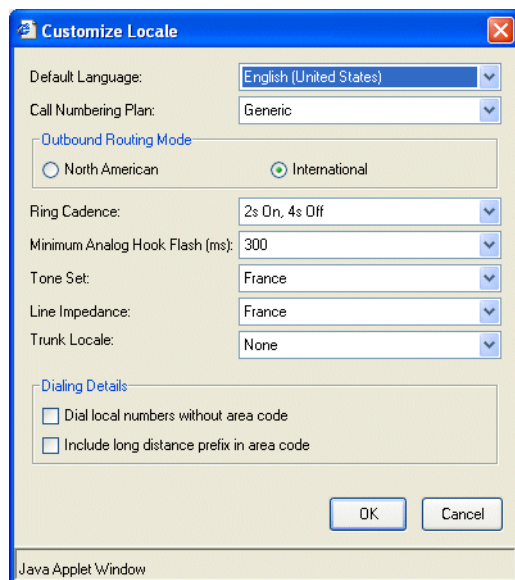


For more about editing the First Digit Table, see “Setting the Home Area Code” in Chapter 7 in the *Wave Global Administrator Guide*

Click **OK** to continue.

5. Click **Customize** to review the default advanced locale settings.

Caution: The default advanced settings for a locale should work for you unless you have a unique environment. Do not modify these settings unless you are a Wave ISM system configuration expert.



For more about the settings in this dialog, see Chapter 32 in the *Wave Global Administrator Guide*.

Click **OK** to close the Customize Locale dialog.

6. Select the **Voice Mail System** extension used to reach the voice mail hunt group. The default is 550 (which is adequate for most systems) but you can map it to a different pilot number (see “Configuring the Voicemail extension” in Chapter 7 in the *Wave Global Administrator Guide*.)
7. Click **Apply** to save your changes.
8. Click **Done** to return to the Global Administrator Management Console.

Setting the system date and time

Important: If you configured **Global Settings / System Time** via the Installation Wizard as described in Chapter 6, you do not need to perform the steps in this section, unless you now want to change any of those settings.

This section describes how verify or change the date, time, and time zone on the Wave ISM.

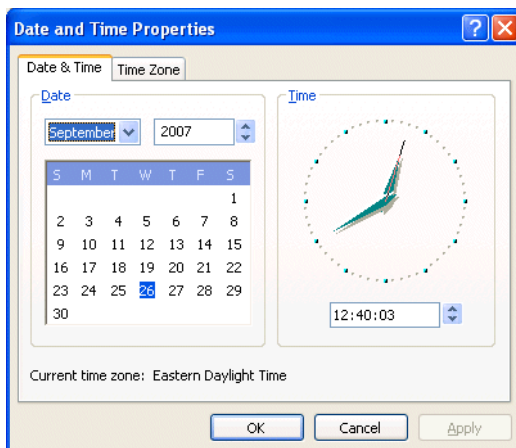
1. In the Global Administrator Management Console, click **Date and Time**, located in the General Administration section.

Note: If you are accessing Wave via Remote Desktop, do not attempt to access the Date and Time applet through the Global Administrator Management Console. Instead, simply right-click on the time in the system tray at lower right of the Wave desktop and adjust the date and time there.

2. The Date and Time applet launches the Microsoft Windows Date and Time application in a remote control window that allows the application running on the Wave ISM to appear on the administrator PC. (For more information, see “Remote Access Application applets” in Chapter 25 in the *Wave Global Administrator Guide*.)

Click **Yes** if you are asked if you trust the computer to which you are connecting.

3. The Date and Time Properties dialog opens. If you need help using this dialog, click the ? button at the top of the dialog and then click a field for more information on that field.

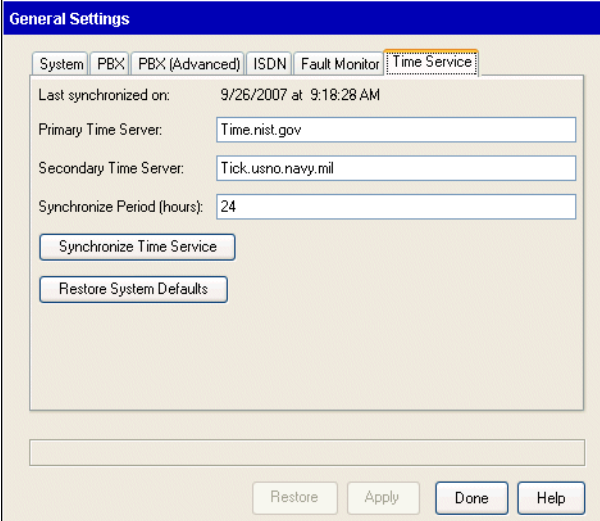


4. On the **Time Zone** tab, verify that the time zone is correct for your Wave ISM location, and change it if necessary.
5. On the **Date and Time** tab, verify that the date and time are correct for your Wave ISM location, and change them if necessary.
6. Click **OK** to save your changes and return to the Global Administrator Management Console.

Configuring the time service used by Wave ISM

This section describes how to specify a time server that is polled by the Wave ISM time service to keep accurate time for Wave ISM components.

1. In the Global Administrator Management Console, click **General Settings**, located in the General Administration section. Click the **Time Service** tab.



The screenshot shows the 'General Settings' window with the 'Time Service' tab selected. The window has a blue header with the title 'General Settings'. Below the header are several tabs: 'System', 'PBX', 'PBX (Advanced)', 'ISDN', 'Fault Monitor', and 'Time Service'. The 'Time Service' tab is active and displays the following configuration fields:

- 'Last synchronized on:' with the value '9/26/2007 at 9:18:28 AM'.
- 'Primary Time Server:' with the text 'Time.nist.gov' in the input field.
- 'Secondary Time Server:' with the text 'Tick.usno.navy.mil' in the input field.
- 'Synchronize Period (hours):' with the value '24' in the input field.

Below these fields are two buttons: 'Synchronize Time Service' and 'Restore System Defaults'. At the bottom of the window are four buttons: 'Restore', 'Apply', 'Done', and 'Help'.

2. Enter the domain names of the time servers you want to use in the **Primary Time Server** and **Secondary Time Server** fields. Enter the full name of the time server. Two commonly used time servers are `time.nist.gov` and `tick.usno.navy.mil`.
3. Enter the interval (in hours) between each time server poll in the **Synchronize Period** field.

4. Click **Synchronize Time Service**. Wave ISM polls the time server immediately.
5. To verify that the Wave ISM time service resynchronized, refresh your browser window and click the Time Service tab again. If the **Last synchronized on** field has been updated, resynchronization was successful.
6. Click **Apply** to save your changes.
7. Click **Done** to return to the Global Administrator Management Console.

Adding Wave ISM user and administrator accounts

This section describes how to do the following:

- Add Wave ISM accounts and passwords. See below.
- Create Wave ISM administrator accounts on the primary domain controller, and use accounts from other trusted domains. See page 7-23.

Adding Wave ISM user accounts and passwords

To secure your Wave ISM from unauthorized configuration changes, you should create one or more new accounts with enterprise-level access privileges to replace the default GlobalAdministrator account included with your Wave ISM, test the new accounts, and then delete the default GlobalAdministrator account.

Enterprise-level access privileges are the most comprehensive. A user with enterprise-level access privileges can perform all of the Wave ISM administrative functions, including changing and configuring access permissions. You need at least one account with enterprise-level access privileges to be able to configure all aspects of your Wave ISM. By default, only individuals with enterprise-level access privileges can do so.

One of three access levels—enterprise, manager, and user—can be selected for most of the Global Administrator Management Console applets via the Access Permissions applet. When a logged-on user does not have permission to use an applet, its icon appears dimmed to indicate that the applet is unavailable. Note that the Access Permissions and Password Administration applets are fixed at the enterprise level and cannot be modified. (For more information, run the Access permissions applet and click Help.)

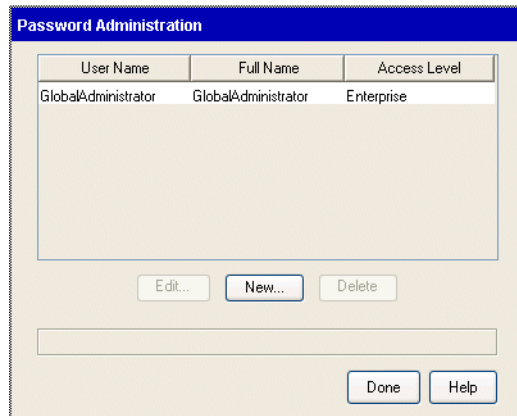
Important: Be sure to keep a record of the new account passwords. Once you remove the default GlobalAdministrator account, the only access will be through the new accounts. If you lose or forget the password for your enterprise-level user, you must reinstall and reconfigure your Wave ISM to regain access. As a best practice, Vertical recommends changing the

password of the GlobalAdministrator account, but leaving it in place in Wave. This ensures that Vertical Technical Support will have a “known” user account that can be used to access the system when providing remote support.

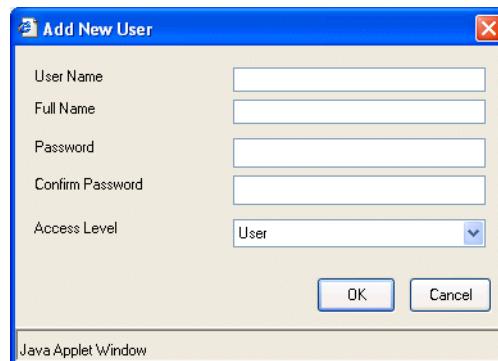
Note: The accounts you create in the Password Administration applet according to the following instructions are **local accounts** and are not controlled by your primary domain controller (PDC). For information about adding the Wave ISM to your PDC and adding Wave ISM administrator accounts to the PDC, see “Creating Wave ISM administrator accounts on the primary domain controller” on page 7-23.

To add new Wave ISM user accounts:

1. In the Global Administrator Management Console, click **Password Administration**, located in the General Administration section.



2. Click **New** to open the Add New User dialog.



3. Choose **Enterprise** from the **Access Level** drop-down list.
4. Enter a **User Name**. The user name can be up to 20 characters long, and can contain any combination of alphanumeric characters, exclamation points (!), underscores (_), and dashes (-). Note that the first character cannot be a numeral.
5. Enter the user's **Full Name**. The full name can be up to 32 characters long and can use any combination of characters, including spaces.
6. Enter a **Password** and confirm it in the appropriate fields. The password can be up to 14 characters long and can use any combination of characters except spaces.
7. Click **OK** to close the dialog. The new user is now listed in the Password Administration dialog.
8. Repeat steps 2 through 7 to create additional user accounts. (For accounts with lower levels of access privileges, choose **Manager** or **User**—instead of **Enterprise**—from the **Access Level** drop-down list.)
9. Click **Done** to return to the Management Console.
10. To secure your Wave ISM, log off and log on again with your new enterprise-level user name and password. Test the new account to make sure it is working correctly. Then, start the Password Administration applet again, and delete the default GlobalAdministrator account.

Creating Wave ISM administrator accounts on the primary domain controller

If your phone system installation includes multiple Wave ISMs, and you have multiple administrators, you may find it convenient to add your Wave ISMs to your Microsoft Windows primary domain controller (PDC). You can then create Wave ISM administrator accounts on the PDC, allowing centralized login authentication and Wave ISM administrator account maintenance.

To create Wave ISM administrator accounts on the PDC:

1. On the primary domain controller, create global groups called VNI-Enterprise, VNI-System, and VNI-Users.
2. Add accounts for your Wave administrators to these groups.

To add Wave ISM to your PDC domain:

1. In the Global Administrator Management Console, click **Network Connections**, located in the Data Administration section.
2. The Network Connections applet launches the Microsoft Windows Network Connections application in a remote control window that allows the application running on the Wave ISM to appear on the administrator PC. (For more information, see “Remote Access Application applets” in Chapter 25 in the *Wave Global Administrator Guide*.)
Click **Yes** if you are asked if you trust the computer to which you are connecting.
3. Select **Start > Control Panel > System**.
4. In the System Properties dialog, click the Computer Name tab and then click **Change**.
5. In the Computer Name Changes dialog, under **Member of**, select the **Domain** radio button. Enter the PDC domain name and then click **OK**.
6. At the login prompt, enter the **User name** and **Password** of a user on the PDC who has privileges to add workstations to the PDC, and then click **OK**. Click **OK** again to clear the message that appears.
7. Follow the prompts to close the System Properties dialog. When a message appears asking if you want to restart Wave ISM, click **No**.
8. Click **Start > All Programs > Wave > Utils > CreatePkg** to run the Create Packages Wave ISM utility.
9. Click **Yes** in the Confirmation Required dialog.
10. Click **OK** to close the message indicating that the Create Packages utility has completed successfully.
11. Click **Start > Administrative Tools > Computer Management**, and then choose **Local Users and Groups**.
12. Add the VNI-Enterprise, VNI-System, and VNI-Users groups to the Administrators group.
13. Restart the Wave ISM according to the instructions on page 7-12.

Now, whenever you log on to the Wave ISM, enter the PDC domain name followed by a backslash (\), then enter your PDC domain user name and password, for example:

User name: Domain\Username

Password: Password

When logging on to the Wave ISM using Windows Remote Desktop, use your PDC domain user name and password for the Windows login prompt.

Using accounts from a trusted domain

You may want to allow access to the Wave ISM domain by users who do not have accounts in the Wave ISM domain, but who do have accounts in other trusted domains (user domains) within your intranet. The easiest way to allow this access is to create a one-way trust relationship.

Creating a one-way trust relationship consists of the following tasks:

- Exporting the trust from your user domain.
- Adding the global groups VNI-Enterprise, VNI-System, and VNI-Users to the user domain.
- Adding the user domain to the list of Trusted Domains in the Wave ISM domain primary domain controller (PDC).
- Synchronizing the domains.

To export the trust from your user domain:

1. Log on to the PDC of the user domain.
2. Open the User Manager for Domains tool, located in the Administrative tools suite.
3. Run **User > Select Domain** and select the user domain in the list.
4. Use the User Manager to run **Policies > Trust Relationships**.
5. Click the **Add** button next to the Trusting (not Trusted) Domains group box.
6. Enter the Wave ISM **Domain Name**.
7. Assign and confirm a **Password**. (This password is not related to any other password on your system.)
8. Click in the Trusting Domain dialog to save your changes.
9. Click **Close** to close the Trust Relationships dialog.

To add the global groups VNI-Enterprise, VNI-System, and VNI-Users to the user domain:

10. In the User Manager for Domains tool, select **User > New Global Group**.
11. Enter VNI-Enterprise in the **Group Name** field.
12. Add the appropriate users to the VNI-Enterprise group.
13. Click **OK**.
14. Repeat these steps to add VNI-System and VNI-Users groups and users to the user domain.

To add the user domain to the list of Trusted Domains in the Wave ISM domain PDC:

15. Log onto the Wave ISM domain PDC.
16. Use the User Manager to run **Policies > Trust Relationships** again.
17. Click the **Add** button, next to the Trusted (not Trusting) Domains group box.
18. Enter the name of the user domain in the **Domain Name** field.
19. Enter and confirm the same **Password** you used above.
20. Click **OK** in the Trusted Domain dialog to save your changes.
21. Click **Close** to close the Trust Relationships dialog.

To synchronize the domains:

22. Run the Server Manager from **Programs > Administrative Tools**.
23. Select your PDC if it is not already selected.
24. Choose **Computer > Synchronize Entire Domain**.
25. Click **Yes** to confirm and **OK** to confirm again.

You now have a one-way trust relationship, and can log into the Wave ISMs.

Installing client caching to improve Global Administrator performance

Client caching enhances Global Administrator performance, especially for slow modem connections.

Note the following:

- On a broadband or LAN connection, client caching will not have much affect. It is mainly intended for dial-up connections.
- You must install client caching on each administrator PC every time you upgrade Wave ISM.
- Client caching remains active until the next Wave ISM upgrade.
- You must restart the administrator PC after installing client caching to enable it.

To install client-side caching:

1. Click the **Client Caching** icon at the top of the Global Administrator Management Console.
2. The Global Administrator Client-Side Caching Web page opens. Read it, and then click the download link. Do not run the installation program from the Web page.
3. Click **Save**. In the Save As dialog box, browse to the location on the administrator PC where you want to save the installation program, and then click **Save**.
4. Close all open programs.
5. Double-click the installation program icon, and follow the on-screen instructions.
6. When installation is complete, restart the administrator PC. You do not need to restart the administrator PC immediately, but client caching will not be enabled until you do.

