

# Overview of and Planning for Serial and Inband Switch Integration

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## Overview

Inband and serial switches can be integrated with the following Lucent™ INTUITY™ multiapplication platforms (MAPs):

- MAP/40
- MAP/40P
- MAP/100
- MAP/5P

This chapter gives an overview of the integration process. It also describes the information that must be obtained in advance of performing procedures to integrate an inband or serial switch with the Lucent INTUITY system.

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## Purpose

The purpose of this chapter is to provide background and planning information needed to integrate a Lucent INTUITY system with the following inband and serial switches:

- Inband:
  - Northern Telecom (Nortel) Norstar DR3-DR6
- Serial:
  - NEC NEAX 2400
  - Ericsson MD110

## **Switch Integration Concepts**

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Switch integration is the sharing of information between a voice messaging system and a switch to provide services to callers and subscribers.

A fully integrated messaging system uses information sent from the switch to determine how to process each incoming telephone call.

### **Inband Integration**

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Inband integration is possible on supported switches through the use of Dual Tone Multifrequency (DTMF) signaling. Strings of DTMF tones are transmitted on the analog voice channel after the channel goes off hook to answer the call, but before the voice is cut through.

Various levels of integration are available and are dependent of the switch.

Typically, the string contains the following information:

- Calling party identification
- Called party identification
- Reason for the call (redirection or direct call)

Dial strings for activation and deactivation of message waiting indicators (MWIs) are included in the specifications specific for the switch.

Support for MWI update command strings and DTMF (interdigit timing and end-of-string) timings are also essential elements.

#### **NOTE:**

An interface is necessary to accommodate different inband signaling protocols. These protocols are switch specific. The DTMF strings should be parsed properly for effective integration.

### **Serial Integration**

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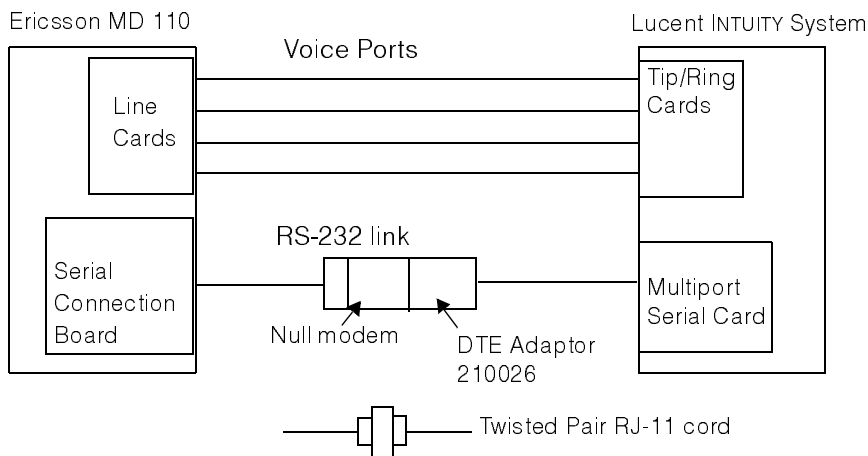
There are two types of serial integration:

- Proprietary serial integration

Proprietary serial integrations require an RS-232 interface between the switch's input/output (I/O) port and the Lucent INTUITY system ([Figure 1-1](#)).

The elements of the serial protocol are typically a superset of those in the inband signaling protocol, with the addition of a field describing channel information.

Information on refresh message waiting lamp (MWL), pause MWL, and disconnect may also be sent by the switch.



**Figure 1-1. Example of a Serial Connection**

It is possible to use a multi-port serial circuit card for the particular integration.

When the call is forwarded to the system, a packet of information is sent via the serial cable. This packet provides the integration data for the channel receiving the call.

Baud, parity, etc. must be determined in addition to the protocol.

**⇒ NOTE:**

If the distance between the Lucent INTUITY system and the switch is more than 15 meters (50 feet), a customer-supplied modem is necessary to make the connection.

■ **Simplified message desk interface (SMDI) serial integration**

SMDI is a Bellcore-defined standard integration protocol that controls the exchange of integration information through a serial interface.

