Lucent Technologies
Bell Labs Innovations

DEFINITY®
Enterprise Communications Server (ECS),
GuestWorks™ *server*,
and System 75 PBX

Property Management System

Interface Specifications

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About This Document

This document describes the Property Management System (PMS) data link interface for the DEFINITY® Enterprise Communications Server (ECS), the GuestWorks™ *server*, and the System 75 PBX. This interface allows a PMS to provide front office and back office hotel/motel management features with communications-related functions coordinated with the switch. Although this document is written for the hotel/motel environment, its specifications may also apply to hospitals and other extended-care facilities.

A PMS usually consists of a computer with one or more data terminals used to input data related to a guest's stay at the property. A PMS terminal provides an efficient way for hotel staff to check guests in and out of the hotel, move guest check-in information from one room to another, control long distance calling access for a guest room, view long distance billing charges as prescribed by a call accounting adjunct, and control other information related to the guest. Information concerning housekeeper-dialed status changes, Controlled Restrictions, and Message Waiting can also be obtained from the switch and sent to the PMS. The switch receives check-in and check-out messages and guest information changes from the PMS, and can also receive Controlled Restriction and Message Waiting data from the PMS as necessary.

Intended Audience

The primary audience for this specification is PMS vendors who wish to create PMS products that interface to Lucent Technologies equipment. A secondary audience is installation and support personnel.

Reasons for Reissue

This document replaces the *System 75 and DEFINITY Generic 1 Property Management System Interface Specification* (555-200-925). Changes in this release include the following:

- New information about DEFINITY Generic 3 interface specifications

- New information about the ASCII protocol mode found in DEFINITY ECS Release 5.4 and the GuestWorks *server*

- New information about voice mail passwords and voice mail languages.

- General updating and corrections.

> ⇒ **NOTE:**
> Property management systems that currently interface to Lucent Technologies switches will continue to operate even if the Lucent Technologies switch is upgraded to a DEFINITY ECS Release 5.4 or to a GuestWorks *server*. The existing PMS interfaces have not been changed, only extended with the ASCII mode.

Conventions

The following conventions are used in this document:

- The term "switch" is used to refer to the DEFINITY ECS, the GuestWorks *server*, and the System 75 PBX.

- Specifications that are supported only on the GuestWorks *server* are identified by "GW."

- Specifications that are supported only on the DEFINITY ECS Release 5.4 are identified by "R5."

- The designation "0x" in numbers such as "0x02" and "0xf" represents the term "hexadecimal." For these two examples, you should read them as "hex 02" and "hex f."

■ This interface supports three modes of hospitality data: Normal Mode, Transparent Mode, and ASCII Mode. The switches that support each mode are as follows:

Switch Release	Mode		
	Normal	**Transparent**	**ASCII**
System 75, R1V3	Yes	No	No
DEFINITY Generic 1	Yes	Yes	No
DEFINITY Generic 3 Versions 1-4	Yes	Yes	No
DEFINITY ECS Release 5.4	Yes	Yes	Yes
GuestWorks *server*	Yes	Yes	Yes

The normal mode gives you standard functionality; everything in that mode is also supported in the transparent mode and the ASCII mode. The transparent mode feature codes are highlighted throughout this document using **(T)**, which will precede the item that pertains to transparent mode only. Feature codes and specifications that support only the transparent ASCII mode are highlighted throughout this document using **(A)**.

■ Administration command paths and options you enter in the administration fields are shown as follows:

change system hospitality-parameters

■ Field names referring to the administration screens are shown as follows:

`Queue Length`

Product Support

To receive support concerning this specification, call 1-800-242-2121. Outside the continental United States, contact your local Lucent Technologies authorized representative.

Related Documents

- 555-200-104 — *System 75 Installation and Test*

- 555-200-652 — *System 75 Implementation*

- 555-204-104 — *DEFINITY® G1 Installation and Test*

- 555-204-654 — *DEFINITY® G1 Implementation*

- 555-230-302 — *DEFINITY® Release 5 Implementation*

- 555-230-303 — *DEFINITY® Release 5 Implementation Blank Forms*

- 555-230-655 — *DEFINITY® G3V4 Implementation*

- 555-230-655B — *DEFINITY® G3V4 Implementation Blank Forms*

- 555-230-723 — *DEFINITY® Hospitality Operations*

- 555-230-894 — *DEFINITY® Release 5 Installation for Single-Carrier Cabinets*

- 555-231-105 — *GuestWorks™ server Issue 3.0 Technicians Handbook*

- 555-231-207 — *GuestWorks™ server Issue 3.0 Feature Descriptions*

- 555-231-741 — *GuestWorks™ server Issue 3.0 Hospitality Operations*

- 555-231-801 — *DEFINITY® Business Communications System and GuestWorks™ server Issue 3.0 Documents* (CD)

- 585-310-234 — *INTUITY™ Lodging Property Management System Interface Specifications*

System Description

Link Interface

The PMS Interface is a full duplex EIA RS232C-D asynchronous data link that operates under specific message protocols and formats. The characteristics of the link, the protocols used, and the message text are described in detail in the "Feature Description" starting on Page 21. Figure 1 shows the various ways a switch can link to a PMS.

Switch · PMS

Data Module

Digital Line — DCP — 8400B/7400A — RS232 —

Data Link Using Digital Line

Switch · PMS

Asynchronous Data Unit

Data Line — EIA — Z3A — RS232 —

Data Link Using Data Line
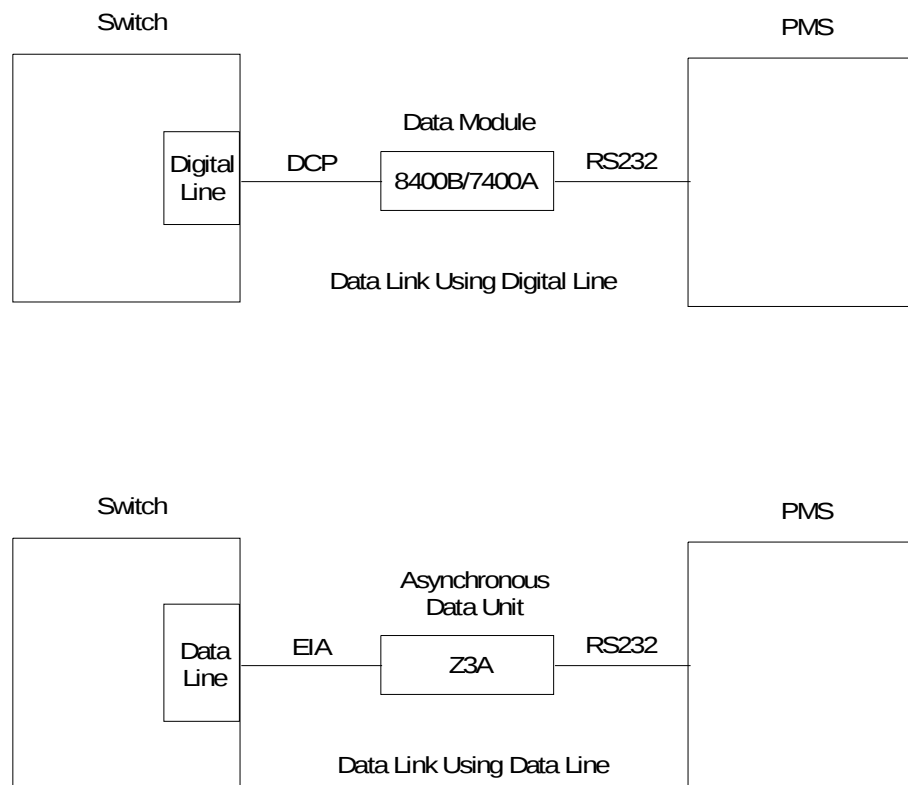
Figure 1.   Switch-to-PMS Connectivity

The PMS Interface feature permits a co-located PMS to request more sophisticated room status functions via the switch and communication of housekeeper status changes from the switch. In addition, the PMS may perform guest folio preparation and perform sophisticated message waiting and room station restriction functions utilizing the switch control capabilities. The PMS can communicate with the switch by sending and receiving specific messages associated with the functions to be performed.

The PMS can receive the following from the switch:

- Housekeeper-dialed status changes from room and designated stations.

- Telephone restriction status changes entered on voice terminals (Controlled Restrictions).

- Message waiting lamp changes entered on voice terminals and changes in Message Waiting status.

- Status inquiry and room data image messages indicating failures, requests for database updates, requests or confirmation of impending link release for maintenance, and normal link operations.

- (T) (A) Guest name, names registration, and coverage path number via room data image.

The PMS can send the following to the switch:

- Room check-in and check-out messages. Check-in/check-out messages are required to support the data link since the PMS controls room status. (T) (A) Check-in messages may be sent with or without guest name information. Check-ins may also include (T) (A) the coverage path number which correlates to the destination of an unanswered call to a guest's room (for example, hotel attendant, voice mail, etc), (A) the guest's language interface attribute, and (A) the guest's voice messaging password.

- (T) (A) Guest Information Input/Change messages. Allows input or changes in guest information after check-in [guest name, coverage path, (A) language interface attribute, and (A) voice messaging password].

- Room change or room swap messages specifying the "from" and "to" Room Station Numbers (RSN). These messages are required to support the data link so that the switch will always reflect the most current guest room status information.

- Telephone restriction changes entered on PMS terminals.

- Message waiting lamp changes entered on PMS terminals.

- (A) Text or FAX notations entered on a PMS terminal.

- Status inquiry and room data image messages indicating failures, requests for database updates, requests or confirmation of impending link release for maintenance, and normal link operations.

The messages to be sent and received depend on the functions required for the particular application. This is discussed in detail in "Administration Options" starting on Page 7. The specific actions taken by the switch for each of the messages is discussed in "Feature Codes, Process Codes, and Operations" starting on Page 53.

Administration Options

This section shows the switch administration screens used to administer the PMS Interface options and a description of those options. Screens are shown for the System 75 R1V3, the GuestWorks server Phases 1 and 2, and the GuestWorks server Phase 3 and DEFINITY ECS Release 5.4. Please note that the command paths and the layout of the screens are different for different releases and phases. For example, the command path to these screens for GuestWorks Phases 1 and 2 is **change system hospitality-parameters**; the command path for the System 75, the DEFINITY Generic 1, and the DEFINITY ECS is **change system-parameters hospitality**.

> **NOTE:**
> The screens and options described here may differ slightly depending on the switch being used. Refer to the administration or implementation documents provided with your switch to verify which options you must administer.

System 75 R1V3 Administration Screens

The following screens are examples of the System 75 R1V3 PBX:

```
change system-parameters hospitality                          Page   1 of 2
                        HOSPITALITY

                                         PMS: yes
                   Message Waiting Configuration: act-nopms
               Control Restrictions Configuration: act-pms
           Housekeeper Information Configuration: act-pms
                 Number of Housekeeper ID Digits: 0
                     Extension of PMS Log Printer:
           Extension of Journal/Schedule Printer:
           Client Room Coverage Path Configuration: act-nopms
           Default Coverage Path for Client Rooms: 1

                          PMS LINK PARAMETERS
                             Extension of PMS: 7899
                          PMS Protocol Mode: normal
             Seconds before PMS Link Idle Timeout: 20
Milliseconds before PMS Link Acknowledgement Timeout: 500
                 PMS Link Maximum Retransmissions: 5
         PMS Link Maximum Retransmission Requests: 5
```

```
change system-parameters hospitality                          Page   2 of  2
                        HOSPITALITY

                 Time of Scheduled Wakeup Activity Report:
                  Time of Scheduled Wakeup Summary Report:
        Time of Scheduled Emergency Access Summary Report:

                                        Announcement Type: voice-synthesis
                                        Announcement Ports:

        Length of Time to Remain Connected to Announcement: 30
            Extension to Receive Failed Wakeup LWC Messages: 399
            Routing Extension on Unavailable Voice Synthesis:
```

GuestWorks *server* Phases 1 and 2
Administration Screens

The following screens are examples of the GuestWorks *server* Phases 1 and 2 (Issue 2.0 and Issue 3.0):

```
change system hospitality-parameters                       Page   1 of   3
                         HOSPITALITY

                    Message Waiting Configuration: act-nopms
              Controlled Restrictions Configuration: act-pms
              Housekeeper Information Configuration: act-pms
                     Number of Housekeeper ID Digits: 0
                           Extension of PMS Log Printer:
                Extension of Journal/Schedule Printer:
            Client Room Coverage Path Configuration: act-nopms
                Default Coverage Path for Client Rooms: 1
                Forward PMS Messages to Intuity Lodging? y

                          PMS LINK PARAMETERS
                                Extension of PMS: 7899
                             PMS Protocol Mode: transparent ASCII mode? y
              Seconds before PMS Link Idle Timeout: 20
Milliseconds before PMS Link Acknowledgement Timeout: 500
                   PMS Link Maximum Retransmissions: 5
          PMS Link Maximum Retransmission Requests: 5
                    Take Down Link for Lost Messages? y
```

```
change system hospitality-parameters                       Page   2 of   3
                         HOSPITALITY


                    Time of Scheduled Wakeup Activity Report:
                     Time of Scheduled Wakeup Summary Report:
            Time of Scheduled Emergency Access Summary Report:


                                        Announcement Type: mult-integ
                        Default Announcement Extension: 380

      Length of Time to Remain Connected to Announcement: 30
         Extension to Receive Failed Wakeup LWC Messages: 399
         Routing Extension on Unavailable Voice Synthesis:
                  Display Room Information in Call Display? n

                            Number of Digits from PMS:
                                  PMS Sends Prefix? n
                   Number of Digits in PMS Coverage Path: 3
                              Digit to Insert/Delete:
```

```
change system hospitality-parameters                    Page    3 of   3
                         HOSPITALITY

Definition for Rooms in State 1: Occupied/Dirty
Definition for Rooms in State 2: Occupied/Maid in Room
Definition for Rooms in State 3: Occupied/Clean
Definition for Rooms in State 4: Vacant/Clean
Definition for Rooms in State 5:
Definition for Rooms in State 6:
```

GuestWorks *server* Issue 3.0 and DEFINITY ECS Release 5 Administration Screens

The following screens are examples of the GuestWorks *server* Issue 3.0 and the DEFINITY ECS Release 5.4:

```
change system-parameters hospitality                    Page   1 of   3
                         HOSPITALITY

                   Message Waiting Configuration: act-nopms
             Controlled Restrictions Configuration: act-pms
             Housekeeper Information Configuration: act-pms
                   Number of Housekeeper ID Digits: 0
                       Extension of PMS Log Printer:
               Extension of Journal/Schedule Printer:
            Client Room Coverage Path Configuration: act-nopms
               Default Coverage Path for Client Rooms: 1
               Forward PMS Messages to Intuity Lodging? y

                         PMS LINK PARAMETERS
                              Extension of PMS: 7899
                              PMS Protocol Mode: transparent ASCII mode? y
               Seconds before PMS Link Idle Timeout: 20
Milliseconds before PMS Link Acknowledgement Timeout: 500
                  PMS Link Maximum Retransmissions: 5
           PMS Link Maximum Retransmission Requests: 5
                  Take Down Link for Lost Messages? y
```

```
change system-parameters hospitality                      Page   2 of   3
                        HOSPITALITY


               Time of Scheduled Wakeup Activity Report:
                Time of Scheduled Wakeup Summary Report:
          Time of Scheduled Emergency Access Summary Report:

                                        Announcement Type: silence


         Length of Time to Remain Connected to Announcement: 30
            Extension to Receive Failed Wakeup LWC Messages: 399
            Routing Extension on Unavailable Voice Synthesis:
                     Display Room Information in Call Display? n

                                  Number of Digits from PMS:
                                         PMS Sends Prefix? n
                      Number of Digits in PMS Coverage Path: 3
                                      Digit to Insert/Delete:
```

```
change system-parameters hospitality                      Page   3 of   3
                        HOSPITALITY

Definition for Rooms in State 1: Occupied/Dirty
Definition for Rooms in State 2: Occupied/Maid in Room
Definition for Rooms in State 3: Occupied/Clean
Definition for Rooms in State 4: Vacant/Clean
Definition for Rooms in State 5:
Definition for Rooms in State 6:
```

Administration Options

The following sections describe the administration options available for each release. The options are grouped as they are located on each page of the administration screens.

⇒ **NOTE:**
Not all administration options are available for each release. Remember that items preceeded with (T) apply only to transparent mode and items preceeded with (A) apply only to ASCII mode.

Administration Options on Page 1

■ **PMS** - This option is found only on System 75 PBX. Enter **y** to enable the PMS and **n** to disable the PMS.

■ **Message Waiting Configuration** - This indicates whether message waiting notification requests and changes are being exchanged between the server and the PMS. Allowable entries are **act-nopms**[*] or **act-pms**. The option **act-nopms** indicates that message waiting is operational on the server but message waiting information is not being transmitted between the PMS and server. The option **act-pms** indicates that message waiting is active on the server and information between the PMS and server is being transmitted. The default is **act-nopms**.

■ **Controlled Restrictions Configuration** - This indicates whether controlled restriction information is being exchanged between the server and the PMS. If active (**act-pms**), the server and the PMS exchange and accept controlled restriction information. Allowable entries are **act-nopms**[*] and **act-pms**. The default is **act-nopms**.

■ **Housekeeper Information Configuration** - This indicates whether housekeeper information is being exchanged between the server and the PMS. If active (**act-pms**), the server and PMS exchange and accept housekeeper information. Allowable entries are **act-nopms**[*] or **act-pms**. The default is **act-nopms**.

■ **Number of Housekeeper ID Digits** - This is the number of digits (**0** to **6**) that the housekeeper must dial for identification. The default is **0**.

■ **Extension of PMS Log Printer** - This is a valid data extension number (cannot be a VDN extension) that is assigned to the data module connected to the PMS/Log printer. This extension is dialed by the server to send housekeeping and PMS events to the printer.

