

Lucent Technologies
Bell Labs Innovations



Internet Telephony Server-Enterprise Administration Guide

108324534
193-117-803
Issue 2.0
August 1998

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Acknowledgment

This document was prepared by the Product Information Development Organization, Lucent Technologies, Denver, CO, and Basking Ridge, NJ.

Placeholder for Chinese.

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Sie sollten berücksichtigen, daß Kommunikationsnetze mit Paketvermittlung in Verbindung mit der Kompression und Dekompression von Sprachsignalen generell eine Reihe

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- Intermittierender Verlust von Sprachsignalen aufgrund eines Datenstaus im IP-Netzwerk bzw. aufgrund eines Paketverlusts.
- Verzögerungen durch den Paketierungsprozeß und der Querbewegung über bestimmte Netzkomponenten, wie z.B. Router.
- Abschwächung der Sprachsignale durch die Kompression, Paketierung und Dekompression der Signale. Dieser Effekt kann noch verdoppelt werden, wenn bei einem Anruf eine Nachricht in einer Voice-Mailbox hinterlassen wird, da die Signale in diesem Fall den Kompressions-/Dekompressionsprozeß zweimal durchlaufen.
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Placeholder for Korean

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Su responsabilidad para la seguridad de su sistema

El fraude telefónico es el uso no autorizado de su sistema de telecomunicaciones por una parte no autorizada, por ejemplo, personas distintas a los empleados, agentes, subcontratistas de su empresa u otras personas que trabajen a nombre de su empresa. Tome en cuenta que existe el riesgo de fraude telefónico asociado con su sistema de telecomunicaciones y que, de ocurrir un fraude telefónico, podría resultar en substanciales cargos adicionales para sus servicios de telecomunicaciones.

Usted y su administrador del sistema son responsables de la seguridad de su sistema, como la programación y la configuración del equipo para prevenir el uso no autorizado. El administrador del sistema también es responsable de leer todos los documentos de instalación, instrucciones y administración del sistema proporcionados con este producto a fin de comprender en su totalidad aquellas funciones que pueden introducir el riesgo de fraude telefónico y los pasos a seguir para reducir ese riesgo. Lucent Technologies no garantiza que este producto sea inmune o que prevendrá el uso no autorizado de los servicios de telecomunicaciones de portadora común o de las facilidades accesadas a través de o conectadas a ella. Lucent Technologies no será responsable de ningún cargo que resulte de dicho uso no autorizado.

Usted también debe estar consciente de que la naturaleza de las redes de conmutación de paquetes, aunada a la compresión y descompresión de la señal de voz, puede

originar problemas de rendimiento, incluyendo, pero no limitados a:

- Pérdida intermitente de la señal de voz causada por la congestión de la red IP o por la pérdida de paquetes
- Retrasos causados por el empaquetamiento y transmisión a través de los componentes de la red, como por ejemplo, los ruteadores (routers)
- Degradación de la señal de voz causada por la compresión, el empaquetamiento y la descompresión de la señal. Esto puede complicarse si la llamada resulta en un mensaje de correo de voz, ya que la señal pasará nuevamente a través del proceso de compresión/descompresión.
- Interrupciones del servicio causadas por ráfagas de tráfico provenientes de otras aplicaciones TCP/IP ejecutadas a través de la red IP

Estos problemas de rendimiento pueden agravarse si usted no sigue las recomendaciones de Lucent Technologies para la configuración, operación y uso del producto.

El mejor rendimiento y la máxima seguridad se obtienen cuando este producto se utiliza en un entorno controlado, como una intranet privada. Las llamadas hechas con este producto se comprimen y se empaquetan, pero no se codifican, por lo que es posible que las comunicaciones a través del Internet público no sean seguras. Además, el enrutamiento de llamadas a través de un gestor de protección o de filtrado de paquetes puede poner en riesgo la seguridad de la red.

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1 Getting Started

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Overview

The Internet Telephony Server-Enterprise (ITS-E) consists of the following components:

- A specially prepared and configured server
- The ITS service software, which routes telephone calls and faxes over the Internet or your company's intranet, resulting in substantial long distance savings
- The ITS Configuration Manager software, which lets you, the ITS-E administrator, monitor and adjust key parameters to initially administer and enhance the operation and performance of the ITS service

In order to use the ITS-E you need:

- a PBX with available T1, E1 or analog line(s)
- an Ethernet 10/100 BaseT LAN connection that provides access to the Internet or your company's intranet

Note: The ITS-E must be used with a PBX for all digital connections. Only analog ITS-E connections are intended for use through a direct connection to a central office (CO) or public switched telephone network (PSTN).

The following figure shows a typical ITS-E configuration:

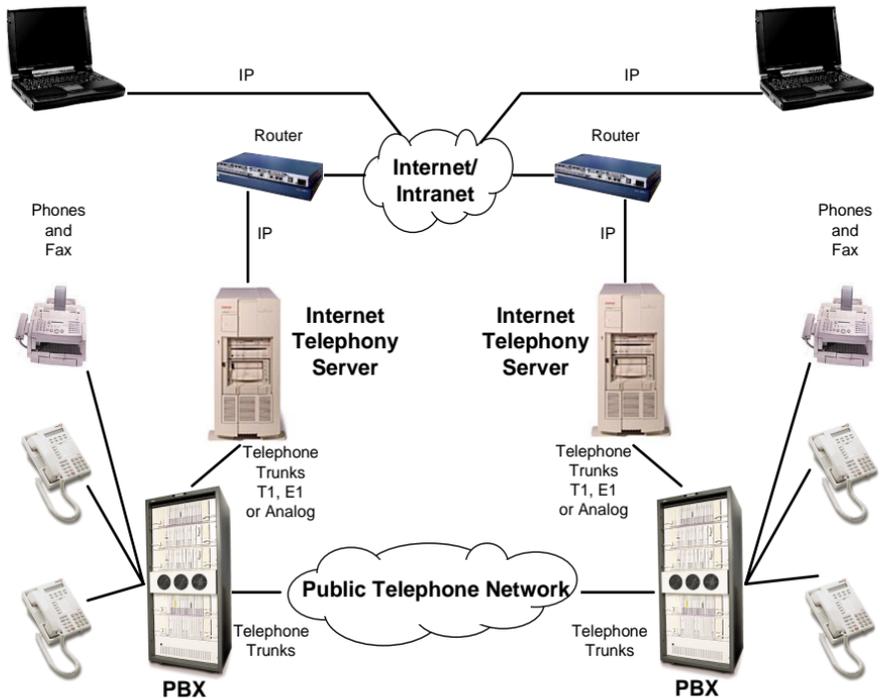


Figure 1. Typical ITS-E configuration

Minimum ITS-E Administration

Before you perform ITS-E administration, make sure that all of the procedures in Chapter 6 of the *ITS-E Integration Guide* have been completed successfully.

As an ITS-E administrator, you will use the ITS Configuration Manager and Windows NT Server 4.0 utilities initially to set up your ITS-E and to maintain it thereafter. The basic tasks that you will perform include:

- Logging On to the ITS-E computer
- Starting the ITS Configuration Manager
- Exiting the ITS Configuration Manager
- Starting and Stopping the ITS service

Logging On to the ITS-E Computer

When you receive the ITS-E computer, follow these steps:

- 1 Log on with the user name of “administrator” and use a blank password.
- 2 Change this password immediately.



SECURITY ALERT:

Change your administrative password immediately to ensure the security of the ITS-E.

Starting the ITS Configuration Manager

To start the ITS Configuration Manager, follow this step:

- From the Windows NT Server 4.0 desktop, double-click the ITS Configuration Manager icon. The ITS Configuration Manager logo displays briefly, followed by the **ITS Configuration Manager** dialog box.

What Is Next After You Start the ITS Configuration Manager for the First Time

When you receive the ITS-E you must:

- 1 Verify that the default PBX-to-ITS-E connectivity parameters will establish the necessary communication path between your PBX and the ITS-E.
- 2 Enter your dialing plan and routing information (refer to your *ITS Dial/Routing Plan Worksheets*).

2 Minimum ITS-E Administration

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The sections that follow provide instructions to complete the following tasks:

- Configuring PBX-to-ITS-E Connectivity
- Configuring the Dialing Plan and Routing Information
- Exiting the ITS Configuration Manager
- Configuring Windows NT Event Viewer
- Starting and Stopping the ITS Service
- Placing a Test Telephone Call

Before you perform ITS-E administration and start the ITS service for the first time, make sure that all of the procedures in Chapter 6 of the *ITS-E Integration Guide* have been completed successfully.

Configuring PBX-to-ITS-E Connectivity

You receive the ITS-E with default PBX-to-ITS-E connectivity parameters already entered to establish communication between your PBX and the ITS-E. In most cases, you will only need to verify these parameters.

To configure PBX-to-ITS-E connectivity, follow these steps after starting the ITS Configuration Manager:

- 1 Click the **Telephony** tab, and the **Telephony** property page displays.
- 2 In the **Telephony Board Installed** control group, verify that the
 - a Number of Boards
 - b Type of Board
 - c Trunk Control Protocolinstalled in your ITS-E is shown. If not, contact your local Lucent Technologies customer support representative.
- 3 Click **Show All Ports** to verify that the correct number of ports are enabled.

Note: The following table shows the maximum number of ports that can be enabled for each card type, number of cards, and trunk control protocol:

Card Type	Card Number	Trunk Control Protocol	Max Ports Enabled
AG-T1	1	WINK START	24
AG-T1	2	WINK START	48
AG-T1	1	ISDN National-ISDN-2	23
AG-T1	2	ISDN National-ISDN-2	46
AG-T1	1	ISDN INS1500	23
AG-T1	2	ISDN INS1500	46
AG-E1	1	ISDN Euro-ISDN	30
AG-E1	2	ISDN Euro-ISDN	60
AG-E1	1	R2-MFC (ARG or BRA)	30
AG-E1	2	R2-MFC (ARG or BRA)	60
AG-8	1	LOOP START	8
AG-8	3	LOOP START	24

- 4 In the **Maximum Digits to be collected** box, enter the number of digits that the PBX will forward to the ITS-E (see the *ITS Dial/Routing Plan Worksheets*).
- 5 Click **Apply**, and your changes are saved.

Note: *MERLIN LEGEND® Analog Solution Dial Tone Frequencies*

For the ITS-E to place calls to the PBX when connected by analog lines, it must be configured to recognize the PBX's dial tone, otherwise it will not dial the digits. For

a MERLIN LEGEND system, the ITS-E dial tone frequencies must be set as follows:

- 1 Click the **Telephony** tab, and the **Telephony** property page displays.
- 2 Click the **Advanced** button, and the **Telephony Advanced** property page displays.
- 3 Under the **Dial Tone control group**, set **Frequency 2** to 0.

Configuring the Dialing Plan and Routing Information

Configuring the dialing plan and routing information establishes how the ITS-E will process:

- Originating telephone calls and fax transmissions: the telephone calls and fax transmissions that you place from your site to the remote ITS-E
- Terminating telephone calls and fax transmissions: the telephone calls and fax transmissions that you receive at your site from the remote ITS-E

Adding Originating Dialing Plan and Routing Information

To specify how the ITS-E will process originating telephone calls and fax transmissions, follow these steps after starting the ITS Configuration Manager:

- 1 Click the **Dial/Routing Plan** tab, and the **Dial/Routing Plan** property page displays.
- 2 In the **Machine Name** list, click the local ITS-E machine name.
- 3 Select **Originating**.
- 4 Click **Add** (under Routing Info), and the **Add Originating Entry** dialog box displays.
- 5 Do not change the **Entry Type** box; leave it set to Accept.
- 6 Do not change the **Line Number** box; leave it set to Any.
- 7 In the **Search Digits** box, type the number from the *ITS Dial/Routing Plan Worksheets* for the originating entry for your site.
- 8 In the **Replace Digits** box, type the number from the *ITS Dial/Routing Plan Worksheets* for the originating entry for your site.
- 9 In the **Destination Type** box, select the appropriate value for the remote ITS-E. For Virtual Telephone Servers, the **Destination Type** should be OCSR1.0.
- 10 In the **Destination Address (IP)** box, type the Internet Protocol (IP) address of the remote ITS-E.
- 11 Do not change the **Port** box; leave it set to the default value.
- 12 Click **OK**. The **Add Originating Entry** dialog box closes, and the **Dial/Routing Plan** property page displays, now showing the information that you entered.

13 Click **Apply**, and your changes are saved.

Note: Repeat the above steps for each originating entry specified by the *ITS Dial/Routing Plan Worksheets* you filled out.

Adding Terminating Dialing Plan and Routing Information

To specify how the ITS-E will process terminating telephone calls and fax transmissions, follow these steps after starting the ITS Configuration Manager:

- 1 Click the **Dial/Routing Plan** tab, and the **Dial/Routing Plan** property page displays.
- 2 In the **Machine Name** box, click the local ITS-E machine name.
- 3 Select **Terminating**.
- 4 Click **Add** (under Routing Info), and the **Add Terminating Entry** dialog box displays.
- 5 Do not change the **Entry Type** box; leave it set to Accept.
- 6 In the **Search Digits** box, type the number from the *ITS Dial/Routing Plan Worksheets* for the terminating entry for your site.
- 7 In the **Replace Digits** box, type the number from the *ITS Dial/Routing Plan Worksheets* for the terminating entry for your site.
- 8 Do not change the **Line Number** box; leave it set to Any.
- 9 Click **OK**. The **Add Terminating Entry** dialog box closes, and the **Dial/Routing Plan** property page displays, now showing the information that you entered.
- 10 Click **Apply**, and your changes are saved.

Note: Repeat the above steps for each terminating entry specified by the Dial/Routing Plan Worksheets you filled out.

Note: Be aware that the ITS-E is now configured without remote access control. If you wish to restrict remote access to your system, see Chapter 4, “Configuring Dial/Routing Plan Parameters”, Routing Info - Access Control parameter.

Exiting the ITS Configuration Manager

To exit the ITS Configuration Manager, do the following in any ITS Configuration Manager dialog box:

- Click **OK**. Depending on the parameters you changed through the ITS Configuration Manager, you may be prompted to restart the ITS service to ensure that your configuration changes take effect.

Configuring Windows NT Event Viewer

The System and Application Logs settings in the Windows NT Event Viewer should be configured as follows to ensure that ITS-E records are written correctly to these logs.

- 1 Click **Start, Programs, Administrative Tools**.
- 2 Click **Event Viewer**. Select the **Log** menu and **System**.
- 3 Click **Log Settings**. The **Event Logs Settings** dialog box displays.
- 4 Select **Overwrite Events as Needed** and click **OK**.
- 5 Select the **Log** menu and **Application**.
- 6 Click **Log Settings**.
- 7 In the **Event Logs Settings** dialog box, select **Overwrite Events as Needed** and click **OK**.
- 8 Exit the NT Event Viewer.

Starting and Stopping the ITS Service

Normally, the ITS service is started automatically when the Windows NT™ operating system is started. However, if you have changed parameters that cause the ITS Configuration Manager to prompt you to restart the ITS service, you will have to stop the ITS service and then restart it manually for the changes to take effect. Instructions are provided in the following sections.

Starting the ITS Service

To start the ITS service, follow these steps:

From the Windows NT Server 4.0 desktop:

- 1 Click **Start, Settings, Control Panel**.
- 2 Double-click **Services**.
- 3 Click **Internet Telephony Server, Start**.

Note: When the ITS-E uses a T1 (robbed-bit) connection to the PBX, allow a brief start-up interval to elapse before attempting to place a telephone call through the ITS-E. This interval is necessary to allow the PBX to perform a series of maintenance tests on the T1 telephony interface connection.

Stopping the ITS Service

To stop the ITS service, follow these steps:

From the Windows NT desktop:

- 1 Click **Start, Settings, Control Panel**.
- 2 Double-click **Services**.
- 3 Click **Internet Telephony Server, Stop**.

Placing a Test Telephone Call

Before you attempt to place a test telephone call, make sure that all of the procedures in Chapter 6 of the *ITS-E Integration Guide* have been completed successfully.

To place a test telephone call to the remote ITS-E, follow these steps:

After starting the ITS service:

- 1 Contact the ITS-E administrator at the remote site in your organization to verify that he or she has completed the following procedures:
 - Configured the PBX-to-ITS-E connectivity parameters
 - Entered dialing plan and routing information
 - Started the ITS service
- 2 Dial the telephone number of the remote site using the same procedure that you followed before installing the ITS-E. For example, if, prior to installing the ITS-E, you dialed 2, then 011 plus the country code followed by the telephone number, then continue to dial 2, then 011 plus the country code followed by the telephone number after installing the ITS-E.