It is mainly used for central office switches such as the Lucent 5ESS® and the Nortel DMS-100.

## **Demarcation Points**

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The following are two demarcation points for the connections made by the Lucent Technologies technicians.

### **Switches Maintained by Lucent Technologies**

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Lucent service technicians dispatched for the Lucent INTUITY system installation are responsible for making connections only to switches maintained by the Lucent Technologies personnel or entities.

### **Switches Not Maintained by Lucent Technologies**

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The demarcation point for integration of switches not maintained by Lucent depends on the integration type:

- For serial integrations, the demarcation point immediately follows the null modem (if used).



**NOTE:**

A null modem is required for a DTE connection, but not for a DCE connection.

- For inband integrations, the demarcation point is immediately before the modular connectors at the switch end.

Lucent Technologies services personnel are permitted to connect the modem and cables to the Lucent INTUITY system.

For additional information concerning the extent of the installation, refer to the contract between the customer and Lucent Technologies.

## **Joint Acceptance Testing**

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Acceptance testing is performed at the end of an installation to demonstrate to the customer that the integration is operational.

Joint acceptance testing is to be conducted by the customer representative and the INTUITY AUDIX<sup>®</sup> on-site installer when the integration includes Lucent Technologies products and customer-provided equipment.

# Checklist for Inband and Serial Switch Integration

[Table 1-1](#) outlines the process of integrating the Lucent INTUITY system with a switch using an inband or serial integration. The following points are assumed:

- The switch integration software package is already installed on your system.
  - Use the View Installed Software window to verify that the correct switch integration software package is installed. For information on using this window, see the platform maintenance book. The window should list the following packages:

Serial-Inband Switch Integration Software

Serial-Inband Telephony Interface Switch Module
  - If you need to install the software, see “Installing the Switch Integration Software Packages” in your platform maintenance book.
- You are performing the integration as part of the installation of the Lucent INTUITY system and completing the procedures specified in the system installation book.

**Table 1-1. Checklist for Inband and Serial Switch Integration**

Task	Description	Reference	✓
1.	Modify the switch.	<a href="#">“Switch Link Administration for Inband Switches”</a> and <a href="#">“Switch Link Administration for Serial Switches”</a> found in this chapter.	
2.	Complete the procedures in Chapters 1 through 4 up to the section, “Powering Up the System” in the system installation book.	Chapters 1 through 4 in the system installation book.	
3.	Complete the appropriate procedures for your switch type in Chapters 5 of the system installation book.	Chapters 5 of the system installation book.	

**Table 1-1. Checklist for Inband and Serial Switch Integration**

Task	Description	Reference	✓
4.	Set up the Lucent INTUITY switch integration windows.	<a href="#">Chapter 6, “Lucent INTUITY Administration for Inband and Serial Switch Integration”</a>  <a href="#">“Switch Link Administration for Inband Switches”</a> and <a href="#">“Switch Link Administration for Serial Switches”</a> found in this chapter.	
5.	Ensure that the switch has been set to perform acceptance tests for the two test system subscribers.	None.	
6.	Return to “Administering Channels” section in Chapter 6 of the system installation book and complete all required tasks through Chapter 16.	Chapters 6 through 16 in the platform installation book.	
7.	Validate and, if necessary, troubleshoot the integration.	<a href="#">Chapter 7, “Integration Validation and Troubleshooting”</a> .	
8.	Cut to service by notifying the switch administrator or your project manager to change the system subscribers’ call forwarding coverage path to the Lucent INTUITY system	None.	

# Planning Worksheets

Complete the worksheets in this section for inband and serial integrations.

Worksheets are included to record information. Responsibility for implementing the information on the worksheets is as follows:

- The project planner or project manager is responsible for completing the worksheets.
- The Lucent installer is responsible for implementing information specific to the Lucent INTUITY system.
- The switch administrator is responsible for implementing information on the worksheets specific to the switch.

## Planning Worksheets for Inband Switch Integration

[Table 1-2](#) lists the worksheets that must be completed for inband switch integration.