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[*] If **act-nopms**, the message is acknowledged (MESSAGE ACK), but no action is taken.

- **Extension of Journal/Schedule Printer** - This is a valid data extension number (cannot be a VDN extension) that is assigned to the data module connected to the Journal/Schedule printer. This extension can be the same as the PMS/Log printer and both sets of reports may be printed on the same printer. This extension is dialed by the server to send journal information or schedule reports to the printer.

- **(T) (A) Client Room Coverage Path Configuration** - This indicates whether the server and the PMS exchange coverage path information for guest stations. If active (**act-pms**), the server and PMS exchange and accept coverage path information. Allowable entries are **act-nopms**[*] or **act-pms**. This field does not apply to normal mode. When upgrading from a release that does not support this feature, the field is set to **act-pms** if the PMS protocol mode is administered for transparent or ASCII mode. The default is **act-nopms**.

- **(T) (A) Default Coverage Path for Client Rooms** - This indicates the coverage path assigned when the server receives a check-out message for a valid extension or a new check-in. This applies only to stations with a "client room" class of service in the "occupied" mode. This field does not apply to normal mode; it is used only for transparent or ASCII mode. The value in this field is also used during a translation save as the coverage path for each station with "client room" class of service.

- **(T) (A) Forward PMS Message to Intuity Lodging** - This indicates whether the PMS-to-INTUITY™ messages will be sent through the server (**y**) or directly to the Lucent INTUITY Lodging system (**n**). This field does not apply to normal mode; it is used only in transparent or ASCII mode.

- **Extension of PMS** - This indicates the data extension number (cannot be a VDN extension) the server must dial to access PMS. When this extension is entered and PMS is ready, the server brings up the link.

- **PMS Protocol Mode** - This indicates the message protocol mode used between the server and PMS. Allowable entries are **normal** and **transparent**. The default is **normal**.

- **(A) ASCII mode** - This indicates whether the ASCII-only mode is being used for the PMS message set. The PMS Protocol Mode field must be set to **transparent**. This field does not apply to normal mode. The default is **n**.

- **Seconds Before PMS Link Idle Timeout** - This indicates the idle time in seconds (**5** to **20**) that the server waits for an acknowledgment from the PMS before the server enters link failure mode from the PMS transmission link. The default is **10**.

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[*]   If **act-nopms**, the message is acknowledged (MESSAGE ACK), but no action is taken.

■ **Milliseconds Before PMS Link Acknowledgement Timeout** - This indicates the time in milliseconds (**100** to **1500**) that the server waits for an acknowledgment from the PMS indicating it correctly received a message. This regulates how quickly the server responds to a message from the PMS (also known as "pacing timing"). This value is also used as the "inquiry message" (ENQ) timeout value. In most cases, keep this value as short as possible. The default is **150**. The possible values are as follows:

— 100-300 ms (normal mode)

— 100-500 ms (transparent mode)

— 100-20000 ms (GW) (transparent and ASCII mode only)

— 100-1500 ms (R5) (transparent and ASCII mode only).

■ **PMS Link Maximum Retransmissions** - This indicates the number of times (**1** to **5**) that the server will retransmit a message to the PMS in response to a negative acknowledgment or send an inquiry for acknowledgment from the PMS before giving up on the message. The default is **3**.

■ **PMS Link Maximum Retransmission Requests** - This indicates the number of times (**1** to **5**) that the server will allow the PMS to request acknowledgment for a message that it sent. The default is **3**.

■ **Take Down Link for Lost Messages** - This indicates whether the link will be taken down if messages are being lost. Enter **y** to cause the PMS link to come down; enter **n** to keep the link operating. Careful monitoring of the PMS error log is recommended when using this option. The default is **y**.

Administration Options on Page 2

⚠ CAUTION:
*Do not set the time for the following reports to coincide when the server does its scheduled maintenance tests (usually at 1 a.m.). See the **change system-parameters maintenance** screen to verify the time and coordinate this administration so the times do not overlap.*

■ **Time of Scheduled Wakeup Activity Report** - This indicates the time of day that the Wakeup Activity Report will be printed on the Journal/Schedule Printer. This report summarizes the wakeup activity for each extension that had wakeup activity for the past 24 hours. Enter the time **hh:mm:am/pm** where hh=hour, mm=minute, am/pm=A.M. or P.M.

- **Time of Scheduled Wakeup Summary Report** - This indicates the time of day that the Wakeup Summary Report will be printed on the Journal/ Schedule printer. This report gives an hour-by-hour summary of the number of scheduled wakeup calls and a list of extensions to which wakeup calls were attempted but did not complete during the hour. Enter the time **hh:mm:am/pm** where hh=hour, mm=minute, am/pm=A.M. or P.M.

- **Time of Scheduled Emergency Access Summary Report** - This indicates the time of day that the Emergency Access Summary Report will be printed on the Journal/Schedule printer. The time is represented by **hh:mm:am/pm** where hh=hour, mm=minute, and am/pm=A.M. or P.M.

- **Announcement Type** - This indicates the type of automatic wakeup announcement the hotel guest will receive. Allowable entries are as follows:

    — external (applicable when using an announcement adjunct)

    — integrated (applicable when using the TN750B or TN750C announcement circuit pack)

    — mult-integ (multi-integrated; applicable when using the TN750B or TN750C announcement circuit pack)

    — music-on-hold

    — silence (default)

    — voice-synthesis

  If **external** is used, complete the **Auxiliary Board for Announcement** field.

  If **integrated** is used, complete the **Integrated Announcement Extension** field. If **mult-integ** is used, complete the **Default Announcement Extension** field. For **integrated** and **mult-integ**, the extension you enter must be a valid integrated announcement extension (administered on the Recorded Announcements form) or a VDN. If you enter an invalid extension, the server displays an error message.

  If **voice-synthesis** is used, complete the **Announcement Ports** field.

- **Auxiliary Board for Announcement** - This field displays only when the **external** announcement type is used. This indicates the equipment location of an auxiliary trunk circuit that connects to the external announcement equipment.

- **Integrated Announcement Extension** - This field displays only when the **integrated** announcement type is used. This indicates the default wakeup announcement extension when using the integrated announcement circuit pack. Note that an attendant can identify another announcement extension for any specific wakeup call. This extension and all other extensions used for Automatic Wakeup must be administered on the Recorded Announcement form.

- **Default Announcement Extension** - This field displays only when the **mult-integ** announcement type is used. This indicates the default wakeup announcement extension when using the integrated announcement circuit pack. This extension and all other extensions used for Automatic Wakeup must be administered on the Recorded Announcement form.

- **Announcement Ports** - This field displays only when the **voice-synthesis** announcement type is used. For the **voice-synthesis** announcement type, this indicates the equipment location of two ports on the voice synthesizer circuit pack (TN725B). Any two of the four ports can be assigned.

- **Length of Time to Remain Connected to Announcement** - Enter the length of time in seconds (**0** to **300**) that a hotel guest will be connected to an announcement. This applies only after the guest has heard the announcement completely one time, but continues to listen for a second time. The default is **30**.

- **Extension to Receive Failed Wakeup LWC Messages** - This indicates where unsuccessful wakeup LWC messages will be stored. This is usually administered to an unassigned extension (cannot be a VDN extension) or to the attendant (attd). In addition, a LWC lamp for that extension is usually assigned to the attendant console as an indication of failed wakeup calls. The default is blank.

- **Routing Extension on Unavailable Voice Synthesis** - This indicates where a wakeup call will go to if both wakeup announcements on the Speech Synthesizer circuit pack are not available. This is usually adminis-tered to an unassigned extension (cannot be a VDN extension) or to the attendant (attd). The default is blank.

- **Display Room Information in Call Display** - This indicates the type of guest room information displayed on voice terminal displays. If this field is set to **n**, the voice terminals will display the name and extension number. If this field is set to **y**, the voice terminals will display the name and room number. The extension number and room number are not always the same number. The default is **n**.

- **Number of Digits from PMS** - This indicates the number of digits being sent from the PMS to the server to identify room numbers. If using mixed numbering in the server, leave this field blank. When using normal mode, digits **1** through **4** are valid. When using transparent or ASCII mode, digits **1** through **5** are valid. The default is blank.

  > **NOTE:**
  > If the **Number of Digits from PMS** field is blank and the **PMS Sends Prefix** field is set to **n**, the server will not support an extension that starts with 0.

■ **PMS Sends Prefix** - This indicates if the PMS sends a prefix digit to the server as part of the room numbering plan. This field can be set to **y** or **n**. The default is **n**.

> ⟹ **NOTE:**
> If the **PMS Sends Prefix** field is set to **n** and the **Number of Digits from PMS** field is blank, the server will not support an extension that starts with 0.

■ **Number of Digits in PMS Coverage Path** - This indicates whether the coverage paths are **3** or **4** digits long. This value depends on the type of switch; use the following table to determine the possible values.

Switch Type	Coverage Path Number Range	Digits in Coverage Path
System 75 and DEFINITY Generic 1	0-600	3
DEFINITY Versions 1-4 and DEFINITY ECS Release 5 (s,vs)	0-150	3
DEFINITY Versions 1-4 and DEFINITY ECS Release 5 (i)	0-600	3
DEFINITY Versions 1-4 and DEFINITY ECS Release 5	0-7500	4
GuestWorks *server*	0-400	3

Depending on the number of digits in the coverage path (CP1, CP2, CP3, and CP4), leading digits in the paths must be padded with zeros and the final digit may be unused or defined as null (f). Coverage paths use "forward ordering." The following table illustrates examples of how this must be designed:

N-Digit Coverage Paths	Path Number Examples	Digit Format (CP1 to CP4)
3-Digit	5	005f*
	22	022f*
	314	314f*
4-Digit	5	0005
	22	0022
	314	0314
	2133	2133

* This is an unused nibble that is unused or filled out with a null (f). This value is ignored.

■ **Digit to Insert/Delete** (GW only) - This indicates that if the room numbers use a combination of 3- and 4-digit or 4- and 5-digit extension numbers, you must enter the leading digit that must be inserted when sent from the PMS to the switch, and deleted when sent from the switch to the PMS.This works as shown in the following example:

— Digit Insertion — If the digits received by the server are 123 and the insertion digit is **7**, extension 7123 is checked to see if it is a valid extension. If 7123 is valid, the message is processed for extension 7123; if extension 7123 is not valid, the server assumes that the message is for extension 123 and processes it accordingly. If both 7123 and 123 are valid, the message will only be processed for extension 7123. Numbering conflicts such as this should be avoided when possible.

— Digit Deletion — The server checks the extension before it is sent to the PMS. If the extension contains the maximum number of digits translated for a leading digit and the leading digit matches the administered Insert/Delete digit, the digit is deleted before sending the extension to the PMS. For example, if the Insert/Delete digit is **7** and extensions 712 and 7123 are valid on the server, 712 will be sent as 712; however, 7123 is sent as 123 (this assumes there are no 5-digit extensions starting with 7 exist on the server).

⇒ **NOTE:**
The PMS interface supports 3-, 4-, or 5-digit extensions, but be aware that prefixed extensions do not send the entire number across the interface. Only the assigned extension number is sent. Therefore, you should not use prefixed extensions for numbers that are also going to use the Insert/Delete Digit function.

Administration Options on Page 3

■ **Definition for Rooms in State 1** - **6** - This indicates the status definitions for each of the six housekeeping room states. The definitions can be up to 30 characters long.

Implementation Examples

Names Registration

When a guest in a hotel calls any hotel service, the attendant should be able to use displayed name to address the caller appropriately. One way for the PMS vendor to implement this is to have an additional field on the check-in form to enter an "f" for a female guest, "m" for a male guest, or "x" for multiple guests. Using this field and the Last Name field, the PMS can then send the name field content that looks like "Mr. LastName" or "Ms. LastName" or "LastName" (multiple guests) to the switch.

Coverage Path

This part of the feature provides customized coverage for unanswered telephone calls to guest rooms; for example, you can have calls routed to the front desk, to voice messaging, or to another room.

There are two steps to implementing this feature on the PMS:

1. The PMS should provide a way to enter a "default coverage path number" as part of the setup of the PMS software. This field must be alterable by the hotel personnel.

2. The PMS should add a field on the check-in form to enter a 3- or 4-digit Coverage Path number so that the front desk personnel will be able to enter a number if a guest desires a customized coverage path. If any number other than 0 or blank is entered, the selected coverage path is used. If 0 is entered, no coverage is used. If a blank is entered, the default coverage path on the PMS is used. If the PMS default coverage path field is also blank, then the PMS can send "0xbbb" or "0xbbbb" coverage path. This will cause the switch to use its default coverage path (see the Default Coverage Path for Client Rooms administration on Page 13 and the Number of Digits in PMS Coverage Path administration on Page 17).

Voice Mail Password (GW/R5; ASCII Mode Only)

This message is used to change the voice mail password for a room upon check-in. This operation applies only to ASCII mode. Check-in is the only message that will change the INTUITY mailbox password. To use the INTUITY default password, send ASCII blanks. To change the password, it must conform to the following restrictions:

■ It must be four digits long

■ It cannot be the same number as the room number

■ All four digits cannot be the same digits (for example, 1111).

Voice Mail Languages (GW/R5; ASCII Mode Only)

When interfacing to the Lucent INTUITY Lodging voice messaging system, there is a two-digit encoding used to select the different guest language interfaces. To use the default, send ASCII blanks. The digits will be sent as ASCII digits. The following is a list of the different language encodes supported by Lucent INTUITY Lodging:

Language	Hex Value and Message Position		INTUITY Lodging Numbering
	Language 1	Language 2	
American English	32	30	00
Japanese	32	31	01
Latin American Spanish	32	32	02
Greek	32	33	03
Mandarin	32	34	04
Reserved for future use	32	35	05
UK English	32	36	06
Canadian French	32	37	07
Brazilian Portuguese	32	38	08

NOTE:
French and German are scheduled for release in 3Q97. Contact your Lucent Technologies representative for more information about language support.

Feature Description

Line Control Characteristics

The hardware data link consists of an EIA RS232C-D serial data electrical interface extended from a switch data channel. The link interface appears as a data communications equipment (DCE) unit (CCITT definition) with the attributes shown in Table 1. See Figure 1 and Table 2 for more details about the switch-to-PMS link.

Table 1.   Link Interface Attributes

Item	Description
Data Rate	1200, 2400, 4800, 9600 bps (+1.0%, -2.5%) nominal asynchronous

Maximum Message Rate (2-way)*	System 75 R1V3 — 8 msg/sec
	DEFINITY G1, DEFINITY ECS, GuestWorks *server*
	  Smallest message size — 20 msg/sec
	  Largest message size — 2 msg/sec

Operating Mode	Full Duplex Only
Electrical Interface Signal Form (See Table 2)	EIA RS232C - Type D Electrical standard compatibility EIA RS404

Interface Distances (maximum)	From switch to 8400B/7400A — 3000 ft.
	From switch to ADU
	  1200 bps — 20000 ft.
	  2400 bps — 12000 ft.
	  4800 bps — 7000 ft.
	  9600 bps — 5000 ft.
	From 8400B/7400A/ADU to PMS — 50 ft.

Word Framing (see Figure 2)	10 bits (1 start, 8 data bits, 1 stop)
Parity Options	No parity
Maximum Message Text	13 Frames (R1V3 and G1.1) (T) 33 Frames (DEFINITY Versions 1-4)† (A) 47 Frames (GW/R5)

* The rate may vary with different values in the "Milliseconds Before PMS Link Acknowledgement Timeout" field.
† Data Link Escape (DLE) characters are not included.
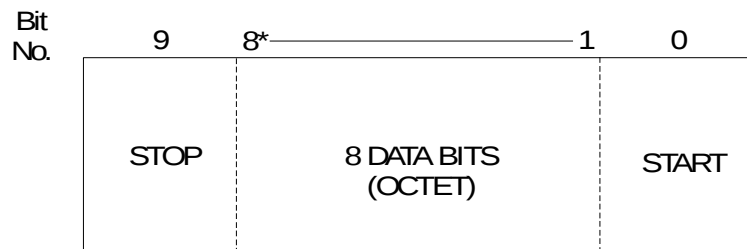
Table 2. PMS Interface Lead Designations

Lead*	Pin Number	Function	Source
AA	1	Frame Ground	Common
BA	2	Transmitted Data	PMS
BB	3	Received Data	Interface
CA†	4	Request to Send	PMS
CB†	5	Clear to Send	Interface
CC†	6	Data Set Ready	Interface
AB	7	Signal Ground	Common
CF†	8	Received Line Detect	Interface
CD†	20	Terminal Ready	PMS

* An 8400B/7400A supports all of these leads. An ADU does not support Pin 4, and
  Pins 5, 6, and 8 are driven by one lead tied together.
† These must be valid controlled signals.

Bit No.

9	8* ———————————————— 1	0
STOP	8 DATA BITS (OCTET)	START

*The most significant bit is at the left.

Figure 2. Message Word Frame

Message Envelope

The envelope for the message text uses the following ASCII encoded characters:

- STX: Start of data text, 0x02

- ETX: End of data text, 0x03

- BCC: Block check code.

The character-oriented protocol used for communications exchange uses the following ASCII encoded characters:

- ACK: Message acknowledged by receiver, 0x06

- NAK: Message not acknowledged by receiver, 0x15

- ENQ: Sender request for ACK/NAK from receiver, 0x05.

An *octet* is the 8-bit text field of a 10-bit word frame which excludes Start and Stop (see Figure 2).

The control character frames use an entire octet for one ASCII encoded character (the most significant or 8th text bit is always a logical 0 - the STX is 0000 0010 in binary). The standard message text frames (not containing guest names) consist of two 4-bit characters per frame called nibbles (see Figure 3, Figure 4, Figure 5, and Table 3). Except for the control characters, the ASCII mode uses the standard ASCII character set.

