Lucent Technologies
Bell Labs Innovations

Nurse Call Integration of the DWBS and the Rauland-Borg Responder IV System

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About This Book

Introduction

Nurse Call Integration of the DWBS and the Rauland-Borg Responder® IV System describes how to administer and troubleshoot all of the components included within the integration of the Lucent Technologies DEFINITY® Wireless Business System (DWBS) and the Rauland-Borg Responder IV Nurse Call System (NCS).

Before using this book, all planning and site-preparation steps must be completed. For additional planning and site information, see the documents listed in the “Related Information” section in this chapter.

Audience

The primary audience for this book are the nurse call integration installers, administrators, troubleshooters, and users.

Important Safety Guidelines for Users

Observe these guidelines for safe and efficient operation of your DEFINITY Wireless Business System (DWBS) 9601 Wireless Terminal (WT) or 9630 Series WT.

Your WT is a radio transmitter and receiver. When the battery is installed, the phone is on and it receives and sends out radio frequency (RF) energy. The phone operates in the frequency range of 1920 to 1930 MHz. Your handheld wireless telephone uses the digital Time Division Multiple Access (TDMA) mode. Power is transmitted in bursts at a 100 KHz pulsed repetition rate. The peak envelope transmit power is 100 mW or less.

Exposure to Radio Frequency Energy

The design of your wireless telephone complies with the latest safety levels of the Institute of Electrical and Electronic Engineers (IEEE) and the American National Standards Institute (ANSI) with respect to human exposure to RF energy. Of course, if you would like to limit RF exposure even further, you may choose to control the duration of your calls.

Cardiac Pacemakers

The Health Industry Manufacturers Association recommends that a minimum separation distance of six inches be maintained between a handheld wireless phone and a pacemaker to avoid potential interference with a pacemaker. These recommendations are consistent with the independent research by and recommendations of wireless technology research.

- *Always* keep the WT more than six inches from the pacemaker whenever the battery is in the WT.
- Do not carry the WT in a breast pocket.
- Use the ear opposite the pacemaker to minimize the potential for interference.
- If you have any reason to suspect that interference is taking place, take the battery out of your phone immediately.

Hearing Aid Compatibility

Most electronic equipment, such as equipment in hospitals, is shielded from RF energy. However, RF energy from wireless telephones may affect some electronic equipment.

Although the DWBS WT is compatible with inductively coupled hearing aids, you should consult your physician or hearing aid manufacturer to determine if your hearing aid is adequately shielded from external RF energy. The operation of inadequately shielded medical devices may be adversely affected when a portable wireless telephone is operating in close proximity.

Typographic Conventions

The following typographic conventions are used in this book to convey information consistently and quickly.

- *This typeface* is used for references to titles of other information and for emphasis within other typefaces.
- **This typeface** emphasizes key words to help clarify meaning in a sentence or to call attention to a distinction.
- The following note icon identifies additional information pertinent to the text preceding or following it.

  NOTE:

Organization

This book is organized as follows:

- **Chapter 1, "System Overview,"** provides a description of the nurse call integration, including its unique characteristics, along with the appropriate hardware and software requirements and feature interactions.
- **Chapter 2, "Administration,"** explains how to administer the nurse call integration components, including the DEFINITY Enterprise Communications Server® (ECS), the MAP-D circuit pack on the PC, and the Telephony Services Application Programming Interface (TSAPI) on the PC.
- **Chapter 3, "Troubleshooting,"** provides the technician with the background and procedural information to troubleshoot the nurse call integration and its components.

A glossary and an index are also included.

Related Information

The following list provides related information:

- *NCLUWDKIT Wireless Display Kit for the Lucent DEFINITY ECS, Installation and Configuration,* KI-2056
- *DEFINITY Enterprise Communications Server Release 6 Maintenance for R6vs/si,* 555-230-127
- *DEFINITY Enterprise Communications Server Release 6 Maintenance for R6r,* 555-230-126
- *DEFINITY Enterprise Communications Server CallVisor® ASAI PC LAN Over MAPD Installation, Administration, and Maintenance,* 555-230-113
- *CentreVu® Computer-Telephony for Windows NT® Administration and Maintenance for the DEFINITY ECS and CallVisor® PC, Issue 1.6*

  NOTE:
  This book is included only on the CD-ROM for the CentreVu computer-telephony application. Consult your Lucent Technologies representative for details.

- *CentreVu® Computer-Telephony for Windows NT® Release 3.10* (or later) *Telephony Services Troubleshooting Guide*

  NOTE:
  This book is included only on a Lucent Technologies web site, and it is intended only for Lucent Technologies personnel. Consult your Lucent Technologies representative for details.

- *DEFINITY Wireless Business System Site Planning*, 555-232-601
- *DEFINITY Wireless Business System Installation and Test*, 555-232-102
- *DEFINITY Wireless Business System Maintenance*, 555-232-103
- *DEFINITY Wireless Business System 9601 Wireless Terminal Quick Reference*, 555-232-104
- *DEFINITY Wireless Business System 9601 Wireless Terminal User Guide*, 555-232-105
- *DEFINITY Wireless Business System 9630 Series Wireless Terminal Quick Reference*, 555-232-702
- *DEFINITY Wireless Business System 9630 Series Wireless Terminal User Guide*, 555-232-701

System Overview

1

Introduction

The Release 1.2 DEFINITY Wireless Business System (DWBS) provides the infrastructure to support the Nurse Call System (NCS), which is a hospital/healthcare adjunct application. This infrastructure includes an Adjunct Switch Applications Interface (ASAI) to the DEFINITY Enterprise Communications Server® (ECS). Integration of the NCS with the DWBS is based on the DEFINITY ECS ASAI 3rd-party call control and monitoring capabilities.

NCS Description and Capabilities

The NCS provides robust, two-way telephone communication between nurses and patients in a hospital/healthcare environment. Patients make a service request by using a call button that is associated with the NCS, and nurses answer by using wireless terminals (WTs) that are equipped with a display, which provides information on patients. Nurses can use any of the WTs that operate within the DWBS, including the 9601 WT, the 9601+ WT, and the 9630 Series WT.

The following list summarizes capabilities and advantages of the wireless component of the NCS .

- Patients can place calls to the specific nurse who is assigned to a particular patient (bed); this allows the patients to talk directly to the responsible nurse immediately.
- Nurses get a patient-specific display on their WT automatically when the WT receives an NCS call. This display includes information such as the patient's name, patient's room number, call priority, etc. This information is provided by the NCS.

- Because the nurses have a WT, they can be reached anywhere in the coverage area of the system; this allows the nurses to attend to other duties as well as receive requests (not just emergency requests) that come through the NCS.
- Nurses can use the WT keypad to perform actions remotely (for example, cancel nurse call requests, administer lights, etc.).

Hardware and Software Requirements

Nurse call integration operates on a DEFINITY G3i, G3si, G3r, or ProLogix™ system. However, it cannot operate on a DEFINITY G3vs system. The following lists identify the components that are required for each type of nurse call integration system and also the PC within system.

NOTE:
Existing, as well as future, versions of DWBS hardware configurations for Wireless Fixed Bases (WFBs), Cell Antenna Units (CAUs), and WTs can be used for the NCS application because there are no NCS-specific hardware changes to the DWBS. However, the Radio Controller (RC) must have firmware version 8.1.4 or later.

1. All nurse call integration systems must include the following:

- TN789 RC circuit pack with firmware version 8.1.4 or higher

  NOTE:
  Insert this circuit pack into any of the universal port (purple) slots.

- DWBS (as per the DWBS documentation) and WTs
- Maximum of nine Digital Communications Protocol (DCP) phones that are dedicated only for use in nurse call integration

  NOTE:
  The actual number of DCP phones used is determined by Rauland-Borg. Two or three DCP phones are commonly used.

- Either the TN742, TN746B, or TN769 Analog circuit pack
- Either the TN754, TN2181, or TN2424 Digital circuit pack
- TN771D Maintenance Test circuit pack
- TN801B MAPD circuit pack that is configured with a DEFINITY ECS local area network (LAN) Gateway. This circuit pack occupies three consecutive slots in the DEFINITY ECS carrier.