Verifying installed hardware components

You can use the Chassis View applet in the Global Administrator Management Console to verify that all of the cards and modules installed in the Wave Server are recognized by the Wave ISM and are functioning properly. Chassis View shows all modules and cards installed in the Wave Server, as well as the status LEDs on those components.

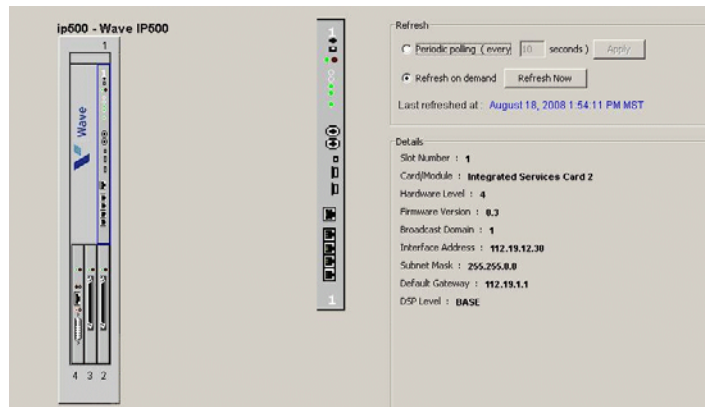
Note the following about the Wave IP 500:

- Digital station modules on the Wave IP 500 will show a green LED when the system is powered on, even if the external supply (used to support digital phones) is not powered on. This is because the card LED gets its power from the main system bus, but the card ports themselves rely on the external power supply. You may see a green LED status indicated for a digital station module and still not have a functional card. If this is the case, verify that the external power supply is powered on.
- On the Wave IP 500, only expansion modules are supported. You cannot install expansion cards on the Wave IP 500.

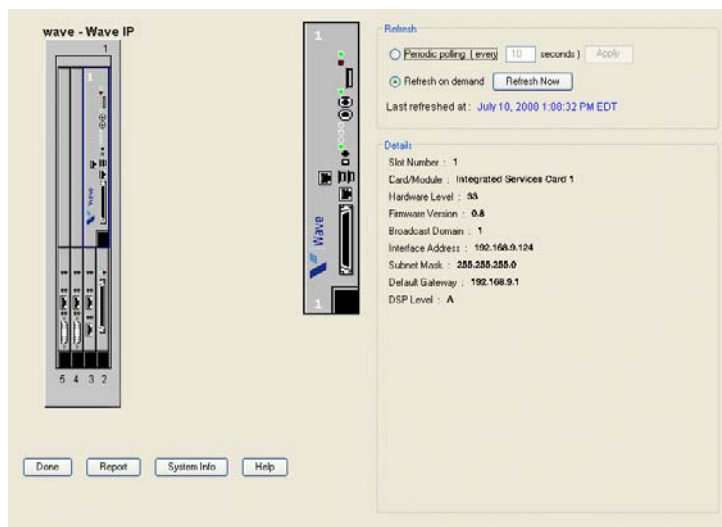
To verify installed components:

1. In the Global Administrator Management Console, click **Chassis View**, located in the General Administration section. Chassis View opens in a browser window.

The following is an example of the Chassis View on a Wave IP 500:



The following is an example of the Chassis View on a Wave IP 2500:



2. Verify that all of the modules and cards that you installed are visible in the graphical representation of your Wave Server at the left of the window. You can do the following in Chassis View:
 - Position the cursor on a module or card on the left side of the window to display an expanded version of it, along with statistics for that module or card, on the right side of the window.
 - Click a module or card on the left side of the window to open the configuration applet for that card or module.
 - Click **Periodic polling** to automatically update the status LEDs periodically. Set the update interval (in seconds), and then click **Apply**.
 - Click **Refresh on demand** to update the status LEDs whenever you click **Refresh Now**.
 - Click **System Info** to display advanced information about the Wave Server.

3. If a module or card is not displayed as expected in Chassis View, check the physical status LEDs on the Wave Server to make sure they are green (on and operational).
If the physical LEDs are off (nonoperational):
 - a. Shut down and power off the Wave Server according to the instructions on page 7-13.
 - b. Reseat the component in question. For more information, see page 3-17 or page 4-20 (depending on your Wave Server model).
 - c. Restart the Wave Server according to the instructions on page 7-13, and run the Chassis View applet again.

Chassis View should now show the component in question as present and functioning normally. If the component is still not displayed in Chassis View, contact your Vertical support representative.

4. Click **Done** to return to the Global Administrator Management Console.

Entering and Activating Wave Licenses

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Viewing the status of licenses on your system.	8-18

Important: It is strongly recommended that you enter all of your Wave licenses and activate them immediately after installing your Wave ISM. Doing so avoids the disruptions described in “Before your licenses are activated” on page 8-8.

Note: If you configured Wave licenses via the Installation Wizard as described in Chapter 6, you do not need to perform the steps in this chapter, unless you now want to add and activate additional licenses.

About Wave licenses

Wave licenses form the basis of your ability to install and use Wave. Keep your license information in a safe location and do not share it with others.

Wave licenses do the following:

- Control the ability to configure Wave system resources, for example VoIP resources, SIP phones, and so forth.
- Enable Wave workstation or add-on applications such as ViewPoint, Global Manager, Call Navigator, and so forth.

New licenses are required in Wave ISM 2.0.

Important: Starting with Wave ISM 2.0, many of the core functionality licenses from prior versions are no longer valid. If you are upgrading from a previous version, in order for your Wave system to continue to function at its full capacity, you must install the new 2.0 licenses issued to you as part of your Software Subscription or upgrade. Contact your Vertical support representative if you have not received your 2.0 licenses. For a description of the Wave licenses available starting in Wave ISM 2.0, see “Wave license requirements” on page 8-3.

Full vs. trial licenses

Wave licenses are available as full or trial licenses.

- A full license can be used for a period of time before it must be activated. If the grace period elapses and you do not activate the license, you will no longer be able to configure the type of system resource controlled by the license or use the add-on, as described in the table on page 8-4.
- A trial license lets you evaluate a feature or add-on for a period of time. Trial licenses cannot be activated—after the trial period expires, you must purchase a full license to continue using the feature or add-on.

Obtaining Wave licenses

Contact your Wave provider for the licenses required for your specific configuration. You may want to purchase additional licenses to allow for expected system growth so that you do not have to wait for a license the next time you want to expand your system.

Wave licenses are supplied by your Vertical provider in the following formats:

- **Wave license files:** License files can be imported directly onto the Wave ISM. License files are named LICxxxxxx.LIC, where x = the sales order number.
- **Acrobat file:** Each license file is accompanied by an Acrobat file that lists the included licenses. If the license file itself is lost or unreadable, you can enter the license keys in the associated Acrobat file manually.

Important: Before proceeding, ensure that you received the correct licenses by reviewing the Acrobat file that came with your license file. If you have any questions, contact your Vertical provider before entering and activating the licenses.

Wave license requirements

Wave ISM supports scalability and edition-based licensing.

- **Scalability licenses** increase the maximum number of Wave users that can be added on a single system:
 - **Wave Professional Edition license.** Supports a maximum of 200 users/phones. You must add a Wave Professional Edition license to support this configuration.
 - **Wave Enterprise Edition license.** Supports a maximum of 500 users/phones. You must add a Wave Enterprise Edition license to support this configuration.
 - **Wave Standard Edition license.** Supports a maximum of 50 users/phones. There is no separate Standard Edition license—if you don't have a Wave Professional Edition license or a Wave Enterprise Edition license on your Wave Server, you have a Wave Standard Edition license.
- **Edition-based licenses** introduce dependencies between certain types of Wave licenses that are enforced when importing, adding, and deleting licenses.
 - **Wave SIP Trunk for Standard Edition license.** Requires a Wave Standard Edition license. See “Wave Standard Edition” above.
 - **Wave SIP Trunk for Professional Edition license.** Requires a Wave Professional Edition license.
 - **Wave SIP Trunk for Enterprise Edition license.** Requires a Wave Enterprise Edition license.
 - **WaveNet for Standard Edition license.** Requires a Wave Standard Edition license.
 - **WaveNet for Professional Edition license.** Requires a Wave Professional Edition license.
 - **WaveNet for Enterprise Edition license.** Requires a Wave Enterprise Edition license.

Wave ISM supports additional license types that enable specific functionality. If you do not have the correct number of Wave licenses entered, your ability to configure or use your Wave system will be affected in the following ways:

This license type	Is required
Wave ISM User	To add or modify a user via the User/Workgroup Configuration applet. This license also supports usage of the ViewPoint Softphone as a user's secondary phone.
Wave IP Gateway	To configure VoIP resources via the Resource Management applet.
Wave IP User - Certified Third Party IP Phone	To configure a user to use a supported Aastra SIP phone.
Wave IP User - Edge IP and ViewPoint Phone	To configure a user to use an Edge 5000-series SIP phone or the ViewPoint Softphone as his or her primary phone.
Wave IP User - Generic Third Party IP Phone	To configure a user to use a third-party SIP phone.
Wave SIP Trunk (Standard, Professional, or Enterprise Edition)	To configure signaling control points (SCPs) via the IP Telephony applet.
Wave ViewPoint	For each ViewPoint user, so that multiple Viewpoint users can concurrently access the Wave system.
Wave ViewPoint Secondary Softphone	On a per-Wave Server basis, to provide support for the ViewPoint Softphone as users' secondary phone, if they are configured to do so.
Wave Contact Center Reporter	So that all ViewPoint users with the appropriate permissions can produce basic call and usage reports using the Contact Center Reporter. If you are also using the Wave Contact Center, a complete suite of queue reports is available.
Wave Contact Center Agent	For each user who is an agent in a Contact Center queue. Only one license is required for each agent, even if an agent is a member of multiple queues.

This license type	Is required
WaveNet (Standard, Professional, or Enterprise Edition)	On a per-Wave Server basis, so that a Wave Server can be a member of a WaveNet network.
Wave Call Classifier	On a per-Wave Server basis, so that the Wave Call Classifier add-on can be used to create rules to identify callers, intelligently route calls, and present Contact Center agents with scripts and related caller information before calls are answered.

Note: Other Wave Add-ons also require valid licenses. See the documentation for the Add-on for specific license requirements.

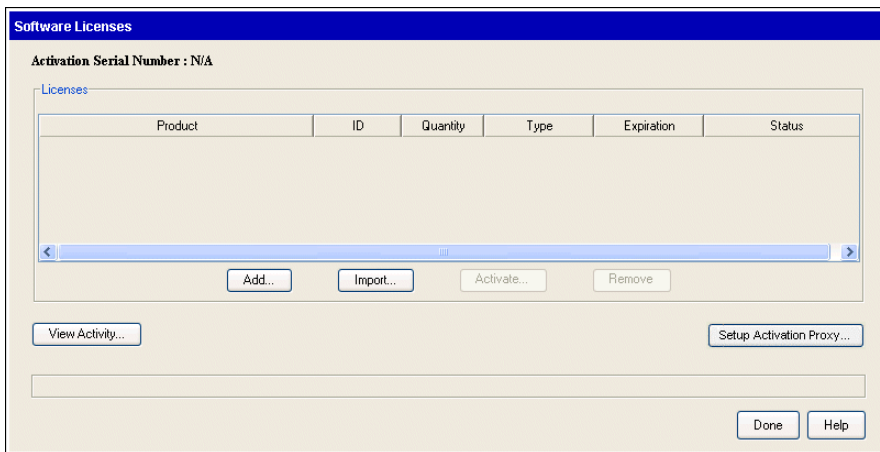
Entering Wave licenses

You can add Wave licenses to the Wave ISM in either of the following ways:

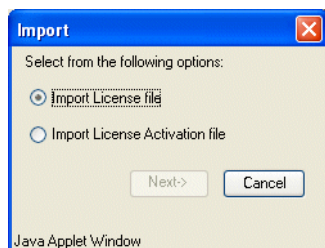
- Import a license file, as described in the next section.
- Enter the license key for each license, as described on page 8-7.

Entering Wave licenses by importing a license file

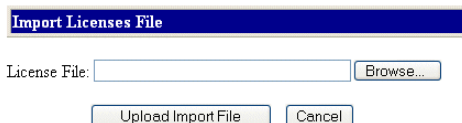
1. On the Administration tab of the Global Administrator Management Console, select **Software Licenses**. The Software Licenses applet starts and displays any licenses that have already been entered:



2. Click **Import**. When the Import dialog opens, click **Import License file** and then click **Next**.



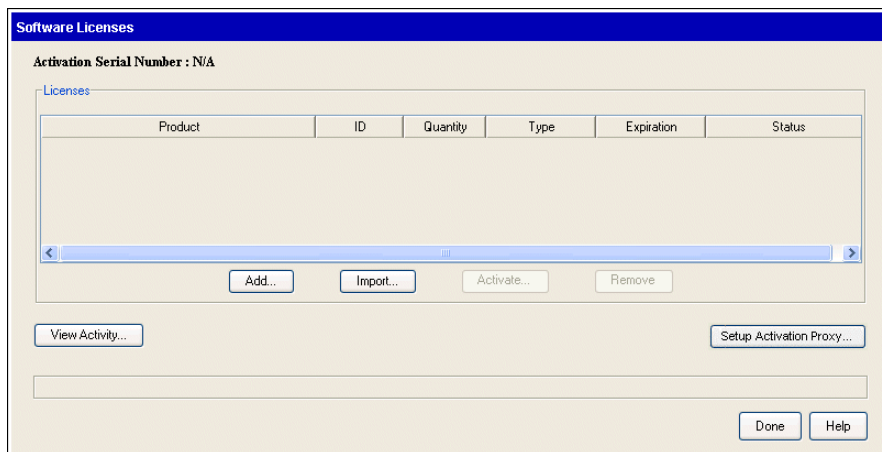
3. In the Import Licenses File dialog, click **Browse** to go to the license text file that you want to import.



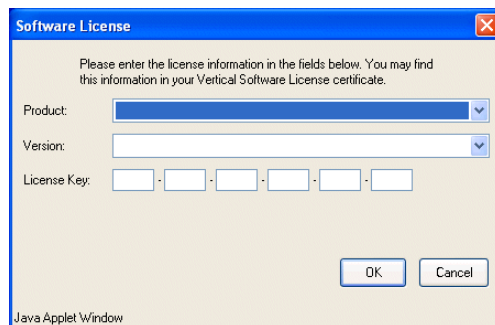
4. In the Choose File dialog, select the license file and then click **Open** to return to the Import Licenses File dialog.
5. Click **Upload Import File**. A list of all of the licenses in the file is displayed. Scroll to the bottom of the list and click **Done**.
6. After the import finishes, the Import Licenses File dialog opens again. Click **Cancel** to return to the Software Licenses applet. Go to “Activating Wave licenses” on page 8-8.

Entering Wave license keys for each license

1. On the Administration tab of the Global Administrator Management Console, select **Software Licenses**. The Software Licenses applet starts and displays any licenses that have already been entered:



2. Click **Add**. The Software License dialog opens:



3. Enter the following information:
 - Select the **Product** for which you want to enter licenses from the drop-down list.
 - Select the **Version** number for that product.
 - Enter the full 24-character **License Key**.
4. Click **OK**. The license you added is now displayed.
5. To add additional licenses, repeat steps 2-4. When you are done, go to the next section to activate the new licenses.

Activating Wave licenses

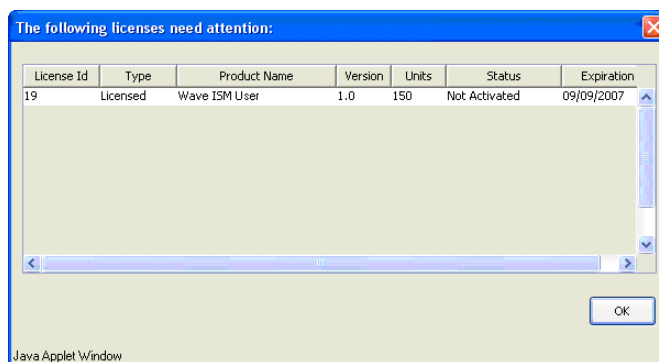
You activate your Wave licenses to enable full functionality on your Wave system. Once you have entered your licenses, you are ready to activate them.

Before your licenses are activated

You can use non-trial Wave licenses for a period of time without activating them (the specific period of time can vary by license type.) The grace period starts on the day that you enter the license via the Software Licenses applet. You can activate your licenses at any time during the grace period.

Until you activate your licenses, the following will occur:

- Every time you launch the Global Administrator Management Console, you will be reminded that licenses need to be activated. The dates when license grace periods are due to elapse are displayed in the Expiration column



- If the grace period expires before a license is activated, whenever any user accesses his or her voice messages, the user hears a message stating that there is an expired license on the system and to contact the system administrator.

