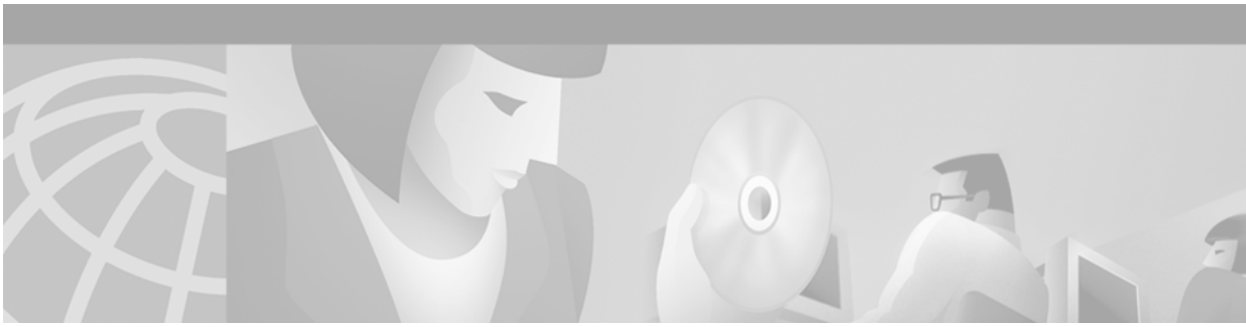

Preface

Objective

The New Zealand country feature package supports the R2 signaling tones, pulse code modulation (PCM) line signaling, and tone plan as stated in Chapter 2, “R2 Signaling Tones and Pulse Code Modulation Line Signaling” and Chapter 3, “New Zealand Tone Plan.”

Except where otherwise noted, this supplement describes the installation, configuration, operation and general functionality of the New Zealand country feature package as used with the following Virtual Central Office (VCO) and Specialty Digital Switch (SDS) platforms.

- VCO/4K running system software V5.x FSR00 PUN00 or higher
- VCO/20 running system software V4.0 FSR00 PUN00* or higher
- VCO/80 running system software V3.3 FSR00 PUN00** or higher
- SDS-1000 running system software V3.3 FSR00 PUN00** or higher
- SDS-500 running system software V3.3 FSR00 PUN00** or higher

* The PUN number was included as part of the V4.x system software numbering scheme at V4.0 FSR02 PUN00.

** The PUN number was included as part of the V3.x system software numbering scheme at V3.3 FSR05 PUN00.

Note Within any given country, there may be more than one tone plan in use by the various telecommunication service providers who operate privately and/or publicly within the country in question. Thoroughly review the tone plan listed in Chapter 3, “New Zealand Tone Plan” to verify that this is the country feature package that you ordered.

Audience

This document is intended for all personnel using the New Zealand country feature package.

Document Organization

This document is organized as follows:

Chapter 1, “System Requirements” lists the system requirements for running the New Zealand country feature package.

Chapter 2, “R2 Signaling Tones and Pulse Code Modulation Line Signaling” describes the R2 signaling tones generated and detected by the MFCR2 transceiver cards, and the R2 pulse code modulation (PCM) 2-bit line signaling transmitted and received by E1 spans.

Chapter 3, “New Zealand Tone Plan” details the modifications to the Digital Tone Generator (DTG or DTG-2) and Call Progress Analyzer (CPA) cards, and the SPC-CPA service cards.

Chapter 4, “R2 Signaling Examples” provides examples of R2 signaling.

Documentation Conventions

This document uses the following conventions:

Caution Means *reader be careful.* In this situation, you might do something that could result in equipment damage or loss of data.

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Related Documentation

The *Cisco VCO/4K New Zealand Supplement* provides important information about running the New Zealand country feature package on the VCO and SDS platforms. If a topic is discussed in both the SDS/VCO documentation set and this supplement, refer to the information in this document.

You should have a working knowledge of R2 signaling.

Network signaling requirements appear in the following specifications:

- International Telecommunications Union (ITU, formerly Comité Consultatif International Téléphonique et Télégraphique, CCITT) Q.421 Digital Line Signaling Code
- ITU Q.440 Interregister Signaling

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Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

http://www.cisco.com/register/

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

http://www.cisco.com/tac/caseopen

Contacting TAC by Telephone

If you have a priority level 1(P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround in available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

CHAPTER 1

System Requirements

Installation and Configuration

This chapter lists system requirements for running the New Zealand country feature package on SDS and VCO platforms operating with system V3.3 through V5.x. These requirements are categorized by hardware, firmware, and software. For any site-specific concerns, contact Cisco as described in the preface.

The New Zealand country feature package consists of the following components:

- Digital Tone Generator (DTG) card or DTG-2 card
- Call Progress Analyzer (CPA) or Service Platform (SPC) cards, software-configured for CPA (displayed as SPC-CPA)
- SPC card software-configured for DTMF (displayed as SPC-DTMF)
- SPC software configured for MFCR2 (displayed as SPC-MFCR2)
- Diskette for the CPA and SPC cards containing the download files

Note Service circuit cards must occupy only one resource group in the Resource Group Summary screen; further, different card types cannot share the same resource group. Use either the SPC or the CPA card (but not both) if your system requires CPA service circuit functionality.

Hardware Requirements

Refer to the *Cisco VCO/4K Tone Plan Release Notes* for the A-law and Mu-law rules and timing rules governing the hardware configurations of cards with jumpers/DIPs, and the software configurations of cards without jumpers/DIPs.

Refer to the *Cisco VCO/4K Card Technical Descriptions* for each service circuit card and for each network card for jumper and DIP switch settings.

Firmware Requirements

Refer to the *Cisco VCO/4K Tone Plan Release Notes* for information regarding system firmware requirements particular to the New Zealand country feature package.

Refer to your system release notes for step-by-step instructions to install firmware on either the DTG-2 mezzanine card, or DTG card, and to install firmware on the MFCR2 card.

Software Requirements

Refer to the *Cisco VCO/4K Tone Plan Release Notes* for information regarding system software requirements particular to the New Zealand country feature package.

System software V5.1 FSR00 PUN24, or higher, is required to operate the New Zealand SPC software on the SPC.

Call Progress Analyzer and Service Platform Card Downloads

Your country feature package contains a 3.5-inch diskette containing the POST-P24 directory. This directory contains Call Progress Analyzer (CPA) and Service Platform Card (SPC) download files. The POST-P24 directory contains the following files:

cpa.dwn
cpa.nor
cpa.spc
cpa.sit
cpa.ctg
mfcr2.sim
mfcr2.sma
mfcr2.utg
mfcr2.spc
mfcr2.smt
dtmf.spc

Copy the POST-P24 directory contents to your system's C:/BOOT directory. You must be using system software V5.1 FSR00 PUN24, or higher, in conjunction with this directory.

If you are using system software V5.1 FSR00 PUN23 or lower, copy only the cpa.dwn file to the C:/BOOT directory.

Refer to the *Cisco VCO/4K System Administrator's Guide* for step-by-step instructions in order to copy the above files to your system's C:/BOOT directory.

Note Always wear a wrist strap when installing software and handling system components.

The files are now loaded onto your hard disk. Complete the installation by loading the files from the hard disk to the cards. The method you use depends on whether you are loading the files onto a new or existing installation. For new installations, refer to the "Loading the Software onto Cards—New Installations" section on page 1-3; for existing installations, refer to the "Loading the Software onto Cards—Existing Installations" section on page 1-3. Refer to the *Cisco VCO/4K System Administrator's Guide* for step-by-step instructions as you complete this installation procedure.

Loading the Software onto Cards—New Installations

To load files from the hard disk to cards on a new installation, follow these steps:

Step 1 If you have not already done so, access the Card Maintenance screen from the Maintenance Menu screen, and use the A command to add the CPA (the console displays this choice as Call Progress Analyzer) or the SPC (the console displays this choice as either SPC-CPA or SPC-DTMF) to the database.

Step 2 Insert your card, either the CPA or the SPC, into the appropriate slot. The card automatically runs internal diagnostics. One of two results follow, dependent upon which card you have inserted.

Caution Do not unseat or otherwise disturb the card while running internal diagnostics.

- For the CPA, the LEDs display the transition from off (all LEDs unlighted) to on (the red and yellow unlighted and the green lighted).
- For the SPC, the LED matrix display transitions from off (all LEDs unlighted) to on (the LED matrix lights the letters S, P, and C one at a time repeatedly; the lower right LED changes from unlighted to lighted repeatedly).

