

IP Server 900

Hardware Installation Manual

0450-1305
Rev. E



Copyright © 2013 ESI (Estech Systems, Inc.).

IVX is a registered trademark of Estech Systems, Inc. *Ethernet* is a registered trademark of Xerox Corporation. *Motorola* and *ColdFire* are registered trademarks of Motorola, Inc. *Rayovac* is a registered trademark of Rayovac Corporation. *Act!* is a registered trademark of Sage Software, Inc. *Goldmine* is a trademark of Goldmine Software Corporation. *Microsoft*, *Windows*, *Word*, *NT* and *Outlook* are registered trademarks of Microsoft Corporation. *Panasonic* and *DBS* are registered trademarks of Matsushita Electric Corporation of America. *Novell* and *Netware* are registered trademarks of Novell, Inc. *Smart Jack* is a trademark of Westell Technologies, Inc. Information contained herein is subject to change without notice. Certain features described herein may not be available at initial release. ESI products are protected by various U.S. Patents, granted and pending. Visit ESI at www.esi-estech.com.



We Make It Easy To Communicate

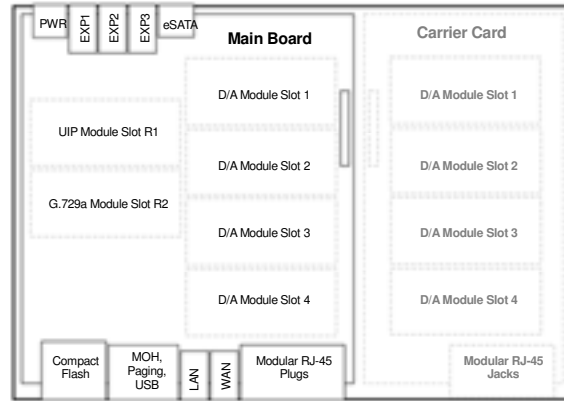
TABLE OF CONTENTS

Overview.....	A.1	Hardware installation.....	G.1
Master Control Unit	A.1	Site location	G.1
Main board.....	A.1	IP 900 D/A Carrier Card installation instructions	G.1
Memory Module.....	A.1	IP Server 900 module installation instructions.....	G.2
Power supply	A.2	IP Server 900 IP Resource Module installation instructions ...	G.3
Module options	A.2	About replacing modules	G.4
Cautions and regulatory information	B.1	Memory Module installation or replacement.....	G.5
Cautions.....	B.1	LED functions	G.5
Regulatory Information.....	B.2	ESI Presence Management installation	G.5
Précautions et informations réglementaires	B.3	External connections	H.1
Précautions	B.3	Grounding instructions	H.1
Informations réglementaires	B.4	Power	H.1
Ordering and installing PRI circuits.....	C.1	MOH port	H.3
PRI configuration description.....	C.1	External paging device connection	H.3
System capacities.....	D.1	CO line connection	H.3
Licensing.....	E.1	Module connections	H.3
Phones.....	F.1	60-Key Expansion Console connection	H.4
ESI IP phones.....	F.1	60-Key Second Expansion Console connection	H.5
ESI digital phones.....	F.2	Installing ESI's Cordless Handsets	H.6
ESI Cordless Handsets.....	F.3	Index	
Expansion Consoles	F.4		
Phone overlays.....	F.4		
VIP 7 Softphone.....	F.4		

Important: For information concerning the **programming** of an **IP Server 900**, see the *IP Server 900 Programming Manual* (ESI document # 0450-1307).

Overview

Master Control Unit



IP Server 900 Master Control Unit Layout

The **IP 900 Master Control Unit** is designed for easy installation and component access. It houses the IP Server 900's main board, a CompactFlash[®] Memory Module¹ socket, and external connections for a power supply, Music On Hold (MOH), an external paging system, a USB or eSATA drive for ESI Media Management, LAN and WAN, and RJ-45 plugs for **modules** (see "Module options," page A.2). The IP 900 Master Control Unit measures 16.5" W × 1.5" H × 11.75" D.

Note: The IP Server 900's eSATA drive port does not support device "hot-plugging" or "hot-swapping" operations. Power down the system, install the eSATA storage device, and reboot to synchronize the storage device with the IP Server 900.

Main board

The main board combines leading-edge hardware components — including a Motorola[®] ColdFire[®] processor and DSP structure — along with proprietary operating system software. The board provides system control of the Memory Module, control of all modules and expansion cabinets, a built-in Network Services Processor (NSP) which provides remote access via TCP/IP and supports certain optional ESI PC software applications, and built-in Application Services Card (ASC) functionality.

The main board offers 64 **universal IP (UIP) ports**, expandable to 127 ports with a **UIP resource module**. It also accepts a **G.729a resource module** which provides an optional 48 sessions of the G.729a audio codec for use on SIP COs or ESI-Link channels. In addition, it allows up to four analog or digital (D/A) **modules** (see "Module options," page A.2), and connects to an optional expansion carrier card that allows up to four more **modules**. For ESI Media Management, the built-in ASC functionality allows 32 channels of call recording and 12 channels of video recording.

Memory Module

The **Memory Module** — a CompactFlash with **proprietary formatting** — contains all system programming, configuration data, and pre-loaded voice prompts. The Memory Module provides voice storage of 140 hours at 64 kilobits per second — the industry's highest-quality sampling rate.

¹ CompactFlash Memory Modules and system modules are packaged separately and are mounted in the system's cabinet during installation.

Power supply

The Master Control Unit includes a 33 VDC, 80-watt power supply prepackaged.

Optional rack-mount Power Distribution Shelf

An optional **Power Distribution Shelf** is available that can be mounted in a standard 19-inch rack. Each Power Distribution Shelf, which can hold up to six power supplies, includes a six-outlet power strip with on/off switch and 15' power cord.

Module options

The IP Server 900 supports a wide range of **modules** with capacities as shown below:

Module	Phones	COs	ESI-Link channels	Maximum Modules ¹
4-FXO		4 Analog		8
4-FXS	4 Analog			8
D8	8 digital			8
T1/PRI		24 (T1) or 23B +1D (PRI)		2 (1 per Carrier Card • 2 per system)
UIP	63 UIP ports for ESI IP phones, SIP phones, or SIP COs			1
G.729a		48 simultaneous channels using G.729a codec		1

Module descriptions

- **4-FXO** — Provides circuits for up to four analog loop-start CO lines. This card uses four CO ports.

Note: Ground-start CO lines are not supported.

- **4-FXS** — Connects up to four analog devices, such as fax machines and cordless phones. This module uses four phone ports and no CO ports. Each port provides a standard 24-volt, two-wire phone connection. Only one analog device can be connected to each port.
- **D8** — Connects up to eight ESI digital phones. This module uses eight phone ports and no CO ports.
- **T1/PRI** — Provides **either** a T1 interface supporting 24 DS0 channels **or** an ISDN PRI interface supporting 23 B (bearer) channels and one D (datalink) channel.

Note: A jumper must be installed on pins 7 and 8 of J2 to enable ISDN PRI functions. The module supports, and any or all of the available channels can be assigned as, loop-start, ground-start, E&M or DNIS/DID CO types with immediate, wink-start, or dial-tone-start signaling. This module is equipped with a built-in CSU that can be connected directly to a network interface unit, SmartJack, or ISDN PRI. All 24 CO ports are allocated (regardless of whether they are assigned or used).

- **UIP** — Provides 63 universal IP ports which can be used for any combination of: local or remote ESI IP phones, local or remote SIP phones, SIP COs, or ESI-Link channels. This module must be installed in the slot closest to the rear of the MCU. This slot is labeled with white silkscreen on the main board as *UIP MODULE*.

Note: SIP phones and SIP COs require additional licensing.

- **G.729a** — Provides 48 G.729a sessions for use on SIP COs or ESI-Link channels. This module must be installed in the slot closest to the front of the MCU. This slot is labeled with white silkscreen on the main board as *CODEC MODULE*.

¹ The maximum module capacity is also dependent on the system's dialing plan (four-digit or three-digit).

Cautions and regulatory information

Cautions

Important: This information complies with the requirements of Underwriters' Laboratories (UL) and UL Standards 1950, 60950, and 60950-1, as applicable.

When using this telephone equipment, always exercise basic safety precautions in order to minimize the risk of fire, electric shock or injury to persons. **Before proceeding, please read the following:**

- **Do not** use liquids or aerosols to clean any system equipment; rather, use a cloth that is only **slightly** damp.
- The ESI system contains **no** components that are serviceable by either non-Resellers or non-manufacturer technicians. **All service must be referred to the Reseller for further handling.**
- **Do not** install the cabinet in areas with extreme heat or improper ventilation.
- Install the cabinet **only** in "low-traffic" or "non-public" areas.
- To reduce the risk of fire, use **only** 24 AWG or larger telecom wire.

Power supply

Heed all warnings and instructions in documentation or marked on the cabinet or peripheral equipment.

Fuse

Contact the factory **before** attempting to replace the fuse. The fuse is located on the main board in the Master Control Unit, and on the backplane in an Expansion Unit.

Battery (located on the main board)

Caution: There is a risk of explosion if the onboard battery is replaced by an incorrect type. Replace only with Ray-O-Vac BR1225 (or equivalent). Dispose of used batteries according to the battery manufacturer's instructions.

