Dialogic

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Developer's Guide: Line Cards

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About this Publication

Purpose

This publication provides guidelines for using the Dialogic® CSP.

Safety Labels

The following Safety labels may appear in this information product to alert customers to avoidable hazards. The following are in the order of priority:

DANGER

Danger indicates the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.

WARNING

Warning indicates the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.

CAUTION

Caution indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. Caution can also indicate the possibility of data loss, loss of service, or that an application will fail.

Conventions used

This information product uses the text conventions explained below. In addition, hexadecimal numbers are preceded by a zero and small “x.” For example, the decimal number 15 is represented in hexadecimal as 0x0F.

Convention	Description
. . .	A horizontal ellipsis in an API message indicates fields of variable length.
:	A vertical ellipsis in an API message indicates that a block of information is repeated or is variable.
n	The letter *n* is a generic placeholder for a number.
`Sans serif mono space`	Indicates a command name, option, input, output, non-GUI error, and system messages.
`Sans serif monospace italic`	Indicates a parameter name in an input message. Example: `move *.dot a: c:` *`-s`* The *`-s`* is the parameter.
Serif italic	Indicates the name of a book, chapter, path, file, or API message. Example: *`UserDirectory/Config.exe`*
Boldface	Indicates keyboard keys, key combinations, and command buttons Example: **Ctrl+Alt+Del**
Sans serif boldface	Identifies text that is part of a graphical user interface (GUI). Example: Go to the **Configuration** menu and select **Card**->**Span Configuration**

Contents

1 DS3 Information

Overview

This chapter provides information for configuring DS3, setting up your software for redundancy, and running internal diagnostics on the DS3 card.

Clarification of Terms

The term DS3 (Digital Signal, Level 3) is sometimes used interchangeably with *T3*, but T3 is really the physical interface over which DS3 information is transmitted. DS3 is the network interface protocol defined by ANSI Standard T1.102-1993, and according to AT&T TR62411 and TR54016.

Unless otherwise specified, the term DS3 card refers to the DS3 line card, not to the DS3 I/O card.

Technology Overview

DS3 Technology

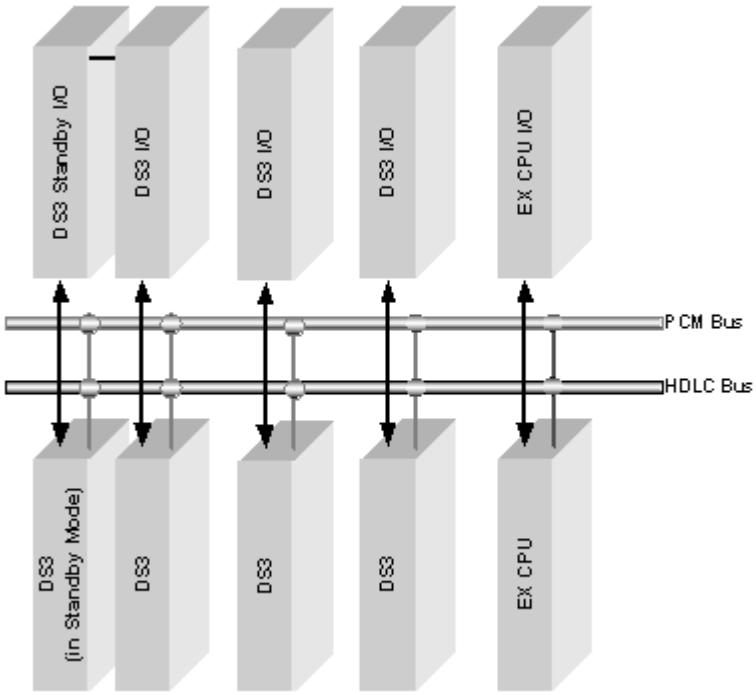
A DS3 has a bandwidth of 44.736 Mbps, which is the capacity of 28 T1 spans (28 times the DS1 rate of 1.544 Mbps) with approximately 1.5 Mbps left over. With this leftover bandwidth, every 85th bit in a DS3 bit sequence is used for overhead functions such as frame alignment, error detection, and terminal-to-terminal data communication. All other bits are payload bits.

CSP Information

The CSP software supports the DS3 card on the CSP 2090 chassis, with common DS3 L3 configuration, T1 Robbed Bit Signaling, Cross Connections, and other functionality. A full switching matrix resides on the DS3 card.

The DS3 card resides in a line card slot and routes data on the midplane buses (HDLC and PCM). The diagram below shows how the DS3 card integrates into the CSP architecture.

Figure 1-1 DS3 in CSP Architecture



M-Frame Format Use

The DS3 card uses the M-Frame format and supports the following framing modes:

- M13
- C-bit (default)

DS3 Framer In Service

The DS3 framer is automatically brought into service when the DS3 card is brought into service. Once in service, DS3 status changes are reported to the host in the *Alarm* messages (0x00B9). If the DS3 circuit is not ready for operation, DS3 alarms may be disabled by placing the DS3 framer out of service. To do this, send a *Service State Configure* message (0x000A) with the DS3 Offset AIB (0x32) and an action of 0x0F (Take Out of Service). Refer to the *API Reference* for the format of the message.

If the host does take the DS3 Framer Out of Service, it is the host's responsibility to bring it back in service. If the host does not bring the DS3 Framer back in service, the CSP will send a NACK 0x005A (DS3 Out of Service) when it receives the *Service State Configure* message to Bring Span In Service.

Channel Information

The DS3 signal format typically transports 672 channels at 64 Kbps per channel. The DS3 signaling interface is bipolar with Bit 3 Zero Substitution (B3ZS).

Configuring DS3

Configuration

The DS3 card can be used with any other line card or combination of cards to yield a maximum platform capacity of 80 spans. If you wish to configure 64 spans or more in a single node, please contact Dialogic Technical Support.

Configuration Sequence

To configure the DS3 card, you must have the host send the API messages outlined in the steps below in the order listed.

The DS3 framer is in service when the DS3 card is inserted so you do not have to bring it into service with the *Service State Configure* message (0x000A) specifying the DS3 offset AIB (0x32) - unless it was brought out of service by the host.

1. *Assign Logical Span ID* (0x00A8).
2. *Inpulsing Parameters Configure* (0x0028).
3. *Inseize Instruction List Configure* (0x0029).
4. *Service State Configure* (0x000A) bring spans into service.
5. *Service State Configure* (0x000A) bring channels into service.

Important! The DS3 framer must be in service before spans and channels can come into service. You can perform other types of configurations after Step 2. This is only a sample configuration, and others can be more complex.

Setting up the Software for DS3 Redundancy

Message Configuring for Redundancy

After installation, the host must send the *Standby Line Card Configure* message to the DS3 card that will be designated as the standby card. This message must indicate the Card Type and Action of the standby line card. For more information on this message, consult the *API Reference*.

Switchover Process

If the CSP Matrix Series 3 Card detects a line card failure, the host receives an *Alarm* message followed by a *Card Status Report*. The host then sends the *Line Card Switchover* message to indicate the slot number of the following:

- The line card that has failed--Originating Slot Number
- The standby line card--Destination Slot Number

After confirming that the two cards are of the same type, the CSP Matrix Series 3 Card instructs the Standby I/O to connect to the incoming/outgoing DS3 coaxial cable.

When the standby line card is in service, the host receives a *Card Status Report.* The host then configures the card the same way that the failed line card was configured, and the switchover is finished.

Diagnostics

Overview

The DS3 card set has some internal diagnostic functions. You can also set the DS3 card to loopback diagnostic mode.

DS3 Card Diagnostics

Diagnostics include:

- Detection of carrier group alarm
- Loss of frame
- Signal
- Carrier group alarm generation

Statistics for errors and alarms are gathered to support Request for Comment (RFC) 1407. Statistics can also be retrieved by the host using the *Generic Report* (0x46) message.

Loopback Diagnostics

Using the Loopback entity, the *DS3 Configure/Query* message (0x000F) loops the inbound DS3 stream back to the outbound DS3 stream. This message can also request the far end to go into loopback mode.

Setting Up Loopback Mode

Follow the steps below to place a DS3 span into loopback mode.