Step 3 Use the C command from the Card Maintenance screen to activate the card. The card takes the download. The service circuit spans are active, as can be seen from the Card Maintenance screen.

Caution Do not unseat or otherwise disturb the card while it is downloading.

Step 4 Verify the received FRM225, FRM226, FRM241, and FRM242 messages in your log file in order to ensure that the card has taken the download.

For the SPC, verify two additional messages in the log file—"Begin downloading spec file C:/boot/xxx.xxx" and "End downloading spec file C:/boot/xxx.xxx." The CPA does not have these, or any other, additional log file messages.

Step 5 Create a resource group for the CPA or the SPC service circuits.

You have completed the software installation.

Loading the Software onto Cards—Existing Installations

To load files from the hard disk to cards on an existing installation, follow these steps.

Caution This process disrupts in-progress calls and removes service circuits from operation for a few minutes.

Step 1 If you have not already done so, access the Card Maintenance screen from the Maintenance Menu screen, and take either the CPA card or the SPC service circuits out of service (OOS).

If you have a CPA, unseat it, wait 15 seconds, then insert the card into its slot.

Step 2 Use the C command from the Card Maintenance screen to activate the CPA or the various SPC service circuits.

Caution Do not unseat or otherwise disturb the card while it is downloading.

Step 3 Verify received download messages in your log file to ensure that the card has taken the download. The messages you need to verify are dependent upon which card type you are using.

- For the CPA, verify the received FRM225, FRM226, FRM241, and FRM242 messages.
- For the SPC, verify the following two messages—"Begin downloading spec file C:/boot/xxx.xxx" and "End downloading spec file C:/boot/xxx.xxx."

Note The SPC does not take a redownloading of the spc.dwn file.

You have completed the software installation.

Typical System Software Configurations

This section lists typical system software configurations used with the New Zealand country feature package. For more information on how to use and configure the various system software screens and menus, refer to the *Cisco VCO/4K System Administrator's Guide*.

Database Administration

Special consideration pertains to the following Database Administration menus and screens.

Card Summary Menu

The Card Summary menu displays the status and port availability of E1, 4xE1, and ICC cards. To assign operating characteristics to E1 spans, access the Configuration screen for that card from the Card Summary menu.

Note The term "E1 span" designates E1 and 4xE1 cards, or ICC cards with associated ICC-E1-I/O module.

Resource Group Summary Menu

You must define all SPC-MFCR2, SPC-DTMF, CPA, or SPC-CPA service circuit ports in a single resource group in the Resource Group Summary menu and Resource Group Configuration screen. To optimize outgoing call system performance, group E1 span outgoing ports into one or more resource groups.

Inpulse Rule and Outpulse Rule Screen

Typical inpulse and outpulse rule tokens used to support R2 signaling are listed in Table 1-1.

Table 1-1 Typical Inpulse and Outpulse Rule Tokens Used to Support R2 Signaling

Inpulse Tokens		Outpulse Tokens	
REP NEXT	CLR CHAR1 [xx]	REP END	OP ANI
MFCR2	WINK ENAB	REP NEXT	OP MFCR2
DIGITS [xx]	IP ANI [xx]	OP FIELD [xx]	
END CHAR1 [xx]	IP FIELD [xx]	OP CAT [xx]	

For more information about these and other inpulse and outpulse rule tokens, refer to the *Cisco VCO/4K System Administrator's Guide*.

For more information on how to construct inpulse and outpulse rules for R2 signaling, refer to Chapter 4, "R2 Signaling Examples."

Answer Supervision Template Screen

Refer to the "Tone Detection" section on page 3-2 for information on the answer supervision template function.

System Configuration

Special considerations pertain to the following System Configuration screen.

System Features Screen

The Enable MFCR2 Supervised Clear feature flag supports automatic call release on outgoing ports in response to backward MFCR2 supervision tones. When the Enable MFCR2 Supervised Clear feature flag is set to **Y**, an outgoing port is released when a B2, B4, A4, or C4 backward tone is detected during R2 signaling. The system performs disconnect processing appropriate to the port, and generates an Outgoing Port Change of State ($DA) report that indicates a supervision error and specifies the backward tone. Backward supervision tones are described in Chapter 2, "R2 Signaling Tones and Pulse Code Modulation Line Signaling." The $DA report is discussed in the *Cisco VCO/4K Standard Programming Reference* and the *Cisco VCO/4K Extended Programming Reference.*

Note This feature flag enables/disables automatic call release on a system-wide basis. When the feature is enabled (set to **Y**), any outgoing port receiving the backward error tones is automatically released. If the feature flag is disabled (set to **N**), the outgoing port remains in SETUP unless out-of-band supervision or a host command changes the port state.

Maintenance

Special considerations pertain to the following Maintenance screen.

Card Maintenance Screen

Use the Card Maintenance screen to add, delete, and change the card/port status for MFCR2, CPA, and SPC service circuits, and E1 spans. When an E1 span is added to the Card Maintenance screen, its span type is set to CAS/R2 by default.

For E1 spans set to CAS/R2, ports 1 and 17 of the card's 32 ports are reserved. Port 1 (Channel 0) carries the frame alignment pattern, remote alarm indication bit, and national-use bits. Port 17 (Channel 16) carries the multiframe alignment pattern, extra bits, and channel-associated signaling bits.

For 4xE1 and ICC cards, set the span type to CCS/31B from the Card Summary menu in order to use port 17 as a bearer port. Use E1-31B firmware on single span E1 cards in order to use port 17 as a bearer port.

Diagnostics

Special considerations pertain to the following Diagnostics screens.

Card Display Screen

The Card Display screen lists the operating status of E1 spans. Information on the Card Display screen varies according to card type.

Port Display Screen

The Port Display screen lists the processing states, rule processing, links, paths, and digit collection activity of E1 spans.

Test Port Card Screen

The Test Port Card screen tests individual E1 channels. A path is set up between three elements—the selected E1 channel(s), MFCR2 circuits, and a Digital Tone Generator (DTG) channel. The system compares the signals sent with the signals received by the MFCR2 and reports discrepancies. You can test all channels on E1 spans with one command. You can select the E1 span for port card diagnostic tests. The E1 span enters a local loopback mode during the test and sends out an all 1s (ones) pattern.

Test Service Circuit Screen

The Test Service Circuit screen tests MFCR2 cards and SPC-MFCR2 service circuits.

Host Commands and Reports

The host commands and reports are documented in the *Cisco VCO/4K Standard Programming Reference* and the *Cisco VCO/4K Extended Programming Reference*.

CHAPTER 2

R2 Signaling Tones and Pulse Code Modulation Line Signaling

This chapter describes the R2 signaling tones generated and detected by the MFCR2 transceiver cards, and the R2 pulse code modulation (PCM) 2-bit line signaling transmitted and received by E1 spans.

Forward and Backward R2 Signaling Tones

Table 2-1 through Table 2-4 provide R2 signaling information based on ITU Q.441 as it applies specifically to the New Zealand telephone network.