Notice: This product is intended to be supplied by a Listed Direct Plug-In Power Unit marked 'Class 2' and provided with electrical ratings.

Regulatory Information

United States of America

Registration

The CO line telephone numbers, FCC registration number, and ringer equivalence number (REN) of this equipment must be provided to the telephone company before installation. (See below for FCC registration number and ringer equivalence number.)

FCC Part 15

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 (in which case, the user will be required to correct the interference at his/her own expense).

FCC Part 68

This equipment complies with Part 68 of the FCC Rules. On the bottom of this equipment is a label that contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your telephone company.

The REN is helpful to determine the quantity of devices you can connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all, areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN, you should contact your local telephone company to determine the maximum REN for your calling area.

If your telephone equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, the telephone company will notify you in advance but, if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Your telephone company may make changes to its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If so, you will be notified in advance, to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, the telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Installation: The device is equipped with a T568B connector.

Registration Number: 1T1MF08B33727.

Ringer Equivalence Number (REN): 0.8.

Hearing-aid compatibility

This equipment, utilizing telephone phone equipment manufactured by ESI, meets all FCC requirements for hearing-aid compatibility.

Précautions et informations réglementaires

Précautions

Important: Cette information est conforme aux exigences des Underwriters' Laboratories (UL) et les normes UL 1950, 60950, et 60950-1, le cas échéant.

Lorsque vous utilisez cet équipement téléphonique, toujours prendre les précautions de sécurité élémentaires afin de minimiser les risques d'incendie, d'électrocution ou de blessures. **Avant de procéder, s'il vous plaît lisez ce qui suit:**

- **N'utilisez** pas de liquides ou d'aérosols pour nettoyer tout l'équipement du système, mais plutôt utiliser un chiffon qui est seulement **légèrement** humide.
- Le système ESI **ne** contient aucun composant qui sont utilisables soit par non-revendeurs ou de non-fabricant de techniciens. **Tous les services doivent être soumis au revendeur pour la manipulation.**
- **Ne pas** installer l'armoire dans les zones à la chaleur extrême ou une mauvaise ventilation.
- Installez l'armoire que "à faible trafic" ou "non-public" domaines.
- Pour réduire le risque d'incendie, utiliser **seulement** 24 AWG ou plus gros fil de télécommunications.

Alimentation

Respectez tous les avertissements et les instructions dans la documentation ou marqué sur le boîtier ou de l'équipement périphérique.

Fusible

Contactez l'usine **avant de** tenter de remplacer le fusible. Le fusible est situé sur le tableau principal à l'Unité de Contrôle Maître, et sur le fond de panier dans une Unité d'Extension.

Batterie

Attention: Il ya un risque d'explosion si la batterie embarquée est remplacé par un type incorrect. Remplacer uniquement avec Ray-O-Vac BR1225 (ou équivalent). Jetez les batteries usagées conformément aux instructions du fabricant de batteries.

Avis: Ce produit est conçu pour être alimenté par un directs énumérés Plug-In Power Unit marqué 'classe 2' et fourni avec notes d'électricité.

Informations réglementaires

États-Unis d'Amérique

Enregistrement

Les numéros de CO ligne téléphonique, le numéro d'enregistrement FCC et le numéro d'équivalence sonnerie (REN en anglais) de cet équipement doit être fourni à la compagnie de téléphone avant l'installation. (Voir ci-dessous pour le numéro d'enregistrement FCC et le numéro d'équivalence sonnerie.)

La Partie 15 des Règlements de la FCC

Cet équipement a été testé et trouvé conforme aux limites pour un numérique de classe A, conformément à la Partie 15 des règlements de la FCC. Ces limites sont conçues pour fournir une protection raisonnable contre les interférences nuisibles lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut émettre des fréquences radio et — s'il n'est pas installé et utilisé conformément aux instructions du manuel — peut provoquer des interférences nuisibles aux communications radio (dans ce cas, l'utilisateur devra corriger l'interférence à son/sa propres frais).

La Partie 68 des Règlements de la FCC

Cet équipement est conforme à la Partie 68 des règlements de la FCC. Sur le fond de cet équipement est une étiquette qui contient, entre autres informations, le numéro d'enregistrement FCC et le numéro d'équivalence sonnerie (REN en anglais) pour cet équipement. Vous devez, sur demande, fournir cette information à votre compagnie de téléphone.

Le REN est utile pour déterminer la quantité d'appareils que vous dites se connecter à votre ligne téléphonique et ont encore tous ceux qui sonneront quand votre numéro de téléphone est appelé. Dans la plupart, mais pas tous, régions, la somme des REN de tous les appareils connectés à une ligne ne doit pas dépasser cinq (5,0). Pour être certain du nombre de dispositifs que vous pouvez brancher à votre ligne, tel que déterminé par le REN, vous devriez communiquer avec votre compagnie de téléphone locale afin de déterminer le REN maximum pour votre zone d'appel.

Si votre équipement téléphonique cause des nuisances au réseau téléphonique, la compagnie de téléphone peut interrompre votre service temporairement. Si possible, la compagnie de téléphone vous avisera à l'avance, mais, si un préavis n'est pas pratique, vous serez avisé dès que possible. Vous serez informé de votre droit de déposer une plainte auprès de la FCC.

Votre compagnie de téléphone peut apporter des changements à ses installations, équipements, opérations ou procédures pouvant affecter le bon fonctionnement de votre équipement. Si oui, vous en serez informé à l'avance, pour vous donner une chance de maintenir un service téléphonique sans interruption.

Si vous rencontrez des problèmes avec cet équipement téléphonique, la compagnie de téléphone peut vous demander de déconnecter cet équipement du réseau tant que le problème a été corrigé ou jusqu'à ce que vous êtes sûr que le matériel n'est pas défectueux.

Cet équipement ne peut être utilisé avec les services payants fournis par la compagnie de téléphone. Connexion à des lignes est soumis aux tarifs locaux.

L'installation: L'appareil est équipé d'un connecteur T568B.

Numéro d'Enregistrement: 1T1MF08B33727.

Numéro d'Équivalence Sonnerie (REN en Anglais): 0.8.

Prothèse Auditive Compatibilité

Cet équipement, en utilisant l'équipement poste téléphonique fabriqué par ESI, respecte toutes les exigences de la FCC pour la compatibilité des prothèses auditives.

Ordering and installing PRI circuits

This section addresses things to consider when ordering and installing ISDN PRI circuits on the IP Server 900.

When ordering and provisioning such circuits, you must correctly define certain parameters in order for the PRI to function correctly. This section is a template for a PRI order form you can use to order PRI circuits that — if provisioned according to the order form — will be fully compatible with the IP Server 900.

PRI configuration description

- **Agent Company** — The name of the company ordering the PRI on behalf of the customer.
- **Contact** — The individual placing the PRI order.
- **Address** — Address of the agent company.
- **Customer Name** — The name of the end user's company.
- **Circuit ID** — The circuit number (or sequence of characters and numbers) that the service provider uses to identify the PRI circuit. This is used for identification when troubleshooting or reporting issues.
- **Support Phone Number** — The service provider's Customer Service phone number.
- **PRI Line Protocol** — The ISDN protocol offered by the service provider. ESI strongly recommends using the **NI-2** (*National ISDN-2*) protocol.
- **Framing and Line Encoding** — You **must** use **ESF** (*extended super frame*) framing and **B8ZS** (*binary eight-zero substitution*) encoding.
- **Pilot/DID Numbers** — In the IP Server 900 number delivery on a PRI circuit is separated into pilot numbers and Direct Inward Dialing (DID) numbers. It can support up to 100 pilot numbers and up to 600 DID numbers. DID numbers are dedicated to ring to a specific phone or department and can come in on any PRI channel. Pilot numbers ring down a specific PRI channel or group of channels, typically referred to as a hunt group. When you create a pilot number in the IP Server 900 you must enter the maximum number of PRI "B" channels (one to 23) that can be used for that pilot number's hunt group. For example:

Pilot number	Name	Chs.	Day ring 1	Day ring 3	Day ring 5	Day ring 9
2145554378	ABC SYSTEMS	10	Dept. 290			
2145552390	ABC SYS SVC	9	Dept. 291			
2145555678	ABC SYS INTL	4	X100, X101	X100, X101 X102	Dept. 290	

Important: The total number of channels assigned across all pilot numbers should not exceed 23. Exceeding this limit may cause system instability.

- **Glare Resolution** — Glare is a condition wherein an outgoing call and an incoming call attempt to seize the same circuit at the same time. On loop-start analog lines this usually causes the two callers to be connected because loop-start lines do not manage glare resolution. PRI COs, however, utilize glare resolution protocols that define what the CO will do with a call if glare is detected. The IP Server 900 **requires** that connected PRI circuits be set to the **normal** (also called *standard*) protocol rather than the yielding protocol. This means that the system will block the **outgoing call** if glare is detected.
- **Incoming Hunt** — In order to help prevent glare, PRI providers will attempt to send calls down the PRI in the opposite order that the phone system attempts to send them out. The IP Server 900 sends calls out in a descending order, meaning the first call goes out channel 23. When ordering the PRI the service provider needs to set the circuit to hunt in an **ascending** order, meaning incoming calls will start at **channel one**.
- **ISDN Bearer Capabilities** — This is the supported PRI feature set. The IP Server 900 supports **only** 56K voice (CSV).