1. Take the DS3 span out of service by using *Assign Logical Span ID*.
2. Use the *DS3 Configure/Query* message (0x000F) message to loopback the span.

Important! The *Loop Timing Configure* (0x4A) message is not supported because DS3 is not intended to be a loop timing source. You can get clock source timing off a T1 span or an external BITS source.

SS7 CIC Traffic Over the DS3 Line Card

Overview

The DS3 line cards support SS7 CIC traffic. Under normal operation, a DS3 line card can handle 28 spans, and a CSP chassis can support up to three DS3 line cards. However, if you wish to support SS7 CIC traffic on all three line cards, you must reconfigure one of the DS3 line cards to 24 spans using DIP switches 4 and 6. The following are the DIP Switch settings:

Switches 4 and 6 Both ON:
All physical spans can be used for CICs.

Switches 4 and 6 Both OFF:
Only physical spans 0-23 can be used for CICs.

2 T1 Information

Overview

This chapter contains information on T1 configuration. This information applies to the T-ONE card only (not the ST1LC card).

The T-ONE card supports 16 T1 spans. If you do not need all 16 spans, you can buy the card with fewer spans. When your needs increase, you can buy product licenses to enable more spans, two at a time.

For PPL Component Addressing information regarding T1, refer to *PPL Component Addressing Information* in the *API Reference.*

Refer to *Configuring SS7 Virtual Spans* in the *Developer's Guide: Common Channel Signaling* for information on virtual T1 cards.

Important! PPL timer and configuration bytes are stored on a *per channel* basis for T1 configuration.

The *PPL Transmit Signal Configure* message (0xD2) is applicable to the T1 Layer 3 PPL.

Important! If the T-ONE card is not responding during frame synchronization, you must take it out of service and bring it back into service.

Default Instruction Lists

Default Inseize Instruction List

The default inseize instruction lists for T1 spans are shown in the table below.

Channel	Instruction List
T1	1. Report Incoming Call 2. Wait For Host Control

Default Outseize Instruction Lists

The default outseize instruction lists for T1 spans are shown in the table below.

Channel	Instruction List
T1	1. Wait For Host Control Message

Configuring Instruction Lists

You must send a separate message for each instruction you add to the list. For example, to configure the following inseize instruction list on all of the channels on Span 0, send the following sequence of *Inseize Instruction List Configure* messages, with the specifications noted:

Instruction List

1. Generate Wink 1
2. Receive Stage 1 Digits
3. Report Incoming Call with Address Data
4. Wait for Host Control

Send the following *Inseize Instruction List Configure* messages:

Message 1:

Instruction Number: 0x01
Instruction Type: 0x02 (Generate Call Processing Event)
Instruction Data Byte 1: 0x03 (Wink 1)

Message 2:

Instruction Number: 0x02
Instruction Type: 0x03 (Receive Stage N Address Data)
Instruction Data Byte 1: 0x01 (Stage 1)

Message 3:

Instruction Number: 0x03
Instruction Type: 0x06 (Report Incoming Call With Address Data)

Message 4:

Instruction Number: 0x04
Instruction Type: 0x04 (Wait For Host Control)

T1 Component (0x0003)

Configuration Bytes

The table below shows the PPL Configuration Byte values for the T1 PPL component.

Table 2-1 Configuration Bytes for T1 Component

Byte	Description	Values
101	Incoming Start Dial Type	0x01 Wink Start 0x03 Immediate 0x04 Dial Tone Default values vary by trunk type; see Table 2-2.
102	Outgoing Start Dial Type	0x01 Wink Start * 0x03 Fixed Pause 0x04 Dial Tone Default values vary by trunk type; see Table 2-2.
Transmit Signaling Type		
111	Onhook Transmit Signal	Default values vary by trunk type; see Table 2-2.
112	Primary Outseize Transmit Signal	
113	Secondary Outseize	
114	Inseize ACK Transmit Signal	
115	Answer Transmit Signal	
116	Post Outseize ACK	
130	Local End Release Host Notify	0x00 Disable 0x01 Enable
131	Glare Control Flag	0x00 Give Up Control 0x01 Continue Outseize
132	Receive Answer Line Signaling	Default values vary by trunk type; see Table 2-2.

Important! The default byte values correlate to AB bits for signaling. The AB bits are two discrete binary values, but the EXS API uses a hexadecimal representation. For received line signaling, only AB bits are validated. You must use custom PPLs to comply with T1.403-1995/ANSI T1.403.02-1999 for received line signaling. To change default Out of Service signaling, use the *PPL Transmit Configure* message. Changes to configuration bytes will change transmitted signaling only when In Service.

Example.

AB bits	Hex
00	0x00
01	0x01
10	0x02
11	0x03

Table 2-2 Default T1 Configuration Bytes, by trunk type.

Config Byte No.	E & M	FXO/LS	FXO/GS	FXS/ LS	FXS/ GS
101	0x01	0x00	0x00	0x04	0x04
102	0x01	0x04	0x04	0x00	0x03
111	0x00	0x01	0x01	0x01	0x03
112	0x03	0x03	0x00	0x00	0x01
113	0x03	0x03	0x00	0x00	0x00
114	0x03	0x03	0x03	0x01	0x01
115	0x03	0x03	0x03	0x01	0x01
116	0x03	0x03	0x03	0x01	0x01
132	0x03	0x03	0x03	0x01	0x01

T1 Signaling

Overview

This section includes configuration information specific to the T-ONE line card.

Start Dial

To change the Start Dial Type, use the *PPL Configure* message to modify the following Config Bytes:

Byte 101 = Incoming Start Dial

Byte 102 = Outgoing Start Dial

Transmit Signaling

To change Transmit Signaling, use the *PPL Configure* message to modify the following Config Bytes (see the *Transmit Signaling Configure* message for values).

Byte 111 = Onhook pattern

Byte 112 = Initial Outseize

Byte 113 = Secondary Outseize

Byte 114 = Inseize ACK

Byte 115 = Answer

Byte 116 = Post Outseize ACK

Receive Answer Line Signaling

To change Receive Answer Line Signaling, use the *PPL Configure* message to modify Config Byte 132 (see the *Receive Signaling Configure* message for values). This byte stores the default answer line signaling for the configured trunk type. It is used to report CPA of answer through line signaling. If a protocol other than the default is used, this byte should be updated to reflect the answer line signaling.

T1 Call Setup

Tables Table 2-3 through Table 2-8 show the ICB subtypes that are supported for each T1 protocol in these API messages:

- *Inseize Instruction List Configure*
- *Outseize Instruction List Configure*
- *Inseize Control*
- *Outseize Control*

Table 2-3 E&M

Outgoing	Incoming
The only valid outseize control Action ICBs used for the default E&M protocol are the following:	The only valid inseize control Action ICBs used for the default E&M protocol are the following:
0x00 Null	0x00 Null
0x01 Scan for Wink N	0x01 Report Call Processing Event
0x02 Scan for ANI Request Off-hook	0x02 Generate Call Processing Event
0x04 Report Call Processing Event	0x03 Receive Stage N Address Data
0x05 Outpulse Stage N Address Data	0x04 Wait for Host Control
0x06 Wait for Host Address Data	0x05 Report Incoming Call
0x07 Wait for Host Control	0x06 Report Incoming Call with Digits
0x08 Send Host Acknowledgment	0x07 Generate Inseize Acknowledgment
0x09 Do Call Progress Analysis	0x08 Send Host Acknowledgment
0x0A Seize	0x09 Use Instruction List
0x0B Use Instruction List	0x0A Delay N ms
0x0F Wait for Host control with Answer	
0x10 Do CPA Without Line Signaling	
0x11 Delay N ms	

Table 2-4 FXS/LS

Outgoing	Incoming
The only valid outseize control Action ICBs used for the default FXS/LS protocol are the following:	The only valid inseize control Action ICBs used for the default FXS/LS protocol are the following:
0x00 Null	0x00 Null
0x07 Wait for Host Control	0x01 Report Call Processing Event
0x08 Send Host Acknowledgment	0x03 Receive Stage N Address Data
0x0A Seize	0x04 Wait for Host Control
0x0B Use Instruction List	0x05 Report Incoming Call
0x0F Wait for Host control with Answer	0x06 Report Incoming Call with Digits
0x11 Delay N ms	0x07 Generate Inseize Acknowledgment
	0x08 Send Host Acknowledgment
	0x09 Use Instruction List
	0x0A Delay N ms

