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Digital Switching Systems

UCS DMS-250

Spectrum Feature Description Manual

SPM01 UCS12 Standard 02.01 February 2000

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Digital Switching Systems

UCS DMS-250

Spectrum Feature Description Manual

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Publication history

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Standard release 02.01 for SPM01 and UCS12 software releases. Removed EOPS-related data from the document.

In the scenarios for the “Boomerang reorigination with services platform” subsection and the “Release link trunk” section of Chapter 3, EOPS was changed to ESP and UCS DMS-250 host switch was changed to Services platform.

Added Figure titles and Table titles.

ATTENTION

The UCS12 software release does not support Enhanced Operator Position System (EOPS) functionality. The UCS software continues to support operator-assisted calls through other platforms such as Enhanced Services Provider (ESP). Refer to Appendix A in the *UCS DMS-250 Feature Change Reference Guide* for additional information about EOPS removal.

August 1998

Standard 01.03 for SPM01 (UCS08). This document was revised for minor technical changes.

August 1998

Standard 01.02 for SPM01 (UCS08).

May 1998

Preliminary 01.01 for SPM01 (UCS08).

Contents

About this document

When to use this document

This NTP describes UCS-specific features that support the Spectrum Peripheral Module (SPM).

Intended audience

This document is intended for use by operating company personnel who need information about how features for the UCS DMS-250 switch support the SPM.

How this manual is organized

This NTP includes an introductory chapter, followed by descriptions of each feature specific to the UCS DMS-Spectrum system.

References in this document

The following documents are referred to in this document:

- *UCS DMS-250 Master Index of Publications*, 297-2621-001
- *Spectrum User Guide*, 297-1771-330
- *Spectrum Features and Hardware Reference Manual*, 297-1771-550
- *Spectrum Commands Reference Manual*, 297-1771-819
- *GR-394-CORE Switching System, Generic Requirements for Interexchange Carrier Connection using ISUP*

How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

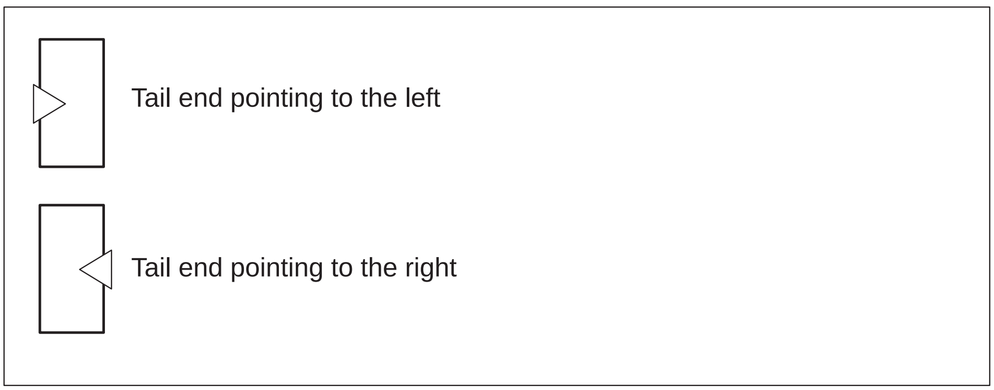
The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the *next* software release cycle, the first release of the same document is 02.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but rereleased in the *same* software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

This document is written for all UCS DMS-250 offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for this product is organized, check the release information in the *UCS DMS-250 Master Index of Publications*.

Special conventions

In all figures within this NTP, the following representation is used to show the direction of tail end.



Introduction to UCS DMS-250 Spectrum

ATTENTION

This NTP describes UCS-specific features that support the Spectrum Peripheral Module (SPM).

For general information about base Spectrum, refer to the following NTPs: *Spectrum Feature and Hardware Description Reference Manual*, *Spectrum User Guide*, and *Spectrum Commands Reference Manual*.

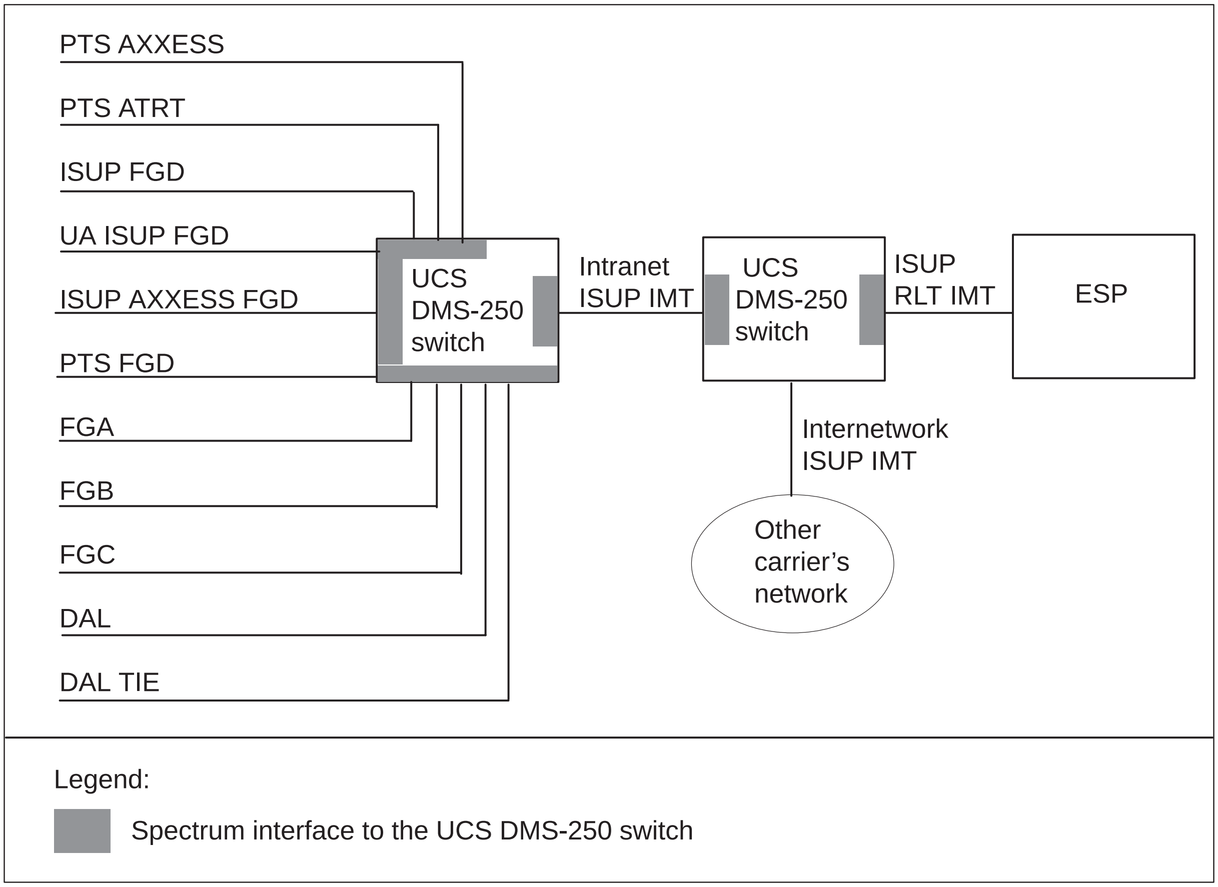
Network overview for the UCS DMS-250 switch

From a network perspective, the following scenarios apply:

- Calls can originate and terminate on UCS DMS-250 switches using any of the following access trunks:
  - — per trunk signaling (PTS) or ISUP FGD
  - — FGA
  - — FGB
  - — FGC
  - — direct access line (DAL)
- Calls can tandem through a UCS DMS-250 switch network using ISUP intermachine trunks (IMT).
- Calls can route to an Enhanced Services Provider (ESP) using ISUP release link trunk (RLT) IMTs.
- The FlexDial capability enables customization of ISUP FGD and PTS access protocols using AXXESS trunk group agencies.
- Several variations of each ISUP and PTS trunk group types are supported on UCS DMS-250 Spectrum, as described in “Trunk group types” in this chapter.

Figure 1-1 shows a UCS DMS-250 switch network using ISUP and PTS trunking agencies.

Figure 1-1
UCS DMS-250 network using ISUP and PTS trunking agencies



Hardware dependencies

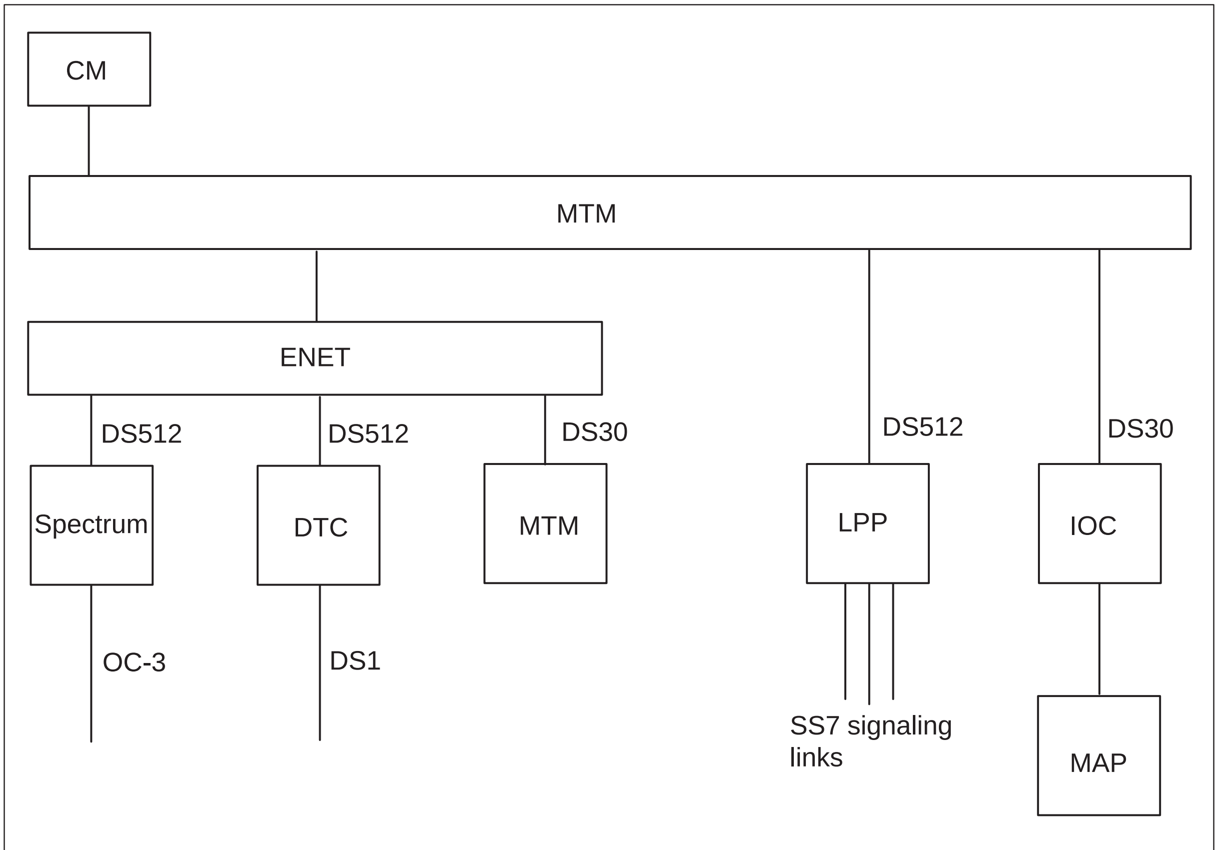
Spectrum hardware dependencies include the following:

- SuperNode switch
- enhanced network (ENET) with NT9X40DA paddleboard for Spectrum connection
- switch timing from BITS (built in timing system) clock using one of the following:
  - — Loran-C
  - — timing signal generator (TSG)

Spectrum hardware is directly connected to the DMS ENET using a DS-512 (fiber optic) interface. The connection to the public network is by way of an OC-3 high-speed fiber optic interface. The Spectrum communicates with other peripherals within the DMS switch over the DMS-BUS or ENET.

Figure 1-2 shows UCS DMS-250 switch and Spectrum hardware components.

Figure 1-2
Spectrum hardware components



Legend:
CM = computing module
MTM = maintenance trunk module
IOC = input/output controller
DTC = digital trunk controller
LPP = link peripheral processor
MAP = MAP terminal

Software layer dependencies

Base Spectrum functionality was developed in the CSP and Spectrum software layers. The UCS DMS-250 specific functionality described in this document is located in the UCS custom software layer.

Other network dependencies

The software changes described in this document are transparent to downstream networks, such as billing systems and service control points (SCP).

Feature operation

Supervision messages are passed between the computing module (CM) and Spectrum to instruct the Spectrum to perform basic call control functions, such as

- allocate and deallocate digit receivers
- generate a prompt tone
- collect digits
- establish trunk group connections (for example, terminating trunks or announcements)
- activate or deactivate echo cancellers

CM-to-Spectrum messaging for STR/UTR equivalent functionality

The Spectrum platform does not support specialized tone receivers (STR) or universal tone receivers (UTR). Instead, DTMF receivers are allocated to collect basic and special digits. CM-to-Spectrum messaging is provided by base Spectrum development. Call processing modifications ensure a DTMF receiver is allocated to receive the following special digits:

- basic digits (for example, address, authcodes)
- reorigination digits (* #)
- reset digits (* # ##)
- long duration digits (* # ##)
- short duration digits (* # ##)

For switches where both Spectrum and extended peripheral module (XPM) platforms coexist, the UCS DMS-250 software sends the correct message to the appropriate platform for STR/UTR based functions.

Integrated echo canceller call control messaging

The Spectrum version of integrated echo cancellers (ECAN) uses voice services processor (VSP) resource modules (RM) to perform echo cancellation. Spectrum ECANs are pooled resources, which differs from current XPM functionality where ECANs are attached directly to a trunk (NT6X50EC).

When echo cancellation is required, the CM sends a supervision message to the Spectrum requesting an ECAN be allocated for the call. The Spectrum then selects an ECAN from a pool of idle ECANs. The UCS DMS-250 Spectrum provides the CM-to-Spectrum messaging to request an ECAN.

ECAN support of Dialable Wideband Service narrowband calls

Dialable Wideband Service (DWS) trunks are typically used for data calls, but can also be used to process narrowband voice calls. The UCS DMS-250 Spectrum supports CM-to-Spectrum messaging to allocate ECANs for narrowband calls on DWS trunks.

Echo canceller bit for IAM, ACM, and ANM

With the existing ISUP protocol, there is an ECAN bit in the Initial address Message (IAM), Address Complete Message (ACM), and Answer Message (ANM) messages. When set to ON, the bit indicates an ECAN has already been allocated in a previous leg of the call in that direction, so additional ECAN resources are not necessary.

The UCS DMS-250 Spectrum supports the ISUP ECAN bit for IAM, ACM, and ANM messages. The ECAN bits are set if a Spectrum ECAN is involved in the call.

Feature interaction

The following areas are a subset of the total UCS DMS-250 Spectrum feature functionality:

- Carrier Advanced Intelligent Network (CAIN)
- RLT
- FlexDial
- FlexCDR
- reorigination
- DWS
- dynamically controlled routing (DCR)

Trunk group types

The UCS DMS-250 switch supports the following originating and terminating ISUP trunk group types on the Spectrum:

- ISUP FGD variants
  - ISUP FGD
  - universal access (UA) ISUP FGD
  - ISUP AXXESS FGD
- ISUP IMT variants
  - inter-network ISUP IMT
  - intra-network ISUP IMT
  - UA inter-network ISUP IMT
  - ISUP RLT IMT

The following PTS trunk group types are supported on Spectrum:

- feature group trunks
  - FGA
  - FGB
  - FGC
  - UA FGC
  - PTS FGD
  - UA PTS FGD
- DAL trunk groups
  - DAL (2-wire)

— DAL TIE (4-wire)

The UCS DMS-250 switch supports the following trunk group inter-workings:

- ISUP to ISUP
- ISUP to PTS
- PTS to PTS
- PTS to PTS
- ISUP to PRI
- PRI (on ISDN digital trunk controller [DTCI]) to ISUP
- PTS to PRI (on DTCI)
- PRI (on DTCI) to PTS

Note: Refer to “Spectrum and XPM Interworking” in this chapter.

Signaling

The ISUP features described in this document are supported by both Universal Carrier Software (UCS) and Universal Carrier Protocol (UCP) protocol variants on the Spectrum.

Transmission

The transmission requirement for ISUP and PTS trunk groups on Spectrum is an optical fiber interface (OC-3).

Vendor equipment inter-working

Downstream billing must support the addition of approximately 4 bytes of data. This data is required for tracking ECAN resources used within the Spectrum on a per call basis.

Administration

Table control

In order to access table SPMECAN, an option vector index is added to table TRKSIG. Table SPMECAN stores information specific to the ECAN that enables ECANs.

Logs

No UCS DMS-250 logs are required. Base Spectrum software provides all logs necessary to support Spectrum.

Commands

No UCS DMS-250 specific commands are required. Base Spectrum software provides all command interpreter (CI) commands necessary to support Spectrum.

Operational measurements

No UCS DMS-250 specific operational measurements (OM) are required. Base Spectrum software provides all OMs necessary to support Spectrum.

Alarms

No UCS DMS-250 specific alarms are required. Base Spectrum software provides all alarms necessary to support Spectrum.

Feature control

UCS DMS-250 specific controls are not required. Spectrum is controlled using base Spectrum software tables.

Maintenance

No UCS DMS-250 specific development is required. The base Spectrum software provides all operations, administration, maintenance, and processing (OAM&P) functionality for the Spectrum.

Tones and announcements

Tones

Tones can either be generated or received by the Spectrum. Tones are typically generated to convey information to a subscriber, such as invalid dialing or network congestion, or to provide instructions for subscribers to enter digits, such as address or calling card. When tone generation is required, the CM sends a supervision message to the Spectrum containing the tone to be played and the tone length. The Spectrum then accesses the tone synthesizer (TONESYN), which generates the appropriate tone.

The base Spectrum software provides the same North American tone set that is currently available on the XPM. These tones are used by the UCS DMS-250 switch.

Tones are also used to represent digits. During the subscriber dialing phase of a call, the Spectrum must allocate a DTMF receiver to detect tones resulting from digits dialed.

Announcements

Announcements convey information or prompt users to enter information. When an announcement is needed, the CM instructs the EDRAM to play the announcement. Supervision is sent to the trunk peripheral to inform it the announcement is playing. The Spectrum is supervised with announcement information the same as that provided for digital trunk controllers (DTC).

Spectrum supports both active and passive announcements. Active announcements are those that can be interrupted by subscriber dialed digits. Passive announcements cannot be interrupted; the subscriber must wait until the announcement has completed before entering digits.

The base Spectrum software provides the same announcement processing that is currently available on the XPM.

Engineering, provisioning, and installation

Base Spectrum provisioning rules apply to the UCS market. No provisioning rules are required for UCS.

One Night Process (ONP) requirements are handled at the base Spectrum software level. There are no UCS DMS-250 specific ONP requirements.

Base call control messaging

The majority of supervision messages exchanged between the CM and Spectrum are the same as those exchanged between the CM and XPM. Supervision messages that are specific to the UCS DMS-250 Spectrum are

- ISUP CM-to-Spectrum messaging for STR equivalent functions:
  - — reorigination digit detection
  - — enhanced STR digit detection (short duration DTMF)
- ISUP CM-to-Spectrum messaging for integrated ECAN call control
- PTS CM-to-Spectrum messaging for STR equivalent functions:
  - — reorigination digit detection
  - — enhanced STR digit detection (short duration DTMF)
- PTS CM-to-Spectrum messaging for integrated ECAN call control

Additionally, the link peripheral processor (LPP) sends ISUP messages directly to the Spectrum, bypassing the CM.

Multi-party call control messaging

When a two-party call becomes a three-party call, as with operator assistance calls or ESP calls, the dynamics of the original call changes. Another level of complexity is added if ECANs are required for these calls.

The Spectrum integrated ECAN typically provides echo control for two-party calls. When a two-party call becomes a three-party call, additional sources of echo are introduced in the call. Echo cancellers are added from a pool of Spectrum ECANs as needed.

The UCS DMS-250 feature that affect the dynamics of a call is ESPs. The ESP feature is described in the following paragraph.

ESP calls

ESPs provide access to special services, such as voice activation, information databases, and call delivery. DMS-250 switches access an ESP using ISUP RLT IMT trunk agencies. For ESP calls that involve a third party, it is necessary to activate new ECANs or reconfigure the existing ECANs on a call. Messaging to the Spectrum ECAN communicates ECAN reconfiguration requirements during the processing of a three-way call.

ISUP dialing plans

UCS DMS-250 Spectrum-supported dialing plans for ISUP FGD and ISUP IMT are as follows:

- ISUP FGD
- UA ISUP FGD
- ISUP AXXESS FGD
- ISUP IMT

ISUP FGD

For ISUP FGD originations, calls can be billed to either the automatic number identification (ANI) or a calling card number. If ANI is the billing type, only account code digits are collected. If calling card is the billing type, then address, calling card, and optional account code digits are collected. The UCS DMS-250 switch prompts for this information using the following dialing sequences:

- for ANI calls, the account code
- for calling card calls, one of the following:
  - — 0 + address + calling card + (account code)
  - — 01 + CC + NN + (account code)

UA ISUP FGD

For UA ISUP FGD originations, the subscriber accesses the long distance network by an 800 or 888 number. UA calls require the DMS switch to prompt the subscriber for called number and billing information. The billing information can be either an authcode or calling card number. For authcode calls, tone prompts are given to prompt the subscriber to enter digits. For calling card calls, both tone prompts and voice prompts are used. The UCS DMS-250 switch prompts for this information using the following dialing sequences:

- for authcode calls, authcode + (PIN) + address + (account code)
- for calling card calls, one of the following
  - — 0 + address + calling card + (account code)
  - — 01 + CC + NN + (account code)

ISUP AXXESS FGD

For ISUP AXXESS FGD originations, the address and billing information can be collected in any order as defined in the FlexDial software tables. Spectrum supports the ISUP FGD dialing plans as described for an ISUP AXXESS FGD trunk agency.