(T) (A) Message text frames containing guest names (Check-in w/Name, Guest Information Input/Change, and Room Image) will interpret the 8 data bits as two 4-bit nibbles in all frames not containing ASCII-encoded name characters.

STOP	MODULO 10 MESSAGE COUNTER (4-BIT ENCODE)	PROCESS CODE (4-BIT ENCODE)	START
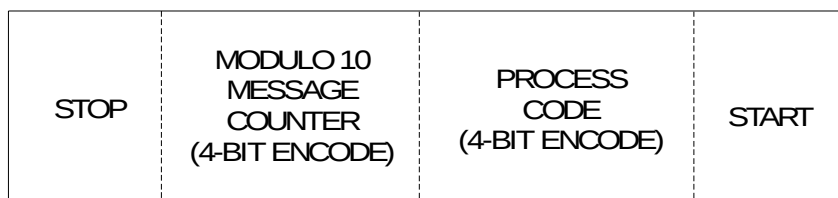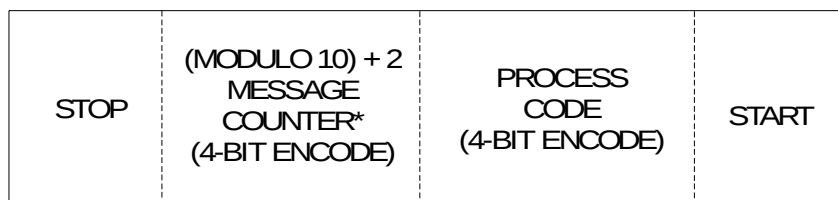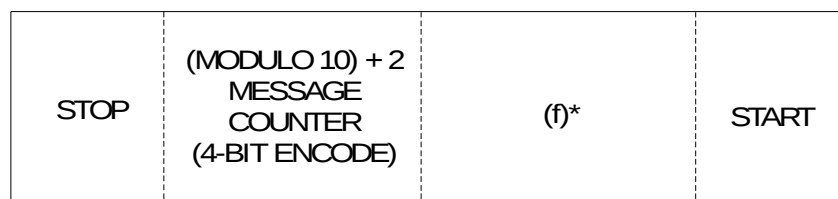
Figure 3.   Message Format — Frame 2 (Normal Mode)

STOP	(MODULO 10) + 2 MESSAGE COUNTER* (4-BIT ENCODE)	PROCESS CODE (4-BIT ENCODE)	START

* In the Transparent Mode, the message count ranges from 0x2 to 0xb. Thus, this nibble does not exactly follow the data encode as shown in Table 3.

Figure 4.   Message Format — Frame 2 (Transparent Mode)

STOP	(MODULO 10) + 2 MESSAGE COUNTER (4-BIT ENCODE)	(f)*	START

* The Process Code resides in Frame 6 in ASCII mode.

Figure 5.   Message Format — Frame 2 (ASCII Mode)

Table 3.   Data Encoding of Message Text Nibbles

Value	4-Bit Encode (Normal and Transparent)	8-Bit Encode (ASCII)
0	0000	0011 0000
1	0001	0011 0001
2	0010	0011 0010
3	0011	0011 0011
4	0100	0011 0100
5	0101	0011 0101
6	0110	0011 0110
7	0111	0011 0111
8	1000	0011 1000
9	1001	0011 1001
(Note 1)	1010 (Normal Only)	N/A
* (Note 2)	1011	0010 1010
# (Note 2)	1100	0010 0011
NULL	1111	0010 0000 (Note 3)

Note 1: The 0 encode is transmitted as "1010" in the normal mode and converted to "0000" by the receiver.
Note 2: The "1011" and "1100" encodes are used to represent the "*" and "#" characters on the telephone keypads.
Note 3: ASCII space is hex 20.
N/A = Not applicable.

The general PMS message layout is shown in Figure 6.

FRAME NO.	Normal and Transparent (T)		ASCII (A)	
0	STX	8 bits	STX	8 bits
1	VIOL	1 bit	VIOL	1 bit
	FEAT CODE	7 bits	FEAT CODE	7 bits
2	MSGCT	4 bits	MSGCT	4 bits
	PROC CODE	4 bits	Unused*	4 bits
3 thru N-2	MESSAGE DATA	8 bits	MESSAGE DATA	8 bits
		8 bits		8 bits
		8 bits		8 bits
N-1	ETX	8 bits	ETX	8 bits
N	BCC	8 bits	BCC	8 bits

* The PROC CODE is found
   in Frame 6.

Figure 6.   PMS Message Layout

Each message block will be terminated by a BCC octet. The BCC is an exclusive
"OR" of all octets following the STX through and including the ETX (the STX is **not**
included in the BCC calculation). Figure 7, Figure 8, and Figure 9 show examples
of messages. The BCC is used to insure message integrity.

Condition: Check-in (16) Mr. John Smith, Room 302, no coverage

Feature Code: 16
MSG Count: 2
Process Code: 1
Station: 302

FRAME NO.	MESSAGE REGISTER MESSAGE FORMAT		OCTET CONTENT OF ENCODED MESSAGE		STOP	MESSAGE FRAMES OCTET	START
					9 8	5 4	1 0
0	STX		0	2	1 0000	0010	0
1	FEAT	CODE	1	6	1 0001	0110	0
2	MSGCT	PROC	2	1	1 0010	0001	0
3	STA2	STA1	A*	2	1 1010	0010	0
4	STA4	STA3	A*	3	1 1010	0011	0
5	NULL	NULL	F	F	1 1111	1111	0
6	ETX		0	3	1 0000	0011	0
7	BCC		C	A	1 1100	1010	0

* "A" is the encode for 0
  for transmission

Figure 7.   Example Message — Normal Mode

Condition: Check-in (36) Mr. John Smith, Room 22415, Coverage Path 157
(3-digit coverage path numbers)

Feature Code: 36 Coverage Path: 157
MSG Count: 2 Name: Mr. John Smith
Process Code: 1
Station: 22415

FRAME NO.	MESSAGE REGISTER MESSAGE FORMAT		OCTET CONTENT OF ENCODED MESSAGE		STOP 9 8	MESSAGE FRAMES OCTET 5 4	START 1 0
0	STX		0	2	1 0000	0010	0
1	FEAT	CODE	3	6	1 0011	0110	0
2	MSGCT	PROC	2	1	1 0010	0001	0
3	STA2	STA1	1	5	1 0001	0101	0
4	STA4	STA3	2	4	1 0010	0100	0
5	NULL	STA5	F	2	1 1111	0010	0
6	CP2	CP1	5	1	1 0101	0001	0
7	NULL	CP3	F	7	1 1111	0111	0
8	NAME	CHAR 1		S	1 0101	0011	0
9		2		M	1 0100	1101	0
10		3		I	1 0100	1001	0
11		4		T	1 0101	0100	0
12		5		H	1 0100	1000	0
13		6		,	1 0010	1100	0
14		7		M	1 0100	1101	0
15		8		R	1 0101	0010	0
16		9		.	1 0010	1110	0
17		10		J	1 0100	1010	0
18		11		.	1 0010	1110	0
19		12		SPACE	1 0010	0000	0
20		13		SPACE	1 0010	0000	0
21		14		SPACE	1 0010	0000	0
22		15		SPACE	1 0010	0000	0
23	NULL	NULL	F	F	1 1111	1111	0
24	NULL	NULL	F	F	1 1111	1111	0
25	NULL	NULL	F	F	1 1111	1111	0
26	NULL	NULL	F	F	1 1111	1111	0
27	NULL	NULL	F	F	1 1111	1111	0
28	ETX		0	3	1 0000	0011	0
29	BCC		A	C	1 1010	1100	0

Note: Ordering of Station Digits is the reverse of other fields.
See section on Message Text Ordering.

Figure 8.   Example Message — Transparent Mode

Condition: Check-in (26) Mr. John Smith, Room 22415, Coverage Path 157
(4-digit coverage path numbers)

Feature Code: 26 Coverage Path: 157
MSG Count: 2 Name: Mr. John Smith
Process Code: 1
Station: 22415

FRAME NO.	MESSAGE REGISTER MESSAGE FORMAT		OCTET CONTENT OF ENCODED MESSAGE		STOP 9 8	MESSAGE FRAMES OCTET 5 4	START 1 0	HEX	ASCII
0	STX		0	2	1 0000	0010	0	02	STX
1	FEAT CODE		2	6	1 0010	0110	0	26	&
2	MSGCT Unused		2	f	1 0010	1111	0	2F	/
3	C		C		1 0100	0011	0	43	C
4	K		K		1 0100	1011	0	4B	K
5	I		I		1 0100	1001	0	49	I
6	PROC		1		1 0011	0001	0	31	1
7	STA1		2		1 0011	0010	0	32	2
8	STA2		2		1 0011	0010	0	32	2
9	STA3		4		1 0011	0100	0	34	4
10	STA4		1		1 0011	0001	0	31	1
11	STA5		5		1 0011	0101	0	35	5
12	CP1		0		1 0011	0000	0	30	0
13	CP2		1		1 0011	0001	0	31	1
14	CP3		5		1 0011	0101	0	35	5
15	CP4		7		1 0011	0111	0	37	7
16	NAME CHAR 1		S		1 0101	0011	0	43	S
17	2		M		1 0100	1101	0	4D	M
18	3		I		1 0100	1001	0	49	I
19	4		T		1 0101	0100	0	54	T
20	5		H		1 0100	1000	0	48	H
21	6		,		1 0010	1100	0	2C	,
22	7		M		1 0100	1101	0	4D	M
23	8		R		1 0101	0010	0	52	R
24	9		.		1 0010	1110	0	2E	.
25	10		J		1 0100	1010	0	4A	J
26	11		.		1 0010	1110	0	2E	.
27	12		SPACE		1 0010	0000	0	20	space
28	13		SPACE		1 0010	0000	0	20	space
29	14		SPACE		1 0010	0000	0	20	space
30	15		SPACE		1 0010	0000	0	20	space
31	VM PASSWD 1		7		1 0011	0111	0	37	7
32	VM PASSWD 2		6		1 0011	0110	0	36	6
33	VM PASSWD 3		4		1 0011	0100	0	34	4
34	VM PASSWD 4		8		1 0011	1000	0	38	8
35	LANGUAGE 1		2		1 0011	0010	0	32	2
36	LANGUAGE 2		0		1 0011	0000	0	30	0
37	NULL		NULL		1 0010	0000	0	20	space
38	NULL		NULL		1 0010	0000	0	20	space
39	NULL		NULL		1 0010	0000	0	20	space
40	NULL		NULL		1 0010	0000	0	20	space
41	ETX		0	3	1 0000	0011	0	03	ETX
42	BCC		6	4	1 0110	0100	0	64	d

Figure 9. Example Message — ASCII Mode

The ACK and NAK control characters are transmitted back to the sender by the receiver to indicate positive or negative acknowledgment to the transmitted message, respectively. An ACK means that the message was received and the sender can continue with another message. A NAK means that the message was not received and that the message should be resent. The ENQ control character is transmitted by the sender when the ACK or NAK acknowledgment of a transmitted message is not received by the sender, and is a request for a repeat of the ACK or NAK response. A sample sequence is shown in Figure 10.
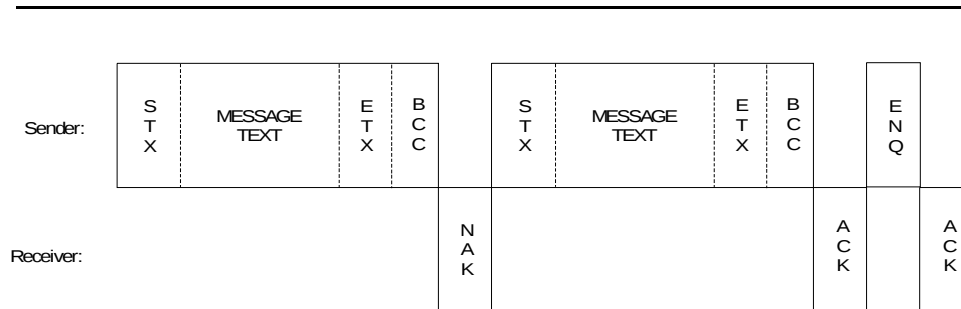

Figure 10. Sample Acknowledgment Sequence

Exchange Protocol and Message Responses

For the following discussions, the definition of sender and receiver is relative to the origination of the message because of full duplex operations.

The parameters shown in Table 4 are administerable. See "Administration Options" starting on Page 7 for details. The acronyms shown in the table are used in this section when referring to the parameters.

Table 4. PMS Link Administration Parameters

Parameter	Administrable Entry
PMS Link Maximum Retransmission Requests (MRR)	1-5 retransmissions
PMS Link Maximum Retransmissions (MR)	1-5 retransmissions
Milliseconds before PMS Link Acknowledgment Timeout (LAT)	100-300 ms (T) 100-500 ms (T) (A) 100-20000 ms (GW) (T) (A) 100-1500 ms (R5) (+125ms tolerance)
Seconds Before PMS Link Idle Timeout (LIT)	5-20 seconds

Sending Rules

The sender *must* adhere to the following rules:

1. The BCC must be calculated for characters following the STX, including the ETX, and transmitted as the terminating character of a message packet. If the BCC is incorrect, the receiver will respond with a NAK.

2. The entire message (STX to BCC) must be transmitted within 200 ms or (T) (A) within 350ms. If the message is not completely transmitted within this time, the receiver will respond with a NAK, ignore the rest of the message (which is interpreted as characters received outside of the framework of a message), and log the errors.

3. The next message cannot be transmitted until the last message has been acknowledged as successfully transmitted or is flushed because of message failure (administered MRR of unanswered ENQs and/or NAK retransmissions). If this rule is violated, the receiver may accept and process messages, but message overflow is likely (which possibly can result in link tear down).

4. If neither an ACK or a NAK is received from the receiver within the Link Acknowledgment Timer (LAT)[*]. After transmission of the BCC, the sender will transmit an ENQ requesting a repeat from the receiver of that ACK/ NAK response. After the initial LAT delay with no response from the receiver, the sender will issue up to MRR-1 subsequent ENQs in intervals of LAT (for a total of up to MRR ENQs requesting a message acknowledgment), after which the sender will flush the message. If the sender does not send an ENQ within the LAT, the receiver assumes that the ACK/NAK has been received. Consequently, if the sender transmits an ENQ after the LAT, the receiver logs the event as an unsolicited ENQ and sends a NAK.

5. The sender must assume that an expected ACK or NAK response to a sent message or an ENQ response to a received message does not occur in a message packet (STX through BCC) being simultaneously received. If the sender embeds an ACK or ENQ in a message, the receiver ignores the ACK or ENQ (and does not include in the BCC calculation), and logs an error[†]. If the sender embeds a NAK in a message (that is, it is really not a nibble with value 0x15 but a message response), the receiver transmits a NAK and logs an error since the NAK is considered part of the message text which causes the BCCs to be different.

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[*] System 75 R1V3 and DEFINITY Generic 1 have a tolerance of up to a 125ms delay for the LAT inherent in their system design. Therefore, to compensate for switch's real time deficiencies, the PMS should send ENQs such that the switch receives them as close as possible to, but not after, the LAT expires. For example, if the LAT is 200 ms, the switch's LAT expires between 200 - 325 ms after the end of the original transmission. Similarly, if the PMS does not respond within the LAT, the switch sends an ENQ. However, the switch will send this ENQ between the time of LAT to LAT plus 125ms.

6. Upon receipt of a NAK (negative acknowledgment) from the receiver the sender will retransmit the current message using the same message count (up to MR attempts - see next note); retransmission must be started within the LAT after receipt of the NAK. If the transmission is not started (or an ENQ received) within LAT, the switch will drop the link.

7. When MRR retransmission is made due to receiver NAKs or MRR ENQs are sent to the receiver due to nonacknowledgement, the sender will flush the message and log the unsuccessful transmission. If the sender does not flush the message and keeps sending the message, the receiver treats the message as a new message.

8. Each time a new message is sent, the message count field must be incremented by one, modulo (10) or (T) (A) modulo (10) + 2.

9. The priority among conflicting actions at a sender is as follows:

   a. Message currently being sent

   b. Responses to ENQ

   c. ACK or NAK to received message

   d. Retransmission in response to NAK

   e. Generic message.

Receiving Rules

The receiver *must* adhere to the following rules:

1. Verify that the entire message (STX through BCC) is received within 200 ms or (T) (A) 350 ms. Otherwise, corrupted messages could be processed.

2. Calculate a BCC for the received characters following the STX, including the ETX; compare the calculated BCC against the received BCC to insure message integrity. Otherwise, corrupted messages could be processed.

3. As soon as possible after the BCC verification (after 10 ms if receiver is not actively sending a message), the receiver must transmit a response. If the receiver waits longer than the LAT, the sender will send an ENQ.

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† Since the normal mode requires 0x0-to-0xa conversion in the message text, the ACK and ENQ characters are not possible in the message text if the sender and receiver rules are followed. However, these values are possible in the transparent mode. The difference between interpreting these characters as control characters or message text is the presence of a DLE character before these characters. See the section "Timeout Control" starting on Page 34.

4. The receiver must complete sending a message packet before transmitting an ACK or NAK response to a received message. If the receiver breaks this rule by embedding an ACK or ENQ in an outgoing message, the sender ignores the ACK (and does not include it in the BCC calculation), logs an error, and sends an ENQ after the LAT times out. If the receiver breaks this rule by embedding a NAK in an outgoing message (that is, it is really not a nibble with value 0x15 but a message response), the sender transmits a NAK in response to the outgoing message since the NAK is considered part of the message text which causes the BCCs to be different. Also, the sender logs an error and sends an ENQ after the LAT times out.

5. After transmitting the ACK/NAK response, the receiver must repeat the previous reply if an ENQ is received within the LAT after the original transmission of the ACK/NAK; this may be repeated until the maximum MRR (for a total of MRR received ENQs at LAT intervals). If the receiver does not reply, the sender transmits another ENQ.