**Table 1-2. Planning Checklist for Inband Switch Integration**

Worksheet	Section and Page	Nortel Switch Required
A	<a href="#">"Number of Digits in Dial Plan" on page 1-9</a>	Yes
B	<a href="#">"Routing Table" on page 1-12</a>	Yes
C	<a href="#">"Business Schedule" on page 1-14</a>	Yes
D	<a href="#">"Holiday Schedule" on page 1-15</a>	Yes
E	<a href="#">"Automated Attendant Number" on page 1-16</a>	Yes
F	<a href="#">"Switch Link Administration for Inband Switches" on page 1-18</a>	Yes
H	<a href="#">"Device Assignment" on page 1-23</a>	Yes
I	<a href="#">"Dial Plan Translation" on page 1-24</a>	Yes
K	<a href="#">"MWI Parameters" on page 1-26</a>	Yes

Planning Worksheets for Serial Switch  
Integration

[Table 1-3](#) are the worksheets that you must complete for serial switch integration.

Table 1-3. Planning Checklist for Serial Switch Integration

Worksheet	Section and Page	Switches Required
A	<a href="#">"Number of Digits in Dial Plan" on page 1-9</a>	NEC NEAX 2400 and Ericsson MD110
B	<a href="#">"Routing Table" on page 1-12</a>	NEC NEAX 2400 and Ericsson MD110
C	<a href="#">"Business Schedule" on page 1-14</a>	NEC NEAX 2400 and Ericsson MD110
D	<a href="#">"Holiday Schedule" on page 1-15</a>	NEC NEAX 2400 and Ericsson MD110
E	<a href="#">"Automated Attendant Number" on page 1-16</a>	NEC NEAX 2400 and Ericsson MD110
G	<a href="#">"Switch Link Administration for Serial Switches" on page 1-21</a>	NEC NEAX 2400 and Ericsson MD110
H	<a href="#">"Device Assignment" on page 1-23</a>	NEC NEAX 2400 and Ericsson MD110
I	<a href="#">"Dial Plan Translation" on page 1-24</a>	NEC NEAX 2400 and Ericsson MD110
J	<a href="#">"Attendant Translation" on page 1-25</a>	NEC NEAX 2400
K	<a href="#">"MWI Parameters" on page 1-26</a>	NEC NEAX 2400 and Ericsson MD110

Lucent INTUITY System Integration  
Planning

Complete the following planning forms to plan for the Lucent INTUITY system side of the integration. Otherwise, provide the information to the installer.

Digits in Dial Plan

The Lucent INTUITY system requires a fixed-length dial plan. You can use a 3-digit or 10-digit dial plan. Write the number of digits on [Worksheet A](#).

# Worksheet A: Number of Digits in Dial Plan

Customer: \_\_\_\_\_

Prepared by: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Date: \_\_\_\_\_

Lucent INTUITY location/name: \_\_\_\_\_

Number of digits in the dial plan: \_\_\_\_\_

## INTUITY AUDIX System Parameters Features


- Set the System-Parameters Features window for the INTUITY AUDIX application:
  - Transfer Type = basic
  - Transfer Restriction = subscribers
  - Covering Extension = system console or operator extension

## Channel Information for Installation

For the Lucent INTUITY system to operate properly, it must know what extension is assigned to each of its channels (voice ports) and how incoming calls on that channel are to be processed. For each channel, provide the extension number and assign all channels that are part of an integrated voice mail interface (VMI) calling group to \*DNIS\_SVC for operation.

## Assign Service to Called Number

All calls are processed by the \*DNIS\_SVC. For \*DNIS\_SVC to function with both the INTUITY AUDIX and INTUITY Lodging applications defined in a shared port group, the installer must fill out a table in the system. The information in this table tells the \*DNIS\_SVC which called number should receive a particular service.

 **NOTE:**  
Calls not specifically routed elsewhere are routed to the INTUITY AUDIX application. The called numbers are processed through the routing table. Trunk numbers must also be routed through the INTUITY AUDIX routing table.