  NOTE:
  Whenever a MAPD circuit pack is inserted into a DEFINITY G3i system that includes an Expanded Port Network (EPN) configuration,

the Expansion Interface (EI) circuit packs must be changed to TN570 circuit packs. Normally, a G3i system has TN776 EI circuit packs and a G3r system has TN570 EI circuit packs. See DEFINITY ECS customer documentation for details.

- DEFINITY ECS Release 6.3.2 or later with ASAI enabled
- Additional phones for non-nurse call integration usage (optional)

2a. Additionally, nurse call integration with DEFINITY G3i or G3si requires:

- TN778 Packet Control (PACCON) circuit pack

NOTE:
DEFINITY ECS Release 7.1 or later requires the TN794 NetPacket circuit pack. This circuit pack replaces the Network Control (Netcon) and PACCON circuit packs.

2b. Additionally, nurse call integration with DEFINITY G3r requires:

- TN577 Packet Gateway circuit pack
- TN1655 Packet Interface circuit pack

3. Pentium™ PC Running Windows NT® Version 4.0 or Higher With CD-ROM Drive and Dedicated to the NCS

- Standard off-the-shelf Pentium PC with the following:
  - — Windows NT Version 4.0 (or later)
  - — Transmission Control Protocol/Internet Protocol (TCP/IP) stack for network connections
  - — 64 MB of RAM
  - — 10 MB of disk space
  - — CPU speed of 350MHz or better
  - — One Ethernet® card to connect the Computer Telephony Integration (CTI) link to the DEFINITY ECS
  - — CD-ROM drive and 3.5-inch floppy drive (for license disks)
  - — One serial port for connecting the PC to the NCS
  - — A second serial port if an external 56 kbps modem is being used
- 56 kbps modem
- Uninterruptible Power Supply (UPS) for the PC
- One Category 5 twisted pair cable between the PC and the hub, and one Category 5 twisted pair cable between the hub and the DEFINITY ECS

NOTE:
The Category 5 twisted pair cable can have a maximum length of 328 feet.

- Ethernet hub

NOTE:
Although the Ethernet hub can be connected to a network, it is strongly recommended that this not be done in order to provide a secure and reliable link to the DEFINITY ECS.

- Following software installed on the PC:
  - — Interworking Unit (IWU) software
  - — NCS Application Software (NCA)
  - — CentreVu Computer Telephony Release 3.10, Version 2.2 or later. This is also known as the Telephony Services Application Programming Interface (TSAPI).

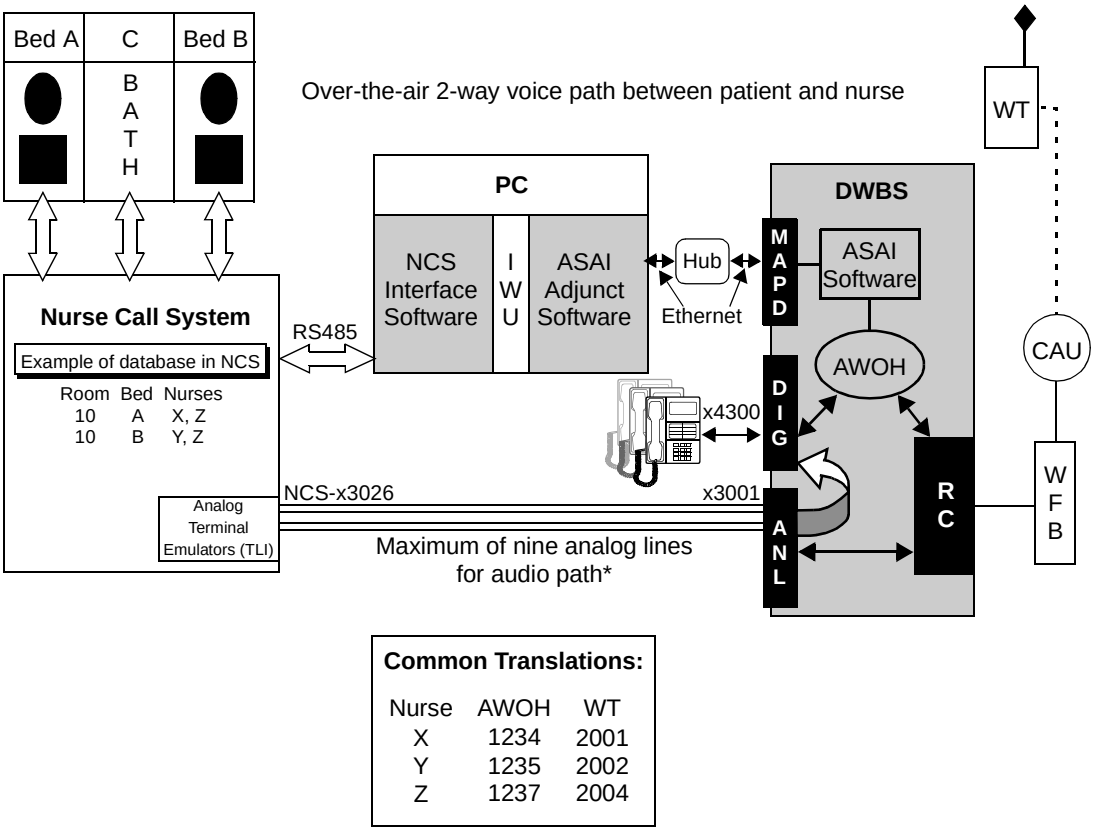
    NOTE:
    IWU software provides the interface between the NCA software and the TSAPI application software.

  - — pcANYWHERE™ Version 8.0 or later software

4. Rauland-Borg Responder® IV Unit

NOTE:
Refer to the appropriate Rauland-Borg documentation for details.

The following figure presents a view of the hardware and system configuration.



*Rauland-Borg recommends using three reserved (always ringing) lines (that is, one TLI). These lines form a resource pool whose members are recycled whenever an audio path is cut through from a WT to the NCS. The recycling occurs when the DCP line is first dropped from the conference and then called again by the NCS to restore it to the ringing state. Each DCP line that is added to this pool impacts the performance: it reduces the average recycle time, during which time the NCS cannot establish a new audio path. Reducing the recycle time by a factor of 3 is more than adequate for a busy hospital.

Figure 1-1. Nurse Call Integration

Typical NCS Call Walkthrough

This section presents a typical NCS call walkthrough. As you read the following steps, refer to the previous figure.

NOTE:
These steps are completed within two or three seconds and are transparent to the user.

1. A normal nurse call request is initiated from Room 10, Bed A. (Nurses X and Z are covering Room 10.)
2. The NCS sends the following information to the PC:
   - Extensions of the nurses to be alerted (x2001 and x2004)
   - Patient information (Room 10, Bed A)
   - Call type (normal)
3. The PC sets up a 3rd-Party Make Call from the AWOH extensions to the WTs. (AWOH x1234 calls WT x2001, AWOH x1237 calls x2004)
4. When Nurse X answers the request, the following actions occur:
   - Call between the AWOH and WT is held using 3rd-Party Hold.
   - NCS initiates a call from the analog line (NCS-x3026/x3001) to the digital station (x4300). The PC connects the call using 3rd-Party Answer.
   - NCS clears the call request going to the remaining nurses (Nurse Z).
5. The PC does a Single Step Conference to add the AWOH (x1234) to the NCS/digital station call. There are now two active calls associated with the NCS request. One call involves the AWOH and WT, and the other call involves the AWOH, analog line, and digital station.
6. The PC uses 3rd-Party Conference to conference the two calls together. Nurse X can now talk to the patient in Room 10, Bed A.
7. The interim parties (AWOH and digital station) are removed from the conference using 3rd-Party Drop and are now free for other NCS call requests.

Calls From Patients to WTs

A patient activates the NCS by pushing the bedside button or by pulling the bath cord. The NCS determines the type of call (NORMAL, BATH, OR CODE BLUE), display information, and which nurses are alerted for the call. This information is sent to the PC and then converted from a nurse call message to an ASAI message by the IWU. The IWU instructs the TSAPI to initiate calls to the WTs by using the AWOH stations as the originator.

An NCS-specific display on the WT provides the patient's room and bed number, along with the type of call. A voice path is established between the NCA Telephone Line Interface (TLI) analog lines and the WT that answers the call.