ISUP IMT

Spectrum supports the four IMT dialing plans, as follows, that apply to intra-network, inter-network, UA inter-network, and RLT ISUP IMTs.

1 ADDR
   — address
2 I3PA
   — FC + 3-digit PART + address
3 QS3PAO
   — Q + SAT + 3-digit TPART + address + (OPART)
4 SD4PA
   — SAT + DATA + 4-digit TPART + address

where:

address = called number (stored in IAM, Called Party Number parameter)

DATA = standard data call classmark (= 2)

FC = Facility Code (queueing and satellite indicators: F is stored in IAM Network Specific parameter; C is stored in IAM Nature of Connection parameter.)

OPART = 3-digit origination partition number (stored in IAM, Network Specific parameter)

PART = 3-digit partition number (stored in IAM, Network Specific parameter)

Q = queueing indicator (stored in IAM Network Specific parameter)

SAT = satellite indicator (stored in IAM Nature of Connection parameter)

TPART = terminating partition (stored in IAM, Network Specific parameter)

PTS dialing plans

The PTS dialing plans supported are

- subscriber dialing, one of the following:
  - (auth) + (PIN) + address + (ACCT)
  - address + (auth) + (PIN) + (ACCT)
  - (auth) + (PIN) + 011 + CC + NX...X + (ACCT) + (#)
  - 0 + address + TCN + (ACCT)
- DAL
  - subscriber dialing
- EDAL
  - (ACCT) + address = (prompt) + (auth)
- DAL TIE:
  - MF, one of the following:
    - KP + (auth) + (PIN) + address + (ACCT) + ST
    - KP + address + (auth) + (PIN) + (ACCT) + ST
  - DTMF
    - subscriber dialing
- FGA
  - subscriber dialing
- FGB
  - MF
    - KP + (UAC) + ST
    - KP + I + 7-digit ANI + ST (if ANIDIGS = Y in table TRKGRP)
  - DTMF
    - subscriber dialing
- FGC national
  - MF
    - KP + 10-digit address + ST
- FGC UA
  - MF
    - KP + 800 + NXX + XXXX + ST
  - DTMF

    - subscriber dialing
- FGD transitional
  - MF
    - KP + 11 + 10-digit ANI + ST2P
    - KP + 800 + NXX + XXXX + ST
  - DTMF
    - subscriber dialing
- FGD pure
  - MF
    - KP + 11 + 3 or 10-digit ANI + ST
    - KP + address + ST
  - DTMF
    - (PIN) + (ACCT)
- FGD cut–through
  - MF
    - KP + 11 + 10-digit ANI + ST
  - DTMF
    - (auth) + address + (ACCT)
- FGD international
  - MF
    - KP + 1NX + XXX + CCC + ST
    - KP + 11 + ANI + ST
    - KP + TCC + NX...X + ST
  - DTMF
    - (PIN) + (ACCT)
- SPRINT IMT
  - MF
    - KP + FC + PART + address + ST
  - DTMF
    - FC + PART + address + (#)
- USTEL IMT
  - MF

    - KP + F + C + TPART + address + ST (standard call)
    - KP + F + C + TPART + address + OPART + ST (private network call)
  - DTMF
    - F + C + TPART + address + (#) (standard call)
    - F + C + TPART + address + OPART + (#) (private network call)
- GTE IMT
  - MF
    - KP + TP + ONAL + PART + address + ST
  - DTMF
    - TP + ONAL + PART + address + (#)
- ETN IMT
  - MF
    - KP + address + T + ST
  - DTMF
    - address + T
- shared IMT
  - MF
    - KP + 11 + COSindex + PART + address + (#)
- DATA
  - # + FC + address + (ACCT)
- ATRT
  - DTMF
    - XXXXXXXX + NN...N + *

where:

xxxxxxxx = port number of trunk to be tested

digit 1 = PM type (Spectrum = 5)

digits 2-3 = PM number

digits 4-6 = Carrier number

digits 7-8 = time

NN...N = test digits outpulsed by trunk under test (up to 17 digits); can also be 100 and 102 for test lines terminations

* = cut-through digit, indicating the completion of digit dialed

ISUP digit collection

Digit collection for ISUP FGD origination occurs after the ACM message returns in response to an IAM message. This provides cut-through to the subscriber so the UCS DMS-250 switch can collect subscriber dialed digits, such as authcode, PIN, calling card, and account code.

Subscriber dialed digits are DTMF, thus DTMF receivers are allocated by the Spectrum. The Spectrum also provides the same digit collection tone prompts and voice prompts that are supported on the XPM.

PTS digit collection

Dial pulse (DP), multi-frequency (MF), and dual tone multi-frequency (DTMF) digit collection are supported on the Spectrum to match XPM functionality. As well, prompt tones provided by the Spectrum match those provided by XPM during PTS digit collection. The receivers used for PTS digit collection include the AB-bit handler for DP, MF, and DTMF receivers.

Digit masking

In some cases, it is necessary to instruct the Spectrum to ignore certain digits during the digit collection phase of a call. This is known as digit masking. Spectrum provides XPM equivalency.

STR/UTR equivalency

The base Spectrum does not use STRs/UTRs. Instead, DTMF receivers are allocated to collect basic and special digits for reorigination and long duration DTMF digits. CM-to-Spectrum messaging supports this functionality.

Additionally, short duration DTMF digit collection is provided by the Spectrum, equivalent to the UTR. Additional call control software development is required on the UCS DMS-250 to support Spectrum short duration DTMF digit collection. STR/UTR digit collection is supported on ISUP and PTS trunks for reorigination purposes.

Tone and announcement processing

All existing tones and announcements are supported by the Spectrum.

ISUP RLT IMT facility parameters

ISUP RLT IMT accesses both operator services and ESP services. Once the requested service is provided, the RLT links are released back into the network on the bridging switch. The bridging switch is the one that connects the calling and called parties, and it can be located anywhere in the long distance network. Other interexchange carrier markets have RLT functionality, however, the UCS DMS-250 switch allows calls to be bridged back more than one switch in the network.

ISUP messages unique to RLT are as follows:

- Facility Accept (FAA) message
- Facility Request (FAR) message
- Facility Reject (FRJ) message

UCS RLT Facility messages are supported only on the UCP protocol. The base Spectrum software supports Facility messages and UCS ISUP RLT functionality.

UCS-specific ANM parameters

The UCS ISUP protocol contains two ANM parameters that are UCS specific. These parameters, as follows, are used to interwork with DEX switches over ISUP IMTs.

- Inter-network-specific ANM indicates the connecting DEX switch is located in another carrier’s network.
- Intra-network-specific ANM indicates the connecting DEX switch is part of the carrier’s network.

When the UCS DMS-250 switch sends an ANM to a DEX switch, one of these parameters can be sent in the ANM message. Table TRKGRP, field NETWKSPC, defines the parameter to send, if one is required.

When the UCS DMS-250 switch receives an ANM from a DEX switch, either parameter is accepted regardless of the IMT dialing plan used.

Echo canceller bit for IAM, ACM, and ANM

The ECAN bit in the ISUP IAM, ACM, and ANM messages is supported for Spectrum ECANs.

Echo canceller for DWS narrowband calls

CM-to-Spectrum messaging allocates an ECAN for narrowband voice calls over DWS trunks.

Spectrum and XPM interworking

Since both Spectrums and XPMs can coexist in a single switch, the two platforms must interwork.

Table 1-1 provides the Spectrum to XPM call interaction scenarios.

Table 1-1
Spectrum to XPM call interaction scenarios

Call type	Peripheral module hardware
ISUP to ISUP	Spectrum to Spectrum Spectrum to XPM XPM to Spectrum
ISUP to PTS	Spectrum to Spectrum Spectrum to XPM XPM to Spectrum
PTS to ISUP	Spectrum to Spectrum Spectrum to XPM XPM to Spectrum
PTS to PTS	Spectrum to Spectrum Spectrum to XPM XPM to Spectrum
ISUP to PRI	Spectrum to XPM
PRI to ISUP	XPM to Spectrum
PTS to PRI	Spectrum to XPM
PRI to PTS	XPM to Spectrum

Table 1-2 provides the Spectrum to XPM ECAN interaction scenarios.

Table 1-2
Spectrum to XPM ECAN interaction scenarios

Call type	Peripheral module hardware
ISUP to ISUP	Spectrum ECAN to Spectrum ECAN Spectrum ECAN to XPM NT6X50EC XPM NT6X50EC to Spectrum ECAN
ISUP to PTS	Spectrum ECAN to Spectrum ECAN Spectrum ECAN to XPM NT6X50EC XPM NT6X50EC to Spectrum
PTS to ISUP	Spectrum ECAN to Spectrum ECAN Spectrum ECAN to XPM NT6X50EC XPM NT6X50EC to Spectrum ECAN
PTS to PTS	Spectrum ECAN to Spectrum ECAN Spectrum ECAN to XPM NT6X50EC XPM NT6X50EC to Spectrum ECAN
ISUP to PRI	Spectrum ECAN to XPM NT6X50EC
PRI to ISUP	XPM NT6X50EC to Spectrum ECAN
PTS to PRI	Spectrum ECAN to XPM NT6X50EC
PRI to PTS	XPM NT6X50EC to Spectrum ECAN

Restrictions/limitations

The Spectrum does not support blue box fraud.

Standards and regulatory requirements

The Spectrum OC-3 optical interface is compliant with applicable sections of Bellcore TR782 and TR253.

The Spectrum integrated ECAN development adheres to ITU-T G.164, G.165, G.168, and GR253-Core standards.

AD9959 — Spectrum ECAN Call Control

The Spectrum Echo Canceller (ECAN) Call Control feature provides call processing support to control integrated ECANs on a Spectrum system for each two-party call. This is achieved using an algorithm implemented on the UCS DMS-250 switch.

This chapter describes the Spectrum Echo Canceller (ECAN) Call Control feature.

AD9959
Spectrum Echo Canceller Call Control

Functionality name

Spectrum Echo Canceller (ECAN) Call Control

Description

This feature provides call processing support to control integrated ECANs on a Spectrum system for each two-party call. This is achieved using an algorithm implemented on the UCS DMS-250 switch.

The algorithm ensures the best use of Spectrum ECAN resources by considering certain factors associated with the call. These factors include

- the presence or absence of external ECANs
- the presence or absence of internal ECANs (NT6X50EC or NT6X50ED) in the case where one of the trunk agencies involved in the call is serviced by an extended peripheral module (XPM)
- rules governing ECAN provisioning

If an ECAN is required, the DMS-250 switch instructs Spectrum to allocate an available Spectrum ECAN from a pool of resources on a voice services processor (VSP) resource module (RM) in Spectrum. These ECANs are not statically assigned to a trunk, but instead are dynamically allocated for each call as determined by the Spectrum ECAN call control algorithm.

Spectrum ECANs are half ECANs cancelling echo in one direction. Therefore, two ECANs are activated for a two-party call. The two ECANs are not necessarily on the same Spectrum.

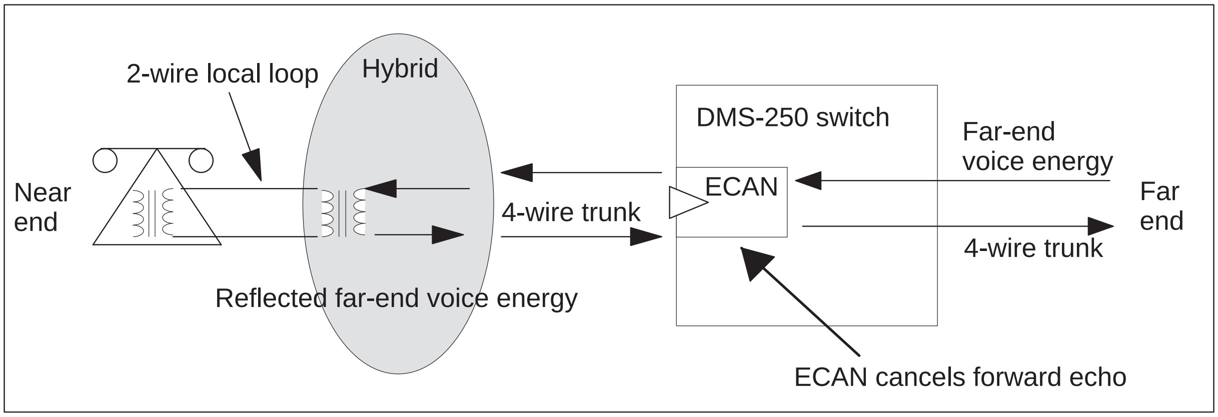
AD9959
Spectrum Echo Canceller Call Control (continued)

Echo in the telephone network

The perception of echo is caused by a combination of reflected voice energy and a delay in reception of that reflected voice energy. Thus, no echo is perceived when either is removed.

The shaded oval in Figure 2-1 is a representation of the function performed by a typical hybrid circuit. Exactly 50% of the received energy is dissipated by the hybrid if there is a perfect impedance match between the tip/ring of the 2-wire side of the hybrid and the tip/ring of the phone. The other 50% of the energy is dissipated by the telephone. In an impedance matched environment, there is no reflected energy (potential echo) from the hybrid. Unfortunately, it is nearly impossible to obtain a perfect impedance match between the hybrid and the phone because of the nature and the lack of control over the facilities outside of the telephone office.

Figure 2-1
Hybrid circuit function in the telephone network



The other component necessary for the perception of echo is a delay in the reception of the reflected energy and the original energy transmission. This delay is referred to as round-trip delay. It is not possible to remove the delay component from the call. If the round-trip delay exceeds 15 milliseconds (typically), echo may be perceived if the reflected energy is at a perceivable level.

AD9959
Spectrum Echo Canceller Call Control (continued)

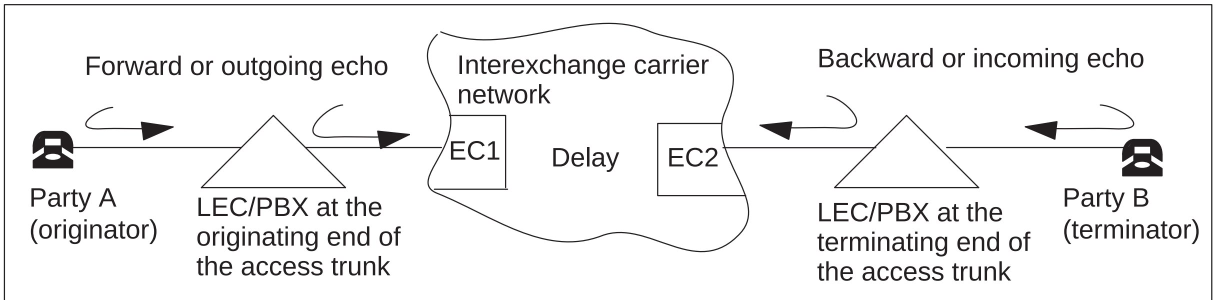
Echo cancellation

ECANs are inserted in a four-wire trunk circuit and cancel reflection of the far-end (voice of party at other end) speech at the near-end hybrid. All half ECANs, including Spectrum ECANs, are near-end ECANs. They cancel that portion of the energy transmitted by the far-end that is reflected at the near-end hybrid. The echo is cancelled before it leaves the UCS DMS-250 switch and prevents it from entering back into the network for transmission to the far-end. This was illustrated in the previous figure.

In all two-party calls where echo is generated, two ECANs are required. One ECAN cancels the forward or outgoing echo and one ECAN cancels the backward or incoming echo. The forward echo is the echo of voice from the terminator reflected from the originator's hybrid and telephone. The backward echo is the echo of voice from the originator reflected from the terminator's hybrid and telephone.

Figure 2-2 is a simple example of a two-party call. As shown, the first ECAN, EC1, cancels the forward or outgoing echo (echo of Party B's voice reflected from Party A's hybrid and telephone). The second ECAN, EC2, cancels the backward or incoming echo (echo of Party A's voice reflected from Party B's hybrid and telephone). In a two-party call, if multiple ECANs are provisioned, only the two closest to the sources of the echo are activated.

Figure 2-2
Two-party call with echo scenario



Legend:
LEC — local exchange carrier

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Spectrum Echo Canceller Call Control (continued)

Terminology

ECAN terminology is provided in the following paragraphs.

Access mode

A Spectrum ECAN is in the “access mode” if the tail end of the ECAN faces away from the center of the DMS-250 switch. The tail end is the side of the ECAN that receives the echo first. For access mode installation of the ECAN, see the following two figures. When an ECAN is enabled in the access mode, the echo is processed before it reaches the computing module (CM) of the near-end DMS-250 switch.

Figure 2-3 shows access mode installation of an ECAN for forward echo.

Figure 2-3
Access mode of ECAN installation (forward echo)

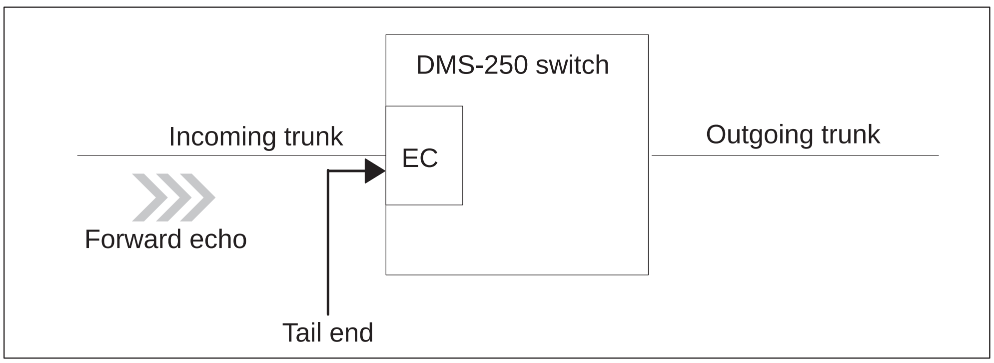
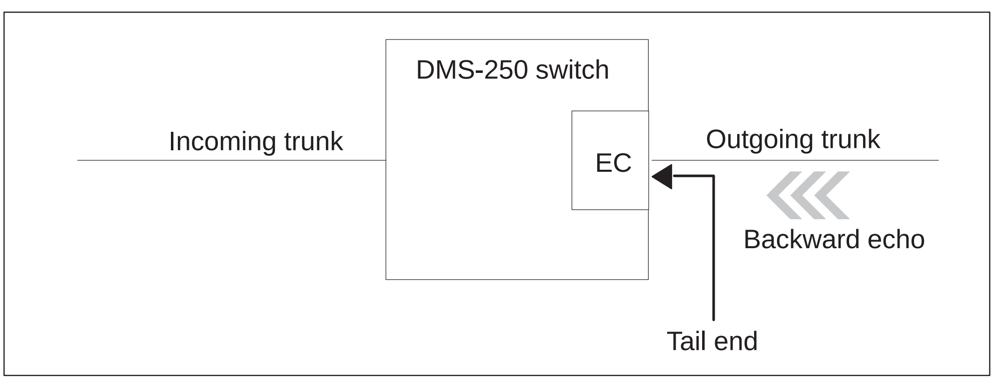


Figure 2-4 shows access mode installation of an ECAN for backward echo.

Figure 2-4
Access mode for ECAN installation (backward echo)



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Spectrum Echo Canceller Call Control (continued)

Network mode

A Spectrum ECAN is in the "network mode" if the tail end of the ECAN faces toward the center of the DMS-250 switch. For network mode installation of the ECAN, refer to the following two figures. When an ECAN is enabled in the network mode, the echo is processed after it passes through the CM of the near-end DMS-250 switch.

Figure 2-5 shows network mode installation of an ECAN for forward echo.

Figure 2-5
Network mode for ECAN installation (forward echo)

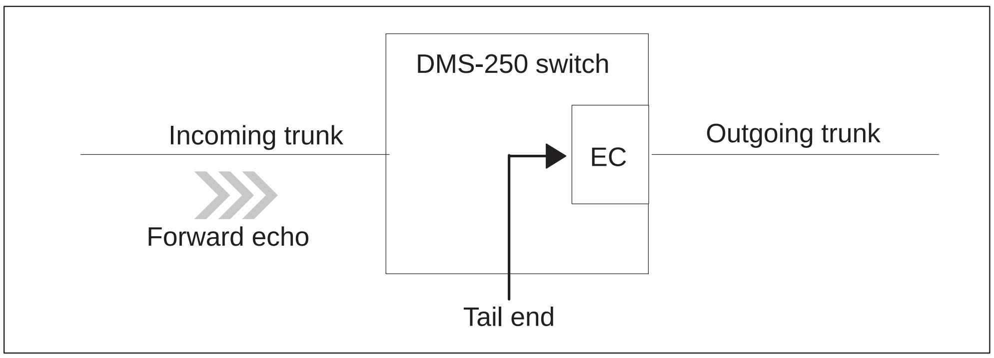
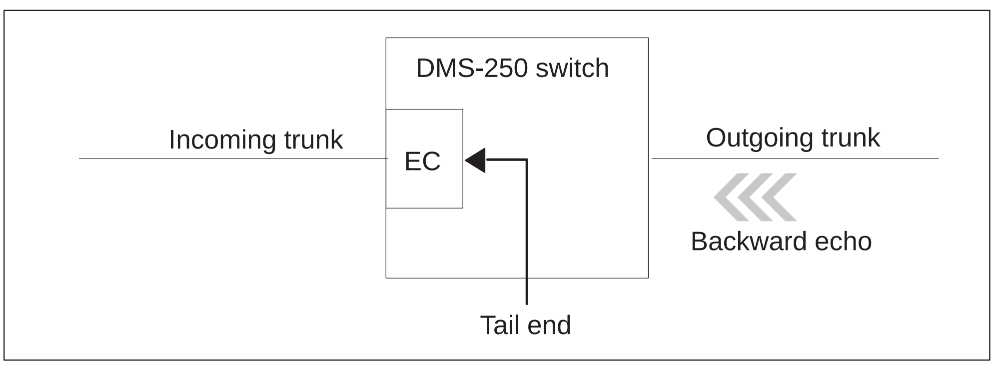


Figure 2-6 shows network mode installation of an ECAN for backward echo.