Routing Table

Use the information in [Worksheet B](#) to create the routing table. There are a maximum of 25 rows in the routing table. This worksheet has the following columns:

■ Incoming Called Number

Enter the incoming called number or range of called numbers. When a call arrives, the system compares the incoming called number to the numbers in this column. If no match is found, the call is routed to the INTUITY AUDIX application without changing the called number information. If a match is found, the remaining columns are examined for processing.

■ Business Schedule

Leave this column blank or enter **login** or the name of a business schedule.

⇒ NOTE:

The Business Schedule and the Holiday Schedule columns cannot both be blank.

If you enter login in this column, the system provides voice mail service from the INTUITY AUDIX application. If you enter the name of a business schedule, the system checks the current date against any holiday schedule. If no holiday schedule applies, the system checks the business schedule to determine if the current time falls within the alternate hours for the current day of the week. If a match is found, the automated attendant mailbox in the "Alternate Service Mailbox" column is substituted for the called number and the call is passed to the INTUITY AUDIX application.

If a match to the alternate hours is not found, the system checks the business schedule to determine if the switch night service status applies. If night service status applies, the system provides the automated attendant mailbox listed in the "Day Service Mailbox" or "Night Service Mailbox" column, depending on the switch night service status.

If the business schedule does not follow the switch night service status, the system checks the day service hours for the current day of the week. If a match is found, the system provides the automated attendant mailbox in the "Day Service Mailbox" column. Otherwise, the automated attendant mailbox in the "Night Service Mailbox" column is substituted for the called number, and the call is passed to the INTUITY AUDIX application.

■ Holiday Schedule

Leave this column blank or enter the name or number of a holiday schedule.

⇒ NOTE:

The Business Schedule and the Holiday Schedule columns cannot both be blank.

After checking the Business Schedule column for the specific entry "login," the system checks the current date against any specified holiday schedule. If a matching date is found, the system provides the automated attendant mailbox from the Mailbox column of the holiday schedule. If no match is found, the business schedule (if any) is checked.

- **Day Service Mailbox**

This column contains the automated attendant mailbox that replaces the called number if a match is found for day service hours in the business schedule. This matching is performed after checking for a match on alternate service hours.

- **Night Service Mailbox**

This column contains the automated attendant mailbox that replaces the called number if a *no* match is found in the business schedule for day service hours. This matching is performed after checking for a match on alternate service hours.

- **Alternate Service Mailbox**

This column contains the automated attendant mailbox that replaces the called number if a match is found in the business schedule for alternate service hours.

 **NOTE:**

The mailboxes listed in the routing table and holiday schedules typically do not correspond to extensions on the telephone system. They are defined as automated attendant main menus. Update these mailboxes before modifying the routing table and holiday schedules.

Customer: \_\_\_\_\_

Prepared by: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Date: \_\_\_\_\_

Lucent INTUITY  
location/name: \_\_\_\_\_

[illegible]

## Business Schedules

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The purpose of a business schedule is to allow you to specify different automated attendant services based on normal hours (day-service range) and, if needed, an alternate service range (for example, lunch break). Day or night service can follow the switch night service status.

The system supports a maximum of four business schedules. Each business schedule is associated with specific called numbers (which may be trunk numbers). Complete a copy of [Worksheet C](#) for each business schedule. This worksheet has the following fields and columns:

- **Business Schedule**

Enter the name of the business schedule. Default names are "bus $n$ " where  $n$  is 1, 2, 3, or 4. The business schedule can be referred to in the routing table by either its name or number. Do not use "login" as the name of a business schedule.

- **Follow Night Service Status**

If this field contains "n," a match is made against day service hours for the day of the week to determine whether day or night service should be provided.

If this field contains "y," leave the day service hours blank. Night service is provided based on the switch night service status.

 **NOTE:**

In either case, a match for the alternate service hours for the day of week is performed first.

- **Day Of Week**

This column lists the seven days of the week. It cannot be changed.

- **Day Service Hours (Start Time and End Time)**

These columns list the start time and end time for day service on the specified day of the week. Use 24-hour time (00:00 to 23:59) to specify these times. The end time must be later than the start time. For night service only, leave the columns blank. For day service only, specify start time as **00:00** and end time as **23:59**.