Calls From WTs to Patients

The WT can communicate to the patient's station (speaker over bed) by placing a call to the appropriate DEFINITY ECS hunt group. This hunt group contains extensions for the Telephone Line Interface (TLI) analog lines on the NCS. Once the WT is connected to the NCS, the nurse can enter the keypad digits of the specific patient's room and bed. The NCS will route the call to the patient's station (speaker over bed) based on the Dual-Tone Multifrequency (DTMF) tones that are sent end-to-end by the DEFINITY ECS.

Clearing Calls

NCS calls can be cleared by hanging up (that is, going on-hook). Also, the NCS will drop an NCS call after an audio connection of five minutes or after 15 seconds of silence on the call.

Nurse Call Integration Architecture and Operation

The NCS-DWBS integration provides immediate access to the appropriate nurse whenever a patient in a hospital or nursing home makes a request. This integration is based on the DEFINITY ECS ASAI 3rd-party call control features, which include the following:

- 3rd-Party Make Call
- 3rd-Party Answer
- Single Step Conference
- 3rd-Party Conference
- 3rd-Party Clear Connection
- 3rd-Party Drop

Telephony Services Application Programming Interface (TSAPI) uses these ASAI capabilities to establish an NCS call to a WT.

There is always a one-to-one correspondence between the WTs that are used for the NCS application and the Administration Without Hardware (AWOH) stations in the DWBS.

The NCA software assigns unique identifiers to each of the AWOH/WT pairs in its list. The software passes the information whenever it sends a message to the IWU and TSAPI. This allows TSAPI and the DEFINITY ECS to complete the transaction and establish a voice path between the WT and the patient's telephone/speaker unit.

Unique Characteristics of the NCS

The items in the following list identify and discuss the unique characteristics of the NCS.

- **Basic Call Setup**

  The NCS can launch calls to several nurses in response to a patient's call. However, the WT that answers the call first is provided with an audio connection to the patient's bed station. Nurses who attempt to answer a patient call that has already been answered will hear silence for a few seconds.

  For the patient-to-nurse call, the NCS typically sends signaling information, including the nurse's telephone number, display information, and call type to the DWBS via the signaling link between the NCS and the PC that supports ASAI. The DWBS uses a 3rd-party call control via the ASAI

software to set up the call. The actual talk path between the patient and the nurse is established via analog lines between the NCS and the DEFINITY ECS.

- **NCS-Specific Display For WTs**

  Nurses can distinguish between non-NCS telephone calls and NCS calls by the distinctive display on the WT.

  Generalized alphanumeric messages containing a maximum of 16 characters can be sent from the NCS for display on a wireless handset. The handset displays messages concurrently with ringing; no action is required by the nurse to access the messages.

  Typically, the NCS provides display information such as the room number, bed number, and call priority (bed call or bathroom call), as determined by the NCS. The display on the handset is cleared once the call ends.

- **One NCS Call Instance Despite Multiple Call Appearances**

  A WT can be administered in several patient groups on an NCS. As such, a WT could theoretically be alerted for multiple NCS calls. However the Rauland-Borg NCS and the DWBS allow each WT to receive or be active on only one NCS call at any given time.

  NOTE:
  This is true even though each WT has two call appearances if it is administered as a 9601 set type or three call appearances if it is administered as a 9601+ set type.

- **Treatment of NCS Calls Offered to WTs Active on a Non-NCS Call**

  If a WT is active on a non-NCS call, an NCS call can be offered on an idle call appearance for that WT. In such a case, the NCS call is offered as the second call to the WT; accordingly, the nurse may put the non-NCS call on hold and pick up the NCS call.

  Whenever the NCS call is active on the handset, the associated NCS display message is provided on the handset. The nurse may go back and forth between the non-NCS call and the NCS call with the appropriate message displayed on the WT.

  NOTE:
  The maximum continuous amount of time that an NCS call can be on hold is 15 seconds. The NCS will terminate the call after 15 seconds of continuous silence.

  It is recommended that the administrator reserve a call appearance for NCS calls by setting the *Restrict Last Appearance* field on the Station form to **y**. The DEFINITY ECS checks for the NCS call type and allows the call to be offered on the last available call appearance.

- **Treatment of Non-NCS Calls Offered to WTs Active on an NCS Call**

  If an NCS call is made to a WT, a second call and subsequent calls to the WT are handled as follows:

  — Another NCS call cannot be offered to the WT.

  — Regular (nonpriority) non-NCS calls are not offered on the second or third call appearance for the WT; however, such calls follow the WT's coverage criteria, if administered (for example, these calls cover to AUDIX or to other coverage points). If the WT does not have any coverage, the caller receives a busy signal.

  — Priority non-NCS calls are offered to the WT. The nurse can put the NCS call on hold and pick up the priority non-NCS call. Thereafter, the nurse may go back and forth between the priority non-NCS call and the NCS call with the appropriate message displayed on the WT.

  NOTE:
  The maximum continuous amount of time that an NCS call can be on hold is 15 seconds. The NCS will terminate the call after 15 seconds of continuous silence.

  The display and the ringing that are provided for the second (priority non-NCS) call depends on the state of the NCS call.

  - If the current NCS call at the WT is in an *active state* (that is, the WT has answered the call), the following apply:

    — Display for the new call overwrites the current NCS call-related display for 30 seconds (per the auto-display of incoming calls feature) and then reverts back to the old display.

    — WT is provided with priority alerting, as administered.

  - If the current NCS call at the WT is in the *ringing state*, the second call and subsequent calls alert the WT without affecting the current call-related display.

- **WT not Available for Receiving NCS Calls**

  If an NCS call comes into a WT, and if the DEFINITY ECS can recognize that the WT is busy (that is, it has no available call appearances), out of service, or out of the system, or if no ports can be allocated to the call, the DEFINITY ECS returns a busy indication to the AWOH station. The TSAPI monitors the AWOH and therefore recognizes and logs this event; it then relays this event back to the NCS.

  If the DEFINITY ECS cannot recognize that the call did not alert the WT, it assumes that the call is alerting the WT. This can happen if the DEFINITY ECS is unaware that, for example, the WT has missed an incoming call page or is outside of the system range.

To deal with such scenarios, the NCS application software always sets a timer for “no answer” and takes the appropriate action.

NOTE:
If the NCS is configured to work with the DWBS, it is recommended that you not run other ASAI applications that involve WTs. More specifically, ensure that the other ASAI applications do not use a 3rd-party make-call to a WT from an AWOH station over the ASAI link.

Feature Interactions

This section discusses the appropriate feature interactions.

- **Bridging**

  It is recommended that you *not administer* NCS-related WTs in a bridging environment. If a WT is administered in a bridging configuration as either the principal or the bridge, an NCS call alerts all the parties, including the WT and the wired stations. However, NCS implementation is WT-specific for special display and call-handling capabilities, and such implementation is not available to wired sets.

- **Call Coverage**

  NCS calls do not follow the coverage path even if a WT is assigned a coverage path. Therefore, NCS calls ring until the call is either answered by the WT or dropped by the NCS. Non-NCS calls may follow a coverage path.

- **Call Forwarding**

  — **Provided by the NCS**

  NOTE:
  Refer to Rauland-Borg documentation.

  — **Provided by the DEFINITY ECS**

  The DEFINITY ECS does not forward NCS calls. An NCS call always alerts the WT even if the WT has activated DEFINITY ECS-based Call Forwarding. This is done to prevent NCS calls from being redirected to wired stations, stations in other parts of the network (for example, via DCS Call Forwarding), or to off-premises destinations without knowledge of the NCS.

  For all of the Call-Forwarding scenarios, non-NCS calls to the WTs follow the normal call redirection criteria.

- **Conference/Transfer**

  A WT that is connected to an NCS call may use the Conference feature to add additional parties to the call. The original WT that answers the NCS request must remain on the call in order to keep the connection between all parties. If the WT attempts to drop off, all of the parties on the call are disconnected.

  Traditional transfer is not supported for NCS calls. An NCS call can be transferred to another extension; however, the WT that transfers the call cannot receive another NCS call until the two remaining parties have disconnected. This means that although the WT may appear to be available for NCS calls, it is still considered “connected” by the NCS system until the original call request has been terminated.