Table 2-1 R2 Signaling Group I Forward Signals

Token Data Field	Designation	Frequencies	Digit Meaning
1	G-I-1	1380 + 1500 Hz	Digit 1
2	G-I-2	1380 + 1620 Hz	Digit 2
3	G-I-3	1500 + 1620 Hz	Digit 3
4	G-I-4	1380 + 1740 Hz	Digit 4
5	G-I-5	1500 + 1740 Hz	Digit 5
6	G-I-6	1620 + 1740 Hz	Digit 6
7	G-I-7	1380 + 1860 Hz	Digit 7
8	G-I-8	1500 + 1860 Hz	Digit 8
9	G-I-9	1620 + 1860 Hz	Digit 9
10	G-I-10	1740 + 1860 Hz	Digit 0
11	G-I-11	1380 + 1980 Hz	Reserved
12	G-I-12	1500 + 1980 Hz	Reserved
13	G-I-13	1620 + 1980 Hz	Reserved
14	G-I-14	1749 + 1980 Hz	Reserved
15	G-I-15	1860 + 1980 Hz	End of number

Table 2-2 R2 Signaling Group II Forward Signals

Token Data Field	Designation	Frequencies	Meaning
1	G-II-1	1380 + 1500 Hz	Ordinary subscriber
2	G-II-2	1380 + 1620 Hz	Priority subscriber
3	G-II-3	1500 + 1620 Hz	Maintenance equipment
4	G-II-4	1380 + 1740 Hz	Coin telephone
5	G-II-5	1500 + 1740 Hz	Operator
6	G-II-6	1620 + 1740 Hz	Data subscriber
7	G-II-7	1380 + 1860 Hz	Barred message rate[1]
8	G-II-8	1500 + 1860 Hz	Step original call
9	G-II-9	1620 + 1860 Hz	Step ICF on Trunk Link Frame (TLF) at Tandem (Do not re-route)
10	G-II-10	1740 + 1860 Hz	Reserved
11	G-II-11	1380 + 1980 Hz	Price required subscriber (PPR)
12	G-II-12	1500 + 1980 Hz	Operator number identification (ONI)
13	G-II-13	1620 + 1980 Hz	Hotel service subscriber (HTL)
14	G-II-14	1740 + 1980 Hz	Expansion identification service (EIS)
15	G-II-15	1860 + 1980 Hz	Trunk offer

1. Step subscribers only.

Table 2-3 R2 Signaling Group A Backward Signals

Token Data Field	Designation	Frequencies	Meaning
1	A-1	1140 + 1020 Hz	Send next digit *(n + 1)*
2	A-2	1140 + 900 Hz	Send last but one digit (n - 1)[1]
3	A-3	1020 + 900 Hz	Number complete, send category and change over to reception of Group B signals
4	A-4	1140 + 780 Hz	Network congestion
5	A-5	1020 + 780 Hz	Send calling category first (first A-5) Calling subscriber's indentity (successive A-5s)[2]
6	A-6	900 + 780 Hz	Set up speech conditions
7	A-7	1140 + 660 Hz	Send last but two digit (n - 2)[1]
8	A-8	1020 + 660 Hz	Send last but three digit (n - 3)[1]
9	A-9	900 + 660 Hz	Send real category[3]
10	A-10	780 + 660 Hz	Send last digit (n)[1]
11	A-11	1140 + 540 Hz	Reserved
12	A-12	1020 + 540 Hz	Reserved

Table 2-3 R2 Signaling Group A Backward Signals (continued)

Token Data Field	Designation	Frequencies	Meaning
13	A-13	900 + 540 Hz	Reserved
14	A-14	780 + 540 Hz	Reserved
15	A-15	660 + 540 Hz	Reserved

1. If the digit referred to is preceded by the trunk prefix 0 or 013, dialing begins back at the first digit of the dialing prefix.
2. The first A-5 is an instruction to send G-11 signal. Second and successive A-5s are to send the calling identity as G-I signals.
3. A-9 is an instruction to send a true G-II signal. It is followed by successive A-5s requesting calling party identity.

Table 2-4 R2 Signaling Group B Backward Signals

Token Data Field	Designation	Frequencies	Meaning
1	B-1	1140 + 1020 Hz	Malicious
2	B-2	1140 + 900 Hz	Subscriber transferred (changed number)
3	B-3	1020 + 900 Hz	Busy
4	B-4	1140 + 780 Hz	Congestion (when encountered after A-3)
5	B-5	1020 + 780 Hz	Not allotted and barred
6	B-6	900 + 780 Hz	Subscriber free with charging
7	B-7	1140 + 660 Hz	INward Wide Area Telephone Service (IN-WATS) (no charging to A subscriber)
8	B-8	1020 + 660 Hz	Line out of order
9	B-9	900 + 660 Hz	Common Carrier Bureau (CCB)
10	B-10	780 + 660 Hz	Malicious and INward Wide Area Telephone Service (IN-WATS)
11	B-11	1140 + 540 Hz	Reserved
12	B-12	1020 + 540 Hz	Reserved
13	B-13	900 + 540 Hz	Reserved
14	B-14	780 + 540 Hz	Reserved
15	B-15	660 + 540 Hz	Reserved

Pulse Code Modulation Line Signaling

Table 2-5 describes the 2-bit, channel-associated pulse code modulation (PCM) line signaling used by the VCO system equipped with E1 interface cards. Forward signals are used by originating or outgoing ports, while backward signals are generated by incoming ports. For more information on E1 cards, refer to the *Cisco VCO/4K Card Technical Descriptions*.

Table 2-5 R2 Pulse Code Modulation Line Signaling

Signal	Exchange Signaling Forward		Backward	
	A*f*	B*f*	A*b*	B*b*
Idle	1	0	1	0
Seize	0	0	1	0
Seize acknowledge	0	0	1	1
Answer	0	0	0	1
Flash (for 600 ms)	1	0	0	1
Called party clear	0	0	1	1
Called party reanswer (before timeout)	0	0	0	1
Calling party clear (before called party)	1	0	0	1
Calling party clear (after called party)	1	0	1	1
Release guard	1	0	1	0
Blocking	1	1	1	0

CHAPTER 3

New Zealand Tone Plan

This chapter details the modifications to the Digital Tone Generator (DTG or DTG-2) and Call Progress Analyzer (CPA) card, and Service Platform (SPC)-CPA service circuits to support the supervision tones specific to the New Zealand telephone network.

The information in this chapter supersedes the information in the following manuals:

- *Cisco VCO/4K System Administrator's Guide*
- *Cisco VCO/4K Standard Programming Reference*
- *Cisco VCO/4K Extended Programming Reference*
- *Cisco VCO/4K Supervision and Call Progress Tone Detection*

Tone Characteristics

Table 3-1 summarizes the characteristics of the most frequently used supervision and conference tones in the New Zealand network.

Table 3-1 New Zealand Digital Tone Generator Supervision and Conference Tones

Tone	Frequencies (Hz)	Amplitude (dBm)	Cadence	Detected by CPA?
Dial	400	– 9	Continuous	Yes
Ringback	400 + 450	– 9	0.4 second on, 0.2 second off, 0.4 second on, 2 seconds off, REPEATED	Yes
Busy	400	– 9	0.5 second on, 0.5 second off, REPEATED	Yes
Fast Busy	400	– 9	0.25 second on, 0.25 seconds off, REPEATED	Yes

Table 3-1 New Zealand Digital Tone Generator Supervision and Conference Tones (continued)

Tone	Frequencies (Hz)	Amplitude (dBm)	Cadence	Detected by CPA?
Number Unobtainable	400	– 9	0.075 second on, 0.1 second off, 0.075 second on, 0.1 second off, 0.075 second on, 0.1 second off, 0.075 second on, 0.4 second off, REPEATED	Yes—detected as SIT
Intrusion	1400	– 12	0.1 second on, 1.5 seconds off, REPEATED	No
Recorder Warn	1400	– 12	0.1 second on, 15 seconds off, REPEATED	No

Tone Detection

CPA and SPC-CPA processing is modified to support the New Zealand network requirements. Use the system administration answer supervision templates function to control tone detection for the tones listed in Table 3-1. Supervision template processing is described in the *Cisco VCO/4K System Administrator's Guide*.

Answer Supervision Template Screen Terminology

The supervision events and tones listed in the Answer Supervision Template screen use standard North American network terminology. Table 3-2 shows the Answer Supervision Template screen terms to use with the New Zealand country feature package.

Table 3-2 Answer Supervision Template Screen Terminology for New Zealand

Answer Supervision Template Event and Tone Names	New Zealand Tone Names
Dial	Dial
Ringback	Ringback
Busy	Busy
Reorder	Fast Busy
SIT Tones	Number Unobtainable
Ring Cess[1]	Not Applicable
Voice Det.[1]	Not Applicable
Voice Cess.[1]	Not Applicable

Table 3-2 Answer Supervision Template Screen Terminology for New Zealand (continued)

Answer Supervision Template Event and Tone Names	New Zealand Tone Names
Wink[1]	Not Applicable
Answer[1]	Not Applicable
Time[1]	Not Applicable
Hook Flash[1]	Not Applicable
Pager Cue	Not Available
ISUP Tone	Not Available
ISUP Cess.[1]	Not Applicable

1. Not a tone.

Tone Generation

Tone generation is performed through DTG outpulse and static tone channels. Use inpulse rules and the Voice Path Control ($66), and DTMF Collection Control ($67) commands to allocate these tones.