Activating your licenses eliminates these behaviors, and prevents any interruption to your system's operation if the grace period expires.

Important: Whenever you activate licenses (either during initial system installation or to expand your system at a later time), be sure to back up your Wave system according to the instructions in "Backing up your system configuration" in Chapter 15 in the *Wave Global Administrator Guide* so that you do not have to repeat the activation process if you ever need to restore your system.

The activation process

Activation consists of the following steps:

1. You submit your license information to Vertical using either of the methods described below.
2. Vertical verifies the information. When you activate your licenses, the registration information that you submit to Vertical is verified and saved for future troubleshooting purposes. You have the opportunity to review the details of Vertical's privacy statement during the activation process detailed later in this chapter.
3. Activated licenses are returned to you and applied to your system.

One-click vs. offline activation

There are two ways to activate your Wave licenses:

- **One-click activation.** Use this method if the Wave Server has an Internet connection that allows the use of the HTTPS protocol, and you have a valid DNS server. (See page 7-7 for more about configuring the Wave Server for one-click activation.) If you encounter problems with one-click activation, you can try offline activation, or contact your Vertical provider.

Note: If your Wave Server does not meet these requirements, you can still use one-click activation if you set up a license activation proxy server. See page 8-16 for more information.

One-click activation steps start on page 8-10.

- **Offline activation.** Use this method if the Wave Server does not have Internet access or does not allow the use of the HTTPS protocol. With offline activation, you generate an Offline Activation Request and submit it to the Vertical Activation Web site from another PC. An Activation File is returned to you that you then manually activate on the Wave ISM.

Offline activation steps start on page 8-12.

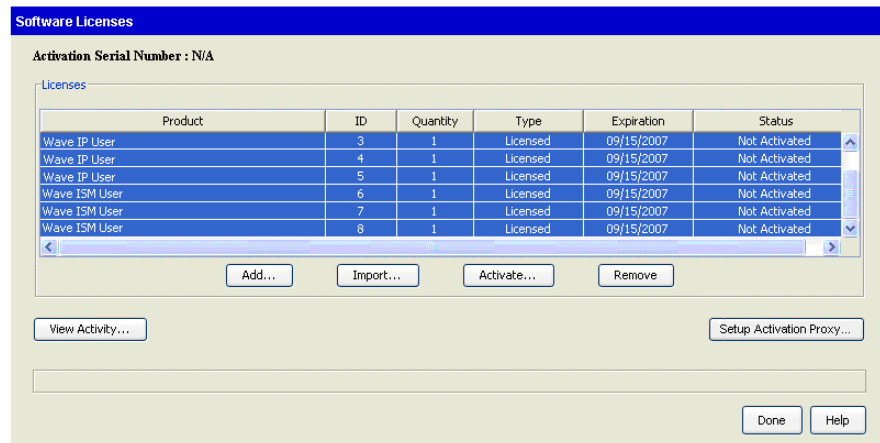
Activation results

If activation is successful, activated licenses are returned and automatically added to your system. You are returned to the screen that displays all of your licenses. Note that the Status column will not update until you exit and restart the Software Licenses applet.

If activation is not successful, the reason is displayed. The most common status resulting from an unsuccessful one-click activation, “Activation Pending”, indicates a bad Internet connection, or that the Vertical Activation Server is down; the system will retry activation automatically. If you continue to experience problems, try offline activation, or contact your Vertical representative.

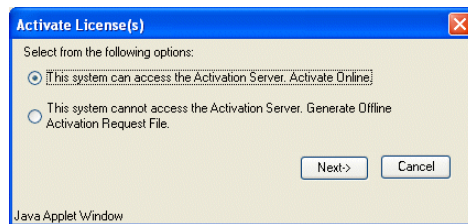
Activating your Wave licenses using one-click activation

1. In the Software Licenses applet, click one license to activate it or Ctrl-click to select multiple licenses.



Note: Only those licenses that are in the statuses of Not Activated, Activation Pending, and Activation Failed can be selected for Activation.

2. Click **Activate**. To continue, accept the Vertical Communications Privacy Statement and then click **OK**.
3. The Activate Licenses dialog opens. Select **This system can access the Activation Server. Activate Online**, and then click **Next**.



4. In the next screen, enter registration information about your organization. You must enter at least **First Name** and **Last Name** to enable the **OK** button in order to continue.

Activate License(s)

Registration Information

First Name: John Last Name: Smith

Company: Company, Inc.

Address: 123 Some Street

City: Anywhere State: MO

Postal Code: 56464 Country: USA

Phone: 941-555-1212 Fax: 941-555-1313

Email: jsmith@company.com

Purchased From: Vertical

OK Cancel

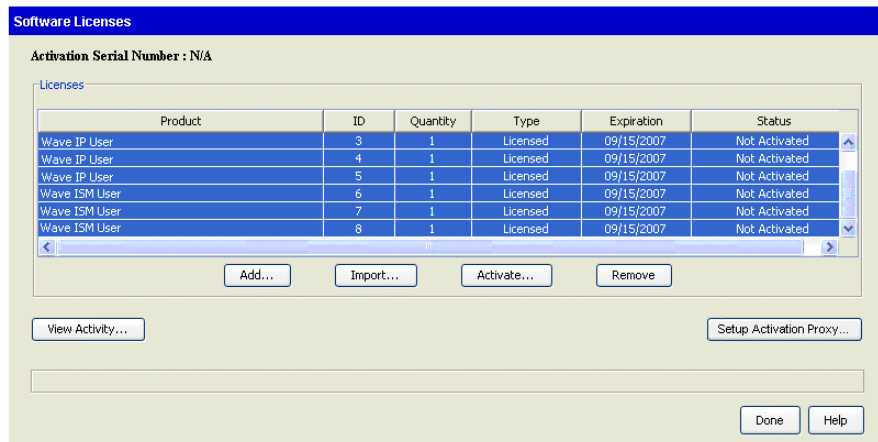
Java Applet Window

5. Click **OK** to submit the selected licenses for activation. During activation, the Activate Licenses dialog (with the registration information cleared) is displayed.
6. Return to the Software Licenses dialog. (The license Status column will not update until you exit and restart the Software Licenses applet.)
7. Click **Done** to return to the Global Administrator Management Console.

Activating your licenses using offline activation

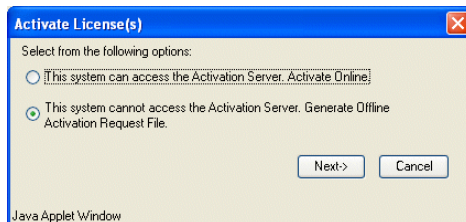
Offline license activation occurs in 2 stages:

- You generate an Activation Request file and submit it to the Vertical Activation Web site.
 - You receive an Activation file in response, and activate it.
1. In the Software Licenses applet, click one license to activate it or Ctrl-click to select multiple licenses.

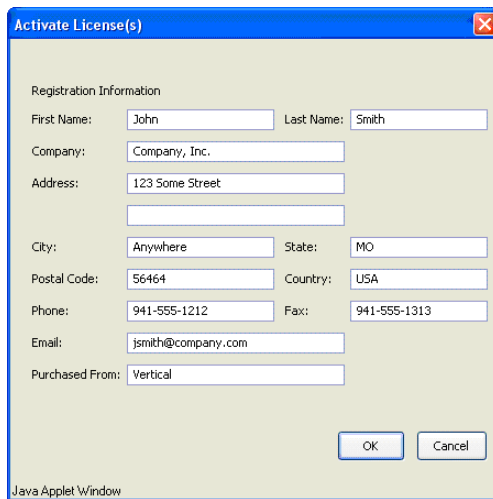


Note: Only those licenses that are in the statuses of Not Activated, Activation Pending, and Activation Failed can be selected for Activation.

2. Click **Activate**. To continue, accept the Vertical Communications Privacy Statement and then **OK**.
3. The Activate Licenses dialog opens. Select **This system cannot access the Activation Server. Generate Offline Activation Request File**, and then click **Next**.



4. In the next screen, enter registration information about your organization. You must enter at least **First Name** and **Last Name** to enable the **OK** button in order to continue



Registration Information

First Name: John Last Name: Smith

Company: Company, Inc.

Address: 123 Some Street

City: Anywhere State: MO

Postal Code: 56464 Country: USA

Phone: 941-555-1212 Fax: 941-555-1313

Email: jsmith@company.com

Purchased From: Vertical

OK Cancel

Java Applet Window

5. A file save dialog opens. Choose to save the file, then in the Save As dialog name the file and specify the save location. Make a note of the file's name (the default file name is ActivationRequestFileName.lic) and location,.

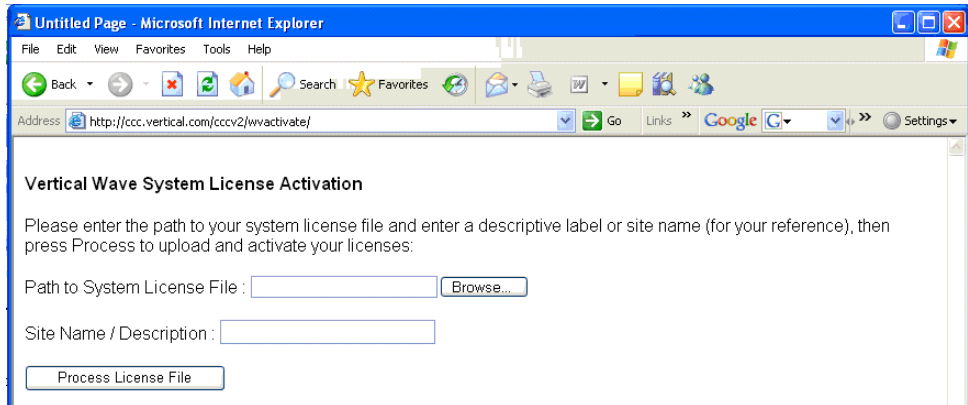
Go to step 6.

Important: If you fail to see a file save dialog but see instead a screen of encrypted characters, you must reconfigure the Wave ISM to save rather than open LIC files. To do so, perform the steps on page 8-16, and then begin the offline license activation process again, starting at step 1 on page 8-12.

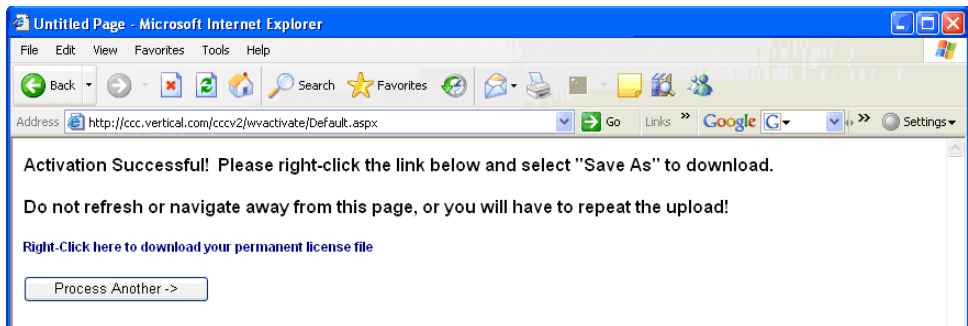
6. Start another instance of Internet Explorer, and then enter and go to the following URL address:

<https://activate.vertical.com>

7. Click **Yes** if you are asked whether to trust the site. You are taken to the Vertical License Activation Web page.

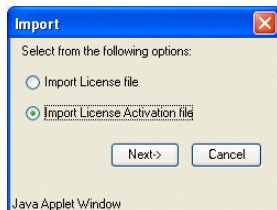


8. Enter the following information:
 - **Path to System License File:** Type the path and file name of the LIC file that you saved earlier, or click **Browse** to specify it.
 - **Site Name / Description:** For your own reference, enter identifying information about the license file, for example, "CambridgeLicenses".
9. Click **Process License File**. Activation may take a few seconds to 2-3 minutes.
10. If activation is successful, you will see the following web page. Click **Right-click here to download your permanent license file**.

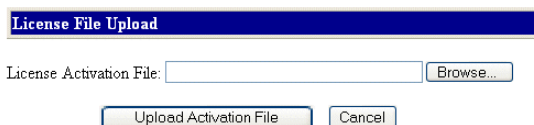


If activation was unsuccessful, the error or errors are displayed on-screen.

11. A file save dialog opens. Choose to save the file, then in the Save As dialog, name the file and specify the save location. Make a note of the file's name and location.
12. Click **Process Another ->** to activate another Activation Request File, or return to the Software Licenses applet if you are done.
13. Click **Import**. When the Import dialog opens, click **Import License Activation file** and then click **Next**.



14. In the License File Upload dialog, click **Browse** to go to the Activation Request File that you downloaded and saved from the Vertical License Activation web page.



15. In the Choose File dialog, select the Activation Request File and then click **Open** to return to the License File Upload dialog.
16. Click **Upload Activation File**.
17. A list of all of the licenses in the file is displayed. Scroll to the bottom of the list and click **Done**.
18. After the upload finishes, the License File Upload dialog opens again. Click **Cancel** to return to the Software Licenses applet. (The license Status column will not update until you exit and restart the Software Licenses applet.)
19. Click **Done** to return to the Global Administrator Management Console.

Configuring the Wave ISM to save rather than open License files

Perform the steps in this section if you are directed to do so in step 5 in “Activating your licenses using offline activation” on page 8-12.

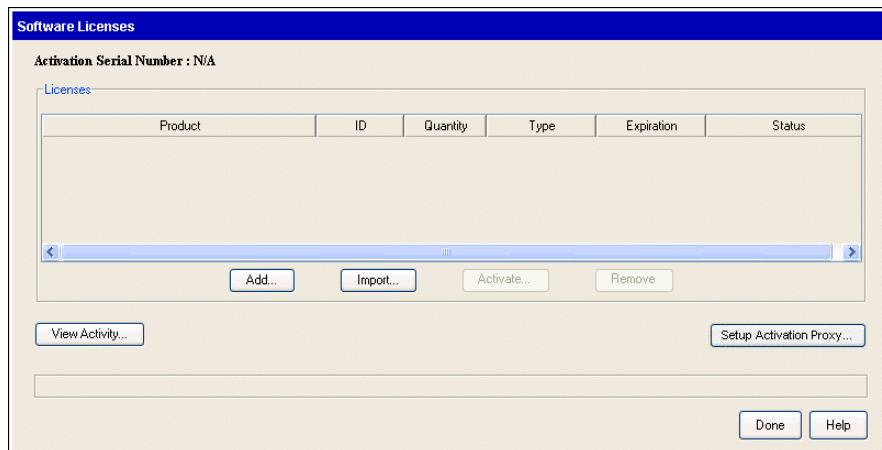
1. In Windows Explorer (not Internet Explorer), choose **Tools > Folder Options** to open the Folder Options dialog.
2. On the File Types tab, select **LIC** in the **Extensions** column, and then go to step 8.
If there is no LIC entry in the **Extensions** column, you must create one. To do so, click **New**.
3. In the Create New Extension dialog, enter LIC in the **File Extension** field, and then click **Advanced>>**.
4. Select **License** from the **Associated File Type** drop-down list. Click **OK** to return to the Folder Options dialog.
5. Click **Advanced** to open the Edit File Type dialog.
6. Check **Confirm open after download**, and then click **New** to open the New Action dialog.
7. In the **Application used to perform action** field, enter the following:
`C:\WINDOWS\system32\notepad.exe %1`
You can specify a different text editor if you prefer.
8. Click **OK** to close all dialogs.
9. Begin the offline license activation process again, starting at step 1 on page 8-12.

Setting up a proxy server for license activation

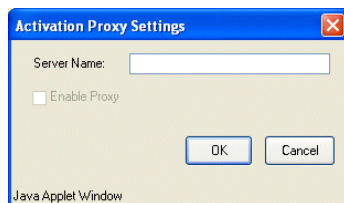
You can set up a proxy server on another PC on your network to act as an interface between your Wave Server and the Vertical License Activation Web page. The proxy server PC must have Internet access and allow the use of the HTTPS protocol, and you must have a valid DNS server on your network.

- A proxy server is useful if the Wave Server does not have Internet access or does not allow the use of the HTTPS protocol, and you want to be able to use one-click license activation (instead of offline activation).
- You **MUST** use a proxy server for license activation if a Wave license file consists of a single license key for unlimited site usage.

1. In the Software Licenses applet, click **Setup Activation Proxy**.



2. In the Activation Proxy Settings dialog, enter the following information:



- **Server Name:** Name of the PC on your network to be used as the license activation proxy server. **Server Name** can consist of a maximum of 20 alphabetic and numeric characters including dashes, periods, underlines, and parenthesis, but it cannot contain blanks.
 - **Enable Proxy:** Select this checkbox to enable the license activation proxy server. This checkbox is disabled until you enter a valid **Server Name**.
3. Click **OK**.