Figure 2-6
Network mode for ECAN installation (backward echo)



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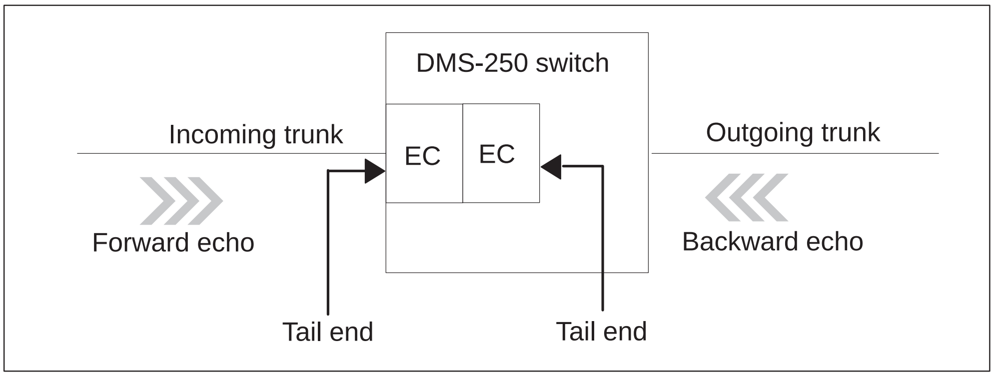
Spectrum Echo Canceller Call Control (continued)

Back-to-back mode

A pair of Spectrum ECANs is in “back-to-back mode” if the tail ends of the two ECANs face opposite directions. For example, one ECAN is enabled in the access mode and one ECAN is enabled in the network mode. Figure 2-7 shows back-to-back mode installation. Notice that the pair of ECANs are on the same side of the trunk.

Figure 2-7
Back-to-back mode ECAN installation



Intermachine trunk

A trunk is referred to as an “intermachine trunk” (IMT) if it interconnects two DMS-250 switches (or other switches) within the network or if it interconnects a DMS-250 switch and a gateway switch. Trunks in the IMT class are ISUP IMT, ISUP release link trunk (RLT), and ISUP reseller (RSLR).

Access trunk

A trunk is referred to as an “access trunk” if it connects the DMS-250 switch with access-side network elements, such as local exchange carrier (LEC) or PBX. The following trunk agencies are access trunks: DAL, CAMA, FGA, FGB, FGC, FGD (PTS and ISUP). Specifically, all PTS trunks and ISUP FGD trunks are access trunks.

Long trunk

A “long access trunk” is longer than 600 miles. An IMT trunk is typically classified as a “long IMT” if the length of the IMT trunk is greater than 500 miles. However, from the DMS-250 perspective, the only way a trunk is recognized as a “long access” or “long IMT” is by the datafill in table TRKSGRP. An XPM long trunk is datafilled with ECSTAT = external and a

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Spectrum Echo Canceller Call Control (continued)

Spectrum long trunk is datafilled with the SPMECIDX option in table TRKSGRP.

Spectrum ECAN control parameters

The Spectrum ECAN has a number of control parameters stored in table SPMECAN. Supported trunk agencies have an index (SPMECIDX) into this table, thus selecting the required control parameters. Refer to “Supported trunk agencies” in this chapter for more information about the trunk agencies that are supported.

Note: The SPMECIDX option is added to table TRKSIG. Thus, AXXESS trunks can be provisioned with Spectrum ECAN resources.

Table 2-1 provides the Spectrum ECAN control parameters, along with the suggested default values.

Table 2-1
Spectrum ECAN control parameters

Control parameters	Description	Default
TONDS	Tone disabler enable/disable	1 (enable)
TONEMODE	Tone disabler disable/again enable event messages enable/disable	1 (enable)
G.164	Tone disabler G.164/165 mode select	0 (G.165)
S56KB	Tone disabler switched 56 Kbyte/s mode enable/disable	0 (disable)
AUTON	Tone disabler Auto on	1 (enable)
NLP	Center clipper enable/disable	1 (enable)
NSMAT	Noise matching enable/disable	1 (enable)
LAW	µLaw/ALaw select	0 (µLaw)
CVRG	Convergence enable/disable (test purpose only)	1 (enable)
ESTRS	Estimation reset enable/disable	0 (disable)
SOS	SOS messages enable/disable when ECAN can not achieve specification	1 (enable)

—continued—

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Spectrum Echo Canceller Call Control (continued)

Table 2-1
Spectrum ECAN control parameters (continued)

Control parameters	Description	Default
TDINC	Auto increment of maximum tail delay when convergence cannot be achieved enable/disable	1 (enable)
MDLA	Maximum tail delay select (16–128 ms)	32 ms
MERL	Minimum ERL setting as initial assumption (0 dB, 3 dB, 6 dB)	6 dB
—end—		

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Spectrum Echo Canceller Call Control (continued)

Table SPMECAN

Table SPMECAN contains control parameters for Spectrum ECANs. The key to the table is an integer index called ECINDEX. The maximum number of tuples that can be added to this table is 256 (0 to 255). Table 2-2 provides the fields and values for table SPMECAN.

Table 2-2
Table SPMECAN fields and values

Field	Value	Default
ECINDEX	0 to 255	Not applicable
TONDS	Y, N	Y
TONMG	Y, N	Y
TONDMOD	G164, G165	G165
S56KB	Y, N	N
AUTOON	Y, N	Y
NLP	Y, N	Y
NSMAT	Y, N	Y
SOS	Y, N	Y
TDINC	Y, N	Y
MDLA	16MS, 32MS, 48MS, 64MS, 80MS, 96MS, 112MS, 128MS	32MS
MERL	0DB, 3DB, 6DB	6DB
FAREC	Y, N	N
BK2BK	Y, N	Y
EC_BYTE_1	00–FF	00
EC_BYTE_2	00–FF	00
EC_BYTE_3	00–FF	00
EC_BYTE_4	00–FF	00

All fields in table SPMECAN correspond to Spectrum ECAN control parameters except for FAREC and BK2BK.

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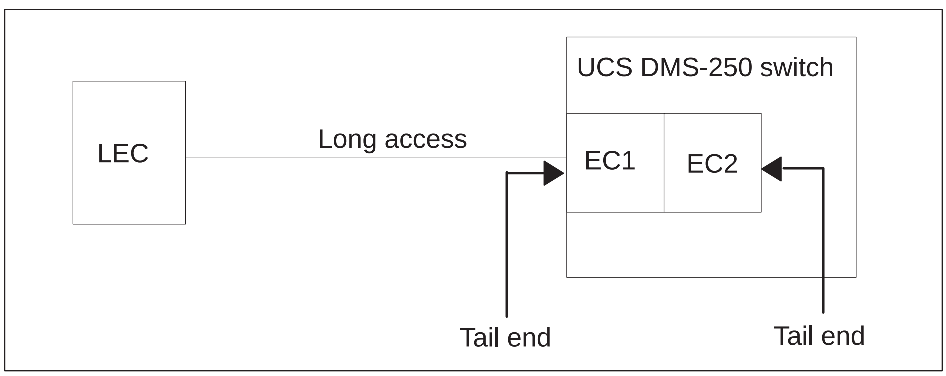
Spectrum Echo Canceller Call Control (continued)

The value “Y” in the FAREC field indicates the presence of an external ECAN at the distant end of the trunk (the end that connects the trunk to the other office) and the BK2BK field, if set to “Y,” indicates that back-to-back ECAN configuration is provided on the trunk. If a trunk is provisioned with FAREC, the near-end DMS-250 switch may be required to provide only one ECAN. Thus a trunk provisioned with FAREC does not require back-to-back ECANs.

FAREC = N and BK2BK = Y

Figure 2-8 shows a configuration of FAREC = N and BK2BK = Y. In this scenario, an ECAN is not provided at the distant end of the long access trunk. The UCS DMS-250 switch is provisioned with two ECANs; one to cancel the forward echo, and the other to cancel the backward echo.

Figure 2-8
Configuration for FAREC=N and BK2BK=Y (2 ECANs)



FAREC = Y and BK2BK = N

Figure 2-9 shows a configuration of FAREC = Y and BK2BK = N. In this scenario, an external ECAN is provided at the distant end of the long access trunk. The UCS DMS-250 switch is provisioned with only one ECAN to cancel the backward echo.

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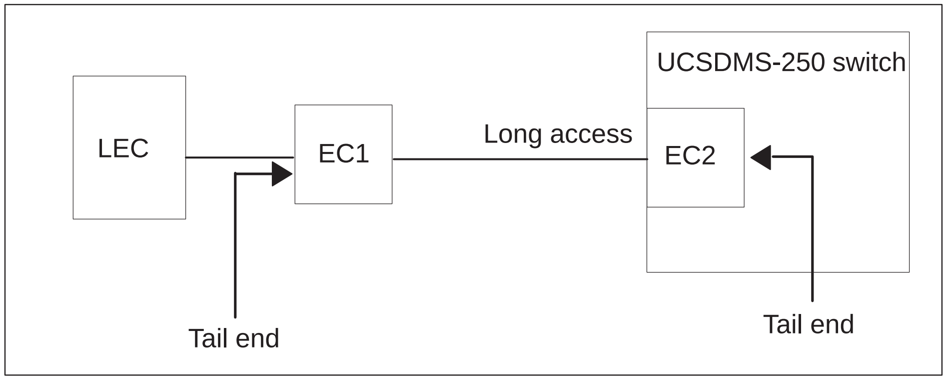
Spectrum Echo Canceller Call Control (continued)

Figure 2-9
Configuration for FAREC=Y and BK2BK=N (1 ECAN)



FAREC = Y and BK2BK = Y

The scenario of FAREC = Y and BK2BK = Y is invalid. Datafilling table SPMECAN in such a manner is prevented.

Long access and long IMT trunks

The UCS DMS-250 switch does not know the distance between switches or the length of the trunks interconnecting them. The first step in identifying long trunks (both access and IMT) is through datafil. The second step is to position ECANs on these long trunks strategically.

Recognizing long distances

Trunks are considered long if the distances spanned introduce delay in the reception of the reflected energy sufficient enough to be perceived as echo. Typically, access trunks 600 miles or longer are considered long access trunks, and IMT trunks 500 miles or longer are considered long IMT trunks.

The only way the UCS DMS-250 switch can recognize a trunk as a long access or a long IMT is through datafill, indicated as follows:

- If the agency is serviced by an XPM, the presence of an external ECAN is indicated by setting the ECSTAT field in table TRKSGRP to “external.” For AXXESS trunks, table TRKSIG is used instead of table TRKSGRP, and the ECSTAT field of table TRKSIG is set to “EXTERNAL.”

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Spectrum Echo Canceller Call Control (continued)

- For a trunk agency serviced by an XPM, if the trunk is equipped with an internal ECAN (NT6X50EC or NT6X50ED), the presence of this internal ECAN is conveyed to the DMS-250 switch by setting the ECSTAT field in table TRKSGRP to “INTERNAL” or “INNOTONE.” For AXXESS trunks, this ECSTAT setting is done in table TRKSIG.
- For a trunk agency serviced by a Spectrum, the presence of a Spectrum ECAN is indicated by adding the SPMECIDX option in table TRKSGRP. The SPMECIDX option is followed by an integer value between 0 and 255. The value indexes desired control parameters in table SPMECAN and associates control parameters with Spectrum ECAN.

ECAN configurations for deployment

There are three basic configurations in which ECANs can be deployed. They are as follows:

- access only — ECANs are deployed on all access trunks. Subsequently, the ECANs are positioned close to the source of the echo they cancel, so they yield the best results. The large number of ECANs involved makes this configuration very costly.
- IMT only — ECANs are deployed on IMT trunks only. This is the most cost effective configuration. However, since the proximity of the ECAN to the source of the echo is compromised, echo cancellation is rendered less effective. Also, for calls involving two access trunks where at least one of the trunks is long, no echo cancellation is provided. Thus, this configuration cannot be used if long access trunks are present.
- access and IMT — ECANs are provisioned on long access trunks and long IMT trunks. Essentially, this configuration is a combination of access only and IMT only. The combined advantages yield the best match between echo cancellation performance and cost.

Per-call control of Spectrum ECAN for two-party calls

The per-call control of Spectrum ECANs is applicable only to trunks on the Spectrum that are provisioned with Spectrum ECANs. The SPMECIDX option identifies the trunk as provisioned with a Spectrum ECAN. The option is followed by an index into table SPMECAN to associate the Spectrum ECAN with desired control parameters.

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Spectrum Echo Canceller Call Control (continued)

Call processing logic

The logic for the per-call control algorithm is implemented based on the following factors:

- The echo cancellation capabilities for a call are determined on a per trunk subgroup basis based on table TRKSGRP datafill using the SPMECIDX option. For AXXESS trunks, table TRKSIG is used instead of table TRKSGRP.
- Spectrum ECAN control parameters are derived from table SPMECAN. Once the call control logic determines that an ECAN is required on a trunk for a call, the control parameters from table SPMECAN are sent to the ECAN resource along with the command to allocate the ECAN.
- Wherever possible, only two ECANs are activated for a two-party call. One ECAN cancels the forward/outgoing echo and the other ECAN cancels the backward/incoming echo. The ECANs are allocated as close as possible to the source of the echo they cancel. Although only two ECANs are activated, there may be cases where more than two ECAN resources are allocated for a call.
- In all intra-network interswitch calls, the Spectrum ECAN call control algorithm uses the Echo Control bits in the Nature of Connection Indicator field of the Initial Address Message (IAM), to determine whether to activate the forward ECAN. In other words, the Spectrum ECAN call control algorithm uses the Echo Control bit in its decision making process only when the received IAM pertains to an intra-IMT trunk. An IMT trunk is characterized as intra-IMT by datafilling a value of “INTRA” in the NETWKSPC field of table TRKGRP.
- In all intra-network interswitch calls, the Spectrum ECAN call control algorithm uses the Echo Control bits in the Backward Call Indicator of the Address Complete Message (ACM) or the Answer Message (ANM) to determine whether to activate the backward ECAN. In other words, the Spectrum ECAN call control algorithm uses the Echo Control bit in its decision making process only when the received ACM/ANM pertains to an intra-IMT trunk.
- The Echo Control bit handling by the Spectrum ECAN call control algorithm in each of the following signaling type interworkings are as follows:

  Note: PRI trunks are serviced by the XPM.

  — PTS to PTS, PRI to PTS, PTS to PRI: All the information required to allocate Spectrum ECANs on PTS trunks is obtained from datafill.

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Spectrum Echo Canceller Call Control (continued)

— PTS/PRI to SS7: If a Spectrum ECAN cancelling the forward echo (echo travelling in the direction of IAM) is activated, the Echo Control bit in the IAM is set.

— SS7 to PTS/PRI: If an ECAN cancelling the backward echo (echo travelling in the direction of the ACM) is activated, the Echo Control bit in the ACM or ANM is set.

— SS7 to SS7: If an ECAN cancelling the forward echo (echo travelling in the direction of IAM) is activated, the Echo Control bit in the IAM is set. If an ECAN cancelling the backward (echo travelling in the direction of the ACM) is activated, the Echo Control bit in the ACM or ANM is set.

- ECANs are not activated for digital data calls even if a Spectrum ECAN resource is assigned to the trunk. This allows consolidation of voice and data trunks. Data calls can be categorized as follows:

  — For fax/modem calls, the activated ECAN deactivates when a valid G.164/G.165 tone is received. The ECAN may be disabled for the remainder of the call or may be enabled again once the data transmission is finished, depending on the value of the AUTON field in table SPMECAN. This is handled by Spectrum ECAN’s tone disabler firmware. The ECAN control parameter TONDS enables or disables tone detection. When the TONDS bit is set, the tone disabler disables the ECAN when a valid 2100 Hz tone is received.

  — For data calls, the ECAN is not allocated for the entire duration of the call.

Requirements

The Spectrum ECAN call control algorithm is based on the following requirements:

1 If a two-party call requires echo cancellation, only two ECANs are activated—one for the outgoing/forward echo and the other for the incoming/backward echo.

2 If multiple ECANs are present in the call path, only the two ECANs closest to the source of echo are activated.

3 For digital data calls ECANs are not allocated.

4 External ECANs are always activated when present on a trunk. This may require that a Spectrum ECAN not be activated, if an external ECAN is present. Call processing software on the UCS DMS-250 switch does not provide activation control for external ECANs.

5 NT6X50EC ECANs are activated on a per call basis.

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Spectrum Echo Canceller Call Control (continued)

6 The Echo Control bits in the Nature of Connection Indicator and Backward Call Indicator ISUP parameters are set when an ECAN is activated in the appropriate direction.

— If a forward ECAN is activated, the Echo Control bit in the Nature of Connection Indicator in the outgoing IAM message is set.

— If a backward ECAN is activated, the Echo Control bit in the Backward Call Indicator in the ACM or ANM message is set.

— The Echo Control bits are also set if an ECAN is present at the distant end of the trunk indicated by appropriate datafill, that is the FAREC field is set to "Y."

7 When the call configuration changes (for example, a reoriginated call), ECANs are reconfigured (enabled or disabled) according to the new state of the call.

Interaction with the internal ECANs on the XPM

The Spectrum ECAN call control algorithm works with the existing internal ECAN algorithm on the XPM. This ensures an optimal number of ECANs are allocated on the call.

Interaction with external ECANs on the XPM

The Spectrum ECAN call control algorithm considers the presence or absence of external ECANs on the trunk serviced by the XPM before determining the need for a Spectrum ECAN on the trunk serviced by Spectrum.

Supported trunk agencies

The Spectrum ECAN call control algorithm requires that a trunk be identified as either an access trunk or an IMT trunk.

Note: PRI trunks are not supported by Spectrum ECAN support.

Access trunks

The following trunk agencies are supported as access trunks:

- DAL
- enhanced dedicated access line (EDAL)
- FGA
- FGB
- FGC

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Spectrum Echo Canceller Call Control (continued)

- FGD (PTS and SS7)
- AXXESS

IMT trunks

The following trunk agency is supported as an IMT trunk:

- SS7 IMT, which includes SS7 IMT RLT

Provisioning rules

Provisioning ECANs on trunks serviced by the XPM centers around the ECSTAT field. All trunk agencies except AXXESS trunks use the ECSTAT field in table TRKSGRP. AXXESS trunks use the ECSTAT field in table TRKSIG instead. Provisioning ECANs on a Spectrum trunk is accomplished using the option SPMECIDX. For all trunks other than AXXESS trunks, this option is added to the appropriate tuple in table TRKSGRP. For AXXESS trunks, table TRKSIG is used. In order to prevent repetition of this information, from this point on, the following convention is followed:

> Any reference to the ECSTAT field or the SPMECIDX option in table TRKSGRP, also applies to table TRKSIG unless stated otherwise.

The ECSTAT field only applies to trunk members serviced by an XPM. Similarly, SPMECIDX applies to trunk members on Spectrum only. This needs careful attention when some trunk members of a certain subgroup (or AXXESS trunks having the same characteristics through table TRKSIG), reside on an XPM and the others on a Spectrum. This is because provisioning a Spectrum ECAN on Spectrum trunk member depends on SPMECIDX only, not the ECSTAT field.

Similarly, provisioning an ECAN on the XPM trunk member is dependent on the ECSTAT value regardless of SPMECIDX. Thus, it is possible to have an ECSTAT value of “INTERNAL” or “INNOTONE” along with an SPMECIDX option specified. The call processing software uses the appropriate information based on the peripheral supporting the trunk member.

The following example describes the datafill necessary to provision a Spectrum ECAN on a trunk serviced by Spectrum. The option SPMECIDX

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Spectrum Echo Canceller Call Control (continued)

is added in table TRKSGRP with an index into table SPMECAN which specifies the control parameters.

```
>TABLE SPMECAN
>POS 1
1 Y Y G165 N Y Y Y Y Y 32MS 6DB N N

>TABLE TRKSGRP
>POS EAN861C7LPN00 0
EAN861C7LPN00 0 DS1SIG C7UP 2W N N UNEQ ACTIVEA UCP THRH 100 DMSNODE
SPMECIDX 1 $ NIL CIC
```

Spectrum ECANs are in back-to-back mode when field BK2BK in table SPMECAN is set to “Y.” This is shown in the following example.

```
>TABLE SPMECAN                  BK2BK
>POS 1                            |
1 Y Y G165 N Y Y Y Y Y 32MS 6DB N Y

>TABLE TRKSGRP
>POS EAN861C7LPN00 0
EAN861C7LPN00 0 DS1SIG C7UP 2W N N UNEQ ACTIVEA UCP THRH 100 DMSNODE
SPMECIDX 1 $ NIL CIC
```

The field FAREC in table SPMECAN indicates the presence of an external ECAN at the distant end of the access trunk. A value of “Y” in the FAREC field indicates that an external ECAN is present at the distant end. The Spectrum ECAN call control algorithm sets the Echo Control bits in the appropriate SS7 messages to announce the presence of the enabled (assumed) external ECAN.

```
>TABLE SPMECAN                FAREC
>POS 1                          |
1 Y Y G165 N Y Y Y Y Y 32MS 6DB Y N

>TABLE TRKSGRP
>POS EAN861C7LPN00 0
EAN861C7LPN00 0 DS1SIG C7UP 2W N N UNEQ ACTIVEA UCP THRH 100 DMSNODE
SPMECIDX 1 $ NIL CIC
```

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Spectrum Echo Canceller Call Control (continued)

For IMT trunks, if an ECAN is provisioned on one end of any IMT trunk, this implies the presence of an ECAN at the other end. Therefore, the FAREC field is not required to indicate the presence of an ECAN at the other end of the IMT trunk. If the FAREC field is set to “Y” for an IMT trunk, the Spectrum ECAN call control algorithm sets the Echo Control bits in the appropriate SS7 messages to reflect the presence of the enabled (assumed) ECAN at the distant end of the IMT trunk. This capability may be particularly useful when the distant end of the IMT trunk terminates at a third-party vendor’s switch. For example, the third-party vendor has an ECAN provisioned at the distant end, but the disposition of the ECAN is not conveyed through the Echo Control bits of the appropriate SS7 messages. The FAREC field can be used to have appropriate Echo Control bits set to prevent redundant allocation of ECANs further along the network.