Table 3-3 supersedes the tone generation table listed in the *Cisco VCO/4K Standard Programming Reference* and the *Cisco VCO/4K Extended Programming Reference*. It also supersedes the tone output level specifications found in the *Cisco VCO/4K Card Technical Descriptions*. For more information on generating tones, refer to the *Cisco VCO/4K System Administrator's Guide*.

The tones and their corresponding output levels, decimal values, hexadecimal values, and port addresses are summarized in Table 3-3.

Table 3-3 Tone Levels, Values, and Port Addresses

Tone	Output Level	Decimal Value	Hex Value	Port Addresses
Beep	—	0	00	None
Quiet (PCM idle pattern 01010100)	—	1	01	04C0
1 KHz	0 dBm	2	02	04C1
Dial	**–9 dBm**	**3**	**03**	**04C2**
380 Hz	–10 dBm	4	04	04C3
440 Hz	–13 dBm	5	05	04C4
480 Hz	–17 dBm	6	06	04C5
1400 Hz	–10 dBm	7	07	04C6
1000 Hz @max CODEC output	—	8	08	04C7
920 Hz	–13 dBm	9	09	04C8
404 Hz	0 dBm	10	0A	04C9
1004 Hz	0 dBm	11	0B	04CA
2804 Hz	0 dBm	12	0C	04CB
Steady Ringback	–15.5 dBm	13	0D	04CC

Table 3-3 Tone Levels, Values, and Port Addresses (continued)

Tone	Output Level	Decimal Value	Hex Value	Port Addresses
1760 Hz	–10 dBm	14	0E	04CD
Digital Test Pattern	—	15	0F	04CE
400 Hz	–14 dBm	16	10	04CF
Ringback	**–9 dBm**	**17**	**11**	**04D0**
Busy	**–9 dBm**	**18**	**12**	**04D1**
Fast Busy	**–9 dBm**	**19**	**13**	**04D2**
380 Hz	–10 dBm	20	14	04D3
Reserved	—	21	15	04D4
Intrusion	**–12 dBm**	**22**	**16**	**04D5**
Recorder Warning	**–12 dBm**	**23**	**17**	**04D6**
Number Unobtainable	**–9 dBm**	**24**	**18**	**04D7**
Reserved	—	25	19	04D8
Reserved	—	26	1A	04D9
Reserved	—	27	1B	04DA
Reserved	—	28	1C	04DB
Reserved	—	29	1D	04DC
Reserved	—	30	1E	04DD
Reserved	—	31	1F	04DE
Reserved	—	32	20	04DF
DTMF digit 0 (steady)	–9/–11 dBm/freq	33	21	04E0
DTMF digit 1 (steady)	–9/–11 dBm/freq	34	22	04E1
DTMF digit 2 (steady)	–9/–11 dBm/freq	35	23	04E2
DTMF digit 3 (steady)	–9/–11 dBm/freq	36	24	04E3
DTMF digit 4 (steady)	–9/–11 dBm/freq	37	25	04E4
DTMF digit 5 (steady)	–9/–11 dBm/freq	38	26	04E5
DTMF digit 6 (steady)	–9/–11 dBm/freq	39	27	04E6
DTMF digit 7 (steady)	–9/–11 dBm/freq	40	28	04E7
DTMF digit 8 (steady)	–9/–11 dBm/freq	41	29	04E8
DTMF digit 9 (steady)	–9/–11 dBm/freq	42	2A	04E9
DTMF digit A (steady)	–9/–11 dBm/freq	43	2B	04EA
DTMF digit B (steady)	–9/–11 dBm/freq	44	2C	04EB
DTMF digit C (steady)	–9/–11 dBm/freq	45	2D	04EC
DTMF digit D (steady)	–9/–11 dBm/freq	46	2E	04ED
DTMF digit * (steady)	–9/–11 dBm/freq	47	2F	04EE
DTMF digit # (steady)	–9/–11 dBm/freq	48	30	04EF

Table 3-3 Tone Levels, Values, and Port Addresses (continued)

Tone	Output Level	Decimal Value	Hex Value	Port Addresses
MF digit 0 (steady)	–7 dBm/freq	49	31	04F0
MF digit 1 (steady)	–7 dBm/freq	50	32	04F1
MF digit 2 (steady)	–7 dBm/freq	51	33	04F2
MF digit 3 (steady)	–7 dBm/freq	52	34	04F3
MF digit 4 (steady)	–7 dBm/freq	53	35	04F4
MF digit 5 (steady)	–7 dBm/freq	54	36	04F5
MF digit 6 (steady)	–7 dBm/freq	55	37	04F6
MF digit 7 (steady)	–7 dBm/freq	56	38	04F7
MF digit 8 (steady)	–7 dBm/freq	57	39	04F8
MF digit 9 (steady)	–7 dBm/freq	58	3A	04F9
MF digit KP (steady)	–7 dBm/freq	59	3B	04FA
MF digit ST (steady)	–7 dBm/freq	60	3C	04FB
MF digit ST3P	–7 dBm/freq	61	3D	04FC
MF digit STP	–7 dBm/freq	62	3E	04FD
MF digit ST2P	–7 dBm/freq	63	3F	04FE

CHAPTER 4

R2 Signaling Examples

This chapter provides examples of R2 signaling performed with the following call control elements:

- Inpulse rules
- Outpulse rules
- Host commands and reports

Two examples discuss R2 digit collections on incoming trunks (calls coming into the VCO/4K); a third example describes R2 digit outpulsing on outgoing trunks (calls originating at the VCO/4K). Each example begins with a brief explanation of the scenario, followed by a graphic representation of the call flow. These diagrams illustrate system processing and information flow between the VCO/4K and host, and between the VCO/4K and connected equipment (network registers). Direction of the information flow is indicated by arrows under the message data.

Example #1—Incoming Call Using Inpulse Rules

Example #1 illustrates a simple R2 digit collection scenario after an incoming seize on the system E1 circuit at port address $00 41. A New Zealand specific inpulse rule is executed to perform R2 digit collection on this circuit. The rule generates a wink signal when an MFCR2 transceiver is enabled to alert the network register to send the R2 signals.

The inpulse rule performs the following general tasks:

- Collects an unspecified number of called party number digits and stores them in Field 1. A-1 (send next digit) signals prompt the network register for each new digit. When an I-15 digit is received, the system sends an A-5 (send calling category) digit.
- Collects the calling party's category (1 digit) and stores it in Field 2. After the digit is received, the system sends another A-5 (send calling subscriber's identity) digit.
- Collects the calling party's number (7 digits) and stores them in the ANI field. A-5 (send calling subscriber's identity) signals prompt the network register for each new digit. After the seventh digit is collected, the system sends an A-6 (set up speech conditions) digit.

At the end of this example, the system establishes speech conditions with the connected equipment (network register) and generates an Inpulse Rule Complete ($DD) report to the host. The processing flow for this example is shown in Figure 4-1 to Figure 4-3. In this example, the New Zealand specific inpulse rule for the incoming circuit has been defined as inpulse rule #1 (shown below).

Inpulse Rule #1

- REP EACH
- MFCR2
- WINK ENAB
- END CHAR 5
- CLR CHAR 1
- DIGITS 0
- IP FIELD 1
- END CHAR 5
- CLR CHAR 5
- DIGITS 1
- IP FIELD 2
- END CHAR 6
- CLR CHAR 5
- IP ANI 7

For information on inpulse rule tokens, refer to the *Cisco VCO/4K System Administrator's Guide*.