Table 2-5 FXO/LS

Outgoing	Incoming
The only valid outseize control Action ICBs used for the default FXO/LS protocol are the following:	The only valid inseize control Action ICBs used for the default FXO/LS protocol are the following:
0x00 Null	0x00 Null
0x03 Scan for Dial Tone	0x04 Wait for Host Control
0x04 Report Call Processing Event	0x05 Report Incoming Call
0x05 Outpulse Stage N Address Data	0x07 Generate Inseize Acknowledgment
0x06 Wait for Host Address Data	0x08 Send Host Acknowledgment
0x07 Wait for Host Control	0x09 Use Instruction List
0x08 Send Host Acknowledgment	0x0A Delay N Milliseconds
0x09 Do Call Progress Analysis	

Outgoing	Incoming
0x0A Seize	
0x0B Use Instruction List	
0x0F Wait for Host Control with Ans	
0x11 Delay N Milliseconds	

Table 2-6 FXS/GS

Outgoing	Incoming
The only valid outseize control Action ICBs used for the default FXS/GS protocol are the following:	The only valid inseize control Action ICBs used for the default FXS/GS protocol are the following:
0x00 Null	0x00 Null
0x07 Wait for Host Control	0x01 Report Call Processing Event
0x08 Send Host Acknowledgment	0x03 Receive Stage N Address Data
0x0A Seize	0x04 Wait for Host Control
0x0B Use Instruction List	0x05 Report Incoming Call
0x0F Wait for Host Control with Answer	0x06 Report Incoming Call with Digits
0x11 Delay N ms	0x07 Generate Inseize Acknowledgment
	0x08 Send Host Acknowledgment
	0x09 Use Instruction List
	0x0A Delay N ms

Table 2-7 FXS/GS

Outgoing	Incoming
The only valid outseize control Action ICBs used for the default FXS/GS protocol are the following:	The only valid inseize control Action ICBs used for the default FXS/GS protocol are the following:
0x00 Null	0x00 Null
0x07 Wait for Host Control	0x01 Report Call Processing Event

Outgoing	Incoming
0x08 Send Host Acknowledgment	0x03 Receive Stage N Address Data
0x0A Seize	0x04 Wait for Host Control
0x0B Use Instruction List	0x05 Report Incoming Call
0x0F Wait for Host Control with Answer	0x06 Report Incoming Call with Digits
0x11 Delay N ms	0x07 Generate Inseize Acknowledgment
	0x08 Send Host Acknowledgment
	0x09 Use Instruction List
	0x0A Delay N ms

Table 2-8 FXO/GS

Outgoing	Incoming
The only valid outseize control Action ICBs used for the default FXO/GS protocol are the following:	The only valid inseize control Action ICBs used for the default FXO/GS protocol are the following:
0x00 Null	0x00 Null
0x03 Scan for Dial Tone	0x04 Wait for Host Control
0x04 Report Call Processing Event	0x05 Report Incoming Call
0x05 Outpulse Stage N Address Data	0x07 Generate Inseize Acknowledgment
0x06 Wait for Host Address Data	0x08 Send Host Acknowledgment
0x07 Wait for Host Control	0x09 Use Instruction List
0x08 Send Host Acknowledgment	0x0A Delay N ms
0x09 Do Call Progress Analysis	
0x0A Seize	
0x0B Use Instruction List	
0x0F Wait for Host Control with Answer	
0x11 Delay N ms	

T1 Call Flows

This section includes call flows for T1 interfaces.

Inbound Four-digit DNIS

The example call comes into the CSP with E&M Wink Start signaling. The channel has been configured using the *Inpulsing Parameters Configure* message, with the following inpulsing parameters:

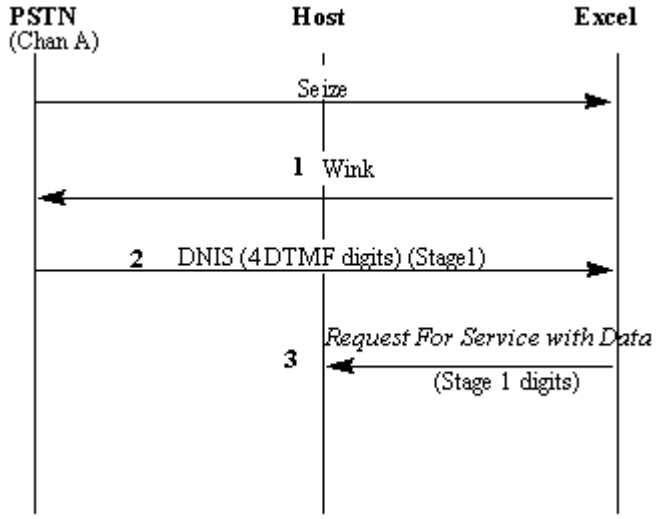
Number of Stages:	1
Number of Digit Strings:	1
Address Signaling Type:	DTMF
Stage Complete Timeout:	20 seconds
String Collection Method:	Fixed Number of Digits
Number of Digits:	4

The channel has been previously configured using the *Inseize Instruction List Configure* message with the following inseize instruction list:

1. Generate Inseize ACK (Wink 1)
2. Receive Stage 1 Digits
3. Report Incoming Call with Address Data
4. Wait for Host Control

When an incoming call is detected, the CSP performs the following steps:

1. Generates Wink 1
2. Performs in-band DTMF reception, collecting and storing four Stage 1 digits
3. Reports the incoming call with the Stage 1 digit buffer and channel ID in a *Request for Service with Data* message sent to the host
4. Waits for further instructions from the host



Inbound - Exchange Access North American (EANA)

The example call comes into the CSP with E&M Wink Start signaling. The channel is configured with the following inpulsing parameters (using the *Inpulsing Parameters Configure* message):

Number of Stages:	1
Number of Digit Strings:	2
Address Signaling Type:	MFR1
Stage Complete Timeout:	20 seconds
String Collection Method:	KP/ST Framed

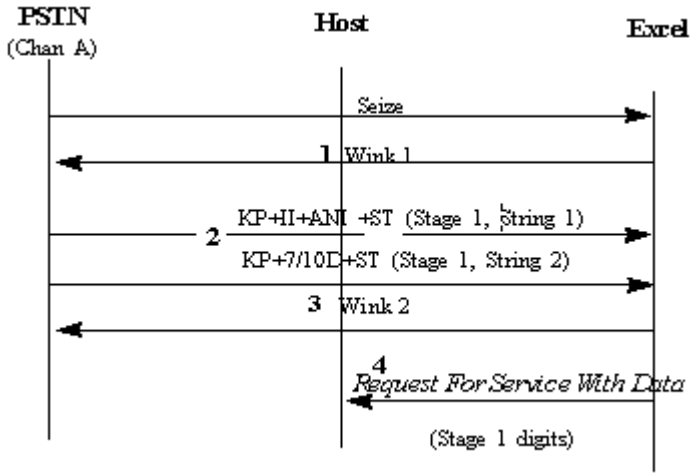
The channel has been previously configured with the following inseize instruction list (using the *Inseize Instruction List Configure* message):

1. Generate Inseize ACK (Wink 1)
2. Receive Stage 1 Digits
3. Generate Wink 2
4. Report Incoming Call with Address Data
5. Wait for Host Control

When an incoming call is detected, the CSP performs the following:

1. Generates Wink 1
2. Performs in-band MFR1 reception, collecting and storing the KP/ST framed ANI digits and the called party address in Stage 1
3. Generates an ANI confirmation Wink 2

4. Reports the incoming call with the Stage 1 digit buffer and channel ID in a *Request For Service With Data* message sent to the host
5. Waits for further instructions from the host



Inbound - Taiwan MDR1 with ANI

The example call comes into the CSP with E&M Wink Start signaling. The channel is configured with the following inpulsing parameters (using the *Inpulsing Parameters Configure* message):