- **Alternate Service Hours (Start Time and End Time)**

These columns list the start time and end time for alternate service on the specified day of the week. Use 24-hour time (00:00 to 23:59) to specify these times. The end time must be later than the start time.

## Worksheet C: Business Schedule

Customer: \_\_\_\_\_

Prepared by: \_\_\_\_\_

Telephone  
number: \_\_\_\_\_

Date: \_\_\_\_\_

Lucent INTUITY  
location/name: \_\_\_\_\_

### Follow Switch Night Service Status (y/n)?

Day of Week	Day Service Hours		Alternate Service Hours	
	Start Time (hh:mm)	End Time (hh:mm)	Start Time (hh:mm)	End Time (hh:mm)
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

### Holiday Schedules

The purpose of a holiday schedule allows a business to specify appropriate greetings and automated attendant services based on specific holidays.

There can be a maximum of four holiday schedules, each with up to 26 holidays. Each holiday schedule is associated with specific called numbers (which may be trunk numbers). Complete a copy of [Worksheet D](#) for each holiday schedule. This worksheet has the following fields and columns:

- Holiday Schedule

This field contains the name of the holiday schedule. Default names are “holn” where *n* is 1, 2, 3, or 4. The holiday schedule can be referred to in the Routing Table by either name or number.

- ## Worksheet D: Holiday Schedule

Lucent INTUITY  
location/name:

[illegible]

# Determining the Automated Attendant Number



**NOTE:**

Use this worksheet only for integrations where the customer uses the automated attendant feature of the INTUITY AUDIX application.

The automated attendant number is the INTUITY AUDIX extension number indicated for the automated attendant mailbox.

Use [Worksheet E](#) to record the automated attendant number.

## Worksheet E: Automated Attendant Number

Customer: \_\_\_\_\_

Prepared by: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Date: \_\_\_\_\_

Lucent INTUITY location/name: \_\_\_\_\_

Automated attendant number: \_\_\_\_\_

## Planning for Phantom Numbers

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A *phantom number* (also called a **dummy number**) is an extension number not associated with a switch port or a telephone station. It is typically assigned when the channels in a hunt group have shared usage for coresident applications, such as the INTUITY AUDIX application and the Lucent INTUITY Lodging application.

When the phantom number is dialed, the switch forwards the call to a channel in the hunt group.

### **CAUTION:**

*The selected switch must support the phantom number feature.*

From there the Lucent INTUITY system service assignment determines the correct application to start for the call.

There must be two numbers established in a coresident system:

- A start hunt number for one application
- A phantom number for the coresident application

### **CAUTION:**

*All phantom numbers must be assigned to switch 0 in the INTUITY AUDIX database. If switch 0 is not used for these extensions (which do not have real stations), the system will try to turn MWIs on and off and continually fail. This condition can seriously impede system performance.*

# Switch Link Administration for Inband Switches

Switch link administration is performed to ensure that the correct data is received on the designated ports.

[Worksheet F](#) contains the following field:

- Interdigit Timeout  
Interdigit timeout is the period for which the INTUITY AUDIX application waits before assuming that no more digits are being received in a transmission and that the transmission is complete.  
This data is entered in seconds.  
The minimum value that can be entered in this field is 1 second. The maximum value that can be entered is 9 seconds.



**NOTE:**  
Only the remote support center can set the interdigit timeout.

## Worksheet F: Switch Link Administration for Inband Switches

Customer: \_\_\_\_\_

Prepared by: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Date: \_\_\_\_\_

Lucent INTUITY location/name: \_\_\_\_\_

Interdigit timeout: \_\_\_\_\_

## Switch Link Administration for Serial Switches

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Switch Link Administration is performed to ensure that the correct data is received on the given ports.

[Worksheet G](#) contains the fields listed below. These fields are switch-dependent.

- Data Bits

Enter the number of bits for transmitting data in this field.

The two options available are **7** or **8**.

- Stop Bits

Enter the stop bits for transmitting data in this field.

The two options available are **1** or **2**.

- Start Bits

Enter the start bits for transmitting data in this field.

The two options available are **1** or **2**.