Figure 4-1 Processing Flow for Example #1, Part 1 of 3

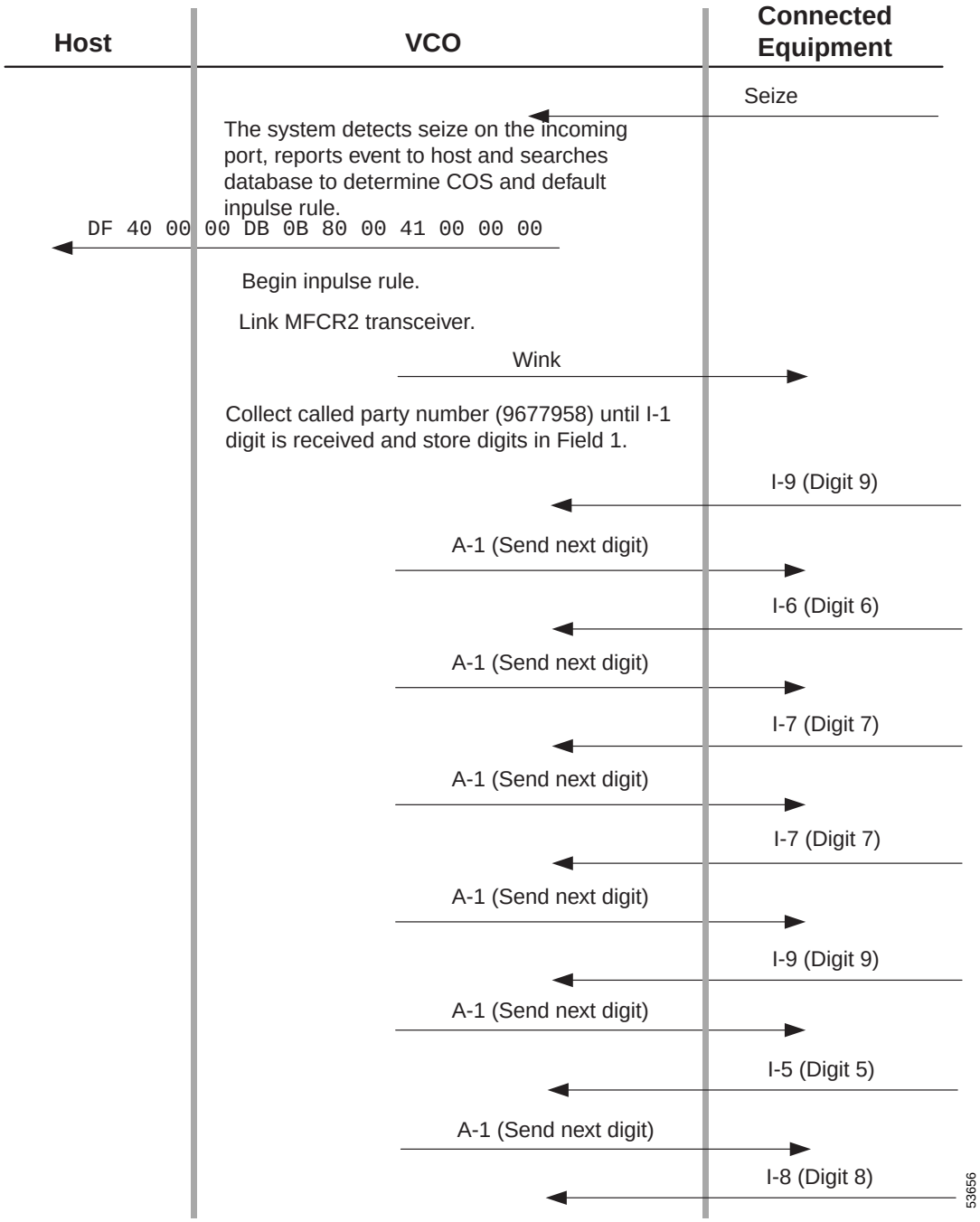


Figure 4-2 Processing Flow for Example #1, Part 2 of 3

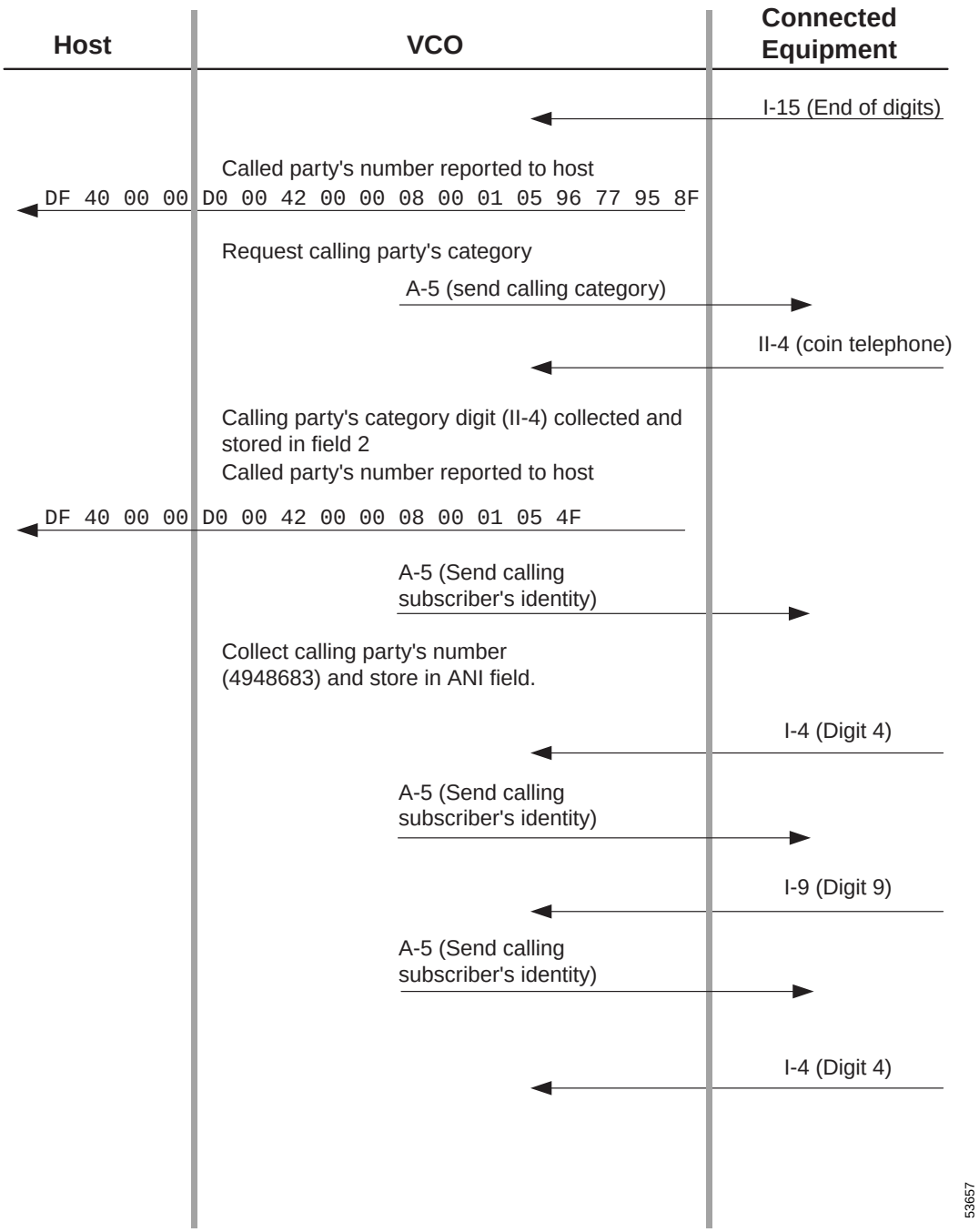
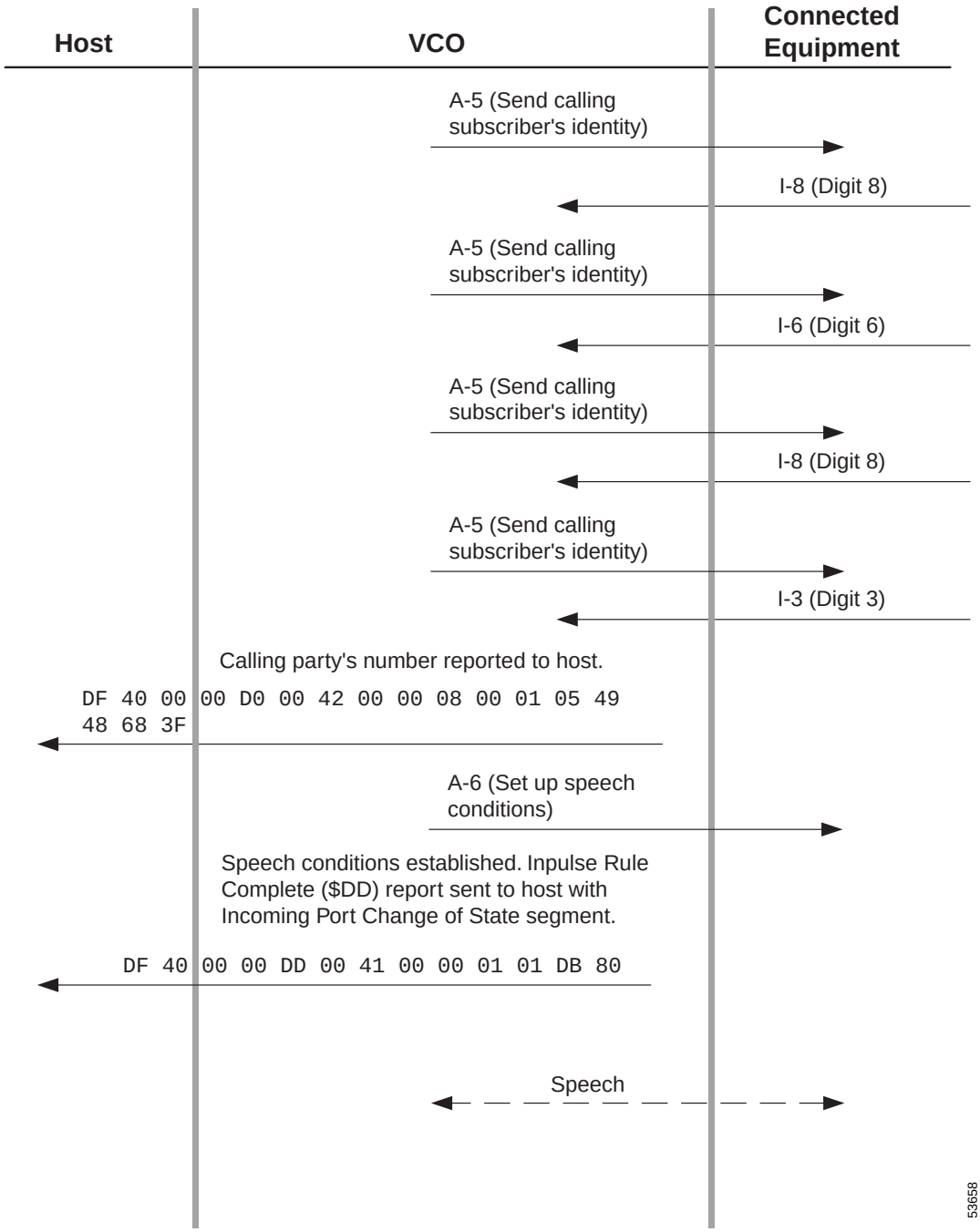