Note: If you are using an analog solution or a Lucent Technologies MERLIN LEGEND[®] system, refer to the *ITS Dial/Routing Plan Worksheets* for changes in the way you dial.

3 Feature Operation

August 1998

Overview

This chapter provides you with information on ITS-E feature operation in order to help you set up the more advanced configurations described in Chapter 4, should you want to do so.

The sections that follow provide information on the following topics:

- Basic Configuration
- Basic Administration
- Telephony Support
- Dialing
- Access Control
- Off-premise Dialing
- PSTN Fallback and Quality of Service Line Pools
- Alerts
- H.323 Calls
- Virtual Telephone Application

Basic Configuration

In the simplest ITS-E configuration there are two sites. Each site has an ITS-E connected to a PBX, via either a T1, an E1 or an analog connection. The two ITSs are connected to each other through either a corporate Intranet or the Internet. Users at one site make voice calls and send faxes to users at the other site, via the ITS-E. Calls (voice or fax) that go out from one of the sites to any location other than the other ITS-E site are sent over the regular Public Switched Telephone Network (PSTN).

This basic configuration is extended by adding a third (fourth, fifth, ...) site to the ITS-E network. Again, only calls to a remote ITS-E site will be sent through the ITS-E network, all other calls will go over the PSTN.

Note: For the Virtual Telephone (VT) application, the basic configuration would only use one ITS-E server. For a description of this configuration, refer to the "Virtual Telephone Application" section later in this chapter.

The sections that follow explain how this basic ITS-E network configuration can be enhanced and extended.

Basic Administration

PBX

In order for the PBX to work correctly with the ITS-E at a site, it must be administered correctly. This administration has two main components:

- Administration of the connection (either T1, E1 or analog) between the PBX and the ITS-E.
- Administration of the call routing on the PBX to route the appropriate calls to the ITS-E connection.

Note: The VT application requires additional administration on the PBX. Refer to the *Virtual Telephone Server Integration Guide* for more information.

ITS-E

In order for the ITS-E to work correctly with both the PBX and the IP network at the site, it must be administered correctly. This administration has three main components:

- IP network
- Telephony
- Dial/Routing plan.

Note: ITS-E administration for the VT application differs from the standard ITS-E network configuration. Refer to the “Configuring Dial/Routing Plan Parameters” section in Chapter 4 and the *Virtual Telephone Server Administration Guide* for further details.

IP Network

The ITS-E interface to the IP network must be properly administered using the Windows NT Networking interface. The settings in the Networking interface control the behavior of the Network Interface Card (NIC) in the ITS-E that is connected to the IP network.

Telephony

The ITS-E interface to the PBX must be properly administered. The major components of this administration (type and number of telephony card(s) and trunk control protocol) are specified when the ITS-E software is installed. These can only be changed by uninstalling and then reinstalling the ITS-E software. Verification of the values of these major components and administration of minor components (for example, expected number of digits) is done using Telephony property page in the ITS Configuration Manager. The settings on the Telephony property page control the behavior of the telephony card in the ITS-E that is connected to the PBX.

Dial/Routing Plan

The ITS Dial/Routing Plan must be properly administered using the ITS Configuration Manager Dial/Routing Plan property page. The settings on the Dial/Routing Plan property page control how the ITS-E software manipulates the digits of the telephone numbers of the calls it receives from the PBX and to what IP destinations (addresses) it sends those calls. It also controls how the ITS-E software manipulates the digits of the telephone numbers of the calls it receives over the IP network before those calls are passed on to the PBX at the local site.

Note: If you are using the VT application, refer to the *VT Administration Guide* for information on additional ITS-E administration required for that application.

Telephony Support

This section is intended as a brief overview of some basic telephony concepts that are needed to understand the various ITS-E telephony connections that are currently supported. To begin with, there are two basic types of telephony connections:

- digital
- analog

Digital Connections

All of the ITS-E digital connections are for PBX connections ONLY. The ITS-E digital connections do NOT support connection to a central office (CO, that is, telephone company) switch.

The digital connections can be further divided according to the rate that bits are transmitted over the connection as follows:

- 1.544 megabits per second (known as T1 transmission rate, or simply T1)
- 2.048 megabits per second (known as E1 transmission rate, or simply E1)

Each of the digital transmission rates can be further divided according to how the signaling for the call (call setup, termination, phone number passing, etc.) is handled:

- “bit-oriented” signaling (the signaling is sent as bit patterns and tones)
- “message-oriented” signaling (the signaling is sent in a series of messages over a separate signaling path)

The T1 rate supports both signaling types as follows:

- T1 “bit-oriented” signaling is commonly known as “robbed-bit” protocol
- T1 “message-oriented” signaling uses the Integrated Services Digital Network-Primary Rate Interface (ISDN-PRI) protocol

The E1 rate supports both signaling types as follows:

- E1 “bit-oriented” signaling (the form used by ITS-E) is commonly known as Modulated Frequency Compelled (signaling) Release 2 (R2-MFC) protocol
- E1 “message-oriented” signaling uses the Integrated Services Digital Network-Primary Rate Interface (ISDN-PRI) protocol

Most of these protocols can be further divided according to the country where it is being used, since most countries have their own version of these protocols.

Thus the digital ITS-E telephony connections (to PBXs ONLY) that are supported are as follows:

Bit Rate	Signaling	Protocol	Country	Comments
T1	“bit-oriented”	NA	North America	This is known as T1 “robbed-bit”
T1	“message-oriented”	ISDN-PRI	North America	This is known as National-ISDN-2
T1	“message-oriented”	ISDN-PRI	Japan	This is known as INS1500
E1	“message-oriented”	ISDN-PRI	Germany	This is known as Euro-ISDN for Germany

Bit Rate	Signaling	Protocol	Country	Comments
E1	"message-oriented"	ISDN-PRI	France	This is known as Euro-ISDN for France
E1	"bit-oriented"	R2-MFC	Argentina	
E1	"bit-oriented"	R2-MFC	Brazil	

Each of the digital connections shown above have a large number of parameters associated with them that may be configured in many different ways. The *ITS-E Integration Guide* shows specific values for all of these parameters for the above telephony connections. ONLY the specific configurations shown in the *ITS-E Integration Guide* for the parameters associated with the digital connections above are supported. For example, the T1 "in-band" signaling connection for North America (known as T1 "robbed-bit") uses the "wink" start configuration. This is the ONLY configuration that is supported. T1 "robbed-bit" connections with "immediate" or "automatic" start configurations are *not* supported. Thus not all (or even most) T1 "robbed-bit" connections are supported. ONLY the one specifically shown in the *ITS-E Integration Guide* is supported.

Analog Connections

The ITS-E analog telephony connections support connection to either a PBX or a CO switch. In the case of analog connections, the only differences are in the "call progress tone" (for example, dialtone, busy tone, ringback tone, and so on) that are used. In general, each country has its own set of call progress tones, although there are exceptions. For example, Canada and the United States use the same set of call progress tones. This release of the ITS-E supports the use of any of the call progress tones that NMS supports, however the analog NMS card that the

ITS-E uses (the AG-8) is only officially allowed to be connected to CO switches (this is called being "type approved") in North American and Japan. This release of ITS-E also supports connection to PBX switches, but only in North American and Japan.

Dialing

There are two basic types (or ways) of dialing ITS-E calls. Which one you use is a function of the type of connection (T1, E1, or analog) between the ITS-E and the PBX, and in some cases, the type of PBX at your site.

Types

One Stage

The first and simplest type of ITS-E dialing is called one-stage dialing. In this type of dialing the user only hears one dial tone and only dials one telephone number. This is the type of dialing that you are most familiar with in your normal home and office routine. The following chart illustrates one-stage dialing.

Calling Party	PBX 1	Gateway 1	Gateway 2	PBX 2	Called Party
Goes off hook and dials destination number.					
	Collects digits, routes call to ITS-E trunk after consulting with routing table, Connects to ITS-E and delivers dialed digits to ITS-E.				
		Detects incoming call and receives digits delivered from PBX. Performs any local digit translations, determines IP address of the destination ITS-E and forwards call to that ITS-E.			

Calling Party	PBX 1	Gateway 1	Gateway 2	PBX 2	Called Party
			Receives connection indication from Gateway 1 over the IP connection along with delivered digits. Performs any local digit translations and places call to PBX.		
				Detects incoming call and receives destination digits. Rings phone associated with that number.	
					Hears the phone ringing. Goes off hook.

One-stage dialing is generally used with a T1 or E1 ITS-E solution. (An exception is the MERLIN LEGEND system, which uses two-stage dialing with a T1 ITS-E solution.)

Two Stage

The second type of ITS-E dialing is called two-stage dialing. In this type of dialing the user hears two dial tones and will dial two telephone numbers. The following chart illustrates two-stage dialing.

3 Feature Operation

Types

Caller 1	PBX 1	Gateway 1	Gateway 2	PBX 2	Caller 2
Goes off hook, dials access number of Gateway 1.					
	Collects digits, finds a free line and connects caller to Gateway 1.				
		Detects and answers incoming call and plays back a secondary dial tone to caller 1.			
Hears secondary dial tone and dials remote destination number.					
		Collects dialed digits from caller 1, performs any local digit translations, determines IP address of the destination ITS-E and forwards the call to that ITS-E.			

Caller 1	PBX 1	Gateway 1	Gateway 2	PBX 2	Caller 2
			Receives connection indication from Gateway 1 along with translated digits. Performs any further local digit translations and places call to PBX.		
				Detects incoming call, receives destination digits. Rings phone associated with that number.	
					Hears the ringing. Goes Off hook.

Two-stage dialing is always used with an Analog ITS-E solution. It is also used with a T1 ITS-E solution for certain PBXs, in particular the MERLIN LEGEND system.

As much as possible, within the above dialing limitations, the system should be configured so that the user dials the same telephone numbers using the ITS-E as he/she does using the PSTN.

T1 (WINK START) Solution

DEFINITY

Normal

Normal dialing on a DEFINITY T1 (WINK START) ITS-E solution is one stage with the user dialing the number exactly as he/she would if no ITS-E were present, including the use of the Automatic Route Selection (ARS) Feature Access Code (FAC). The ARS FAC is normally the digit '9'. Users know this digit as the digit they dial to get an outside line.

Facility Busy

If the telephone on the far end is busy, the user hears the standard busy tone.

Near End: If No channels of the T1 trunk that connects the near-end PBX to the ITS-E are available, the user hears the reorder (also known as fast busy) tone.

Far End: If No trunk facility (either T1 or E1 channels or analog lines) that connects the far-end PBX to the ITS-E is available, the user hears the reorder (also known as fast busy) tone.

Caveats

If the user dials an incorrect number, either one that does not match the Dial/Routing Plan information defined on the near- or far-end ITS-E, or the far-end PBX does not recognize the number, the user hears the "intercept" (also known as the European siren) tone.

In addition, if the near-end ITS-E cannot connect to the far-end ITS-E over the IP network, the user also hears the intercept tone.

**MERLIN
LEGEND*****Normal***

Normal dialing on a MERLIN LEGEND T1 (WINK START) ITS-E solution is two-stage dialing. The user first dials a "pool" number associated with the T1 connected to the ITS-E. The user then hears a second dial tone, and dials the number as he/she normally would, except that he/she does *not* dial the ARS FAC.

Facility Busy

If the telephone on the far end is busy, the user hears the standard busy tone.

Near End: If No channels of the T1 trunk that connects the near-end PBX to the ITS-E are available, the user hears the reorder (also known as fast busy) tone immediately after he/she dials the "pool" number.

Far End: If No trunk facility (either T1 or E1 channels or analog lines) that connects the far-end PBX to the ITS-E is available, the user hears the reorder (also known as fast busy) tone.

Caveats

If the user dials an incorrect number, either one that does not match the Dial/Routing Plan information defined on the near- or far-end ITS-E, or the far-end PBX does not recognize the number, the user hears the "intercept" (also known as the European siren) tone.

In addition, if the near-end ITS-E cannot connect to the far-end ITS-E over the IP network, the user also hears the intercept tone.

A MERLIN LEGEND T1 ITS-E solution cannot receive off-premise calls in the normal way. See the *ITS-E Integration Guide*, Chapter 2, section "Configuring Off-Premise Dialing" for more information.

ISDN-PRI Solutions

DEFINITY

Normal

Normal dialing on a DEFINITY ISDN-PRI ITS-E solution is one stage with the user dialing the number exactly as he/she would if no ITS-E were present, including the use of the Automatic Route Selection (ARS) Feature Access Code (FAC). The ARS FAC is normally the digit '9'. Users know this digit as the digit they dial to get an outside line.

Facility Busy

If the telephone on the far end is busy, the user hears the standard busy tone.

Near End: If No channels of the ISDN-PRI trunk that connects the near-end PBX to the ITS-E are available, the user hears the reorder (also known as fast busy) tone.

Far End: If No trunk facility (either T1 or E1 channels or analog lines) that connects the far-end PBX to the ITS-E is available, the user hears the reorder (also known as fast busy) tone.

Caveats

If the user dials an incorrect number, either one that does not match the Dial/Routing Plan information defined on the near- or far-end ITS-E, or the far-end PBX does not recognize the number, the user hears the "intercept" (also known as the European siren) tone.

In addition, if the near-end ITS-E cannot connect to the far-end ITS-E over the IP network, the user also hears the intercept tone.

Note: ISDN-PRI is the recommended interface for the Virtual Telephone application. Refer to the *Virtual Telephone Server Integration Guide* for additional ISDN-PRI considerations in a VT environment.

**MERLIN
LEGEND**

The ITS-E ISDN-PRI solutions are *not* supported with the MERLIN LEGEND.

R2-MFC Solutions

DEFINITY**Normal**

Normal dialing on a DEFINITY R2-MFC ITS-E solution is one stage with the user dialing the number exactly as he/she would if no ITS-E were present, including the use of the Automatic Route Selection (ARS) Feature Access Code (FAC). The ARS FAC is normally the digit '9'. Users know this digit as the digit they dial to get an outside line.

Facility Busy

If the telephone on the far end is busy, the user hears the standard busy tone.

Near End: If No channels of the R2-MFC trunk that connects the near-end PBX to the ITS-E are available, the user hears the reorder (also known as fast busy) tone.

Far End: If No trunk facility (either T1 or E1 channels or analog lines) that connects the far-end PBX to the ITS-E is available, the user hears the reorder (also known as fast busy) tone.

Caveats

If the user dials an incorrect number, either one that does not match the Dial/Routing Plan information defined on the near- or far-end ITS-E, or the far-end PBX does not recognize the number, the user hears the "intercept" (also known as the European siren) tone.

In addition, if the near-end ITS-E cannot connect to the far-end ITS-E over the IP network, the user also hears the intercept tone.

MERLIN LEGEND

The ITS-E R2-MFC solutions are *not* supported with the MERLIN LEGEND.

Analog Solution

DEFINITY

Normal

Normal dialing on a DEFINITY Analog ITS-E solution is two-stage dialing. The user first dials a "hunt group" extension number associated with the analog lines connected to the ITS-E. This extension is normally either a one- or two-digit number. The user then hears a second dial tone, and dials the number as he/she normally would, except that he/she does *not* dial the ARS FAC.

Facility Busy

If the telephone on the far end is busy, the user hears the standard busy tone.

Near End: If None of the analog lines that connects the near-end PBX to the ITS-E are available, the user hears the busy tone immediately after dialing the "hunt group" extension number.

Far End: If No trunk facility (either T1 or E1 channels or analog lines) that connects the far-end PBX to the ITS-E is available, the user hears the reorder (also known as fast busy) tone.

Caveats

If the user dials an incorrect number, either one that does not match the Dial/Routing Plan information defined on the near- or far-end ITS-E, or the far-end PBX does not recognize the number, the user hears the "intercept" (also known as the European siren) tone.

In addition, if the near-end ITS-E cannot connect to the far-end ITS-E over the IP network, the user also hears the intercept tone.

If the hunt group on the DEFINITY that contains the ITS-E analog lines is configured to have a queue length greater than zero and fewer than the specified number of users are in the queue, the user is placed in the queue and hears a "ring back" tone until an analog line becomes available, at which time he/she hears a secondary dial tone.