- **Service Termination** — ESI recommends that the PRI circuit be terminated on an eight-pin RJ-68 (also called a **SmartJack**). If an RJ-68 isn't available, you may use an eight-pin RJ-48 jack. If you use an external Channel Service Unit (CSU) be sure to turn **off** the internal CSU in the IP Server 900.

Important: ESI recommends using Category 5 (or better) twisted-pair cable with a length of at least six feet when connecting a cable between the PRI and CSU or Smart Jack.

- **Span Type** — When the distance from the IP Server 900 to the CSU, SmartJack, or multiplexer (all of which are considered repeaters) is less than 655 feet use the **DSX-1** setting. For longer distances use **DS-1**. This value is used in combination with the **Line Build-Out** setting below to define loss levels and compensation when programming the PRI circuit in the IP Server 900.
- **Line Build-Out (LBO)** — For **long-haul** (DS-1 span) circuits, the CSU must usually be set to correct for signal loss across the longer cabling. This is called **Line Build-Out**, and is used in combination with **Span Type** setting above to determine the attenuation levels used by the IP Server 900.

Note: The sample order form template on the next page is available on the ESI Web site. There you can download a *Microsoft Word* document version — listed as **Technical Update #176** — that can be filled out on a PC.

PRI Order Configuration Information		Date of order	
Agent company			
Contact		Phone	
Address			
Customer name			
Cust. contact		Phone	
Address			
Circuit ID			
Support phone			
ISDN PRI line protocol	<input type="radio"/> National ISDN-2 (NI-2) <input type="radio"/> Nortel DMS 100/250 custom <input type="radio"/> Lucent/AT&T 5ESS Custom <input type="radio"/> Siemens EWSD custom		
Framing mode	<input checked="" type="checkbox"/> D4 ESF (req'd)	Line encoding	<input checked="" type="checkbox"/> B8ZS (req'd)
One- or two-way service	<input type="radio"/> One-way — Ability to only receive calls (i.e., incoming only) <input type="radio"/> Two-way — Ability to receive or generate calls (both ways)		
Pilot or DID numbers		Max. channels	
		Max. channels	
		Max. channels	
		Max. channels	
		Max. channels	
		Max. channels	
		Max. channels	
	TOTAL pilot number channels (CANNOT exceed 23)		
Glare resolution	<input checked="" type="checkbox"/> Normal (CPE yields) (req'd)	Incoming hunt	<input checked="" type="checkbox"/> Ascending (req'd)
ISDN bearer capabilities	<input checked="" type="checkbox"/> 56k voice (CSV) (req'd)	Service termination	<input type="radio"/> Smart Jack (RJ-68) <input type="radio"/> RJ-48C
Span type	<input type="radio"/> Short-haul (DSX-1) <input type="radio"/> Long-haul (DS-1)		
Line build-out (LBO)	Short-haul LBO line length <input type="radio"/> 0–133 feet <input type="radio"/> 134–266 feet <input type="radio"/> 267–399 feet <input type="radio"/> 400–533 feet <input type="radio"/> 534–655 feet	Long-haul LBO attenuation levels <input type="radio"/> 0.0 dB <input type="radio"/> -7.5 dB <input type="radio"/> -15.0 dB	

System capacities

Important: Each ESI Presence Management RFID Reader (digital model) consumes one digital phone port.

Phones and COs

The specifications shown below reflect system maximum capacities and configurations. Not all of the phone and CO maximums can be reached simultaneously.

Dialing plans (-digits) ▶	Four	Three
Maximum modules	8	8
CO Line groups 9, 8, 71-76	Yes	Yes
SIP CO capability	Yes	Yes
Maximum port configuration ¹	500	400
– Maximum phones	191	168
– Maximum IP phones	127	127
– Maximum digital phones	64	64
– Maximum analog phones	32	32
Maximum CO lines	192	84
– Maximum T1/PRI Modules	2	2
– ESI-Link channels	127	127
– Total number of SIP COs	127	84
Max. members, CO ring assignment list	64	64

Dedicated ports

Dialing plans (-digits) ▶	Four	Three
Voice mail/auto attendant ports	32	32
Conference ports (max. of 16 members per conference)	64	64
Overhead paging ports	1	1
Serial/SMDR ports	n/a	n/a

Departments

Dialing plans (-digits) ▶	Four	Three
Max departments	64	20
Department types: Ring-all, ACD, UCD, in-order, pick-up, attendant	Yes	Yes
Max members, non-ring-all depts.	64	64
Max members, ring-all depts.	64	64

Automatic Call Distribution (ACD)

Dialing plans (-digits) ▶	Four	Three
Max ACD departments	64	64
Max ACD agents per department	64	64
Max ACD agents (system-wide)	191	168

Shared-office tenanting

Dialing plans (-digits) ▶	Four	Three
Tenants	8	8

Translation tables

Dialing plans (-digits) ▶	Four	Three
Pilot numbers	100	100
Max. DID entries	600	600

¹ Includes ESI-Link channels.

System speed-dial numbers

Dialing plans (-digits) ▶	Four	Three
System speed-dial numbers	1,000	100

Voice mail capacities

Dialing plans (-digits) ▶	Four	Three
Voice mail storage (hours)	140	140
Broadcast mailbox (one to all extensions)	Yes	Yes
Cascade notification mailboxes	20	10
Group mailboxes/max. members	32/64	32/64
Guest/info mailboxes	1,000	190
Maximum phone mailboxes	191	168
Q & A mailboxes	20	10

Maximum installations of VIP 7 applications

Dialing plans (-digits) ▶	Four	Three
Installations, <i>VIP 7 PC Attendant Console</i>	8	8
Installations, <i>VIP 7 ACD Supervisor</i>	8	8

ESI Presence Management features

Dialing plans (-digits) ▶	Four	Three
RFID Reader access door records	10,000	10,000
RFID Reader entries in Fn. 372 ¹	32	32
Max. RFID tags ("electronic keys")	500	500

ESI Mobile Messaging features

Dialing plans (-digits) ▶	Four	Three
Maximum phones	191	168
Maximum guest mailboxes	250	250

ESI Video Viewer and ESI Video Adapters

Dialing plans (-digits) ▶	Four	Three
ESI Video Adapters (see below)	12	12
RFID Readers per ESI Video Adapter	1	1
User extns./depts. per ESI Video Adapter	64	64
<i>ESI Video Viewer</i> users	20	20

Although the system supports up to 12 cameras, a variety of other factors can affect the maximum number of usable cameras. The frequency and duration of video recordings from each camera as well as overall network load to the system — such as local or remote IP phones, SIP trunks, SIP stations, and usage of ESI applications (e.g., ESI Mobile Messaging, *VIP 7*, or ESI Presence Management) — can severely impact the performance of both the cameras and the IP Server 900. The following chart can be used as a general guideline for determining the number of cameras supported based on system configuration and usage:

Number of users	Light usage	Medium usage	Heavy usage
20	12 cameras	12 cameras	10 cameras
40	12 cameras	10 cameras	8 cameras
60	10 cameras	8 cameras	5 cameras
120	8 cameras	6 cameras	4 cameras

ESI Media Management features

Dialing plans (-digits) ▶	Four	Three
Video recordings	12	12
Audio recordings	32	32
SMDR events	Yes	Yes
Fob activity	Yes	Yes
<i>ESI Media Manager</i> users	20	20

¹ See the *ESI Presence Management Installation Manual* (ESI document # 0450-0792).

Licensing

There are various types of **licenses** needed to activate certain features and functionality in the IP Server 900. The following features, products, and capabilities require license activation:

- Universal IP (UIP) Ports used for:
 - *ESI IP phones*
 - *SIP phones*
 - *SIP CO lines*
 - *ESI-Link channels*
 - *Local IP phone operation*
 - *Remote (off-site) IP phone operation*¹
- ESI Media Management
 - *Audio recordings*
 - *Video recordings*
- ESI Mobile Messaging
- G.729a codec
- SIP CO lines
- SIP phones
- Meet-me conferencing
- ESI RFID tags for *ESI Presence Management*
- *ESI Video Viewer*
- *VIP 7*²
- *VIP 7 ACD Agent*
- *VIP 7 ACD Supervisor*
- *VIP 7 PC Attendant Console*.
- *VIP 7 Softphone*
(also requires purchase of local or remote IP phone license)
- Voice mail
 - *Channels*
 - *Message storage (in hours)*

License activation

To have licenses activated by ESI Technical Support:

1. Licenses must already have been ordered from ESI.
2. The IP Server 900 must have **either**:
 - A public IP address assigned to the NSP³ (with associated port forwarding in NAT environments);
 - or**
 - A CO line connected to it (analog, PRI, or T1).
3. You'll need the following information to provide to the ESI representative:
 - The ESI sales order number.
 - The customer (site) name.
 - The public IP address of the NSP or the phone number of the CO line.

IP phone licenses

Each IP Phone⁴ connected to the system will require an available UIP port as well as activation of a UIP license and any other required license. If a new extension number is assigned to the phone and there are not enough licenses available, the phone will display the error **LICENSE EXCEEDED** when connected to the IP Server 900.