- **Coverage Answer Groups**

  WTs may be included into Coverage Answer Groups (CAGs) for non-NCS call scenarios. NCS calls do not follow the coverage path and will never alert the members of a CAG.

- **Other Call Coverage Criteria**

  If the WT is administered with a coverage path and coverage criteria, NCS calls are processed as follows.

  — **Cover-on-Don't-Answer Criteria**. If a WT does not answer a NCS call even after the specified number of rings, the coverage criteria for the WT is not applied to the NCS call. Instead, the NCS call overrides the criteria and continues to alert the user.

  — **Cover-on-Busy**. If the WT is busy on a call and receives an NCS call, the call is offered to the WT rather than sent to the coverage path.

  — **Cover-all.** If the cover-all criteria is set, the NCS call alerts the WT as well as all the users at the coverage path.

- **Hunt Groups or Terminating Extension Groups**

  Do not administer the NCS to alert a hunt group or Terminating Extension Group (TEG). The nurse groups are set up via NCS administration; therefore, these groups do not need to be included into a hunt group or TEG to alert a specific group of users.

  NOTE:
  WTs may be included into hunt groups or TEGs for non-NCS call scenarios.

- **Priority Calls**

  To allow WT users to identify the priority of NCS calls, the NCS application sends messages to the display that indicate NORMAL, BATH CORD, and CODE BLUE calls. A patient makes a *BATH CORD* call by pulling the cord that is installed in the patient's bathroom. A patient makes a *CODE BLU*E call by pressing the blue button that is installed somewhere near the patient's bed.

  The following list discusses several scenarios for which the NCS takes action if it detects a higher priority request for the same WT extension.

  — If the call is still in a ringing state (that is, if the WT has not answered), the NCS initiates a drop of the previous call. The NCS then initiates a new NCS call to the same WT extension.

  — If the NCS finds that the WT is in an active or answered state, it does not offer the second call to the WT.

- **Restrict Last Call Appearnace**

  It is recommended that you reserve a call appearance for NCS calls by setting the *Restrict Last Appearance* field on the Station form to **y**. With this setting, the DEFINITY ECS checks for the NCS call type and allows the call to be offered on the last available call appearance.

- **Send All Calls (SAC)**

  If an NCS call is in a ringing state, and if the WT user activates SAC, the NCS call continues to alert the user.

  If an NCS call comes into the WT when SAC is already active, the NCS call overrides SAC and is offered to the WT. On the other hand, regular non-NCS calls may follow the coverage path.

- **Silent Mode And Vibrator**

  Silent Mode turns the WT ringer on or off. Silent Mode is available on all WTs. The vibrator option is available only on the 9630 Series WTs.

  NOTE:
  To minimize the amount of ambient noise that could disturb or annoy patients, the hospital staff may decide to have WTs vibrate, and not ring, for non-NCS calls as well as NCS calls.

Administration

2

Introduction

Administration is required on each of the following:

- DEFINITY ECS on the management terminal (MT)
- MAPD circuit pack using a PC
- TSAPI on the PC
- NCS Unit

This section discusses in detail the administration for all of these components except the NCS Unit. For information on administering the NCS Unit, refer to the appropriate vendor-specific documentation.

Procedure for Administering the DEFINITY ECS On the Management Terminal

NOTE:
Only nurse call integration-specific administration procedures are provided in this section. If necessary, refer to the DWBS Installation document.

DEFINITY ECS administration is done from the DEFINITY ECS MT. After you complete each form, be sure to select the “submit” option on the MT to enter the information into the system.

1. For the ASAI link, administer one BRI station. For the ISDN-BRI station that is to be used as an ASAI link, access the Add Station form by entering the **add station *<extension>*** command. Then enter the MAPD port number into the *Port* field (for example, **a0701**, **a0702**, etc.). In the *Type* field, enter **adjlk** (for adjunct link). In the *CRV Length* field, enter value **2**. Submit the form.
2. Administer each of the station types that are identified in the following list by accessing the Add Station form via the **add station <*extension*>** command, populating the identified fields as directed, and then submitting the form.

    a. **WTs that are to be used by the nurses**.

    Enter **9601** or **9601+** into the *Type* field. The *Port* field should already contain **WT**. If you are using a 9630 Series WT, enter the **change alias station** command at the MT, and alias the WT by administering the Alias Station form.

    Ensure that *Restrict Last Appearance* field is set to **y**.

    b. **Administration WithOut Hardware (AWOH) stations (logical station extensions without real ports associated with them) for ASAI call control purposes**. Every WT that is used for the NCS must have a corresponding AWOH station.

    Enter a value identifying a DCP station type (for example, **7403**) into the *Type* field. (You can choose the default value **7406D**, which comes up with three call appearances.) Enter **x** into the *Port* field.

    c. **A maximum of nine analog stations (TLIs) for the line-side interface to the NCS**.

    Enter **2500** into the *Type* field and the actual port number into the *Port* field.

    d. **A maximum of nine multifunction digital stations that the analog ports can call into to establish ringing lines**. These must be real stations (and not logical extensions or AWOH stations).

    NOTE:
    Two or three digital stations are usually sufficient to meet the demands of NCS call requests. Consult Rauland-Borg for guidelines.

    Enter a value identifying the digital station type (for example, **8410D**) into the *Type* field, a valid port number into the *Port* field, and **ONLY ONE CALL APPEARANCE** (to interface with Rauland-Borg's Responder IV System).

    Ensure that *Restrict Last Appearance* field is set to **n**. If the field is not set to **n**, the switch will provide a busy indication for incoming calls to the station (because the station has only one call appearance and is reserved for call originations and priority calls).

Optionally, administer a “release” feature button to make the stations “off-hook idle.” For details, refer to the “System Startup” section later in this chapter.

NOTE:
The Rauland-Borg Responder IV Unit can support a maximum of nine telephone line interfaces (TLIs). TLIs are used for providing audio connectivity through the serial interface to the system. As such, any combination of ports identified in the previous two letter items can be administered for NCS connectivity purposes as long as the maximum of nine TLIs that the NCS can support is not exceeded.

e. ***(Optional)*** **Hunt group that includes the extensions that correspond to the NCS’s analog lines** (that is, all of the lines except for the ones that are dedicated to the ringing line connection of incoming NCS calls).

Access the Hunt Group form by entering the **add hunt-group next** command on the MT. Then administer the hunt group extension and the analog stations’ extensions as members of the hunt group. The nurses can call into the hunt group extension and then enter specific keypad digits to connect to a patient’s room by using a normal call sequence (not through the ASAI adjunct).

The following table provides an example of station administration on the system assuming the following system configuration.

NOTE:
The actual port information for digital, analog, and adjunct link station types depends on the actual location of the circuit packs.

- Analog circuit pack is plugged into Carrier A Slot 2.
- Radio Controller (RC) is inserted into Carrier A Slot 3. The port is dynamically allocated for wireless stations on a per-session basis; therefore, actual port information is NOT administered on the WT Station form, and the *Port* field is automatically populated with **WT**.
- The Digital circuit pack is plugged into Carrier A Slot 4.

- The MAPD circuit pack is inserted into Carrier A Slot 7, and it occupies Slots 7, 8 and 9.

Table 2-1. Example of Station Administration for the System

Device	Type	Port (*PPCSS*)
WTs	9601 or 9601+	WT
Digital Stations	8410D	1A0401
Analog-1	2500	1A0201
Analog-2	2500	1A0202
AWOH-1	7403D	X
AWOH-2	7403D	X
AWOH-3	7403D	X
ASAI-1	ADJLK	A0701

Procedure for Administering the MAPD Circuit Pack

MAPD circuit pack administration requires a dumb terminal or a terminal emulator on a PC that is connected to an RS-232 serial port of the MAPD circuit pack.

Administer the MAPD circuit pack as follows.