The lack of option SPMECIDX in table TRKSGRP for a Spectrum trunk implies that a Spectrum ECAN is not provisioned.

In the following example, provisioning an external ECAN on an XPM trunk is illustrated. The ECSTAT field in table TRKSGRP is set to “EXTERNAL.”

```
>TABLE TRKSGRP
>POS EAN861C7LPN00 0
EAN861C7LPN00 0 DS1SIG C7UP 2W N N EXTERNAL ACTIVEA UCP THRH 100 DMSNODE
$ NIL CIC
```

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Spectrum Echo Canceller Call Control (continued)

The following are examples of provisioning an internal ECAN on an XPM trunk. The first example depicts orientation of the ECAN in access mode, which is used for access trunks.

```
>TABLE CARRMTC
>POS DTC ECACC
DTC ECACC 255 255 DS1 NT6X50EC MU_LAW SF ZCS BPV NILDL N 250 1000 50 50
150 1000 3 6 864 100 17 511 4 255 access

>TABLE LTCPSINV
>POS DTC 2
DTC 2 N (0 DS1 DEFAULT N) (1 DS1EC ECACC N 440) (2 ...) ...$

>TABLE TRKSGRP
>POS EAN861C7LPN00 0
EAN861C7LPN00 0 DS1SIG C7UP 2W N N INTERNAL ACTIVEA UCP THRH 100 DMSNODE
$ NIL CIC
```

more data follows, however not relevant to this discussion

The second example illustrates datafill to orient the ECAN in network mode, which is used for IMT trunks.

```
>TABLE CARRMTC
>POS DTC ECNET
DTC ECNET 255 255 DS1 NT6X50EC MU_LAW SF ZCS BPV NILDL N 250 1000 50 50
150 1000 3 6 864 100 17 511 4 255 network

>TABLE LTCPSINV
>POS DTC 2
DTC 2 N (0 DS1 DEFAULT N) (1 DS1EC ECNET N 440) (2 ...) ...$

>TABLE TRKSGRP
>POS IMT761C7LPN00 0
IMT761C7LPN00 0 DS1SIG C7UP 2W N N internal ACTIVEA UCP THRH 100 DMSNODE
$ NIL CIC
```

more data follows, however not relevant to this discussion

The orientation of an XPM ECAN algorithm cannot be changed on a per-call basis. For the existing XPM ECAN algorithm to work properly, IMT trunks are oriented in network mode and access trunks are oriented in access mode.

The presence of the internal ECAN (NT6X50EC/NT6X50ED) on the XPM is indicated to the CM by setting field ECSTAT in table TRKSGRP to either

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"INTERNAL" or "INNOTONE." The orientation is specified by appropriate datafill in table CARRMTC and table LTCPSINV.

For XPM trunks, a value of "UNEQ" in the ECSTAT field of table TRKSGRP implies that neither an external nor an internal ECAN is provisioned.

The Spectrum ECAN call control algorithm has no control on either external or internal ECANs on the XPM.

Provisioning tip for the three configurations of installed ECANs

Note: The concept described in this tip ensures adequate ECAN coverage and helps keep provisioning simple.

This provisioning tip is applicable to all three configurations, which are

- access only (Refer to "Access only installation of ECANs" for detailed information.)
- IMT only (Refer to "IMT only installation of ECANs" for detailed information.)
- access and IMT (Refer to "Access and IMT installation of ECANs" for detailed information.)

A Spectrum ECAN provisioned on an access trunk is allocated by the Spectrum ECAN call control algorithm in access mode. The only exception is when an additional Spectrum ECAN is provided on the access trunk, so the additional ECAN is allocated in network mode.

On an access trunk, an additional Spectrum ECAN is provided by one of the following:

- datafilling a back-to-back Spectrum ECAN pair
- by provisioning a Spectrum ECAN with an indication of the presence of an ECAN at the distant end of the access trunk (using the FAREC field).

  Note: Spectrum ECAN is considered the additional ECAN. If Spectrum ECAN is allocated in access mode, it would cancel echo in the same direction as the ECAN at the distant end, making it redundant.

A Spectrum ECAN provisioned on an IMT trunk is allocated by the Spectrum ECAN call control algorithm in network mode. The only exception is when an additional Spectrum ECAN is provided on the IMT trunk, so the additional ECAN is allocated in access mode. On an IMT

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Spectrum Echo Canceller Call Control (continued)

trunk, an additional Spectrum ECAN is provided by datafilling a back-to-back Spectrum ECAN pair.

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Spectrum Echo Canceller Call Control (continued)

Access only installation of ECANs

ECANs are deployed on all access trunks, thus providing echo cancellation on both interswitch and intraswitch calls. In this configuration, ECANs are positioned close to the source of the echo to yield better echo cancellation. The large number of ECANs required makes this configuration impractical.

Provisioning rules and guidelines for access only installation

Follow these provisioning rules and guidelines for the access only installation of the ECANs.

Rule 1 — Provision one ECAN on all access trunks (short or long). This ECAN cancels echo in one direction (forward or backward). For intraswitch calls, the ECAN cancelling echo in the reverse direction (backward or forward) is provided by the other trunk agency. For interswitch calls it is assumed that an ECAN cancelling echo in the reverse direction is present. If this assumption cannot be made, see the following Rule 3.

Rule 2 — Do not provision ECANs on any IMT trunks.

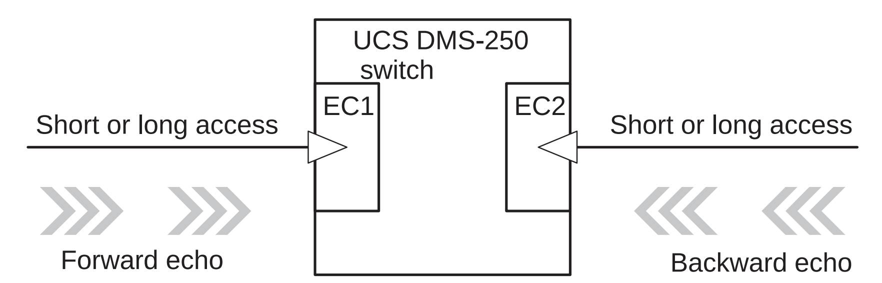
Rule 3 — Provision two ECANs on an access trunk for interswitch calls. ECAN deployment on the switch (and other subsequent switches) at the other end of the IMT is beyond the control of the provisioning party. This can be achieved by either provisioning Spectrum ECANs in back-to-back mode, or by provisioning a Spectrum ECAN and an external ECAN at the distant end of the access trunk. Provisioning two ECANs may result in redundant allocation of ECANs if the received Echo Control bits (in the appropriate SS7 messages) do not provide accurate information regarding the status of ECANs in the call path across the network.

AD9959
Spectrum Echo Canceller Call Control (continued)

Examples

Figure 2-10 illustrates Spectrum ECANs provisioned on all access trunks.

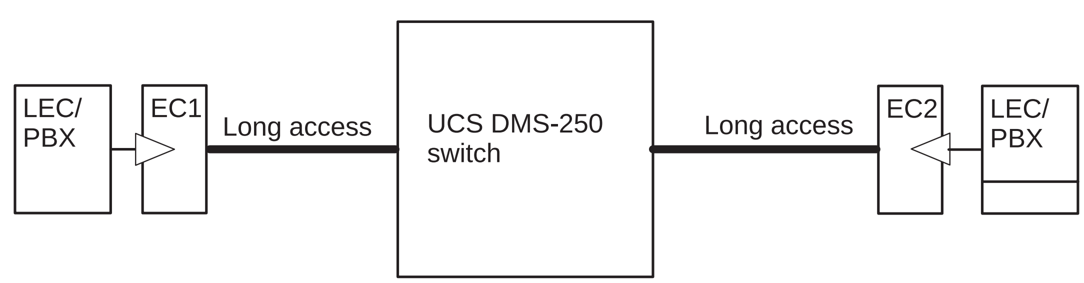
Figure 2-10
Spectrum ECANS provisioning (all access trunks)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

For long access trunks, better echo cancellation is achieved by provisioning an external ECAN at the distant end of the access trunk. However, the per-call control capability is sacrificed. Figure 2-11 illustrates the Spectrum ECAN provisioning at the distant end of the access trunk.

Figure 2-11
Spectrum ECAN provisioning (long access trunks)

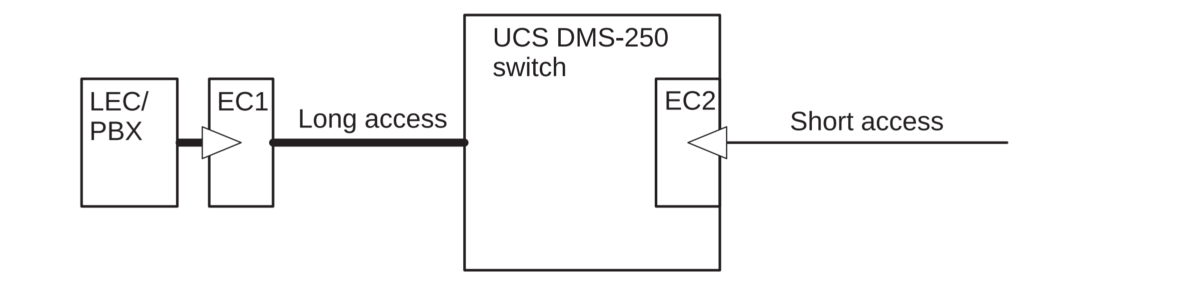


Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-12 illustrates long access trunks that are provisioned with external ECANs and short access trunks that are provisioned with Spectrum ECANs.

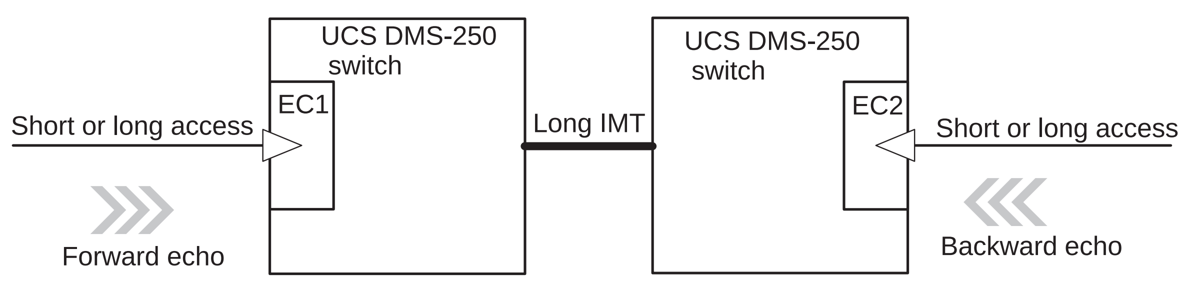
Figure 2-12
Spectrum ECAN provisioning (long and short access trunks)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

Figure 2-13 illustrates an interswitch call where Spectrum ECANs are provisioned on all access trunks.

Figure 2-13
Spectrum ECAN provisioning (interswitch call)

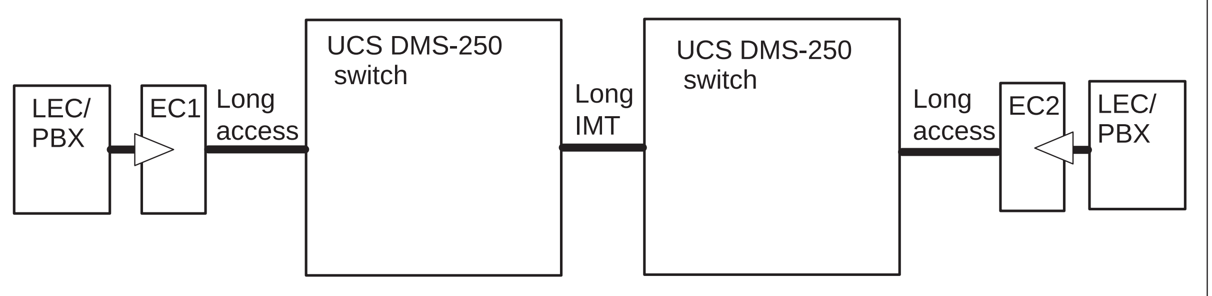


Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

Figure 2-14 illustrates a scenario where external ECANs are used at the distant end (with respect to the DMS-250 switch) of the long access trunks. The per-call control capability is compromised for better echo cancellation.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-14
Spectrum ECAN provisioning (distant end of long access trunks)

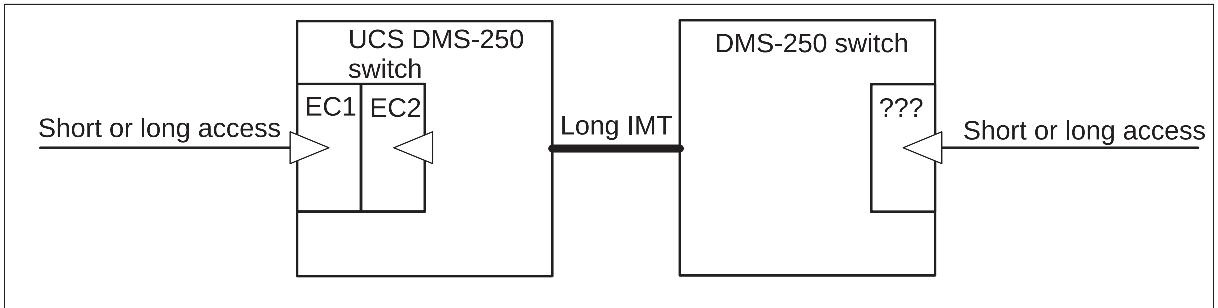


Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

For an interswitch call, it is assumed that the second ECAN is provisioned on the switch at the other end of the IMT. This may not always be true, especially when the switch at the other end is not under the jurisdiction of the provisioning party. Figure 2-15 illustrates this by three question marks in the block used to represent an ECAN. Such situations can be remedied by provisioning two ECANs on the access trunks. The figure uses back-to-back Spectrum ECANs. The Spectrum ECAN call control algorithm enables EC2 only when no indication (through SS7 messages) is received that an ECAN has been allocated downstream to cancel backward echo. The lack of indication of the presence (activation) of ECANs at the other end of the IMT results in redundant allocation of ECANs.

AD9959
Spectrum Echo Canceller Call Control (continued)

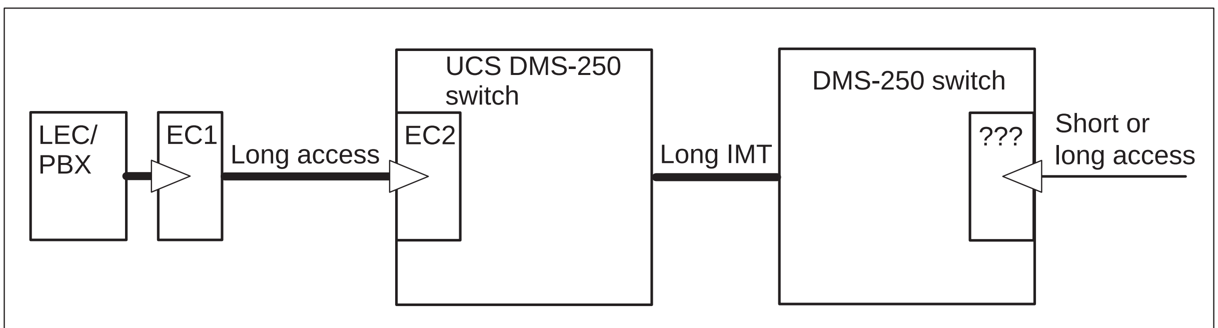
Figure 2-15
Spectrum ECAN provisioning (back to back scenario)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
??? = Information about the ECAN is not known, so it’s presence cannot be assumed.

On long access trunks an external ECAN at the distant end provides better results. However, per-call control is lost. Figure 2-16 shows this configuration.

Figure 2-16
Spectrum ECAN provisioning (long access trunks with unknown ECAN scenario at distant end)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
??? = Information about the ECAN is not known, so it’s presence cannot be assumed.

AD9959
Spectrum Echo Canceller Call Control (continued)

IMT only installation of ECANs

This configuration is used only if all access connections encounter only short delays, eliminating the need for ECANs on intraswitch access-to-access calls. ECANs are deployed only on IMT trunks identified as “long.” This makes the configuration cost-effective as far as ECAN resources are concerned. ECANs are farther away from the source of the echo than if they were provisioned on access trunks.

Provisioning rules and guidelines for IMT only installation

Follow these provisioning rules and guidelines for the IMT only installation of the ECANs.

Rule 1 — All access-to-access connections are expected to be low in delay.

Rule 2 (adjacent IMT ECAN rule)— Provision ECANs on long IMT trunks only. Only one ECAN is provisioned. It is assumed that the second ECAN is provided at subsequent switches on the other end of the long IMT trunk. This ensures optimal allocation of ECAN resources. Rule 2 can be restated as follows:

> The provisioning of an ECAN at one end of the IMT implies the presence of an ECAN at the other end (cancelling echo in the reverse direction), with one exception which is governed by the following Rule 3.

Note: Set the FAREC field to “N” for intra-IMT trunks. For IMT trunks terminating to a third-party switch, set the FAREC field to “Y” if the SS7 messages (IAM/ACM/ANM) received from the switch at the distant end of the trunk do not correctly reflect the enabled status of ECANs at the distant end. When the FAREC field is set to “Y,” the Spectrum ECAN call control algorithm correctly sets the Echo Control bits in the appropriate SS7 messages to indicate that the ECAN at the distant end of the IMT trunk is enabled. If necessary, this capability can be utilized on IMT trunks terminating to a third-party vendor’s switch. Before setting the FAREC field to “Y,” it is recommended that the provisioning party determine that echo cancellation in the direction required is provided at the third-party switch.

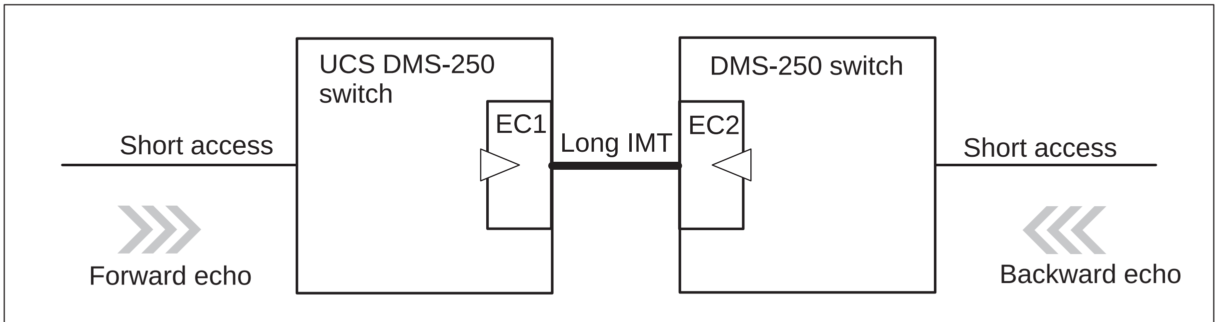
AD9959
Spectrum Echo Canceller Call Control (continued)

Rule 3 — When the assumption that subsequent switches at the other end of a long IMT trunk provides the second ECAN (cancelling echo in the reverse direction) is not true, then Spectrum ECANs in back-to-back mode are provisioned. In other words, Spectrum ECANs on a long IMT are provisioned in back-to-back mode when ECAN deployment at the other end is beyond the control of the provisioning party. This provisioning mode may result in redundant allocation of ECANs if the received Echo Control bits (in the appropriate SS7 messages) do not provide accurate information regarding the status of ECANs in the call path across the network.

Examples

As shown in Figure 2-17, when provisioning EC1, it is assumed that the switch at the other end of the IMT provides EC2 (either on the IMT or the access trunk).