It is important to keep this licensing in mind for SIP phones or CO lines, because each SIP phone or CO line will require not only an available UIP port, but an UIP license and a SIP phone or SIP CO license.

¹ ESI desktop IP phones programmed for remote operation can still operate as local phones on the LAN.

² *VIP 7 ACD Agent* uses the same license part numbers as *VIP 7*, allowing mixing and matching as the customer may require; e.g., 100 licenses could be used for 60 *VIP 7* installations and 40 *VIP 7 ACD Agent* installations. For licensing information for *VIP 7 PC Attendant Console* and *VIP 7 ACD Supervisor* refer to their respective *Product Overviews* (available from www.esi-estech.com). *VIP 7 Softphone* is sold as a single license, which provides one user with *VIP 7* features and *Softphone*-specific capabilities. The *VIP 7 Softphone* license is selected, at the time of purchase, for local or remote operation.

³ For more information about the NSP, refer to *NSP Installation Made Simple* (ESI #0450-0669).

⁴ An ESI 60 (IP model), ESI 40 (IP model), 48-Key IP Feature Phone II, IP Cordless Handset (Local or Remote), *VIP Softphone*, or SIP phone.

Phones

ESI IP phones

Current models

- **ESI 60** (IP versions) — 10/100 or Gigabit Ethernet. Three-line, 56-character display (adjustable backlit display available); speakerphone; headset jack; 48 programmable feature keys; supports *VIP 7* and the 60-Key Expansion Consoles.
- **ESI 40** (IP version) — 10/100 Ethernet. Three-line, 56-character display (adjustable backlit display available); speakerphone; headset jack; 16 programmable feature keys; supports *VIP 7* and the 60-Key Expansion Consoles.
- **48-Key IP Feature Phone II** (includes full duplex and backlit models¹) — Three-line, 56-character display; speakerphone; headset jack; 30 programmable feature keys; supports *VIP 7* and the 60-Key Expansion Consoles.
- **Remote IP Cordless Handset II** and **Local IP Cordless Handset II** -- DECT 6.0 technology; two-line, 32-character display; speakerphone; eight programmable feature keys. Also supports range-extending Repeater units.

Features and support for standards

An ESI desktop IP phone looks and works like a regular digital phone as described on page F.2, but connects from within the local premises via an IP network connection rather than twisted-pair cabling. If used remotely, an ESI desktop IP phone connects to the IP Server 900 through the public internet. Each ESI desktop IP phone derives its power from Power over Ethernet (PoE) via either a PoE switch on the local premises, or through an individual PoE adapter. ESI desktop IP phones support the following features and standards:

- Power via IEEE 802.3af Power over Ethernet (PoE).
- Local or remote (off-site) operation.
- Use the G.711 audio codec in local operation and the G.726 codec during remote operation. The G.711 transfer rate is 206 Kbps; the G.726 transfer rate is 90 Kbps.
- Use DHCP² to obtain an IP address:
 - In local operation DHCP can be provided by the IP Server 900 or an external server.
 - In remote operation the phone will use the DHCP server at the remote site to obtain its addressing.
- Complies with IEEE 802.1q and 802.1p (VLAN) Layer 2 switching and prioritization.
- Complies with Layer 3 DiffServ (RFC 2475) Quality of Service (QoS) implementations.

Important: Each ESI IP phone draws up to 7.25 watts³ at 48 volts DC; therefore, each advertises itself to a Power over Ethernet switch as a Class 3 device per the 802.3af standard. Most PoE switches adhering to this standard will provide up to 12.5 watts for each Class 3 device.

Notes: When connecting an ESI desktop IP phone to a PoE source, the PoE cable **must** be connected to the jack labeled **NETWORK** on the base of the phone. The jack labeled **PC** **DOES NOT** support PoE.

ESI has tested each ESI desktop IP phone with several PoE sources. For a current list of tested devices, consult the ESI Knowledge Base at <http://support.esiresellers.com>.

Important: None of the IP phones listed in this section will work with ESI's legacy IP E-Class or IVX[®] systems. Similarly, previous IP Feature Phone models (including the Remote IP Feature Phone) **don't** work with the IP Server 900 but, instead, are intended for use with only IP E-Class and appropriate IP-enabled IVX systems.

¹ Supported only on software versions 25.1.2.5 and later; see *ESI Technical Update 335*.

² Dynamic Host Configuration Protocol, an IP standard described in RFC 2131 (<http://www.ietf.org/rfc/rfc2131.txt>).

³ An ESI desktop IP phone's power consumption takes into account an optional 60-Key Expansion Console.

ESI digital phones

The IP Server 900 supports several different models of **ESI digital phones**, each of which connects to the cabinet via standard two-wire twisted pair.

Current models

- **ESI 60** (digital version) — Three-line, 56-character display with adjustable backlighting; full-duplex, high-definition speakerphone; headset jack; 48 programmable feature keys; supports *VIP 7* and the 60-Key Expansion Consoles. Available with full-duplex speakerphone and display with adjustable backlighting.
- **ESI 40** (digital version) — Three-line, 56-character display with adjustable backlighting; speakerphone; headset jack; 16 programmable feature keys; supports *VIP 7* and the 60-Key Expansion Consoles.
- **ESI 30D** — Two-line, 32-character backlit display; speakerphone; 12 programmable feature keys.
- **48-Key Digital Feature Phone** (includes full-duplex and backlit models¹) — Three-line, 56-character display; speakerphone; headset jack²; 30 programmable feature keys; supports *VIP 7* and the 60-Key Expansion Consoles.

Note: Not all modular headsets will work on the 48-Key Feature Phone's headset jack.³ For information on supported headset models, visit www.plantronics.com or www.jabra.com.

- **Cordless Handset II** — DECT 6.0 technology; two-line, 32-character display; speakerphone; eight programmable feature keys. Also supports range-extending Repeater units.

Note: When a desktop phone is in the highest upright position, use the wall-mount hook located under the handset to secure the handset when you're not using the phone.

¹ Supported only on software versions 25.1.2.5 and later; see *ESI Technical Update 335*.

² Headset jack for 48-Key Feature Phones (Digital, Digital TAPI, Local IP, or Remote IP) manufactured after March, 2004 only.

³ Not all headsets are compatible with your ESI phone; contact your ESI Reseller for a list of compatible models. Noise-cancelling headsets are not compatible with ESI phones.

ESI Cordless Handsets

The IP Server 900 also supports ESI's digital, Local IP, and Remote IP **Cordless Handsets** (but only the ESI Cordless Handset II models, **not** the original ESI Cordless Handset).

The ESI Cordless Handset II includes seven familiar fixed feature keys, eight programmable feature keys, a speakerphone, and a headset jack. The Base Phone for the ESI Digital Cordless Handset II uses a standard line cord and is line-powered. The Base Phone for each ESI IP Cordless Handset II (Local IP or Remote IP) uses network cabling and receives (and requires) Power over Ethernet (PoE). The ESI Remote IP Cordless Handset II Base Phone also includes a jack into which the user can plug an analog CO line. This gives the home-based teleworker the convenience of using both home and business lines with the ESI Remote IP Cordless Handset II. Each ESI Cordless Handset II model employs advanced DECT 6.0 technology which, as compared to the original ESI Cordless Handsets, allows more secure communications and — through the use of one or more optional ESI Cordless Handset II Repeaters — greater range.

Important: Each ESI IP phone draws up to 7.25 watts¹ at 48 volts DC; therefore, each advertises itself to a Power over Ethernet switch as a Class 3 device per the 802.3af standard. Most PoE switches adhering to this standard will provide up to 12.5 watts for each Class 3 device.

¹ An ESI desktop IP phone's power consumption takes into account an optional 60-Key Expansion Console.

Expansion Consoles

The **60-Key Expansion Console** gives a designated user 60 additional programmable feature keys. It is supported by the ESI 60 (digital or IP models), ESI 40 (digital or IP models), and the 48-Key Feature Phone (digital or IP models). The Expansion Console is connected to its host ESI phone via a special cable (provided) and **doesn't** require a separate phone port of its own. Additionally, it may be connected to a **60-Key Second Expansion Console** via a special cable (provided with the 60-Key Second Expansion Console) so that one phone can have a total of 120 programmable feature keys in addition to its own complement of keys.

A **fully configured** IP Server 900 allows up to 80 phones to have one or two Expansion Consoles (60-Key and 60-Key Second).

Note: The IP 900 Master Control Unit can support a maximum of eight Expansion Consoles, and each Expansion Unit can support a maximum of 24 Expansion Consoles — for a system maximum of 80 Expansion Consoles.

Phone overlays

Each ESI phone comes with one overlay for the programmable feature keys. To order additional overlays visit the DESI™ Web site, www.desi.com. While there you may also want to download the free *Windows*-based software *DESI Lite*, which allows you to print on the overlays. For assistance with DESI products contact DESI (the DESI Web site contains contact information).

Tip: The browser-based *IP Server 900 System Programmer* application also lets you print on the overlays.

VIP 7 Softphone

VIP 7 Softphone integrates the features of *VIP 7* and an ESI desktop IP phone into a PC-based, full-audio phone. With the appropriate license, *VIP 7 Softphone* can be configured for use locally or remotely. This product requires a PC equipped with **either** (a.) a third-party USB headset **or** (b.) a microphone and speakers.