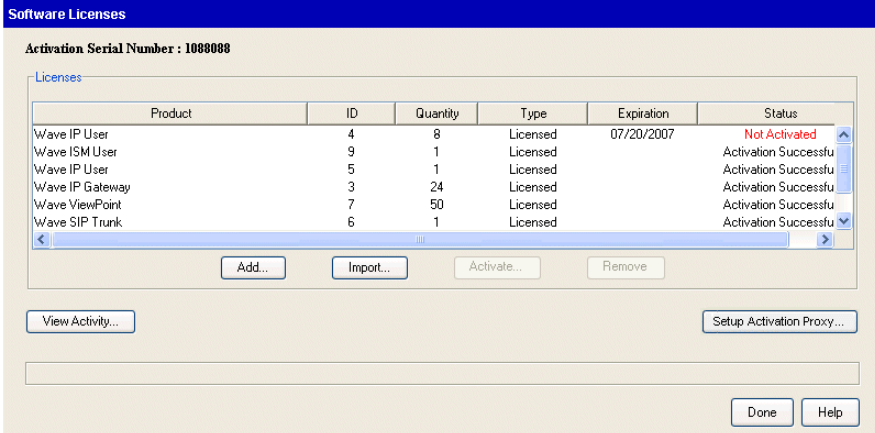
Viewing the status of licenses on your system

There are two ways to view the status of your Wave licenses:

- **Software Licenses applet.** See the instructions below.
- **License Status report.** You can run the License Status report using the Report Generator. This report reports on all Wave installed licenses by product name and version, and lists the license key, quantity, type, status, activation date (blank for a trial license), and expiration date (if applicable) for each license. See “Using the Report Generator” in Chapter 29 in the *Wave Global Administrator Guide*.

To view the status of licenses on your system at any time:

1. On the Administration tab of the Global Administrator Management Console, select **Software Licenses**.
2. The Software Licenses applet starts and displays the status of all of the licenses on your system:



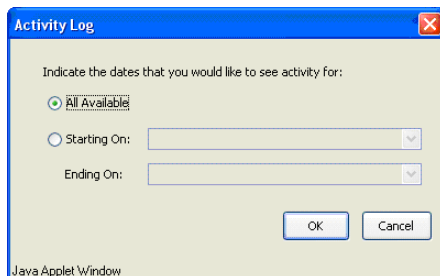
The screenshot shows the 'Software Licenses' applet interface. At the top, it displays 'Activation Serial Number : 1088098'. Below this is a table with the following data:

Product	ID	Quantity	Type	Expiration	Status
Wave IP User	4	8	Licensed	07/20/2007	Not Activated
Wave ISM User	9	1	Licensed		Activation Successfu
Wave IP User	5	1	Licensed		Activation Successfu
Wave IP Gateway	3	24	Licensed		Activation Successfu
Wave ViewPoint	7	50	Licensed		Activation Successfu
Wave SIP Trunk	6	1	Licensed		Activation Successfu

Below the table are buttons for 'Add...', 'Import...', 'Activate...', and 'Remove'. At the bottom of the applet are buttons for 'View Activity...' and 'Setup Activation Proxy...'. The 'Done' and 'Help' buttons are located at the bottom right of the interface.

3. To view license activity by date, click **View Activity**.

- In the next screen, click **All Available** to display all licensing activities, or enter **Starting On** and **Ending On** dates to view licensing activities for a specific time period.

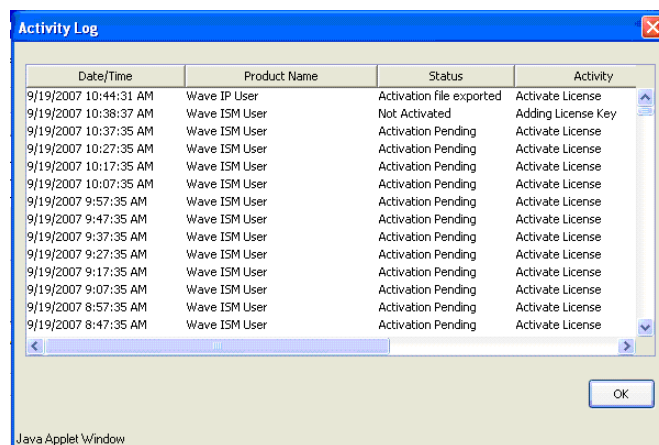


The image shows a Java Applet Window titled "Activity Log". It contains a form with the following elements:

- A label: "Indicate the dates that you would like to see activity for:"
- A radio button labeled "All Available" which is selected.
- A radio button labeled "Starting On:" followed by a date selection dropdown menu.
- A radio button labeled "Ending On:" followed by a date selection dropdown menu.
- Two buttons: "OK" and "Cancel".
- Text at the bottom: "Java Applet Window".

Click **OK** to continue.

- The Activity log opens showing the following information:



The image shows a Java Applet Window titled "Activity Log" displaying a table of licensing activities. The table has four columns: Date/Time, Product Name, Status, and Activity. The data is as follows:

Date/Time	Product Name	Status	Activity
9/19/2007 10:44:31 AM	Wave IP User	Activation file exported	Activate License
9/19/2007 10:38:37 AM	Wave ISM User	Not Activated	Adding License Key
9/19/2007 10:37:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 10:27:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 10:17:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 10:07:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 9:57:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 9:47:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 9:37:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 9:27:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 9:17:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 9:07:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 8:57:35 AM	Wave ISM User	Activation Pending	Activate License
9/19/2007 8:47:35 AM	Wave ISM User	Activation Pending	Activate License

At the bottom right of the window is an "OK" button. The text "Java Applet Window" is visible at the bottom left.

- Click **OK** to close the Activity Log.

Installing ViewPoint and Other Wave Workstation Applications

CHAPTER CONTENTS

About the Wave workstation applications	9-1
About ViewPoint automatic updates.	9-2
Using the Wave Workstation Applications Setup	9-6
Configuring the Wave workstation applications	9-10
Synchronizing system clocks	9-12

About the Wave workstation applications

The Wave workstation applications provide end users with a point-and-click Windows interface for common Wave features. They include:

- **Wave ViewPoint.** Install ViewPoint on the PCs of users who will manage their calls, contacts, Call Log, and voice messages from the Windows desktop.
ViewPoint is the most efficient way to use Wave, and some Wave features are available only through ViewPoint, ViewPoint is not required in order to make and receive calls, and most Wave features can be accessed without it by using the telephone commands. See the *Wave ViewPoint User Guide* for a list of ViewPoint-only features.
- **Wave TAPI Service Provider.** Install the TAPI Service Provider on the PCs of users who need to run the Wave Contact Manager Assistant or want to use some other TAPI-compliant application to place calls using Wave ISM.
- **Wave Contact Manager Assistant.** Install the Contact Manager Assistant on the PCs of Microsoft Outlook, GoldMine, GoldMine FrontOffice, or GoldMine Business Contact Manager users who need to receive screen pop notification of incoming calls.
- **Wave Archived Recording Browser.** Install the Archived Recording Browser on the PCs of users who need to search for and act on large numbers of archived mailbox recordings.

Attended vs. unattended installs

This chapter explains how to install the Wave workstation applications by running the Wave Workstation Setup. For information on installing the Wave workstation applications from the command line without user input, see Appendix D, “Performing Unattended Workstation Installations.”

About ViewPoint auto-upgrading

When ViewPoint starts, it checks to see if a newer version of ViewPoint is available than what is currently installed on the user's PC, and if so, a message is displayed saying that the new version needs to be installed. When the user confirms the upgrade, the Workstation Applications Setup starts and all Wave workstation applications that are detected on the workstation PC are upgraded automatically.

Important: This message does not appear and the auto-upgrade does not take place if the user *only* has TAPI Service Provider or Contact Manager Assistant (and not ViewPoint) installed. If you are upgrading to a newer version of Wave ISM, and have users who only use the TAPI Service Provider or Contact Manager Assistant, you or they need to install the new versions according to the steps in “Using the Wave Workstation Applications Setup” on page 9-6.

About ViewPoint automatic updates

ViewPoint can perform an unattended automatic update on all user PCs whenever a new version of ViewPoint is installed on the Wave Server.

By default, the ViewPoint auto-update process is enabled for all ViewPoint users. To disable auto-update in ViewPoint, choose **Tools > Options**. On the ViewPoint tab, de-select the **Disable auto-updates** checkbox.

For details, see “Automatic updates” in Chapter 2 in the *Wave ViewPoint User Guide*.

Requirements

Installing as a LOCAL ADMINISTRATOR in Windows

Important: You must install ViewPoint and other Wave workstation applications as a LOCAL ADMINISTRATOR in Windows to ensure that the application is installed with the proper permissions and credentials. Do not install as a LOCAL USER with Administrator rights or as a Domain Administrator, via Active Directory, or via a silent installation (as described Appendix D, "Performing Unattended Workstation Installations") as anything other than LOCAL ADMINISTRATOR.

This requirement also applies when you install a third-party application, for example Goldmine or another customer relationship management (CRM) product.

Where to install the Wave workstation applications

You can install the Wave workstation applications on any Windows PC on the network that meets the requirements in this section. Do not attempt to install a Wave workstation application on the Wave Server itself—the Wave Server is a dedicated telephony server.

Terminal server support

You can install the workstation applications on a terminal server running Citrix MetaFrame or Windows Terminal Services. For instructions, see Appendix A.

Installing ViewPoint on the Wave Server for administrative purposes

Important: You can install ViewPoint on the Wave Server for administrative purposes only. All end user copies of ViewPoint must be installed on other PCs in your network.

ViewPoint requirements

ViewPoint PC requirements

You can install ViewPoint on any PC that meets the following requirements:

- **Operating system:** The following operating systems can be used:
 - Windows Server 2003, base release or higher
 - Windows XP SP2 or higher
 - Windows Vista, base release or higher
 - Windows 7 (32-bit and 64-bit versions)

Important: If your ViewPoint PCs currently use or will use the Windows Firewall, review the important information in Appendix E, “Configuring Wave ISM for the Windows Firewall.”

- **Processor:** Minimum Pentium III.
- **Memory:** Minimum 512 MB RAM for Windows 2003 Server or Windows XP. Minimum 2 GB RAM for Windows Vista.

This is the minimum memory required to support ViewPoint. More memory may be required if other applications are running on the same PC. To manage thousands of voice messages or call recordings, consider using the Wave Archived Recording Browser instead of or in addition to ViewPoint.

- **Disk space:** 20 MB free disk space.
- **Software:** The following are required:
 - TCP/IP with Microsoft Network Client.
 - .NET 2.0 (installed automatically with ViewPoint if not detected on the workstation application PC.)
- **Hardware:** Sound card and speakers to listen to voice messages and call recordings and to hear call announcements without using a phone.
- **Network connection:** TCP/IP connection to the Wave Server, as well as access to the Wave Server’s file shares (\Netsetup, \Reports, and \Buffer).
- **Microsoft Excel:** In order to run any of the Contact Center Reporter reports (available from the ViewPoint Tools menu), you must install Excel version 2003, 2007, or 2010 (32-bit versions only) on the ViewPoint PC. For more about Wave Contact Center Reporter requirements, see Chapter 13 in the *Wave ViewPoint User Guide*.

ViewPoint license requirements

You must purchase, enter, and activate the following licenses on the Wave ISM:

- One ViewPoint license for each user who needs to concurrently access the Wave ISM. (Each Wave ISM User license comes with a ViewPoint license.)

See Chapter 8, “Entering and Activating Wave Licenses” for more about entering and activating Wave licenses.

TAPI Service Provider and Contact Manager Assistant requirements

TAPI Service Provider and Contact Manager Assistant PC requirements

You can install the Wave TAPI Service Provider or Wave Contact Manager Assistant on any PC that meets the following minimum requirements:

- **Operating system:** The following operating systems can be used:
 - Windows Server 2003, base release as well as SP1 or R2
 - Windows XP SP2 or higher
 - Windows Vista, base release or higher
 - Windows 7 (32-bit and 64-bit versions)

Important: If your TAPI Service Provider or Contact Manager Assistant PCs currently run or will run Windows XP Professional SP2 or Windows Server 2003 SP1 or R2 with the Windows Firewall enabled, review the important information in Appendix E, “Configuring Wave ISM for the Windows Firewall.”

- **Software:** The Contact Manager Assistant requires the TAPI Service Provider. Neither the Contact Manager Assistant or the TAPI Service Provider require the presence of ViewPoint on the same PC.

The following contact managers are also supported:

- Act! 3.0, 4.0, 2000, and 6.0
- GoldMine 4.0, 5.0, 6.5, and 6.7, and GoldMine Business Contact Manager
- GoldMine FrontOffice 2000
- Microsoft Outlook for Windows 98, 2000, XP, 2003, 2007, and 2010 (32-bit version)
- **Network connection:** TCP/IP connection to the Wave Server.

Other TAPI Service Provider requirements

In addition to the PC requirements described on page 9-5, a user must have the following to install and use the TAPI Service Provider:

- A Wave user name and station ID. (You cannot use station ID 0)
- A Windows telephony location that allows the user to place calls. Typically, you need to configure your area code and external dialing prefix, for example “9”.

Archived Recording Browser requirements

The PC requirements for the Archived Recording Browser are the same as for ViewPoint, as described on page 9-4.

In order for users to use the Archived Recording Browser, you must first install and configure a Wave archive server on your network. For more information, see Chapter 10.

Using the Wave Workstation Applications Setup

You use the Wave Workstation Applications Setup to install any or all of the workstation applications. If you encounter problems installing the Wave workstation applications, or running them after installation, contact your Vertical representative.

Entering station IDs

When you install ViewPoint or the TAPI Service Provider, you can enter the station ID of the Wave phone that will be used by the user at the PC. If you have not yet connected and assigned a phone to the user at the PC, you can complete the installation according to the instructions on page 9-7, but full functionality will not be enabled until you enter the user’s correct station ID.

Note the following limitations:

- **ViewPoint:** Without a Wave phone, a user **WILL NOT** be able to use ViewPoint to manage calls or record greetings. The user **WILL** be able to use ViewPoint to listen to voice messages, manage contacts, and change settings.
- **TAPI Service Provider:** Without a Wave phone, the TAPI Service Provider **WILL** work for placing outbound calls, but **WILL NOT** work for identifying inbound calls.

You can update the station ID at a later time, or you may prefer to wait to install ViewPoint and the TAPI Service Provider on users' PCs until you have connected and assigned phones, and can enter valid station IDs.

To update station IDs at a later time, do either of the following:

- In the ViewPoint Logon dialog, specify a default station ID or a specific station ID according to the instructions in "Using ViewPoint with a different phone or server" in Chapter 2 in the *Wave ViewPoint User Guide*.
- Re-run the TAPI Configuration Wizard, as described in "Configuring the TAPI Service Provider" on page 9-10.

To install the Wave workstation applications

1. Log on to the PC on which the workstation applications will be installed as a Windows LOCAL ADMINISTRATOR (see "Installing as a LOCAL ADMINISTRATOR in Windows" on page 9-3).
2. Close all open Windows applications.
3. Start the Wave Workstation Applications Setup by running setup.exe, located in the Netsetup directory on the Wave Server. The default location (based on the IP address of the Wave Server's VAM) is:

\\192.168.205.1\Netsetup\setup.exe

Note: You may have changed the default IP address of the VAM as part of initial system configuration (see "Identifying the Wave Server on your LAN" in Chapter 3 or Chapter 4 (depending on your Wave Server model).

If you are installing workstation applications on a PC running Windows 7:

Right-click setup.exe and then click **Run As Administrator**. If you are requested to enter security credentials to proceed as an administrator at this point, do so. When a security warning is displayed, click **Yes** to continue.

4. When prompted by the InstallShield Wizard, choose the appropriate language to use for this installation, and then click **OK**.
5. Review the License Agreement. Click **I accept the terms in this license agreement**, and then click **Next** to continue.