Number of Stages:	2
Number of Digit Strings:	1
Address Signaling Type:	MFR1
Stage 1 Complete Timeout:	20 seconds
Stage 1 String 1 Collection Method:	KP/ST Compelled
Stage 2 Complete Timeout	20 seconds
Stage 2 String 1	KP/ST framed

The channel has been previously configured with the following inseize instruction list (using the *Inseize Instruction List Configure* message):

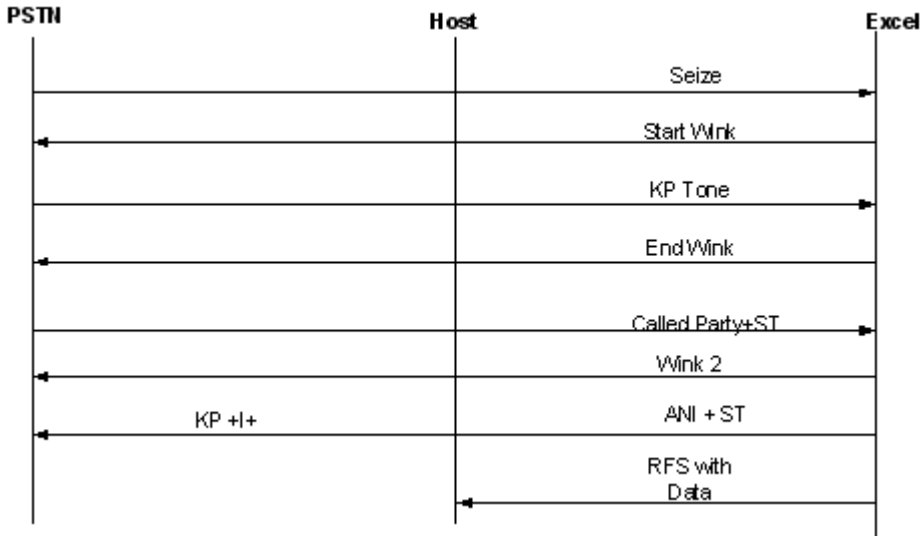
1. Generate Inseize ACK (Wink 1).
2. Receive Stage 1 Digits.
3. Generate Wink 2.
4. Receive Stage 2 Digits.
5. Report Incoming Call.
6. Wait for Host Control.

7. Set the following timers:

   PPL Timer 0x5B - 640 ms
   PPL Timer 0x1D - 800 ms

When an incoming call is detected, the CSP performs the following:

1. Starts Wink 1. Waits to detect KP Tone. Acknowledges KP tone by ending wink.
2. Performs in-band MFR1 reception, collecting and storing the KP/ST 1 framed digits and the called party address in Stage 1
3. Generates an ANI request Wink 2
4. Performs in band MFR1 reception, collecting and storing the KP/ST 1 framed ANI digits in Stage 2.
5. Reports with Stage 1 and Stage 2 digit buffer and channel ID in a Request for Service with Data message sent to the host.
6. Waits for further instructions from the host.



Outbound - Four-digit DNIS

The example call shows the host instructing the CSP to initiate an outbound call with E&M Wink Start signaling. Using the *Outseize Control* message, the host can have varying degrees of interaction with the CSP. The host can send each instruction separately, use a list of instructions preprogrammed on a channel with the *Outseize Instruction List Configure* message, or a combination of both.

To process this call without preprogrammed instructions, send a *Route Control* (or *Outseize Control*) message with the following ICBs:

1. Action ICB: Seize
2. Action ICB: Outpulse Stage 1
3. Action ICB: Send Host ACK
4. Action ICB: Wait for Host Control with Answer Supervision
5. Data ICB: Stage 1 Digits (DTMF digits, 4)

To process this call using preprogrammed instructions, send a *Route Control* (or *Outseize Control*) message with the following ICBs:

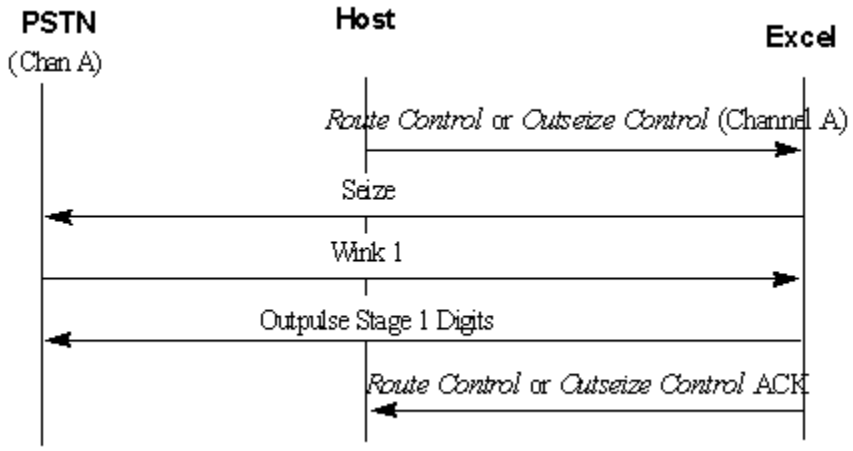
1. Action ICB: Seize
2. Action ICB: Use Instruction List

The CSP initiates the channel's outseize instruction list, previously configured with the *Outseize Instruction List Configure* message.

Outpulse Stage 1 (the CSP uses the first Data ICB in list 3)

- Send Host ACK
- Wait for Host Control with Answer Supervision

3. Data ICB: Stage 1 Digits (DTMF digits, 4)



Outbound - Exchange Access North American (EANA)

To process this call without preprogrammed instructions, send a *Route Control* (or *Outseize Control*) message with the following ICBs:

Route Control message

1. Action ICB: Seize
2. Action ICB: Outpulse Stage 1 Digits
3. Action ICB: Scan For Wink 2
4. Action ICB: Send Host ACK

5. Action ICB: Wait for Host Control with Answer Supervision
6. Data ICB: Stage 1 Digits To Be Outpulsed (String1: ANI, String 2: MFR1 Called Party Address)

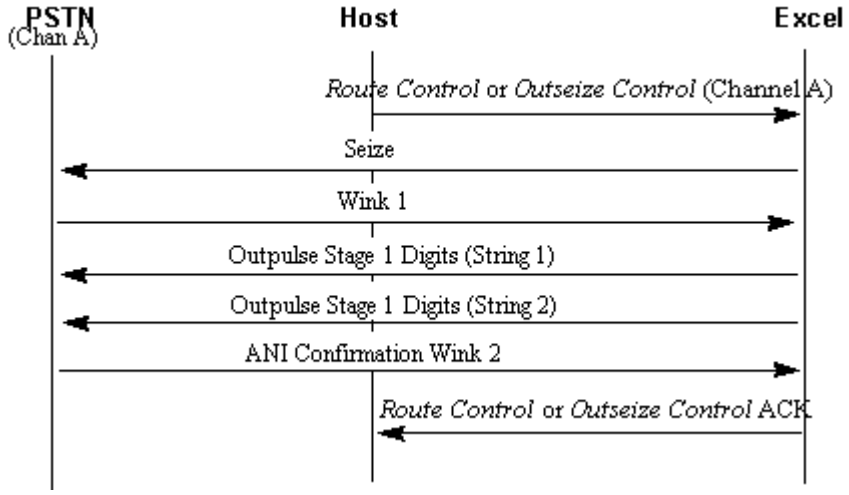
To process this call using preprogrammed instructions, the host first configures the channel with the following instructions:

Outseize Instruction List

1. Outpulse Stage 1 Digits
2. Scan For Wink 2
3. Send Host ACK
4. Wait for Host Control with Answer Supervision

Then, the host sends a *Route Control* (or *Outseize Control*) message with the following ICBs:

1. Action ICB: Seize
2. Action ICB: Use Instruction List
3. Data ICB: Stage 1 Digits (String1: ANI, String 2: MFR1 Called Party Address