1. Use the default IP address for the PC and the DEFINITY G3 PBX Driver (MAPD circuit pack) per the directives in *CenterVu Computer Telephony for Windows NT—Administration and Maintenance for DEFINITY ECS and CallVisor PC*, Issue 1.6. The default IP address for the PC server is 192.168.25.20. The default IP address for the DEFINITY ECS LAN Gateway MAPD board is 192.168.25.10.
2. Log in as **craft** and enter password **crftpw**.
3. From the main menu, select the second option called “TCP/IP administration.”
4. Select the first option called “this host.” This prompts for the following:
    a. *Host Name*—Enter the host name (for example, **defb01**).
    b. *Host IP-Address*—Enter the IP address for the DEFINITY ECS LAN Gateway MAPD board from Step 1.
    c. *Subnet Mask*—Enter **255.255.255.0**.
    d. Press ENTER to submit the information, and press CANCEL to back up to the “TCP/IP Administration” window.
5. Select option 2 to access the “local host table” window.
6. Select the ADD function key to access the table (which has three columns).
    a. Enter the IP address of the PC from Step 1.
    b. Enter **HM30A** for the PC’s host name.

        NOTE:
        Avoid entering any information into the “aliases” column.

    c. Select the ADD function key again to enter the information.
    d. Press CANCEL to back up to the “TCP/IP Administration” window.
7. Select “exit” to get out of the TCP/IP Administration window and to go back to the main menu.
8. Select option 3 to access the “port administration” screen.
9. Select option 2 (“dlg administration” screen).
10. Select the ADD function key and do the following.

a. *Port* field—Enter the port used on the MAPD board (there are 8 ports on the board).

b. *Client Name/IP-Address* field—Enter the PC's IP-address.

c. *Client Link* field—Enter the link number (which also appears in the *Port* field).

d. Select the ADD function key.

11. MAPD administration is now completed. Exit out of the main menu and log off.

Procedure for Administering TSAPI on the PC

The PC will arrive with the TSAPI software already loaded. Once the PC arrives, do the following administration on the PC.

NOTE:
In most cases, only Step 8 will be performed by Lucent Technologies personnel.

1. Go to the TSAPI controller window by selecting **start->programs->TSAPI telephony services>TSAPI telephony services Controller**.
2. Enter a checkmark into the "Automatic Start of TSAPI Services on Server Reboot" dialog box. This starts the TSAPI services automatically when the PC is rebooted. (If this is not done, you must manually start the TSAPI when the PC is rebooted.)
3. On the TSAPI controller window, select **start** to set up the ASAI link initially.

   NOTE:
   To verify that the ASAI link is up, enter the **status bri** command on the MT. When the link is up, "l3 established" (Layer 3 established) is displayed. The MAPD circuit pack on the DWBS cabinet shows "A_INIT" followed by "ALINK-1" (where the link number has a value from 1 to 4) when the link is established.

4. Open the TSAPI services controller window. Log in as "administrator." The password is "root."
5. Open the TSadmin window by selecting **start->programs->tswin32client->Telephony Services admin**.
6. When you see the "open Tserver" window, click OK. This opens a Telephony Services Administration window.
7. From the Telephony Services Administration window, select "Users."

   a. Select the ADMINISTRATOR login ID; this creates the "User Properties" screen.

b. Go to the “Access Rights” screen.

c. Set all modifiable fields to “Any Device.”

8. Go back to the Telephony Services Administration window and select “Devices.”

   a. Administer the devices to be controlled and/or monitored by TSAPI. Telephone devices to be administered include the following: WTs, AWOH stations, and digital stations that have been administered on the MT for NCS purposes.

   b. Ensure that the extensions are the same as the administered extensions on the DEFINITY ECS.

Procedure For the NCS and NCA

NOTE:
For information on administering the NCS and NCA, refer to the appropriate vendor-specific documentation.

On the PC, you must include the Responder IV Application software (NCA) into the list of applications to start up when the PC boots. To do this, drag the Responder IV application into the appropriate Startup folder. This results in starting up the NCA whenever the PC is booted up.

The NCS Application software (NCA) must maintain a database of WT extensions with corresponding Call IDs. The NCA must also maintain information regarding analog extensions and the digital extensions to which they can connect.

System Startup

Digital stations that are used for a voice path connection must be kept in an off-hook state (whether idle, ringing or active) to allow a 3rd-party answer by the AWOH station. A maximum of nine such stations can be used to meet the demands of NCS call requests.

NOTE:
Consult Rauland-Borg for the appropriate number of digital stations. Two or three digital stations are usually used.

Initially, make the digital station(s) that are used for NCS purposes “off-hook idle” by using one of the following methods:

- Set the *Restrict Last Appearance* field in the Add Station form to **n**. An example of the form appears as follows:

```
add station next                                          Page   2 of  3

                                STATION

FEATURE OPTIONS
           LWC Reception: msa-spe   Auto Select Any Idle Appearance? n
          LWC Activation? y                  Coverage Msg Retrieval? y
            CDR Privacy? n
   Redirect Notification? y                          Data Restriction? n
 Per Button Ring Control? n                Idle Appearance Preference? n
   Bridged Call Alerting? n
  Active Station Ringing: single             Restrict Last Appearance? n

        H.320 Conversion? n
                               Per Station CPN - Send Calling Number?

                                             Audible Message Waiting? n
                                        Display Client Redirection? n
                                      Select Last Used Appearance? n
```

Figure 2-1. Add Station Form

- Administer a “release” feature button, go off-hook, and either press the “release” button or do nothing

Thereafter, call the digital stations from any other station on the switch, answer the call, and then drop the call at the calling party. This results in the digital station going into the off-hook-idle state.

NOTE:
Do not go on hook on the digital stations because this makes the stations go into an on-hook state. In such a case, you must repeat one of the previous methods to put the stations back into the off-hook-idle state.

Once the station is in “off-hook-idle” state, the handset can be disconnected from the station. This prevents any extraneous noise in and around the digital station from being heard by the other parties in the conference.

On the PC, start the PC application software if it is not already running. To check if the TSAPI is running, select **start->programs->TSAPI telephony services->TSAPI telephony services controller**. This opens a dialog box that displays the status. Status “RUNNING” should be displayed. If this is not displayed, manually start the application by selecting the **Start** button.

The Responder IV NCA software is invoked by including it into the list of applications to be invoked upon booting up the PC. To verify this, select **start->programs->Responder IV Lucent Controller->Responder IV Lucent Interface**. This opens the Responder IV Interface R4DEVI01 window (which shows up minimized). Shortly thereafter, the R4WD-Responder IV Wireless window shows up on the screen. This window displays two fields, as follows:

- *Nurse Call Interface Operating*—provides the status of the NCS-to-PC connectivity.
- *Wireless Telephone Interface Operating*—provides the state of PC-to-DWBS connectivity.

Both fields should contain value **yes**.

For details, refer to the “Troubleshooting” chapter in this book.

The Responder IV Unit should place calls from its analog terminal emulators to these digital stations that are in the off-hook-idle state. The digital stations progress to an “off-hook-ringing” state. They alert once for the call and then provide “silent ringing”; that is, the status lamp is flashing for the call, but the alerting stops (since the stations were in the off-hook-idle state when they were called).

Whenever a nurse call is to be placed to a WT, the NCS sends a message (via the NCA and the IWU software) to the TSAPI application on the PC to alert the nurse’s WT. Once the WT answers the call, the NCS sends additional messages to the IWU to establish end-to-end connectivity between the WT and the patient.

When the NCS specifies a particular ringing line for connecting the NCS to a WT, TSAPI initiates an answer by using the 3rd-party-answer feature. The digital station is used as an interim party on the NCS call to facilitate an end-to-end connection between the WT and the patient.

Once the end-to-end connectivity between the patient and the WT is established, the interim station that is used for establishing the connectivity gets dropped, and it goes into the off-hook idle-state. The NCS must then call this station again from the analog terminal emulator (therefore putting the digital station once again in the off-hook-but-ringing state) to allow that digital station to be used for the next NCS call.

Because the duration of NCS calls is expected to be very short, very few dedicated digital stations and analog station extensions are required to provide service to a large number of patients.

Troubleshooting

3

Introduction

NOTE:
The first point of contact for troubleshooting is the Rauland-Borg distributor. Use this guide only when the distributor determines that there is an issue with the DEFINITY ECS.

Also, Lucent Technologies does not support LANs. This is the customer's responsibility.