Figure 4-3 Processing Flow for Example #1, Part 3 of 3



Example #2—Incoming Call Using $68 Host Command

Example #2 also illustrates a simple R2 digit collection scenario on an incoming E1 circuit (port address $00 42). However, all R2 digit collections in this scenario are initiated by host command; no inpulse rule processing is used. Three MF Collection Control ($68) commands perform the following actions:

- Collect an unspecified number of called party number digits until I-15 digit is received, then send an A-5 (send calling category) digit.
- Collect the calling party's category (1 digit) and then request the calling subscriber's identity by sending another A-5 (send calling subscriber's identity) digit.
- Collect an unspecified number of calling party's number digits until I-15 digit is received, then send an A-6 (set up speech conditions) digit.

Each digit collection is reported to the host via an MF Digit ($D0) report.

At the end of this example, the system establishes speech conditions with the connected equipment (network register). The processing flow for this example is shown in Figure 4-4 to Figure 4-6.

Refer to the *Cisco VCO/4K Standard Programming Reference* or the *Cisco VCO/4K Extended Programming Reference* for complete descriptions of the $68 command and $D0 report.

Figure 4-4 Processing Flow for Example #2, Part 1 of 3

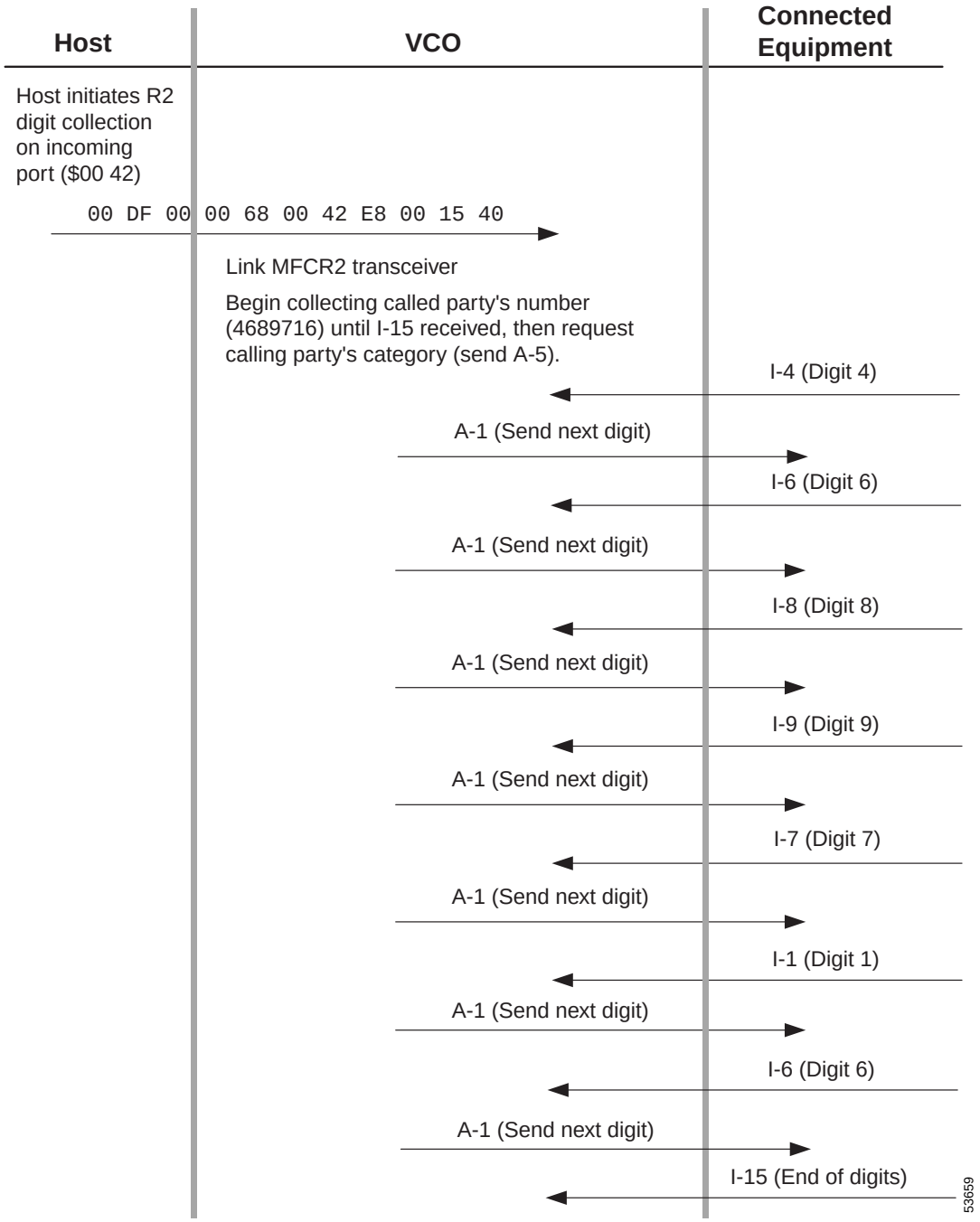


Figure 4-5 Processing Flow for Example #2, Part 2 of 3

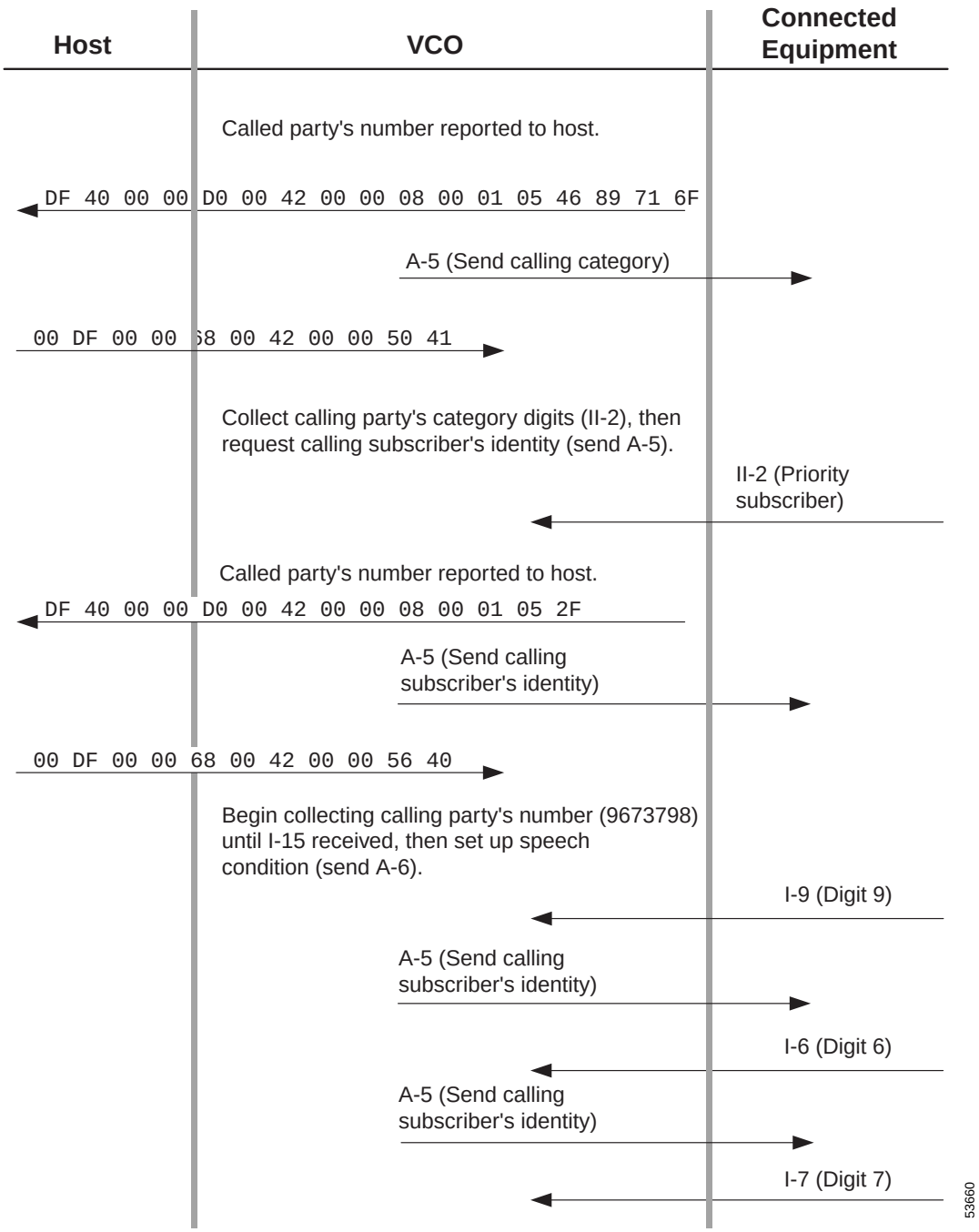
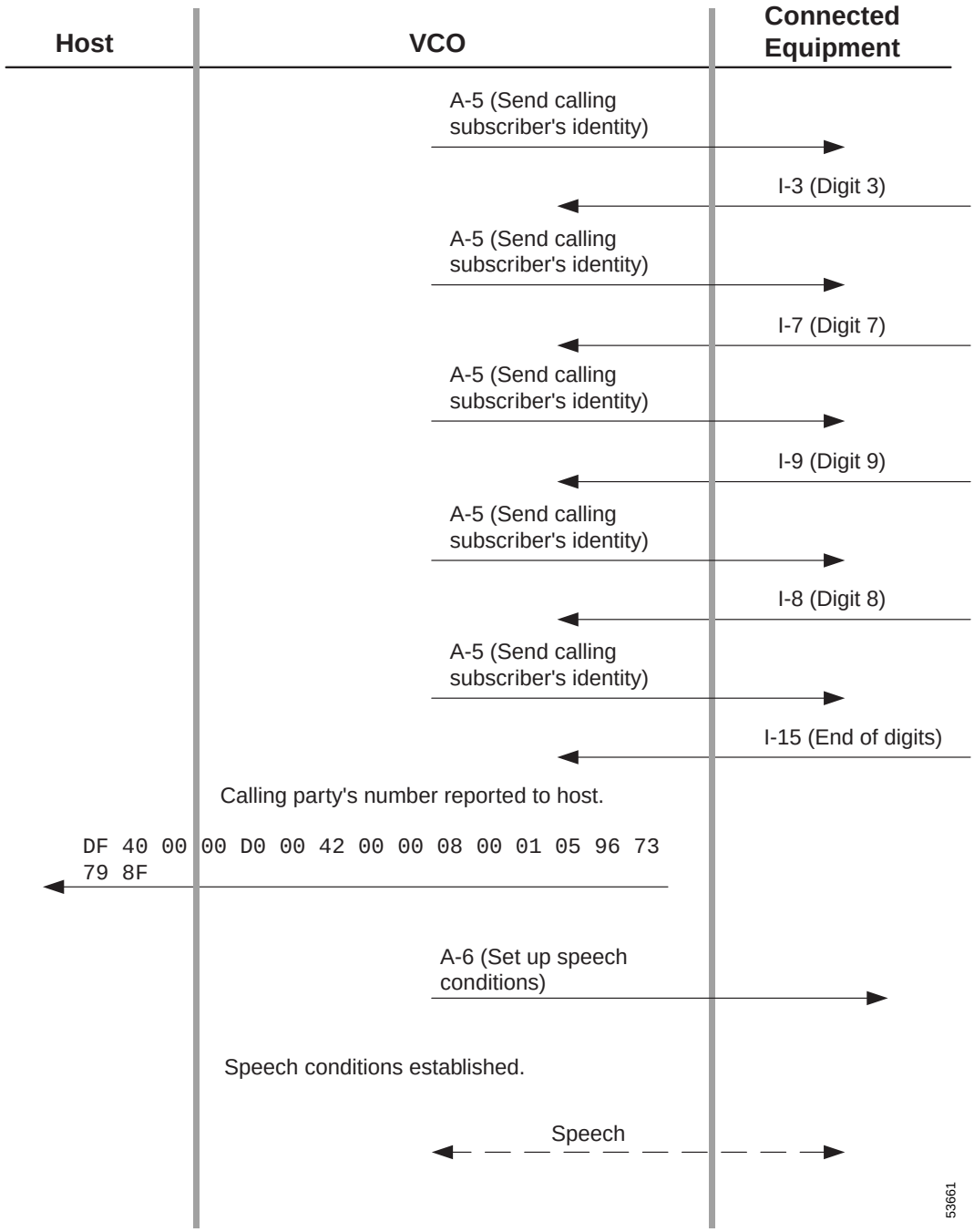