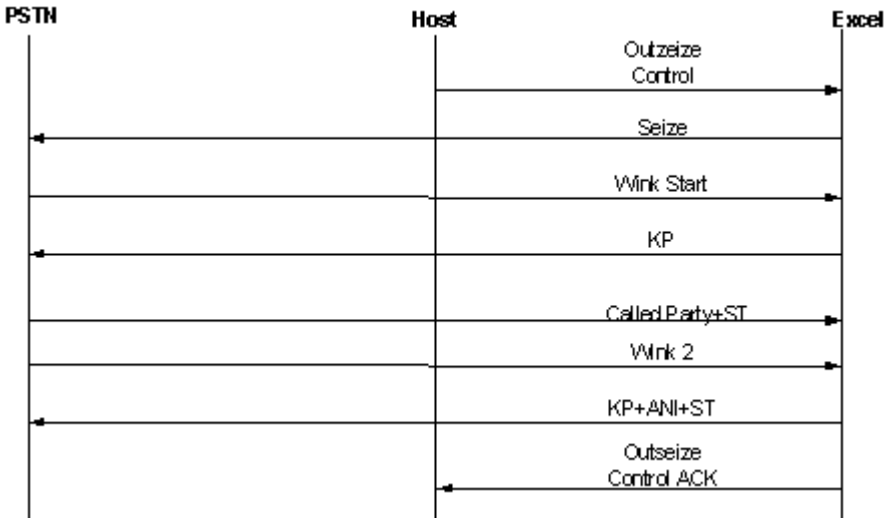


Outbound - Taiwan MDR1 with ANI

To process this call without preprogrammed instructions, send a *Route Control* (or *Outseize Control*) message with the following ICBs:

Route Control message

1. Action ICB: Seize
2. Action ICB: Outpulse Stage 1 Digits
3. Action ICB: Scan For Wink 2
4. Outpulse Stage 2 Digits.
5. Action ICB: Send host ACK.
6. Action ICB: Wait for Host Control with Answer Supervision
7. Data ICB: Stage 1 Digits To Be Outpulsed (String1: KP Compelled MFR1.
8. Data ICB Stage 2 Digits to be outpulsed (String 1: MFRI (0x04) must use ST 1 as last signal.)



Outbound - Exchange Access International (EAI)

To process this call without preprogrammed instructions, send a *Route Control* (or *Outseize Control*) message with the following ICBs:

1. Action ICB: Seize
2. Action ICB: Outpulse Stage 1 Digits
3. Action ICB: Scan For Wink 2
4. Action ICB: Outpulse Stage 2 Digits
5. Action ICB: Scan For Wink 3
6. Action ICB: Send Host ACK
7. Action ICB: Wait for Host Control with Answer Supervision
8. Data ICB: Stage 1 Digits (String1: country routing information)

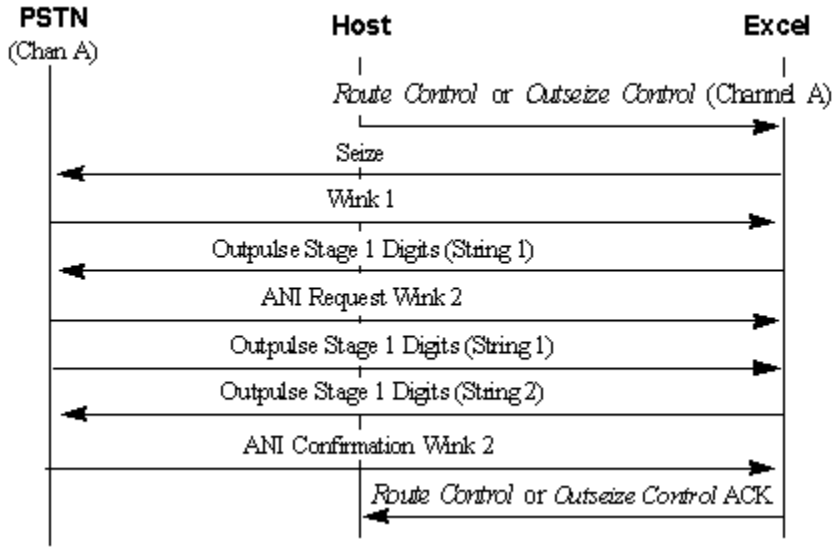
9. Data ICB: Stage 2 Digits (String 1: ANI, String 2: MFR1 Called Party Address)

To process this call using preprogrammed instructions with the *Outseize Instructions List Configure* message, the host first configures the channel with the following instruction list:

1. Outpulse Stage 1 Digits
2. Scan For Wink 2
3. Outpulse Stage 2 Digits
4. Scan For Wink 3
5. Send Host ACK
6. Wait for Host Control with Answer Supervision

Then send a *Route Control* message with the following ICBs:

1. Action ICB: Seize
2. Action ICB: Use Instruction List
3. Data ICB: Stage 1 Digits (String1: country routing information)
4. Data ICB: Stage 2 Digits (String 1: ANI, String 2: MFR1 Called Party Address)



3 J1 Information

Overview

This chapter provides information on J1 configuration.

The J-ONE card supports 16 J1 spans. If you do not need all 16 spans, you can buy the card with fewer spans. When your needs increase, you can buy product licenses to enable more spans, two at a time. The card can be used with, or instead of, the existing four-span SJ1LC. The product hardware includes a line card and input/output (I/O) cards.

For PPL Component Addressing information regarding J1, refer to *PPL Component Addressing Information* in the *API Reference.*

Refer to *Configuring SS7 Virtual Spans* in the *Developer's Guide: Common Channel Signaling* for information on virtual J1 cards.

J1 Supported Features

This CSP supports the following features:

- Clear Channel for 30 J-ONE channels
- A maximum of four J-ONE cards per CSP
- 16 spans per J-ONE card
- 30 ports per J-ONE span (480 ports per card)

Using the Clear Channel Protocol

The default protocol for the J-ONE card is Clear Channel. To use Clear Channel, you must assign Logical Span IDs on the J-ONE card before bringing it into service. The channels are ready for call processing when the host receives *DS0 Status Change* messages indicating that the channels are in service.

Limitations for J-ONE using Clear Channel Protocol

- Preprogrammed call control instruction lists (inseize or outseize) are not supported
- The *Channel Parameter Query* message is not supported for J-ONE channels
- The *Outseize Control* message supports only the following ICBs:
  - Seize
  - Send Host Acknowledge
  - Wait for Host Control
  - Wait for Host Control with Answer

JATE Specifications

You should be familiar with the JATE (Japan Approvals Institute for Telecommunications Equipment) specifications and you should have ready access to them. The JATE specifications are not explained in this document except where they are immediately relevant to the topic being described.

API Messages

The following three API messages report ID numbers for the J-ONE cards:

- *Card Population Query* (0x07)
- *Card Status Query* (0x83)
- *Card Status Report* (0xA6)

The J-ONE and SJ1LC card ID numbers reported in the messages above are as follows:

- 0x0E: 4-span SJ1LC
- 0x1D: 8-span J-ONE card
- 0x1E: 16-span J-ONE card
- 0xDA: Standard J-ONE I/O card
- 0xDB: Redundant J-ONE I/O card
- 0xDC: Standby J-ONE I/O card

4 E1 Information

Overview This section contains information on E1 configuration.

The E-ONE card supports 16 E1 spans. If you do not need all 16 spans, you can buy the card with fewer spans. When your needs increase, you can buy product licenses to enable more spans, two at a time.

For PPL Component Addressing information regarding E1, refer to *PPL Component Addressing Information* in the *API Reference*.

Refer to *Configuring SS7 Virtual Spans* in the *Developer's Guide: Common Channel Signaling* for information on virtual E1 cards.

Important! If the E-ONE card is not responding during frame synchronization, you must take it out of service and bring it back into service.

Default Instruction Lists

Default Inseize Instruction List

The default inseize instruction lists for E1 spans are shown in the table below.

Channel	Instruction List
E1	1. Generate Inseize ACK 2. Receive Stage 1 Address Data 3. Report Incoming Call With Digit 4. Wait For Host Control Message

Default Outseize Instruction Lists

The default outseize instruction lists for E1 spans are shown in the table below.