The PC is the recommended starting point for troubleshooting. This is true because the PC sits in the middle of the components, and it provides a status of each system component. These factors allow you to isolate problems more quickly. On the other hand, attempting to start troubleshooting from either the NCS or DWBS end is not advisable because each of these components does not have a view of the status of the other; instead, each one can view only the link to the PC.

General Procedure

In general, first determine if there is a problem with the integration of the DWBS with the Rauland-Borg NCS or if there is another type of failure that is being reported. For example, a nurse reports not receiving calls from the NCS. Subsequent investigation shows that the nurse's WT is not working. In this case, the problem is not with the nurse call but with the handset.

Also, be sure to make a test call using a WT to determine if the DWBS is operational. If the DWBS is not operational, refer to the DWBS Maintenance document to isolate and resolve the problem.

Checking Components

The goal of troubleshooting is to determine which component or interconnection has the problem and then resolve that problem. Problem isolation often requires that you determine which parts of the connection are problem-free as a prelude to finding where the problem actually resides. Problems can reside in the hardware or software.

The components of the system include the following:

- DEFINITY ECS, including the DWBS and ASAI applications
- Windows NT PC with the Nurse Call Application (NCA) and Interworking Unit (IWU)
- Nurse Call System (NCS)

Troubleshoot the NCS components as follows:

1. Determine if there are any alarms or errors on the DEFINITY ECS and DWBS by issuing the **display alarms** and **display errors** commands. If there are alarms, or if errors are reported, resolve these problems first. Check, in the prescribed order, the corresponding maintenance objects (MOs) for each of the components identified in the following table:

Table 3-1. Maintenance Object Troubleshooting Checklist

Category	Maintenance Objects
DWBS	■ WT-STA (WTs administered for the NCS) ■ CAU (CAUs located in the coverage areas of the NCS) ■ WFB (WFBs located in the coverage areas of the NCS) ■ RC-BD (RC circuit pack in the coverage area) **NOTE**: Refer to the DWBS Maintenance document.
MAPD Circuit Pack	■ ATTE-AJ (Adjunct link between the DEFINITY ECS and the PC/TSAPI) ■ ATTE-PT (Port on the MAPD used for the adjunct link) ■ ASAI-BD (MAPD circuit pack) **NOTE**: Refer to the DEFINITY R7 Maintenance document. For the MAPD, refer to the maintenance chapter in *DEFINITY ECS CallVisor ASAI DEFINITY LAN Gateway over MAPD Installtion, Administration, and Maintenance,* and check information regarding system states, system initialization and shut down flow, and maintenance connections.
Digital stations	■ DIG-LINE (Digital station) ■ DIG-PT (Port used for the digital station) ■ DIG-BD (Digital Line circuit pack) **NOTE**: Refer to the DEFINITY R7 Maintenance document.
Analog lines	■ ANL-LINE (Analog station) ■ ANL-PT (Port used for the analog station) ■ ANL-BD (Analog Line circuit pack **NOTE**: Refer to the DEFINITY R7 Maintenance document.

2. Verify that the NCS is running. Check for alarms and errors.
3. Verify that the PC is running. Log into the PC as “root” and verify the operation.
4. Check the Responder IV application to the nurse call. If the application is running, the following is displayed:

NOTE:
Any of the following PC screens that you check may be running as an icon; in such a case, you must enlarge the icon to view the screen.

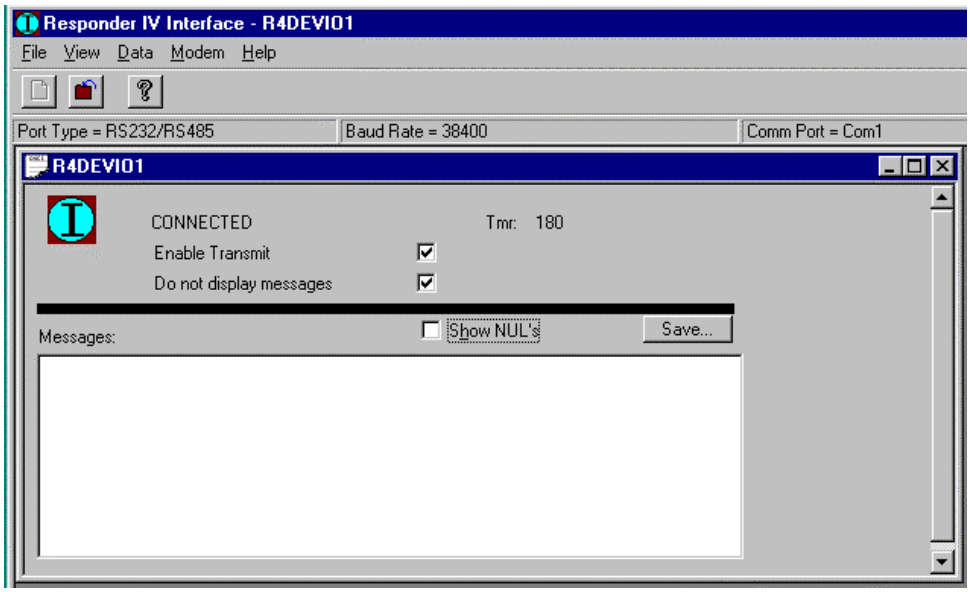


Figure 3-1. Responder IV Application Verification

The following is displayed if the local area network (LAN) connection to the MAPD is not working:

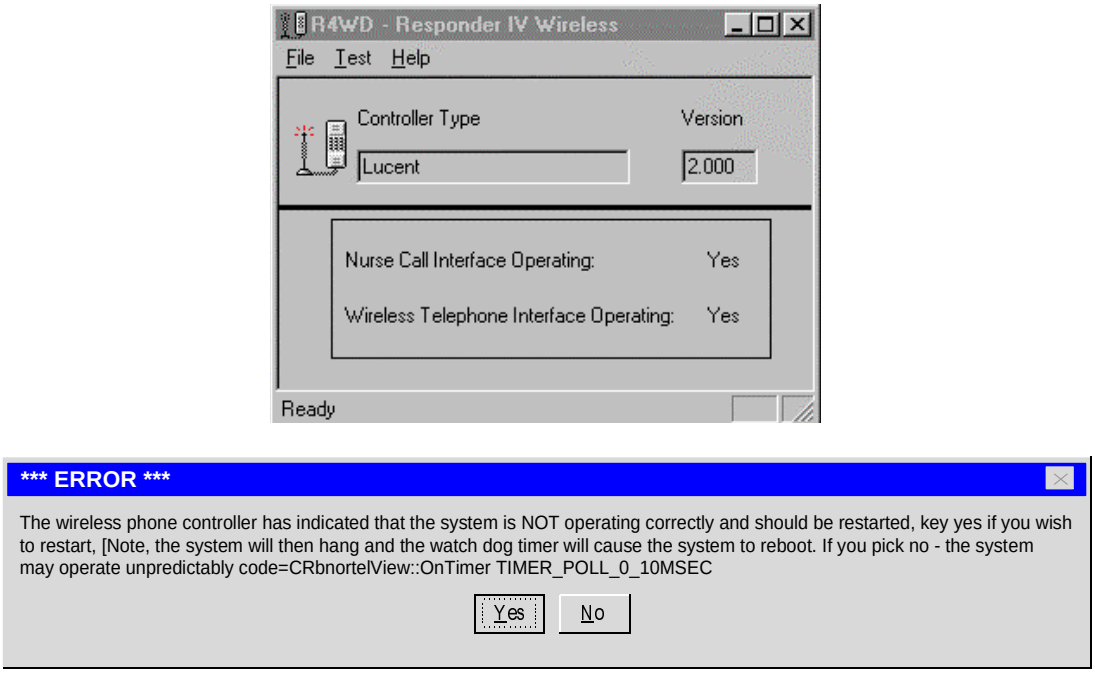


Figure 3-2. LAN-MAPD Connection Error

5. Determine and fix the problem with the LAN. Check the hub and the connections between the PC and MAPD circuit pack. After you fix the LAN connection, restart the application.