- Baud Rate

Enter the baud for transmission of data.

There is a list of default bauds that you can choose from. These range from 1200 to 9600.

- Parity

Set parity to check for any transmission errors in the message received.

Parity can be set to any of the following:

- Odd
- Even
- None

If the parity is set to Odd, an extra digit is added (if required) to the original message to make it an odd number of digits. If the message received at the other end has an even number of digits, a transmission error has occurred.

- Flow Control

Flow of control helps to ensure that the Lucent INTUITY system can handle all of the data it receives. If too much data is received, a message is displayed asking the switch administrator to modulate the flow.

- Serial Ports

Enter the name for each serial ports on the switch.

For multi-port serial card, a maximum number of eight ports can be specified in this column.

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- DCE or DTE Connector Required  
In this column, enter either *DCE* or *DTE* to state the type of connector required.
- Connector Type (Male/Female)  
In this column, enter either Male or Female based on the connector type.

# Worksheet G: Switch Link Administration for Serial Switches

Data bits: \_\_\_\_\_

Stop bits: \_\_\_\_\_

Start bits: \_\_\_\_\_

Baud rate: \_\_\_\_\_

Parity: \_\_\_\_\_

Flow Control: \_\_\_\_\_

Switch Link Administration Table

Number	Serial Ports	DCE or DTE Connector Required	Connector Type (Male/Female)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

## Device Assignment Worksheet

Use [Worksheet H](#) to assign the channel group number(s) on which the system performs MWI updates. This procedure allows you to partition the channel(s) on which MWI updates are performed.

This worksheet has the following fields and columns:

- Switch Number
- Device ID

The data to be entered in this field is different for inband switches and serial switches.

— Inband switches

The device IDs are the group numbers set using the Channels to Group option.

The valid range of device IDs is 1-32.

By default all groups are assigned to Channel 2.

Outcalling is also done on Group 2.

If the channels are to be assigned to another group for MWI updates the functionality must be enabled on the [Device Assignment Window](#).

More than one device ID can be specified per line.

— Serial switches

For serial switches, enter the name of a port on the multi-port serial circuit card.

The device ID must also be specified in the Serial Ports field on the Serial Interface Window.

Only one device ID can be specified in each line.

 **NOTE:**

It is recommended that you use the lowest ports available on the multi-port serial circuit card. Device IDs for this card are in the format /dev/ttysax, where x is a letter (a through h) representing a port on the card, from right to left (Example: /dev/ttysaa).

See [“Setting the MWI Device Assignments”](#) in [Chapter 6, “Lucent INTUITY Administration for Inband and Serial Switch Integration”](#) for additional information on the above fields.

# Worksheet H: Device Assignment

Device Assignment Table

No.	Switch Number	Device ID
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		

This worksheet has the following fields and columns:

- See [“Setting the Dial Plan Translations” in Chapter 6, “Lucent INTUITY Administration for Inband and Serial Switch Integration”](#) for additional information on the above fields.

Switch Network Access Code: \_\_\_\_\_

[illegible]

# Attendant Translation

 **NOTE:**

This worksheet is required for the NEC NEAX 2400 switches only.

See [“Setting the Attendant Translation”](#) in [Chapter 6, “Lucent INTUITY Administration for Inband and Serial Switch Integration”](#) for more information.

## Worksheet J: Attendant Translation

Attendant number: \_\_\_\_\_

Lucent INTUITY subscriber number: \_\_\_\_\_

# MWI Parameters

[Worksheet K](#) allows you to specify the time and periodicity with which you would like MWI updates to take place.

This worksheet has the following fields:

- Background Refresh
- Background Interval
- Background Update
- Broadcast Interval
- Broadcast Update
- Block Start Time
- Block End Time

See [“Setting MWI Parameters”](#) in [Chapter 6, “Lucent INTUITY Administration for Inband and Serial Switch Integration”](#) for additional information on the above fields.

## Worksheet K: MWI Parameters

### MWI Block Time

Field	Data
Background Refresh	
Background Interval	
Background Updates	
Broadcast Interval	
Broadcast Update	
Block Start Time	
Block End Time	