MERLIN LEGEND

Normal

Normal dialing on a MERLIN LEGEND Analog ITS-E solution is two-stage dialing. The user first dials a "group calling" extension number associated with the analog lines connected to the ITS-E. This extension is normally a two- digit number. The user then hear a second dial tone, and dials the number as he/she normally would, except that he/she does *not* dial the ARS FAC.

Facility Busy

If the telephone on the far end is busy, the user hears the standard busy tone.

Near End: If None of the analog lines that connects the near-end PBX to the ITS-E is available, the user hears a ring back tone after dialing the "group calling" extension number. This will continue until the user hangs up or until one of the analog lines becomes available, at which time the user hears the secondary dial tone.

Far End: If No trunk facility (either T1 or E1 channels or analog lines) that connects the far-end PBX to the ITS-E is available, the user hears the reorder (also known as fast busy) tone.

Caveats

If the user dials an incorrect number, either one that does not match the Dial/Routing Plan information defined on the near- or far-end ITS-E, or the far-end PBX does not recognize the number, the user hears the "intercept" (also known as the European siren) tone.

In addition, if the near-end ITS-E cannot connect to the far-end ITS-E over the IP network, the user also hears the intercept tone.

Access Control

When the ITS-E is initially installed and configured, it allows any other IP destination (address) to send calls to (that is, access) that ITS-E. You can restrict access to the ITS-E using the Access Control feature on the Dial/Routing Plan property page of the ITS Configuration Manager. This feature allows the administrator to specify which IP addresses (either specific ones or subnets) can access the ITS-E. This restriction on access can be enabled for other ITS-E systems (Gateways), NetMeeting™ PCs (clients) or both.

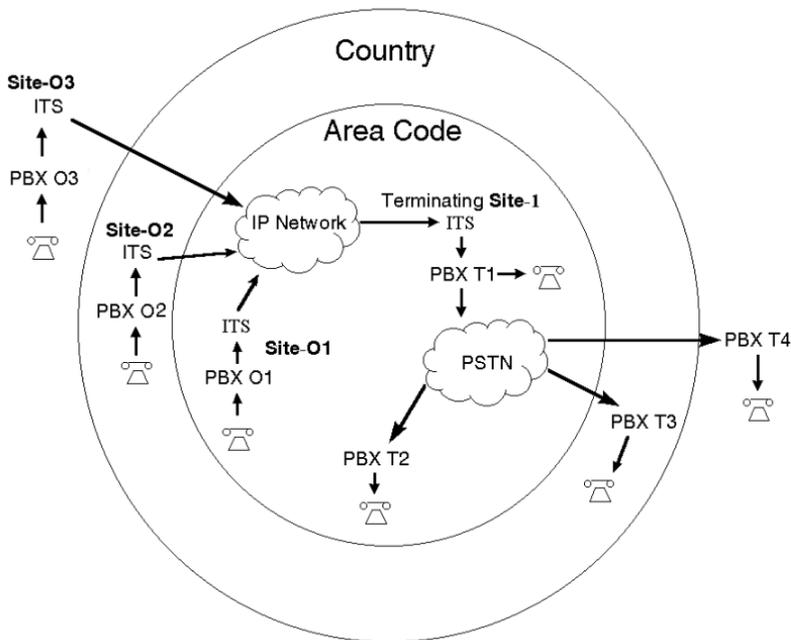
It also has the ability to reject (or block) calls it receives from the PBX it is connected to based on a pattern matching of the beginning part of the number dialed. For example, all phone numbers that start with 1900 could be blocked. You can reject numbers using the Originating Routing Info feature on the Dial/Routing Plan property page of the ITS Configuration Manager.

Off-premise Dialing

As mentioned earlier in the “Basic Configuration” section, only calls going to the PBX connected to the ITS-E at a site would be routed over the IP network via the ITS-E. The ITS-E also supports off-premise dialing. This means that calls *not* intended for the PBX at a remote site, could be routed over the IP network to the ITS-E at the remote site, which would send them to the PBX at that site, which in turn would route them “off-premise” over the PSTN to the final destination.

For example, suppose there is an ITS-E in Tokyo and one in New York. A user could make a call to New Jersey from Tokyo by sending the call from Tokyo to New York over the IP network using the ITS-E, and then have the New York PBX send the call over the PSTN to New Jersey, greatly reducing the long-distance expense.

As mentioned previously, the goal is for users to dial the same telephone numbers for ITS-E calls as they do for calls over the PSTN. The following chart illustrates the different possible originating and terminating locations for calls to an ITS-E site, labeled as Terminating Site1.



Possible sites for originating a call to Terminating Site-1 are labeled O1 (for Originating Site-1), O2, and so on. A call could terminate on a telephone connected to the PBX at Terminating Site-1 (indicated by PBX T1), or it could be routed "off-premise" to terminating sites T2, T3, or T4. Since calls received by the ITS-E (at Terminating Site-1) are dialed the same way as PSTN calls, even if no

off-premise dialing is configured, the telephone number received will differ depending on where the call originated.

For example, if the call originated at originating site O1 (which is within the same area code as Terminating Site-1), it will contain only exchange and extension portions. On the other hand, if the call originates at originating site O2 (which is within the same country, but in a different area code than Terminating Site-1), it will contain a long distance access code and an area code, as well as an exchange and an extension. In the same way, calls from originating site O3 will contain an international access code, a country code, an area code, an exchange and an extension. In all three cases, the Terminating Site-1 ITS-E will have to change the digits in the telephone number received to match what the PBX expects to receive for a call to one of its extensions (telephones).

Consider the following example where off-premise dialing is configured. When Originating Site-1 calls terminating site T2 (over the IP network via the Terminating Site-1 ITS-E) for example, the user at originating site O1 will dial the exchange of PBX T2, not the PBX of Terminating Site-1. Similarly, when originating site O3 calls terminating site T4, the user at originating site O3 will dial his/her country's international access code and the country code of terminating site T4. The ITS-E at Terminating Site-1 must convert the international access code at originating site O3 to the international access code for Terminating Site-1, while preserving the country code for terminating site T4.

For assistance in performing PBX and ITS-E administration at a site with the desired level of off-premise dialing, refer to the *ITS Dial/Routing Plan Worksheets*.

PSTN Fallback and Quality of Service (QoS) Line Pools

The Public Switched Telephone Network (PSTN) "Fallback" feature allows ITS-E calls (in some types of ITS-E solutions) to be automatically rerouted over the regular telephone network when the IP network is too congested. This feature is implemented by measuring the Quality of Service (QoS) to logical groups of ITS-E telephony ports (T1 channels, E1 channels or analog lines) called "line pools". See the *ITS-E Integration Guide*, Chapter 2, 3, 4, or 5 (depending on the type of telephony connection your ITS-E has), section "PSTN Fallback and QoS Line Pools" for more information.

Alerts

Alerts are a mechanism that will cause a popup window to automatically appear on the receiving Windows NT™ system whenever a potentially service effecting event occurs on an ITS-E server. They are a way to remotely monitor the ITS service on one or more ITS-E systems.

See Chapter 7 for instructions on how to set up alerts.

H.323 Calls

H.323 is a set of standards for transmission of voice calls over an IP network. A number of Windows based PC applications exist that allow telephone calls to be made from the PC (with a microphone and speakers or headset) over the IP network to another H.323 compliant PC. The ITS-E supports H.323 telephone calls. Currently, the NetMeeting H.323 application is supported. This means that NetMeeting can make a call to an ITS-E, which then passes the call on to the PBX to which it is connected, and that PBX may in turn route the call off-premise, depending on how the ITS-E and PBX are configured. Conversely, the PBX can send a call to the ITS-E which then passes the call on to a NetMeeting client on the IP network.

See Chapter 7 for instructions on how to configure NetMeeting to work with ITS-E.

Virtual Telephone Application

Virtual Telephone is an application that works with an ITS-E system. When ITS-E is used with the Virtual Telephone application, it must be administered in a specific way.

Remote users who access your communications system from a variety of locations on an irregular basis (such as casual telecommuters, traveling sales people, technicians dispatched to remote sites, knowledge workers traveling on business, auditors, etc.) often have the following needs:

- Dial-up access to electronic mail and enterprise data applications.
- Access to voice messaging.
- Ability to place voice calls, receive voice calls, and handle multiple voice calls (just as if they are using their multiline phone at the office).
- Ability for important callers to reach them without the caller having to know their travel itineraries. In other words, an important caller should be able to dial the user's office number, as usual, without necessarily knowing where the user is, and the call should reach the user.
- Preferences for screening and redirecting calls using time-of-day and calling number information that can be modified while on the road.

The Virtual Telephone is client/server software that fulfills these user needs. A remote user dials into the enterprise data network using the existing remote access infrastructure and runs the Virtual Telephone client. While the remote user runs data applications over the dial-up connection, the Virtual Telephone makes voice communication possible on the same dial-up connection. The Virtual Telephone client on the remote laptop uses voice-over-IP and H.323 technology to

communicate with an ITS-E. The ITS-E, in turn, has access to voice circuit interfaces to the PBX. This allows the Virtual Telephone client to make and receive voice calls while connected to the enterprise data network.

Proper integration with call redirection features on the enterprise PBX makes it possible for calls arriving at the user's office phone to automatically redirect to the Virtual Telephone client. As such calls redirect, they pass through that Virtual Telephone user's Personal Router on the server. Each user sets preferences in their Personal Router to screen or redirect calls. Preferences use the calling number or time-of-day to screen and redirect incoming calls.

The Virtual Telephone client provides multiple call appearances and also supports DTMF (Dual Tone Multi-Frequency) interaction with voice messaging systems and IVRs (Interactive Voice Responses, such as "auto-attendants").

If you are using the Virtual Telephone application you need to be aware of the following:

- Only ITS-E systems with a National-ISDN-2 PBX telephony connection can be used with the VT application.
- The Automatic Number Identification (ANI) information *must* be provided by the PBX and ITS-E on all VT calls.
- Special administration is required on an ITS-E system that will be used with the VT application.

See the Virtual Telephone documentation for more information.

4 Advanced ITS-E Administration

August 1998

Overview

After you set the minimum required ITS-E configuration, you have the option of adjusting other parameters in the ITS Configuration Manager.

Your options include:

- Viewing information about the ITS-E software components
- Configuring telephony parameters
- Viewing voice/fax parameters
- Configuring Internet parameters
- Configuring dial/routing plan parameters
- Configuring service log parameters
- Configuring quality of service parameters

The sections that follow provide you with a description of each parameter in the property pages in the ITS Configuration Manager.

Taking a Quick Tour of the ITS Configuration Manager

Tabs and Property Pages

The ITS Configuration Manager lets you configure, administer, and troubleshoot the ITS-E in an easy-to-use tabbed interface featuring standard Windows® property pages.

The ITS Configuration Manager tabs and property pages are:

Table 1. Tabs and property pages in the ITS Configuration Manager

Press this tab:	To display this property page:
Info	Info property page: Shows you the version and build number of the installed ITS-E software.
Telephony	Telephony property page: Allows you to view PBX-to-ITS-E connectivity parameters and DSP resources installed. Also allows you to configure some of the minor components of this connectivity. Telephony Advanced property page: Allows you to adjust additional telephony parameters as needed.
Voice/Fax	Voice/Fax property page: Allows you to view information about the capabilities of the DSP subsystem and configure some of its parameters.

Table 1. Tabs and property pages in the ITS Configuration Manager

Press this tab:	To display this property page:
Internet	Internet property page: Allows you to adjust ITS-E-to-Internet connectivity options as needed for optimal performance on the ITS-E-to-Internet connection.
Dial/Routing Plan	Dial/Routing Plan property page: Allows you to configure the dialing plan and routing information for the ITS-E, which regulates how the ITS-E will route the originating and terminating sides of a call. Access control information is also configured in this property page.
Service Logs	Service Logs property page: Allows you to configure the service logging options for the ITS-E.
Quality of Service (QoS)	Quality of Service property page: Allows you to configure and monitor the quality of service to remote ITS-E sites.

Standard Command Buttons

The standard command buttons that you will use as you work in the ITS Configuration Manager are:

- **OK:** Accepts your changes and exits the ITS Configuration Manager.
- **Cancel:** Cancels your changes and exits the ITS Configuration Manager.
- **Apply:** Accepts your changes and lets you continue working in the ITS Configuration Manager.
- **Set Default Values:** Cancels your changes and resets the parameters in a property page back to their default values.

- **Help:** Shows context-sensitive help for the currently displayed property page. Context-sensitive help can also be accessed by clicking the “?” button on the title bar and then clicking on an item, or by highlighting an item and then pressing the F1 function key.

Note: The following parameters, when changed through the ITS Configuration Manager, will take effect while the ITS service is running:

- Telephony: PSTN ports
- Dial/Routing Plan
- Quality of Service (QoS)

Whenever you change any other parameters through the ITS Configuration Manager, you must stop and restart the ITS service for the changes to take effect.

Viewing Information About the ITS-E Software

Use the Info property page to view information about ITS-E software.

The Info property page is provided for your reference only. You cannot change any of the information shown on this page.

Configuring Telephony Parameters

Use the Telephony property page to configure and monitor PBX-to-ITS-E connectivity options and DSP resource information.

The Telephony property page contains the following parameters:

Table 2. Parameters in the Telephony property page

Parameter	Description
Telephony Board Installed	<ul style="list-style-type: none"> • Number of Boards: Identifies the number of telephony boards installed in your ITS-E. (1 or 2 or 3) • Type of Board: Identifies the type of telephony board(s) installed in your ITS-E. (AG-8, AG-T1, AG-E1) • Trunk Control Protocol: Identifies the control protocol being used by the telephony board(s) installed in your ITS-E. (WINK START, LOOP START, ISDN National-ISDN-2, ISDN Euro-ISDN, ISDN INS1500, R2-MFC ARG, R2-MFC BRA) <p>(These three parameters determine the default maximum number of ports.)</p> <p>This information is read-only.</p>
DSP Resources Installed	<ul style="list-style-type: none"> • Number of Boards: Identifies the number of DSP cards installed in the server. • Type of Board: Identifies the type of DSP cards installed in the server. In this release, two types of DSP card(s) are supported: TAP-801 and TAP-802. This information is read-only.

Table 2. Parameters in the Telephony property page

Parameter	Description																												
Ports	<ul style="list-style-type: none"> Port Number: Allows you to specify the ports that you want to enable or disable by entering the port number, and selecting the Enable or Disable option button in the Status control group. <p>The maximum number of ports that are available is a function of the number and type of telephony card(s). How many of those ports that can be enabled is a function of the number and type of DSP card(s). The maximum number of simultaneous calls that can be made is further limited by the number of ITS-E licenses you purchased.</p> <p>By default, all ports from 1 through the maximum number are set to an active state (even if this exceeds the number of licenses you purchased). The maximums for Cards are as follows:</p> <table border="1" data-bbox="559 714 1113 989"> <thead> <tr> <th><u>Type</u></th> <th><u>No.</u></th> <th><u>TCP</u></th> <th><u>Max</u></th> </tr> </thead> <tbody> <tr> <td>AG-T1</td> <td>1</td> <td>WINK START</td> <td>24</td> </tr> <tr> <td>AG-T1</td> <td>2</td> <td>WINK START</td> <td>48</td> </tr> <tr> <td>AG-T1</td> <td>1</td> <td>ISDN National-ISDN-2</td> <td>23</td> </tr> <tr> <td>AG-T1</td> <td>2</td> <td>ISDN National-ISDN-2</td> <td>46</td> </tr> <tr> <td>AG-T1</td> <td>1</td> <td>ISDN INS1500</td> <td>23</td> </tr> <tr> <td>AG-T1</td> <td>2</td> <td>ISDN INS1500</td> <td>46</td> </tr> </tbody> </table>	<u>Type</u>	<u>No.</u>	<u>TCP</u>	<u>Max</u>	AG-T1	1	WINK START	24	AG-T1	2	WINK START	48	AG-T1	1	ISDN National-ISDN-2	23	AG-T1	2	ISDN National-ISDN-2	46	AG-T1	1	ISDN INS1500	23	AG-T1	2	ISDN INS1500	46
<u>Type</u>	<u>No.</u>	<u>TCP</u>	<u>Max</u>																										
AG-T1	1	WINK START	24																										
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AG-T1	1	ISDN National-ISDN-2	23																										
AG-T1	2	ISDN National-ISDN-2	46																										
AG-T1	1	ISDN INS1500	23																										
AG-T1	2	ISDN INS1500	46																										

Table 2. Parameters in the Telephony property page

Parameter	Description			
Ports, con't.	<u>Type</u>	<u>No.</u>	<u>TCP</u>	<u>Max</u>
	AG-E1	1	ISDN Euro-ISDN	30
	AG-E1	2	ISDN Euro-ISDN	60
	AG-E1	1	R2-MFC (ARG or BRA)	30
	AG-E1	2	R2-MFC (ARG or BRA)	60
	AG-8	1	LOOP START	8
	AG-8	3	LOOP START	24
	<ul style="list-style-type: none"> <li data-bbox="536 490 1182 552">• Show All Ports: Displays a list of available ports in the telephony subsystem. <p data-bbox="561 562 1182 686">If a port is a member of a line pool (refer to the QoS tab), a # sign appears next to its number in the list of all ports (even if the line pool is in an “idle” or “monitor only” mode).</p> <p data-bbox="561 697 1182 759">If a port is disabled, an asterisk (*) appears next to its number in the list of all ports.</p>			

Table 2. Parameters in the Telephony property page

Parameter	Description
Maximum Digits to Be Collected	<p>Allows you to set the maximum number of digits that the PBX will forward to the ITS-E.</p> <p>Note: If this value is less than the number of digits actually forwarded by the PBX, the calls will <i>not</i> go through.</p> <p>The default value is 30. You can enter a value within the range of 0 to 30.</p>
Advanced	Displays the Telephony Advanced dialog box, where you can set additional telephony parameters.