Figure 2-17
Spectrum EC1 provisioning (EC2 provisioning assumption at distant end)

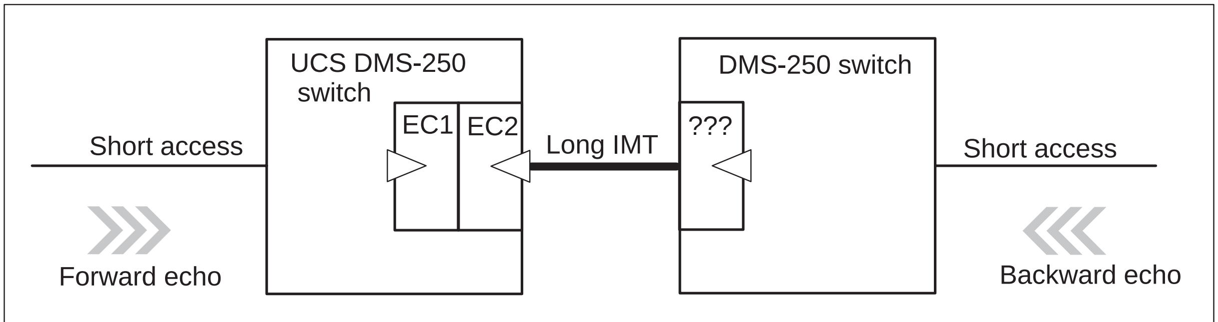


Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

If EC2 is not provided on the other end of the IMT, then adequate echo cancellation does not take place. For example, if EC2 is not present, then backward echo is not cancelled. If the other end of the long IMT trunk is hosted by a third-party switch, the situation is remedied by provisioning two Spectrum ECANs in back-to-back mode on the long IMT trunk. This is shown in the Figure 2-18. The Spectrum ECAN call control algorithm enables EC2 if the Echo Control bit in the backward SS7 messages received from the switch downstream indicates that no ECANs cancelling backward echo are allocated. Lack of proper indication about the disposition of ECANs on the switch at the other end of the long IMT trunk may result in redundant allocation of ECANs.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-18
Spectrum ECAN provisioning (back to back mode on long IMT trunk)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
??? = Information about the ECAN is not known, so it’s presence cannot be assumed.

AD9959
Spectrum Echo Canceller Call Control (continued)

Access and IMT installation of ECANs

This configuration offers the best match between cost (ECAN resources) and performance. This is realized through deployment of ECANs on selected trunks only. The selected trunks are long IMT trunks and long access trunks. The ECANs on long access trunks ensure echo cancellation on the intraswitch and interswitch calls they are involved in. The ECANs on IMT trunks provide echo cancellation on interswitch calls that originate and terminate on short access trunks.

Essentially, this is a combination of the IMT only installation (except that long access trunks are provisioned with ECANs) and the access only installation (except that ECANs are deployed on long IMT trunks and ECANs are not deployed on short access trunks). Since ECANs are not deployed on short access trunks, two ECANs are provisioned on long access trunks to provide echo cancellation in either direction.

Provisioning rules and guidelines for access and IMT installation of ECANs

Follow these provisioning rules and guidelines for the access and IMT installation of the ECANs.

Rule 1 — Do not provision any ECANs on short access trunks and short IMT trunks.

Rule 2 — Provision two ECANs on all long access trunks. These can be a Spectrum ECAN back-to-back pair or a Spectrum ECAN with an external ECAN present at the distant end of the long access trunk.

Rule 3 — Provision one ECAN on all long IMT trunks. It is assumed that the second ECAN is provided by subsequent switches at the other end of the long IMT trunk. This ensures optimal allocation of ECAN resources. This rule, which is also referred to as the “Adjacent IMT ECAN” rule, can be restated as follows:

> The provisioning of an ECAN on one end of the IMT implies the presence of an ECAN at the other end (cancelling echo in the reverse direction), with one exception which is governed by the following Rule 4.

AD9959
Spectrum Echo Canceller Call Control (continued)

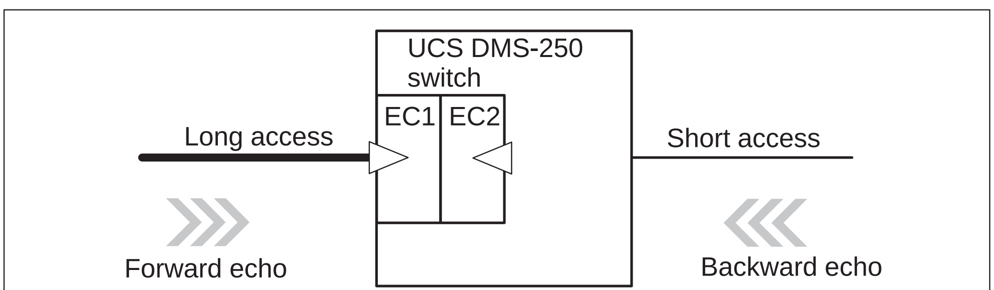
Note: Set the FAREC field to “N” for intra-IMT trunks. For IMT trunks terminating to a third-party switch, set the FAREC field to “Y” if the SS7 messages (IAM/ACM/ANM) received from the switch at the distant end of the trunk do not correctly reflect the enabled status of ECANs at the distant end. When the FAREC field is set to “Y,” the Spectrum ECAN call control algorithm correctly sets the Echo Control bits in the appropriate SS7 messages to indicate that the ECAN at the distant end of the IMT trunk is enabled. This capability (if necessary) can be used on IMT trunks terminating to a third-party vendor’s switch. Before setting the FAREC field to “Y,” determine whether echo cancellation in the required direction is provided at the third-party switch.

Rule 4 — When the assumption that subsequent switches at the other end of a long IMT trunk provides the second ECAN (cancelling echo in the reverse direction) is not true, then Spectrum ECANs in back-to-back mode are provisioned. In other words, Spectrum ECANs on a long IMT are provisioned in back-to-back mode when ECAN deployment at the other end is beyond the control of the provisioning party. This provisioning mode may result in redundant allocation of ECANs if the received Echo Control bits in the appropriate SS7 messages do not provide accurate information regarding the status of ECANs in the call path across the network.

Examples

Figure 2-19 illustrates the reason two ECANs are needed on intraswitch calls. Spectrum ECANs are provided on the long access trunk in back-to-back mode.

Figure 2-19
Spectrum ECAN provisioning (intraswitch calls)

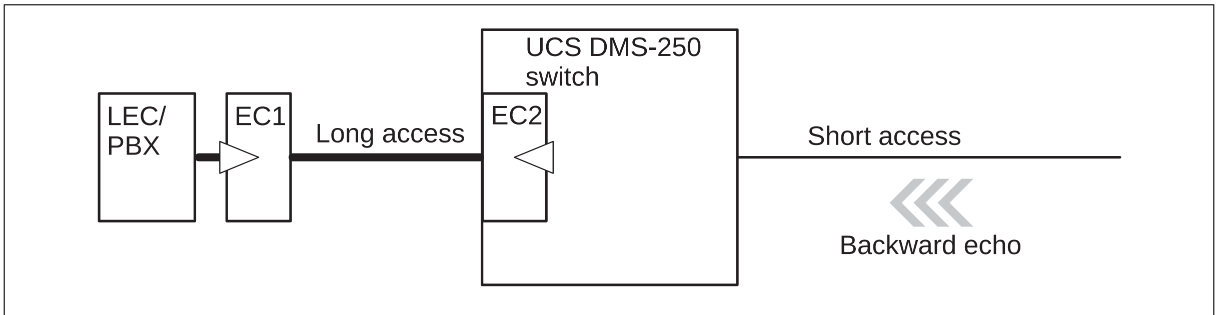


Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Obviously, better ECAN performance is obtained if an external ECAN is provisioned at the distant end of the long access trunk. The ability to control ECAN resources on a per-call basis is compromised. Figure 2-20 illustrates this.

Figure 2-20
Spectrum ECAN provisioning (external EC1 at distant end of long access trunk)



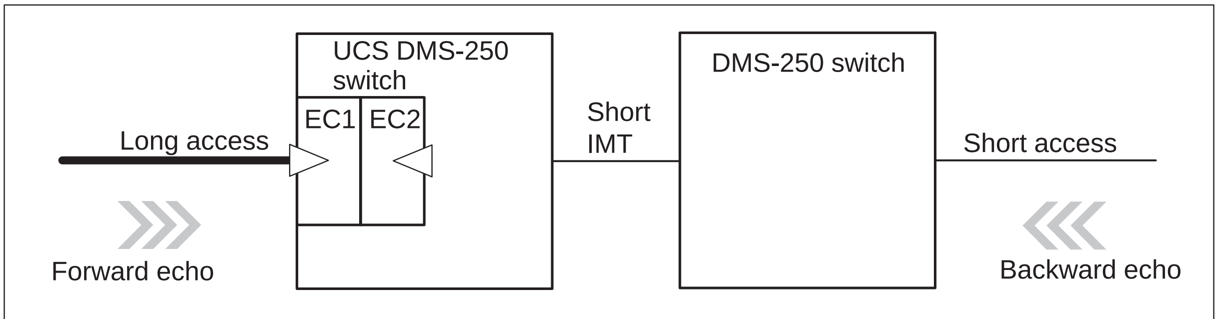
Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

For long access to long access intraswitch calls, four ECANs are involved. Only the necessary number of Spectrum ECANs are allocated by the Spectrum ECAN call control algorithm.

Figure 2-21 illustrates how adequate echo cancellation coverage is achieved on interswitch calls by a pair of Spectrum ECANs on the long access trunk.

AD9959
Spectrum Echo Canceller Call Control (continued)

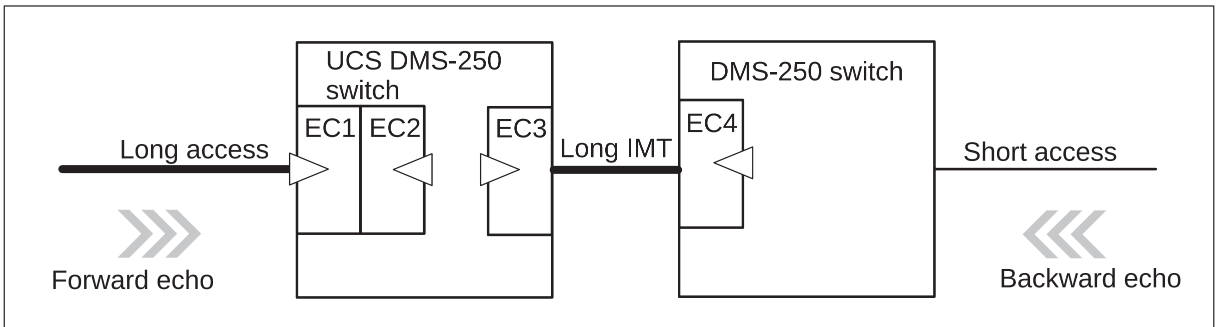
Figure 2-21
Spectrum ECAN provisioning (long access on interswitch calls)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

Figure 2-22 uses a long IMT provisioned with ECANs. The Spectrum ECAN call control algorithm allocates only the necessary ECANs.

Figure 2-22
Spectrum ECAN provisioning (call control algorithm allocation)

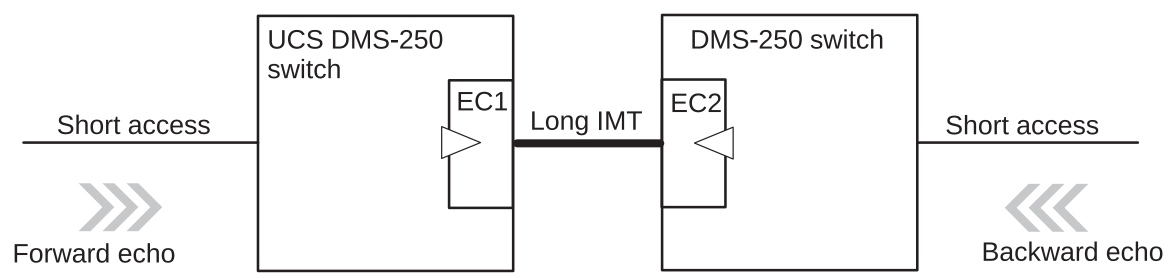


Legend:
EC1, EC3 = ECAN cancels forward echo.
EC2, EC4 = ECAN cancels backward echo.

Figure 2-23 illustrates echo cancellation coverage for interswitch calls that originate and terminate on short access trunks.

AD9959
Spectrum Echo Canceller Call Control (continued)

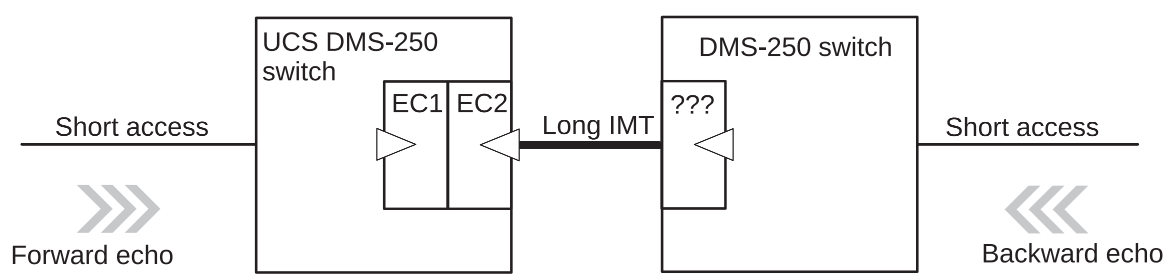
Figure 2-23
Echo cancellation coverage (interswitch calls on short access trunks)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

When ECAN provisioning at the other end of an IMT trunk is beyond the control of the provisioning party, back-to-back Spectrum ECANs on the IMT trunk are necessary. Although the Spectrum ECAN call control algorithm guarantees optimal ECAN allocation on the switch in concern, the lack of indication about the disposition of ECANs at the other end of the long IMT may result in redundant ECANs. Figure 2-24 illustrates this situation.

Figure 2-24
Spectrum ECAN provisioning (without provisioning information for far end[short access])

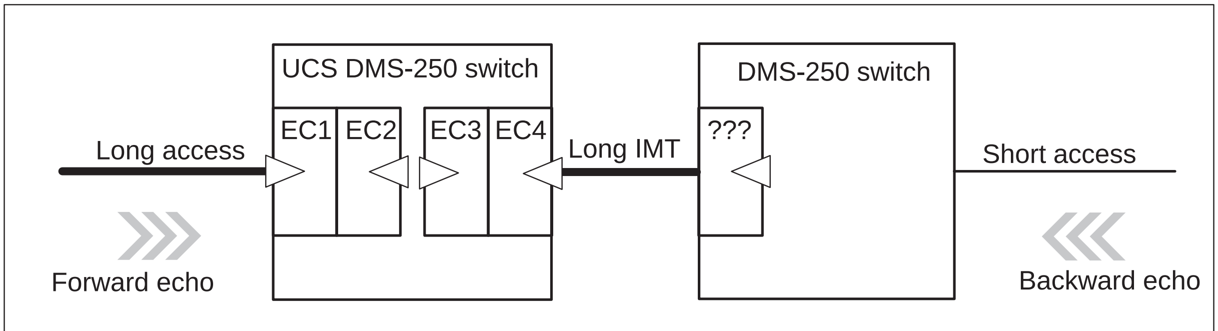


Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
??? = Information about the ECAN is not known, so it’s presence cannot be assumed.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-25 illustrates a long access trunk involved in a scenario similar to the previous example. Though the Spectrum ECAN call control algorithm allocates at most two ECANs (out of EC1, EC2, EC3, and EC4), redundant ECANs may be present if proper indication about the disposition of ECANs downstream is not received.

Figure 2-25
Spectrum ECAN provisioning (without provisioning information at far end [long access])



Legend:
EC1, EC3 = ECAN cancels forward echo.
EC2, EC4 = ECAN cancels backward echo.
??? = Information about the ECAN is not known, so it’s presence cannot be assumed.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum ECAN call control agorithm and scenarios

The combinations of the four basic scenarios are as follows:

- Spectrum origination to a Spectrum termination
  - Spectrum access to Spectrum access
  - Spectrum access to Spectrum IMT
  - Spectrum IMT to Spectrum access
  - Spectrum IMT to Spectrum IMT
- XPM origination with external ECAN to a Spectrum termination
  - XPM access with external ECAN to Spectrum access
  - XPM access with external ECAN to Spectrum IMT
  - XPM IMT with external ECAN to Spectrum access
  - XPM IMT with external ECAN to Spectrum IMT
- XPM origination with internal ECAN to a Spectrum termination
  - XPM access with internal ECAN to Spectrum access
  - XPM access with internal ECAN to Spectrum IMT
  - XPM IMT with internal ECAN to Spectrum access
  - XPM IMT with internal ECAN to Spectrum IMT
- Spectrum origination to an XPM termination with external ECAN
  - Spectrum access to XPM access with external ECAN
  - Spectrum access to XPM IMT with external ECAN
  - Spectrum IMT to XPM access with external ECAN
  - Spectrum IMT to XPM IMT with external ECAN

AD9959
Spectrum Echo Canceller Call Control (continued)

In all the scenarios, the following are true:

- A Spectrum trunk can be informed of the presence of an external ECAN at the distant end of a Spectrum trunk only if a Spectrum trunk is provisioned with a Spectrum ECAN. The FAREC field that carries this information can be accessed only through the SPMECIDX option. The SPMECIDX option indicates that a Spectrum ECAN is provisioned. Through the remainder of this chapter, the terms “far-end ECAN” and “distant end ECAN” imply the presence of an external ECAN at the distant end (from the UCS DMS-250 switch) of a Spectrum trunk provisioned with a Spectrum ECAN and the control parameter FAREC datafilled in table SPMECAN set to “Y.”
- ECANs on IMT trunks are usually activated in network mode. However, in certain instances, such as back-to-back mode on IMT, Spectrum ECANs on IMT trunks are activated in access mode. Due to the presence of switches between the ECAN on the IMT and the hybrid, which is the source of the echo the ECAN is cancelling, this behavior is termed pseudo-access behavior.
- When associated with an IMT trunk, the sole function of the FAREC field is to have the Spectrum ECAN call control agorithm set Echo Control bits in the appropriate SS7 messages based on the assumed orientation of the ECAN at the other end of the IMT trunk. This functionality is typically used when the IMT trunk is not an intra-IMT trunk and the incoming SS7 messages (pertaining to the IMT trunk) do not accurately represent the disposition of the ECAN at the other end.

  Note: Before making use of this functionality, establish whether the ECAN at the other end of the IMT (third-party premises) is activated. If it is not activated, echo cancellation in the direction required may be compromised. Refer to “Message protocols” later in this chapter for more information.

- The Echo Control bits are respected by the algorithm if the corresponding incoming message pertains to an intra-IMT trunk. For all other trunks, the Echo Control bit information in the corresponding SS7 message is not considered. For example, if the Spectrum ECAN call control agorithm decides that a Spectrum ECAN is needed in a certain direction, then that Spectrum ECAN is allocated irrespective of the information in the corresponding Echo Control bit.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum origination to a Spectrum termination

The four basic scenarios when both the originator and the terminator are serviced by Spectrum are described in this section. They are

- Spectrum access to Spectrum access
- Spectrum access to Spectrum IMT
- Spectrum IMT to Spectrum access
- Spectrum IMT to Spectrum IMT

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum access to Spectrum access

Spectrum ECAN is allocated according to the following rules. These rules are illustrated in Table 2-3.

Rule 1 — No more than two Spectrum ECANs are allocated. Each Spectrum ECAN is allocated as close as possible to the source of the echo it cancels.

Rule 2 — If an external ECAN is provided at the distant end of a trunk, a Spectrum ECAN is not allocated to cancel echo in the direction already taken care of by the external (far-end) ECAN.

Rule 3 — A Spectrum ECAN is always allocated in access mode, except in the following cases.

- when a far-end ECAN is provided on one agent of a two-party call, and the other agent is not provisioned with an ECAN
- when the second ECAN of the back-to-back pair on an agent is allocated in network mode to compensate for the lack of an ECAN on the other agent

Rule 4 — The second Spectrum ECAN of a back-to-back pair is allocated in network mode if there is neither a Spectrum ECAN nor a far-end ECAN on the access side of the echo source.

Rule 5 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated or when an external ECAN is present at the distant end of the originating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to "Y." Similarly, the Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated or when an external ECAN is present at the distant end of the terminating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to "Y."

Note: A dash (—) in any table cell indicates ECAN is provisioned, but not activated. A void in any table cell indicates ECAN is not provisioned.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-3
Spectrum access to Spectrum access echo canceller call control

Case #	Originator (Spectrum access)				Terminator (Spectrum access)			
	SPM ECIDX	**BK2 BK**	**FAREC**	**Spectrum ECAN status**	**SPM ECIDX**	**BK2 BK**	**FAREC**	**Spectrum ECAN status**
1	N	Y or N	Y or N		N	Y or N	Y or N	
2	Y	N	N	Notes 1, 3	N	Y or N	Y or N	
3	Y	Y	N	Note 5	N	Y or N	Y or N	
4	Y	N	Y (Note 1)	Notes 2, 4	N	Y or N	Y or N	
5	N	Y or N	Y or N		Y	N	N	Notes 2, 3
6	Y	N	N	Notes 1, 3	Y	N	N	Notes 2, 3
7	Y	Y	N	Notes 1, 3	Y	N	N	Notes 2, 3
8	Y	N	Y (Note 1)	—	Y	N	N	Notes 2, 3
9	N	Y or N	Y or N		Y	Y	N	Note 6
10	Y	N	N	Notes 1, 3	Y	Y	N	Notes 2, 3

Note 1: Cancels forward echo.

Note 2: Cancels backward echo.

Note 3: Allocated in access mode.

Note 4: Allocated in network mode.

Note 5: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in access mode. The other cancels backward echo and is allocated in network mode.

Note 6: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode. The other cancels backward echo and is allocated in access mode.