6. The receiver must respond with a NAK to a message transmission when the following occurs:

   — A period of 200 ms or (T) (A) 350ms has expired since reception of an STX with no BCC received (incomplete message).

   — The BCC calculated for the received characters does not match the received character following the ETX.

   — The message text (excluding DLEs; see "Check-In/Check-Out" starting on Page 67) is less than three characters or greater than 10 or (T) (A) 30 characters.

7. The receiver must respond with a NAK to a received ENQ when the following occurs:

   — The original ACK/NAK reply has been repeated up to MRR times in response to ENQs spaced LAT or less. After MRR retransmission of an ACK/NAK, the link will also be dropped.

   — The interval since the last response (to a message or to an ENQ) is greater than the LAT (assumed missed message).

8. The receiver must increment the expected message count of the sender by one after receiving a message modulo (10) or (T) (A) modulo (10) +2.

Link Setup and Drop Conditions

Link Setup

The PMS, if operational, must have the Data Terminal Ready EIA pin in the "on" state. The switch attempts to bring the link up by placing an internal call to the data extension connected to the PMS. This call sets the Data Set Ready EIA pin to the "on" state which allows the PMS and the switch's data module to "hand-shake." The switch will wait up to 12 link idle timer (LIT) periods for the PMS to send a status inquiry message before dropping the link. However, if the PMS sends ten other messages before the status inquiry message, the switch will drop the link. Upon receipt of the status inquiry message, the switch sends a status inquiry response and restarts the LIT. Restarts (including power-up) cause the switch to attempt link setups within 5 minutes after switch recovery. The switch will immediately retry after most link errors, but will wait 5 minutes for further attempts if the first attempt fails. For protocol error-counter overflow and internal buffering overflow, the switch will wait 5 minutes before attempting link setup.

Link Drop

The switch drops the physical layer of the link by tearing down the call to the data extension which causes the data channel to change the Data Set Ready EIA pin to the "off" state. However, some data sets may keep the Data Set Ready EIA pin "on" which may give the appearance that the physical layer is still "up."

Timeout Control

In order to maintain normal link operations, the PMS must send the switch at least one message every LIT seconds. Otherwise, the LIT will expire causing the link to drop.

Message Text Format Structure and Encoding

Figure 11 shows the general format for a message packet. Information in the text is treated as 8-bit characters. However, these characters are interpreted as either two 4-bit encoded digits (nibbles) or (T) (A) ASCII characters. Consequently, a zero valued most significant bit is used to pad the ASCII character to eight bits. Table 3 on Page 25 shows the encoding of the nibbles and the format of the (T) (A) ASCII characters. Since ASCII characters are supported in some messages, the interface supports three modes of the protocol[*]:

■ The first mode, normal, uses only nibbles and converts all 0x0 message text nibbles into 0xa.

■ (T) The second mode, transparent, uses both nibbles (without 0x0 to 0xa conversion) and ASCII characters in the message set.

■ (A) The third mode, ASCII, uses ASCII characters exclusively for the guest data (frames 3 through N-2).

FRAME NO.	Normal and Transparent (T)		ASCII (A)	
0	STX	8 bits	STX	8 bits
1	VIOL	1 bit	VIOL	1 bit
	FEAT CODE	7 bits	FEAT CODE	7 bits
2	MSGCT	4 bits	MSGCT	4 bits
	PROC CODE	4 bits	Unused*	4 bits
3 thru N-2	MESSAGE DATA	8 bits	MESSAGE DATA	8 bits
		8 bits		8 bits
		8 bits		8 bits
N-1	ETX	8 bits	ETX	8 bits
N	BCC	8 bits	BCC	8 bits

* The PROC CODE is found in Frame 6.

Figure 11. PMS Message Layout

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[*]   The Names Registration, Guest Input/Change, and 5-digit RSN feature set require ASCII characters.

The Data Link Escape (DLE) character is used to precede any characters in the message text that have a value also used by "control characters" to distinguish message text from control characters (for example, STX), since 0x0 to 0xa conversion cannot be used. As an example, the character sequence "DLE STX" in the message text is interpreted as 0x02 character value whereas "STX" without the preceding DLE is interpreted as the STX control character. The transparent and ASCII modes can use both 4-bit encoded nibbles and ASCII characters.

The first two characters immediately following the STX are fixed in format and imply the format and length of the remaining message data characters. This varies for different message types.

The FEAT CODE character specifies which of the possible variable length feature message formats [for example, 11, (T) 31, or (A) 21 for Housekeeper Status from Room] applies to the message data. The receiver sets the most significant bit of the FEAT CODE to a logical 1 when content errors such as invalid encoding for characters interpreted as nibbles, invalid characters for fields interpreted as ASCII, (T) (A) invalid coverage paths, (T) (A) invalid station numbers, and invalid feature and process codes exist in the message. Thus, this bit is the VIOL bit and indicates a message violation. The receiver returns the invalid message to the sender with the violation bit set (VIOL) after inserting its own correct message count into the message envelope. For example, a check-in message [FEAT CODE = 16, (T) 36, or (A) 26] from the PMS to the switch will be transmitted back to the PMS as a check-in violation message [FEAT CODE = 96, (T) B6, or (A) A6]. Usually, content errors will occur if the sender's encoding algorithm fails or if an odd number of bit errors occur in the same position in different characters of the transmitted message.

The receiver of a violation message (that is, the original sender of the invalid feature message) has the responsibility to appropriately log the individual violation message(s) for later problem determination and correction.

Frame 2 in the normal and transparent mode (the message count [MSGCT] and PROC CODE nibbles) consists of two 4-bit encoded digits (Figure 3, Figure 4, and Figure 11). Frame 2 in the ASCII mode contains only the MSGCT nibble (see Figure 5). The most significant 4 bits, the MSGCT field, represents a message counter. The counter is modulo (10) or (T) (A) modulo (10) + 2. The message counter complements the ENQ in eliminating acceptance of duplicate messages. Such a possibility could occur if an ACK was corrupted to a NAK and the message retransmitted; the receiver is expected to notice the immediate repeated message count and will ACK the message but will not act on the data. The message counter is incremented by the sender with each new message, and not incremented when retransmitting in response to a NAK from the receiver. If the message count is not what is expected by the switch, the switch logs an internal error and resets the message count to the received value. The message counter runs from 0 (encoded "A") through 9 in the normal mode, or 2 through 11 in the transparent mode and is relative to the originator.

The PROC CODE nibble denotes a "process code." This code represents a specific action or processing for that feature message. In normal mode and transparent mode, the PROC CODE is in Frame 2. In ASCII mode, the PROC CODE is found in Frame 6.

The (FEAT CODE, PROC CODE) notation is used throughout this document to denote a feature message (FEAT CODE) with processing actions (PROC CODE). For the ASCII Mode, the FEAT CODE designation (a 2-digit number) is replaced by the ASCII equivalent of the feature code. For instance, (13,1) or (MSG,1) denotes a message waiting lamp feature, with PROC CODE 1 implying that the switch is to turn on the message waiting lamp for an indicated RSN. If only a process code is given, the feature code of the section you are in is implied.

The MESSAGE DATA fields, frames 3 through N-2 in the message layout, consist of two 4-bit encoded digits (T) (A) per 8-bit character, called "nibbles," with encodings or 8-bit ASCII characters. In all message features but one, part of the MESSAGE DATA information is the switch RSN. Additional processing information may also be passed according to the message feature type.

Null characters are used to pad out message characters where no more data or name characters exist. Definitions of null characters used by the normal and transparent mode are explained below.

For the Normal Mode, the following encoding rules apply to all message frames (any frame between the STX and ETX):

■ The binary nibble 1010 is the encode in MESSAGE DATA fields for the0000 nibble; this prevents MESSAGE DATA octets such as 0x02, 0x03, 0x05, and 0x06 from being confused with STX, ETX, ENQ, and ACK, respectively (for example, a message text frame that has value 0x03 would be transmitted as 0xa3).

■ The 0xff denotes a null character (not the standard ASCII null character 0x00) and will be used to pad out message characters. In a frame with only one 4-bit information digit, the null "0xf" nibble pads the most significant 4-bit field.

■ Leading zeros (encoded 0xa) are used for nibbles of data items that are lower in value than the allotted space; for example, RSN 305 will be sent as a3a5.

■ The BCC 8-bit octet does **not** follow the 0x0 -> 0xa encoding rule and thus may be 0x02, 0x03, 0x15, etc. It may always be assumed that the character received immediately after an ETX is the BCC for the transmitted message.

For the Transparent Mode, the following encoding rules apply to all message frames (any frame between the STX and ETX):

- The DLE character must precede any control character (valued 0x00 to 0x1f) in the message text.

- Leading zeros are used for nibbles of data items that are lower in value than the allotted space; for example, RSN 305 will be sent as 00305.

- The 0xff denotes a null character (not the standard ASCII null character 0x00) and will be used to pad out frames. In a frame with only one 4-bit information digit, the null nibble pads the most significant 4-bit field. Name characters, however, will be filled with ASCII space character 0x20 for padding the field.

- The BCC 8-bit octet always follows immediately after an ETX. Any transmitted DLE characters are included in the BCC.

For the ASCII Mode, the following encoding rules apply to all message frames (any frame between the STX and ETX):

- The DLE character must precede any control character (valued 0x00 to 0x1f) in the message text.

- Leading zeros are used for nibbles of data items that are lower in value than the allotted space; for example, room station number (RSN) 305 will be sent as 00305.

- The 0xf character denotes a null character and will be used to pad out frames (such as Frame 2). In a frame with only one 4-bit information digit, the null nibble pads the most significant 4-bit field.

- Name characters will be filled with ASCII space character 0x20 for padding the field.

- The BCC 8-bit octet always follows immediately after an ETX. Any transmitted DLE characters are included in the BCC.

Table 5 shows the message format key and Figure 7, Figure 8, and Figure 9 show examples of messages using normal, transparent, and ASCII modes. Figure 12 through Figure 22 show the message formats for each of the feature codes (identified as normal, transparent, or ASCII).

Many of the feature messages require that a "station number" be specified. This 4-digit or (T) (A) 5-digit number is always the switch station number and usually correlates identically with the hotel room number. For cases where the hotel room and RSN do **not** correlate, the PMS has the responsibility to perform the room-to-station number mapping for all messages sent or received over the data link.

The use of various feature and process messages and responses is discussed in "Feature Codes, Process Codes, and Operations" starting on Page 53.

Message Text Ordering

The extension, housekeeper digits, coverage path, name fields, and restriction level consist of several nibbles or characters which have a defined ordering.

- Extensions in the normal and transparent mode consist of 5 nibbles which are mapped from the least significant digit to the most significant digit (backwards ordering) for the normal and transparent modes. For example, the extension 54321 maps to the STA5, STA4, STA3, STA2, and STA1 symbols used in Figure 12 through Figure 22.

- Except for extension numbers in the normal and transparent mode, all strings of characters or numbers occur using "forward ordering." Thus, if the user dials the housekeeper FAC followed by "123456," these digits map to the DIG1, DIG2, DIG3, DIG4, DIG5, and DIG6 symbols used in Figure 12 and Figure 13. Similarly, if coverage path 157 is used in a message, this number maps to the CP1, CP2, and CP3 symbols used in Figure 17, Figure 19, and Figure 21. Padding is done on the coverage path numbers and the housekeeper identification digits.

- The name characters are ordered as the name is spelled (forwards ordering) and are left-justified and padded with space characters as necessary. Thus, the name "abc" maps to the symbols used in Figure 17, Figure 19, and Figure 21 as follows: NAME CHAR1 = 'a', NAME CHAR2 ='b', NAME CHAR3 ='c', and NAME CHAR4 through NAME CHAR15 = ' ' (all blanks).

- In ASCII Mode, the restriction level value is a 2-digit field. When the restriction level is sent to the PMS, it is sent as "digit-blank." The switch can receive the restriction level in several different ways: 0-digit, digit-blank, or blank-digit.

Table 5. Message Format Key

Message	Definition
ADD/REM	ASCII Add or Subtract from Message Count (GW/R5)
BCC	Block Check Code
CP1 to CP4	Coverage Path Digits
DIG1 to DIG6	Information Digits
ETX	End of Text (0x03)
FEAT CODE	Feature Code
LANGUAGE 1 to LANGUAGE 2	ASCII Encoded Voice Mail Language Code (GW/R5)
MSGCT	Message Count
MW	Message Waiting Lamp Status Indication
*NAME CHAR 1 to NAME CHAR 15	Guest Name Characters (0x20 to 0x7E)
NULL	Padding Character (do not use for any other function)
PROC	Process Code
RESTRICT LEV	Restriction Level
RR	Link Release Request Code
STA1 to STA5	Room Station Number (RSN) Digits
STF1 to STF5	"From" RSN in Room Change/Swap Message
STX	Start of Text (0x02)
TEXT/FAX	ASCII Identify Text or FAX Message (GW/R5)
VIOL	Violation of Message Protocol
VM PASSWD 1 to VM PASSWD 4	Voice Mail Password (GW/R5)
V/O	Vacant or Occupied Room Status

* The DEFINITY G3V4 and R5 support 27-character names, but the PMS interface only supports 15-character names. Any characters beyond 15 will not be transmitted between the PMS and the server.

FRAME NO.	(11) HOUSEKEEPER STATUS FROM ROOM		(T) (31) HOUSEKEEPER STATUS FROM ROOM		(A) (21) HOUSEKEEPER STATUS FROM ROOM	FRAME NO.
0	STX		STX		STX	0
1	11		31		21	1
2	MSGCT	PROC*	MSGCT	PROC*	MSGCT x(f)	2
3	STA2	STA1	STA2	STA1	"H"	3
4	STA4	STA3	STA4	STA3	"K"	4
5	DIG2	DIG1	NULL	STA5	"R"	5
6	DIG4	DIG3	DIG2	DIG1	PROC*	6
7	DIG6	DIG5	DIG4	DIG3	STA1	7
8	ETX		DIG6	DIG5	STA2	8
9	BCC		ETX		STA3	9
10			BCC		STA4	10
11					STA5	11
12					DIG1	12
13					DIG2	13
14					DIG3	14
15					DIG4	15
16					DIG5	16
17					DIG6	17
18					NULL	18
19					NULL	19
20					ETX	20
21					BCC	21

* PROCESS CODES

1-6. The associated feature access code was dialed from the RSN indicated. Message may include up to six housekeeper ID digits in addition to the RSN. (to PMS)

8. PMS rejects the validity of the message text or an invalid state change was indicated. (to switch)

9. PMS accepts the status change. (to switch)

Note: The optional additional information digits (DIG1-DIG6) are padded with nulls when not used.

Figure 12. Housekeeper Status from Room Message Formats

FRAME NO.	(12) HOUSEKEEPER STATUS FROM DESIGNATED STATION		(T) (32) HOUSEKEEPER STATUS FROM DESIGNATED STATION		(A) (22) HOUSEKEEPER STATUS FROM DESIGNATED STATION	FRAME NO.
0	STX		STX		STX	0
1	12		32		22	1
2	MSGCT	PROC*	MSGCT	PROC*	MSGCT x(f)	2
3	STA2	STA1	STA2	STA1	"H"	3
4	STA4	STA3	STA4	STA3	"K"	4
5	DIG2	DIG1	NULL	STA5	"S"	5
6	DIG4	DIG3	DIG2	DIG1	PROC*	6
7	DIG6	DIG5	DIG4	DIG3	STA1	7
8	ETX		DIG6	DIG5	STA2	8
9	BCC		ETX		STA3	9
10			BCC		STA4	10
					STA5	11
					DIG1	12
					DIG2	13
					DIG3	14
					DIG4	15
					DIG5	16
					DIG6	17
					NULL	18
					NULL	19
					ETX	20
					BCC	21

* PROCESS CODES

1-4. The associated feature access code and the indicated station number were dialed from a designated station. Message may include up to six housekeeper ID digits in addition to the RSN. (to PMS)

8. PMS rejects the message. (to switch)

9. PMS accepts the message. (to switch)

Note: The optional additional information digits (DIG1-DIG6) are padded with nulls when not used.

Figure 13. Housekeeper Status from Designated Station Message Formats

FRAME NO.	(13) MESSAGE WAITING		(T) (33) MESSAGE WAITING		(A) (23) MESSAGE WAITING	FRAME NO.
0	STX		STX		STX	0
1	13		33		23	1
2	MSGCT	PROC*	MSGCT	PROC*	MSGCT x(f)	2
3	STA2	STA1	STA2	STA1	"M"	3
4	STA4	STA3	STA4	STA3	"S"	4
5	ETX		NULL	STA5	"G"	5
6	BCC		ETX		PROC*	6
7			BCC		STA1	7
8					STA2	8
9					STA3	9
10					STA4	10
11					STA5	11
12					ADD/REM	12
13					TEXT/FAX	13
14					NULL	14
15					NULL	15
16					ETX	16
17					BCC	17

* PROCESS CODES

1. Turn on message lamp of room station indicated. (to switch)
2. Turn off message lamp of room station indicated. (to switch)
3. Message lamp of room station indicated has been turned on via Message Waiting Notification from the attendant console or a voice terminal. (to PMS)
4. Message lamp of room station indicated has been turned off via Message Waiting Notification from the attendant console or a voice terminal. (to PMS)
5. (T) (A) Lamp of room station indicated was already on or is still on due to another message type, such as LWC or AUDIX. (to PMS)

ADD/REM (A)
2. Add one to message count
3. Subtract one from message count

TEXT/FAX (A)
2. This is a text message
3. This is a FAX message

Figure 14. Message Waiting Message Formats

FRAME NO.	(15) CONTROLLED RESTRICTION
0	STX
1	15
2	MSGCT PROC*
3	STA2 STA1
4	STA4 STA3
5	RESTRICT LEV
6	NULL NULL
7	NULL NULL
8	ETX
9	BCC

(T) (35) CONTROLLED RESTRICTION
STX
35
MSGCT PROC*
STA2 STA1
STA4 STA3
NULL STA5
RESTRICT LEV
ETX
BCC

(A) (25) CONTROLLED RESTRICTION	FRAME NO.
STX	0
25	1
MSGCT x(f)	2
"C"	3
"R"	4
" "	5
PROC*	6
STA1	7
STA2	8
STA3	9
STA4	10
STA5	11
RESTRICT LEV1	12
RESTRICT LEV2	13
NULL	14
NULL	15
ETX	16
BCC	17

* PROCESS CODES
1. Set indicated restriction for indicated RSN. (to switch)
2. Restriction has been set as indicated for indicated RSN via the attendant console or a voice terminal. (to PMS)

Note 1: The restriction levels from the PMS are as follows (toll restriction can be substituted for station-to-station or outward restriction only on GW/R5):
0 - No restriction
1 - Outward/toll restriction
2 - Station-to-station/toll restriction
3 - Outward/toll and station-to-station/toll restriction
4 - Total restriction
5 - Termination restriction
6 - Outward/toll and termination restriction
7 - Station-to-station/toll and termination restriction

Note 2: In ASCII Mode, the restriction level value is a 2-digit field. When the restriction level is sent to the PMS, it is sent as "digit-blank." The switch can receive the restriction level in several different ways: 0-digit, digit-blank, or blank-digit.