Channel	Instruction List
E1	1. Outpulse Stage 1 Digits 2. Outpulse Stage 2 Digits 3. Outpulse Stage 3 Digits 4. Outpulse Stage 4 Digits 5. Report Call Processing Event 6. Wait For Host Control Message

Configuring Instruction Lists

You must send a separate message for each instruction you add to the list. For example, to configure the following inseize instruction list on all of the channels on Span 0, send the following sequence of *Inseize Instruction List Configure* messages, with the specifications noted:

Instruction List

1. Generate Wink 1
2. Receive Stage 1 Digits
3. Report Incoming Call with Address Data
4. Wait for Host Control

Send the following *Inseize Instruction List Configure* messages:

Message 1:

Instruction Number: 0x01
Instruction Type: 0x02 (Generate Call Processing Event)
Instruction Data Byte 1: 0x03 (Wink 1)

Message 2:

Instruction Number: 0x02
Instruction Type: 0x03 (Receive Stage N Address Data)
Instruction Data Byte 1: 0x01 (Stage 1)

Message 3:

Instruction Number: 0x03
Instruction Type: 0x06 (Report Incoming Call With Address Data)

Message 4:

Instruction Number: 0x04
Instruction Type: 0x04 (Wait For Host Control)

E1 PPL Component Information (0x0001)

Events The events listed below are specific to the E1 PPL component.

Events 0-15 are Receive Line Signaling Events. They require an Event Data value for the Timer Filter. The data value is an index into the Generic Protocol Timer list that is configurable using the *PPL Timer Configure* message.

The default value for timers 1-45 are shown below in 10 millisecond units. Timers 46-100 are not used. See the default E1 PPL DSD for the default timers used for each event.

Table 4-1 E1 Events

0	RCV LINE SIG 0000	Receive CAS line signaling bits of a = 0, b = 0, c = 0, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
1	RCV LINE SIG 0001	Receive CAS line signaling bits of a = 0, b = 0, c = 0, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
2	RCV LINE SIG 0010	Receive CAS line signaling bits of a = 0, b = 0, c = 1, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
3	RCV LINE SIG 0011	Receive CAS line signaling bits of a = 0, b = 0, c = 1, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
4	RCV LINE SIG 0100	Receive CAS line signaling bits of a = 0, b = 1, c = 0, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
5	RCV LINE SIG 0101	Receive CAS line signaling bits of a = 0, b = 1, c = 0, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
6	RCV LINE SIG 0110	Receive CAS line signaling bits of a = 0, b = 1, c = 1, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value

7	RCV LINE SIG 0111	Receive CAS line signaling bits of a = 0, b = 1, c = 1, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
8	RCV LINE SIG 1000	Receive CAS line signaling bits of a = 1, b = 0, c = 0, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
9	RCV LINE SIG 1001	Receive CAS line signaling bits of a = 1, b = 0, c = 0, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
10	RCV LINE SIG 1010	Receive CAS line signaling bits of a = 1, b = 0, c = 1, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
11	RCV LINE SIG 1011	Receive CAS line signaling bits of a = 1, b = 0, c = 1, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
12	RCV LINE SIG 1100	Receive CAS line signaling bits of a = 1, b = 1, c = 0, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
13	RCV LINE SIG 1101	Receive CAS line signaling bits of a = 1, b = 1, c = 0, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
14	RCV LINE SIG 1110	Receive CAS line signaling bits of a = 1, b = 1, c = 1, d=0.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
15	RCV LINE SIG 1111	Receive CAS line signaling bits of a = 1, b = 1, c = 1, d=1.
		Event Data: Index Into Generic Protocol Timer List for Filter Value
16	FWD R2 SIG1	Receive multifrequency forward R2 signal 1.
17	FWD R2 SIG2	Receive multifrequency forward R2 signal 2.
18	FWD R2 SIG3	Receive multifrequency forward R2 signal 3.
19	FWD R2 SIG4	Receive multifrequency forward R2 signal 4.
20	FWD R2 SIG5	Receive multifrequency forward R2 signal 5.
21	FWD R2 SIG6	Receive multifrequency forward R2 signal 6.

22	FWD R2 SIG7	Receive multifrequency forward R2 signal 7.
23	FWD R2 SIG8	Receive multifrequency forward R2 signal 8.
24	FWD R2 SIG9	Receive multifrequency forward R2 signal 9.
25	FWD R2 SIG10	Receive multifrequency forward R2 signal 10.
26	FWD R2 SIG11	Receive multifrequency forward R2 signal 11.
27	FWD R2 SIG12	Receive multifrequency forward R2 signal 12.
28	FWD R2 SIG13	Receive multifrequency forward R2 signal 13.
29	FWD R2 SIG14	Receive multifrequency forward R2 signal 14.
30	FWD R2 SIG15	Receive multifrequency forward R2 signal 15.
31	BWD R2 SIG1	Receive multifrequency backward R2 signal 1.
32	BWD R2 SIG2	Receive multifrequency backward R2 signal 2.
33	BWD R2 SIG3	Receive multifrequency backward R2 signal 3.
34	BWD R2 SIG4	Receive multifrequency backward R2 signal 4.
35	BWD R2 SIG5	Receive multifrequency backward R2 signal 5.
36	BWD R2 SIG6	Receive multifrequency backward R2 signal 6.
37	BWD R2 SIG7	Receive multifrequency backward R2 signal 7.
38	BWD R2 SIG8	Receive multifrequency backward R2 signal 8.
39	BWD R2 SIG9	Receive multifrequency backward R2 signal 9.
40	BWD R2 SIG10	Receive multifrequency backward R2 signal 10.
41	BWD R2 SIG11	Receive multifrequency backward R2 signal 11.
42	BWD R2 SIG12	Receive multifrequency backward R2 signal 12.
43	BWD R2 SIG 13	Receive multifrequency backward R2 signal 13.
44	BWD R2 SIG 14	Receive multifrequency backward R2 signal 14.
45	BWD R2 SIG 15	Receive multifrequency backward R2 signal 15.
46	R2 COMP CYCLE COMPLETE	Generated upon R2 cycle completion when indicated by the Generate Call Processing Event of BWD R2 Compelled Signal with Cycle Completion.
50	L5 BUSY OUT	L4-initiated Busy Out event.
51	L5 BUSY OUT RELEASE	L4-initiated Release Busy Out event.
55	L4 CALL REQ	Outgoing call request generated by L4 when a *Connect* message is sent from L5 and the B party is in the idle state.

56	L4 ALERTING	L4 indication sent to the PPL on an incoming call when the destination is being rung.
57	L4 CONNECT	L4 indication sent to the PPL on an incoming call when the destination has answered.
58	L4 CLEAR REQ	L4 indication to release the call or L4 ACK to a L3 “Disconnect”.
59	L4 BUSY OUT ACK	L4 ACK to L3 “Busy Out” message.
60	L4 PURGE	L4-initiated purge event.
61	L4 OUTSEIZE CONTROL	L4 *Outseize Control* message event.
62	L4 INSEIZE CONTROL	L4 *Inseize Control* message event.
66	DSP RESULT DIGITS	Generated upon detection of DTMF digits.
67	DSP RESULT FIRST-DIGIT TIMEOUT	Generated upon failure to detect DTMF digit.
68	DSP RESULT INTER-DIGIT TIMEOUT	Generated upon detecting DTMF inter-digit timeout.
69	DSP RESULT DIGITS COMPLETE TIMEOUT	Generated upon failure to detect a complete set of DTMF digits.
70	DSP RESULT OUTPULSE COMPLETE	Generated upon DTMF digit outpulsing completion.
71	L3PPLevDSP_RESULT_CP_RESUL.	Generated when DSP reports a call progress analysis result.
72	DSP Result Dialtone Detected	Generated upon detection of dial tone.
80	DSP Announcement Start	Generated by the beginning of a recorded announcement.