Configuring Advanced Telephony Parameters

Use the Telephony Advanced dialog box to adjust additional telephony parameters.

The Telephony Advanced dialog box contains the following parameters:

Table 3. Parameters in the Telephony Advanced dialog box

Parameter	Description
Ring Count	<p>Allows you to set the number of rings before the ITS-E hangs up because of a No Answer message.</p> <p>The default value is 10. You can enter any value within the range of 10 to 32767.</p>
First Digit Time Out	<p>Allows you to set the first digit time-out interval in milliseconds for the ITS-E software.</p> <p>The default value is 7000 milliseconds. You can enter any value within the range of 2000 to 600000.</p>
Inter Digit Time Out	<p>Allows you to set the inter digit time-out interval, which sets the time of arrival of subsequent dialed digits from the user.</p> <p>The default value is 5000 milliseconds. You can enter any value within the range of 2000 to 600000.</p>
Wink Wait Time	<p>Allows you to set the maximum time to wait for the far end to wink for an outgoing call.</p> <p>The default value is 10000 milliseconds. You can enter any value within the range of 1000 to 600000. If no wink is expected, set this parameter to zero. This is not applicable if your ITS-E contains analog card(s).</p>

Table 3. Parameters in the Telephony Advanced dialog box

Parameter	Description
Time Out	<p>Allows you to set the maximum time that can elapse with no stimulus from the network before call will be disconnected by ITS-E with reason of time-out.</p> <p>The default value is 45000 milliseconds. You can enter any value within the range of 1 to 600000.</p>
Busy Tone Duration (sec)	<p>Allows you to set the maximum time that can elapse after a busy tone is detected before call progress will be stopped.</p> <p>The default value is 60 seconds. You can enter any value within the range of 10 to 300.</p>
Config Path	<p>Displays the location of the PSTN library configuration file as follows:</p> <p>C:\NMS\AG\CFG\AG.CFG</p> <p>This information is read-only.</p>
Report Path	<p>Displays the location of the PSTN status report file as follows:</p> <p>C:\NMS\AG\AG.RPT</p> <p>This information is read-only and is helpful to Lucent Technologies Customer Support when troubleshooting.</p>

Table 3. Parameters in the Telephony Advanced dialog box

Parameter	Description
Connect Mask	<p>Allows you to set additional connection options.</p> <p>These connection options control the network events that enable an outgoing call to transition to the connected state.</p> <p>If your ITS-E contains a T1 or E1 telephony interface card, the default selected option is out-of-band signal.</p> <p>If your ITS-E contains an analog telephony interface card, the default values are out-of-band signal, voice detected, ring ended, and modem detected.</p>

Table 3. Parameters in the Telephony Advanced dialog box

Parameter	Description
Dial Tone	<p data-bbox="509 203 1132 260">Specifies the dial tone that the ITS-E is configured to detect.</p> <p data-bbox="509 277 1153 334">The dial tone frequencies may be PBX- or country-specific and you may need to adjust them accordingly.</p> <ul data-bbox="534 352 1172 940" style="list-style-type: none"><li data-bbox="534 352 1172 518">• Frequency1: Allows you to set the first dial tone frequency that the ITS-E will detect. The default value is for an INS1500 solution is 400, for all other solutions it is 350. You can enter any value within the range of 330 to 3600.<li data-bbox="534 533 1172 761">• Frequency2: Allows you to set the second dial tone frequency that the ITS-E will detect. The default value for an INS1500 solution is 0, for all other solutions it is 440. You can enter any value within the range of 330 to 3600. If only a single dial tone frequency needs to be deleted, set this to zero (0).<li data-bbox="534 777 1172 940">• Amplitude: Allows you to set the minimum broadband signal amplitude to qualify for dial tone detection. The default value is -28. You can enter any value within the range of -40 to 0.

Table 3. Parameters in the Telephony Advanced dialog box

Parameter	Description
ISDN Connection	Specifies which side of the ISDN-PRI protocol (network or user) the ITS-E is configured as. The PBX <i>must</i> be configured as the opposite side of protocol. On ITS-E solutions that are <i>not</i> ISDN-PRI this control group is dimmed (unavailable).

Viewing Voice/Fax Parameters

Use the Voice/Fax dialog box to view information about, and configure some of the capabilities of the DSP subsystem.

The Voice/Fax dialog box contains the following parameters:

Table 4. Parameters in the Voice/Fax dialog box

Parameter	Description
Enable Voice	Indicates that ITS-E voice transmission functionality is enabled. This information is read only.
Enable Fax	You can enable or disable ITS-E fax transmission functionality using this feature.

Parameter	Description
Voice	<ul style="list-style-type: none"><li data-bbox="479 168 1183 225">• Gateway Voice Coder: Sets the type of voice coder used for voice calls. The default voice coder for phone-to-phone (ITS-E-to-ITS-E) communication is SX 7300. The voice coder type of both ITS-E systems should agree. If they do not, then voice quality may be poor.<li data-bbox="479 391 1183 484">• Voice Frames per Packet: Sets the number of frames of voice information sent in each packet when using the Gateway Voice Coder. The default value is 1 (packet). Valid values are 1 or 2. Generally, a value of 2 will give better voice quality as long as packet loss is low.<li data-bbox="479 603 1183 697">• H.323 Voice Coder: The default value for phone-to-PC, PC-to-phone, and ITS-E-to-OCS communication is G732.1. This information is read only.<li data-bbox="479 712 1183 806">• Voice Frames per Packet: Sets the number of frames of voice information sent in each packet when using the H.323 Voice Coder. The default value is 1 (packet). Valid values are 1 or 2. Generally, a value of 2 will give better voice quality as long as packet loss is low.

Parameter	Description
Voice, con't.	<ul style="list-style-type: none"><li data-bbox="479 166 1179 332">• DTMF Duration: Sets the DTMF (Dual Tone Multi-frequency) duration for communication with an H.323 client. (Virtual Telephone application) The default value is 600 (milliseconds). You can enter any value in the range of 150 to 15000 (milliseconds).<li data-bbox="479 348 1179 544">• DTMF Silence Duration: Sets the silence duration interval between two consecutive DTMF tones for communication with an H.323 client. (Virtual Telephone application) The default value is 150 (milliseconds). You can enter any value in the range of 30 to 15000 (milliseconds).

Parameter	Description
Fax	<ul style="list-style-type: none">• Maximum Fax Rate: Indicates the fax transmission rate. The default value is 9.6 Kbps. Valid values are 9.6 Kbps or 14.4 Kbps.• Fax Error Control: Sets the level of redundant information used to improve the fax completion rate. The default value is None (no redundant information use). Valid values are None, Moderate, and Extensive.<ul style="list-style-type: none">• Moderate: Each packet transmitted also contains the previous packet sent.• Extensive: Each packet transmitted also contains the previous two packets sent.For good quality, managed networks with very little packet loss, use None. For a managed network with high packet loss, use Extensive to improve the fax completion rate.<p>Note: This results in higher bandwidth usage and longer fax sending time.</p><ul style="list-style-type: none">• Fax Frames Per Packet: Sets the number of fax frames per packet. The default value is 2. Valid values are 1 or 2.

Configuring Internet Parameters

Use the Internet dialog box to configure ITS-E-to-Internet connectivity parameters. Adjust these parameters as needed for optimal performance on the ITS-E-to-Internet connection.

The Internet dialog box contains the following parameters:

Table 5. Parameters in the Internet dialog box

Parameter	Description
Lucent Gateway Protocol	<ul style="list-style-type: none">• Signaling Port: Displays the initial port number (5000) used for call setup. This value is read-only.• Setup Time-out (ms): Allows you to set the number of milliseconds to wait before canceling a call attempt while trying to set up the Internet connection. If the call setup exceeds this threshold, the calling party will hear a fast busy signal. The call setup time probes network traffic conditions at the given instant. Exceeding the set threshold indicates that the network is congested and that good voice quality may not be possible on the Internet. Setting this parameter to a large value effectively lets all calls go through regardless of Internet traffic conditions. Setting this parameter too low unnecessarily restricts otherwise good calls. Generally, you should accept the default value of 8000. You can enter a value within the range of 50 to 30000.

Table 5. Parameters in the Internet dialog box

Parameter	Description
Lucent Gateway Protocol, con't.	<ul style="list-style-type: none">• Keep Alive (sec): Allows you to set the number of seconds to wait before clearing a call if the remote ITS-E does not respond. The default value is 30 seconds. You can enter any value within the range of 3 to 180. It is recommend that you use the default value (30 seconds).
H.323 Protocol	<ul style="list-style-type: none">• Signaling Port: Displays the initial port number (1720) used for H.323 call setup. This value is read-only. You cannot change this value in this release of the software.• Setup Time-out (ms): Specifies the number of milliseconds to wait before canceling a call attempt while trying to set up the H.323 connection. The default value is 1000. This value is read-only.• Keep Alive (sec): Allows you to set the number of seconds to wait before clearing an H.323 call if no voice traffic is detected on the call. The default value is 60, within the range of 10 to 86400
Enable GateKeeper	Uses the gatekeeper subsystem of the ITS-E to assist in H.323 dialing, rather than dialing directly. This value is read-only. You cannot change this value in this release of the software.
Port	Displays the initial port number (1719) that the gatekeeper will use for H.232 call setup. This value is read-only. You cannot change this value in this release of the software.

Table 5. Parameters in the Internet dialog box

Parameter	Description
Setup Time-out (ms)	Specifies the number of milliseconds to wait before canceling a call attempt while trying to set up the H.323 connection using the GateKeeper. The default value is 100. This value is read-only. You cannot change this value in this release of the software.
IP Address	Specifies the IP address of the gatekeeper. In this release, this IP address is blank. This value is read-only.

Configuring Dial/Routing Plan Parameters

Use the Dial/Routing Plan dialog box to configure the dialing plan and routing information for the ITS-E, which regulates how the ITS-E will route the originating and terminating side of a telephone call. You also use this dialog box to control which remote sites can access the ITS-E.

The Dial/Routing Plan dialog box contains the following parameters:

Table 6. Parameters and buttons in the Dial/Routing Plan dialog box

Parameter	Description
ITS Servers	Displays a list of the computers that you have designated as members of the ITS-E network.
Routing Info - Originating Dial Plan	<ul style="list-style-type: none">• Entry Type: Sets whether or not the originating call is accepted. The default value is Accept. If you set this to Reject, then originating calls are not accepted.

Table 6. Parameters and buttons in the Dial/Routing Plan dialog box

Parameter	Description
Routing Info - Originating Dial Plan, con't.	<ul style="list-style-type: none"> • Line Number: Allows you to specify a telephony interface line number for originating calls (the calls that you make at your site to the remote ITS-E). It is used for special configurations. In normal configurations, it is recommended that you enter Any. • Search Digits: See the <i>ITS Dial/Routing Plan Worksheets</i>. • Replace Digits: See the <i>ITS Dial/Routing Plan Worksheets</i>. • Destination Type: Sets the type of remote destination. The default value is ITS R1.0. Valid entries are ITS R1.0, ITS R1.2, OCS R1.0, NetMeeting 2.1. When using the Virtual Telephone application, set this parameter to OCS1.0. When making phone-to-PC calls using H.323 client software, set this parameter to NetMeeting 2.1. • Destination IP: The IP address of the remote ITS-E. • Port: Used to set the (remote destination) port number. If the Destination Type is ITS R1.0 or ITS R1.2, the default is 5000. If the Destination Type is OCS R1.0 or NetMeeting 2.1, the default is 1720. <p>Note: It is recommended that you do not change the default port number unless you are certain that the remote destination has different port settings to accept calls.</p>

Table 6. Parameters and buttons in the Dial/Routing Plan dialog box

Parameter	Description
Routing Info - Terminating Dial Plan	<ul style="list-style-type: none">• Entry Type: Sets whether or not the terminating call is accepted. The default value is Accept. If you set this to Reject, then terminating calls are not accepted.• Search Digits: See the <i>ITS Dial/Routing Plan Worksheets</i>.• Replace Digits: See the <i>ITS Dial/Routing Plan Worksheets</i>• Line Number: Allows you to specify a telephony interface line number for terminating calls (the calls that you receive at your site from the remote ITS-E). It is recommended that you either leave this blank or enter the string Any.

Table 6. Parameters and buttons in the Dial/Routing Plan dialog box

Parameter	Description
Routing Info - Access Control	<p>In Use For:</p> <ul style="list-style-type: none">• Gateways: Use the access control entry being created when gateways (ITS-E machines) attempt to make calls to this ITS-E.• Client: Use the access control entry being created when clients (NetMeeting™ PCs and Virtual Telephone application servers) attempt to make calls to this ITS-E.• Gateway/Client: Specifies that the entry being created will be used when both ITS-E machines and clients attempt to make calls to this ITS-E.• IP Address: Specifies the IP address of the remote system (or subnet) that is being given access to this ITS-E.• Address Bits to Match: Specifies the number of bits (starting with the leftmost or high-order bit) that are being used to control access to this ITS-E. A value of 32 limits access to the individual IP address entered. A value of 24 limits access to the 255 IP addresses in a class C IP address (in other words, a subnet). The range of values is 0 - 32. The default value is 32. <p>While the Access Control list is empty, any IP address can send calls (access) to the local ITS-E. Once a single entry exists in the list, <i>only</i> IP addresses explicitly specified in the list can access the local ITS-E.</p>

Table 6. Parameters and buttons in the Dial/Routing Plan dialog box

Parameter	Description
Add	Allows you to add the names of ITS-E computers connected to your network; also allows you to add originating and terminating dial/routing plan information, and access control information.
Remove	Allows you to remove the name of an ITS-E computer connected to your network; also allows you to remove originating and terminating dial/routing plan information, and access control information.
Edit	Allows you to edit the names of remote ITS-E computers; also allows you to edit originating and terminating dial/routing plan information, and access control information.
Clear All	Clears all information from the ITS-E Servers section of the dialog box; also clears all originating and terminating dial/routing plan information, and access control information.

Configuring Service Log Parameters

Use the Service Logs dialog box to configure the service logging options for the ITS-E.

The Service Logs dialog box contains the following parameters:

Table 7. Parameters in the Service Logs dialog box

Parameter	Description
Log File Directory	Specifies the location of the ITS-E service log files.
No New File Will Be Created When Free Disk Space Reaches	Allows you to specify the minimum free disk space on drive D, which, when reached, will stop creation of service log files. The default value is 50 megabytes. You can enter any value within the range of 10 to 1500 megabytes.
Call Records	Shows you that the call detail record logging option is on. This value is read-only. When this option is on, the ITS-E logs call detail records into files. You can use a separate utility to produce statistical and call accounting reports from the logged data.