Figure 15. Controlled Restriction Message Formats

```
                    (16)
                 CHECK-IN/
FRAME            CHECK-OUT
NO.
 0       ┌─────────────────┐
         │       STX       │
 1       ├─────────────────┤
         │       16        │
 2       ├─────────────────┤
         │ MSGCT    PROC*  │
 3       ├─────────────────┤
         │ STA2     STA1   │
 4       ├─────────────────┤
         │ STA4     STA3   │
 5       ├─────────────────┤
         │ NULL     NULL   │
 6       ├─────────────────┤
         │       ETX       │
 7       ├─────────────────┤
         │       BCC       │
         └─────────────────┘
```

* PROCESS CODES

1. Switch is to perform the functions associated with check-in for the
   indicated RSN. (to switch)
2. Switch is to perform the functions associated with check-out for the
   indicated RSN. (to switch)
5. Check-out functions were completed for the indicated RSN and the
   message waiting lamp was not on. (to PMS)
6. Check-out functions were completed for the indicated RSN and the
   message waiting lamp was on. (to PMS)
7. Confirmation of receipt of check-out message; no action was taken
   because the indicated RSN was already vacant. (to PMS)
8. Confirmation of receipt of check-in message; no action was taken
   because the indicated RSN was already occupied. (to PMS)

Figure 16. Check-In/Check-Out Message Formats

FRAME NO.	(T) (36) CHECK-IN		(A) (26) CHECK-IN	FRAME NO.
0	STX		STX	0
1	36		26	1
2	MSGCT PROC*		MSGCT x(f)	2
3	STA2 STA1		"C"	3
4	STA4 STA3		"K"	4
5	NULL STA5		"I"	5
6	CP2 CP1		PROC*	6
7	CP4 CP3		STA1	7
8	NAME CHAR 1		STA2	8
9	2		STA3	9
10	3		STA4	10
11	4		STA5	11
12	5		CP1	12
13	6		CP2	13
14	7		CP3	14
15	8		CP4	15
16	9		NAME CHAR 1	16
17	10		NAME CHAR 2	17
18	11		NAME CHAR 3	18
19	12		NAME CHAR 4	19
20	13		NAME CHAR 5	20
21	14		NAME CHAR 6	21
22	15		NAME CHAR 7	22
23	NULL NULL		NAME CHAR 8	23
24	NULL NULL		NAME CHAR 9	24
25	NULL NULL		NAME CHAR 10	25
26	NULL NULL		NAME CHAR 11	26
27	NULL NULL		NAME CHAR 12	27
28	ETX		NAME CHAR 13	28
29	BCC		NAME CHAR 14	29
			NAME CHAR 15	30
			VM PASSWD 1	31
			VM PASSWD 2	32
			VM PASSWD 3	33
			VM PASSWD 4	34
			LANGUAGE 1	35
			LANGUAGE 2	36
			NULL	37
			NULL	38
			NULL	39
			NULL	40
			ETX	41
			BCC	42

* PROCESS CODES
1. Switch is to perform the functions associated with check-in for the indicated RSN. (to switch)
2. Confirmation of receipt of check-in message; no action was taken because the indicated RSN was already occupied. (to PMS)

VM PASSWD is used to change the voice mail password when checking-in a guest; to use default, send blanks.

LANGUAGE is used to select the guest language interface; to use default, send blanks.

Figure 17. Check-In Message Formats

FRAME NO.	(T) (46) CHECK-OUT	
0	STX	
1	46	
2	MSGCT	PROC*
3	STA2	STA1
4	STA4	STA3
5	NULL	STA5
6	ETX	
7	BCC	

(A) (29) CHECK-OUT		FRAME NO.
STX		0
29		1
MSGCT	x(f)	2
"C"		3
"K"		4
"O"		5
PROC*		6
STA1		7
STA2		8
STA3		9
STA4		10
STA5		11
NULL		12
NULL		13
ETX		14
BCC		15

* PROCESS CODES

1. Switch is to perform the functions associated with check-out for the indicated RSN. (to switch)
2. Check-out functions were completed for the indicated RSN and the message waiting lamp was not on. (to PMS)
3. Check-out functions were completed for the indicated RSN and the message waiting lamp was on. (to PMS)
4. Confirmation of receipt of check-out message; no action was taken because the indicated RSN was already vacant. (to PMS)
5. Check-out functions were completed for the indicated RSN and the message waiting lamp is still on due to another message type (for example, LWC or AUDIX). (to PMS)

Figure 18. Check-Out Message Formats

FRAME NO.	(17) ROOM DATA IMAGE		(T) (37) ROOM DATA IMAGE		(A) (27) ROOM DATA IMAGE		FRAME NO.
0	STX		STX		STX		0
1	17		37		27		1
2	MSGCT	PROC*	MSGCT	PROC*	MSGCT	x(f)	2
3	STA2	STA1	STA2	STA1	"R"		3
4	STA4	STA3	STA4	STA3	"M"		4
5	NULL	V/O	NULL	STA5	"I"		5
6	NULL	MW	NULL	V/O	PROC*		6
7	RESTRICT LEV		NULL	MW	STA1		7
8	NULL		RESTRICT LEV		STA2		8
9	NULL		CP2	CP1	STA3		9
10	NULL		CP4	CP3	STA4		10
11	ETX		NAME	CHAR 1	STA5		11
12	BCC			2	V/O		12
13				3	MW		13
14				4	RESTRICT LEV 1		14
15				5	RESTRICT LEV 2		15
16				6	CP1		16
17				7	CP2		17
18				8	CP3		18
19				9	CP4		19
20				10	NAME CHAR 1		20
21				11	NAME CHAR 2		21
22				12	NAME CHAR 3		22
23				13	NAME CHAR 4		23
24				14	NAME CHAR 5		24
25				15	NAME CHAR 6		25
26			NULL	NULL	NAME CHAR 7		26
27			NULL	NULL	NAME CHAR 8		27
28			NULL	NULL	NAME CHAR 9		28
29			NULL	NULL	NAME CHAR 10		29
30			NULL	NULL	NAME CHAR 11		30
31			ETX		NAME CHAR 12		31
32			BCC		NAME CHAR 13		32
33					NAME CHAR 14		33
34					NAME CHAR 15		34
35					VM PASSWD 1		35
36					VM PASSWD 2		36
37					VM PASSWD 3		37
38					VM PASSWD 4		38
39					LANGUAGE 1		39
40					LANGUAGE 2		40
41					NULL		41
42					NULL		42
43					NULL		43
44					NULL		44
45					ETX		45
46					BCC		46

* PROCESS CODES
1. Request to send the data image for indicated room for informational purpose only. (to switch)
2. Response to received process code 1 message. (to PMS)
3. Database update status information and/or request for switch status. (to switch)
4. Database update switch status response to process code 3. (to PMS)

In ASCII Mode, the restriction level value is a 2-digit field. When the restriction level is sent to the PMS, it is sent as "digit-blank." The switch can receive the restriction level in several different ways: 0-digit, digit-blank, or blank-digit.

VM PASSWD is a placeholder for future development
LANGUAGE is a placeholder for future development

See Table 18 for more information.

Figure 19. Room Data Image Message Formats

FRAME NO.	(20) ROOM CHANGE/SWAP		(T) (30) ROOM CHANGE/SWAP		(A) (24) ROOM CHANGE/SWAP		FRAME NO.
0	STX		STX		STX		0
1	20		30		24		1
2	MSGCT	PROC*	MSGCT	PROC*	MSGCT	x(f)	2
3	STA2	STA1	STA2	STA1	"R"		3
4	STA4	STA3	STA4	STA3	"M"		4
5	STF2	STF1	NULL	STA5	"C"		5
6	STF4	STF3	STF2	STF1	PROC*		6
7	ETX		STF4	STF3	STA1		7
8	BCC		NULL	STF5	STA2		8
9			ETX		STA3		9
10			BCC		STA4		10
					STA5		11
					STF1		12
					STF2		13
					STF3		14
					STF4		15
					STF5		16
					NULL		17
					NULL		18
					ETX		19
					BCC		20

* PROCESS CODES
1. Room change to STAx from STFx. (to switch)
2. Room swap between STAx and STFx. (to switch)
3. Room change/swap was performed but an error
   was detected in room status. (to PMS)

Note 1: STA represents "change to" RSN; STF represents
        "change from" RSN; x=1-4 or (T) (A) 1-5.

Note 2: Room change is from occupied-to-vacant;
        Room swap is from occupied-to-occupied.

Figure 20. Room Change/Swap Message Formats

FRAME NO.	(T) (38) GUEST INFORMATION INPUT/CHANGE		(A) (28) GUEST INFORMATION INPUT/CHANGE	FRAME NO.
0	STX		STX	0
1	38		28	1
2	MSGCT	PROC*	MSGCT x(f)	2
3	STA2	STA1	"G"	3
4	STA4	STA3	"I"	4
5	NULL	STA5	"C"	5
6	CP2	CP1	PROC*	6
7	CP4	CP3	STA1	7
8	NAME	CHAR 1	STA2	8
9		2	STA3	9
10		3	STA4	10
11		4	STA5	11
12		5	CP1	12
13		6	CP2	13
14		7	CP3	14
15		8	CP4	15
16		9	NAME CHAR 1	16
17		10	NAME CHAR 2	17
18		11	NAME CHAR 3	18
19		12	NAME CHAR 4	19
20		13	NAME CHAR 5	20
21		14	NAME CHAR 6	21
22		15	NAME CHAR 7	22
23	NULL	NULL	NAME CHAR 8	23
24	NULL	NULL	NAME CHAR 9	24
25	NULL	NULL	NAME CHAR 10	25
26	NULL	NULL	NAME CHAR 11	26
27	NULL	NULL	NAME CHAR 12	27
28	ETX		NAME CHAR 13	28
29	BCC		NAME CHAR 14	29
			NAME CHAR 15	30
			VM PASSWD 1	31
			VM PASSWD 2	32
			VM PASSWD 3	33
			VM PASSWD 4	34
			LANGUAGE 1	35
			LANGUAGE 2	36
			NULL	37
			NULL	38
			NULL	39
			NULL	40
			ETX	41
			BCC	42

* PROCESS CODES
1. Change/input the following guest name and coverage path number for RSN. (to switch)
2. Change/input completed as requested for RSN. (to PMS)
3. Change/input received, no action taken, RSN vacant. (to PMS)
4. Change/input received, no action taken, information the same as stored for RSN. (to PMS)

VM PASSWD is a placeholder for future development
LANGUAGE is a placeholder for future development

Figure 21. Guest Information Input/Change Message Formats

FRAME NO.	(70) STATUS INQUIRY
0	STX
1	70
2	MSGCT PROC*
3	NULL RR
4	ETX
5	BCC

(A) (71) STATUS INQUIRY	FRAME NO.
STX	0
71	1
MSGCT x(f)	2
"S"	3
"T"	4
"S"	5
PROC*	6
RR	7
NULL	8
NULL	9
ETX	10
BCC	11

* PROCESS CODES

F. (NULL) Heartbeat message; must be issued by the PMS within every LIT interval and no more often than 500 ms. (to switch)

0. Acknowledgement of NOP "are you there" message from the PMS, indicating that the switch has had no changes that were not communicated to the PMS and has not initialized. Note that while in the Normal Mode, the process code 0 is encoded as an A in the message frame sent to the PMS. This message will be sent only in response to process code F from the PMS. (to PMS)

1. NOP acknowledgement indicating that at least one noncommunicated change in the switch has occurred during a communications failure; the PMS must initiate a database exchange. (to PMS)

2. NOP acknowlededment indicating that the switch had failed and the status memory has been initialized; the PMS must initiate a database exchange. (to PMS)

3. Start of database room exchange; the PMS will be sending a room image message for each room requiring status synchronization. (to switch)

4. End of database exchange. (to switch)

5. Release of the data link is requested for maintenance activity; process code 6 is confirmation. (both)

6. Release of the data link confirmed; all necessary actions have been taken. (both)

REASON CODES (RR)

1. One flushed message
2. Excessive protocol violations
3. Excessive violation messages
4. Cannot receive messages
5. Craft demanded maintenance
6. System demanded maintenance
7. Ten protocol startup violations
F. Reason code not provided/supported

Figure 22. Status Inquiry Message Formats

Feature Codes, Process Codes, and Operations

This section discusses the operations associated with each feature message. The set of feature messages actually used may vary among various PMS system applications. General operation, summary of the process codes defined and their uses, and switch and/or PMS considerations will be discussed for each feature message.

Feature Code Summary

The feature codes are summarized in Table 6. The feature codes shown apply to the normal mode, the transparent mode (T), and the ASCII mode (A).

Table 6. Feature Code Summary

Feature/Page Number	Feature Code*	Purpose
Housekeeper Status-Room (HR)/ Page 55	11 (T) 31 (A) 21/HKR	Communicate housekeeper-dialed status changes originated from room
Housekeeper Status-Remote Status Designated Station (HD)/ Page 55	12 (T) 32 (A) 22/HKS	Communicate housekeeper-dialed changes originated from a desig- nated station
Message Waiting (MW)/Page 61	13 (T) 33 (A) 23/MSG	Communicate message waiting lamp status changes
Controlled Restriction (CR)/Page 64	15 (T) 35 (A) 25/CR	Communicate changes in room sta- tion calling restrictions placed on RSN
Check-in/check-out (CK)/Page 67	16	Communicate room check-ins and check-outs
Check-in (CK)/Page 67	(T) 36 (A) 26/CKI	Check-in when using guest name display
Check-out (CK)/Page 67	(T) 46 (A) 29/CKO	Check-out when using guest name display
Room Data Image (RI)/Page 72	17 (T) 37 (A) 27/RMI	Exchange status information for an RSN

Table 6.   Feature Code Summary

Feature/Page Number	Feature Code*	Purpose
Room Change/Swap (RC)/Page 79	20 (T) 30 (A) 24/RMC	Perform room change or swap operations between two rooms
Guest Information Input/Change (GI)/Page 81	(T) 38 (A) 28/GIC	Communicate guest name or coverage path information changes
Status Inquiry (SI) and Failure Management/Page 83	70 (A) 71/STS	Data link maintenance
* The ASCII Mode feature codes also show the ASCII representation of the feature code.		

Housekeeper Status

The Housekeeper Status feature enables on-line tracking of the housekeeper services and room state changes using the following:

- Six process codes for dialing from room stations

- Four process codes for dialing from designated station lines

- Each process code may include up to six additional information digits, available for room state changes and/or auxiliary processing such as housekeeper ID tracking.

The Housekeeper Status feature capability is an optional switch feature available through administration.

Feature Codes

The Housekeeper Status from Room feature codes are as follows:

- 11 — Normal mode

- 31 — Transparent mode

- 21/HKR — ASCII mode.

The Housekeeper Status from Designated Station feature codes are as follows:

- 12 — Normal mode

- 32 — Transparent mode

- 22/HKS — ASCII mode.

These feature message formats are shown in Figure 12 on Page 41 and Figure 13 on Page 42.

Process Codes

The process codes for the Housekeeper Status from Room feature are shown in Table 7.

Table 7. Housekeeper Status from Room Process Codes [Feature Codes 11, (T) 31, or (A) 21/HKR]

Process Code	Message Direction	Indications
1 through 6	Switch to PMS	The associated feature access code was dialed from the RSN indicated. Message may include up to six house-keeper ID digits in addition to the RSN.
8	PMS to Switch	PMS rejects the validity of the message text or an invalid state change was indicated.
9	PMS to Switch	PMS accepts the status change.

The process codes for the Housekeeper Status from Designated Station feature are shown in Table 8.

Table 8. Housekeeper Status from Designated Station Process Codes [Feature Codes 12, (T) 32, or (A) 22/HKS]

Process Code	Message Direction	Indications
1 through 4	Switch to PMS	The associated feature access code and the indicated station number were dialed from a designated station. Message may include up to six housekeeper ID digits in addition to the RSN.
8	PMS to Switch	PMS rejects the message.
9	PMS to Switch	PMS accepts the message.

Operational Considerations (act-pms)

The following sections describe the Housekeeper Status operational consider-ations when the feature is active in the switch and the PMS is active.

Feature Access Code/Message Process Code Correlation

The feature access code (FAC) determines the process code used when the call originates from the room or from a designated station. The correlation between an FAC and the process code is specified by the relative numbering of the FAC in the switch installation translation. The meanings of the process codes (for example, that process code 21 means "housekeeper in room") are assigned by the PMS. For further clarification, refer to the implementation or administration manuals for your switch. Table 9 and Table 10 show some example feature access codes.