Figure 4-6 Processing Flow for Example #2, Part 3 of 3



Example #3—Outgoing Call

Example #3 describes R2 digit outpulsing on an E1 circuit at port address $00 40. This scenario involves both host command and outpulse rule processing. The host initiates the outpulsing using an Outgoing Port Control ($69) command that populates the digit fields and specifies the outpulse rule to execute (refer to the *Cisco VCO/4K Standard Programming Reference* or the *Cisco VCO/4K Extended Programming Reference* for a command description).

The outpulse rule performs the following actions:

- Seizes out on the E1 trunk at port address $00 40 and waits for a wink signal (executing the WAIT SUP W preconfigured answer supervision template documented in the *Cisco VCO/4K System Administrator's Guide*).
- Outpulses the first three digits of the called party's number (stored in Field 1) after wink signal is detected. The system responds to A-1 (send next digit) signals that request each new digit.
- Outpulses the calling party's category specified in the rule when an A-5 (send calling category) digit is received.
- Outpulses the calling party's number stored in the ANI field when another A-5 (send calling subscriber's identity) digit is received. The system responds to A-1 (send next digit) signals that request each new digit.
- Outpulses the remaining digits of the called party's number (stored in Field 1). The system responds to A-1 (send next digit) signals that request each new digit. An I-15 digit is sent once all digits have been outpulsed.

This rule is shown below.