—continued—

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-3
Spectrum access to Spectrum access echo canceller call control (continued)

Case #	Originator (Spectrum access)				Terminator (Spectrum access)			
	SPM ECIDX	**BK2 BK**	**FAREC**	**Spectrum ECAN status**	**SPM ECIDX**	**BK2 BK**	**FAREC**	**Spectrum ECAN status**
11	Y	Y	N	Notes 1, 3	Y	Y	N	Notes 2, 3
12	Y	N	Y (Note 1)	—	Y	Y	N	Notes 2, 3
13	N	Y or N	Y or N		Y	N	Y (Note 2)	Notes 1, 4
14	Y	N	N	Notes 1, 3	Y	N	Y (Note 2)	—
15	Y	Y	N	Notes 1, 3	Y	N	Y (Note 2)	—
16	Y	N	Y (Note 1)	—	Y	N	Y (Note 2)	—

Note 1: Cancels forward echo.

Note 2: Cancels backward echo.

Note 3: Allocated in access mode.

Note 4: Allocated in network mode.

Note 5: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in access mode. The other cancels backward echo and is allocated in network mode.

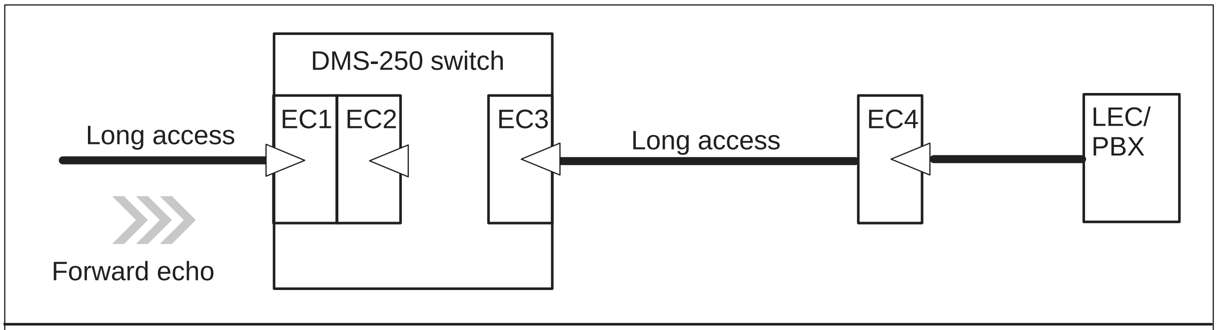
Note 6: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode. The other cancels backward echo and is allocated in access mode.

—end—

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-26 shows the configuration of case 15 from Table 2-3. EC1 is allocated to cancel the echo in the forward direction, whereas the far-end EC4 cancels echo in the backward direction. This example demonstrates the application of Rules 1 and 2.

Figure 2-26
Echo cancellation scenario (Case 15 and Rules 1 and 2, Table 2-2)



Legend:
EC1 = ECAN cancels forward echo.
EC4 = ECAN cancels backward echo.

AD9959 Spectrum Echo Canceller Call Control (continued)

Spectrum access to Spectrum IMT

Spectrum ECAN is allocated according to the following rules. These rules are illustrated in the Table 2-4.

Rule 1 — A Spectrum ECAN provisioned on the access originator is always allocated in access mode unless an external ECAN is provisioned at the distant end of the trunk.

Rule 2 — A Spectrum ECAN provisioned on the access originator is allocated in network mode if the following statements are true:

- The access originator is provisioned with a back-to-back pair or is provisioned with a Spectrum ECAN with the FAREC field set to “Y” indicating the presence of an external ECAN at the distant end of the trunk.
- The IMT terminator is not provisioned with a back-to-back Spectrum ECAN pair.
- The Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 3 — A Spectrum ECAN is allocated on the IMT terminator in network mode if the access originator is not provisioned with a Spectrum ECAN.

Rule 4 — A Spectrum ECAN is allocated on the IMT terminator in access mode if the following statements are true:

- The IMT terminator is provisioned with a back-to-back pair.
- The Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 5 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated, or when an external ECAN is present at the distant end of the originating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to “Y.” The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set if a Spectrum ECAN cancelling backward echo is allocated, or if the terminating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Note: A dash (—) in any table cell indicates ECAN is provisioned, but not activated. A void in any table cell indicates ECAN is not provisioned.

Table 2-4
Spectrum access to Spectrum IMT echo canceller call control

Case #	Originator (Spectrum access)				Terminator (Spectrum IMT)			
	SPM ECIDX	BK2 BK	FAREC	Spectrum ECAN status	SPM ECIDX	BK2 BK	FAREC (Note 1)	Spectrum ECAN status
1	N	Y or N	Y or N		N	Y or N	Y or N	
2	Y	N	N	Note 3	N	Y or N	Y or N	
3	Y	Y	N	Note 8	N	Y or N	Y or N	
4	Y	N	Y (Note 2)	Note 5	N	Y or N	Y or N	
5	N	Y or N	Y or N		Y	N	Y or N	Note 4
6	Y	N	N	Note 3	Y	N	Y or N	—
7	Y	Y	N	Note 8	Y	N	Y or N	—

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels forward echo; allocated in access mode. Pseudo-access mode on IMT.

Note 4: Cancels forward echo; allocated in network mode.

Note 5: Cancels backward echo; allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

Note 6: Cancels backward echo; allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set. Pseudo-access mode on IMT.

Note 7: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode. The other cancels backward echo and is allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set. Pseudo-access mode on IMT.

Note 8: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in access mode. The other cancels backward echo and is allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-4
Spectrum access to Spectrum IMT echo canceller call control (continued)

Case #	Originator (Spectrum access)				Terminator (Spectrum IMT)			
	SPM ECIDX	BK2 BK	FAREC	Spectrum ECAN status	SPM ECIDX	BK2 BK	FAREC (Note 1)	Spectrum ECAN status
8	Y	N	Y (Note 2)	Note 5	Y	N	Y or N	—
9	N	Y or N	Y or N		Y	Y	Y or N	Note 7
10	Y	N	N	Note 3	Y	Y	Y or N	Note 6
11	Y	Y	N	Note 3	Y	Y	Y or N	Note 6
12	Y	N	Y (Note 2)	—	Y	Y	Y or N	Note 6

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels forward echo; allocated in access mode. Pseudo-access mode on IMT.

Note 4: Cancels forward echo; allocated in network mode.

Note 5: Cancels backward echo; allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

Note 6: Cancels backward echo; allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set. Pseudo-access mode on IMT.

Note 7: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode. The other cancels backward echo and is allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set. Pseudo-access mode on IMT.

Note 8: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in access mode. The other cancels backward echo and is allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

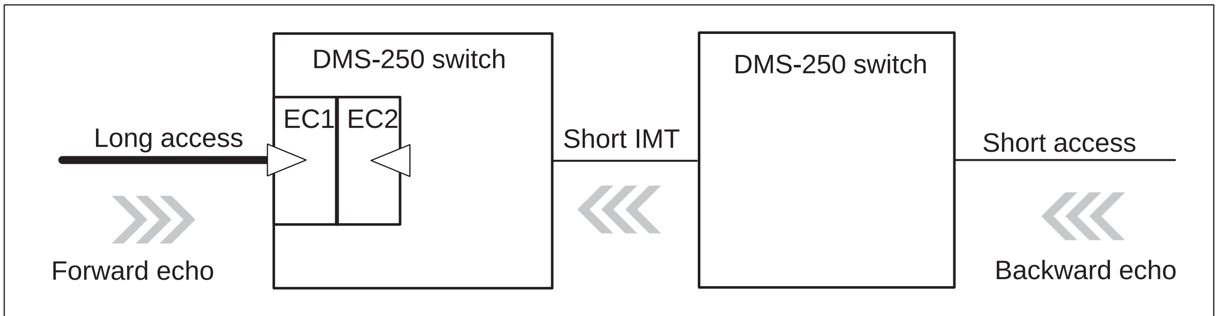
—end—

AD9959
Spectrum Echo Canceller Call Control (continued)

Cases 3 and 4 show that a Spectrum ECAN in network mode cancelling backward echo is turned on only if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set. This is required to eliminate redundant ECANs.

Figure 2-27 illustrates the configuration for case 3 from Table 2-4.

Figure 2-27
Echo cancellation scenario (Case 3, Table 2-3)



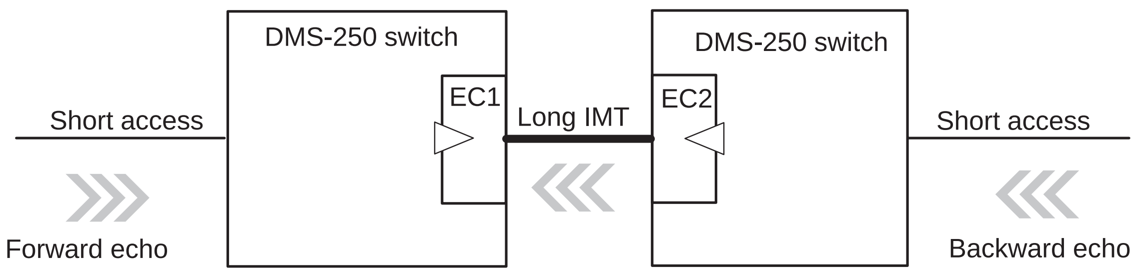
Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

Cases 5 and 6 are based on the assumption that the “Adjacent IMT ECAN” rule is enforced. (The rule is described in Rule 2 of “Provisioning rules and guidelines for IMT only installation and Rule 3 of “Provisioning rules and guidelines for access and IMT installation of ECANs.”) The “Adjacent IMT ECAN” rule also applies to cases 7 and 8. However, since an additional ECAN is available on the originator, the additional Spectrum ECAN is allocated if the Echo Control bit in the received ACM/ANM is not set. This provides a safeguard against errors, such as an ECAN not being provisioned at the other end of the terminating IMT trunk.

Figure 2-28 illustrates the configuration of case 5 from Table 2-3.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-28
Echo cancellation scenario (Case 5, Table 2-3)



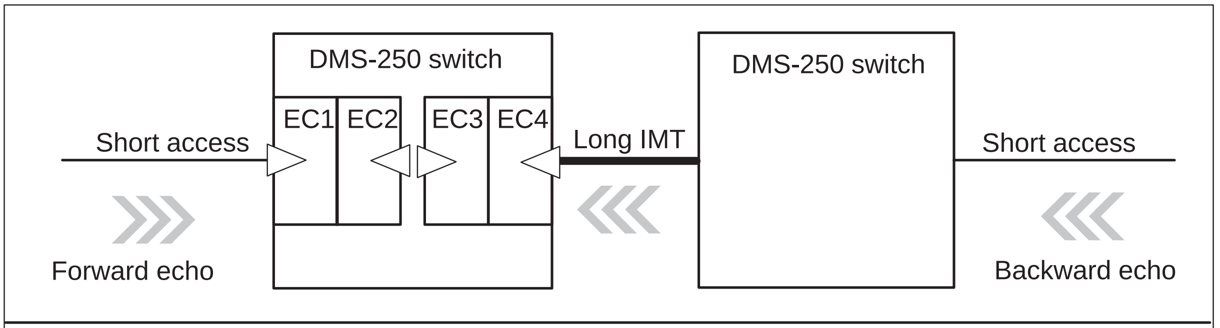
Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

In cases 9, 10, 11, and 12, the BK2BK datafill on the terminator causes the IMT trunk to be treated as an access trunk per the following provisioning rules: Rule 3 of “Provisioning rules and guidelines for IMT only installation” and Rule 4 of “Provisioning rules and guidelines for access and IMT installation of ECANs.” In order to eliminate possible redundancy, the ECANs cancelling backward echo are allocated only if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

The following illustration for case 11 explains how back-to-back Spectrum ECAN allocation on IMTs can be used to force pseudo-access behavior. This configuration is used when an ECAN is provisioned farther along the network (towards the terminator) is not under the jurisdiction of the provisioning party. If the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is set, then EC4 is not allocated. Redundant ECANs are possible in this configuration when farther along the network ECANs that cancel backward echo are allocated, but the Echo Control bit in the Backward Call Indicator of the ACM/ANM is not updated to indicate this. Redundant ECANs are also a possibility if ECANs are allocated downstream to cancel forward echo without regard to the Echo Control bit in the Nature of Connection Indicator of the IAM. The Echo Control bit is set by the Spectrum ECAN call control agorithm to indicate that a Spectrum ECAN cancelling forward echo has been allocated.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-29
Echo cancellation scenario (Case 11, Table 2-3)



Legend:
EC1 = ECAN cancels forward echo.
EC4 = Cancels backward echo, if allocated. EC4 is allocated only if Echo Control bit in Backward Call Indicator of ACM/ANM is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum IMT to Spectrum access

This is a mirror image of the Spectrum access to IMT scenario. As such, the roles of the Echo Control bit in the Nature of Connection of the IAM and the Backward Call Indicator of the ACM/ANM are reversed.

Spectrum ECAN is allocated according to the following rules. Table 2-5 illustrates these rules.

Rule 1 — Spectrum ECAN provisioned on the access terminator is always allocated in access mode unless an external ECAN is provisioned at the distant end of the trunk.

Rule 2 — A Spectrum ECAN on the access terminator is allocated in network mode if the following statements are true:

- The access terminator is provisioned with a back-to-back pair or is provisioned with a Spectrum ECAN when an external ECAN is present at the distant end of the trunk.
- The IMT originator is not provisioned with a back-to-back Spectrum ECAN pair.
- The Echo Control bit in the Nature of Connection Indicator of the received IAM is not set.

Rule 3 — A Spectrum ECAN is allocated on the IMT originator in network mode if the access terminator is not provisioned with Spectrum ECAN(s).

Rule 4 — A Spectrum ECAN is allocated on the IMT originator in access mode if the following statements are true:

- The IMT originator is provisioned with a back-to-back pair.
- The Echo Control bit in the Nature of Connection Indicator of the received IAM is not set.

Rule 5 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated or when an external ECAN is present at the distant end of the terminating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to “Y.” The Echo Control bit in the Nature of Connection Indicator field of the outgoing IAM is set if a Spectrum ECAN cancelling forward echo is allocated or if a single Spectrum ECAN is provisioned on the originating IMT trunk with the FAREC field set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Note 1: A dash (—) in any table cell indicates ECAN is provisioned, but not activated. A void in any table cell indicates ECAN is not provisioned.

Table 2-5
Spectrum IMT to Spectrum access echo canceller call control

Case #	Originator (Spectrum IMT)				Terminator (Spectrum access)			
	SPM ECIDX	BK2 BK	FAREC (Note 1)	Spectrum ECAN status	SPM ECIDX	BK2 BK	FAREC	Spectrum ECAN status
1	N	Y or N	Y or N		N	Y or N	Y or N	
2	Y	N	Y or N	Notes 3, 5	N	Y or N	Y or N	
3	Y	Y	Y or N	Notes 8, 10	N	Y or N	Y or N	
4	N	Y or N	Y or N		Y	N	N	Note 4
5	Y	N	Y or N	—	Y	N	N	Note 4

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo.

Note 4: Cancels backward echo; allocated in access mode.

Note 5: Allocated in network mode.

Note 6: Cancels forward echo; allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. Pseudo access mode on IMT.

Note 7: Allocated if the Echo Control bit in Nature of Connection Indicator of IAM is not set.

Note 8: Pseudo access mode on IMT.

Note 9: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in access mode.

Note 10: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in network mode.

—continued—

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-5
Spectrum IMT to Spectrum access echo canceller call control(continued)

Case #	Originator (Spectrum IMT)				Terminator (Spectrum access)			
	SPM ECIDX	**BK2 BK**	**FAREC (Note 1)**	**Spectrum ECAN status**	**SPM ECIDX**	**BK2 BK**	**FAREC**	**Spectrum ECAN status**
6	Y	Y	Y or N	Note 6	Y	N	N	Notes 4, 8
7	N	Y or N	Y or N	—	Y	Y	N	Note 9
8	Y	N	Y or N	—	Y	Y	N	Note 9
9	Y	Y	Y or N	Note 6	Y	Y	N	Notes 4, 8
10	N	Y or N	Y or N		Y	N	Y (Note 3)	Notes 2, 5, 7
11	Y	N	Y or N	—	Y	N	Y (Note 3)	Notes 2, 5, 7

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo.

Note 4: Cancels backward echo; allocated in access mode.

Note 5: Allocated in network mode.

Note 6: Cancels forward echo; allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. Pseudo access mode on IMT.

Note 7: Allocated if the Echo Control bit in Nature of Connection Indicator of IAM is not set.

Note 8: Pseudo access mode on IMT.

Note 9: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in access mode.

Note 10: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in network mode.

—continued—

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-5
Spectrum IMT to Spectrum access echo canceller call control(continued)

Case #	Originator (Spectrum IMT)				Terminator (Spectrum access)			
	SPM ECIDX	BK2 BK	FAREC (Note 1)	Spectrum ECAN status	SPM ECIDX	BK2 BK	FAREC	Spectrum ECAN status
12	Y	Y	Y or N	Note 6	Y	N	Y (Note 3)	—

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo.

Note 4: Cancels backward echo; allocated in access mode.

Note 5: Allocated in network mode.

Note 6: Cancels forward echo; allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. Pseudo access mode on IMT.

Note 7: Allocated if the Echo Control bit in Nature of Connection Indicator of IAM is not set.

Note 8: Pseudo access mode on IMT.

Note 9: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in access mode.

Note 10: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in network mode.

—end—

Cases 7 and 10 show that a Spectrum ECAN in network mode cancelling forward echo is turned on only if the Echo Control bit in the Nature of Connection Indicator of the received IAM is not set. This is done to eliminate possible redundant ECANs.

Cases 2 and 5 are based on the assumption that the “Adjacent IMT ECAN” rule is enforced. The “Adjacent IMT ECAN” rule also applies to cases 8 an 11. However, since an additional ECAN is available on the terminator, the additional Spectrum ECAN is allocated if the Echo Control bit in the

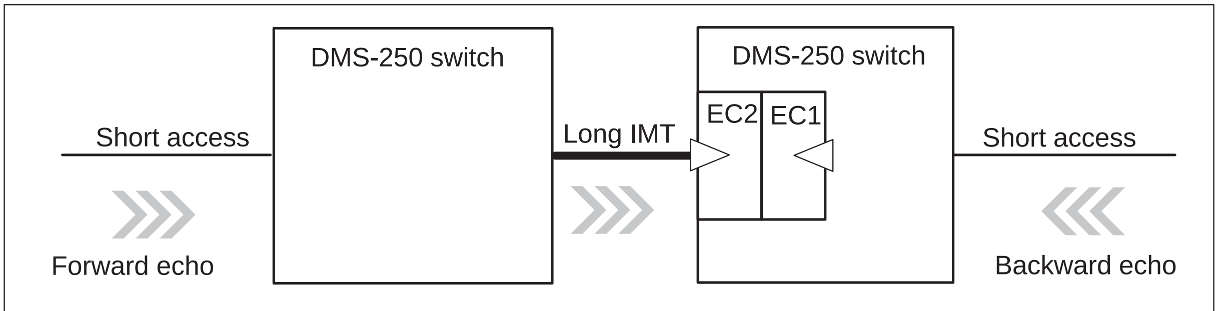
AD9959
Spectrum Echo Canceller Call Control (continued)

received IAM is not set. This provides a safeguard against errors, such as an ECAN not being provisioned at the other end of the originating IMT trunk.

For cases 3, 6, 9, and 12, the BK2BK datafill on the terminator causes the IMT trunk to be treated as an access trunk according to the following provisioning rules: Rule 3 of “Provisioning rules and guidelines for IMT only installation” and Rule 4 of “Provisioning rules and guidelines for access and IMT installation of ECANs.” The ECANs cancelling forward echo are allocated only if the Echo Control bit in the Nature of Connection of the received IAM is not set in order to eliminate possible redundancy.

Case 3, as shown in Figure 2-30, shows how back-to-back Spectrum ECAN allocation on IMTs can be used to force pseudo-access behavior. Use this configuration when an ECAN provisioned upstream (towards the originator) is beyond the customer’s jurisdiction. If the Echo Control bit in the Nature of Connection Indicator field of the IAM is set, EC2 is not allocated. Redundant ECANs are possible in this configuration when ECANs that cancel the forward echo are allocated upstream, but the Echo Control bit in the Nature of Connection Indicator field of the IAM is not correspondingly updated. Redundant ECANs are also a possibility if ECANs are allocated upstream to cancel backward echo disregarding the Echo Control bit in the Backward Call Indicator of the ANM. The Echo Control bit is set by the Spectrum ECAN call control agorithm to indicate that a Spectrum ECAN cancelling backward echo has been allocated.

Figure 2-30
Echo cancellation scenario (Case 3, Table 2-4)



Legend:
EC1 = ECAN cancels backward echo.
EC2 = ECAN cancels forward echo. EC2 is allocated only if the Echo Control bit on the Nature of Connection of IAM is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum IMT to Spectrum IMT

A Spectrum ECAN is allocated according to the following rules. Table 2- illustrates these rules.

Rule 1 — If either the originator or the terminator are provisioned with a Spectrum ECAN, then that Spectrum ECAN is always allocated in network mode based on the indication received in the Echo Control bits. A Spectrum ECAN on the originator is allocated if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set. A Spectrum ECAN on the terminator is allocated if the Echo Control bit in the Nature of Connection Indicator of the received IAM is not set.

Rule 2 — When only one of the IMT trunks is provisioned with back-to-back Spectrum ECANs, both Spectrum ECANs are allocated as follows:

- One Spectrum ECAN of the back-to-back pair is allocated to cancel forward echo if the Echo Control bit in the Nature of Connection Indicator of the received IAM is not set.
- The other Spectrum ECAN of the back-to-back pair is allocated to cancel backward echo if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 3 — When both the IMT originator and the IMT terminator are provisioned with back-to-back Spectrum ECANs, then one Spectrum ECAN is allocated in access mode on either trunk as follows:

- A Spectrum ECAN on the IMT originator cancelling forward echo is allocated if the Echo Control bit in the Nature of Connection Indicator of the received IAM is not set.
- A Spectrum ECAN on the IMT terminator cancelling backward echo is allocated if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 4 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated or when the originating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.” Similarly, the Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated or when the terminating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Note 1: A dash (—) in any table cell indicates ECAN is provisioned, but not activated. A void in any table cell indicates ECAN is not provisioned.