Note: For details, see the *VIP 7 Product Overview* and the *VIP 7 Setup and User's Guide*; both are available from www.esi-estech.com.

Hardware installation

Site location

As with most electronic equipment, the environmental considerations for this site need to observe good common sense. Provide a dry, clean, and accessible area.

Locate space in the telephone equipment room, which will provide easy connection to the termination blocks and 110 VAC power. **The location should be no further than 1,000 feet from the farthest phone.**

Ambient room temperature must be 40°–80° (F.), and relative humidity no higher than 90%.

Notes: Do not place the equipment or run phone cabling near high voltage electrical equipment or electrical lines susceptible to high voltage surges from air conditioner compressors, *etc.*

Do not mount the equipment in a place that receives direct sunlight.

IP 900 D/A Carrier Card installation instructions

Important: Before installing, verify that the system is running the appropriate system software. If it isn't, download the correct version from the ESI Resellers' Web site and install it on the system.

ALWAYS power-down the system BEFORE adding or replacing any hardware. Also, be sure to observe all proper procedures regarding the prevention of electrostatic discharge (ESD) when performing the following procedures; otherwise circuit boards may suffer damage.

Whenever you change the module configuration, you **must** create a **backup file** for the new configuration to be able to perform the Restore function later.

After removing an IP 900 D/A Carrier Card from the box, install it as follows in the IP Server 900.

1. Loosen the two thumbscrews on either side of the Master Control Unit that secure the base tray to the top, and then slide the bottom tray out and away from the top cover.
2. With the bank of eight RJ-45 connectors facing toward you, align the IP 900 D/A Carrier Card with the six mounting standoffs. Use the screws that ship with the IP 900 D/A Carrier Card to secure the new IP 900 D/A Carrier Card to the standoffs. (You may have leftover screws.) **DON'T** over-tighten the screws; it will strip the standoffs.
3. A cable is attached to connector **J20** of the new IP 900 D/A Carrier Card. Connect the cable's other end to connector **J15** of the Master Control Unit's main board.
4. Connect the four-wire power cord attached to the IP 900 D/A Carrier Card to the main board of the Master Control Unit labeled **PC POWER (J8)**.
5. Slide the bottom tray back into the top case, and secure the two pieces together by tightening the thumbscrews.
6. If you have no more IP 900 D/A Carrier Cards or modules to install at this time, power-up and program the system.

IP Server 900 module installation instructions

Important: Before installing, verify that the system is running the appropriate system software. If it isn't, download the correct version from the ESI Resellers' Web site and install it on the system.

ALWAYS power-down the system BEFORE adding or replacing any hardware. Also, be sure to observe all proper procedures regarding the prevention of electrostatic discharge (ESD) when performing the following procedures; otherwise, circuit boards may suffer damage.

Whenever you change the module configuration, you **must** create a **backup file** for the new configuration to be able to perform the Restore function later.

After removing an IP Server 900 module from the box, install it as follows:

1. Loosen the two thumbscrews on either side of the Master Control Unit that secure the base tray to the top, and then slide the bottom tray out and away from the top cover.

Notes: The main board and IP 900 Carrier Card support the installation of four separate modules on each component, allowing up to 8 modules to be installed within the system. Modules are numbered in an order of 1–4 on each and will be connected using the following connectors:

Master Control Unit connectors

M1 — J12 and J13

M2 — J21 and J22

M3 — J31 and J32

M4 — J40 and J41

IP 900 D/A Carrier Card connectors

M1 — J11 and J13

M2 — J15 and J14

M3 — J16 and J17

M4 — J18 and J19

Each module has a 20-pin and a 40-pin connector, each of which is keyed to allow the module to be installed a certain way. Also, modules can be installed in any order, allowing you to skip module positions, if desired, to save room for later growth.

2. Holding the module with the 40-pin and 20-pin connectors facing towards the Carrier Card, select the location where you wish to install the module and press it gently into place.

Note: If **removing** a previously installed module, use the two pull tabs to **gently** remove the module.

3. Slide the bottom tray back into the top case, and secure the two pieces together by tightening the thumbscrews.
4. If you have no more modules or Carrier Cards to install at this time, power-up and program the system.

IP Server 900 IP Resource Module installation instructions

Important: Before installing, verify that the system is running the appropriate system software. If it isn't, download the correct version from the ESI Resellers' Web site and install it on the system.

ALWAYS power-down the system BEFORE adding or replacing any hardware. Also, be sure to observe all proper procedures regarding the prevention of electrostatic discharge (ESD) when performing the following procedures; otherwise, circuit boards may suffer damage.

Whenever you change the module configuration, you **must** create a **backup file** for the new configuration to be able to perform the Restore function later.

After removing an IP Server 900 IP Resource Module (either the UIP Resource Module or the G.729a Resource Module) from the box, install it in the Master Control Unit as follows.

1. Loosen the two thumbscrews on either side of the unit that secure the base tray to the top, and then slide the bottom tray out and away from the top cover.

Notes: The main board supports the installation of two separate IP Resource Module, which are numbered in an order of 1–2 and will be connected using the following connectors:

R1 — J16 and J17 (UIP MODULE)

R2 — J25 and J26 (CODEC MODULE)

Each IP Resource Module has two 40-pin connectors, each of which is keyed to allow the module to be installed a certain way.

2. Holding the IP Resource Module with the two 40-pin connectors facing toward the Carrier Card, identify the location where the IP Resource Module should be installed, and press it gently into place.

Note: The UIP Resource Module **MUST** be installed in slot R1, which is labeled as UIP MODULE.
The G.729a Resource Module **MUST** be installed in slot R2, which is labeled as CODEC MODULE.

Note: If **removing** a previously installed module, use the two pull tabs to **gently** remove the module.

3. Slide the bottom tray back into the top case, and secure the two pieces together by tightening the thumbscrews.
4. If you have no more resource modules or Carrier Cards to install at this time, power-up and program the system.

About replacing modules

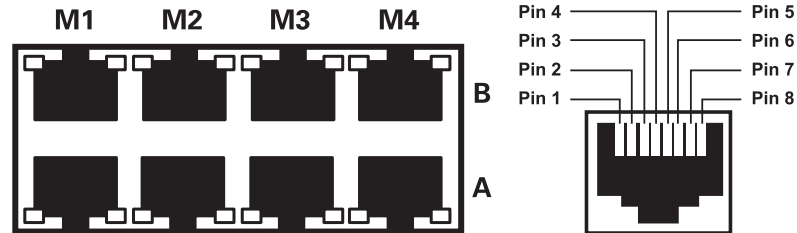
Important: The main board, expansion board, and expansion cable **cannot** be removed or replaced under power. **The entire system must be powered-down** when you install, remove, or replace **any** of these components. Hot-swapping of modules is **NOT** supported.

Notes: When you replace a module with a new one, the system will detect the module type.
 If the new module's type is **different** than that of the original, the newly installed module **won't** come on-line.
 If the new module's type is the **same** as that of the original module, the system will automatically upload software to the new module. This upload process can take from four minutes to one hour, depending on the type of module and how busy the system is at the time.

When replacing modules, you **must** observe the following rules and limitations:

1. The replacement module **must** be **identical** to the port card being removed (*i.e.*: an FXO must be replaced with an FXO; a T1/PRI must be replaced with a T1/PRI; *etc.*).
2. **BEFORE** you remove the module, the system **must** be **powered down**.
3. When removing the module, follow the appropriate instructions (page G.2 or G.3).
4. After replacing the module, power the system back up.

Refer to this graphic for the following module installation details:



FXO and FXS Modules

Connector row(s)	M1–M4 pin out as	Pins 4 and 5	Pins 1 and 2	Pins 3 and 6	Pins 7 and 8
A only	T568B	First line or phone	Second line or phone	Third line or phone	Fourth line or phone

D8 Module

Connector row(s)	M1–M4 pin out as	Pins 4 and 5	Pins 1 and 2	Pins 3 and 6	Pins 7 and 8
A	T568B	First digital phone	Second digital phone	Third digital phone	Fourth digital phone
B	T568B	Fifth digital phone	Sixth digital phone	Seventh digital phone	Eighth digital phone

T1/PRI Module

Connector row(s)	M1–M4 pin out as	Pins 4 and 5	Pins 1 and 2
A only	T568B	Receive T and R	Transmit T and R

Use a standard patch cord to the SmartJack.

Memory Module installation or replacement

Important: Always **power-down** the system (all cabinets) **before** adding or replacing the Memory Module. Also, be sure to observe all proper procedures regarding the prevention of electrostatic discharge (ESD) when performing the following procedures otherwise circuit boards may suffer damage.

LED functions

The unit's various LEDs are designed to provide visual feedback as follows:

Power LED

The **Power** LED is located on the left side of the system's faceplate, and is illuminated when power is being applied to the system. This LED blinks periodically to indicate that the main processor is operational.

LED appearance	What it means
Solid red	Boot-loader is running and loading the FPGA
Solid green	System is loading DSPs
Rapidly flashing red	Boot-loader is loading call processing into memory
Solid green	System is reading configuration and loading port cards
Slow red "heartbeat"	System powered up and ready

Activity LEDs

The **Activity** LEDs are located above their respective connectors on each installed module. Each LED is illuminated when any port on its associated module is in use.