Outpulse Rule #1

- REP END
- SEIZE
- WAIT SUP W
- MFCR2
- OP CAT 6
- OP ANUM
- OP FIELD 1

At the end of this example, the system establishes speech conditions with the connected equipment (network register) and generates an Outgoing Port Change of State ($DA) report to the host. The processing flow for this example is shown in Figure 4-8.

Refer to the *Cisco VCO/4K System Administrator's Guide* for more information on MFCR2, OP ANUM, OP FIELD [xx], and OP CAT [xx] outpulse rule tokens.

Figure 4-7 Processing Flow for Example #3, Part 1 of 3

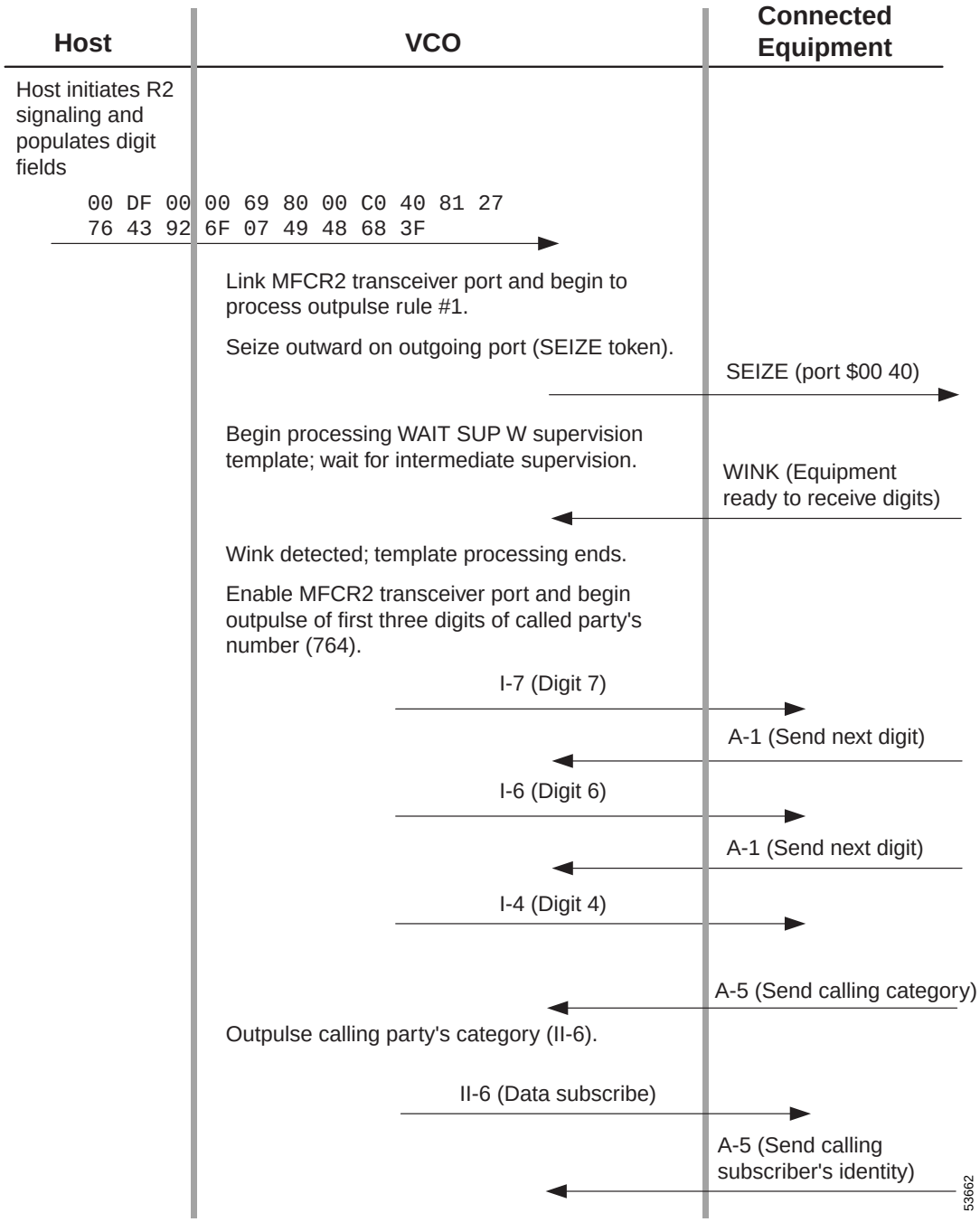


Figure 4-8 Processing Flow for Example #3, Part 2 of 3

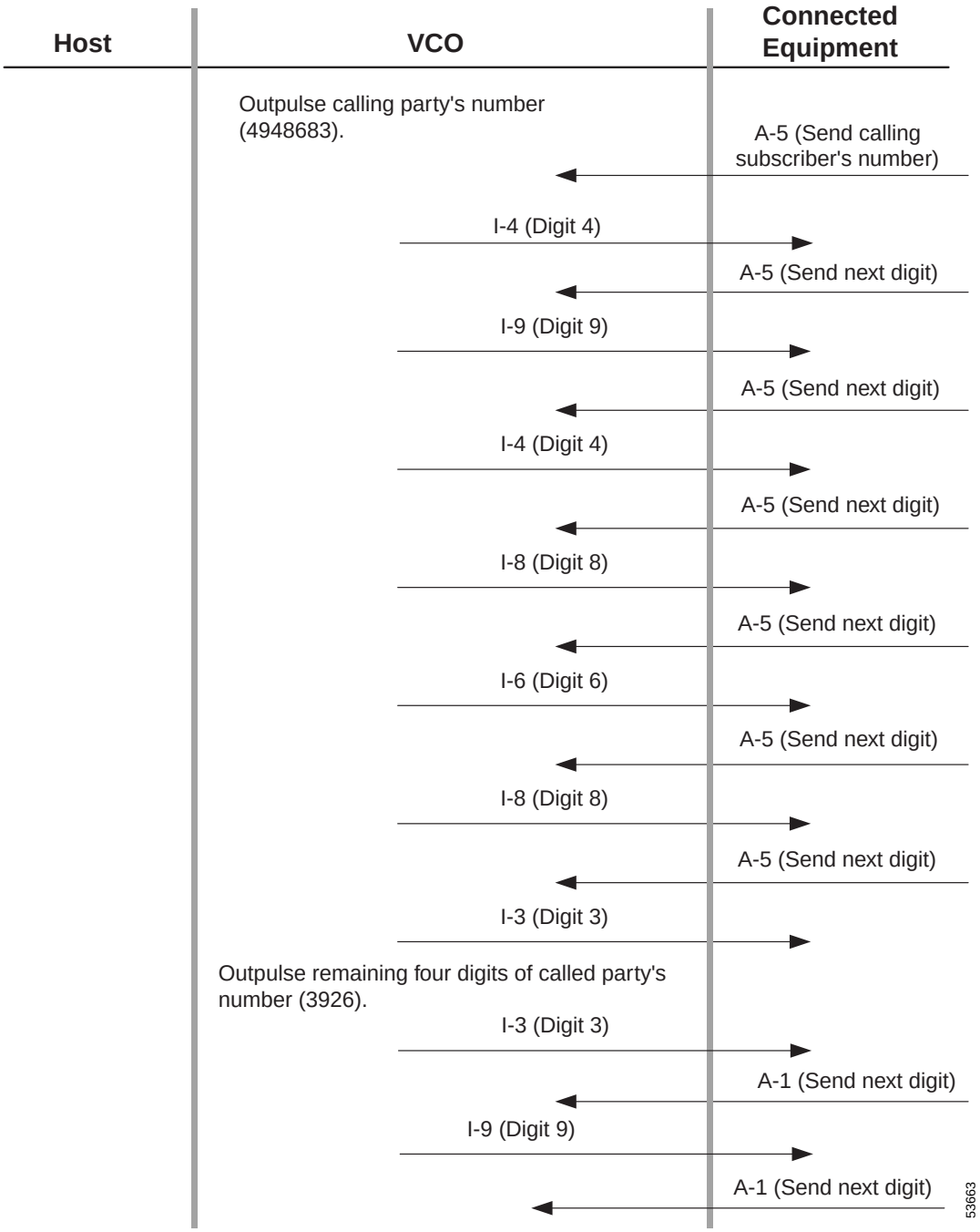


Figure 4-9 Processing Flow for Example #3, Part 3 of 3