Table 2-6
Spectrum IMT to Spectrum IMT echo canceller call control

Case #	Originator (Spectrum IMT)				Terminator (Spectrum IMT)			
	SPM ECIDX	BK2BK	FAREC (Note 1)	Spectrum ECAN status	SPM ECIDX	BK2BK	FAREC (Note 1)	Spectrum ECAN status
1	N	Y or N	Y or N		N	Y or N	Y or N	
2	Y	N	Y or N	Notes 3, 5, 7	N	Y or N	Y or N	
3	Y	Y	Y or N	Note 9	N	Y or N	Y or N	
4	N	Y or N	Y or N		Y	N	Y or N	Notes 2, 5, 6

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo.

Note 4: Allocated in access mode.

Note 5: Allocated in network mode.

Note 6: Allocated if the Echo Control bit in Nature of Connection Indicator of IAM is not set.

Note 7: Allocated if the Echo Control bit in the Backward Call Indicator is not set.

Note 8: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set.

Note 9: Equipped with back-to-back ECANs. One cancels cancels forward echo and is allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

—continued—

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-6
Spectrum IMT to Spectrum IMT echo canceller call control (continued)

Case #	Originator (Spectrum IMT)				Terminator (Spectrum IMT)			
	SPM ECIDX	**BK2BK**	**FAREC (Note 1)**	**Spectrum ECAN status**	**SPM ECIDX**	**BK2BK**	**FAREC (Note 1)**	**Spectrum ECAN status**
5	Y	N	Y or N	Notes 3, 5, 7	Y	N	Y or N	Notes 2, 5, 6
6	Y	Y	Y or N	Note 9	Y	N	Y or N	—
7	N	Y or N	Y or N		Y	Y	Y or N	Note 8
8	Y	N	Y or N	—	Y	Y	Y or N	Note 8
9	Y	Y	Y or N	Notes 2, 4, 6	Y	Y	Y or N	Notes 3, 4, 7

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo.

Note 4: Allocated in access mode.

Note 5: Allocated in network mode.

Note 6: Allocated if the Echo Control bit in Nature of Connection Indicator of IAM is not set.

Note 7: Allocated if the Echo Control bit in the Backward Call Indicator is not set.

Note 8: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set.

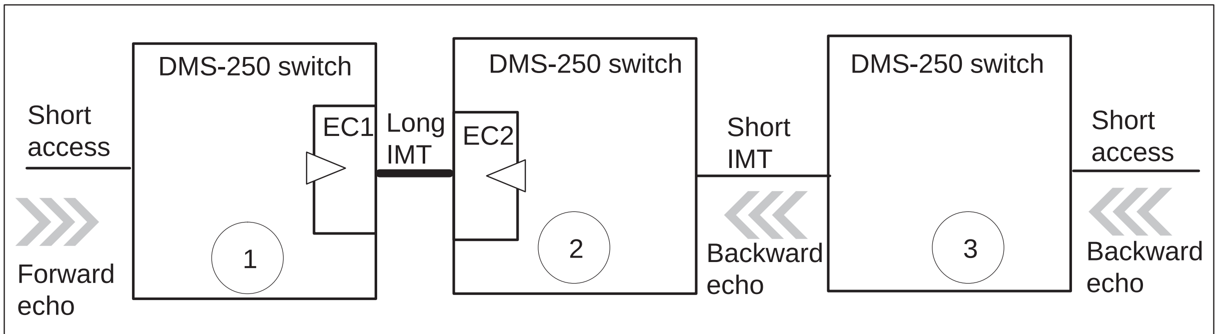
Note 9: Equipped with back-to-back ECANs. One cancels cancels forward echo and is allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

—end—

AD9959
Spectrum Echo Canceller Call Control (continued)

In case 2, a Spectrum ECAN provisioned on the originator is allocated in network mode if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set. This is illustrated in Figure 2-31. In the event that an ECAN (if provisioned) is activated on switch 3 cancelling backward echo and the Echo Control bit in the Backward Call Indicator of the ACM/ANM is set accordingly, then EC2 is not allocated.

Figure 2-31
Echo cancellation scenario (Case 2, Table 2-5)

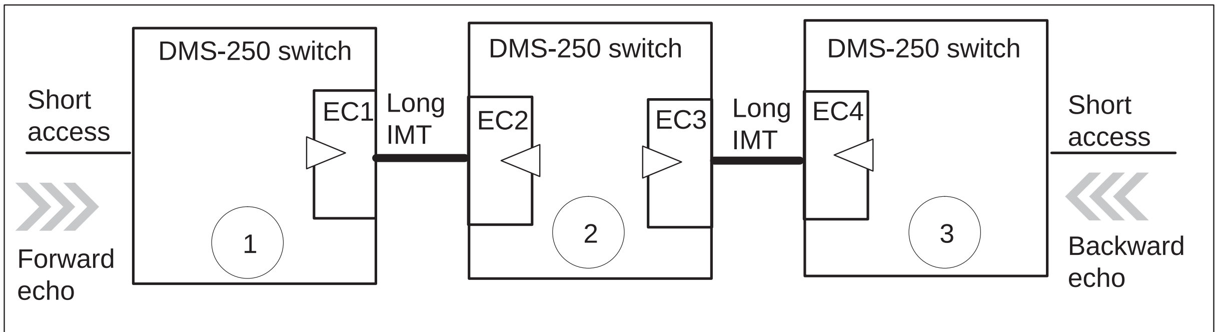


Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

In case 5, Spectrum ECANs are allocated on the originator and the terminator. Specifically, a Spectrum ECAN cancelling backward echo is allocated on the originator if the Echo Control bit in the Backward Call Indicator of the incoming ACM/ANM is not set, even though the provisioned Spectrum ECAN on the terminator (switch 2) implies the presence of a Spectrum ECAN at the distant end of the terminating IMT trunk cancelling backward echo (switch 3) as described by the “Adjacent IMT ECAN” rule. (The rule is described in Rule 2 of “Provisioning rules and guidelines for IMT only installation and Rule 3 of “Provisioning rules and guidelines for access and IMT installation of ECANs.”) This provides an additional measure of protection against errors during provisioning. Similarly, a Spectrum ECAN cancelling forward echo is allocated on the terminator if the Echo Control bit in the Nature of Connection Indicator of the IAM is not set. Case 5 is illustrated in Figure 2-32.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-32
Echo cancellation scenario (Case 5, Table 2-5)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Allocated only if the Echo Control bit in the Backward Call Indicator of ACM/ANM is not set.
EC3 = Allocated only if the Echo Control bit in the Nature of Connection Indicator field of IAM is not set.
EC4 = Cancels backward echo.

On switch 2, Spectrum ECANs are allocated only if the corresponding received Echo Control bits are not set. For example, if an ECAN provisioned on switch 3 is beyond the operating company’s control, then to guarantee adequate echo cancellation, the IMT terminator on switch 2 is provisioned with back-to-back Spectrum ECANs. This is the situation encountered in case 8 and is illustrated in Figure 2-.

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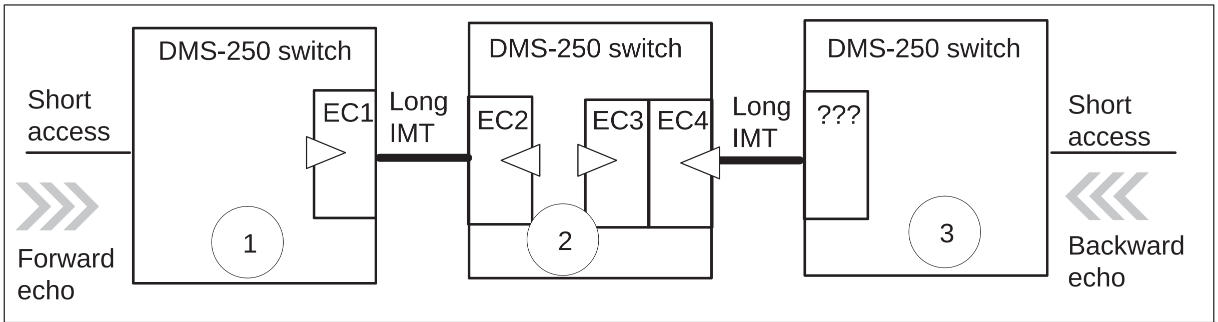
Spectrum Echo Canceller Call Control (continued)

Figure 2-33
Echo cancellation scenario (Case 8, Table 2-5)



Legend:
EC1 = ECAN cancels forward echo.
EC3 = Allocated only if Echo Control bit in the Nature of Connection Indicator field of IAM is not set.
EC4 = Cancels backward echo and is allocated only if the Echo Control bit in the Backward Call Indicator of ACM/ANM is not set.

Redundant ECANs are possible in this situation if ECANs are allocated downstream and the Echo Control bit in the Backward Call Indicator of the ACM/ANM is not set. This is a case of IMT trunks displaying pseudo-access behavior. Use such configurations sparingly in order to conserve Spectrum ECAN resources.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM origination with external ECAN to Spectrum termination

The following pages discuss Spectrum ECAN allocation for the four basic scenarios, as follows, when the XPM originator is equipped with an external ECAN. An external ECAN on the XPM is always assumed to be activated and oriented in access mode.

- XPM access with external ECAN to Spectrum access
- XPM access with external ECAN to Spectrum IMT
- XPM IMT with external ECAN to Spectrum access
- XPM IMT with external ECAN to Spectrum IMT

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM access with external ECAN to Spectrum access

Spectrum ECAN is allocated according to the following rules. Table 2-7 illustrates these rules.

Rule 1 — When a Spectrum ECAN is provisioned on the access termination, it is allocated in access mode only if an external ECAN is not provisioned at the distant end of the trunk.

Rule 2 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated or when an external ECAN is present at the distant end of the terminating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to “Y.”

Rule 3 — The Echo Control bit in the Nature of Connection Indicator field of the outgoing IAM is set to reflect the status of the provisioned external ECAN on the XPM originator.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-7
Spectrum ECAN allocation (XPM access to Spectrum access)

Case #	Originator (XPM access)	Terminator (Spectrum access)			
	ECSTAT = EXTERNAL	**SPM ECIDX**	**BK2BK**	**FAREC**	**Spectrum ECAN status**
1	Y (Note 1)	N	Y or N	Y or N	Not provisioned
2	Y (Note 1)	Y	N	N	Notes 2, 3
3	Y (Note 1)	Y	Y	N	Notes 2, 3
4	Y (Note 1)	Y	N	Y (Note 2)	Provisioned, but not activated

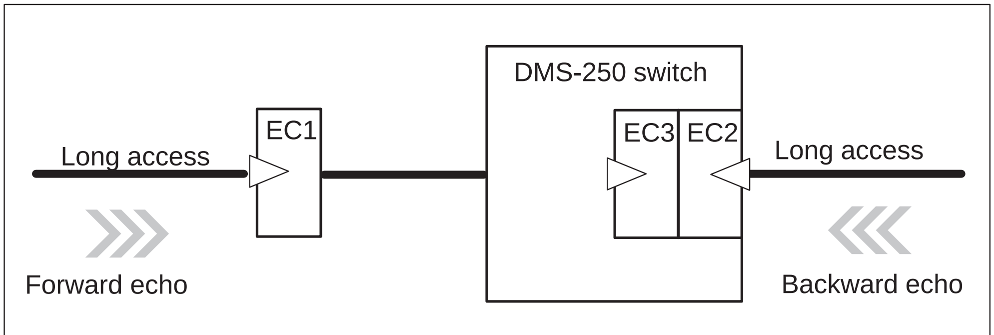
Note 1: Cancels forward echo; ECSTAT = EXTERNAL must be on and provisioned in access mode.

Note 2: Cancels backward echo.

Note 3: Allocated in access mode.

Figure 2-34 illustrates case 3.

Figure 2-34
Echo cancellation scenario (Case 3, Table 2-6)



Legend:
EC1 = External ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM access with external ECAN to Spectrum IMT

Spectrum ECAN is allocated according to the following rules. Table 2-8 illustrates these rules.

Rule 1 — When a Spectrum ECAN is provisioned on the IMT terminator, it is allocated in access mode only if the following statements are true:

- The IMT terminator is provisioned with a back-to-back Spectrum ECAN pair.
- The Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 2 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated or when the terminating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

Rule 3 — The Echo Control bit in the Nature of Connection Indicator field of the outgoing IAM is set to reflect the status of the provisioned external ECAN on the XPM originator.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-8
Spectrum ECAN allocation (XPM access to Spectrum IMT)

Case #	Originator (XPM access)	Terminator (Spectrum IMT)			
	ECSTAT = EXTERNAL	SPM ECIDX	BK2BK	FAREC (Note 1)	Spectrum ECAN status
1	Y (Note 2)	N	Y or N	Y or N	Not provisioned
2	Y (Note 2)	Y	N	Y or N	Provisioned, but not activated
3	Y (Note 2)	Y	Y	Y or N	Note 3

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo; ECSTAT = EXTERNAL must be on and provisioned in access mode.

Note 3: Cancels backward echo; allocated in pseudo-access mode if the Echo Control bit in the Backward Call Indicator is not set.

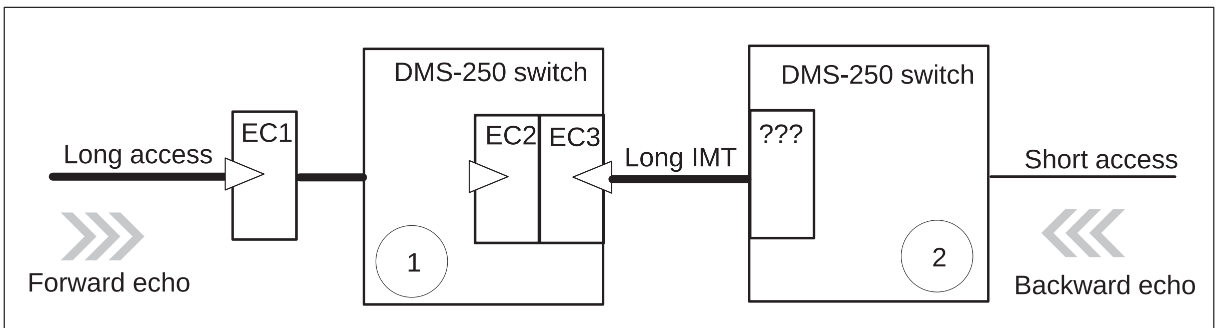
AD9959
Spectrum Echo Canceller Call Control (continued)

No Spectrum ECANs are allocated in case 2 because an ECAN cancelling forward echo is assumed activated on the XPM, and the “Adjacent IMT ECAN” rule implies the presence of an ECAN cancelling backward echo at the other end of the IMT trunk.

Provisioning a back-to-back Spectrum ECAN pair on an IMT overrides the “Adjacent IMT ECAN” rule. Therefore, a Spectrum ECAN is allocated in case 3 depending on the Echo Control bit in the Backward Call Indicator of the received ACM/ANM. Use this configuration sparingly. There is a possibility of redundant ECANs if the Echo Control bit in the Backward Call Indicator does not correctly reflect the ECAN activation status downstream.

Figure 2-35 illustrates case 3.

Figure 2-35
Echo cancellation scenario (Case 3, Table 2-7)



Legend:
EC1 = External ECAN cancels forward echo.
EC3 = ECAN cancels backward echo; allocated only if the Echo Control bit in the Backward Call Indicator of ACM/ANM is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM IMT with external ECAN to Spectrum access

Spectrum ECAN is allocated according to the following rules. Table 2-9 illustrates these rules.

Rule 1 — A Spectrum ECAN on the access terminator is allocated in network mode if the following statements are true:

- The terminator is provisioned with back-to-back Spectrum ECANs or is provisioned with a Spectrum ECAN when an external ECAN is present at the distant end of the trunk.
- The Echo Control bit in the Nature of Connection Indicator field of the received IAM is not set.

Rule 2 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated.

Rule 3 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status if the provisioned external ECAN on the XPM originator. This bit is also set if the terminating Spectrum trunk is provisioned with a Spectrum ECAN with an external ECAN at the distant end (FAREC is set to “Y”).

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-9
Spectrum ECAN allocation (XPM IMT to Spectrum access)

Case #	Originator (XPM IMT)	Terminator (Spectrum access)			
	ECSTAT = EXTERNAL	**SPM ECIDX**	**BK2BK**	**FAREC**	**Spectrum ECAN status**
1	Y (Note 1)	N	Y or N	Y or N	Not provisioned
2	Y (Note 1)	Y	N	N	Provisioned, but not activated
3	Y (Note 1)	Y	Y	N	Note 2
4	Y (Note 1)	Y	N	Y (Note 1)	Note 2

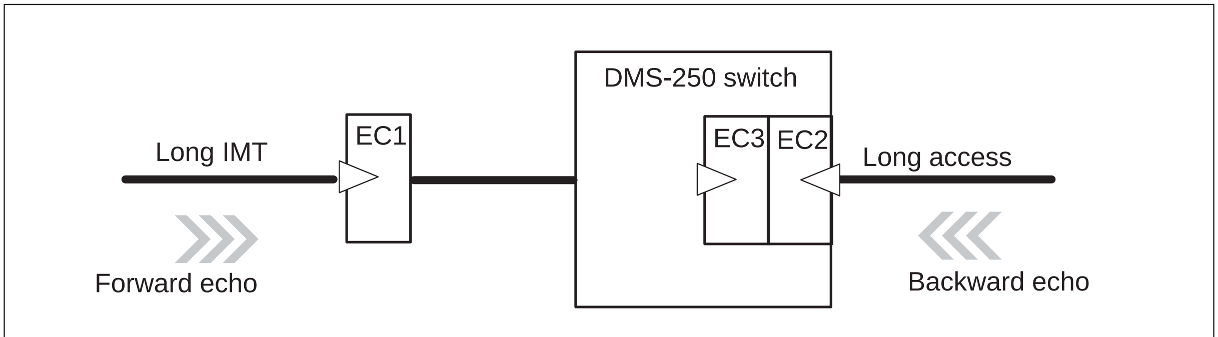
Note 1: Cancels backward echo; ECSTAT = EXTERNAL must be on and provisioned in network mode.

Note 2: Cancels forward echo; allocated in network mode if the Echo Control bit in the Nature of Connection Indicator of IAM is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-36 illustrates case 3.

Figure 2-36
Echo cancellation scenario (Case 3, Table 2-8)



Legend:
EC1 = External ECAN cancels backward echo.
EC2 = ECAN cancels forward echo.
EC3 = Allocated only if the Echo Control bit in the Nature of Connection Indicator field of IAM is not set.

Provisioning as shown in case 4 results in redundant ECANs and wastes the the external ECAN.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM IMT with external ECAN to Spectrum IMT

Spectrum ECAN is allocated according to the following rules. Table 2-10 illustrates these rules.

Rule 1 — A Spectrum ECAN on the IMT terminator is allocated in network mode if the Echo Control bit in the Nature of Connection Indicator field of the received IAM is not set.

Rule 2 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated.

Rule 3 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status of the provisioned external ECAN on the XPM originator. This bit is also set when the terminating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-10
Spectrum ECAN allocation (XPM IMT to Spectrum IMT)

Case #	Originator (XPM IMT)	Terminator (Spectrum IMT)			
	ECSTAT = EXTERNAL	SPM ECIDX	BK2BK	FAREC (Note 1)	Spectrum ECAN status
1	Y (Note 3)	N	Y or N	Y or N	Not provisioned
2	Y (Note 3)	Y	N	Y or N	Note 2
3	Y (Note 3)	Y	Y	Y or N	Notes 2, 4

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo; allocated in network mode if the Echo Control bit in the Nature of Connection Indicator of IAM is not set.

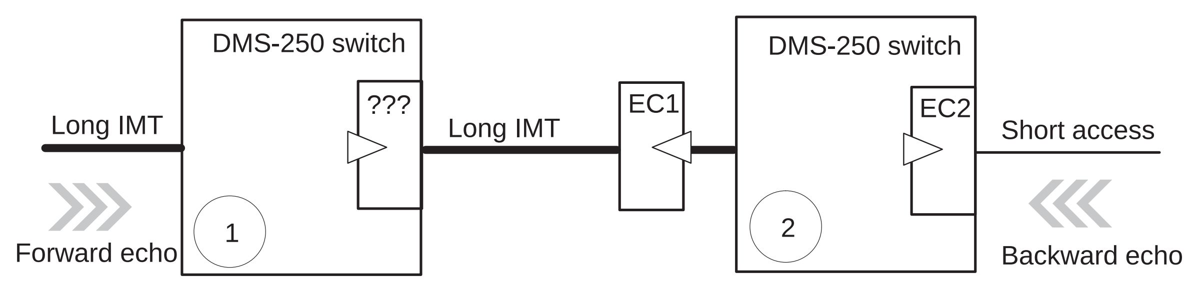
Note 3: Cancels backward echo; ECSTAT = EXTERNAL must be on and provisioned in access mode.

Note 4: Pseudo-access mode.