Note: Disconnecting a connector when its respective LED is lit will disconnect any of its ports that are in use.

Upon power-up, approximately five minutes are required for the system to configure. The **Power** LED will flash red periodically, like a "heartbeat", to indicate that the power-up sequence has been completed.

Note: When a T1/PRI Module's LED is...

- ...not lit at all, the T1/PRI circuit is in service but is idle.
- ...lit solidly, the T1/PRI circuit is out of service.

ESI Presence Management installation

For information on installing ESI Presence Management, see its *ESI Presence Management Installation Manual* (ESI document # 0450-0792).

External connections

Grounding instructions

System grounding (supplemental ground) is as follows:

- The conductor wires can be no smaller than the ungrounded branch-circuit supply conductors (usually AWG-16 or higher gauge).
- Acceptable wire: bare **or** covered with green (or green-and-yellow-striped) jacket.
- Conductors (and power receptacles) shall connect to earth ground at the service equipment (usually a cold water pipe or copper ground rod).
- The supplemental ground must: be used regardless of power cord ground, be connected to the ground lug on the bottom of the cabinet, and retain ground connection when the power supply module is unplugged.
- Connect the grounding lugs of all units to system ground

Note: IP Server 900 lines are protected against a 10 KV surge **only** if the earth ground procedures described above are followed.

Power

The cabinet requires a 110 VAC outlet (if possible, a dedicated outlet). Use **only** the Class-2 power supply module provided. A clean, isolated power source in conjunction with a UPS is **STRONGLY** recommended.

When fully loaded, the IP Server 900 consumes 80 watts.

If AC power is interrupted, the system will drop all connections. When power is restored, the system will resume normal operation in approximately five minutes, having retained its full programming and clock setting.

UPS

For system protection and to maintain uninterrupted operation, an uninterruptible power supply is **STRONGLY** recommended. ESI recommends a UPS minimum rating of 230 VA **per system**.

Refer to the particular UPS unit's specifications to determine expected backup duration during a power outage.

Note: The following information about UPSs comes from *Technical Update #216*.

Most people have heard about UPSs, but seem to think that there is just one kind of device that goes by that name. In fact, there are several different major designs in use by today's major UPS manufacturers. These makers share much of the blame for confusing UPSs' end users by, far too often, lumping different designs under the "UPS" name.

UPSs can first be broken down into **system types**:

- **Stand-by** — A very simple design that affects power only when either a lag/brownout occurs below, or a spike/surge occurs above, a certain threshold. When either occurs, the unit trips — *i.e.*, goes into battery mode. This "cleans" the voltage and helps to keep any load safe. Industry average "trip" times are 2–8 ms. No other filtration of AC power is performed.
- **Line interactive** — Constantly monitors inbound voltages, and uses special circuitry to boost low voltages and clamp high voltages without having to use the batteries. Indeed, the batteries are used only if the input voltage drops below acceptable levels (typically about 12% below normal), goes out completely or rises to dangerous levels (typically about 14% above normal) at which components will be damaged if line voltage is not removed. Industry average transfer time is 1–3 ms. (If voltage stays within its normal window, this unit continues to pass voltage, unaltered, from the wall.)
- **On-line** (or *full on-line*) — Constantly filters the power and performs a function known as double conversion (AC to DC to AC). This assures that the load — in this case, phone equipment — will receive not only uninterrupted, true sine wave output but also the cleanest, steadiest power possible throughout any foreseeable power disruptions or voltage irregularities. According to industry specs, it is not unusual for these types of units to be able to regulate utility power, even when it drops to 27% below or rises to 33% above normal, all without using their batteries.

From this point, UPSs can be further broken down by inverter types, which determine output. These are:

- **Square wave.**
- **Modified sine wave** (or *quasi sine wave*).
- **Sine wave.**

Most devices with wall-mounted chargers, such as cordless drills or screwdrivers, can behave erratically — sometimes not allowing the charge circuit to engage at all — when operating with modified sine or square wave inverters. Small wall-based transformer-style power supplies, similar to those ESI phone systems use, can experience overheating problems with modified sine or square wave outputs, which occur while some UPSs are operating in battery mode. This overheating could eventually cause damage to the power supplies; and, in time, the damage could cause a spike through the phone system — seriously damaging some of the static-sensitive components inside the casing.

While the **true** sine wave UPS output power curve smoothly increases to its peak, then smoothly decreases (allowing connected loads and equipment to operate the same as they would from utility supplied wall power), the **modified** sine wave and square wave UPS output power curve will shoot straight up, level off at peak voltage and then drop straight down. Additionally troublesome is that the modified sine wave sits at zero voltage for a short period during the transition to or from batteries — which is the main difference between it and the square wave output of some UPS. Please note that this short interval during which the modified sine wave UPS sits at zero voltage can directly affect the transfer time of the UPS and could, theoretically, be enough to cause the phone equipment to reset or even “freeze.”

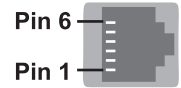
Though it is hard to predict exactly when different ESI systems will have problems with modified sine wave or square waveform UPSs (meaning during a power failure event or the recovery from one), it's fair to assume that a problem will eventually arise from the use of such UPSs. **Therefore, ESI recommends that only true sine wave output UPSs provide backup power to our phone systems and equipment.**

MOH port

The MOH (messages-, or music-, on-hold) connector — located on the Master Control Unit faceplate — is a standard $\frac{1}{8}$ " monophonic mini-jack, used for loading custom MOH recordings or for playing live music-on-hold from an external source such as a CD player.

External paging device connection

A dry-contact overhead-paging device can be connected to the IP Server 900 through the RJ-11 **OH Paging** connector, which is located on the front of the Master Control Unit faceplate. Although this is a six-pin connector, only two pairs are needed between the paging device and the connector:



- To pin-out the connector for **normally open** operation, connect the **audio** wires to **pins 3 and 4** and the **control** pair to **pins 1 and 2**.
- To pin-out the connector for **normally closed** operation, connect the **audio** wires to **pins 3 and 4** and the **control** pair to **pins 5 and 6**.

CO line connection

SIP COs

The IP Server 900 supports SIP COs via Universal IP (UIP) ports. Partial SIP applications are supported through line programming.

Currently supported SIP COs are:

- | | | |
|----------------------|---------------------|------------------|
| • Broadvox | • Cox Cable | • nTelos |
| • Cbeyond | • EasyTel | • 1-VOIP |
| • Clearfly | • Genband | • TCT |
| • Comporium | • MetTel | • Vintalk |
| • Cornerstone | • Netcarrier | • Voxitas |

Local loop

The IP Server 900's advanced CO line circuitry provides for open loop detection and the system's built-in Caller ID interface. Loop start lines are connected via the appropriate M1–M4 connector.

Note: Observe correct order of connection to preserve proper rotary hunting of the CO lines.

In order to more accurately calibrate the system echo canceller algorithms to tune out echo on analog CO lines, the system runs an FXO tuning routine during the initial boot of the system. This tuning process performs some tests on the local loop to set values proactively so that calls are clear at the initial use of the system.

In order for these calibrations to run, it is imperative that each FXO line that is to be used is plugged in at initial bootup. Failure to do so can result in severe echo or other audio disturbances. If this is not possible — such as when the system is pre-built and programmed in a lab environment — it will be necessary to contact ESI Technical Support after the system cutover to have the FXO tuning done manually by ESI personnel.

T1/PRI

For T1 or PRI applications, the IP Server 900 can use the T1/PRI Module.¹ Depending on how you configure it, the T1/PRI Module supports either (a.) a single T1 circuit at 24 DS0 channels or (b.) a PRI circuit supporting 23 “B” (bearer) channels and one “D” (data link) channel. Partial T1 or PRI applications are supported through line programming. The T1 or PRI line is connected via the appropriate M1–M4 connector on the Carrier Card (T568B connection). The connection uses pins 1, 2, 4, and 5 as follows:

Transmit	T	Pin 1
	R	Pin 2
Receive	T	Pin 5
	R	Pin 4

The T1/PRI Module has built-in CSU functionality. The integrated CSU can be enabled or disabled via system programming². The following functionality is provided: line, payload, DTE and none (normal operation) loopback modes with the ability to respond back controlled via system programming; alarm conditions, and both ANSI T1.403 and TR 54016 performance messages for ESF only.

Important: If you're installing more than one T1 or PRI, the T1/PRI Module in the lowest number slot will synchronize (“slave”) the system with the public network. The system will synchronize to only one clock source. Therefore, ESI **strongly** recommends that the first T1/PRI Module in the system be connected to the T1 or PRI that's connected either to the local CO or the nationwide long-distance provider, either of which typically will provide very-high-accuracy clocking (Strata 3). The T1/PRI Module doesn't provide master or sub-master clocking for private-network T1 spans.

When working with a T1 line, the T1/PRI Module supports these CO types:

- **Loop start**
- **Ground start**
- **E&M** (including **E&M–DID/DNIS/ANI**) — When an E&M CO is selected, the choices for **outgoing** signaling type are immediate start, wink start and dial tone start; and the **incoming** signaling type choices are immediate start and wink start. The E&M CO can be set for 2-way traffic, inbound traffic only or outbound traffic only.