81	DSP Announcement Complete	Generated by the completion of a recorded announcement.

Table 4-2 E1 PPL Timers

Timer Number	Description	Default Value (in 10 ms units)
1	(S19) Incoming Layer 4 busy out Acknowledge wait	400
2	(S2) Incoming Stage 1 FWD digit receive wait	2,000
3	(S3) Incoming Stage 2 FWD digit receive wait	2,000
4	(S4) Incoming Stage 3 FWD digit receive wait	2,000
5	(S5) Incoming Stage 4 FWD digit receive wait	2,000
6	(S13) Layer 4 Connect wait	24,000
7	(S14) Layer 4 Clear wait	400
8	(S21) Clear Forward (idle line signal) wait	1,500
9	(S3) Incoming Stage 2 Initial FWD digit receive wait	2,000
10	(S2) Incoming Stage 1 Initial FWD digit receive wait	2,000
11	(S5) Incoming Stage 4 Initial FWD digital receive wait	2,000
12	(S4) Incoming Stage 3 Initial FWD digit receive wait	2,000
13	(S15) Layer 3 Circuit Release wait	10
14	(S18) Layer 3 Circuit Release wait	10
15	(S6) Host Control wait	6,000
16	(S13) Layer 4 Connect wait	24,000
17	(S29) Seize Acknowledge wait	400
18	(S31) After detecting glare time to wait before transmitting idle signal	10
19	(S32) Time to wait before looking for idle line signal after transmitting idle signal when glare detected	10

Timer Number	Description	Default Value (in 10 ms units)
20	(S39) Outgoing Stage 1 BWD R2 signal wait	1,500
21	(S39) Outgoing Stage 1 Initial BWD R2 signal wait	1,500
22	(S41) Outgoing Stage 2 BWD R2 signal wait	1,500
23	(S41) Outgoing Stage 2 Initial BWD R2 signal wait	1,500
24	(S43) Outgoing Stage 3 BWD R2 signal wait	1,500
25	(S43) Outgoing Stage 3 Initial BWD R2 signal wait	1,500
26	(S45) Outgoing Stage 4 BWD R2 signal wait	1,500
27	(S45) Outgoing Stage 4 Initial BWD R2 signal wait	1,500
28	(S46) Outgoing Host Control wait	24,000
29	(S50) Outgoing Layer 4 Clear wait	400
30	(S49) Outgoing idle line signal wait	12,000
31	(S50) Outgoing idle line signal wait (after glare detected)	12,000
32	(S24) Host Control wait	24,000
33	(S33) Time to wait for Clear Forward after glare detected	1,000
34	Receive line signaling filter	4
35	Not Used	N/A
36	(S6, S24) Incoming BWD R2 Cycle Complete Event wait	400
37	Not Used	N/A
38	(S10) Time to wait for idle line signaling after invalid line signal detected while receiving FWD R2 digits	2,000

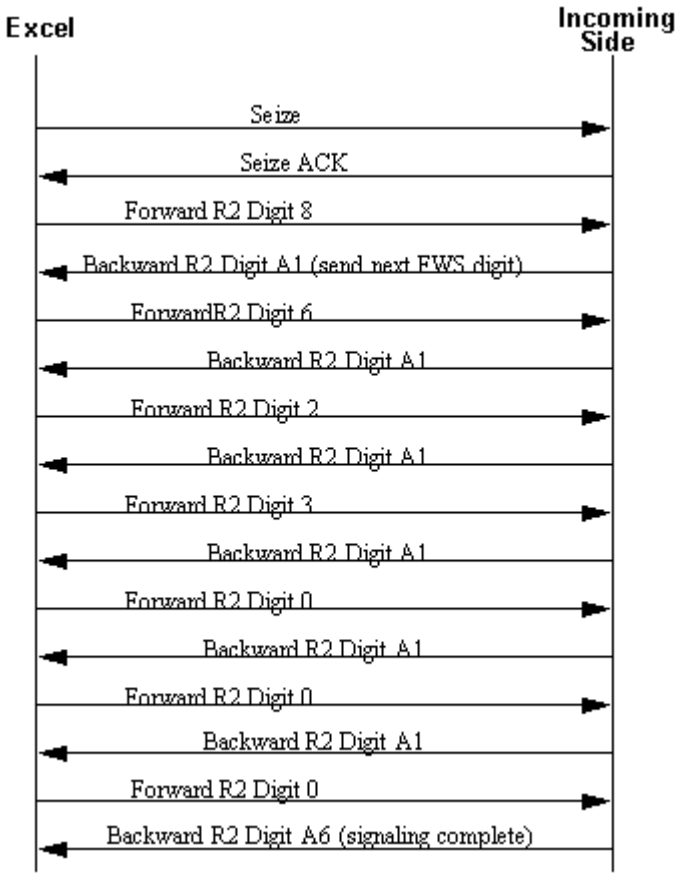
Timer Number	Description	Default Value (in 10 ms units)
39	(S22) Layer 3 Clear Forward wait	300
40	(S39) Outgoing Stage 1 BWD A signal wait after sending all of stage 1 FWD digits	2,000
41	(S2, S3, S4, S5) FWD R2 digit receive wait when String Collection Data field in Inpulsing Parameters Configure is set to 0xFF	144
42	Not Used	N/A
43	R2 Cycle Complete Event wait	200
44	Time to wait for Call Progress Analysis Result	1,500
45	(S43) Time to wait for next BWD R2 signal when stage 3 digits have been outpulsed	2,000

E1 Call Flows

Outseize Message for MFR2 Signaling with Called Party Only (Network)

This call flow shows the events that occur at the Signaling layer.

1. Seize
2. Outpulse Stage 1
3. Send Host ACK
4. Wait for Host Control (with Answer Supervision)
5. Stage 1 digits are 862-3000 (data ICB, address data for Stage 1)



Inseize Message For MFR2 with Called Party and Category

In this example, the CSP performs the following:

1. Acknowledges the Seize message
2. Collects Called Party digits (Stage 1)
3. Changes to Group B signaling
4. Receives Group II signal (Stage 4)

5. Terminates the signaling sequence with a Backward B6 signal

Inseize Control Instructions

1. Generate seize ACK
2. Receive Stage N Address Data (Stage 1 Called Party)
3. Generate Call Processing Event of BWD R2 Compelled or Pulsed R2 Signal (A3)
4. Receive Stage N Address Data (Stage 4 Category)
5. Generate Call Processing Event of BWD R2 Compelled R2 Signal with Cycle Completion (B6)
6. Send Host ACK
7. Wait for Host Control

Inpulsing Parameters

Stage 1:

String Collection Method: Fixed Number of Digits
String Collection Data: 0xFF
(Keep requesting until no more digits are received)

Stage 4:

String Collection Method: Fixed Number of Digits
String Collection Data: 1 Digit

Inseize Message For MFR2 with Called Party, Calling Party, and Category

In this example, the CSP performs the following:

1. Sends an ACK to the Seize
2. Receives Called Party digits
3. Requests the Category digit and Calling Party digits
4. Receives digits (Stage 2)
5. Requests the remaining Called Party digits
6. Receives digits (Stage 3)
7. Changes to Group B
8. Receives Group II signal (Stage 4)
9. Terminates the signaling sequence with a Backward B6 signal.