⇒ **NOTE:**
The definitions administered in the switch must match the definitions admin-istered on the PMS.

Table 9. Housekeeper Status from Room Feature Access Code Examples

FAC	Process Code	Definition
21	1	Housekeeper in Room
22	2	Room Clean - Vacant
23	3	Room Clean - Occupied
24	4	Room Not Clean - Vacant
25	5	Room Not Clean - Occupied
26	6	Room Clean - Needs Inspection

Table 10. Housekeeper Status from Designated Station Feature Access Code Examples

FAC	Process Code	Definition
31	1	Housekeeper in Room
32	2	Room Clean - Vacant
33	3	Room Clean - Occupied
34	4	Room Not Clean - Vacant

Switch Originating Dialing Procedures

The dialing procedures for the housekeepers are determined by the switch installation translation. The assignable items are as follows:

- Feature access codes (six possible for room-originated updates, four possible for designated station-originated updates) which correlate with PMS feature message process codes

- Station numbers capable of remote housekeeper status change [designated station(s)]

- Number of additional information digits (for example, number of Housekeeper ID digits) to be dialed and transmitted to the PMS (the same number of ID digits are used for either room or remote designation station).

The Housekeeper Status messages can carry, in addition to the affected station number, from 0 to 6 arbitrary variable digits entered by the caller via the touch-tone or rotary dial. With 0 additional information digits specified in switch translation, the dialing sequences are as follows:

- Room originated — FAC only

- Designated station — FAC + (dial tone) + affected station

If the number of additional digits specified in switch translation is nonzero (1-6), another dial tone is returned to the caller after the standard dialing sequence. The caller can then dial up to the number of digits specified (extra dialed digits are ignored). For a room originated call, for instance, the dialing sequences are as follows:

- Housekeeper in Room — FAC + (dial tone) + 1-6 additional digits + (confirmation tone)

- Designated Station — FAC + (dial tone) + digits of affected station + (dial tone) + 1-6 additional digits + (confirmation tone)

These additional digits can represent a Housekeeper ID number and/or a dialed status of the room or special request to the PMS. The dialed digits will be entered in the DIG1 through DIG6 fields of the transmitted Housekeeper Status feature message for interpretation by the PMS (see Figure 12 on Page 41 or Figure 13 on Page 42).

If the switch's translation defines the number of additional digits to be less than six, the digits will be placed starting at nibble DIG1 and the unused nibbles of the fixed length message will be padded out. If no additional digits are specified, all six DIG fields will be transmitted as nulls.

If an incomplete dial time-out occurs, no message will be sent to the PMS and intercept tone will be returned to the caller. If an incomplete sequence is dialed and the Housekeeper hangs up, no message will be sent to the PMS.

PMS Response to Housekeeper Status Feature Message

After the housekeeper dialing sequence is completed, the feature message (process codes 1-6 or 1-4) formatted with the affected RSN and any additional dialed digits is sent to the PMS.

The PMS must interpret the received message information and return the message to the switch within a 4-second interval [40 seconds maximum (GW), 1.5 seconds maximum (R5)]. The message text returned to the switch must be identical to the message received, with the exception of the message count and process code. The process code returned must be 8 (signifying rejection of the received message) or 9 (signifying acceptance of the received message information).

Switch Response to PMS Returned Messages

After the initial originating dialing sequence and message transmission to the PMS, the switch awaits the PMS returned message for a 4-second period [8 seconds (GW/R5)]. The switch will return one of the following tones to signify the completion status of the status update (provided the caller remains off-hook):

- Reorder tone: if a valid process code 8 or 9 message response is not received from the PMS before the 4-second interval [40-seconds (GW); 1.5-seconds (R5)]

- Confirmation tone: if a Content Valid (process code 9) message response is received from the PMS before the 4-second interval [40-seconds (GW); 1.5-seconds (R5)]

- Intercept tone: if a reject (process code 8) message response is received from the PMS before the 4-second interval [40-seconds (GW); 1.5-seconds (R5)].

If the caller goes on-hook (hangs up) before the time-out period or before the housekeeper status response message is received from the PMS, the received response message is ignored by the switch.

Failure Considerations

In the case of a data link or PMS failure (communication is severed), the switch will internally log message data, which would have been sent to the PMS for that call, using the **list pms-down** (or **list maintenance pms-down**) report available from the administration terminal. The message will have one of the following formats:

```
Extension        Event                    Reason        Date/Time

XXXX             from room, code x*       PMS link-out   xx:yy A
XXXXX            from station, code y*    PMS link-out   xx:yy P
```

Messages can also be routed to the optional PMS Log printer in the following format:

```
PMS dd/mm/yy   hh:mm   xxxx FROM ROOM:Code x* PMS link out of service
       or
PMS dd/mm/yy   hh:mm   xxxx FROM STATION:Code y* PMS link out of service
```

The caller is always given confirmation tone if the printer is up, assuming that later on immediate or manual entry into the PMS can be done from the printed copy or the **list pms-down** (or **list maintenance pms-down**) log command. The caller is given reorder tone if the printer is unavailable. For System 75 R1V3, the system returns confirmation tone independent of the printer state.

Housekeeper Status data will not be stored in the switch (System 75, DEFINITY Generic 1, and DEFINITY ECS V1). Therefore, during switch failure, room status information is not included in the database update procedure. Upon PMS failure, the data backups are the internal switch logging (**list pms-down** or **list maintenance pms-down**) and the optional printer output (PMS Log).

For the DEFINITY ECS V2-V4, DEFINITY ECS R5, and GuestWorks, you can use the (Maid Status) button to determine the room status even when the link to the PMS is down.

Operational Considerations (act-nopms)

With the feature inactive, the switch will not send housekeeper information to the PMS. However, this information will be logged on the PMS Log printer if a printer is available. The message will be printed as "Feature active nopms." The switch will ACK messages from the PMS for Housekeeper status; however, the switch will send a violation message to the PMS and not act on the received message.

---

*   In this example, "x" is a number from 1 to 6 and "y" is a number from 1 to 4.

Message Waiting

The Message Waiting feature turns on and turns off message waiting lamps in a room station under two conditions:

■ When the switch receives a message from the PMS

■ When a user presses the Message Waiting Notification button on the attendant console or a voice terminal (with notification to the PMS).

This feature controls only message status controlled by the PMS. Leave Word Calling or Lucent INTUITY AUDIX® messages that activate message waiting lamps are not communicated to the PMS from the switch.

Feature Codes

The Message Waiting feature codes are as follows:

■ 13 — Normal mode

■ 33 — Transparent mode

■ 23/MSG — ASCII mode.

The message format for this feature is shown in Figure 14 on Page 43.

Process Codes

The process codes for the Message Waiting feature are shown in Table 11.

Table 11. Message Waiting Process Codes [Feature Codes 13, (T) 33, or (A) 23/MSG]

Process Code	Message Direction	Indications
1	PMS to Switch	Turn on message lamp of room station indicated.
2	PMS to Switch	Turn off message lamp of room station indicated.
3	Switch to PMS	Message lamp of room station indicated has been turned on via Message Waiting Notification activation from the attendant console or voice terminal.
4	Switch to PMS	Message lamp of room station indicated has been turned off via Message Waiting Notification deactivation from the attendant console or voice terminal.
(T) (A) 5	Switch to PMS	Message lamp of room station indicated was already on or is still on due to another message type (for example, Leave Word Calling or Lucent INTUITY AUDIX).

Operational Considerations

The Message Waiting feature message(s) will be sent and/or received and interpreted based on whether the Message Waiting Configuration option on the switch is enabled for PMS support. The possibilities are as follows:

■ Feature active in switch with communication enabled on switch changes and action on valid PMS change requests (**act-pms**).

■ Feature active in switch with no PMS communication (**act-nopms**).

Feature Active with PMS

With the Message Waiting Configuration option enabled (**act-pms**), the operational considerations are as follows:

■ The message waiting status for each room station will be stored in switch memory.

■ When a change in message waiting state for a room station is entered via an attendant console or voice terminal (process code 3 to turn the lamp on or process code 4 to turn the lamp off), the message will be sent to the PMS with the RSN indicated.

■ Upon receipt in the switch of process code 1 to turn on the lamp or process code 2 to turn off the lamp, the appropriate lamp status change will be made by the switch.

   (T) (A) If the lamp is on due to another message type and process code 1 or 2 is sent to the switch, the switch will return process code 5.

■ When a (16,2), (T) (46,1), or (A) (29,1) room check-out message is received from the PMS, a (16,6), (T) (46,2), or (A) (29,2) check-out complete message will be sent to the PMS if the room station had the lamp on due to the PMS component of the message waiting lamp, and a (16,5), (T) (46,3), or (A) (29,3) message if the message waiting lamp is off. A (T) (46,5) or (A) (29,5) is sent if the message waiting lamp is on due to another message type (for example, LWC). The PMS component of the message waiting lamp for the RSN will always be in the off state after the (16,2), (T) (46,1), or (A) (29,1) message has been processed. Subsequent status inquiries will report that the lamp is off (that is, the PMS component is off), even if the lamp is on due to Lucent INTUITY AUDIX or Leave Word Calling which are not supported through this interface.

Feature Active Without PMS

With the Message Waiting Configuration option disabled (**act-nopms**), the switch does not send message waiting messages to the PMS. If the PMS sends message waiting messages to the switch, the switch will ACK the message. However, the switch will send a violation message to the PMS and not act on the received message.

PMS Considerations

If the PMS does not store message waiting data, the Room Data Image for the RSN can be requested to obtain the current status as discussed in "Room Data Image" starting on Page 72. However, if the switch reinitializes after a failure, this information may be incorrect.

Other Considerations

(A) The ASCII mode has two new frames to support text and FAX messages to the INTUITY. See Figure 14 on Page 43 for more information.

Controlled Restriction

The Controlled Restriction feature enables a guest room station line to be restricted using selected origination and/or termination capabilities either from switch terminals (with communication to the PMS), or on receipt of feature messages from the PMS.

⇒ **NOTE:**
The switch also has the capability to apply controlled restrictions to a group of rooms at one time. This capability is not supported on the PMS interface. Modification of user-controlled restrictions do not affect the values of group-controlled restrictions.

Feature Codes

The Controlled Restriction feature codes are as follows:

■   15 — Normal mode

■   35 — Transparent mode

■   25/CR — ASCII mode.

This feature message format is shown in Figure 15 on Page 44.

Process Codes

The process codes for the Controlled Restriction message are shown in Table 12.

Table 12. Controlled Restriction Process Codes [Feature Codes 15, (T) 35, or (A) 25/CR]

Process Code	Message Direction	Indications
1	PMS to Switch	Set indicated restriction for indicated RSN.
2	Switch to PMS	Restriction has been set as indicated for indicated RSN via the attendant console or a voice terminal.

Operational Considerations

The controlled restriction message communication with the PMS is based on the switch installation parameters. The possibilities are as follows:

- The feature is active in the switch with no communication with the PMS (**act-nopms**).

- The feature is active in the switch and communication with the PMS is active. In this configuration, the change can be initiated from either an attendant console or a voice terminal with console permissions on the switch (with notification of the change to the PMS), or from the PMS (with a request sent to the switch to impose the specified restriction level) (**act-pms**).

Switch Operations (act-pms)

The RSN and new restriction level will be sent to the PMS for changes to single user-controlled restriction levels.

When a (15,1), (T) (35,1), or (A) (25,1) message is received from the PMS, the restriction change indicated will be implemented on the indicated room station, overriding any previous single user-controlled restriction.

The controlled restriction level codes and the action indicated are shown in Table 13.

Table 13. Controlled Restriction Level Codes and Actions

Level	Action
00	No restrictions placed on RSN.
01	Outward restriction, which denies all local and toll calling from the room voice terminal, or toll* restriction, which denies all toll calls.
02	Station-to-station restriction, which denies all calls to or from other stations (both administrative and guest rooms), or toll* restriction, which denies all toll calls.
03	Outward/toll* and station-to-station/toll* restriction (both levels 01 and 02 above in effect).
04	Total restriction, which denies all calls to and from the room station (effectively cuts off the room station service).
05	Termination restriction, which denies all calls to the room station.
06	Outward/toll* and termination restriction (both levels 01 and 05 in effect).
07	Station-to-station/toll* and termination restriction (both levels 02 and 05 in effect).

* Toll restriction can be substituted for either outward restriction or station-to-station restriction (GW/R5).

When a controlled restriction is set on a room station, the denied outward/toll, termination, station-to-station/toll, and origination calls are routed to the translated intercept treatment.

The switch automatically removes previous single user-controlled restrictions, imposes controlled outward restriction on room check-out, and removes controlled outward restriction on room check-in. No (15,2), (T) (35,2), or (A) (25,2) message is sent from the switch to the PMS for the automatic change.

⟹ **NOTE:**
If the Controlled Restriction Communication feature is active for the PMS, only manual changes made from a voice terminal for a **single** room will be sent to the PMS. Group controlled restrictions will not be communicated to the PMS. Modification of user-controlled restrictions do not affect the values of group-controlled restrictions.

PMS Considerations

If the PMS stores controlled restrictions and sends a restriction message altering the level of restriction on a station, the PMS must also change its stored restriction level.

Switch Operations (act-nopms)

With the feature translated as **act-nopms**, the switch will not send controlled restriction messages to the PMS. If the PMS sends control restriction messages to the switch, the switch will acknowledge the messages. However, the switch will send a violation message to the PMS and not act on the received message.

Other Considerations

In ASCII Mode, the restriction level value is a 2-digit field. When the restriction level is sent to the PMS, it is sent as "digit-blank." The switch can receive the restriction level in several different ways: 0-digit, digit-blank, or blank-digit.

Check-In/Check-Out

The Check-in/Check-out messages do not represent a unique feature, but rather are a convenient device for invoking a sequence of functions commonly performed when a guest checks in or checks out of a room. It is expected that each check-in or check-out performed in the PMS will immediately be transmitted to the switch[*]. Upon reception of the check-in/check-out message, the switch performs a sequence of operations based on its feature definitions.

The transmission of the check-in/check-out feature messages from the PMS is not an optional switch installation parameter, but is assumed a standard feature for switch operational integrity if the PMS is controlling room status.

The switch requires the check-in/check-out notification from the PMS to perform the appropriate internal status changes for that guest room for message waiting lamp status, wakeup request, and controlled restriction level. (T) (A) The switch also performs changes to the guest name and coverage path numbers. Failure to communicate check-in or check-out information could result in invalid message waiting lamp status, the guest being unable to originate room station calls, the guest receiving an unrequested wakeup call (or no wakeup call at all) and (T) (A) erroneous guest names and coverage paths. Immediate notification to the switch from the PMS is necessary to prevent these sources of guest dissatisfaction.

Feature Codes

The Check-In/Check-Out feature codes are as follows:

- 16 — Normal mode (combined check-in/check-out message)
- 36 — Transparent mode (check-in message)
- 46 — Transparent mode (check-out message)
- 26/CKI — ASCII mode (check-in message)
- 29/CKO — ASCII mode (check-out message).

These feature message formats are shown in Figure 16 on Page 45, Figure 17 on Page 46, and Figure 18 on Page 47.

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[*] The check-in message should also be sent if a guest is reinstated after having checked out initially.

Process Codes

The process codes for the Check-In/Check-Out features are shown in Table 14.

Table 14. Check-In/Check-Out Process Codes (Feature Code 16)

Process Code	Message Direction	Indications
1	PMS to Switch	Switch is to perform the functions associated with check-in for the indicated RSN.
2	PMS to Switch	Switch is to perform the functions associated with check-out for the indicated RSN.
5	Switch to PMS	Check-out functions were completed for the indicated RSN and the message waiting lamp was not on.
6	Switch to PMS	Check-out functions were completed for the indicated RSN and the message waiting lamp was on.
7	Switch to PMS	Confirmation of receipt of check-out message: no action was taken because the indicated RSN was already vacant.
8	Switch to PMS	Confirmation of receipt of check-in message: no action was taken because the indicated RSN was already occupied.

The process codes for the Check-In feature are shown in Table 15.

Table 15. Check-In Process Codes [Feature Codes (T) 36 or (A) 26/CKI]

Process Code	Message Direction	Indications
1	PMS to Switch	Switch is to perform the functions associated with check-in for the indicated RSN.
2	Switch to PMS	Confirmation of receipt of check-in message: no action was taken because the indicated RSN was already occupied.

The process codes for the Check-Out feature are shown in Table 16

Table 16. Check-Out Process Codes [Feature Codes (T) 46 or (A) 29/CKO]

Process Code	Message Direction	Indications
1	PMS to Switch	Switch is to perform the functions associated with check-out for the indicated RSN.
2	Switch to PMS	Check-out functions were completed for the indicated RSN and the message waiting lamp was not on.
3	Switch to PMS	Check-out functions were completed for the indicated RSN and the message waiting lamp was on.
4	Switch to PMS	Confirmation of receipt of check-out message: no action was taken because the indicated RSN was already vacant.
5	Switch to PMS	Check-out functions were completed for the indicated RSN and message waiting lamp is still on due to another message type (for example, Leave Word Calling or Lucent INTUITY AUDIX).

Operational Considerations

The switch will maintain a vacant/occupied status for each RSN. The two possible states for a room are vacant or occupied. These two switch states will be updated by the receipt of the check-in and check-out messages from the PMS. Under normal operation, check-in and check-out will not be performed at the switch attendant console or voice terminals. These functions will only be done at the PMS terminals. The PMS is required to send each check-in/check-out immediately to the switch to support the PMS data link and associated switch operations.

For the DEFINITY ECS V2-V4, DEFINITY ECS R5, and GuestWorks, you can use the ⌞Occupd Rooms⌟ button to determine the room status when the link to the PMS is down.