6. In the Setup Type dialog, select one of the following:
 - Select **Typical** to install the listed workstation applications in the default location. When installing Wave for the first time, only ViewPoint is installed. When upgrading from a previous version of Wave, Workstation Setup detects the workstation applications that are installed, and upgrades those applications to the current version.
Click **Next** to continue. Go to step 8.
 - Select **Custom** to choose which workstation applications to install, including the TAPI Service Provider, Contact Manager Assistant, and Archived Recording Browser, or to change the installation drive or folder.
Click **Next** to continue.
7. In the Custom Setup screen, you can do any of the following:
 - Click a workstation application to see a description of it as well as the amount of disk space it requires.
 - Click **Space** to check the available space on each hard drive on the PC.
 - Click **Change** to change the destination drive or folder where the selected workstation application will be installed. You can specify a different location for each workstation application.
 - If you do not want to install one of the listed workstation applications on this PC, click the drop-down list for the application and then select This feature will not be available.
 - To install another listed workstation application, click the drop-down list for the application and then select This feature will be installed on local hard drive.
Click **Next** to continue.
8. In the Ready to Install screen, click **Install**. Installation may take several minutes.
Note: On a PC running Windows 7, you may receive a security dialog box to verify the file install. Click **Yes** to continue.
9. When Workstation Applications Setup finishes copying files, if you are installing the TAPI Service Provider, the TAPI Service Provider Configuration Wizard starts.

10. Enter the Wave Server **Host Name** and the **Station ID** of the phone that will be used by the person at this PC. The station ID is assigned to a phone automatically by Wave ISM. To hear the station ID, pick up the phone and dial *00.

Important: If there is no Wave phone near this PC, or you have not yet assigned a phone to the user at this PC, you can enter any value (except 0 or another user's station ID) to continue.

Click **Next** to continue.

11. In the next screen, select the **User Name** of the person assigned to this station ID from the drop-down list, and enter the user's **Password**.

If the person at this PC will be using GoldMine contact management software, clear the **Application can hang up calls** checkbox.

Click **Finish** to continue.

12. A TSP Configuration Wizard dialog opens, warning you to close any TAPI applications (for example Outlook or Wave Contact Manager Assistant) that are running. Close the applications, and then click **OK** to continue.

13. If you are installing the TAPI Service Provider for the first time, Workstation Applications Setup prompts you to define a Windows telephony dialing location for your PC, which is required to place outbound calls. If you see this prompt, click **OK**.

- In the Location Information dialog, select your country from the drop-down list, enter your area code, and enter the number you must dial to get an outside line, for example "9". Click **OK**.
- In the Phone and Modem Options dialog, select the location from which you are dialing, and click **OK**.

14. In the Install Completed screen, click **Finish** to complete the installation.

Configuring the Wave workstation applications

Configuring ViewPoint

For information about customizing and using ViewPoint, see the *Wave ViewPoint User Guide*.

Configuring the TAPI Service Provider

Workstation Applications Setup runs the TAPI Service Provider Configuration wizard automatically when you install the TAPI Service Provider for the first time on a PC. You can run the Configuration Wizard later, for example to change your station ID. To do so:

1. Click **Start > Programs > Vertical Wave > Wave TAPI Service Provider Configuration Wizard**.
2. Follow the on-screen instructions. Click **Help** for more information.

Configuring your contact manager for use with the TAPI Service Provider

Before making calls from the contact manager, you must configure it to recognize the TAPI Service Provider. Use one or more of the following procedures as needed.

To configure Outlook

1. Open the Contacts view in Outlook.
2. Choose **Actions > Call Contact > New Call**.
Note: Outlook 2010 has a different user interface—click on the **More** button on the Contacts task bar, and then select **Call > New Call**.
3. In the New Call dialog, click **Dialing Options**.
4. In the Dialing Options dialog, verify that **Connect Using Line** is set to “Wave Line 1.” This option is available after the TAPI Service Provider is installed.
5. Click **OK**.

To configure GoldMine, GoldMine FrontOffice, or GoldMine Business Contact Manager

Use the following procedure after you refer to the documentation that came with the product:

1. Choose **Edit > Preferences**.
2. Click the Modem tab.
3. Under Modem Settings, verify that **TAPI Line** is set to “Wave Line 1.” This option is available after the TAPI Service Provider is installed.
4. Click **OK**.

To configure Act!

1. In Act!, Choose **Edit > Preferences**.
2. Click the Dialer tab.
3. Select the **Use Dialer** checkbox.
4. Under Modem or Line, verify that “Wave Line 1” is selected. This option is available after the TAPI Service Provider is installed.
5. To receive screen pops with contact information when a contact calls, select the **Lookup contact using caller ID** checkbox. Clear the checkbox if you do not want to receive screen pops.
6. Click **OK**.

Calling from another application

After installing the TAPI Service Provider, users can call contacts by using the instructions provided with their contact managers. Calls appear in their Call Logs as if they had dialed them from ViewPoint or the phone.

Configuring the Wave Contact Manager Assistant

1. Click **Start > Programs > Vertical Wave > Wave Contact Manager Assistant**.
2. If only the Contact Manager Assistant splash screen appears, right-click the Outlook, GoldMine, GoldMine FrontOffice, or GoldMine Business Contact Manager icon on the system tray at the lower right of your screen. Select **Setup**.
3. Click **Help** for detailed instructions.

Configuring the Archived Recording Browser

You do not need to perform any configuration steps on Archived Recording Browser users' PCs. However, before users can search and manage archived recordings, you must configure one or more Archive Recording Browser user accounts for their use. For more information, see "Configuring who can manage archived recordings" in Chapter 23 in the *Wave Global Administrator Guide*.

For details on using the Archived Recording Browser to search for and act on mailbox recordings, see Appendix A in the *Wave ViewPoint User Guide*.

Synchronizing system clocks

It is recommended that you verify that the system clocks on the Wave Server and user PCs are synchronized. This ensures that message time stamps, which are set by the Wave Server's clock, agree with the time displayed on the user PCs.

In Microsoft domain-based networks, you can synchronize the workstation clock with the Wave Server's clock by including the following statement in the logon script that executes when the workstation connects to the domain controller:

```
net time \\
```

If your network includes a time server, the Wave Server can use it as a time source. For details, see "Configuring the time service" in Chapter 3 in the *Wave Global Administrator Guide*.

Installing the Wave Recording Archive Service

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The Wave Recording Archive Service manages the archive process that offloads system call recordings to an archive PC or other server on your network.

Important: Before you start, be sure to review the important information about your archive server PC and archive folder in “Archive server PC requirements” on page 10-3 and “Archive folder requirements” on page 10-4.

This chapter describes how to do the following:

- Install the Recording Archive Service, including:
 - Identifying the archive server PC.
 - Creating the archive folder where archived recordings are stored.
 - Installing and configuring Microsoft SQL Server 2005 Express Edition, the database server used by the Recording Archive Service.
 - Installing the Recording Archive Service.
- Configure call recording and archiving
 - Setting up automatic call recording.
 - Configuring the Recording Archive Service.
 - Setting the Recording Archive Service to auto-start.

- Identifying the voice mailboxes from which recordings will be archived. Typically, you specify the mailbox to which automatic call recordings are sent, as well as the voice mailbox of any users or queues whose voice messages you want to preserve.
- Configuring one or more Archived Recording Browser user accounts that allow users to search and manage archived recording.

About archiving mailbox recordings

If you record all calls or even a significant portion of calls, or if you have users with thousands of saved voice messages and large maximum mailbox sizes, disk space on the Wave ISM can quickly fill up with voice messages and call recordings. In addition, ViewPoint performance will suffer when managing thousands of recordings, or when recordings are being delivered to a user in quick succession.

To handle thousands or even millions of recordings effectively, Wave lets you archive mailbox recordings (voice mail and call recordings) to a network directory of your choice, called the archive folder. Archiving moves the mailbox recording as well as all information about the recording from the Wave Server to the archive folder, so archived voice messages and call recordings no longer appear in ViewPoint.

Searching and acting on archived recordings

You use the Wave Archived Recording Browser to search and manage archived recordings. You can restore archived recordings to the mailbox of origin or export them to another location. (When an archived recording is restored or exported, it remains in the archive folder until purged.)

Searching for and managing archived recordings using the Wave Archived Recording Browser puts no load on the Wave Server, Wave ISM database, or ViewPoint.

Using the Wave Archived Recording Browser is described in Appendix A in the *Wave ViewPoint User Guide*.

About archive browser user accounts

To use the Archived Recording Browser, you log on using an archive browser user name and password.

Archive browser users do not necessarily correspond to Wave users, and you do not have to create an archive browser user for each Wave user who needs to search for and act on archived recordings. Multiple Wave users can log on to the Archived Recording Browser simultaneously using the same archive browser user name and password.

Typically, you create multiple accounts, each with different privileges to manage recordings, and then provide the appropriate archive browser user name and password to those Wave users who need to use the Archived Recording Browser. Each account can be shared by multiple Wave users.

Requirements

Archive server PC requirements

Caution: The Recording Archive Service should be installed on the archive server, a separate PC—not the Wave Server. Also, the archive server PC must be on your LAN—it cannot be remotely connected via the Internet. The archive server must be in the same subnet or domain as the Wave Server.

The Recording Archive Service runs on a separate PC for the following reasons:

- For reliability, since it has its own CPU, disk space, and database server requirements.
- To be able to handle the resource-intensive archiving process without negatively impacting Wave ISM performance, especially if you are archiving mailbox recordings in MP3 format. (For more about supported archived file formats, see “Minimum archive folder disk space requirements” on page 10-4.)
- To be able to archive mailbox recordings from multiple Wave ISMs.

The archive server PC must meet the following requirements:

- **Operating system:** The following operating systems can be used:
 - Windows Server 2003, base release or higher
 - Windows XP SP2 or higher

Note: Note that Windows XP is limited to supporting a maximum of 10 simultaneous connections by users running the Archived Recording Browser (for example, users playing back recordings.)

Important: If your archive server PC currently uses or will use the Windows Firewall, review the important information in Appendix E, “Configuring Wave ISM for the Windows Firewall.”

- **Database server:** Microsoft SQL Server 2005 Express Edition SP2. (See page 10-5 for download and installation instructions.)

- **Memory:** Enough memory to run Microsoft SQL Server 2005 Express Edition effectively (at least 512 MB.)
- **Disk space:** See below for more about the requirements for storing your archived recordings in the archive folder. The archive folder can be located on the archive server PC or on another PC in your network.

While not required, the following are recommended:

- **Backup:** A tape backup unit or a DVD burner is recommended to save old recordings
- **RAID:** Configure your archive server PC with RAID so that if a hard drive fails, you do not lose your valuable recordings.

Archive folder requirements

The archive folder is an empty directory that you create in which to store your archived recordings for access by Archived Recording Browser users.

Note the following:

- It is not recommended to create the archive folder on the Wave Server.
- It is preferable but not necessary to create the archive folder on the archive server PC.
- The PC where you archive your recordings must be a local PC on your LAN—it cannot be remotely connected via the Internet.
- The archive folder must be a network folder that is shared with full read/write permissions for all users who will run the Archived Recording Browser, as well as for the Wave Server itself, which must be able to write records to the folder.
- The hard drive used for the archive folder must be an NTFS-partitioned drive. Do not archive recordings to a FAT or FAT32-partitioned drive.

Minimum archive folder disk space requirements

The archive folder should reside on a disk that has a very large amount of available disk space, enough to support the volume of voice messages and call recording files that you expect to archive and maintain before deleting them or backing them up to tape or DVD.

You can archive mailbox recordings in either of the following formats, with the resulting file sizes indicated:

- **WAV format is commonly used by Windows applications**, such as Windows Media Player. (WAV file size = 64 Kb/second or 469 Kb/minute.)
- **MP3 is a popular format that consumes less disk space than WAV files** because of its very high compression rate, and results in the smallest file size, about one-third the size than if you archived the same recording in WAV format. (MP3 file size = 20 Kb/second or 146 Kb/minute.)

Installation steps

1. Identify an archive server PC that meets all of the requirements listed on page 10-3. This is the PC where you will install the Recording Archive Service.

Caution: The Recording Archive Service should **not** be installed on the Wave Server for performance reasons.

To create your archive folder:

2. In Windows Explorer, create the archive folder on a disk that meets all of the requirements described on page 10-4.

Important: You only need to create a single archive folder, even if you are archiving mailbox recordings from multiple Wave Servers. All Wave Servers automatically archive to a separate subfolder within the main archive folder.

3. Set the archive folder's sharing to EVERYONE, and set logon rights to ANONYMOUS.

To install Microsoft SQL Server 2005 Express Edition:

4. Install SQL Server 2005 Express Edition SP2 on the archive server PC. To do so, go to the following location:

<http://www.microsoft.com/downloads/details.aspx?FamilyId=31711d5d-725c-4afa-9d65-e4465cdf1e7&displaylang=en>

Follow the instructions provided to download SQL Server 2005 Express Edition SP2 base version, which meets all of the Recording Archive Service's requirements. (There is no need to install the version that includes Advanced Services.)

5. Run SQLEXP32.EXE from the location where you saved it. When the Microsoft SQL Server 2005 Setup wizard starts, follow the on-screen instructions.

6. In the Installing Prerequisites screen, click **Install** and then click **Next**.
7. In the Registration Information screen, enter a user **Name** (for example, the name of the user responsible for administering the archive server PC), and then clear the **Hide advanced configuration options** checkbox. Click **Next** to continue.
8. In the Feature Selection screen, right-click the down arrow next to the Database Services entry and select **Entire feature will be installed on local hard drive**. Repeat for the Client Components entry. Optionally, change the default installation path. Click **Next** to continue.
9. In the Instance Name screen, select **Default Instance**, and then click **Next** to continue.
10. In the Service Account screen, select **Use the built-in System account**, and then select **Local System** in the drop-down list. Click **Next** to continue.
11. In the Authentication Mode screen, select **Mixed Mode (Windows Authentication and SQL Server Authentication)**. Enter and confirm a “strong” sa logon password, and then click **Next**.
12. In the Collation Settings screen, select **SQL Collations** and then click **Next**.
13. In the Configuration Options screen, select the **Enable User Instances** checkbox, and then click **Next**.
14. In the Error and Usage Report Settings screen, leave both options unchecked, and then click **Next**.
15. Follow the onscreen instructions to complete the installation. If you are prompted to restart the archive server PC, do so.
16. After the archive server PC restarts, enable SQL Server 2005 Express to accept external connections (this option is disabled by default.) To do so:
 1. From the Windows Desktop, click **Start > Programs > Microsoft SQL Server 2005 > Configuration Tools > SQL Server Surface Area Configuration**.
 2. In the Microsoft SQL Server 2005 Surface Area Configuration tool, click **Surface Area Configuration for Services and Connections**.
 3. Select **Remote Connections** in the left pane.
 4. Select **Local and remote connections and Using TCP/IP only** in the right pane.
 5. Click **OK** to save your changes and then exit the configuration tool.

17. On the Windows Desktop right-click My Computer, and then click **Manage**.
18. Expand Services and Applications, and then click **Services**.
19. In the Services pane, scroll to **SQL Server (MSSQLSERVER)**. Right-click it, and then click **Properties**.
20. On the General tab, click **Stop** and then click **Start** to restart the SQL Server Express service.

To install the Recording Archive Service:

21. Run the Vertical Wave Services Setup from the following location on the Wave Server, replacing <Wave Server Host Name> with the IP address of the Wave Server on your local network:

```
ftp://<Wave Server Host Name>/public/workstationapps/ServicesSetup.exe
```

When Services Setup starts, follow the on-screen instructions.
22. In the Wave Server Information screen, enter the Wave Server **Host Name**, and then click **Next** to continue.
23. In the Setup Type dialog, select **Typical** to install the Recording Archive Service in the default location.

```
C:\Program Files\Common Files\Vertical\Vertical Wave
```

Click **Next** to continue.
24. In the Windows Account Name and Password dialog, enter the name and password of the Windows account that you will use to run the Recording Archive Service. Click **Next** to continue.
25. In the Microsoft SQL Server Password dialog, enter your SQL Server SA (system administrator) password. Click **Next** to continue.
26. In the Ready to Install dialog, click **Install**. If you are prompted to restart the PC, do so.

Assigning required access right to run the Recording Archive Service

Important: The Windows account that runs the Recording Archive Service must have the user right **Log on as a service**. If you do not assign the required access rights to the Windows account that runs the Recording Archive Service, you will be unable to start the service.

You can use Local Security Settings (Secpol.msc) to assign the required access right. If this PC is a node in a cluster, verify that this user right is assigned to the Cluster service account on all nodes in the cluster. If you have already assigned this user right to the service account, and the user right appears to be removed, check with your domain administrator to find out if a Group Policy object associated with this node might be removing the right.

Configuring system call recording and automatic archiving

After you have installed the Recording Archive Service, perform the following tasks:

1. If you have not already done so, configure system call recording on your system as described in Chapter 19 in the *Wave Global Administrator Guide*.
2. Configure the Recording Archive Service. For steps to perform the following, see “Configuring the Wave Recording Archive Service” in Chapter 22 in the *Wave Global Administrator Guide*.
 - Identify the archive folder.
 - Specify the time when call recordings will be archived automatically. (The default archive time is 3AM.) Depending on the number of calls that you record, you can archive once a day or at specific intervals, for example once an hour during business hours, and at 9PM and 11PM after hours.