Inseize Control Instructions

1. Generate seize ACK
2. Receive Stage N Address Data (Stage 1 Called Party)
3. Receive Stage N Address Data (Stage 2 Calling Party)
4. Receive Stage N Address Data (Stage 3 Called Party Remaining Digits)
5. Generate Call Processing Event of BWD Compelled R2 Signal (A3)
6. Receive Stage N Address Data (Stage 4 Category)
7. Generate Call Processing Event of BWD Compelled R2 Signal with Cycle Completion (B6)
8. Send Host ACK
9. Wait for Host Control

Inpulsing Parameters

Stage 1:

String Collection Method: Fixed Number of Digits
String Collection Data:3 Digits

Stage 2:

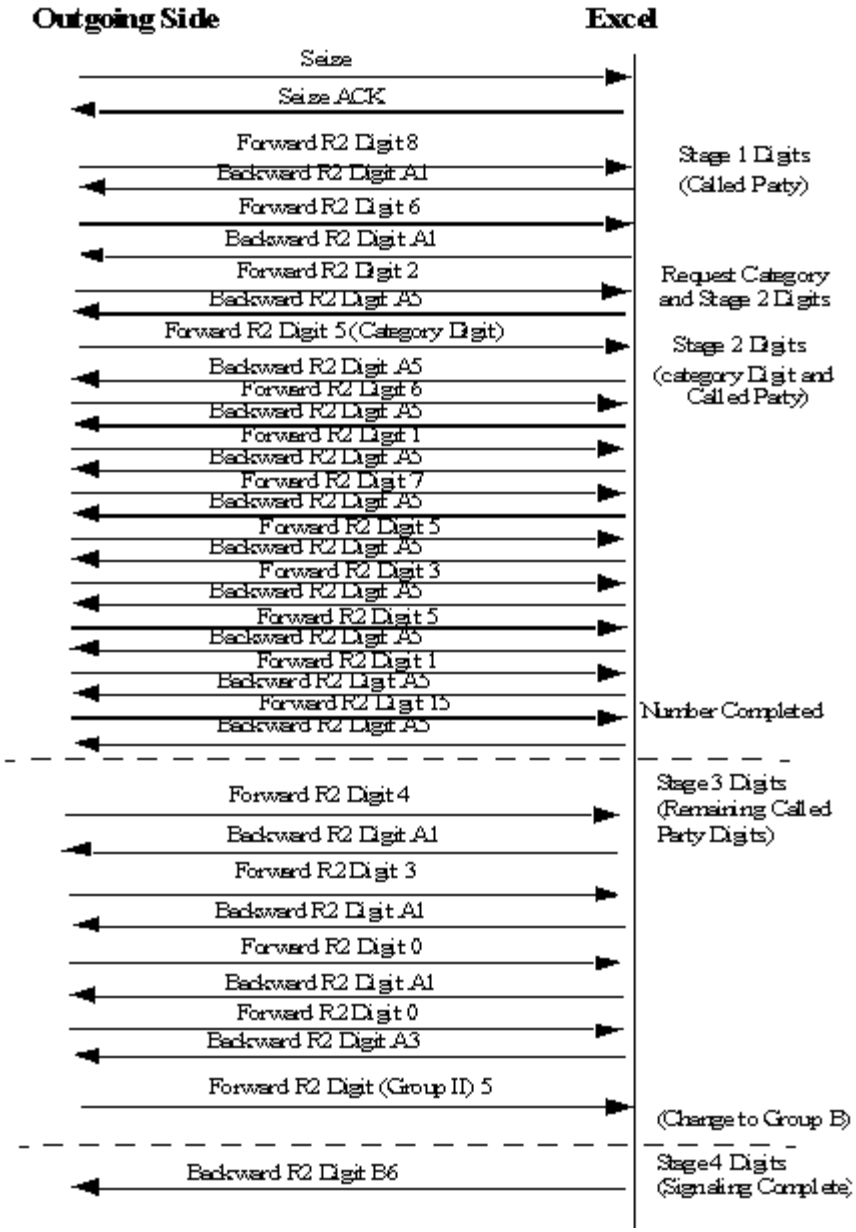
String Collection Method: Fixed Number of Digits
String Collection Data: 0xFF
(Keep requesting until no more digits are received)

Stage 3:

String Collection Method: Fixed Number of Digits
String Collection Data: 4 Digits

Stage 4:

String Collection Method: Fixed Number of Digits
String Collection Data:1 Digit

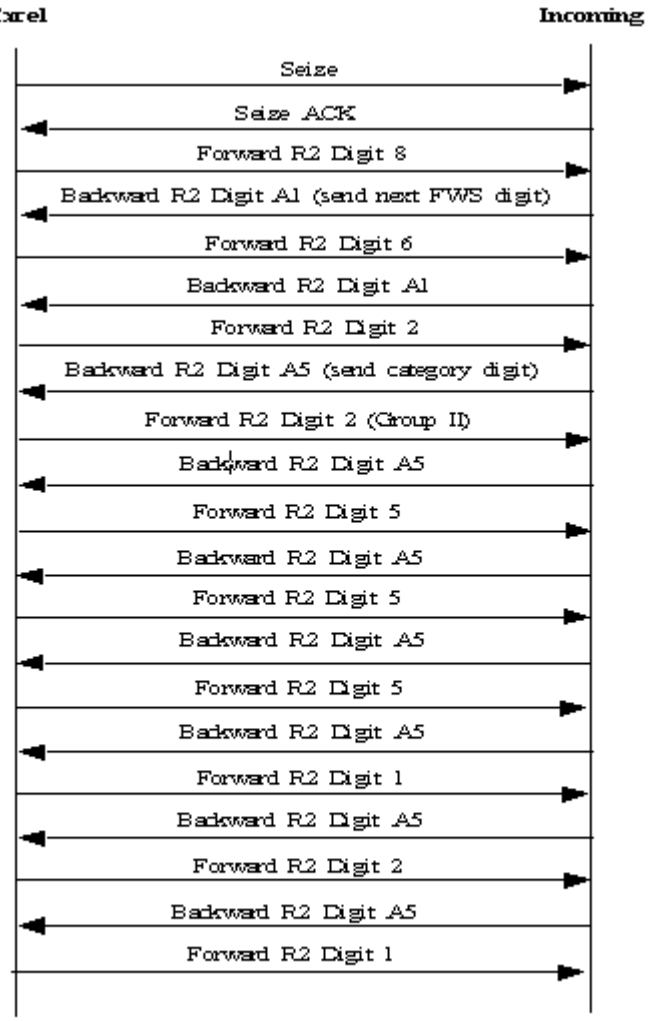


Outbound - Outseize Control for MFR2 with Called Party, Calling Party and Category Example

The call flow in the next example shows the events that occur at the CSP Signaling layer when the host sends a *Route Control* (or *Outseize Control*) message with the following ICBs:

1. Seize
2. Outpulse Stage 1
3. Send Host ACK
4. Wait for Host Control (with Answer Supervision)

5. Stage 1 digits are 862-3000 (data ICB, address data for Stage 1)
6. Stage 2 digits are 555-1212 (data ICB, address data for Stage 2)
7. Stage 4 digit is 2 (data ICB, address data for Stage 4



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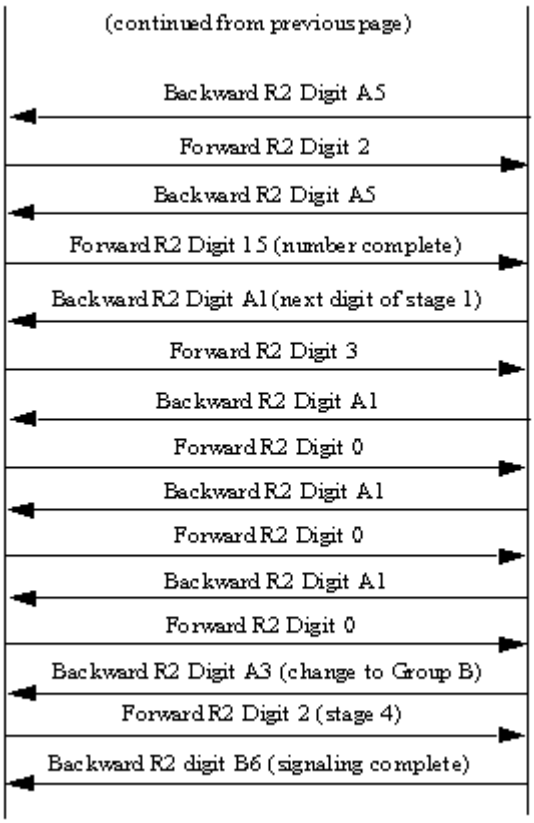
(continued from previous page)
Backward R2 Digit A5
Forward R2 Digit 2
Backward R2 Digit A5
Forward R2 Digit 15 (number complete)
Backward R2 Digit A1 (next digit of stage 1)
Forward R2 Digit 3
Backward R2 Digit A1
Forward R2 Digit 0
Backward R2 Digit A1
Forward R2 Digit 0
Backward R2 Digit A1
Forward R2 Digit 0
Backward R2 Digit A3 (change to Group B)
Forward R2 Digit 2 (stage 4)
Backward R2 digit B6 (signaling complete)