Table 7. Parameters in the Service Logs dialog box

Parameter	Description
Error Messages	<p data-bbox="570 200 1173 294">Shows you that the logging of error or warning messages into the Windows NT Event Viewer is on. This value is read-only.</p> <p data-bbox="570 308 1173 437">When this option is on, you can use the Windows NT Event Viewer to view the reported errors and warnings. (In this release, the Log Properties option is not available for this log.)</p>

Table 7. Parameters in the Service Logs dialog box

Parameter	Description
Performance Statistics	Allows you to turn the logging of ITS-E QoS (quality of service) statistics into the Windows NT Performance Monitor on or off. (In this release, the Log Properties option is not available for this log.)
Log Properties	<p>Allows you to set the maximum log file size. You can enter a value between 1 and 100 (MB).</p> <p>When a log file reaches this setting, the ITS-E will create a new log file. In addition, for the CDR log only, this properties window allows additional CDR file management. If this feature is checked, then a copy of the CDR file is maintained. This allows a remote client to retrieve the CDR records from the ITS-E periodically, without affecting the operation of the ITS-E. This feature makes two additional parameters available:</p> <ul style="list-style-type: none">• Write file every <n> minutes: Specifies how often the copy file is refreshed. If the file doesn't exist, then it is created. The default value is 5. You can enter any value within the range of 1 to 60.• Location: Specifies the directory where the copy (alternate) CDR file is stored.

Configuring Quality of Service Parameters

Use the Quality of Service (QoS) dialog box to configure the quality of service options for the ITS-E connections to remote sites.

The Quality of Service feature is disabled for ISDN-PRI solutions, in this release.

The Quality of Service dialog box contains the following parameters:

Table 8. Parameters in the Quality of Service dialog box

Parameter	Description
Line Pool ID	Allows you to specify an integer between 1 and 999 that identifies a logical group (pool) of lines. These lines are either T1 (running robbed-bit only) or E1 (running R2-MFC only) channels or analog lines connected to the PBX. T1 or E1 connections running ISDN (of any form) cannot be placed in line pools in this release. This group of lines (pool) will be used to handle calls to a particular remote site.
Remote ITS IP Address	Allows you to specify the IP address of the remote site whose calls will be handled by this pool.
Lines in Pool	Allows you to specify which lines are members of this pool.

Table 8. Parameters in the Quality of Service dialog box

Parameter	Description
QoS Parameters	<ul style="list-style-type: none"><li data-bbox="575 205 1183 360">• Sampling Interval (sec): Allows you to specify how often the quality of service to the highlighted line pool's remote ITS-E IP address will be checked. The default is 20 (seconds). You can enter a value within the range of 1 to 300.<li data-bbox="575 370 1183 526">• Samples to Average (number): Allows you to specify the number of samples to average together when evaluating the quality of service to this remote site. The default is 10. You can enter a value within the range of 5 to 1500.<li data-bbox="575 536 1183 837">• Packet Loss Threshold (%): Allows you to specify the acceptable level of percentage of packets lost when evaluating the quality of service to this remote site. When this threshold is reached, and the PSTN Fallback option is set, the ITS-E will disable all the lines in this pool. This will cause subsequent calls to be routed over the PSTN (assuming the PBX is correctly configured), instead of the IP network.<ul style="list-style-type: none"><li data-bbox="623 847 1183 940">• Low: The default low percentage level is 15. You can enter a value within the range of 0 to 100.

Table 8. Parameters in the Quality of Service dialog box

Parameter	Description
QoS Parameters, con't.	<ul style="list-style-type: none"> • High: The default high percentage level is 40. You can enter a value within the range of 0 to 100. • Round Trip Delay Threshold (msec.): Allows you to specify the acceptable level of round trip delay in milliseconds when evaluating the quality of service to this remote site. <ul style="list-style-type: none"> • Low: The default low level is 400. You can enter a value within the range of 10 to 1500. • High: The default high level is 800. You can enter a value within the range of 10 to 1500. <p>The algorithm for the Packet Loss Threshold and Round Trip Delay Threshold evaluations works as follows:</p> <ul style="list-style-type: none"> • If either <i>high</i> value is exceeded, the line pool is blocked. • After the averaged evaluation is below both of the <i>low</i> values, the line pool is unblocked.
Add	Allows you to add line pools.
Remove	Allows you to remove line pools.
Edit	Allows you to edit line pools.

Table 8. Parameters in the Quality of Service dialog box

Parameter	Description
Clear All	Clears all the information from the Line Pools section of the QoS dialog box.
Properties	<p>Displays the Line Pool Properties dialog box.</p> <p>Use this dialog box to monitor quality of service for the specified line pool and control PSTN fallback options for the pool.</p> <ul style="list-style-type: none">• Line Pool ID: Displays the Line Pool ID of the pool being examined.• Remote ITS IP Address: Displays the remote ITS-E IP address of the pool being examined.• Lines in Pool: Displays the lines in the pool being examined.• Idle: Line pool is defined, but not active.• Monitor Only: Quality of service on the line pool is being monitored, but no action will be taken (statistics gathering only).• Monitor and PSTN Fallback: Quality of service evaluation on the line pool will automatically block and unblock the line pool.

Table 8. Parameters in the Quality of Service dialog box

Parameter	Description
Properties, con't.	<ul style="list-style-type: none"> <li data-bbox="575 205 1183 262">• Status: Displays the current status of the selected line pool. The values are: <ul style="list-style-type: none"> <li data-bbox="623 277 1183 396">• Not Available: Always displays when Idle is selected. Displays when Monitor Only is first selected until the sample interval has been reached. <li data-bbox="623 417 1183 500">• Block: Displays when Monitor and PSTN Fallback is selected and PSTN Fallback is in effect. <li data-bbox="623 521 1183 603">• Unblock: Displays when Monitor Only or Monitor and PSTN Fallback is selected and PSTN Fallback is not in effect. <li data-bbox="623 624 1183 811">• Average Packet Loss (%): Displays the percentage of packets lost from the last evaluation of the quality of service. (Note that the evaluation of the quality of service is averaged over a user-specified number of samples.) If Idle is enabled, this statistic is not available. <li data-bbox="575 873 1183 956">• Average Round Trip Delay (ms): Displays the delay from the last evaluation of the quality of service. If Idle is enabled, this statistic is not available.

Table 8. Parameters in the Quality of Service dialog box

Parameter	Description
Properties, con't.	<ul style="list-style-type: none">• Current Round Trip Delay (ms): Displays the delay from the last sample of the quality of service. If Idle is enabled, this statistic is not available.

5 Viewing ITS-E Logs and Messages

August 1998

Overview

The ITS-E logs call detail records and error messages. It also gives you the option of logging Quality of Service statistics. The sections that follow provide instructions for viewing these logs and error messages.

Viewing Call Detail Logs

Call Detail Recording (CDR) data is logged into flat text files. On the ITS-E machine, these files can be found in the **D:\its\log\cdr** directory, by default. However, the user does have the ability to specify a different location. The Service Logs property page of the ITS Configuration Manager indicates the location of the logs.

CDR data log files are written with file names in the following format: cdr_YYYYMMDD_hhmmss.log. The file name has a time stamp (in 24-hour time format), which indicates the local date and time. Whenever a new log file is created, it will contain the current time stamp as part of its name. A file may be empty if no calls have been made. A new log file is written every day as long as a call was placed that day.

A new log file is also created every time the service is started.

To view the file, in the Windows NT Explorer, find the log file directory and double-click the appropriate cdr_YYYYMMDD_hhmmss.log file.

Each record in the ITS-E CDR file is 232 bytes long and contains information about one call. The fields are separated by a space. This release of ITS-E collects data for 18 fields in each record. These fields are detailed in the following chart.

Field Number	Position	Name	Explanation
1	1 – 4	Start Time	Start time of a call. 4 digits: HHMM (Hours.Minutes) (24-hour time format)
2	6 – 10	Duration	The duration of the call in seconds.
3	12	Condition Code	1, call from PSTN 2, call from INET 3, call with error
4	14 – 45	Dialed Number	The dialed number (right-justified).
5	47 – 78	Calling Number	The calling telephone number (right-justified). This field is only populated if the originating ITS-E was an ISDN-PRI or R2-MFC solution and ANI was being passed.

Field Number	Position	Name	Explanation
6	80 – 82	Incoming Cir ID	The ID number of the PBX circuit used to send the call to the ITS-E. 3 digits (hundreds, tens, units)
7	84 – 93	Sequence Number	Unique number of each call. Value in range of 1 to 4294967296.
8	114 – 117	Reason	Reason for the failure: 1, HANGUP, 2, BUSY, 3, NO_ANSWER, 4, NO_PORTS, 5, MEM_FAILURE, 6, LIBAPI_FAILURE, 7, DIAL_STRING_ERROR, 8, INVALID_APPL_HANDLE, 9, UNEXPECTED_ERROR, 10, UNEXPECTED_EVENT 11, LICENSE_CHECK_FAILED 12, INET_CONGESTION_ MED_XFER

Field Number	Position	Name	Explanation
8, con't.	114 – 117	Reason	Reason for the failure: 13, INET_CONGESTION_CALL_SETUP 14, ITS_SERVICE_NOT_READY 15, ITS_SERVICE_STOPPED 16, ITS_HOST_NOT_FOUND 17, MAINTENANCE_MODE 18, TRUNK_CONFIG_VIOLATION 19, PSTN_DIS_REJECT_REQUESTED 20, PSTN_DIS_CLEARDOWN_TONE 21, PSTN_DIS_RING_STUCK 22, PSTN_DIS_HOST_TIMEOUT 23, PSTN_DIS_REMOTE_ABANDONED 24, PSTN_DIS_TRANSFER 25, PSTN_DIS_DIAL_FAILURE 26, PSTN_DIS_NO_WINK 27, PSTN_DIS_NO_DIALTONE 28, PSTN_DIS_REORDER_DETECTED

Field Number	Position	Name	Explanation
8, con't.	114 – 117	Reason	Reason for the failure: 29, PSTN_DIS_DIALTONE_ DETECTED 30, PSTN_DIS_SIT_ DETECTED 31, PSTN_DIS_VOICE_BEGIN 32, PSTN_DIS_VOICE_ MEDIUM 33, PSTN_DIS_VOICE_LONG 34, PSTN_DIS_VOICE_ EXTENDED 35, PSTN_DIS_VOICE_END 36, PSTN_DIS_TIMEOUT 37, PSTN_DIS_RING_QUIT 38, PSTN_DIS_CED 39, PSTN_DIS_NO_LOOP_ CURRENT 40, GLARE_PROTOCOL_ ERROR 41, GLARE_OUT_OF_ SERVICE 42, LATE_CALL_MAKE_ REQUEST 43, REQUESTED_PORT_BUSY

Field Number	Position	Name	Explanation
9	132 – 146	Destination IP Address	Max number of digits is 15.
10	148 – 162	Source IP Address	Max number of digits is 15.
11	164 – 171	Packet Sent	Number of packets sent during the call.
12	173 – 180	Packet Received	Number of packets received during the call.
13	182 – 189	Packet in Error	Number of occurrences of packets out of order.
14	191 – 198	Average Delay	Delay in milliseconds
15	200 – 207	Delay Variation	Delay Variation in milliseconds
16	209 – 212	Media Type	1, Voice, 2, Fax, 3, Both
17	214 – 221	Bytes Sent	Number of bytes sent during the call.
18	223 – 230	Bytes Received	Number of bytes received during the call.

- A record ends with a new line (two bytes, a carriage return, and a line feed character).
- The data is right-justified and padded with blanks.
- Other character positions in the record are blank for this ITS-E release.

Viewing Quality of Service Logs

Quality of Service (QoS) data is logged into flat text files. On the ITS-E, these files can be found in the **D:\its\log\qos** directory, by default. However, the user does have the ability to specify a different location. The Service Logs property page of the ITS Configuration Manager indicates the location of the logs. QoS data log files are written with file names in the following format: qos_yyyymmdd_ hhhmss. log. The file name has a time stamp (in 24-hour time format), which indicates the local date and time. Whenever a new log file is created, it will contain the current time stamp as part of its name. A record is written to the QoS log whenever a line pool is blocked or unblocked by the automatic PSTN fallback mechanism. A file may be empty if there have been no blocks or unblocks of any line pools, and if monitoring for any of the line pools was never started. A new log file is created every time the service is started.

Make sure that QoS monitoring is enabled for the line pool of interest through the Properties dialog box under the Quality of Service tab in the ITS Configuration Manager.

To view the file, in the Windows NT Explorer, find the log file directory and double-click the appropriate file qos_ yyyymmdd_ hhhmss. log.

Each record in the ITS-E QoS file is 65 bytes long and contains information about the quality of service for one line pool at the time that the automatic PSTN fallback mechanism blocked or unblocked that line pool. In this release of the ITS-E, data is collected for four fields in each record. These records are detailed in the following chart.

Field Number	Position	Name	Explanation
1	1-15	Time	Time that the block or unblock (or start of monitoring) occurred HH.MM.SS.MMM (Hours.Minutes.Seconds. Milliseconds)
2	16-31	IP address	Remote ITS-E IP address of the line pool

Field Number	Position	Name	Explanation
3	32-47	QoS parameters	The three quality of service measurements: <ul style="list-style-type: none">• current round trip delay• average round trip delay• average packet loss percentage separated by the pipe () symbol and expressed in decimal numbers
4	48-63	Action	Status of the line pool at the time the record was written; either "block" or "unblock"

- A record ends with a new line (two bytes, a carriage return, and a line feed character).
- The data is left-justified and padded with blanks.

When QoS monitoring is enabled, the ITS-E makes the information available to the Windows NT Performance Monitor.

To view QoS statistics in the Windows NT Performance Monitor, follow these steps:

- 1 Click **Start, Programs, Administrative Tools**.
- 2 Click **Performance Monitor**. The three QoS parameters will be available for charting or logging under the object QOSMon.
- 3 Click **Close**.

Viewing Error Messages

The ITS-E logs Error Messages and will store the error messages and warnings in the Windows NT Event Viewer.

Note: Log settings for the NT Event Viewer should be set to *Overwrite Events as Needed* for both the System and the Application logs.

To view error messages and warnings in the Windows NT Event Viewer, follow these steps:

- 1 Click **Start, Programs, Administrative Tools**.
- 2 Click **Event Viewer**. If necessary, click **Log, Application** to view the application window. The **Event Viewer** application window displays with a list of events, the date and time the events occurred, and the source, category, and event number.

- 3 Double-click the event that you want to view. Details about the selected event display in the **Event Detail** dialog box.
- 4 Click **Close**.

6 Troubleshooting

August 1998

Overview

This chapter provides troubleshooting guidelines for the local administrator of ITS-E servers when ITS calls are not going through. These guidelines cover the basic procedures the administrator should perform before contacting an authorized Lucent Technologies Service Center for further assistance in troubleshooting a problem.

Basic Troubleshooting Guidelines

1: Check the ITS Service

Check that the ITS service is running. Go to the Windows NT™ Control Panel and launch the Services Control Manager by double-clicking on the **Services** icon. Scroll down the list of NT services and look for the Internet Telephony Service service. The status of the service should be “started.”

If the service was not running, first make sure that the following utility programs are not running (in an MS-DOS prompt window).

- **showsig**
- **agmon**
- **t1stat**
- **e1stat**

Then in the Services Control Manager, select the **Internet Telephony Service** and click the **Start** button to start the ITS service.

Be aware that if the ITS-E server is connected to a Lucent Technologies MERLIN LEGEND system, there will be a delay of approximately three minutes from the time that the Services Control Manager indicates that the ITS Service is “started” until you can actually place calls over the server. This is because the PBX is performing a series of maintenance tests on the T1 trunk connected to the server. During these tests, calls will get a fast busy signal after 30 seconds of silence.

After the ITS service is successfully started, proceed to the next section.

If the ITS service does not start, note the error messages displayed on the screen. In addition, launch the Windows NT Event Viewer and save the logs related to this error. Contact your authorized Lucent Technologies Service Center for further assistance.

2: Verify Connectivity

Check the following physical connections indicated below. All vital connections will be labeled from the factory on the back of the ITS-E server.

- 1 PBX to ITS NMS board(s), 1 or 2 T1 or E1 connections or 1 or 3 analog connections.
- 2 RJ-45 from LAN to Ethernet card.
- 3 Analog telephone line to modem card or external modem.
- 4 Video cable from monitor to video card.
- 5 Keyboard/mouse.
- 6 Power cord.

Next, check the telephony connection to the PBX.

T1 Connectivity Testing

To test the status of a T1 card connection (regardless of the trunk control protocol being run on the T1 card), proceed with the following steps:

- 1 Bring up an MS-DOS command prompt on the ITS-E machine.
- 2 Type **agmon**.

This command will boot the T1 board and verify that the board itself is functional. It returns a list of files, followed by the statements: `Booting Board 0` and `Done`, and `Hit F3 to Exit`.