The **DID and DNIS/ANI translation table** allows the translation of DID/DNIS digits to an ID, mailbox, extension or department. You can program 600 entries in the table. There is also an entry for exceptions in the table. This allows reroutes of any DID/DNIS calls that aren't programmed or detected to an ID, mailbox, extension or department and defaults to the operator.

The card supports the following framing format and line coding:

- **ESF/B8ZS** (default)
- **SF(D4)/AMI**
- **ESF/AMI**
- **SF/B8ZS**

Line compensation (or line build-out) is provided as necessary between the CSU or Smart Jack™ and the IP Server 900. The system does not support pulse dialing; all incoming dialing will default to DTMF digits.

When working with a PRI line, the DLC (*i.e.*, the DLC, DLC12, or DLC82) supports these switch protocols:

- **National-NI2** (default)
- **Nortel-DMS100**
- **AT&T/Lucent-5ESS**
- **Siemens-EWSD**

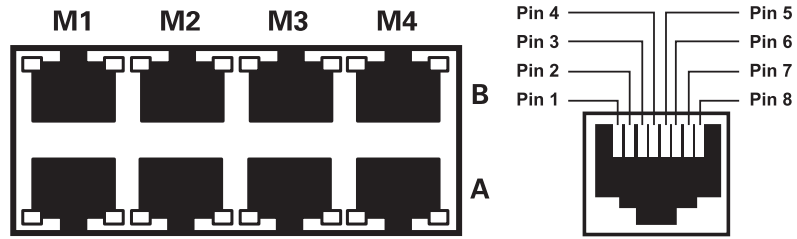
DID for the PRI is an enable/disable field. When DID is enabled, the PRI pilot table becomes active and works in combination with the DID tables.

¹ You may wish to review “Module options,” page A.3.

² See the explanation of Function 2124 in the *IP Server 900 Programming Manual* (ESI #0450-1307).

Module connections

Refer to this graphic for the following module installation details (for more details, see “About replacing modules,” page G.4):



4-FXO and 4-FXS Modules

Connector row(s)	M1–M4 pin out as	Pins 4 and 5	Pins 3 and 6	Pins 1 and 2	Pins 7 and 8
A only	T568B	First line or phone	Second line or phone	Third line or phone	Fourth line or phone

D8 Module

Connector row	M1–M4 pin out as	Pins 4 and 5	Pins 3 and 6	Pins 1 and 2	Pins 7 and 8
A	T568B	First digital phone	Second digital phone	Third digital phone	Fourth digital phone
B	T568B	Fifth digital phone	Sixth digital phone	Seventh digital phone	Eighth digital phone

T1/PRI Module

Connector row(s)	M1–M4 pin out as	Pins 4 and 5	Pins 1 and 2
A only	T568B	Receive T and R	Transmit T and R

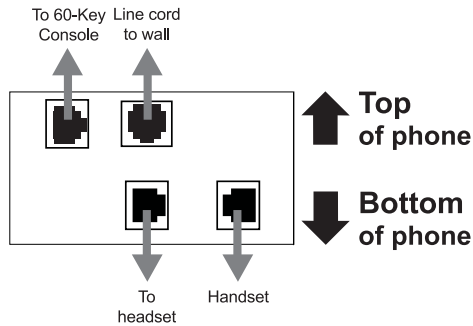
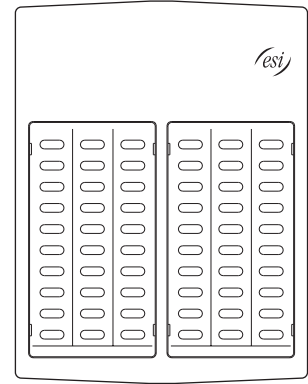
Use a standard patch cord to the SmartJack.

60-Key Expansion Console connection

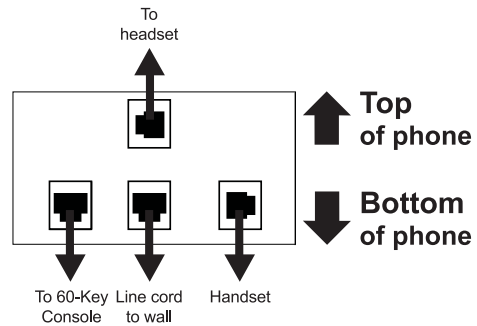
Notes: The 60-Key Expansion Console can be connected to an ESI 60, ESI 40, or 48-Key Feature Phone.

If connecting both a 60-Key Expansion Console and a 60-Key Second Expansion Console to an ESI phone see "60-Key Second Expansion Console connection," page H.5.

1. The 60-Key Expansion Console (*right*) includes an **expansion cable**. Connect one end of the expansion cable to the appropriate connector on the bottom of the ESI phone (*below*). Then, connect the other end of the expansion cable to the 60-Key Expansion Console.
2. To keep cabling out of the way, thread the expansion cable into the slots on the bottom of the phone and 60-Key Expansion Console.
3. Program the keys on the 60-Key Expansion Console using the same procedure as with the ESI phone (press **PROG/HELP 2**).
4. If necessary, remove the clear **plastic** overlay from the keys on the Expansion Console.
5. For the customer's convenience, label the **paper** overlay to show how the keys are programmed (we suggest you use the browser-based *IP Server 900 System Programmer* application for this).
6. Install the labeled **paper** overlay on the 60-Key Expansion Console.
7. Install the clear **plastic** overlay **over** the paper overlay, to protect it.
8. Use the provided Velcro[®] tape to attach the left side of the 60-Key Expansion Console to the right side of the ESI phone.



Connectors on bottom of
ESI 60 or ESI 40

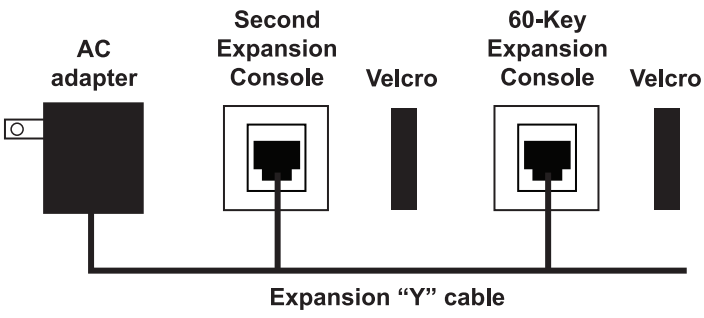


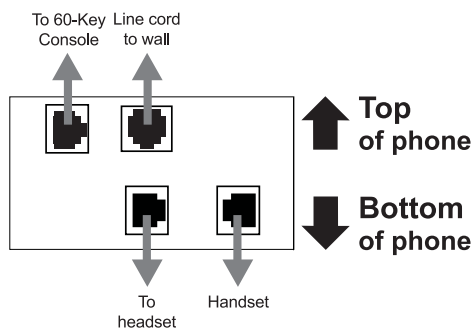
Connectors on bottom of
48-Key Feature Phone

60-Key Second Expansion Console connection

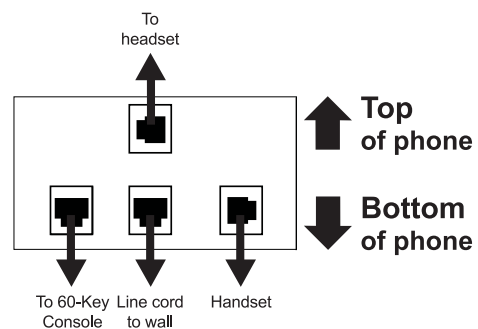
Notes: If connecting only one Expansion Console to an ESI phone, see “60-Key Expansion Console connection,” page H.4.

The 60-Key Second Expansion Console connects to the 60-Key Expansion Console and **cannot** connect directly to any ESI phone to which you can connect a 60-Key Expansion Console.

1. The Second Expansion Console (which is physically identical to a 60-Key Expansion Console) includes an **expansion “Y” cable (right)**¹. Lay out the cable across the back of the equipment so that the AC adapter is on left and the end of the cable is on the right.
- 
2. Connect the **right** end of the expansion “Y” cable to the appropriate connector on the bottom of the ESI phone (*below*).
 3. Then, connect the expansion “Y” cable’s **middle** plug to the 60-Key Expansion Console, the **left** plug to the Second Expansion Console, and the **AC adapter** to an appropriate 110 VAC outlet to provide power to the Second Expansion Console (*above*).
 4. To keep cabling out of the way, thread the expansion “Y” cable into the slots on the bottom of the phone and the two Expansion Consoles.
 5. Program the keys on the two Expansion Consoles using the same procedure as with the ESI phone (press **PROG/HELP 2**).
 6. If necessary, remove the clear **plastic** overlay from the keys on the two 60-Key Expansion Consoles.
 7. For the customer’s convenience, label the **paper** overlay to show how the keys are programmed (we suggest you use the browser-based *IP Server 900 System Programmer* application for this).
 8. Install the labeled **paper** overlays on the two 60-Key Expansion Consoles.
 9. Install the clear **plastic** overlays **over** the paper overlays, to protect them.
 10. Use the provided Velcro[®] tape to attach the left side of the 60-Key Expansion Console to the right side of the ESI phone, and the right side of the 60-Key Expansion Console to the left side of the Second Expansion Console).