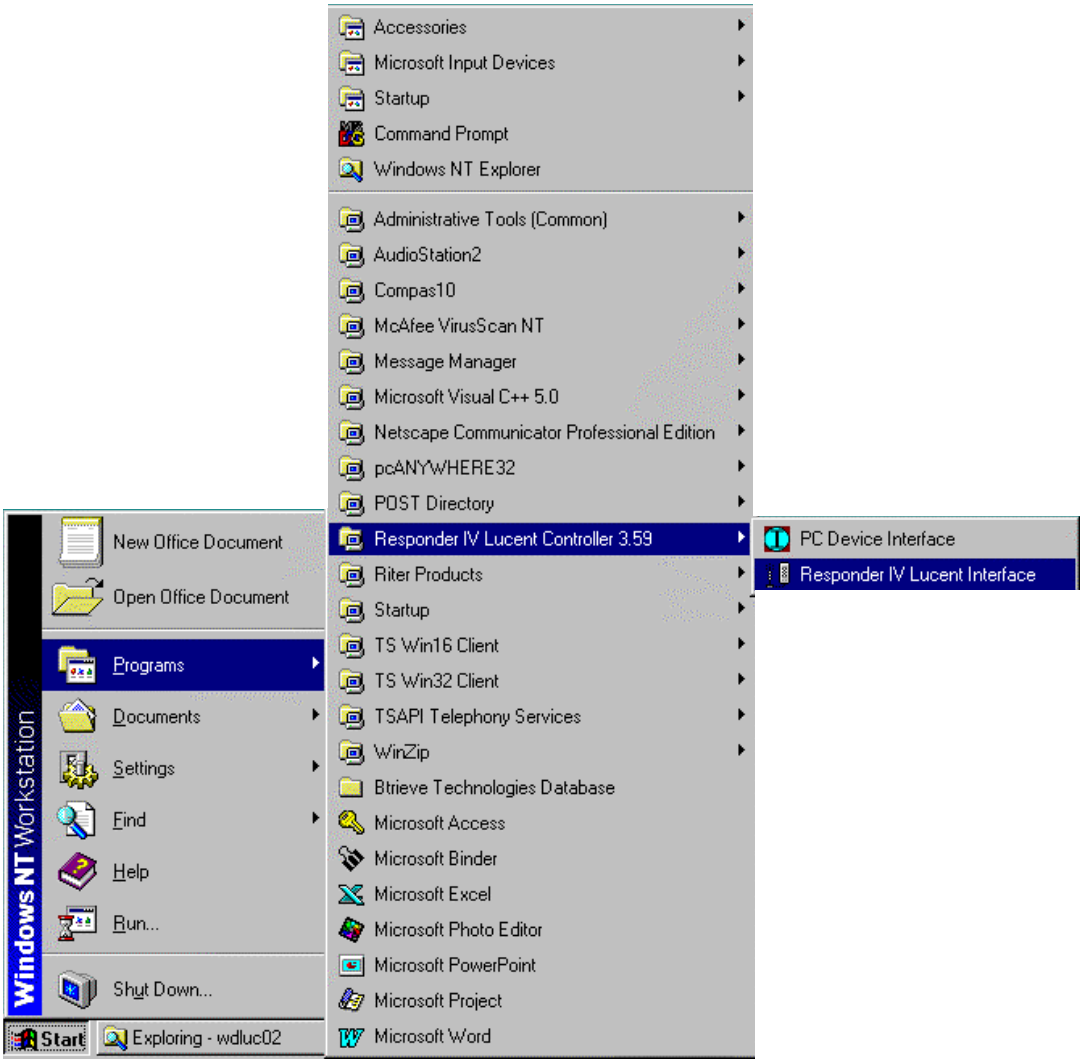


Figure 3-3. Application Restart

6. Check the connection between the PC and the NCS. The connection restores automatically when it is corrected. If the RS-485 connection between the NCS and the PC is disconnected, the following appears:

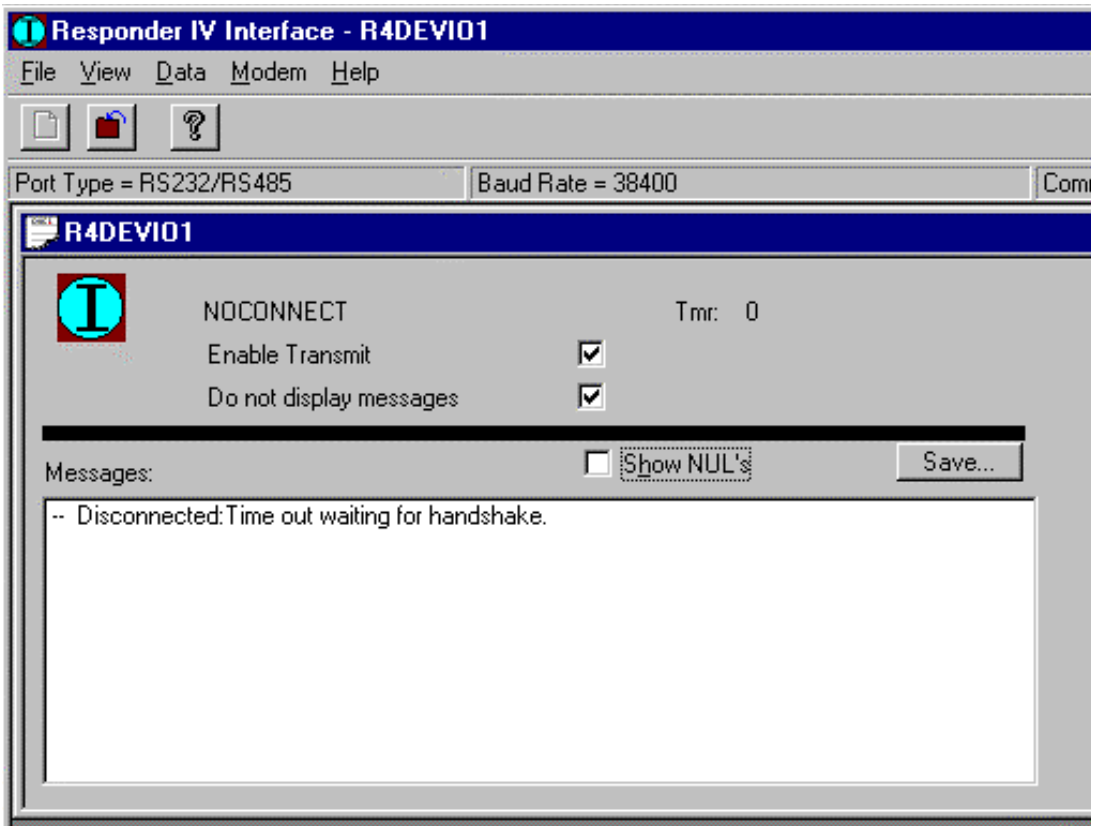


Figure 3-4. Disconnected RS-485 Connection Between the NCS and PC

7. Verify that the DEFINITY ECS applications are working. Check for alarms and errors. If the DEFINITY ECS is operational, verify that the station used for call control and the voice path is operational.

   If any of the components are reporting a problem, correct that problem before proceeding. Once you verify that each component is operating, determine if the interconnection between each component is operational.

   Check the connection between the applications. Look for unplugged cables.

8. Check the connection between the DEFINITY ECS Digital Line circuit pack and the digital voice terminals that are used for call control. These voice terminals must always be off-hook and plugged in. The handset should be removed so that unwanted noise is not heard during transfers. Use the **test station <*extension number*>** command from the MT to verify if these stations are connected. This command brings up the Test Results report.

   The following report indicates a digital voice terminal that is working:

```
test station 31001

                              TEST RESULTS

Port     Maintenance Name Alt. Name  Test No.    Result     Error Code

01A0401  DIG-LINE         31001      16          PASS
01A0401  DIG-LINE         31001      17          PASS
```

Figure 3-5. Tests Results Report (For Working Digital Voice Terminal)

The following report indicates a disconnected digital voice terminal.

```
test station 31001

                              TEST RESULTS

Port     Maintenance Name  Alt. Name  Test No.     Result      Error Code

01A0401  DIG-LINE          31001      16           PASS
01A0401  DIG-LINE          31001      17           ABORT       2
```

Figure 3-6. Tests Results Report (For Disconnected Digital Voice Terminal)

9. Check the connection between the Analog Line circuit pack and the analog terminal emulators (TLIs). Use the **test station <*extension number*>** command from the MT to verify if these stations are connected.