If this command succeeds, the board is functioning. A screen snapshot of a successful run of the `agmon` test is shown below.

Note: If the ITS service is running, there is no need to run the `agmon` test.

```
Alliance Generation Loader/Monitor          Version 11.5   Feb   5 1998

AG Driver Version: 3.00

Files:
 [0] C:\NMS\AG\LOAD\wnk0.tcp                17634 (02/05/98 17:06)
 [1] C:\NMS\AG\LOAD\tone.dsp                1094 (02/05/98 17:05)
 [2] C:\NMS\AG\LOAD\callp.dsp               3752 (02/05/98 17:05)
 [3] C:\NMS\AG\LOAD\signal.dsp              1712 (02/05/98 17:05)
 [4] C:\NMS\AG\LOAD\dtmf.dsp                3478 (02/05/98 17:05)
 [5] C:\NMS\AG\LOAD\voice.dsp                3576 (02/05/98 17:05)
 [6] C:\NMS\AG\LOAD\sysn.run                 233180 (02/05/98 17:06)
 [7] C:\NMS\AG\LOAD\mother.lod              11712 (02/05/98 17:05)
 [8] C:\NMS\AG\LOAD\dsposh.bin               4770 (02/05/98 17:05)

Booting board 0...
Done.
Hit 'F3' to exit.
```

3 Press **F3** to exit.

4 Type **t1stat**.

This command will check the status of the T1 board and connection, and displays that information on the screen. If it indicates that the board is “RUNNING” and “Alarms = NONE”, “Remote Alarms = NONE” and “Frame Sync = OK”, then the test has passed. A screen snapshot of a successful run of the t1stat test is shown below.

Note: Notice from the screen snapshot below, the t1stat command (by default) displays information about card 0 which is the first T1 card in the system. If your ITS-E has a second T1 card, you may test it by specifying an argument of **-b1** on the t1stat command. This specifies card 1 which is the second T1 card in the system.

```
T1 Line Status Display           Natural MicroSystems       Feb  5 1998
                                (Press F3 or ESC to exit)

AG-T1  # 0
-----
Start time:   Tue Jun 23 17:23:24 1998
Elapsed Time: 0017:39:17
Board Status: RUNNING

                                T1a
-----
Alarm:        NONE
Remote alarm: NONE
Errored seconds: 0
Failed seconds: 0
BPVs:        0
Slips:        0
Frame sync:   OK
```

The screen snapshot of the following t1stat test shows red alarms generated because of lost T1 connectivity. In this case, the values displayed in the “Errored seconds” and “Failed seconds” fields will be increasing.

```
T1 Line Status Display          Natural MicroSystems    Feb  5 1998
                               (Press F3 or ESC to exit)

AG-T1 # 0
-----
Start time:      Tue Jun 23 17:23:24 1998
Elapsed Time:    0017:39:17
Board Status:    RUNNING

                               T1a
-----
Alarm:           RED
Remote alarm:    NONE
Errored seconds: 17
Failed seconds:  7
BPVs:           0
Slips:          0
Frame sync:     *LOST*
```

5 Press **ESC** to exit.

E1 Connectivity Testing

To test the status of a E1 card connection (regardless of the trunk control protocol being run on the E1 card), proceed with the following steps:

- 1 Bring up an MS-DOS command prompt on the ITS-E machine.
- 2 Type **agmon**.

This command will boot the E1 card and verify that the card itself is functional. It returns a list of files, followed by the statements: `Booting Board 0` and `Done`, and `Hit F3 to Exit`.

If this command succeeds, the card is functioning. A screen snapshot of a successful run of the `agmon` test is shown below.

Note: If the ITS service is running, there is no need to run the `agmon` test.

```
Alliance Generation Loader/Monitor                Version 11.5   Feb   5 1998

AG Driver Version: 3.00

Files:
 [0] C:\NMS\AG\LOAD\isd0.tcp                      11842 (02/10/98 18:35)
 [1] C:\NMS\AG\LOAD\voice_a.dsp                   3584 (02/05/98 17:05)
 [2] C:\NMS\AG\LOAD\dtmf_a.dsp                    3478 (02/05/98 17:05)
 [3] C:\NMS\AG\LOAD\callp_a.dsp                   3752 (02/05/98 17:05)
 [4] C:\NMS\AG\LOAD\tone_a.dsp                    1076 (02/05/98 17:05)
 [5] C:\NMS\AG\LOAD\sysstieu.run                  560437 (02/10/98 18:50)
 [6] C:\NMS\AG\LOAD\mother.lod                    11712 (02/05/98 17:05)
 [7] C:\NMS\AG\LOAD\dsposh.bin                     4770 (02/05/98 17:05)

Booting board 0...
Done.
Hit 'F3' to exit.
```

3 Press **F3** to exit.

4 Type **e1stat**.

This command will check the status of the E1 board and connection, and displays that information on the screen. If it indicates that the board is “RUNNING” and “Alarms = NONE”, “Remote Alarms = NONE” and “Frame Sync = OK”, then the test has passed. A screen snapshot of a successful run of the e1stat test is shown below.

Note: Notice from the screen snapshot below, the e1stat command (by default) displays information about card 0 which is the first E1 card in the system. If your ITS-E has a second E1 card, you may test it by specifying an argument of **-b1** on the e1stat command. This specifies card 1 which is the second E1 card in the system.

```
E1 Line Status Display           Natural MicroSystems       Feb  5 1998
                                (Press F3 or ESC to exit)

AG-E1  # 0
-----
Start time:      Tue Jun 23 17:23:24 1998
Elapsed Time:    0017:39:17
Board Status:    RUNNING

                                Ela
-----
Alarm:           NONE
Remote alarm:    NONE
Errored seconds: 0
Failed seconds:  0
BER (10^-4):     0
Slips:           0
Frame sync:      OK
```

The screen snapshot of the following e1stat test shows red alarms generated because of lost E1 connectivity. In this case, the values displayed in the “Errored seconds” and “Failed seconds” fields will be increasing.

```
E1 Line Status Display           Natural MicroSystems   Feb  5 1998
                                (Press F3 or ESC to exit)

AG-E1  # 0
-----
Start time:   Tue Jun 23 17:23:24 1998
Elapsed Time: 0017:39:17
Board Status: RUNNING

                                Ela
-----
Alarm:        NO_FRM
Remote alarm: NONE
Errored seconds: 1
Failed seconds: 44
BER (10^-4):  0
Slips:        0
Frame sync:   NO_FRM
```

5 Press **ESC** to exit.

Analog Connectivity Testing

Unfortunately, the ITS-E analog connection does not have a test command equivalent to t1stat or e1stat. However, you can still run the **agmon** command on an analog configuration to ensure that the AG-8 card(s) are correctly configured.

LAN Connectivity Testing

As a next step, check LAN connectivity. The following table summarizes the basic tests.

Network Test Function	DOS Test Command	Reasons for Failure
Current network configuration settings	Use <code>ipconfig</code> or <code>ipconfig /all</code>	Record settings and verify settings with network administrator
Network interface card functionality	Ping IP loopback address (or ITS-E's own IP address) For example: <code>ping 127.0.0.1</code>	<ul style="list-style-type: none">• IP address typed incorrectly• Improper TCP/IP software installation• Improperly seated network card• Duplicate network IP address

Network Test Function	DOS Test Command	Reasons for Failure
Local network connectivity	Ping IP address of default gateway For example: <code>ping 192.20.239.1</code>	<ul style="list-style-type: none">• IP address typed incorrectly• LAN cable not plugged into network card• Wrong gateway (default gateway on different subnet)• Gateway machine is down
Wide Area Network connectivity	<ul style="list-style-type: none">• Ping IP address of known machine outside of the local default gateway (can use remote ITS-E or any machine)• Use tracert to determine which intermediate gateway is malfunctioning For example: <code>tracert 192.20.239.1</code>	<ul style="list-style-type: none">• Gateway machine error• Intermediate gateway machine errors

After T1 and LAN connectivity is verified, the next step is to check the port activity patterns on the PBX-ITS-E interface when trying to make calls. This is discussed in the next sections. There are four sections as follows:

- 3: T1 (WINK START)
- 4: Analog
- 5: ISDN-PRI
- 6: R2-MFC

Choose the section that applies to your ITS and use it to check your port activity, skipping the other sections. Since you are testing port activity on both ends of an ITS connection (that is, on two ITS-E systems) it may be that the two ITS-E systems are using different Trunk Control Protocols (telephony connections). In this case, use the appropriate port activity section for each ITS while performing the tests.

3: Check T1 (WINK START) Port Activity

With the ITS service running, in an MS-DOS command prompt run **showsig** on both ITS-E servers involved in the call attempts.

Showsig is a command line utility that shows the status of each time slot (also known as channels) on the T1 (WINK START) connection¹⁰⁷

. In particular, **showsig** displays the current value of the “signaling” bits for each time slot (by default a sample is taken once every second). This is a low level utility that displays the physical signaling that is happening on the telephony card. For each time slot (channel), the “snd” row indicates the value of the “signaling” bits being sent (by the local ITS-E to the local PBX) and the “rcv” row indicates the

values of the “signaling” bits being received (by the local ITS-E from the local PBX). Thus, the ITS-E controls the “snd” bits and the PBX controls the “rcv” bits. Further, this utility is showing the *local* telephony connection only and does not show anything related to the far-end ITS-E or PBX. Sample outputs under different conditions are shown as follows for ITS-E servers equipped with T1 (WINK START) cards.

Showsig output when the ITS service is not running (you need to run agmon before running showsig, when the ITS service is not running). This indicates that no signaling is occurring on any of the channels.

Note: The ITS Configuration Manager labels the ports (T1 WINK START channels) of the telephony connection 1-24 or 1-48, depending on the number of telephony cards, while **showsig** labels those same channels (slots) 0-23 or 0-47, respectively.

Note: If your system has two T1 (WINK START) cards, you can use the **-b1** option of the **showsig** command to see the signaling on the second card. To see the signaling on both cards at the same time, you will need to run two **showsig** commands each in its own MS-DOS command prompt window.

After the appropriate port activity monitoring command is running on both ITS-E servers, try to place a call. While the call is being processed, observe/document the activity being shown on the port activity monitor screens. This information should be provided to the authorized Lucent Technologies Service Center along with indications of any tones being generated (for example, busy, fast busy, intercept, silence). This information will expedite troubleshooting of the problem by the Lucent Technologies Customer Support personnel.

4: Check Analog Port Activity

With the ITS service running, in an MS-DOS command prompt run **showsig** on both ITS-E servers involved in the call attempts.

Showsig is a command line utility that shows the status of each analog line (port) connecting the ITS-E to the PBX. This is a low-level utility that displays the physical signaling that is happening on the telephony card. On an analog line, "signaling" is actually implemented using voltage changes and DTMF (tones). Showsig displays this information (for analog ports) as if they were using "bit" signaling (like T1 wink start channels).

For each line, the "snd" row indicates the value of the "signaling" being sent (by the local ITS-E to the local PBX) and the "rcv" row indicates the values of the "signaling" being received (by the local ITS-E from the local PBX). Thus, the ITS-E controls the "snd" bits and the PBX controls the "rcv" bits. Further, this utility is showing the *local* telephony connection only and does not show anything related to the far-end ITS-E or PBX. Sample outputs under different conditions are shown as follows for ITS-E servers equipped with analog (AG-8) cards.

Showsig output when the ITS service is not running (you need to run **agmon** before running **showsig**, when the ITS service is not running). This indicates that no signaling is occurring on any of the channels.

Note: The ITS Configuration Manager labels the ports (analog lines) of the telephony connection 1-8 or 1-24, depending on the number of telephony cards, while **showsig** labels those same channels (slots) 0-7 or 0-23, respectively.

```
SHOWSIG Version 1.3   Feb  5 1998
Enter 'showsig /?' for options

Monitoring slots 0-7 of agsw board 0, sending and receiving
Sampling interval 1000 milliseconds

      0  1  2  3  4  5  6  7
snd:  .. .. .. .. ..
rcv:  .. .. .. .. ..
```

Note: If your system has three analog cards, you can use the **-b1** (**-b2**) options of the **showsig** command to see the signaling on the second (third) cards. To see the signaling on all cards at the same time, you will need to run three **showsig** commands each in its own MS-DOS command prompt window.

Showsig output when the ITS service is running with 4 lines, and no calls up. The PBX has lines 4-7 enabled. The **AB** in the “snd” row of slots (lines) 4-7 indicates that the signaling “bits” (on the ITS-E side) are “high” (that is, turned on). This means that the ITS-E already has those lines “in use”. They are *not* actually being

used for calls, but turning on the “signaling” is the ITS-E’s way of communicating to the PBX *not* to use these lines because they are disabled. Notice the **A** in the “rcv” row of slots (lines) 4-7. The PBX is *not* actually sending “signaling”, it is just the nature of analog lines (as displayed by **showsig**) to show this “bit” as ON when the port is disabled (or in use on a call).

(In this screen example, the other ports were disabled by the ITS-E administrator because only 4 ITS-E port licenses were purchased.)

```
SHOWSIG Version 1.3   Feb  5 1998
Enter 'showsig /?' for options

Monitoring slots 0-7 of agsw board 0, sending and receiving
Sampling interval 1000 milliseconds

      0  1  2  3  4  5  6  7
snd:  . . . . . AB AB AB AB
rcv:  . . . . . A. A. A. A.
```

Showsig output when the ITS service is running with 8 lines, and no calls up. The PBX has slots 4-7 disabled. Notice that **showsig** gives *no* indication that the PBX has these slots (lines) disabled. Moreover, even if there is no analog line

connected to a port, **showsig** gives no indication of this fact.

```
SHOWSIG Version 1.3   Feb 5 1998
Enter 'showsig /?' for options

Monitoring slots 0-7 of agsw board 0, sending and receiving
Sampling interval 1000 milliseconds

    0 1 2 3 4 5 6 7
snd:  . . . . .
rcv:  . . . . .
```

Showsig output when the ITS-E is receiving a call from the PBX on port 0, for example.

```
SHOWSIG Version 1.3   Feb 5 1998
Enter 'showsig /?' for options

Monitoring slots 0-7 of agsw board 0, sending and receiving
Sampling interval 1000 milliseconds

    0 1 2 3 4 5 6 7
snd: AB . . . . .
rcv: A. . . . .
```

Showsig output when the ITS-E is placing a call to the PBX on port 6, for example.

```
SHOWSIG Version 1.3   Feb  5 1998
Enter 'showsig /?' for options

Monitoring slots 0-7 of agsw board 0, sending and receiving
Sampling interval 1000 milliseconds

      0  1  2  3  4  5  6  7
snd:  . . . . . AB ..
rcv:  . . . . . A.  ..
```

Showsig output when there is an active call on port 6, for example.

```
SHOWSIG Version 1.3   Feb  5 1998
Enter 'showsig /?' for options

Monitoring slots 0-7 of agsw board 0, sending and receiving
Sampling interval 1000 milliseconds

      0  1  2  3  4  5  6  7
snd:  . . . . . AB ..
rcv:  . . . . . A.  ..
```

Note: As you can see from the last three screen shots, **showsig** (on an analog connection) *cannot* distinguish between an incoming, outgoing, or active call. They are all displayed in the same way.

After the appropriate port activity monitoring command is running on both ITS-E servers, try to place a call. While the call is being processed, observe/document the activity being shown on the port activity monitor screens. This information should be provided to the authorized Lucent Technologies Service Center along with indications of any tones being generated (for example, busy, fast busy, intercept, silence). This information will expedite troubleshooting of the problem by the Lucent Technologies Customer Support personnel.

5: Check ISDN-PRI (either T1 or E1) Port Activity

With the ITS service running, in an MS-DOS command prompt run **showstate** on both ITS-E servers involved in the call attempts.

There are three ISDN-PRI ITS-E solutions currently available:

- National-ISDN-2
- Euro-ISDN
- INS1500

The port activity of all three are monitored the same way, as shown in the screen shot examples that follow. ISDN-PRI uses “message-oriented” signaling, as opposed to “bit-oriented” signaling used by T1 (WINK START), analog and R2-MFC. Therefore, a utility called **showstate** is used to check ISDN-PRI port activity.