Best practice: Ensure that all or most calls are archived off the Wave Server before the automatic system backup that occurs nightly at 2AM, to reduce the size of the backup files generated.
 - Identify the Wave Servers from which call recordings will be archived.
3. **The Recording Archive Service must be running on the archive server in order for an automatic archive to occur as scheduled.** Vertical recommends that you set the Recording Archive Service to auto-start according to the instructions in “Starting and stopping the Wave Recording Archive Service” in Chapter 22 in the *Wave Global Administrator Guide*.

4. To automatically archive the contents of the voice mailbox for a user or queue, see “Archiving mailbox recordings” in Chapter 22 in the *Wave Global Administrator Guide*. That section describes how to specify the users and queues whose voice mailboxes will be automatically archived, as well as how to set archive options (folders to archive, days to keep, and recording format) on a per-user or queue basis.
5. Configure one or more Archive Recording Browser user accounts. For details, see “Configuring who can manage archived recordings” in Chapter 22 in the *Wave Global Administrator Guide*.

Using Wave Workstation Applications with Microsoft Terminal Services or Citrix MetaFrame

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Overview

Using Microsoft Terminal Services or Citrix® MetaFrame with Wave enables you to do the following:

- Run ViewPoint on a PC that does not meet the minimum requirements described in “ViewPoint requirements” on page 9-4.
- Centrally manage the installation and maintenance of ViewPoint by installing it on an application server, instead of on individual users’ PCs.

Note: The Wave TAPI Service Provider workstation application cannot be used with Microsoft Terminal Services or Citrix Metaframe.

Microsoft Terminal Services or Citrix MetaFrame can be used in Application Server mode. In Application Server mode, remote PCs can be used as terminals for programs running in a multi session environment on an application server. For example, several users on remote PCs can start terminal sessions to run ViewPoint. Each session starts a new instance of ViewPoint, and all instances of ViewPoint run simultaneously on the application server. No Wave ISM software is required on the remote PCs.

ViewPoint is compatible with the multi session environment provided by Microsoft Terminal Services and Citrix MetaFrame. See “Installing workstation applications on an application server” on page A-2 for details on how to set up an application server for use with Wave.

Installing workstation applications on an application server

Bear the following considerations in mind when you set up an application server for Wave:

- The application server cannot be the same PC as your Wave Server.
- Applications should not be installed in the same partition as the Windows operating system. In most cases, Windows will be installed on your C drive and applications will be installed on a D drive. The D drive can either be a separate hard disk or another partition on the same disk as the C drive.
- Always use Add/Remove Programs (located on the Windows Control Panel) to install programs. This ensures that the programs are set up properly for multi session use.

Important: The server must be in remote administration mode to remotely install any Wave workstation applications. See “Installing workstation applications on a Windows 2003 server” on page A-2.

Installing workstation applications on a Windows 2003 server

To install the Wave workstation applications on a Microsoft Windows 2003 Terminal Server, see the documentation that came with Terminal Services.

Trunk and Station Ports and Pinouts

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This appendix lists the port numbers, description, and pinout pairs for interfaces on the ISC1/ISC2, cards, and modules that provide trunk and station resources on the Wave Server.

Integrated Services Card (ISC1) port descriptions and pinouts

The ISC1 is supported on the Wave IP 2500 Server.

RJ-21X interface port descriptions and pinouts

Pin	Function	Pin	Function	Description
1	Ring	26	Tip	Analog FXS station port 1 (failover)
2	Ring	27	Tip	Analog FXS station port 2
3	Ring	28	Tip	Analog FXS station port 3
4	Ring	29	Tip	Analog FXS station port 4
5-16		30-41		Not used

Pin	Function	Pin	Function	Description
17	C	42	NC	Alarm relay (reserved for future use)
18	C	43	NO	Alarm relay (reserved for future use)
19-20		44-45		Not used
21	Ring	46	Tip	Analog FXO trunk port 1 (failover)
22	Ring	47	Tip	Analog FXO trunk port 2
23	Ring	48	Tip	Analog FXO trunk port 3
24	Ring	49	Tip	Analog FXO trunk port 4
25	Ground	50	Ground	Chassis ground

Integrated Services Card (ISC2) port descriptions and pinouts

The ISC2 is supported on the Wave IP 500 Server.

RJ-11 interface port descriptions and pinouts

Trunk 1

Pin	Function	Description
1		Not used
2	Ring	Analog FXO trunk port 1 (failover)
3	Tip	Analog FXO trunk port 1 (failover)
4		Not used

Trunk 2

Pin	Function	Description
1		Not used
2	Ring	Analog FXO trunk port 2
3	Tip	Analog FXO trunk port 2
4		Not used

SLT 1

Pin	Function	Description
1		Not used
2	Ring	Analog FXS station port 1 (failover)
3	Tip	Analog FXS station port 1 (failover)
4		Not used

SLT 2

Pin	Function	Description
1		Alarm relay
2	Ring	Analog FXS station port 2
3	Tip	Analog FXS station port 2
4		Alarm relay

Analog Universal Module port descriptions and pinouts

The Analog Universal Module is supported on both the Wave IP 500 and Wave IP 2500 Servers.

RJ-21X interface port descriptions and pinouts

Pin	Function	Pin	Function	Description
1	Ring	26	Tip	Analog FXO trunk port 1
2	Ring	27	Tip	Analog FXO trunk port 2
3	Ring	28	Tip	Analog FXO trunk port 3
4	Ring	29	Tip	Analog FXO trunk port 4
5	Ring	30	Tip	Analog FXO trunk port 5
6	Ring	31	Tip	Analog FXO trunk port 6
7	Ring	32	Tip	Analog FXO trunk port 7
8	Ring	33	Tip	Analog FXO trunk port 8
9-16		34-41		Not used
17	Ring	42	Tip	Analog FXS station/DID Trunk port 1
18	Ring	43	Tip	Analog FXS station/DID Trunk port 2
19	Ring	44	Tip	Analog FXS station/DID Trunk port 3
20	Ring	45	Tip	Analog FXS station/DID Trunk port 4
21	Ring	46	Tip	Analog FXS station/DID Trunk port 5
22	Ring	47	Tip	Analog FXS station/DID Trunk port 6
23	Ring	48	Tip	Analog FXS station/DID Trunk port 7
24	Ring	49	Tip	Analog FXS station/DID Trunk port 8
25	Ground	50	Ground	Chassis ground

Analog Trunk Module port descriptions and pinouts

The Analog Trunk Module is supported on both the Wave IP 500 and Wave IP 2500 Servers.

RJ-21X interface port descriptions and pinouts

Pin	Function	Pin	Function	Description
1	Ring	26	Tip	Analog FXO trunk port 1
2	Ring	27	Tip	Analog FXO trunk port 2
3	Ring	28	Tip	Analog FXO trunk port 3
4	Ring	29	Tip	Analog FXO trunk port 4
5	Ring	30	Tip	Analog FXO trunk port 5
6	Ring	31	Tip	Analog FXO trunk port 6
7	Ring	32	Tip	Analog FXO trunk port 7
8	Ring	33	Tip	Analog FXO trunk port 8
9-24		34-49		Not used
25	Ground	50	Ground	Chassis ground

T1 Module with serial interface pinouts

The T1 Module with serial interface is supported on both the Wave IP 500 and Wave IP 2500 Servers.

RJ-48X interface pinouts

Pin	Function	Pin	Function
1	CI Receive Ring, -	5	CI Transmit Tip, +
2	CI Receive Tip,+	6	Shield / Ground
3	Shield / Ground	7	Not used
4	CI Transmit Ring, -	8	Not used

DB-60 interface pinouts

Pin	Function
1-16	Ground
17	RD- (Receive Data)
18	RD+ (Receive Data)
19	TxC+ (Send SCT)
20	TxC+ (Send SCT)
21	RxC (Receive SCR)
22	RxC (Receive SCR)
23-26	Not used
27	TxD (Send SD)
28	TxD (Send SD)
29	Not used
30	Ground
31-32	Not used
33	LL (Loopback Test)
34	DTR (Data Terminal Ready)
35	RTS (Request to Send)
36-41	Not used
42	CTS (Clear to Send)
43	DSR (Data Set Ready)
44	DCD (Data Carrier Detect)
45-46	Ground
47	CableType[2] 5-in-1 Cable Type Bit 2
48	Ground
49	CableType[1] 5-in-1 Cable Type Bit 1

Pin	Function
50	CableType[0] 5-in-1 Cable Type Bit 0
51	Ground
52	Mode_DCE (DCE Mode)
53-55	Not used
56	Ground
57-60	Not used

T1 Module (without serial interface) pinouts

The T1 Module (without serial interface) is supported on both the Wave IP 500 and Wave IP 2500 Servers.

RJ-48X interface pinouts

Pin	Function	Pin	Function
1	CI Receive Ring, -	5	CI Transmit Tip, +
2	CI Receive Tip, +	6	Shield / Ground
3	Shield / Ground	7	Not used
4	CI Transmit Ring, -	8	Not used

E1 Module with serial interface port descriptions and pinouts

The E1 Module with serial interface is supported on both the Wave IP 500 and Wave IP 2500 Servers.

RJ-48X interface pinouts

Pin	Function	Pin	Function
1	CI Receive Ring, -	5	CI Transmit Tip, +
2	CI Receive Tip, +	6	Shield / Ground

Pin	Function	Pin	Function
3	Shield / Ground	7	Not used
4	CI Transmit Ring, -	8	Not used

DB-60 interface pinouts

Pin	Function
1-16	Ground
17	RD- (Receive Data)
18	RD+ (Receive Data)
19	TxC+ (Send SCT)
20	TxC+ (Send SCT)
21	RxC (Receive SCR)
22	RxC (Receive SCR)
23-26	Not used
27	TxD (Send SD)
28	TxD (Send SD)
29	Not used
30	Ground
31-32	Not used
33	LL (Loopback Test)
34	DTR (Data Terminal Ready)
35	RTS (Request to Send)
36-41	Not used
42	CTS (Clear to Send)
43	DSR (Data Set Ready)
44	DCD (Data Carrier Detect)

Pin	Function
45-46	Ground
47	CableType[2] 5-in-1 Cable Type Bit 2
48	Ground
49	CableType[1] 5-in-1 Cable Type Bit 1
50	CableType[0] 5-in-1 Cable Type Bit 0
51	Ground
52	Mode_DCE (DCE Mode)
53-55	Not used
56	Ground
57-60	Not used

Analog Station Card port descriptions and pinouts

The Analog Station Card is supported on the Wave IP 2500 Server.

RJ-21X interface port descriptions and pinouts

Pin	Function	Pin	Function	Description
1	Ring	26	Tip	Analog FXS station port 1
2	Ring	27	Tip	Analog FXS station port 2
3	Ring	28	Tip	Analog FXS station port 3
4	Ring	29	Tip	Analog FXS station port 4
5	Ring	30	Tip	Analog FXS station port 5
6	Ring	31	Tip	Analog FXS station port 6
7	Ring	32	Tip	Analog FXS station port 7
8	Ring	33	Tip	Analog FXS station port 8
9	Ring	34	Tip	Analog FXS station port 9

Pin	Function	Pin	Function	Description
10	Ring	35	Tip	Analog FXS station port 10
11	Ring	36	Tip	Analog FXS station port 11
12	Ring	37	Tip	Analog FXS station port 12
13	Ring	38	Tip	Analog FXS station port 13
14	Ring	39	Tip	Analog FXS station port 14
15	Ring	40	Tip	Analog FXS station port 15
16	Ring	41	Tip	Analog FXS station port 16
17	Ring	42	Tip	Analog FXS station port 17
18	Ring	43	Tip	Analog FXS station port 18
19	Ring	44	Tip	Analog FXS station port 19
20	Ring	45	Tip	Analog FXS station port 20
21	Ring	46	Tip	Analog FXS station port 21
22	Ring	47	Tip	Analog FXS station port 22
23	Ring	48	Tip	Analog FXS station port 23
24	Ring	49	Tip	Analog FXS station port 24
25	Ground	50	Ground	Chassis ground

Digital Station Card port descriptions and pinouts

The Digital Station Card is supported on the Wave IP 2500 Server.

RJ-21X interface port descriptions and pinouts

Pin	Function	Pin	Function	Description
1	Ring	26	Tip	Digital station port 1
2	Ring	27	Tip	Digital station port 2
3	Ring	28	Tip	Digital station port 3

Pin	Function	Pin	Function	Description
4	Ring	29	Tip	Digital station port 4
5	Ring	30	Tip	Digital station port 5
6	Ring	31	Tip	Digital station port 6
7	Ring	32	Tip	Digital station port 7
8	Ring	33	Tip	Digital station port 8
9	Ring	34	Tip	Digital station port 9
10	Ring	35	Tip	Digital station port 10
11	Ring	36	Tip	Digital station port 11
12	Ring	37	Tip	Digital station port 12
13	Ring	38	Tip	Digital station port 13
14	Ring	39	Tip	Digital station port 14
15	Ring	40	Tip	Digital station port 15
16	Ring	41	Tip	Digital station port 16
17	Ring	42	Tip	Digital station port 17
18	Ring	43	Tip	Digital station port 18
19	Ring	44	Tip	Digital station port 19
20	Ring	45	Tip	Digital station port 20
21	Ring	46	Tip	Digital station port 21
22	Ring	47	Tip	Digital station port 22
23	Ring	48	Tip	Digital station port 23
24	Ring	49	Tip	Digital station port 24
25	Ground	50	Ground	Chassis ground

Digital Station Module port descriptions and pinouts

The Digital Station Module is supported on both the Wave IP 500 and Wave IP 2500 Servers.

Both a 12-port and 24-port digital station module are available. See the *Wave Server Hardware Reference Guide* for detailed specifications for both boards.

RJ-21X interface port descriptions and pinouts

Pin	Function	Pin	Function	Description
1	Ring	26	Tip	12- and 24-port models: Digital station port 1
2	Ring	27	Tip	12- and 24-port models: Digital station port 2
3	Ring	28	Tip	12- and 24-port models: Digital station port 3
4	Ring	29	Tip	12- and 24-port models: Digital station port 4
5	Ring	30	Tip	12- and 24-port models: Digital station port 5
6	Ring	31	Tip	12- and 24-port models: Digital station port 6
7	Ring	32	Tip	12- and 24-port models: Digital station port 7
8	Ring	33	Tip	12- and 24-port models: Digital station port 8
9	Ring	34	Tip	12- and 24-port models: Digital station port 9
10	Ring	35	Tip	12- and 24-port models: Digital station port 10
11	Ring	36	Tip	12- and 24-port models: Digital station port 11
12	Ring	37	Tip	12- and 24-port models: Digital station port 12
13	Ring	38	Tip	12-port model: Not used 24-port model: Digital station port 13
14	Ring	39	Tip	12-port model: Not used 24-port model: Digital station port 14
15	Ring	40	Tip	12-port model: Not used 24-port model: Digital station port 15
16	Ring	41	Tip	12-port model: Not used 24-port model: Digital station port 16

Pin	Function	Pin	Function	Description
17	Ring	42	Tip	12-port model: Not used 24-port model: Digital station port 17
18	Ring	43	Tip	12-port model: Not used 24-port model: Digital station port 18
19	Ring	44	Tip	12-port model: Not used 24-port model: Digital station port 19
20	Ring	45	Tip	12-port model: Not used 24-port model: Digital station port 20
21	Ring	46	Tip	12-port model: Not used 24-port model: Digital station port 21
22	Ring	47	Tip	12-port model: Not used 24-port model: Digital station port 22
23	Ring	48	Tip	12-port model: Not used 24-port model: Digital station port 23
24	Ring	40	Tip	12-port model: Not used 24-port model: Digital station port 24
25	Ground	50	Ground	Chassis ground

Integrated Services Card Status LEDs

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Overview

The System Status LEDs and Card Status LEDs on the front of the Integrated Services Card (ISC1 or ISC2, depending on your Wave Server model) in your Wave Server provide valuable troubleshooting information. When you contact your Vertical technical support representative, you may be asked to describe the LED activity that you observe. You can view the Status LEDs by physically examining the front of the ISC1/ISC2 directly, or via the Chassis View applet in the Global Administrator Management Console.