Switch Actions

When a room check-in message (process code 1) is received from the PMS, the status of that room will be set to Occupied. This change does the following (if the associated function is active in the switch):

- Deactivates Controlled Outward/Toll Restriction

- (T) (A) Stores guest name

- (T) (A) Stores coverage path

- (T) (A) Removes Leave Word Calling (LWC) messages.

When a room check-out message (16,2), (T) (46,1), or (A) (29,1) is received from the PMS, the status of that room will be set to Vacant. This change also does the following (if the associated function is active in the switch):

- Turns off the message waiting lamp PMS component for the indicated RSN

- Clears any existing wakeup entry for the room

- Cancels any current controlled restriction and activate Controlled Outward/ Toll Restriction

- (T) (A) Removes guest name

- (T) (A) Sets coverage path to "Default Coverage Path for Client Rooms" field value

- (T) (A) Checks for other message types and return (46,5) or (29,5) if found.

Other Considerations

The Check-Out Confirmed-Room Already Vacant (16,7), (T) (36,4), or (A) (26,4) and the Check-In Confirmed-Room Already Occupied (16,8), (T) (36,2), or (A) (26,2) messages will be sent to the PMS when a check-out request is received for a vacant room and a check-in request is received for an occupied room, respectively. (T) (A) A Check-Out Confirmed-Other message type (T) (46,5) or (A) (29,5) will be sent to the PMS if the room's message lamp is on due to a non-PMS message. These are not counted as error or invalid conditions by the switch.

The name characters are ASCII and must be between 0x20 (space character) and 0x7e (tilda character) in value. If the name consists of less than 15 characters, the name field must be left-justified by padding the remaining characters with the space (0x20) character.

The data portion of the coverage path field in the check-in message for the transparent PMS protocol consists of three or four Binary Coded Decimal (BCD) characters representing the thousands, hundreds, tens, and unit digits with the following valid values:

- 0 — No coverage is provided for the station

- 1-xxxx — Coverage path used (see the coverage path values on Page 17)

- 0xbbb or 0xbbbb— Coverage path value of the "Default Coverage Path for Client Rooms" field on the switch is used.

(A) The LANGUAGE frames identify which language is for the Lucent INTUITY Lodging voice messaging for the guest rooms. To use the default language, send blanks. To use a particular language, send the language number as defined in the *INTUITY Lodging Property Management System Interface Specifications*,

(585-310-234). At the time of publication, the following is a list of the different language encodes supported by Lucent INTUITY Lodging:

	Hex Value and Message Position		INTUITY Lodging Numbering
Language	Language 1	Language 2	
American English	32	30	00
Japanese	32	31	01
Latin American Spanish	32	32	02
Greek	32	33	03
Mandarin	32	34	04
Reserved for future use	32	35	05
UK English	32	36	06
Canadian French	32	37	07
Brazilian Portuguese	32	38	08

⇒ NOTE:
French and German are scheduled for release in 3Q97. Contact your Lucent Technologies representative for more information about language support.

(A) The VM PASSWD frames are used to change the voice mail password when a guest checks in. To use the default password, send blanks.

Failure Considerations

When loss of communication with the PMS occurs due to failure of the data link or the PMS, the switch will enable the ⬚ Check In ⬚ and ⬚ Check Out ⬚ buttons so that a switch terminal (attendant console or display voice terminal with console permissions) can be used for check-in and check-out. Check-in and check-out on the switch terminal will perform the functions outlined above except guest name and coverage path information which can be entered later using Guest Information Input/Change messages from the PMS or the database swap can fill in. Manual check-in/check-out always sets the coverage path to "Default Coverage Path for Client Rooms."

During the recovery procedure, the RSN's occupancy status specified by the PMS in the (17,3), (T) (37,3), or (A) (27,3) room image message may be different from the switch status for the indicated room, implying a check-in or check-out be performed for that RSN in the switch for synchronization.

Room Data Image

The Room Data Image feature provides a means for sending and receiving the set of pertinent status items for a particular RSN to or from the each system (the PMS or the switch). Two of the process codes are provided for "informational exchange" about the other system's status and do not imply that status changes are to be performed. The other two process codes are provided for the "database exchange" recovery procedure and can imply status changes in either or both systems.

Feature Codes

The Room Data Image feature codes are as follows:

- 17 — Normal mode
- 37 — Transparent mode
- 27/RMI — ASCII mode

This feature message format is shown in Figure 19 on Page 48.

Process Codes

The process codes for the Room Data Image feature are shown in Table 17.

Table 17. Room Data Image Process Codes [Feature Codes 17, (T) 37, or (A) 27/RMI]

Process Code	Message Direction	Indications
1	PMS to Switch	Request to send the data image for indicated room for informational purposes only.
2	Switch to PMS	Response to received process code 1 message.
3	PMS to Switch	Database update status information and/or request for switch status.
4	Switch to PMS	Database update switch status response to process code 3.

Operational Considerations

Process codes 1 and 2 are used in the informational exchange mode. The PMS will request status items from the switch by sending process code 1; the switch will reply with pertinent data by returning process code 2. Process code 1 does not imply or dictate any status change to the receiving system. The PMS may initiate a process code 1 request at any time.

Process codes 3 and 4 are reserved for the database exchange procedure only. The switch will acknowledge but not process the messages and return violation messages if they are sent at any other time. The database "swap" procedure is defined as the message sequence between and including the transmission of the (70,3) or (A) (71,3) database exchange "start" message and the transmission of the (70,4) or (A) (71,4) database exchange "end" message (both originated by the PMS). The (70,3) or (A) (71,3) message signals the start of database synchronization. Then, for each room, a process code 3 message is sent by the PMS specifying current PMS status data and/or requesting switch status data. The switch will process the process code 3 message and return a process code 4 message containing any requested switch status. Thus the exchange constitutes a synchronization of the two systems' databases for a particular room. After the process code 3/process code 4 exchange for all rooms, the (70,4) or (A) (71,4) message from the PMS signals the end of the database synchronization procedure.

The Room Data Image feature message item fields are shown in Table 18.

Table 18. Room Data Image Feature Message Item Fields

Fields	Values
Room Station Number (RSN)	Station Number
*Occupied/Vacant Status	0=Vacant, 1=Occupied
Message Waiting Lamp Status	0=Off, 1=On
Controlled Restriction Level Code	See Table 13
(T) (A) Guest Name	Name String
(T) (A) Coverage Path Number	1-xxxx*, 0xbbb or 0xbbbb
* Can also take null values as described below.	

The name characters are ASCII and must be between 0x20 (space character) and 0x7e (tilda character) in value. If the name consists of less than 15 characters, the name field must be left-justified by padding the remaining characters with the space (0x20) character.

The coverage path field in the room data image message for the transparent and ASCII PMS protocols consists of three or four BCD characters representing the thousands, hundreds, tens, and unit digits with the following valid values:

- 0 — No coverage is provided for the station

- 1-xxxx — Coverage path used (see the coverage path values on Page 17)

- 0xbbb or 0xbbbb — Coverage path value of the "Default Coverage Path for Client Rooms" field on the switch is used.

- 0xfff or 0xffff — "Null" coverage path value used in room data image message only to request coverage path value stored on switch for an extension.

There are two types of room messages: status request (process codes 1 and 3) and status response (process codes 2 and 4). If the switch receives a status request message, it appropriately processes the message and returns a status response message. Appropriate processing depends on the values received in the status fields of the status request message.

If a status request message with process code 1 is received at the switch, for any field that is null (0xf in non-ASCII fields and 0x3f in all bytes of ASCII fields), the switch fills in the corresponding field in the status response message with the internal data associated with that field or a null if status is unavailable. For all fields that are non-null, the non-null value that was received is ignored, but is returned in the corresponding field of the response message. The status response message with process code 2 is then transmitted to the PMS.

If a status request message with process code 3 is received at the switch for any field that is null, the switch fills in the corresponding field in the status response with the data associated with that field or a null if status is unavailable. For all fields that are non-null, the switch will update its internal data with the received values, place a null in the corresponding field in the status response message, and transmit the response message with process code 4.

⇒ **NOTE:**
A field is reserved in the room image message for each status item possible in a data link configuration, even though not all the feature messages may be activated. The switch will ignore any request for status or implied change for any field for which normal status changes are not communicated. For instance, if the controlled restriction (15,x), (T) (35,x), or (A) (25,x) feature message is not enabled in a particular data link configuration, the controlled restriction field in the room image message is likewise inactive.

Table 19 provides a listing of room image messages and the examples which follow show the typical use of the room image exchange.

Table 19. Data Field Interpretations for Room Data Image Messages

Message	Direction	Status Field Specification	
		Null	**Non-Null**
(17,1) (T) (37,1) (A) (27,1)	PMS to Switch	Status request	Ignored
(17,2) (T) (37,2) (A) (27,2)	Switch to PMS	No status available	Returned status
(17,3) (T) (37,3) (A) (27,3)	PMS to Switch	Status request	PMS status: switch should set its status
(17,4) (T) (37,4) (A) (27,4)	Switch to PMS	Either no status available or status has been updated	Switch status returned

Examples

Table 20 shows a sample informational request for a room, originated by the PMS. The switch shows the room with no message waiting, guest name "Smith,J" and coverage path 1. All feature messages except the controlled restriction communication are active.

Table 20. Informational Exchange

Originator	Message	Occupied /Vacant	Message Waiting	Controlled Restriction	Guest Name	Call Coverage Path
PMS	(T) (37,1) (A) (27,1)	1*	Null	Null	Null†	Null
Switch	(T) (37,2) (A) (27,2)	1	0	Null‡	Smith, J§	001

* The PMS must always provide the occupied/vacant status.
† A Null for a guest name field is 15 question mark characters (0x3f).
‡ The Controlled Restriction Communication was not enabled. Therefore, the switch has no information available for request.
§ Remaining characters in this field will be padded with ASCII space (0x20).

Using the same system configuration used for the example above, the process code 3/process code 4 exchange for database update purposes might look like Table 21.

Table 21. Room Synchronization Exchange

Originator	Message	Occupied /Vacant	Message Waiting	Controlled Restriction	Guest Name	Call Coverage Path
PMS	(T) (37,3) (A) (27,3)	1*	1	Null	Smith,J	001
Switch	(T) (37,4) (A) (27,4)	Null	Null	Null†	Null‡	Null

* The PMS must always provide the occupied/vacant status.

† The Controlled Restriction Communication was not enabled. Therefore, the switch has no information available for request.

‡ A Null for a guest name field is 15 question mark characters (0x3f).

The switch will set the status of the room to "occupied," with the message waiting lamp on.

PMS Considerations for Process Code 3

Process code 3 sent from the PMS and the associated process code 4 sent from the switch constitutes an individual "room database exchange" for the purpose of database update after a detected failure.

Process code 3 provides a way for the PMS to send the switch the current valid data stored in the PMS, and request the current valid data stored in the switch. This is done to force a database update during the recovery procedure after a failure.

The PMS should insert its current status values in the occupied/vacant field because the PMS is considered the "master." The PMS is always considered the source for room occupied/vacant status. The master source for message waiting lamp status, controlled restriction status, (T) (A) guest names and coverage path number may vary based on a particular operating environment. If the PMS wishes to receive the current switch data for message waiting lamp status, controlled restriction, and (T) (A) guest name or coverage path number, the PMS must place nulls in the appropriate positional fields of the process code 3 message requesting switch response, if applicable.

**Switch Actions Upon Receipt of Room Image
with Process Code 3**

The switch will change its database to the passed values in the process code 3 message from the PMS for non-null, active fields. Switch status will be returned in the null, active fields.

Switch processing is done in the following sequence:

1. Perform any implied occupied/vacant status change (see detailed description below).

2. Process individual status fields for message waiting lamp status, controlled restriction status, (T) (A) coverage path, and (T) (A) guest name.

3. Return status for any requested active fields.

Vacant-to-occupied or occupied-to-vacant transitions as implied in the received process code 3 message will perform the corresponding check-in or check-out operations in the switch as follows:

■ Vacant-to-Occupied (PMS has occupied, switch has vacant)

1. The standard check-in operations for controlled restriction, with no status change of either the message waiting lamp status or wakeup status; the status of the room station in the switch is set to Occupied; active fields in the process code 3 message for status items from the PMS will then override the switch status (for example, a non-null message lamp field will override switch status if the message waiting message feature is active).

2. The process code 4 (room image recovery response) will then be sent to the PMS with switch status items supplied for the null fields (T) (A) (and '?' fields for guest name characters) in the received process code 3 message, and nulls in the received active fields.

■ Occupied-to-Vacant (PMS Vacant, Switch Occupied)

1. The status of the room station in the switch is set to Vacant.

2. Outward [or Toll (GW/R5)] Restriction will be placed on the room station.

3. Since the possibility exists that a manual check-in was done through the switch which may not have yet been entered in the PMS after a PMS failure, the wakeup and message waiting lamp status settings are **not** reset in the switch.

4. Any active fields in the received process code 3 message from the PMS for the indicated RSN will override the switch status.

5. The process code 4 message is returned to the PMS with nulls in the received active fields, and with data supplied in received null fields.

PMS Actions for Room Image Complement Message (Process Code 4)

Process code 4 is sent from the switch to the PMS and provides the complement data image in response to the process code 3 image sent from the PMS. It is assumed that the PMS will update its status accordingly for the active fields returned from the switch.

Other Considerations

In ASCII Mode, the restriction level value is a 2-digit field. When the restriction level is sent to the PMS, it is sent as "digit-blank." The switch can receive the restriction level in several different ways: 0-digit, digit-blank, or blank-digit.

Room Change/Room Swap

The Room Change/Room Swap feature is used by the PMS to notify the switch that a Room Change or a Room Swap has been made between two rooms. A room change message will be transmitted to the switch when a guest in an occupied room wishes to be moved to a different vacant room. A room swap message will be transmitted when guest status information should be exchanged between two occupied rooms. It is expected that each Room Change/Room Swap performed in the PMS will immediately be transmitted to the switch. This feature message is provided to allow automatic wakeup entries, message waiting indicators for PMS activation, controlled restrictions, and room status to be assigned to the correct room. (T) (A) Also, guest names and coverage information will be assigned to the correct room.

Although feature operations (for example, check-in and check-out) could be used to partially simulate this operation, the functions performed on the switch will not be exactly the same. For example, an Automatic Wakeup request is canceled automatically if a check-out/check-in sequence is used.

Feature Codes

The Room Change/Room Swap feature codes are as follows:

- 20 — Normal mode
- 30 — Transparent mode
- 24/RMC — ASCII mode.

This feature message format is shown in Figure 20 on Page 49.

Process Codes

The process codes for the Room Change/Room Swap feature are shown in Table 22.

Table 22. Room Change/Room Swap Process Codes [Feature Codes 20, (T) 30, or (A) 24/RMC]

Process Code	Message Direction	Indications
1	PMS to Switch	Room change to STAx from STFx [x=1-4 or (T) (A) 1-5].
2	PMS to Switch	Room swap between STAx and STFx [x=1-4 or (T) (A) 1-5].
3	Switch to PMS	Room change/swap performed but an error was detected in room status.

Operational Considerations

Process code 1 is used for the room change message. When the message is received, the switch will transfer the automatic wakeup entry, do not disturb, PMS type message waiting, controlled restrictions, as well as (T) (A) guest name, coverage path, and voice mail from the old room to the new room. If the new room is not vacant (switch status "vacant") or the old room is not occupied (switch status "occupied"), the switch will return the message with a process code of 3 indicating that the change was performed but the status states were inconsistent. The room change will effect the following status states:

■ Room Status - Change the old room in the switch to vacant and the new room to occupied.

■ Wakeup - Move the old room wakeup entry to the new room canceling any existing entry. If the old room has no entry, leave any existing entry for the new room intact.

■ Message Waiting - Turn on the message waiting for the new room if the old room or the new room has a message waiting on.

■ Controlled Restriction - Move the old room controlled restriction to the new room. If the old room is vacant with outward restriction (and Controlled Outward Restriction active), the new room should have no restriction.

■ (T) (A) Replace the coverage path number of the new room with the guest's coverage path number and change the old room to the default path. However, if the room state of the old and new rooms are not occupied and vacant, respectively, the coverage path is swapped instead. Thus, in the event of an error, repeating the operation returns the room to its original state.

■ (T) (A) Change the guest name in the old room to the new room and blank out the guest name in the old room. However, if the room state of the old and new rooms are not occupied and vacant, respectively, the name information is swapped. Thus, in the event of an error, repeating the operation returns the room to its original state.

Process code 2 is used for the room swap message. When the message is received, the switch will swap the automatic wakeup entry, do not disturb, PMS type message waiting, controlled restrictions, as well as (T) (A) guest name, coverage path, and voice mail between room 1 and room 2. Since normal change is from an occupied room to an occupied room, both rooms should be occupied. If other status states are present, the swap will be performed changing both rooms to the occupied state, with the exception that outward restriction in a vacant room will be changed to no restriction. The switch will also return the message with the process code of 3, indicating that the swap was done but the status states were inconsistent.

Guest Information Input/Change

Guest Information Input/Change feature allows changes to or inputs of guest infor-mation (guest name and coverage path) after the check-in of the associated RSN has been completed. The message can be used to input a name and coverage path subsequent to check-in, change an incorrect guest name, and/or alter the coverage path number. See "Implementation Examples" starting on Page 19.

Feature Codes

The Guest Information Input/Change feature codes are as follows:

- N/A — Normal mode
- 38 — Transparent mode
- 28/GIC — ASCII mode.

This feature message format is shown in Figure 21 on Page 50.

Process Codes

The process codes for the Guest Information Input/Change feature are shown in Table 23.

Table 23. Guest Information Input/Charge Process Codes [Feature Codes (T) 38 or (A) 28/GIC]

Process Code	Message Direction	Indications
1	PMS to Switch	Change/Input the following guest name and coverage Path Number for RSN.
2	Switch to PMS	Change/Input complete as requested for RSN.
3	Switch to PMS	Change/Input received, no action taken, RSN vacant.
4	Switch to PMS	Change/Input received, no action taken, information the same as that stored for RSN.