Showstate is a command line utility that shows the status of each time slot (also known as channels) on the ISDN-PRI connection. In particular, **showstate** displays where the call on a time slot originated (near end or far end) and whether or not that call is connected. This is a high-level utility that displays logical states in the application software. For each time slot (channel), the “trunk” row indicates if the slot is being used for a call and if so, where the call originated (N for near end or F for far end). The “Num0” row indicates if the call has connected (“C” if connected, “.” if not). This utility is showing the entire ITS-E call, near-end telephony connection, IP network connection, and far-end telephony connection. Therefore, if **showstate** indicates that the call is connected, the users are actually conversing, or a fax is being negotiated or transmitted.

Sample outputs under different conditions are shown as follows for ITS-E servers using ISDN-PRI telephony connections.

There is no example of **showstate** output when the ITS service is not running.

Showstate displays the logical state (for each port) of the ITS service's telephony software. **Showstate** will not run if the ITS service is not running (even if **agmon** has been run).

Note: **Showstate** can also be run on T1(WINK START), analog, and R2-MFC telephony connections.

The ITS Configuration Manager labels the ports (ISDN-PRI channels) of the telephony connection either 1-23, 1-30, 1-46, or 1-60 depending on the type of ISDN-PRI solution and number of telephony cards, while **showstate** labels those same channels (slots) 0-22, 0-29, 0-45, or 0-59 respectively.

Showstate output when the ITS service is running with 30 time slots, and no calls up. The PBX has all slots enabled. No examples of **showstate** output when ports (time slots) are disabled by ITS is shown, since ISDN-PRI solution ports cannot be disabled in this release.

Note: If **showstate** is run on a T1 (WINK START), analog, or R2-MFC solution, where ports can be disabled, this is indicated by a **B** (for blocked) in both rows of the disabled port (time slot) information.

```

Port   | 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2
Num    | 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9
=====
Trunk  |
Num 0  | . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Ready

```

Note: **Showstate** will automatically refresh the screen whenever the state of any port (time slot) changes. The first time this happens, the word **Ready** will be removed from the displayed output.

Note: Since **showstate** is a high-level utility, it automatically knows if there is a second telephony card in the ITS-E and will display its port activity along with that of the first card.

Showstate output when the ITS service is running with 23 time slots, and no calls up. The PBX has slots 19-22 disabled (0 for out of service). This is an example of what an ITS-E with a National-ISDN-2 or INS1500 telephony connection would display since they only support 23 channels (time slots) for calls.

```

Port   | 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2
Num    | 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9
=====
Trunk  |
Num 0  | . . . . . . . . . . . . . . . . . . . . . . . . 0 0 0 0
Ready

```

Showstate output when the ITS-E is receiving a call from the PBX on port 8, for example. The call is originating on the near end, therefore the **N** in the “Trunk” row.

```

Port   | 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2
Num    | 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9
=====
Trunk  |
Num 0  | . . . . . . . . N . . . . . . . . . . . . . . . . . . .
Ready

```

Showstate output when the ITS-E is placing a call to the PBX on port 6, for example. The call originated remotely (that is at another ITS-E that sent the local ITS-E the call over the IP network, and the local ITS-E is now sending the call to the local PBX). Therefore the **F** in the “Trunk” row, for the far end.

```

Port   | 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2
Num    | 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9
-----|-----
Trunk  |
Num 0  | . . . . . F . . . . .
Ready  |

```

Showstate output when there is an active call (that originated at the far end) on port 3, for example.

```

Port   | 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2
Num    | 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9
-----|-----
Trunk  |
Num 0  | . . . F . . . . .
Ready  |

```

After the appropriate port activity monitoring command is running on both ITS-E servers, try to place a call. While the call is being processed, observe/document the activity being shown on the port activity monitor screens. This information should be provided to the authorized Lucent Technologies Service Center along with indications of any tones being generated (for example, busy, fast busy, intercept, silence). This information will expedite troubleshooting of the problem by the Lucent Technologies Customer Support personnel.

6: Check R2-MFC Port Activity

With the ITS service running, in an MS-DOS command prompt run **showsig** on both ITS-E servers involved in the call attempts.

Showsig is a command line utility that shows the status of each time slot (also known as channels) on the R2-MFC connection. In particular, **showsig** displays the current value of the “signaling” bits for each time slot (by default a sample is taken once every second). This is a low level utility that displays the physical signaling that is happening on the telephony card. For each time slot (channel), the “snd” row indicates the value of the “signaling” bits being sent (by the local ITS-E to the local PBX) and the “rcv” row indicates the values of the “signaling” bits being received (by the local ITS-E from the local PBX). Thus, the ITS-E controls the “snd” bits and the PBX controls the “rcv” bits. With R2-MFC, there are four signaling bits, not two like there are with T1 (WINK START). Further, this utility is showing the *local* telephony connection only and does not show anything related to the far-end ITS-E or PBX. Sample outputs under different conditions are shown as follows for ITS-E servers equipped with R2-MFC cards.

Showsig output when the ITS service is not running (you need to run agmon before running showsig, when the ITS service is not running). This indicates that no signaling is occurring on any of the channels.

Note: The ITS Configuration Manager labels the ports (R2-MFC channels) of the telephony connection 1-30 or 1-60, depending on the number of telephony cards, while **showsig** labels those same channels (slots) 0-29 or 0-59, respectively.

```
SHOWSIG Version 1.3  Feb  5 1998
```

```
Enter 'showsig /?' for options
```

```
Monitoring slots 0-29 of agsw board 0, sending and receiving
```

```
Sampling interval 1000 milliseconds
```

```

      0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
    15  16  17  18  19  20  21  22  23  24  25  26  27  28  29
snd: A..D A..D
     A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D
rcv: A..D A..D
     A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D
```

Note: If your system has two E1 (R2-MFC) cards, you can use the **-b1** option of the **showsig** command to see the signaling on the second card. To see the signaling on both cards at the same time, you will need to run two **showsig** commands each in its own MS-DOS command prompt window.

Showsig output when the ITS-E is receiving a call from the PBX on port 8, for example.

```
SHOWSIG Version 1.3 Feb 5 1998
```

```
Enter 'showsig /?' for options
```

```
Monitoring slots 0-29 of agsw board 0, sending and receiving
```

```
Sampling interval 1000 milliseconds
```

```

      0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
    15  16  17  18  19  20  21  22  23  24  25  26  27  28  29
snd: A..D A..D A..D A..D A..D A..D A..D A..D A..D AB..D A..D A..D A..D A..D A..D A..D
     A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D AB..D AB..D AB..D AB..D AB..D
rcv: A..D A..D A..D A..D A..D A..D A..D A..D A..D ...D A..D A..D A..D A..D A..D A..D
     A..D A..D A..D A..D A..D A..D A..D A..D A..D AB..D AB..D AB..D AB..D AB..D

```


Showsig output when there is an active call on port 3 that originated from the far end, for example.

```
SHOWSIG Version 1.3 Feb 5 1998
```

```
Enter 'showsig /?' for options
```

```
Monitoring slots 0-29 of agsw board 0, sending and receiving
```

```
Sampling interval 1000 milliseconds
```

```

      0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
    15  16  17  18  19  20  21  22  23  24  25  26  27  28  29
snd: A..D A..D A..D ..DA..D A..D A..D
    A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D AB.D AB.D AB.D AB.D AB.D AB.D
rcv: A..D A..D A..D B.D A..D A..D
    A..D A..D A..D A..D A..D A..D A..D A..D A..D AB.D AB.D AB.D AB.D AB.D AB.D

```

Showsig output when there is an active call on port that originated from the near end.

```
SHOWSIG Version 1.3   Feb  5 1998
```

```
Enter 'showsig /?' for options
```

```
Monitoring slots 0-29 of agsw board 0, sending and receiving
```

```
Sampling interval 1000 milliseconds
```

```

      0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
    15  16  17  18  19  20  21  22  23  24  25  26  27  28  29
snd: A..D A..D A..D .B.D A..D A..D
     A..D A..D A..D A..D A..D A..D A..D A..D A..D A..D AB.D AB.D AB.D AB.D AB.D AB.D
rcv: A..D A..D A..D ..D A..D A..D
     A..D A..D A..D A..D A..D A..D A..D A..D A..D AB.D AB.D AB.D AB.D AB.D AB.D

```

After the appropriate port activity monitoring command is running on both ITS-E servers, try to place a call. While the call is being processed, observe/document the activity being shown on the port activity monitor screens. This information should be provided to the authorized Lucent Technologies Service Center along with indications of any tones being generated (for example, busy, fast busy, intercept, silence). This information will expedite troubleshooting of the problem by the Lucent Technologies Customer Support personnel.

7 External Administration

August 1998

Overview

This chapter provides guidelines for external administrative tasks (outside the scope of the ITS Configuration Manager) related to your ITS-E. These tasks include:

- Setting clear-down tones
- R2-MFC administration
- Adjusting ITS-E server performance
- Performing maintenance
- Configuring Microsoft NetMeeting™ for use with the ITS-E
- Setting up alerts

Refer to the appropriate sections for more information and instructions.

Setting Cleardown Tones

Normally, analog telephone calls are terminated by changes in the voltage on the wires that are used for the analog connection. However in some locations, analog telephone calls are terminated by sending special tones, known as cleardown tones. The actual tones used vary depending on the location. These cleardown tones are only a consideration if your ITS-E uses an analog connection to the PBX. If you are not familiar with telephony concepts, you may wish to consult with your PBX administrator or other telephony expert when setting up cleardown tones.

To enable and configure cleardown tone detection capability on ITS-E servers equipped with analog telephony boards (NMS AG-8), you must edit the **cta.par** file. This file is located in the **C:\NMS\ag\cfg** directory. This file contains a list of settings that activate and define the frequencies and cadence of cleardown tones.

Follow these steps to edit the **cta.par** file to set cleardown tone detection on the ITS-E.

- 1 Stop the ITS service.
- 2 Open the file **C:\NMS\ag\cfg\cta.par**.
- 3 Enable cleardown tone detection by setting the cleardown flag to **1**.
- 4 Set the frequencies and cadence of the cleardown tone to be used. Refer to the table that follows for parameter defaults and explanations.
- 5 Save the **cta.par** file
- 6 Restart the ITS service.

CTA.PAR File Settings

The following table provides explanations for all the parameters in the **cta.par** file.

Table 9. Cta.par File Parameters

Parameter	Description
cleardown.flag	Activates cleardown tone detection during the active state of a call (that is, conversation state). Valid values are: <ul style="list-style-type: none">• 0 (cleardown not enabled (default))• 1 (cleardown enabled)
cleardown.freq1	Specifies the first frequency to detect. Valid range is 1-4000 Hz. The default value is 350 Hz.
cleardown.bandw1	Specifies the bandwidth for first frequency of the cleardown detector. Valid range is 20-800 Hz. The default value is 40 Hz.
cleardown.freq2	Specifies the second frequency to detect, or 0 if detecting a single frequency. Valid range is 1-4000 Hz. The default value is 440 Hz.
cleardown.bandw2	Specifies the bandwidth for second frequency. Valid range is 20-800 Hz. The default value is 40 Hz.

Table 9. Cta.par File Parameters

Parameter	Description
cleardown.qualampl	Specifies the minimum signal level recognized as a hang-up tone. Valid range is -51 to -15 dBm. The default value is -28 dBm.
cleardown.qualtime	Specifies the minimum duration of tone before hang-up will be recognized. The valid range is 0 to 32767 ms. The default value is 1000 ms.
cleardown.tonecount	Specifies the minimum number of cadence tones detected before reporting the cleardown event. For continuous tones, set this parameter to 0 (default).
cleardown.minontime	Specifies the minimum time the tone must be ON to qualify. For continuous tones this parameter is ignored. For cadence tones, the count is reset if any tone is shorter than this time. Valid range is 0-32767 ms. The default value is 0 ms.
cleardown.maxontime	Specifies the maximum time the tone must be ON to qualify. For continuous tones this parameter is ignored. For cadence tones, the count is reset if any tone is longer than this time. Valid range is 0-32767 ms. The default value is 0 ms.

Table 9. *Cta.par* File Parameters

Parameter	Description
<code>cleardown.minofftime</code>	Specifies the minimum time the tone must be OFF to qualify. For continuous tones this parameter is ignored. For cadence tones, the count is reset if the interval between any two tones is shorter than this time. Valid range is 0-32767 ms. The default value is 0 ms.
<code>cleardown.maxofftime</code>	Specifies the maximum time the one must be OFF to qualify. For continuous tones this parameter is ignored. For cadence tones, the count is reset if the interval between any two tones is longer than this time. Valid range is 0-32767 ms. The default value is 0 ms.

Sample *cta.par* File

As an example, for a 425 Hz cleardown tone with a cadence of 250 ms ON and 250 ms OFF, the settings indicated in the following sample **cta.par** file are suggested. Ranges based on the reference tone ON and OFF times are used to specify cadence (that is, the tone must be ON from 225 to 275 ms, and it must be OFF from 225 to 275 ms to qualify). The `cleardown.tonecount` parameter has been set to 2 in the sample below. This indicates that at least two cadence tones must be detected before reporting the cleardown event. This makes the cleardown tone detection process more robust against falsely triggering a call disconnect.

[ctapar]

ADI.LPS.cleardownflag =0x0001	# WORD (Mask)
ADI.START.cleardown.freq1 =425	# DWORD (Hz)
ADI.START.cleardown.bandw1 =40	# DWORD (Hz)
ADI.START.cleardown.freq2 =0	# DWORD (Hz)
ADI.START.cleardown.bandw2 = 40	# DWORD (Hz)
ADI.START.cleardown.qualampl =-28	# INT32 (dBm)
ADI.START.cleardown.qualtime =1000	# DWORD (ms)
ADI.START.cleardown.tonecount =2	# DWORD (Count)
ADI.START.cleardown.minontime =225	# DWORD (ms)
ADI.START.cleardown.maxontime =275	# DWORD (ms)
ADI.START.cleardown.minofftime = 225	# DWORD (ms)
ADI.START.cleardown.maxofftime = 275	# DWORD (ms)

R2-MFC Administration

On ITS-E systems with R2-MFC telephony connections, there are some special administrative considerations that the ITS administrator should be aware of.

As noted in Chapter 4, the maximum digits to be collected field of the telephony page of the ITS configuration manager must be equal to or greater than the number of digits in the phone number sent to the ITS by the local PBX. For other Trunk Control Protocols changes to this field do *not* require stopping and starting the ITS service. For R2-MFC systems, the ITS service *must* be stopped and restarted in order for changes to this field to take effect.

If the value of the maximum digits to be collected field is greater than the number of digits in the phone number sent to the ITS by the local PBX, then there will be an extra 10 second delay in the call setup time. Therefore, it is important that this field be set to exactly the correct number of digits passed from the PBX whenever possible.

If you are using ANI with the R2-MFC system, then you must properly configure the number of ANI digits by editing the file C:\Nms\Agaccess\Cfg\Country\mfc.par. In particular, the value of the ADI.MFC.ANInumber variable must be set to one more than the actual number of ANI digits passed. This is because the ANI starts with a single digit that identifies ANI category although it is not actually part of the ANI number. The setting of this value must be coordinated with administration on the PBX as described in the multi-frequency signaling section of Chapter 6 of the *ITS Integration Guide*. The ITS-E service must be stopped and restarted after this file is edited in order for the change to take effect.

ITS-E Server Performance Guidelines

The following guidelines should be observed to guarantee appropriate levels of performance in an ITS-E server.

- 1 Check that the ITS-E server has at least 64 MB of RAM installed.
 - 2 Check that the drive D has the following virtual memory allocation:
Initial Size (MB): 50
Maximum Size (MB): 750
 - 3 Check that the performance boost for the foreground application is set to "None."
 - 4 Check that any applications which are not needed to run the ITS-E server and which consume lots of CPU cycles, such as screensaver utilities, are not running on the server.
 - 5 Check that CDR and/or trace files are not consuming all of the disk space. Is there no or little space available on the C drive? In the ITS Configuration Manager, Service Logs tab, check that the "free disk space" threshold parameter is set correctly (that is, a value other than zero).
-

Windows NT Server Optimization

The default NT Server optimization mode setting that comes pre-configured on Windows NT Server is *Maximize throughput for file sharing*. This setting may not be the most efficient to support an ITS-E. The NT server optimization mode *Maximize throughput for network applications* should be considered.

To access the NT Server Optimization Control Panel:

- 1 In NT's Control Panel, double-click the **Network** icon and select the **Services** tab.
- 2 Highlight the **Server** service and click the **Properties** button.
- 3 The Server Optimization Control Panel will be displayed showing four server optimization modes.
- 4 Select **Maximize throughput for network applications**.
- 5 Exit the Server Optimization Control Panel.