About Card LEDs

There are two Card Status LEDs, red and green, that indicate the general status of the Wave Server:

Status	Red Card LED	Green Card LED
System is in an early boot phase.	off	off
System boot is in progress, or a firmware flash update is in progress.	Blinking red	off
System is operational with no errors.	off	Blinking green
System shutdown is in progress.	Blinking red	Blinking green
Error condition exists on the system.	Red	off

Status	Red Card LED	Green Card LED
System upgrade is in progress.	Blinking red	Green
Hard drive imaging in progress (via the Wave System Recovery Disk.)	Red	Green

About System Status LEDs

There are 4 System Status LEDs that communicate detailed information about the state of the Wave Server.

Acronyms and definitions of selected terms

The following acronyms and terms are used in the System LED settings tables in this appendix:

- **ISC1/ISC2**—Embedded processor installed on the Wave Server that provides primary system control including voice processing and packet switching elements.
- **VAM**—Vertical Application Module. Single-board computer that runs the Integrated Services Manager (ISM1) and call center applications.
- **ISC1/ISC2 Firmware**—Firmware that runs on the Integrated Services Card.
- **PLD Programmer**—Software component on the VAM that is responsible for checking the version of the ISC1/ISC2 firmware and reflashing it with a newer version if one is available on the VAM's hard drive.
- **Linux**—Operating system that runs on the ISC1/ISC2.
- **Check Disk**—Windows utility that looks for and optionally repairs file system errors and bad sectors on a hard drive. While Check Disk is running, do not reset or re-boot the system—Check Disk should be allowed to complete. If it is interrupted, the system will run Check Disk again on recovery, thus increasing the amount of time it will take to return the system to a ready state.

System LED indicators

This appendix lists System Status LED indicators and/or Card Status LED indicators that you may observe for the following scenarios:

- Normal boot sequence
- System shutdown
- Error condition

Important: Not all System LED indicators are described in this appendix. For a complete explanation of all of the potential LED activity that you may observe for a variety of scenarios, see Appendix E in the *Wave Server Hardware Reference Guide*.

Normal boot sequence indicators

After the Wave Server is powered on, you will observe the following LED indicator sequence during a normal boot sequence.

The **Expected time** column indicates the length of time that a specific LED pattern is displayed before moving on to the next pattern in the sequence. “~” indicates an approximate expected time. For settings with complex blink patterns, see Appendix E in the *Wave Server Hardware Reference Guide* for detailed patterns and timings.

Current status	Expected time	SYSTEM STATUS LEDES				CARD STATUS LEDES	
		LED1	LED2	LED3	LED4	Red LED	Green LED
ISC1/ISC2 boot loader LED Lamp Test (red LEDs).	0.5 sec	Red	Red	Red	Red	Red	off
ISC1/ISC2 boot loader LED Lamp Test (green LEDs).	0.5 sec	Green	Green	Green	Green	off	Green
ISC1/ISC2 boot loader early boot initialization and Flash verification.	~15 sec	Red	off	off	off	off	off

Current status	Expected time	SYSTEM STATUS LEDS				CARD STATUS LEDS	
		LED1	LED2	LED3	LED4	Red LED	Green LED
ISC1/ISC2 boot loader is waiting for PLD Programmer on VAM to connect.	~15 sec with 1.5 GHz VAM	Red	Blinking green	off	off	off	off
This pattern may be displayed for up to 150 seconds. Timing can be affected by BIOS memory test, or the Windows Troubleshooting and Advanced Startup menu appearing due to a failure to start Windows on the previous boot.							
PLD Programmer has connected to the ISC1/ISC2 boot loader and is verifying the embedded firmware image.	~12 sec	Red	Green	off	off	off	off
ISC1/ISC2 boot loader is loading Linux kernel image into memory.	~5 sec	Red	Green	Green	off	off	off
ISC1/ISC2 boot loader is transferring execution control to Linux.	~2 sec	Red	Green	Green	Green	off	off
Linux started.	~6 sec	Green	Alternating flickering red on green background / green	off	off	off	off
LED Manager started.	~5 sec	Green	off	off	off	Blinking red	off

Current status	Expected time	SYSTEM STATUS LEDS				CARD STATUS LEDS	
		LED1	LED2	LED3	LED4	Red LED	Green LED
Check Disk in progress.	0 sec (or several minutes if Check Disk occurs.)	Green	Alternating red / green	off	off	Blinking red	off
Windows is loading.	~2 min	Green	Blinking red	off	off	Blinking red	off
Windows is up.	~5 sec	Green	Green	off	off	Blinking red	off
Loading basic PBX services.	~4 min	Green	Green	Blinking red	off	Blinking red	off
Basic PBX services are up. Phone calls can now be made.	~5 sec	Green	Green	Green	off	Blinking red	off
Loading advanced PBX services.	~6 min	Green	Green	Green	Blinking red	Blinking red	off
System is fully booted and operational.	Indefinitely	Green	Alternating flickering red on green background / green	Slow blinking green	Blinking green	off	Blinking green

System shutdown sequence indicators

During a power (red) button shutdown, you will observe the following LED setting sequence.

Status	SYSTEM STATUS LEDS				CARD STATUS LEDS	
	LED1	LED2	LED3	LED4	Red LED	Green LED
LED Manager system shutdown in progress.	Green	Alternating flicker- ing red on green back- ground / green	Alternating green / red	Alternating red / green	Blinking red	Blinking green

If the shutdown type is Power Off (such as a power off initiated by pressing the red Power Off button on the front panel of the ISC1/ISC2 for 4 seconds), the system power will be turned off when the shutdown is complete. Note that older Wave IP 2500s (with backplane rev 0x34) do not have the capability to turn off the power programmatically. On these systems, the following LED setting indicates that the system can now be powered off manually:

Shutdown complete; power off was unsuccessful.	Green	Red	Red	Red	off	off
--	--------------	------------	------------	------------	-----	-----

If the shutdown type is Reboot, the system will restart. See “Normal boot sequence indicators” on page C-3.

Error condition indicators

If an error occurs on your system, you will observe the following Card Status LED setting:

Status	Red Card LED	Green Card LED
Error condition exists on the system.	Red	off

The associated System Status LED indicators describe the specific error that occurred. See “Error Conditions” in Appendix E in the *Wave Server Hardware Reference Guide* for details.

Performing Unattended Workstation Installations

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Overview

You can install any of the Wave workstation applications listed below unattended (silently), so that your organization can perform automatic software updates or use a network maintenance system that performs remote installations.

- ViewPoint
- Contact Manager Assistant
- Archived Recording Browser
- TAPI Service Provider

When running Workstation Setup unattended, you can perform either of the following types of installation:

- **Typical installation:** In a typical installation, the following occur. You cannot change any of these options.
 - When installing Wave on a PC for the first time, only ViewPoint is installed.
 - When upgrading from a previous version of Wave, Workstation Setup detects the workstation applications that are installed, and upgrades those applications to the current version.
 - The workstation applications are installed in the default location.

- **Custom installation:** In a custom installation, you can specify which workstation applications to install, change the installation drive or folder, uninstall workstation applications, and specify other options.

Note: Because the PC where the workstation applications are installed must be restarted to complete the installation, you should perform unattended installations when users will not be interrupted while they are working.

Performing a typical unattended installation

To perform a typical unattended workstation application installation, run the following command on the PC where the workstation applications will be installed:

```
\\<Wave Server Host Name>\Netsetup\setup.exe /s /v"/qn INSTALLLEVEL=200 /!*v  
%TEMP%\wssetup.log"
```

Performing a custom unattended installation

To perform a custom unattended workstation application installation, run the following command on the PC where the workstation applications will be installed, including any of the parameters described in the table on page D-3.

```
\\<Wave Server Host Name>\Netsetup\setup.exe /s /v"/qn CUSTOM_INSTALL=1  
INSTALLLEVEL=200 /!*v %TEMP%\wssetup.log"
```

This example only shows the parameters required for *any* custom unattended installation. For other examples of custom installation commands, see the next section.

Note that any string value that contains a space must be delimited with the characters /" before and after the string value, as in the following example:

```
TVCMAFOLDER="/C:\Program Files\CMA/"
```

Custom unattended installation examples

The following examples demonstrate different unattended installations. See “Workstation Setup command parameters” on page D-3 for details on the command parameters you can use.

The following sample command installs ViewPoint in the default location:

```
setup.exe /s /v"/qn CUSTOM_INSTALL=1 INSTALLLEVEL=200  
ADDLOCAL=Client"
```

The following sample command installs all of the workstation applications in the default location:

```
setup.exe /s /v"/qn CUSTOM_INSTALL=1 INSTALLLEVEL=200
ADDLOCAL=ALL"
```

The following sample command does the following:

- Installs the single-line TAPI Service Provider in the default location.
- Installs the Contact Manager Assistant in the specified location.
- Configures the single-line TAPI Service Provider.
- Launches the Contact Manager Assistant when the installation completes, if a restart is not required.

```
setup.exe /s /v"/qn CUSTOM_INSTALL=1 INSTALLLEVEL=200
ADDLOCAL=TSP,CMA TVSERVER=CompanyServer TVSTATION=1
TVUSER=Operator TVPASSWORD=0 TVTSPAPPHANGUP=1 TVTSPTRACE=1
TVCMAFOLDER="C:\Program Files\CMA/" TVLAUNCHCMA=1 /!*/v
%TEMP%\wssetup.log"
```

When run on a Terminal Server PC, the following command installs all of the workstation applications in the default location:

```
setup.exe /s /v"/qn CUSTOM_INSTALL=1 INSTALLLEVEL=200 ADDLOCAL=ALL
TERMINALSVRMODE=1"
```

Workstation Setup command parameters

The following parameters can be specified in any order. Separate parameters with spaces.

Name	Value	Description
CUSTOM_INSTALL	Integer	Installation type: 0 = (Default) Typical installation. 1 = Custom installation.
INSTALLLEVEL	200	Required whenever you use the ADDLOCAL parameter (not required to REMOVE a workstation application.)

Name	Value	Description
ADDLOCAL	Client CMA RecordingBrowser TSP ALL	<p>Workstation application to install:</p> <p>Client = ViewPoint CMA = Contact Manager Assistant RecordingBrowser = Archived Recording Browser TSP = TAPI Service Provider</p> <p>To install more than one application, separate each one with a comma (,), for example: ADDLOCAL=Client,CMA</p> <p>To install all of the workstation applications, specify ALL, for example: ADDLOCAL=ALL</p>
REMOVE	Client CMA RecordingBrowser TSP ALL	<p>Workstation application to remove:</p> <p>Client = ViewPoint CMA = Contact Manager Assistant RecordingBrowser = Archived Recording Browser TSP = TAPI Service Provider</p> <p>To remove more than one application, separate each one with a comma (,), for example: REMOVE=Client,CMA</p> <p>To remove all of the workstation applications, specify ALL, for example: REMOVE=ALL</p>
TVSERVER	String	<p>Name of the Wave Server, for example: TVSERVER=WaveServer</p>
TVSTATION	String	<p>Station ID of the phone that will be used by the person at this PC: TVSTATION=186</p> <p>If you do not know the station ID, pick up the phone and dial *0.</p> <p>If there is not a Wave phone near this PC, enter a station ID of 0. TVSTATION=0</p>

Name	Value	Description
SUPPRESS_MSGS	Integer	<p>0 = (Default) Workstation Setup displays message boxes on the PC where the applications are installed. Workstation Setup stops processing and waits until someone responds to each message box.</p> <p>1 = Suppress display of message boxes. The messages are still written to the Workstation Setup Log (see "Performing a typical unattended installation" on page D-2.)</p>
<p>Use the following 4 parameters to specify the complete path to the location where a workstation application will be installed, for example:</p> <pre>TVCLIENTFOLDER="/C:\Program Files\TV Client/"</pre> <p>If not specified, the application will be installed in the default location.</p>		
TVCLIENTFOLDER	String	Location where ViewPoint will be installed.
TVTSPFOLDER	String	Location where the single-line TAPI Service Provider will be installed.
TVCMAFOLDER	String	Location where the Contact Manager Assistant will be installed.
<p>Optionally, use the following 4 parameters if you are installing the single-line TAPI Service Provider (<code>ADD_LOCAL=TSF</code> or <code>ADD_LOCAL=ALL</code>.) If you do not provide this information during the unattended install, you must run the TAPI Configuration Wizard later to configure TAPI SP for the user at this PC. See "Configuring the TAPI Service Provider" on page 9-10 for more information</p>		
TVUSER	String	<p>TAPI SP only. User name of the person assigned to the station ID in TVSTATION: TVUSER=SRyan</p> <p>Note: TVUSER must be the user assigned to the station ID in TVSTATION, else this parameter is ignored.</p>
TVPASSWORD	String	<p>TAPI SP only. User's Wave password: PASSWORD=17530</p>

Name	Value	Description
TVTSPAPPHANGUP	Integer	<p>TAPI SP only. Specifies whether applications using TAPI SP can hang up calls.</p> <p>0 = (Default) Applications using the TAPI SP cannot hang up calls. 1 = Applications using the TAPI SP can hang up calls.</p> <p>Important: Some contact manager programs experience problems when TVTSPAPPHANGUP=1. For details, run the TAPI SP Configuration Wizard after installing TAPI SP, and read the Help for the second Wizard screen. Do set TVTSPAPPHANGUP=1 for users who use Microsoft Outlook as their contact manager.</p>
TVTSPTRACE	Integer	<p>TAPI SP only. Specifies whether TAPI SP writes debugging information to disk when placing calls. This information is useful when communicating with technical support.</p> <p>0 = (Default) TAPI SP does not create a trace file. 1 = TAPI SP creates a trace file.</p> <p>Note: The trace file is located at the following location:</p> <p>C:\Program Files\Vertical Wave ViewPoint\Logs\Tvtsp.txt</p> <p>Set the following parameter to 1 when installing workstation applications on a server PC running Windows Terminal Server or Citrix MetaFrame so that users do not have to re-enter logon information when they access the applications.</p>
TERMINALSVRMODE	Integer	<p>1 = Individual user logon settings are preserved for users who access workstation applications via Terminal Services. 0 = (Default) Mode used for non-Terminal Services installations.</p>
TVLAUNCHCLIENT	Integer	<p>Use the following 3 parameters to launch a workstation application after the installation completes. Note: Each parameter takes effect only if the application was installed successfully and no restart is necessary. These parameters are not affected by the REBOOT parameter setting.</p> <p>0 = (Default) Do not start ViewPoint after the installation completes. 1 = Start ViewPoint after the installation completes.</p>
TVLAUNCHCMA	Integer	<p>0 = (Default) Do not start the Contact Manager Assistant after the installation completes. 1 = Start the Contact Manager Assistant after the installation completes.</p>

Name	Value	Description
REBOOT	String	Force = (Default) Automatically restarts the PC where the workstation applications are installed after the installation completes. ReallySuppress = Do not restart the PC after installation completes. If you specify <code>REBOOT=ReallySuppress</code> , the PC must be restarted later.

Verifying that an unattended installation was successful

You can determine if a unattended installation was successful by viewing the Workstation Setup Log. This file is created in the `\Temp` directory on the PC where Workstation Setup was run. When an installation is successful, an entry like this one appears near the end of the file:

```
MSI (c) (80:34): Product: workstation applications -- Installation operation completed successfully.
```

Note: You can also examine the Windows Event Log on the PC to see if the installation completed successfully.

Configuring Wave ISM for the Windows Firewall

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Overview

Important: The information in this appendix applies if any PC where one or more Wave workstation applications are installed is also running the Windows Firewall. Even if it is not company policy to run the Windows Firewall, it may be enabled by default on PCs running Windows Vista, Windows XP SP2 or higher, or Windows Server 2003 SP1 or higher, so the information in this appendix applies to you.

You must perform the steps in “Adjusting Windows Firewall exceptions” on page E-2 if any workstation PC is running the Windows Firewall, so that the workstation PC can receive events from the Wave IP 2500.

The Wave workstation applications are described in more detail in Chapter Chapter 9.