   The following report indicates an analog line that is working.

```
test station 32004

                              TEST RESULTS

Port     Maintenance Name Alt. Name  Test No.   Result      Error Code

01A0201  ANL-LINE         32004      35         PASS
01A0201  ANL-LINE         32004      48         PASS
01A0201  ANL-LINE         32004      36         PASS
```

Figure 3-7. Test Results Report (For Working Analog Line)

The following report indicates a disconnected analog line.

```
test station 32004

                              TEST RESULTS

Port     Maintenance Name Alt. Name Test No. Result      Error Code

01A0201  ANL-LINE         32004     35       PASS
01A0201  ANL-LINE         32004     48       FAIL
01A0201  ANL-LINE         32004     36       PASS
```

Figure 3-8. Test Results Report (For Disconnected Analog Line)

10. Check the connection between the PC and the DEFINITY ECS. For the MAPD connection, use the **status bri-port *PPCSScc*** command to verify if this connection is working. This brings up the Status BRI-Port report. Check the cable between the hub and the MAPD circuit pack and between the hub and the PC.

    The following report indicates a connected MAPD.

```
status bri-port 1A0701

                          STATUS BRI-PORT

             Port: 01A0701                        Version: 3
    Service State: in-service
Maintenance Busy?: no
    Layer 1 State: activated

       TEI Value   Layer 2 State   Endpt Extension  Endpt SPID  Service SPID?

Link 1    1        13-established        33331

Link2

Link3
```

Figure 3-9. Status BRI-Port Report (For Connected MAPD)

The following report indicates a disconnected MAPD.

```
status bri-port 1A0701

                              STATUS BRI-PORT

             Port: 01A0701                          Version:
    Service State: in-service
Maintenance Busy?: no
    Layer 1 State: activated

       TEI Value   Layer 2 State  Endpt Extension  Endpt SPID  Service SPID?

Link1

Link2

Link3
```

Figure 3-10. Status BRI-Port Report (For Disconnected MAPD)

11. Run the **test board PPCSS** command on the MAPD that is being used for NCS, and verify that there are no problems reported with either the MAPD or the packet bus on the system.

    If the system is functioning, the following output appears:

```
test board 2e20                                                Page 1

                              TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result    Error Code

  02E20     ASAI-BD                     52       PASS
  02E2001   ATTE-PT                     620      ABORT     1005
  02E2001   ATTE-PT                     621      PASS
  02E2001   ATTE-PT                     622      FAIL      1
  02E2001   ATTE-PT                     270      PASS
  02E2001   ATTE-AJ           5810      626      PASS
  02E2001   ATTE-AJ           5810      628      ABORT     1005
```

Figure 3-11. Test Results Report (For Functioning System)

If any test other than the ones listed in this report aborts or fails, follow the maintenance procedure for the associated maintenance object (MO) in DEFINITY Maintenance documentation. If test 626 aborts with error code 1139, 1141 or 1144, the packet bus is out of service; in such a case, follow the maintenance procedures for the associated MO.

12. Databases are maintained on each component to make the system work. Verify that the translations are correct for each component. Use the **list history** command on the MT to show the changes that were made to the DEFINITY ECS translations. Check if any of the NCA translations changed; such changes may be causing the problem.

13. Check the IWU error logs by accessing the following path:

    C:/Program Files/Telephony Services/tsrv/logfiles/errlog.txt

    NOTE:
    The “errlog.txt” file cannot be downloaded directly. To download the file, first copy it to a temporary directory and then download it.

    The IWU resides in the middle of the application.

    IWU errors are in the TSAPI error log, which is accessed via the previously indicated path. A sample portion of the error log follows:

```
Telephony Services Error Log Wrapped Around: 05/24/99 11:38:22
5/29/99 09:47:05 IWU 4 465 ERROR: WT is BUSY invokeID = 3
5/27/99 15:53:25 IWU 4 465 ERROR: WT is BUSY invokeID = 1
```

    The TSAPI logs an event that is caused by any of the conditions provided in the following table.

NOTE:
The same event ("WT is busy") is logged each time any of the following conditions occur.

Table 3-2. IWU Error Conditions and Corrective Actions

Conditions	Corrective Actions
WT out of the system	Issue the **status station** command to verify that the WT was in the system. There is no corrective action if the user left the coverage area. If the user is in the coverage area, determine the reason for not receiving calls.
WT is busy	Issue the **status station** command to determine the reason for the busy indication.
No Network Processing Element (NPE) ports available	All RC circuit pack channels are in use. Issue the **list measurements cell performance** command to determine the cell traffic, and reengineer if necessary.
Service outage (RC, WFB, CAU)	Issue the **display errors *wireless*** command to determine the DWBS problem, and then correct the problem.
ASAI link outage	Issue the **display errors *asai*** command to determine the problem, and then correct the problem.
Place call time-out (No TLI ports)	Issue the **list measurements cell performance** command to determine if the problem is traffic related or the ports are out of service. For a traffic-related problem, more TLIs may be needed; if the ports are out of service, determine the problem and correct it. Determine if more TLIs are required to provide an acceptable level of service.
Analog lines busied out	Issue the **display errors** command to determine the reason for the busy indication, and then correct the busy indication.
Call appearances are taken by non-NCS calls	This is traffic related; check with the NCS users.
Invalid NCA parameters	Check the translations, and ensure that the parameters for NCS, TSAPI, and the DEFINITY ECS match.

NOTE:
For further information concerning turning on more diagnostics tracing, refer to the Telephony Services Troubleshooting guide.

Glossary

A

Adjunct/Switch Application Interface
Interface that allows non-DEFINITY switch applications to be connected to and function behind a DEFINITY switch.

Administration Without Hardware
Multifunction station extensions that are administered on the MT, but without actual hardware. These stations are used by ASAI as a third-party call control mechanism to place calls to the nurses' WTs and connect the calls to the NCS.

ASAI
See *Adjunct/Switch Application Interface*.

AWOH
See *Administration Without Hardware*.

C

CAU
See *Cell Antenna Unit*.

Cell Antenna Unit (CAU)
Remote antenna that connects to a Wireless Fixed Base. It contains a transmit power amplifier, transmit/receive switch, low-noise receive amplifier, and antenna.

I

Interworking Unit
PC software that provides the interface between the NCA software and the TSAPI application software.

IWU
See *Interworking Unit*.

N

NCA
See *Nurse Call Application*.

NCS
See *Nurse Call Syste*m.

NCTLI/TLI
Rauland-Borg's model NCTLI Telephone Line Interface module that provides connection for three analog lines. A maximum of three such modules can be installed in an NCS; this allows for support of a maximum of nine analog lines for audio connectivity. Also referred to as "TLI."

Nurse Call Application
PC software that provides an interface to the NCS.

Nurse Call Integration
Setup that includes the following components: NCS integrated with the DWBS, PC, IWU software, MAPD circuit pack, LAN, and ASAI.

Nurse Call System
Rauland-Borg product that is connected to the DWBS through an analog line side interface to provide audio connectivity. The data link and the signaling link are provided through the ASAI interface via the TSAPI PC application.

R

Radio Controller
Circuit pack that provides the interface between the DEFINITY system and the radio subsystem. It controls one or more Wireless Fixed Bases.

RC
See *Radio Controller*.

T

Telephony Services Application Programming Interface
Windows NT-based adjunct programming interface to the DEFINITY system.

Terminal Line Interface
Provides analog line-side interface to the NCS for audio connection. TLIs are administered as analog stations on the switch. (See also *NCTLI/TLI*.)

TLI
See *Terminal Line Interface*.

TSAPI
See *Telephony Services Application Programming Interface*.

W

WFB
See *Wireless Fixed Base*.

Wireless Fixed Base
Component that houses the fixed radio hardware. It provides the radio functions to transmit digitally to the WTs and to receive digital signals from the WTs. A WFB can support a maximum of four external Cell Antenna Units.

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Nurse Call Integration of the DWBS
and the Rauland-Borg Responder IV System
555-232-501, Issue 1, Comcode 108484049, September 1999

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