Maintenance

After performing any hardware removal and/or replacement operations on the Compaq server, certain guidelines need to be followed. The following list provides a summary of such guidelines. Refer to Compaq documentation included with the computer for a complete description of these and other related guidelines.

- 1 After completing any removal and/or replacement procedures of components in the Compaq server, run Compaq's Diagnostics Utility to verify that all components operate properly.
- 2 Always run and print a copy of Compaq's Inspect Utility and the System Configuration Utility after adding, removing, or repositioning any board or options.
- 3 Make sure that Compaq's System Configuration Utility is run after boards and other options (memory, disk drives) are installed or replaced.
- 4 Ensure that all switch settings have been set as dictated by the System Configuration Utility.
- 5 If any of the hard drives are removed, label the drive and its position, and make sure you install it back into its original position.

Configuring Microsoft NetMeeting™ for Use with the Internet Telephony Server (ITS-E)

After NetMeeting 2.0 is installed, the first time you start it, you are prompted by the Configuration Wizard to provide general information. After you provide the general information, you must change some audio settings. Procedures for these tasks follow.

Providing General Information for the Configuration Wizard

The first time you start NetMeeting, follow these steps.

- 1 To start NetMeeting, from the Windows Taskbar click **Start>Programs>NetMeeting** (default location).
- 2 When prompted by the Configuration Wizard, respond as follows:
 - Choose **NOT** to log on to a directory server.
 - Provide your name, e-mail address, and other information.
 - Categorize your information as “For Business Use” or as appropriate.
 - When asked about network connection, choose LAN or appropriate modem speed, (for example, 28.8.)
 - Click the **Starting Recording** button and speak into the microphone so that NetMeeting can adjust the audio settings. This can also be accomplished using the Audio Tuning Wizard from the main user interface.

Changing Audio Settings To change the audio settings so that NetMeeting operates properly with the ITS-E, follow these steps.

- 1 From the **Tools** menu, choose **Options**, and then select the **Audio** tab. The Audio tab settings appear as shown in Figure 1.

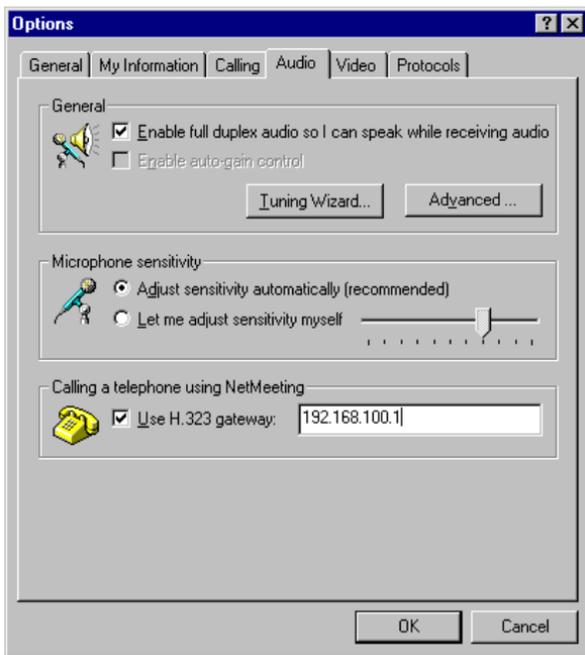


Figure 2. Audio Tab Settings in Options Menu

- 2 Click the check box for **Enable full duplex audio so I can speak while receiving audio**.

- 3 If this option is dimmed, it is not accessible to change. This means your sound card is not full duplex. You need to install updated sound card drivers to make the card full duplex.
 - 4 Click the check box for **Use H.323 gateway** and type the IP address of the ITS gateway in the corresponding field.
 - 5 In the same Options window, select the **Calling** tab and clear the **Refresh directory listing** check box.
 - 6 Click OK when finished.
-

Making Calls to ITS-E from NetMeeting

Before attempting a call, there are certain settings – depending on whether you have a LAN connection or a modem connection – that you must confirm are set correctly.

If You Have a LAN Connection

Ensure the TCP/IP settings are correct on the client machine. To verify this, open an MS DOS command window and ping the remote ITS-E gateway.

If You Have a Modem Connection

Ensure you have the correct dial-up networking settings for the remote RAS server that you are connecting to. You should be able to get these settings from the network administrator of the remote PPP/RAS server. Generally, the default settings are correct. Once the dial-up connection is made, you can ping the remote ITS-E gateway.

To place a call, follow these steps.

- 1 If not already started, start NetMeeting from the Windows Taskbar by clicking **Start>Programs>NetMeeting**. The NetMeeting main window appears as shown in Figure 2.

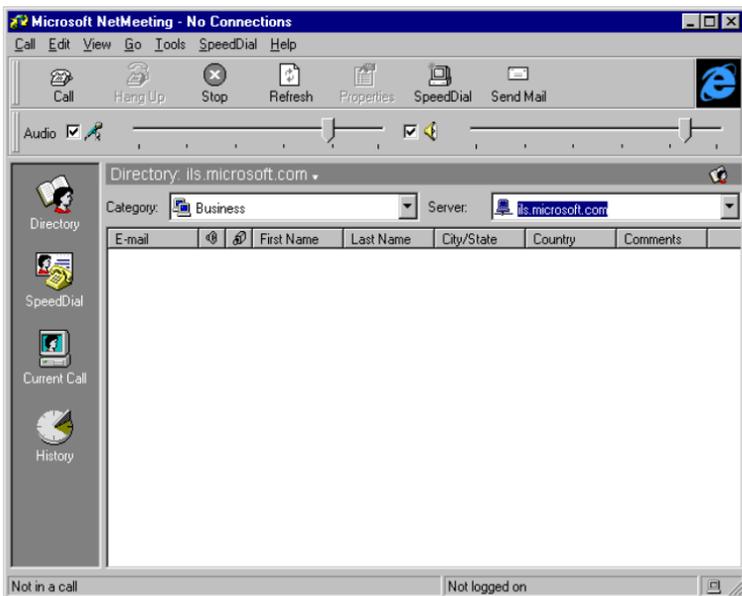


Figure 3. Main NetMeeting Screen (Call button found in upper left corner)

- 2 In the NetMeeting main window, click the **Call** icon located in the upper left-hand corner of the tool bar. The **New Call** dialog box appears as shown in Figure 3.

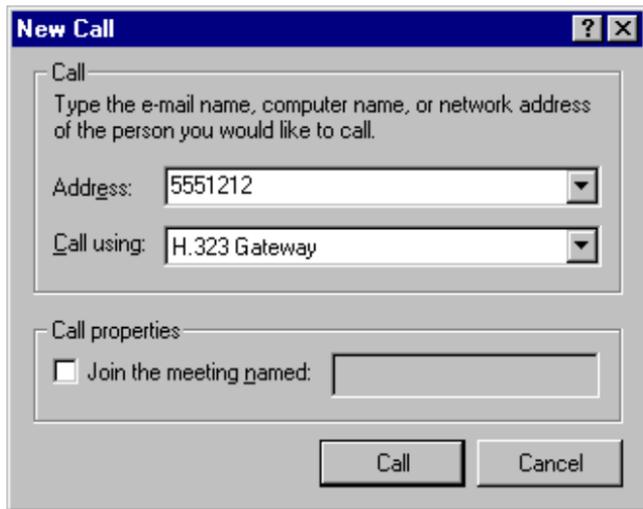


Figure 4. New Call Dialog Box

- 3 In the Address box, type the phone number you want to call. Type the number exactly as you would dial it from a regular phone.

- 4 The ITS-E server may be configured to require an access code. Verify the correct dialing sequence with the ITS-E administrator.
- 5 Click the **Call** button to dial and initiate the call.
- 6 Use the microphone and headphones to talk to the person on the receiving end.

Setting Up Alerts on the ITS-E

Alerts are a mechanism that will cause a popup window to automatically appear on the receiving Windows NT™ system whenever a potentially service effecting event occurs on an ITS-E server. They are a way to remotely monitor the ITS service on one or more ITS-E systems.

To set up alerts, refer to the following instructions.

On the ITS-E system

- 1 Start Messenger Service
 - a Go to NT's Control Panel
 - b Click **Services**
 - c Select **Messenger Service** and click the **Start** button
- 2 Start Alerter Service
 - a Go to NT's Control Panel
 - b Click **Services**
 - c Select the **Alerter Service** and click the **Start** button.
- 3 Specify the list of systems on which alerts should be received
 - a Go to NT's Control Pane
 - b Click **Server**
 - c Click **Alerts**

In the Alert dialog box, enter the NT networking computer names for the systems on which alerts should be received. For example: ICB189-85, ICB189-14.

Note: Do not specify the IP address of the system. You must specify the NT networking computer name.

On the receiving machines

Start the Messenger Service on the systems on which alerts should be received. Refer to step 1 above.

LMHOST Services

To receive alerts on systems in a different domain (from the ITS-E server that is generating the alerts) you must use LMHOST services.

Perform these steps:

- 1 On the ITS-E system, go to the **c:\winnt\system32\drivers\etc** subdirectory.
- 2 Locate the **lmhosts.sam** file.
- 3 Edit this file to add an entry (row) for each system that will receive alerts from this ITS-E system. Each entry (row) contains the NT networking computer name and IP address of the receiving system, separated by tab character. Each entry (row) must be followed by a hard return.

Refer to the following example.

ICB189-85	135.17.189.85
ICB189-11	135.17.189.11
ICB189-14	135.17.189.14

Every machine on which alerts should be received must have an entry (row) in this file.

- 4 Save the file and copy it to **lmhosts** (without any extension).

Note: Most text editors, such a NotePad, automatically add an extension to the file name when it is saved. You *must* save the file without an extension, or rename it to lmhosts with no file extension.

- 5 Shut down the machine and restart it.

Alert Types

Alerts are generated on the ITS-E machine for the following events:

- The ITS Service has stopped
- One or more DSP cards is not responding
- The telephony card is not responding or has malfunctioned
- The Dial Plan has been changed
- The access rules have been changed
- The ITS-E initialization file (**its.ini**) is missing
- The ITS dial/routing plan file (**gk.ini**) is missing

Testing Alerts

You can test alerts by generating a “dial plan has changed” alert.

To generate a “dial plan has changed” alert, follow these steps:

- 1 Open the ITS Configuration Manager.
- 2 Click the **Dial/Routing Plan** tab.
- 3 Add a new machine entry and click **Add**.



Overview

This appendix provides instructions for upgrading your ITS license. The ITS license determines the number of concurrent calls your ITS can support at a given time.

Upgrade Procedure

To upgrade your ITS license, follow these steps:

- 1 From the Windows NT desktop, double-click the **ITS License** icon.
- 2 The ITS license program starts.
- 3 When prompted to install additional licenses for the ITS software, click **Yes**.

Note: If a base license has not been installed, then you are initially prompted for a base license disk before you are prompted for the additional license disks.

- 4 When prompted, insert the ITS Software License disk into the disk drive of the ITS machine and click **OK**.
- 5 Repeat steps **3** and **4** for each additional license disk you want to install.
- 6 After the license is upgraded, when prompted click **No**.

Your ITS license upgrade is complete.

B Limitations and Security

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Overview

This appendix provides information on some known limitations of the system, as well as security issues that you should consider.

Limitations

ITS-E systems connected to a DEFINITY ECS via an analog telephony connection

If a call is active on an analog station connected to the ITS-E and the DEFINITY ECS administrator performs a "maintenance busy-out" on the port associated with that analog station, the active call is not dropped and the "busy-out" does not take effect until the user drops the call.

ITS-E systems connected to some non-Lucent PBXs via an analog telephony connection

If a user is on an active call that uses one of the analog stations connected to the ITS-E from an extension connected to a non-Lucent PBX and the user hangs up the telephone, some non-Lucent PBXs will not send a "call dropped" indication to the analog station connected to the ITS-E that was being used for the call. This means that while the extension the user was on is now free for other calls, the analog port connected to the ITS-E is still considered busy. If the far-end ITS-E does not use an analog connection that exhibits this problem, then when the far-end user hangs up the telephone, the far-end PBX will drop the call to the far-end ITS, which signals the near-end ITS-E to also drop the call. In this case, the call drop on the near-end analog port will be delayed a second or two, but otherwise there will be no difficulty. However, if both ends of the ITS-E call use

analog telephony connections that exhibit this problem, then the ports (on both ends) will be "hung" (that is, no longer usable) until the ITS-E service is restarted.

SX9600 codec

On the ITS Configuration Manager Voice/Fax property page, note the following:

- The SX9600 codec does not work on systems that use the TAP801 DSP card.

Security Information

Note the following security considerations for your ITS-E.

- The PCAnywhere software that comes pre-installed on the ITS-E server is configured with standard PCAnywhere level encryption. In this configuration, the account name and password that the administrator enters when logging into the system is transmitted over the IP network in the "clear" (that is, unencrypted). You may want to configure the PCAnywhere software to use a different level of encryption. You should be aware that other levels of PCAnywhere encryption have not been tested with the ITS-E software.
- The ITS-E server comes with PCAnywhere host software pre-installed. This software allows other systems using the PCAnywhere viewer software to remotely access the ITS-E system. The PCAnywhere host software configured on the ITS-E server does not have the ability to remotely access other systems.

**SECURITY ALERT:**

Do not install the PCanywhere viewer software on the ITS-E server. Doing so creates a potential hacker security risk to other systems that the ITS-E could remotely access.

- You may remove the PCanywhere software if desired.
- You may remove the internal or external modem if desired.

Glossary

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A

agmon A command that loads the low-level drivers and runs test of the telephony interface card (either a T1 card or an analog card).

ANALOG-LOOP START The ITS telephony protocol used in conjunction with analog telephone systems.

C

call detail recording (CDR) Records or statistics of telecommunications (telephone call or fax) activity, such as the time the transmission began, duration, numbers called, number of packets received, delay variations, media type, and other information. Also known as call detail records or call information logging. The ITS lets you log CDR data in the d:\its\log\cdr directory.

connect mask Connection options which control network events that enable outgoing calls to transition to the connected state. If your ITS contains a T1 telephony interface card, the default selected options are out-of-band signal, voice detected, and modem detected.

D

destination ITS The ITS at another site in your organization; also known as the [remote ITS](#).

digital signal processor (DSP) card Processes signals in the digital domain as numbers; also performs speech compression and packetization. A special circuit created to allow high-speed data transmission and manipulation, particularly in communications, graphics, and audio-intensive applications.

DSP card See [digital signal processor \(DSP\) card](#).

H

H.323 An Internet protocol that models ISDN telephone calls on TCP/IP networks. The ITS is H.323-compliant.

I

Internet H.323 protocol See [H.323](#).

Internet Protocol (IP) identifier Refers to the following:

- an IP address in dotted decimal format, such as 135.20.70.27
- a node name, such as mtgzpc94
- a fully qualified node name with an ending period, such as mtgzpc94.mt.lucent.com.
- a partially qualified node name without an ending period, such as mtgzpc94.mt.lucent

Internet Telephony Server A specially configured server that runs Lucent Technologies' ITS service software and the ITS Configuration Manager software.

ITS Configuration Manager software A graphical user interface (GUI) developed by Lucent Technologies that facilitates ITS system administration from a series of dialog boxes and related windows.

ITS service software A program developed by Lucent Technologies that routes telephone calls and faxes over the Internet or your company's intranet, resulting in substantial long distance savings.

O

originating ITS The ITS at your site; also known as the local ITS.

P

PBX See [private branch exchange \(PBX\)](#).

private branch exchange (PBX) A private telephone switchboard, that is, a local electronic telephone switch that serves local connections (for example, extensions within a business) and provides them with access to the public network. A PBX is also called private automatic branch exchange (PABX). The ITS is connected to your company's PBX via a T1 or analog interface card. Commonly used PBXs include Lucent's DEFINITY and MERLIN LEGEND.

public switched telephone network (PSTN) The telephone network to which private telephones, PBXs, automatic call distributors (ACDs), and Key systems are connected.

R

remote ITS The ITS located at another site in your organization. Also known as the destination ITS.

S

service logging options Options in the Service Logs dialog box in the ITS Configuration Manager that allow you to log call detail records (CDRs) and error messages.

T

T1 card A telephony interface card that connects the ITS to your private branch exchange (PBX).

T1-WINK START One of the telephony interface protocols used for ITS T1 support.

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