About Wave ISM and the Windows Firewall

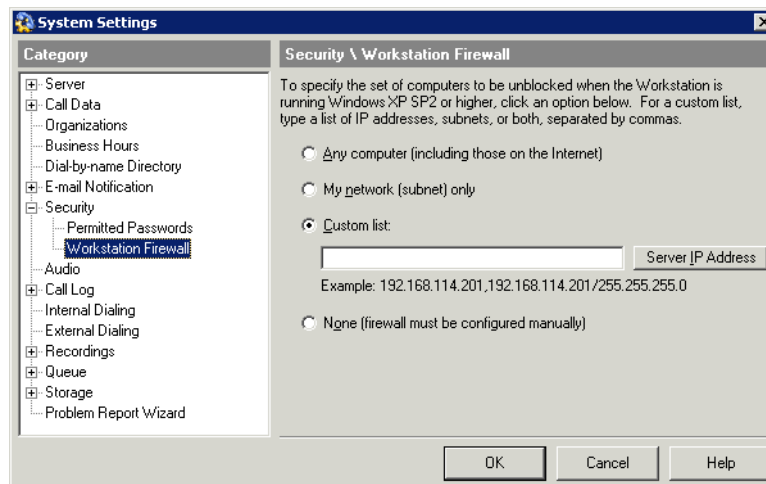
The Windows Firewall is designed to protect Windows from unwanted network access, including potentially hostile viruses. Left unchanged, these security measures also prevent Wave workstation applications from communicating with and receiving requests from the Wave ISM. Workstation applications such as ViewPoint will not operate properly—for example, you may not be able to log into ViewPoint unless you specify a station ID of 0, or calls will not appear in the ViewPoint Call Monitor.

To resolve these problems, when Wave workstation applications are started, the Windows Firewall settings on workstation PCs are automatically modified so that the Wave workstation applications will work properly on most networks. Specifically, to enable necessary communication between a Wave workstation application and the Wave ISM, upon start up the Wave workstation application automatically adds several entries to the Windows Firewall Exceptions List on the workstation PC. (For a complete list of the Windows Firewall exceptions added to Wave workstation PCs and their associated default values, see “Windows Firewall exceptions added for Wave” on page E-4.)

Adjusting Windows Firewall exceptions

You *must* perform the following procedure on your Wave ISM if *any* workstation PC is running the Windows Firewall, so that the workstation PC can receive events from the Wave Server. This allows you to tailor the Windows Firewall settings to match your unique network configuration and security requirements.

1. In the Global Administrator Management Console, click User/Workgroup Management, and then choose **Tools > System Settings**.
2. Select the Security \ Workstation Firewall tab.



3. Click **Custom List**.

The settings on this tab determine which IP addresses will be allowed to send network requests to the Wave workstation PCs. You only need to specify the VAM's IP address on your Wave Server, which you can do in several ways.

- If you have a single Wave Server, click **Server IP Address** to automatically enter it.
- If you have multiple Wave Servers, enter the VAM's IP address for each one, so that any Wave workstation PC can connect to any Wave Server. Separate each IP address with a comma and no space.

Important: If a VAM's IP address ever changes (for example, your VAM is using DHCP—which is NOT recommended) you must update this setting in order for the Wave workstation applications to continue to be able to connect.

4. Click **OK** to close the System Settings dialog.

How updated Windows Firewall exceptions are applied

Once you save changes that you make to the Windows Firewall settings on the Wave ISM (as described in the previous section), the next time any workstation application starts and connects to the Wave ISM, it reads the Security \ Workstation Firewall settings and modifies that workstation PC's Windows Firewall Exception List to match those settings.

For example, if you entered 192.168.114.20 in the Custom List (the VAM's fixed IP address), then as soon as ViewPoint starts on a workstation PC, that PC's Windows Firewall is opened to DCOM traffic from 192.168.114.20 so it can receive events from the Wave Server.

If you save changes while one or more Wave workstation applications are in an active session, the new settings will not be applied until the applications are restarted.

Note the following:

- Restarting the Wave Server forces all Wave workstation applications except the TAPI Service Provider to restart.
- To restart the TAPI Service Provider, you must restart the affected workstation PC.

Windows Firewall exceptions added for Wave

The following Windows Firewall exceptions are added to workstation PCs using the settings you specified in the Security \ Workstation Firewall tabs, according to the instructions in the previous section. All of these exceptions are required to run Wave across a network.

- DCOM Resolver: Port TCP135.
- Wave ViewPoint: Vertical.Wave.ViewPoint.exe.
- Wave Contact Center Reporter: TVReporter.exe.
- Wave Voicemail Archive Browser: TVRecordingBrowser.exe.

Troubleshooting

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This appendix contains information that may be helpful when you are troubleshooting a problem that occurs during installation or initial configuration of your Wave system.

General troubleshooting steps

Resetting the Wave Server IP addresses to the factory defaults

The steps in this section reset the Integrated Services Card (ISC1 or ISC2, depending on the Wave Server model) and Vertical Application Module (VAM) IP address settings to the factory default settings.

This procedure can help you recover if you lose or forget the current ISC1 or ISC2 and VAM IP address settings, or are experiencing problems with IP addresses not updating. Once you recover the factory default IP network settings, you can then connect to the Wave Server again and re-configure IP network settings as needed via the IP Network Settings applet in the Global Administrator Management Console. For instructions, see “Identifying the Wave Server on your LAN” in Chapter 3 or Chapter 4 (depending on your Wave Server model).

IP network settings are reset as follows:

- ISC1 or ISC2
 - IP Address: 192.168.205.10.
 - Subnet Mask: 255.255.255.0.
 - Default Gateway: 0.0.0.0.
- VAM
 - IP Address: 192.168.205.1.
 - Subnet Mask: 255.255.255.0.
 - Default Gateway: 0.0.0.0.

Note: The Media Resource Module (MRM) IP address(es) are **not** reset by this procedure.

Important: When you reset ISC1/ISC2 and VAM IP addresses to the factory defaults settings, you must also reset the administrator PC's IP address if necessary so that all of the IP addresses are on the same subnet.

To reset ISC1/ISC2 and VAM IP addresses to factory defaults:

1. Shut down the Wave Server
2. Turn off the power supply switch on the back of the base unit.
3. Press and hold the red button on the front of the ISC1/ISC2. While continuing to press the red button, turn the power supply switch back on.

Important: Be sure to continue to hold the red button until System Status LED1 and LED4 are both red (this may take up to 15 seconds.)

4. Wait for a few seconds until the System Status LED1 and LED4 (located on the front of the ISC1/ISC2) are both solid red. Then, release the red button.

Troubleshooting modem problems

The information in this section may be useful if you choose to use a different modem that has not been certified for use with Wave ISM (see page 5-3) and experience problems.

The following terms are used throughout this section. For a complete description of each term, see “Connecting to the Wave ISM via a modem” on page 5-10.

- **Wave modem:** The *answering* modem on the ISC1/ISC2.
- **Client modem:** The *calling* modem on the administrator PC.
- **Remote connection:** A modem connection made through a trunk port on the Wave Server.
- **Local connection:** A modem connection made through an analog station port on the Wave Server.

The client modem connects, but cannot authenticate user name and password.

Symptom: This problem has been observed on Creative Labs modems, and on modems that use the Conexant chipset.

Solution:

1. Connect to the Wave Server from the administrator PC via your network (not via the modem connection) as described on page 5-6.
2. In the Windows Control Panel on the Wave Server, choose **Administrative Tools > Routing and Remote Access**.
3. In left panel of the dialog, right-click on the Wave Server, and then click **Properties > Security > Authentication Methods**.
4. Clear the 2nd checkbox, **Microsoft encrypted authentication version 2 (MC-CHAP v2)**.
5. Click **OK**, **Apply**, **No**, and **OK** to save your change.

Once the client modem is connected to the Wave Server, other IP connections on the administrator PC run very slowly.

Symptom: On the administrator PC, this problem affects IP applications such as your Internet browser, e-mail, and so forth. This problem occurs because every DNS request is being routed through the client modem.

Solution:

1. On the administrator PC, in the Windows Control Panel, choose **Network Connections**.
2. Right-click your modem connection and then click **Properties**.
3. In the Properties dialog, on the Networking tab click **Advanced**.
4. In the next dialog, clear the **Use default gateway on remote network** checkbox.
5. Click **OK** until your changes are saved.

The client modem times out and disconnects when the connection to the Wave Server is idle for several minutes.*Solution:*

1. On the administrator PC, in the Windows Control Panel choose **Network Connections**.
2. Right-click your modem connection and then click **Properties**.
3. In the Properties dialog, on the Options tab set **Idle time before hanging up** to **Never** or a large value.
4. Click **OK** to save your change.

The Wave modem port is always busy.

Solution: The Wave modem port may need to be reinstalled. To do so:

1. Connect to the Wave Server from the administrator PC via your network (not via the modem connection) as described on page 5-6.
2. In the Windows Control Panel, choose **System > Hardware**.
3. On the Hardware tab, click **Device Manager**.
4. In the Device Manager dialog, expand **Modems**.
5. Right-click the Surf Modem entry and then click **Uninstall**.
6. Return to Windows Control Panel, and choose **Add Hardware**. When the Add New Hardware wizard starts, follow the onscreen instructions.
7. In the Is the hardware connected? screen, click **Yes**, and then click **Next** to continue.
8. In the screen that lists the hardware that is already installed on your computer, scroll to the bottom of the Installed hardware list and select **Add a new hardware device**. Click **Next** to continue.

9. In the next screen, click **Search for and install the hardware automatically**, and then click **Next** to continue.
10. When prompted to specify the modem manufacturer and model, select **Vertical Communications** and **Surf Modem**. Click **Next** to continue.
11. When prompted to select the port on which to install the modem, click **Selected ports** and **COM100**. Click **Next** to continue.
12. Follow the onscreen instructions to complete the modem installation. You do not need to restart the Wave Server for your changes to take effect.

Troubleshooting IP telephony problems

For the most complete and current information on troubleshooting IP telephony problems, contact your Wave provider.

One-way audio on a SIP trunk call.

Symptom: A user experiences one-way audio on calls involving a SIP trunk.

Solution: Putting the affected call on hold and then retrieving it usually restores two-way audio on the call.

Troubleshooting phone problems

Troubleshooting SIP phone problems

Pressing a Call Appearance button to answer a call on a 5-series Aastra SIP phone may not route audio to the phone's speaker.

This problem occurs if the new call is received when another call is on hold and the handset is on hook.

Solution: Use the handset to listen to the call.

The time is displayed incorrectly on a SIP phone.

Symptom: Wave uses its own time server that you specify during the installation process (as described in “Configuring the time service used by Wave ISM” on page 7-20), and disables the Win32Time service. SIP phones may display the incorrect time because the Win32Time service has been inadvertently re-enabled, and is interfering with Wave's time server.

The Win32Time service can be inadvertently re-enabled in several ways:

- **If the Wave Server is not a member of your Windows domain:** The Win32Time service can be re-enabled if a user double-clicks on the time in the lower-right corner of the Windows Desktop, and then on the Internet Time tab disables and re-enables “Automatically synchronize with an Internet time server”.
- **If the Wave Server is a member of your Windows domain:** The Internet Time feature may be enabled automatically depending on your domain settings.

Solution: If you experience this problem, check to see if the Win32Time service is enabled on the Wave Server, and if necessary, disable it.

Troubleshooting Management Console problems

A remote access applet does not launch successfully when run from an administrator PC.

Symptom: When this problem occurs, the text “Please close the applet below to return to the console” is displayed, but the applet does not open below the text as expected.

This problem occurs only for remote access applets—applets which open a Remote Desktop Connection to the associated application. (See “Remote access applets” in Chapter 2 in the *Wave Global Administrator Guide* for a list of the remote access applets.)

Solution:

This problem occurs because the ActiveX controls have been disabled, possibly as a result of a Windows Update. To re-enable the affected ActiveX controls:

1. In Internet Explorer, click **Tools > Internet Options**.
2. On the Programs tab, click **Manage Add-ons**.
3. In the list, scroll to the following entries:
 - Microsoft RDP Client Control (redist)
 - Microsoft Terminal Services (redist)
4. To enable a disabled add-on, click on it and then click **Enable**.
5. Click **OK** to exit the Internet Options dialog.
6. Close and restart Internet Explorer.

Management Console applets appear to be disabled or hidden.

Symptom: This problem may occur if you are accessing the Management Console from an administrator PC running Microsoft Windows XP SP2 or higher. In Windows XP SP2 or higher, Microsoft enhanced the default browser security in Internet Explorer. These security defaults affect the functionality of the Global Administrator Management Console.

Solution:

1. On the administrator PC, in Internet Explorer choose **Tools > Internet Options**.
 2. On the Privacy tab, click **Settings** in the Pop-up Blocker section. (If **Settings** is disabled, select the **Block pop-ups** checkbox first.)
 3. In the Pop-up Blocker Settings dialog, enter one of the following in the **Address of Web site to allow** text box:
 - **IP address.** Enter the the default IP address of the Vertical Application Module (VAM) in the Wave Server (192 . 168 . 205 . 1), or the VAM's IP address on your system if you have changed it).
 - **DNS-resolvable name.** For example, `yourservername`
- Note:** Do not preface your entry with "http://".
4. Click **Add** and then **Close** to save your changes.
 5. On the Security tab, click **Local intranet** in the **Select a zone...** box, and then click **Sites**.
 6. In the Local Intranet dialog, click **Advanced**.
 7. In the **Add this website to the zone** text box, enter the IP address of the Wave Server without prefacing it with `http://` or `ftp://`, for example 192.168.205.1.
 8. Click **Add** to add the new entry to the **Websites** list. (again, you do not need to preface the IP address with "http://".)
 9. Click **Close**, and then click **OK** twice to close all dialogs.

Troubleshooting ViewPoint problems

Firewall problems may prevent ViewPoint from starting.

Symptom: After installing ViewPoint successfully on a PC, the following message is displayed and ViewPoint fails to start:

“Wave Server is unable to connect to ViewPoint, which could be due to a configuration issue on the Wave Server. Please contact your administrator so the can check if the Wave Global Administrator's Workstation Firewall settings allow connections from nnn.nnn.nnn.nnn”

where “nnn.nnn.nnn.nnn” is the IP address of the Wave Server.

This problem may occur if your company network is defined as a “public network” on the PC’s network settings and there is a firewall between the PC and the Wave Server. Additionally, internet security programs such as McAfee may prevent the connection.

Solution: Define the network to the Wave system as a “work network” instead of a “public network” to eliminate the firewall between the PC and the Wave Server, or allow access by the Wave Server through the PC’s firewall.

On a system configured with a locale of “Spanish (Spain)”, a long distance prefix may be incorrectly added before dialing a long distance number via ViewPoint.

Symptom: A “0” prefix may be incorrectly added before dialing a long distance number via ViewPoint, even though long distance prefixes are not used in Spain.

This problem has been fixed on new systems as of Wave ISM 1.5 SP3. However, if a system was previously configured to use the “Spanish (Spain)” locale it is possible that ViewPoint may still incorrectly add a “0” before dialing a long distance number.

Solution:

1. Start the General Settings applet.
2. On the System tab, click **Apply**. (The **Apply** button will be enabled even though you have not yet made any changes.)
3. Click **Done**.

COM Exception when logging into ViewPoint.

Symptom: After a user clicks **OK** in the ViewPoint Log On dialog, the following error occurs:

```
[03/12/2008 10:22:39.900 - 3][ViewPoint - Except]
System.Runtime.InteropServices.COMException (0x8007041D): Retrieving the COM
class factory for component with CLSID
{EFED4BC8-3AD3-4D22-8493-F4E91D0BA58A} failed due to the following error:
8007041d.
```

Solution:

1. From a command prompt, change directory (cd) to the following:
C:\Program Files\Common Files\Vertical\Wave
2. Run the following program:
tvwkssvc.exe /service

Pages remain open indefinitely.

Symptom: You experience pages that remaining open indefinitely, for example if the user making the page forgets to hang up the phone.

Solution:

The MaxPageDuration timer registry setting disconnects a page once the timer expires. You can use this registry setting if MaxPageDuration is a system-wide setting. The default is 3600 seconds.

MaxPagingDuration is a DWORD value [in seconds (s)] and resides in the following registry path:

```
\Registry\Machine\System\CurrentControlSet\Services\Cm\
Parameters
```

If this registry setting is not available for any reason, a default value of 180 seconds will be used for the maximum paging duration.

Troubleshooting workstation application problems

Error 1706 after installing Microsoft SQL Server 2005 Express Edition.

Symptom: The following error occurs while installing Microsoft SQL Server 2005 Express Edition as part of the Recording Archive Service installation process (as described on page 10-7.)

“Error 1706: An installation package for the product Microsoft SQL Server Native Client cannot be found. Try the installation again using a valid copy of the installation package ‘sqlncli.msi’.”

Solution:

1. Download the following file from the Microsoft Download Center:
<http://download.microsoft.com/download/4/4/D/44DBDE61-B385-4FC2-A67D-48053B8F9FAD/sqlncli.msi>
2. In the Windows Control Panel, go to **Add or Remove Programs**.
3. Scroll to **Microsoft SQL Native Client** and uninstall it.
4. Run `sqlncli.msi`.
5. Reinstall Microsoft SQL Server 2005 Express Edition, as described on page 10-7.

Note: This solution is described in the following Microsoft Knowledgebase article:

<http://support.microsoft.com/kb/933833>

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