Operational Considerations

All 15 name characters in the name field must be printable ASCII codes 0x20 to 0x7E. If the name consists of less than 15 characters, the name must be left-justified by padding with ASCII space character 0x20. These characters may consist of "Unknown" or "To Be Decided" if the name is not known.[*] When sending the Guest Information Input/Change (T) 38 or (A) 28 message to alter a guest name or coverage path number, the PMS must send both the name and coverage number even if only one or the other is being changed/inputted.

One of three responses will be returned when the PMS sends a GI message to update or input the guest information. When the PMS sends the switch a process code 1 message, the switch will try to perform the input or change the information. If the change/input is successful, the switch will return a process code 2 message to the PMS. If the PMS sends a process code 1 message for an RSN that is vacant, the switch will acknowledge the receipt of the message with process code 3 to the PMS, but will not change any data for that RSN. If the PMS sends a process code 1 message for an RSN but the data stored within the switch for that RSN is the same as sent, the switch will return a process code 4 message acknowledging the receipt of the message without changes.

The coverage path field in the guest information input/change message for the transparent PMS protocol mode consists of three or four BCD characters representing the thousands, hundreds, tens, and unit digits with the following valid values:

- 0 — No coverage is provided for the station.

- 1-xxxx — Coverage path used (see the coverage path values on Page 17).

- 0xbbb or 0xbbbb — Coverage path value of the "Default Coverage Path for Client Rooms" field on the switch is used.

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[*] This feature allows a property to preregister a guest without having to know the guest name. This is useful in those situations when a business (for example, airlines or a sports team) reserve rooms for employees without providing the actual employee name.

Status Inquiry and Failure Management

The Status Inquiry and Failure Management feature provides general data link maintenance activity.

$\Longrightarrow$ **NOTE:**
See *INTUITY Lodging Property Management System Interface Specifications*, (585-310-234), for information about troubleshooting the data link between the PMS and the Lucent INTUITY Lodging system.

Feature Codes

The Status Inquiry and Failure Management feature codes are as follows:

- 70 — Normal mode
- 70 — Transparent mode
- 71/STS — ASCII mode.

This feature message format is shown in Figure 22 on Page 51.

Process Codes

The process codes for the Status Inquiry and Failure Management feature are shown in Table 24.

Table 24. Status Inquiry and Failure Management Process Codes [Feature Codes 70 or (A) 71/STS]

Process Code	Message Direction	Indications
NULL (F)	PMS to Switch	Heartbeat message; must be issued by the PMS within every LIT interval and no more often than 500 ms.
0	Switch to PMS	Acknowledgment of no operation (NOP) "are you there" message from the PMS, indicating that the switch has had no changes that were not communicated to the PMS and has not initialized. Note that while in the "normal mode" the process code 0 is encoded as an A in the message frame sent to PMS (see Figure 7). This message will be sent **only** in response to a (70,F) or (71,F) message from the PMS.
1	Switch to PMS	NOP acknowledgment indicating that at least one non-communicated change in the switch has occurred during a communications failure; the PMS must initiate a database exchange.
2	Switch to PMS	NOP acknowledgment indicating that the switch had failed and the status memory has been initialized; the PMS must initiate a database exchange.
3	PMS to Switch	Start of database room exchange; the PMS will be sending a room image message for each room requiring status synchronization.
4	PMS to Switch	End of database exchange.
5	Switch to PMS or PMS to Switch	Release of the data link is requested for maintenance activity; process code 6 is confirmation.
6	Switch to PMS or PMS to Switch	Release of the data link confirmed; all necessary actions have been taken.

Operational Considerations

The primary purpose of the Status Inquiry messages is to indicate to both systems whether the data link interface is "up" (capable of normal communications) or "down" (not capable of normal communications).

The general philosophy of data link failure recognition and subsequent recovery is based on the following points:

■ Either system may recognize a failure as defined below and the switch may request or the PMS may initiate a database synchronization procedure (the room image exchange) once the physical link is reestablished.

■ The PMS system has control of when a database exchange will be initiated, which room stations will be included in the exchange, and which status items will be supplied to the switch for update for each room. However, after the switch requests a Database Swap (process code 1 or process code 2), the switch will not process other messages except Status Inquiry process code F until a process code 3 data swap begin message is sent by the PMS. The switch will acknowledge the message but will not change any stored information. Also, the switch will continue to use process code 1 or process code 2 status inquiry messages until the PMS sends a process code 3 database message.

■ The NOP Status Inquiry process code F message must be sent to the switch at an interval not sooner than every 500 ms and not more than the administered LIT parameter; the receipt of this message informs the switch that the PMS is operational in case no other traffic has been received, and also provides the switch the stimulus to inform the PMS if the switch has detected a failure (via returned process codes 1 or 2).

■ The LIT must be administered consistently between the PMS and the switch.

Recognition of Data Link Failure

Either system may recognize a loss of communication by one or more of the following occurrences:

■ Lack of traffic within the LIT interval. The switch recognizes this by lack of any message received from the PMS within the period. The PMS recognizes it when it does not receive a process code 1, process code 2, or process code 3 message within the LIT immediately following its transmittal of a process code F message.

■ When the PMS drops DTR.

■ When the switch drops DSR.

- Other conditions, such as unavailability of buffers or queuing capability, which result in an inability to communicate the status change message.

- Dropping of data link for maintenance requested and confirmed.

A data link failure will necessitate a database room exchange recovery procedure if any implied status change cannot be communicated to the other system and cannot be queued for later transmission. Note that even with a detected data link failure, a database recovery exchange is not necessarily needed if there has been no implied status changes lost (not transmitted or queued).

In addition to the above data link failures, the switch keeps track of erroneous events and drops the link if the internal switch counter goes over 50. The counter is incremented by one for any of the following events and decremented by one whenever a good message is received from the PMS.

- A control character was received without a DLE in front of it.

- A noncontrol character was received outside of the STX/ETX frame.

- An ETX was received when a message was not being received.

- An ACK, ENQ, NAK, or STX was detected in the middle of a message.

- An unexpected ACK, or NAK was received.

- The PMS sent an STX before the switch acknowledged the last message.

- The message text of an incoming message was less than two bytes.

- The message count for a message was the same as for the last message.

- An ACK/NAK was never received after ENQs were transmitted (and retransmitted).

- The switch exceeded maximum retransmission of a message.

- The BCC timer expired.

Release of Data Link for Maintenance
(Process Codes 5, 6)

Either system may request a temporary release of the data link for maintenance purposes by transmitting a process code 5 Data Link Release Request message to the other system. The receiving system should perform any processing required and return the process code 6 Data Link Release Confirmed message as soon as possible. If process code 6 is not returned within 5 seconds, the sender will stop the protocol or bring down the link.

During switch maintenance, the PMS may continue to send process code F Status Inquiry messages, provided that EIA pin 6 (Data Set Ready) from the switch is in the "on" state. The switch will turn EIA pin 6 on and respond to process code F messages when maintenance is completed.

While the data link is released on request of the PMS, the switch will continue to attempt to read process code F messages from the PMS. EIA pin number 20 (Data Terminal Ready) in the "off" state from the PMS will indicate that reads should not be attempted. When EIA pin 20 is on and a process code F message is received from the PMS, the switch will assume that PMS maintenance is over and communication can be resumed. However, if messages other than status inquiry messages are transmitted, the switch will ignore the messages and bring down the link if ten or more such messages are recorded.

The switch will attempt to send a process code 5 message when the **test pms-link long** or **busyout pms-link** (**execute test pms-link long** or **execute busyout pms-link**) commands are issued on the administration terminal. If either the PMS or switch sends the message with a process code 5 to request the release of the data link, the release reason field is filled in as follows:

Table 25. Data Link Request Reason Codes

Reason Code	Indication
1	One flushed message
2	Excessive protocol violations
3	Excessive violation messages*
4	Cannot receive messages
5	Craft demanded maintenance
6	System demanded maintenance*
7	Ten protocol startup violations
F	Reason code not provided/supported

 * System 75 R1V3 and DEFINITY G1 do not send a (70,5) for excessive violation messages, system demanded maintenance, and processor element interchange ("hot start"). However, these functions may be implemented in the future.

Switch Operations During Loss of Communication

The switch will continue to support the basic telecommunications functions if the data link or PMS becomes unavailable. Upon detection of a data link failure, the switch will automatically switch to the "Link Failed Mode" to perform the following tasks:

■ Enable the ⌐Check In⌐ and ⌐Check Out⌐ buttons so that a switch terminal (attendant console or display voice terminal with console permissions) can be used for check-in and check-out.

■ Journal any dialed housekeeper/status information to the optional PMS log printer for manual entry (either now or later) into the PMS system (or return reorder tone to housekeeper status calls if the housekeeper PMS Log Printer not available).

■ Log events normally sent to the PMS in an audit trail, accessed by the **list pms-down** (or **list maintenance pms-down**) command.

■ Continue to support basic telecommunications.

■ Continued support of message waiting and/or controlled restriction.

The switch will continue to attempt to receive messages from the PMS during data link failure. If a message is received from the PMS with no missed status change communications within the switch, data link operation will resume normally with no database exchange requested by the switch. (T) (A) If during data link failure the switch processes a status change which normally would have been sent to the PMS, the switch sets itself to return a process code 1 response (process code 2 if the link failure was due to a switch restart) to all process code F messages received from the PMS until a process code 3 message is received. (T) (A) The receipt of a process code 1 response from the switch to a process code F will indicate to the PMS that a database image exchange should be initiated for database synchronization.

PMS Operations During Loss of Communication

During the loss of communication, it is expected that the PMS will continue to operate normally, accepting check-ins and check-outs, etc. The PMS can queue the changes which normally would be sent to the switch in anticipation of resuming communication. These changes should be queued in such a way that order of receipt in the PMS will be maintained.

In the case where the PMS remains operational during a data link failure, the PMS should continue sending the process code F Status Inquiry message as long as the PMS is ready to resume communication.

Recovery from Loss of Communication

In the case of a PMS failure, it is assumed that check-in/check-outs may need to be done manually and entered into the PMS system at a later time when the system is again operational. The PMS should not resume transmission of the process code F Status Inquiry message to reestablish communication until the database has been brought to as current a status as possible. This is to prevent the premature transmission of incorrect data to the switch via the database exchange update procedure.

In the case where the PMS has remained operational during a data link failure, the PMS should continue to attempt to send the Status Inquiry process code F messages. A Status Inquiry response (one of process codes 0, 1, or 2) from the switch will indicate that communication has been reestablished.

A process code 0 response indicates that the switch has had no status changes during the data link failure period and that the switch has automatically switched back to the normal operating mode "data link active" (switch-activated check-in/check-out disabled).

A switch response of process code 1 indicates that the switch has had at least one uncommunicated status change and that the PMS should initiate a database room image exchange to synchronize the databases.

A switch response of process code 2 indicates that the switch has failed and that status memory has been initialized with each room station in the following status:

Room Status = Occupied
Controlled restriction level = nonrestricted state
Message Waiting Lamp = off
(T) (A) Guest name = BLANK
(T) (A) Coverage Path = No coverage

In response to the receipt of a status inquiry message that has a process code of 1 or 2, the PMS must immediately initiate a database swap. The database swap must include either of the following:

■ All rooms

■ Vacant rooms plus occupied rooms with:

— Message Waiting

— Restrictions

— (T) (A) Populated name fields

— (T) (A) Coverage paths

The Database Exchange Procedure

If the switch has recognized the reestablishment of communication and responded with a process code 1 or process code 2 message to the PMS, the switch will not process any message type received from the PMS, **except** Status Inquiry messages, until the PMS initiates the database exchange procedure.

The PMS has control of when a database exchange will be initiated, which room stations will be included in the exchange, and which status items will be supplied to the switch for update for each room. However, after the switch requests a Database Swap (process code 1 or process code 2), the switch expects the database swap to start. For DEFINITY, if the PMS sends ten messages that are not status inquiry messages before sending the process code 3 message, the switch will log an error, attempt to send a process code 5 message, and eventually tear down the link. The switch will continue to use process code 1 or process code 2 status inquiry messages until the PMS sends a process code 3 database message.

The PMS indicates the start of the database room exchange by transmitting a process code 3 Status Inquiry message to the switch. The receipt of the process code 3 message in the switch indicates the following to the switch:

1. A database room exchange will commence, and

2. Transmission of normal status changes can be reinitiated.

After transmission of the process code 3 message, the PMS should then transmit the room data exchange image message (17,3), (T) (37,3), or (A) (27,3) for each room for which synchronization is required. Note that some time delay may be necessary between each room data image message so that the maximum message rate for the data link is not exceeded, and to provide "space" for normal status change feature messages.

The switch will process each room data image (17,3), (T) (37,3), or (A) (27,3) message and return the complement room data image message (17,4), (T) (37,4), or (A) (27,4) in response as soon as the LAT occurs. This allows the PMS to use ENQ characters as described in "Room Data Image" starting on Page 72. "Check-In/Check-Out" starting on Page 67, "Room Change/Room Swap" starting on Page 79, and "Guest Information Input/Change" starting on Page 81 also describe switch handling.

As mentioned previously, normal feature messages may be sent or received during the database room image exchange procedure. Care should be taken to insure that the **most current** status is always presented via message sequence for a particular room to the switch. For example, a status change done at a PMS terminal may occur simultaneously with the access of the data for the room data image message for that particular room. If the switch were to receive the "new" individual feature message, followed by the room data image with the "old" status value, the switch would set its status to the "old" status value, leaving the two

databases out of synchronization. Correct message sequencing and data access should be done to eliminate this possibility. The PMS can assume that the switch will send the most current individual status change or most current data in the (17,4), (T) (37,4), or (A) (27,4) message response.

When the database exchange room image (17,3), (T) (37,3), or (A) (27,3) messages have been sent and returned with (17,4), (T) (37,4), or (A) (27,4) messages processed by the PMS for all rooms requiring synchronization, the PMS indicates the end of the database update procedure by transmitting a process code 4 message to the switch.

The receipt of a process code message is necessary for the switch since the switch has a threshold of three database synchronization procedures that are started but were unable to complete due to succeeding data link failures. This may be the case where intermittent yet persistent problems exist which preclude the basic database update procedure from ever completing, leaving the data link in a continual failure/recovery (thrashing) state. After a link drop causes the count to be exceeded, the switch logs an error. Two test commands that try to establish the link are as follows:

- **test pms-link** or **execute test pms-link** — tries to bring the link back up.

- **test pms-link long** or **execute test pms-link long** — tries to bring the link down then back up.

The PMS may initiate a database exchange procedure at any time provided that a database update procedure is not currently active. If such a situation arises (either by error detection within the PMS or by receipt of a process code 1 or process code 2 Status Inquiry response from the switch), the PMS should send a process code 4 Database Exchange Complete message before restarting the procedure.

Table 26 is an example of the status inquiry message activity that might occur during normal traffic to initialize the data link communication (the process code follows the SI).

Table 26. Example of Status Inquiry Message Activity

Originator	Message	Explanation
PMS	(T) (70, F) (null) or (A) (71,F) (null)	"Are you there" message from the PMS.
Switch	ACK	Acknowledgment from the switch.
Switch	(T) (70, 1) or (A) (71,1) or (T) (70, 2) or (A) (71,2)	Message indicating that database swap should begin.
PMS	ACK	Acknowledgment from the PMS.
PMS	(T) (70, 3) or (A) (71,3)	Start database exchange message from the PMS.
Switch	ACK	Acknowledgment from the switch.
PMS	(T) (37,3) or (A) (27,3)	Room image message from the PMS.
Switch	ACK (T) (37,4) or (A) (27,4)	Acknowledgment from the switch. Database update status message from the switch.
PMS	(T) (70, 4) or (A) (71,4)	End of database exchange.
Switch	ACK	Acknowledgment from the switch.

Acronyms and Glossary

Acronyms

This section contains acronym expansions related to the PMS interface specification.

- ACK — Acknowledge message (0x06)
- ASCII — American Standard Code for Information Interchange
- BCC — Block check code
- BCD — Binary coded decimal
- CK — Check-in/check-out
- CKI — Check-in (ASCII)
- CKO — Check-out (ASCII)
- CR — Controlled restriction (ASCII)
- DLE — Data link escape (0x10)
- ENQ — Inquiry message (0x05)
- ETX — End of text message (0x03)
- GI — Guest information input/change
- GIC — Guest information input/change (ASCII)
- HR — Housekeeper status originated from guest room
- HD — Housekeeper status originated from designated station
- HKR — Housekeeper status from room (ASCII)
- HKS — Housekeeper status from designated station (ASCII)
- ID — Identifier
- LAT — Link acknowledgment timer
- LIT — Link idle timer
- MR — Maximum retransmissions
- MRR — Maximum retransmissions request
- MSG — Message Waiting (ASCII)

- MSGCT — Message count

- MW — Message Waiting status change

- NAK — Negative acknowledgment message (0x15)

- NOP — No operation

- RC — Room change/swap

- RI — Room image

- RMC — Room change/room swap (ASCII)

- RMI — Room data image (ASCII)

- RSN — Room station number

- SI — Status inquiry

- STS — Status inquiry (ASCII)

- STX — Start of text message (0x02)

- V/O — Vacant/Occupied

Glossary

This section contains glossary terms related to the PMS interface specification.

- Attendant Console — Telephone equipment usually used at the front desk to answer calls and perform services such as wakeup calls.

- Block Check Code — An exclusive "OR" of all octets following the STX through and including the ETX (the STX is not included in the calculation).

- Octet — The 8-bit text field of a 10-bit word frame. This does not include the Stop and Start bits.

- PMS Terminal — Data terminal usually kept at the front desk where guests are checked in and checked out.

- Voice Terminal — Switch telephone that is administered with console permissions, usually has a display, is used to answer calls at the front desk, and is used to access features such as Automatic Wakeup and Do Not Disturb.

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