Connectors on bottom of ESI 60 or ESI 40



Connectors on bottom of 48-Key Feature Phone

¹ This diagram shows the backs of the Expansion Consoles.

Installing ESI's Cordless Handsets

Note: The IP Server 900 supports only the ESI Cordless Handset II models (**not** the original ESI Cordless Handset models).

Each ESI Cordless Handset comes with:

- A **charger/cradle** to charge the Handset.
- An **AC adapter** for use with only the charger.
- A **base phone** to provide a digital interface between the ESI phone system and ESI Cordless Handset. This base phone needs **no AC power**: if the Cordless Handset is **digital**, the base phone is **line-powered**; if the Cordless Handset is **IP**, the base phone uses **Power over Ethernet (PoE)**.
- **Wall-mount(s)**, a **belt clip**, and a **Quick Reference Guide**.

Each ESI Cordless Handset is keyed to only one base phone and takes up one port (digital or IP) on a port card.

Base phone installation

Due to each site's unique characteristics, the range and distance information we'll provide herein is only approximate.

Characteristics that **positively** affect performance:

- Clear line-of-sight between the base phone and the Cordless Handset.
- Base phone antenna pointed in its uppermost vertical position.

Characteristics that **negatively** affect performance:

- Large amounts of metal shelving (such as in manufacturing or warehouse areas).
- Close proximity to (within one mile of) a radio tower.
 - Concrete walls that divide spaces where Cordless Handsets are used (assuming the base phones are in one location).

Don't install the base phone:

- Close to a wall with metal studs.
- On a metal wall.
 - Next to a device that emits RFI or EMI¹ — *e.g.*, a television, radio, computer, computer printer, fluorescent light fixture, or fax machine.
- Next to any other 900 MHz device — *e.g.*, a hand-held inventory control device.
- In a ceiling that has foil-backed insulation.
 - Behind doors that typically are closed, tinted windows, one-way glass, or other areas that limit or cut off transmission to the Cordless Handset.

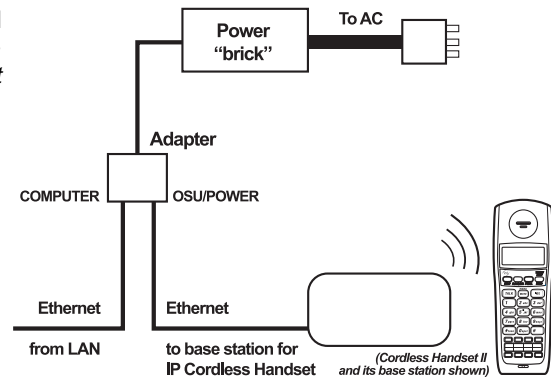
Base phones must be installed at least 10 feet apart, regardless of whether the base phone is for the small-model or large-model Cordless Handset. **Don't** install more than six base phones in one area (such as a network room). Choose a location at least 30 feet away if more than six base phones are needed in a building.

¹ RFI is radio frequency interference. EMI is electromagnetic interference.

A **Digital** Cordless Handset base phone requires only a line cord to the phone system; AC power **isn't** needed because the base phone receives power from the phone system via the line cord.

An **IP** Cordless Handset base phone receives PoE. If PoE isn't already being supplied, you'll need to install the separately purchased **PoE adapter** (sold in five-packs as ESI part # 5000-0437). The diagram at *right* shows the necessary connections.

Note: If the PoE equipment plugs into AC outlets and a power failure occurs, all IP Cordless Handsets on the system will be unable to originate or receive phone calls. Therefore, **either:** (a.) use an appropriately sized uninterruptible power supply (UPS) to power **all** the IP equipment (base phone, PoE adapter, router, etc.) involved in making phone calls **or** (b.) have a traditional POTS ("plain old telephone service") phone available for making and receiving CO calls.



Once the base phones are installed and the Cordless Handsets charged, the Cordless Handset will auto-seek an available channel:

Note: Feedback may result if the Cordless Handset is within three inches of an ESI desktop phone.

ESI Cordless Handset II Repeater

The optional **ESI Cordless Handset II Repeater** extends the coverage area of the ESI Cordless Handset II in all directions, including up and down.

If Repeaters are installed so their coverage area overlaps that of the base phone, the base phone can hand off calls to the Repeaters as the user moves from one coverage area to another. When it's connected to a Repeater, the ESI Cordless Handset II operates exactly as it does when connected to its base phone, and the handoff from the base phone to the Repeater occurs seamlessly without disturbing the end user, even during an active call.

Each ESI Cordless Handset II base phone supports up to **six** repeaters, regardless of configuration.

- Each Repeater supports up to two direct connections to other Repeaters.
- No Repeater can be more than three connections — or **hops** — from the base phone.

All Repeaters, regardless of configuration, must be registered to the base phone.

All Repeaters must be registered directly to the base and then installed in their final locations; each Repeater will determine the best signal path back to the base station.

For detailed information on installing Repeaters, refer to the *ESI Cordless Handset II Repeater Installation Manual* (ESI # 0450-1248).

Repeater installation notes

To achieve optimum operation from your ESI Cordless Handset II Repeater:

- Place the Repeater **at least six feet** off the ground so it has a clear line-of-sight.
- Make sure the Repeater has good reception from the base phone (or Repeater to which it is daisy-chained).
- Make sure the Repeater location is close to a standard 120 VAC power outlet.
- Never install electrical cords across traffic areas where they can cause a tripping hazard (additionally, such cords, if damaged, may create fire or electrical hazards).
- Allow **at least 35 feet** between Repeaters. If you install Repeaters across multiple floors, be sure to allow **35 feet vertically**, too.
- Install the Repeater away from sources of electrical interference. Examples include audio systems, office equipment, and microwave ovens.
- Install the Repeater away from heat sources and direct sunlight.
- Install the Repeater away from items that can interfere with radio signals. Examples include metal doors, thick walls, niches, and cupboards.

In case of trouble

If you have followed the guidelines described herein and still encounter problems with ESI Cordless Handsets, please call ESI Technical Support at **800 491-3609** or e-mail to techsupp@esi-estech.com. When contacting ESI Technical Support, be sure to have as much of the following site and usage information as possible:

- Square footage of the building.
- Layout of building/offices, and locations of base phones and repeaters. This can be a hand-drawn diagram with locations of base phones (you can fax it to ESI at **972 422-9705**; be sure to indicate that it goes to Technical Support). The objective is to give the ESI technician an idea of the site's layout.
- Number of Cordless Handsets, whether they are Cordless Handsets II or original Cordless Handsets, and how many are of each type (digital, Local IP, or Remote IP).
- How the troublesome Cordless Handset is being used. For example, is it used by a supervisor who travels the entire area of the building many times per day, or by an administrative assistant to go a short distance from an office to a copy room?
- Where the problem occurs — e.g., if a Cordless Handset cuts in and out when used in a certain area of the building.

ESI Cordless Handset II specifications

	ESI Cordless Handset II
Fully charged battery time	Approx. 16. hrs.
Recharge time	5–8 hrs. ¹
Standby time	Approx. 7 days
Approximate range ²	Without Repeater: 175 ft. With Repeater: 320 ft.
Weight (including battery)	5.4 ozs.
Size, W x D x H (in.)	2.25 x 1.25 x 6.5

Accessories

ESI sells separately a headset for both ESI Cordless Handset models, and this is the **only** headset ESI supports for use with the ESI Cordless Handset. For more information on accessories for ESI Cordless Handsets, refer to your appropriate *Price Schedule* or the *ESI Cordless Handset II Product Overview* (ESI # 0450-1228).

¹ If charged while in the handset. A battery pack placed in the charger's extra-battery compartment requires 15–19 hours to recharge.

² Interference may result if cordless base phones are installed within 10 feet of each other. Ranges are approximate, and are dependent on each site's unique characteristics. Feedback may result if the Cordless Handset is within three inches of the ESI desktop phone.

Index

- 60-Key Expansion Console, F.4, H.4, H.5
- 60-Key Second Expansion Console, F.4, H.4, H.5
- Battery. *See* Cautions
- Cautions, B.1
 - Battery, B.1
 - Fuse, B.1
 - Power supply, B.1
- CO lines
 - Capacities. *See* System capacities
 - Connecting, H.3
- Console, F.4, H.4, H.5
- ESI Cordless Handsets. *See* Phones
- ESI Presence Management, D.1
- Expansion Console, F.4, H.4, H.5
- Fuse. *See* Cautions
- Grounding, H.1
- Hardware installation, G.1–G.5
- LED functions, G.5
- Main board, A.1
- Memory Module, A.1
- Module
 - Installation, G.3
- Modules
 - Capacities, A.2
 - MOH, H.3
 - Overlays, F.4
 - Paging, H.3
- Phones
 - Digital phones, F.2
 - ESI Cordless Handsets, F.3
 - IP phones, F.1
 - VIP Softphone*, F.4
- Power, H.1
 - Power Distribution Shelf, A.2
 - Power supply. *See* Cautions
 - Transformers, wall-mount, A.2
- PRI, H.2
- Regulatory information (U.S. and Canada), B.2
- Ringer equivalence number (REN), B.2
- Site location, G.1
- System capacities, D.1
- T1, H.2
- UPS (uninterruptible power supply), H.1
- VIP Softphone*. *See* Phones