Although the “Adjacent IMT ECAN” rule applies to case 2, a Spectrum ECAN cancelling forward echo is allocated in order to provide an additional measure of protection against human error during provisioning. Figure 2-37 illustrates this scenario.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-37
Echo cancellation scenario (Case 2, Table 2-9)



Legend:
EC1 = External ECAN cancels forward echo.
EC2 = ECAN cancels backward echo. Allocated only if the Nature of Connection field of IAM is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM origination with internal ECAN to a Spectrum termination

Unlike Spectrum ECANs, internal XPM ECAN resources are not allocated from a pool. An internal ECAN is dedicated to the trunk agency. If the internal ECAN is not activated, it can not be used by another trunk agency. Thus, the Spectrum ECAN call control agorithm adopts the following strategy. The Spectrum ECAN call control agorithm lets the XPM ECAN algorithm go first in the decision making process. Then, the Spectrum ECAN call control agorithm allocates Spectrum ECANs in a manner that guarantees optimal Spectrum ECAN allocation.

The four basic scenarios for calls that have an XPM origination equipped with internal ECANs are as follows:

- XPM access with internal ECAN to Spectrum access
- XPM access with internal ECAN to Spectrum IMT
- XPM IMT with internal ECAN to Spectrum access
- XPM IMT with internal ECAN to Spectrum IMT

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM access with internal ECAN to Spectrum access

Spectrum ECAN is allocated according to the following rules. Table 2-11 illustrates these rules.

Rule 1 — If a Spectrum ECAN is provisioned, it is allocated on an access terminator in access mode only when an external ECAN is not present at the distant end of the trunk.

Rule 2 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated or when an external ECAN is present at the distant end of the terminating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to "Y."

Rule 3 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set to reflect the status of the internal XPM ECAN on the originator.

Table 2-11
Spectrum ECAN allocation (XPM origination with internal ECAN to Spectrum access termination)

Case #	Originator (XPM access)	Terminator (Spectrum access)			
	ECSTAT = EXTERNAL/ INNOTONE	SPM ECIDX	BK2BK	FAREC	Spectrum ECAN status
1	Y (Note 1)	N	Y or N	Y or N	Not provisioned
2	Y (Note 1)	Y	N	N	Note 3
3	Y (Note 1)	Y	Y	N	Note 3
4	Y (Note 1)	Y	N	Y (Note 2)	Provisioned, but not activated

Note 1: Cancels forward echo.

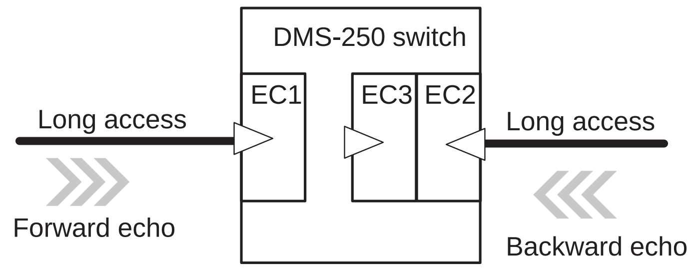
Note 2: Cancels backward echo.

Note 3: Cancels backward echo; allocated in access mode.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-38 illustrates case 3.

Figure 2-38
Echo cancellation scenario (Case 3, Table 2-10)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM access with internal ECAN to Spectrum IMT

Spectrum ECAN is allocated according to the following rules. Table 2-12 illustrates these rules.

Rule 1 — When a Spectrum ECAN is provisioned on the IMT terminator, it is allocated in access mode only if the following statements are true:

- — The IMT terminator is provisioned with a back-to-back Spectrum ECAN pair.
- — The Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 2 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when the Spectrum ECAN cancelling backward echo is allocated, or when the terminating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

Rule 3 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set to reflect the status of the internal XPM ECAN on the originator.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-12
Spectrum ECAN allocation (XPM access with internal ECAN to Spectrum IMT)

Case #	Originator (XPM access) (Note 1)	Terminator (Spectrum IMT)			
	ECSTAT = EXTERNAL/ INNOTONE	SPM ECIDX	BK2BK	FAREC	Spectrum ECAN status
1	Y (Note 2)	N	Y or N	Y or N	Not provisioned
2	Y (Note 2)	Y	N	Y or N	Provisioned, but not activated
3	Y (Note 2)	Y	Y	Y or N	Note 3

Note 1: The XPM ECAN algorithm activates the internal ECAN on the access originator.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo; allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set.

Use case 3 when the downstream provisioning of ECANs is not under the provisioning party’s control. However, there is a possibility of redundant ECANs if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not correctly set.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM IMT with internal ECAN to Spectrum access

Spectrum ECAN is allocated according to the following rules. Table 2-13 illustrates these rules.

Rule 1 — A Spectrum ECAN on the access terminator is allocated in network mode if the following statements are true:

- The terminator is provisioned with back-to-back Spectrum ECANs or is provisioned with a Spectrum ECAN when an external ECAN is present at the distant end of the trunk.
- The Echo Control bit in the Nature of Connection Indicator field of the received IAM is not set.

Rule 2 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when Spectrum ECAN cancelling forward echo is allocated.

Rule 3 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status of the internal XPM ECAN on the originator. This bit is also set when the terminating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-13
Spectrum ECAN allocation (XPM IMT with internal ECAN to Spectrum access)

Case #	Originator (XPM IMT) (Note 1)	Terminator (Spectrum access)			
	ECSTAT = EXTERNAL/ INNOTONE	SPM ECIDX	BK2BK	FAREC	Spectrum ECAN status
1	Y (Note 2)	N	Y or N	Y or N	Not provisioned
2	Y (Note 2)	Y	N	N	Provisioned, but not activated
3	Y (Note 2)	Y	Y	N	Note 3
4	Y (Note 2)	Y	N	Y (Note 2)	Note 3

Note 1: The ECAN on the originator is activated by the existing XPM ECAN algorithm.

Note 2: Cancels backward echo.

Note 3: Cancels forward echo; allocated in network mode if the Echo Control bit in the Nature of Connection Indicator of IAM is not set.

Provisioning as shown in case 4 results in redundant ECANs and wastes the internal ECAN.

AD9959
Spectrum Echo Canceller Call Control (continued)

XPM IMT with internal ECAN to Spectrum IMT

Spectrum ECAN is allocated according to the following rules. Table 2-14 illustrates these rules.

Rule 1 — Spectrum ECANs on the IMT terminator are allocated in network mode if the Echo Control bit in the Nature of Connection Indicator field of the received IAM is not set.

Rule 2 — A Spectrum ECAN is allocated in access mode if the following statements are true:

- The terminator is provisioned with a back-to-back Spectrum ECAN pair.
- The OFCVAR office parameter “IMT_TANDEM_EC_ENABLE” is set to “N.”
- The Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 3 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated.

Rule 4 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status of the internal XPM ECAN on the originator. This bit is also set when a Spectrum ECAN cancelling backward echo is allocated or when the terminating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-14
Spectrum ECAN allocation (XPM IMT with internal ECAN to Spectrum IMT)

Case #	Originator (XPM IMT)		Terminator (Spectrum IMT)			
	ECSTAT = EXTERNAL/ INNOTONE	**IMT_TANDEM_ EC_ENABLE**	**SPM ECIDX**	**BK2BK**	**FAREC (Note 1)**	**Spectrum ECAN status**
1	Y	N	N	N	Y or N	Not provisioned
2	Y (Note 2)	Y	Y	N	Y or N	Not provisioned
3	Y	N	N	Y	Y or N	Note 3
4	Y (Note 2)	Y	Y	Y	Y or N	Note 3
5	Y	N	N	Y	Y or Y	Note 4
6	Y (Note 2)	Y	Y	Y	Y or Y	Note 3

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels backward echo.

Note 3: Cancels forward echo and is allocated in network mode if the Echo Control bit in the Nature of Connection Indicator of IAM is not set.

Note 4: Equipped with back-to-back ECANs. One cancels forward echo and is allocated in network mode if the Echo Control bit in the Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in access mode if the Echo Control bit in the Backward Call Indicator is not set.

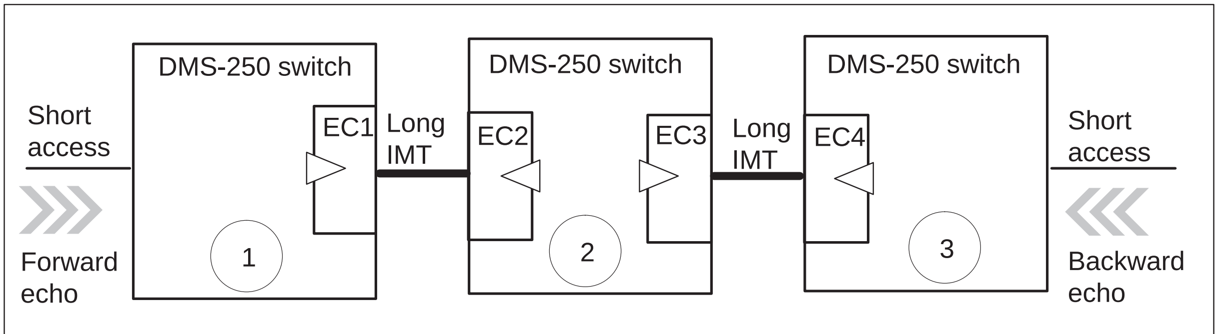
In cases 3 and 4, Spectrum ECANs are allocated despite the indication of the presence of an ECAN at the other end of the originating IMT trunk by the “Adjacent IMT ECAN” rule. This is done in order to provide protection against human error during provisioning.

Note: The ECAN on the originator is activated by the existing XPM ECAN algorithm. The XPM ECAN algorithm activates an internal ECAN on an IMT trunk (if provisioned) only when the value of the OFCVAR “IMT_TANDEM_EC_ENABLE” is set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-39 illustrates case 3. The switch in concern is switch 2. Internal XPM ECAN EC2 is not activated by the XPM ECAN algorithm because the OFCVAR “IMT_TANDEM_EC_ENABLE” is set to “Y.” According to the “Adjacent IMT ECAN” rule, it is assumed that ECAN EC1 is provisioned to cancel the forward echo. Spectrum ECAN EC3 is, however, allocated in network mode (only if the Echo Control bit in the Nature of Connection Indicator of the incoming IAM is not set) to protect against human error during provisioning, which is also illustrated in case 4.

Figure 2-39
Echo cancellation scenario (Case 3, Table 2-13)

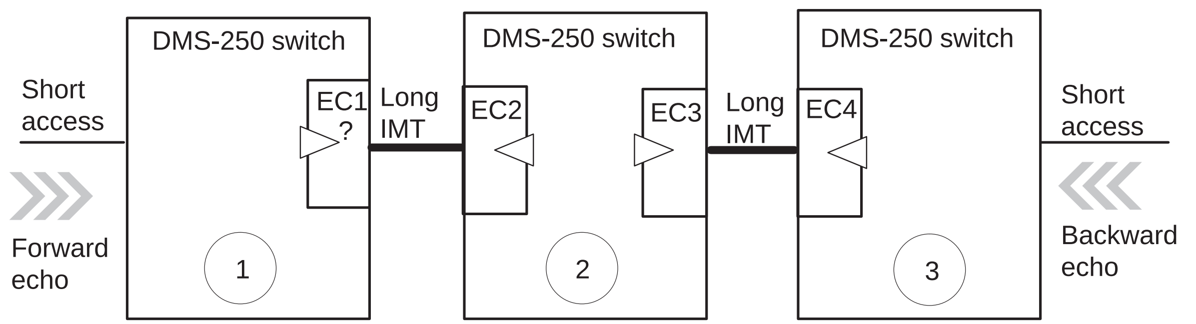


Legend:
EC1 = ECAN cancels forward echo.
EC2 = Internal XPM ECAN is not activated.
EC3 = Spectrum ECAN is allocated only if the Echo Control bit in the Nature of Connection Indicator field of IAM is not set.
EC4 = ECAN cancels backward echo.

Notice that in case 4, as shown in Figure 2-40, EC2 is activated by the XPM ECAN algorithm because the OFCVAR office parameter “IMT_TANDEM_EC_ENABLE” is set to “Y.” EC1 is absent due to a provisioning error. EC3 is allocated to cancel echo in the forward direction and ensures adequate echo cancellation despite the provisioning error. Since EC4 is assumed to be activated, there are redundant ECANs cancelling backward echo. EC2 is an internal XPM ECAN and is beyond the control of the Spectrum ECAN call control agorithm.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-40
Echo cancellation scenario (Case 4, Table 2-13)



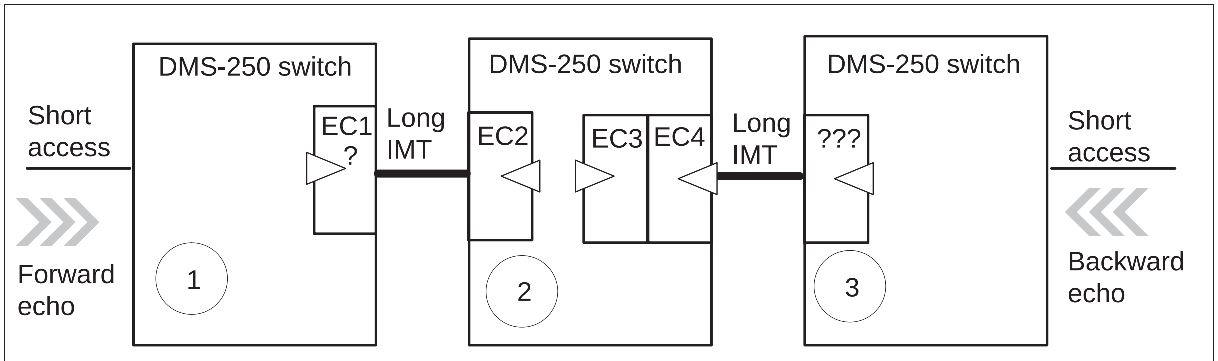
Legend:
EC1 = ECAN cancels forward echo.
EC3 = Allocated only if the Echo Control bit in the Nature of Connection field of IAM is not set.
EC4 = ECAN cancels backward echo.

Provisioning as shown in case 4 results in redundant ECANs and wastes the internal ECAN.

AD9959
Spectrum Echo Canceller Call Control (continued)

Case 5, as shown in Figure 2-41, covers another situation when the "Adjacent IMT ECAN" rule cannot be followed. Switch 2 is the switch under consideration for this case. This time, EC4 is allocated (if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set) since the XPM ECAN algorithm did not enable EC2.

Figure 2-41
Echo cancellation scenario (Case 5, Table 2-13)



Legend:
EC3 = ECAN cancels forward echo. Allocated only if the echo control bit in the Backward Call Indicator field of IAM is not set.
EC4 = ECAN cancels backward echo. Allocated only if Echo Control bit in the Backward Call Indicator of ACM/ANM is not set.

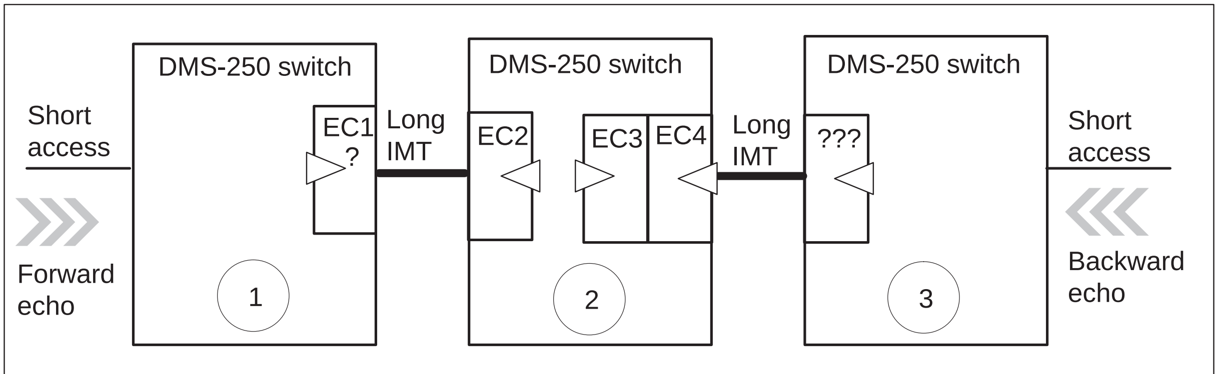
If the Echo Control bit in the Nature of Connection Indicator of the IAM is not set because EC1 is activated, ECAN EC3 is redundant.

In situations where provisioning EC1 is beyond the control of the provisioning party, a back-to-back Spectrum ECAN pair on the terminator (as indicated in case 6) may be used to guarantee adequate ECAN coverage.

AD9959
Spectrum Echo Canceller Call Control (continued)

As shown in Figure 2-42, case 6 serves to demonstrate how the back-to-back pair on the terminator ensures echo cancellation in either direction when provisioning ECANs on the switches at the distant end of the trunks is beyond the control of the provisioning party.

Figure 2-42
Echo cancellation scenario (Case 6, Table 2-13)



Legend:
EC2 = ECAN cancels backward echo.
EC3 = ECAN cancels forward echo. Allocated only if Echo Control bit in the Nature of Connection Indicator field of IAM is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum origination to an XPM termination with external ECAN

This is essentially a mirror image of the combination discussed in "XPM origination with external ECAN to a Spectrum termination."

The following pages discuss the four basic scenarios of when the Spectrum originator is equipped with an external ECAN.

- Spectrum access to XPM access with external ECAN
- Spectrum access to XPM IMT with external ECAN
- Spectrum IMT to XPM access with external ECAN
- Spectrum IMT to XPM IMT with external ECAN

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum access to XPM access with external ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-15 illustrates these rules.

Rule 1 — A Spectrum ECAN when provisioned on the access originator is allocated in access mode only if a far-end ECAN is not present at the distant end of the trunk.

Rule 2 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated or when an external ECAN is present at the distant end of the originating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to “Y.”

Rule 3 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status of the external ECAN on the terminator.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-15
Spectrum ECAN allocation (Spectrum access to XPM access with external ECAN)

Case #	Originator (Spectrum access)				Terminator (XPM access)
	SPM ECIDX	**BK2BK**	**FAREC**	**Spectrum ECAN status**	**ECSTAT = EXTERNAL**
1	N	Y or N	Y or N	Not provisioned	Y (Note 2)
2	Y	N	N	Note 1	Y (Note 2)
3	Y	Y	N	Note 1	Y (Note 2)
4	Y	N	Y (Note 3)	Provisioned, but not activated	Y (Note 2)

Note 1: Cancels forward echo; allocated in access mode.

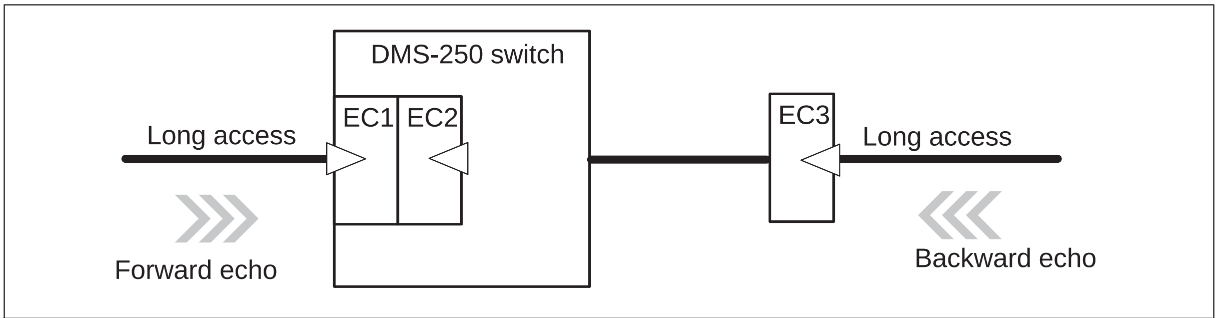
Note 2: Cancels backward echo; ECSTAT = EXTERNAL must be on and provisioned in access mode.

Note 3: Cancels forward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-43 illustrates case 3.

Figure 2-43
Echo cancellation scenario (Case 3, Table 2-14)



Legend:
EC1 = ECAN cancels forward echo.
EC3 = External ECAN cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum access to XPM IMT with external ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-16 illustrates these rules.

Rule 1 — A Spectrum ECAN on the access originator is allocated in network mode if the following statements are true:

- The originator is provisioned with back-to-back Spectrum ECANs, or is provisioned with a Spectrum ECAN when an external ECAN is present at the distant end of the trunk.
- The Echo Control bit in the Backward Call Indicator field of the received ACM/ANM is not set.

Rule 2 — The Echo Control bit in the Backward Call Indicator field of the outgoing ACM/ANM is set when the Spectrum ECAN cancelling backward echo is allocated.

Rule 3 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set to reflect the status of the external XPM ECAN on the terminator. This bit is also set an external ECAN is present at the distant end of the originating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-16
Spectrum ECAN allocation (Spectrum access to XPM IMT with external ECAN)

Case #	Originator (Spectrum access)				Terminator (XPM IMT)
	SPM ECIDX	**BK2BK**	**FAREC**	**Spectrum ECAN status**	**ECSTAT = EXTERNAL**
1	N	Y or N	Y or N	Not provisioned	Y (Note 2)
2	Y	N	N	Provisioned, but not activated	Y (Note 2)
3	Y	Y	N	Note 1	Y (Note 2)
4	Y	N	Y (Note 3)	Note 1	Y (Note 2)

Note 1: Cancels backward echo; allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

Note 2: Cancels forward echo; ECSTAT = EXTERNAL must be on and provisioned in network mode.

Note 3: Cancels forward echo.

Provisioning as shown in case 4 results in redundant ECANs and wastes the external ECAN.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum IMT to XPM access with external ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-17 illustrates these rules.

Rule 1 — A Spectrum ECAN when provisioned on the IMT originator is allocated in access mode only if the following statements are true:

- The IMT originator is provisioned with a back-to-back Spectrum ECAN pair.
- The Echo Control bit in the Nature of Connection Indicator field of the received IAM is not set.

Rule 2 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when the Spectrum ECAN cancelling forward echo is allocated or when the originating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

Rule 3 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status of the external ECAN on the XPM terminator.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-17
Spectrum ECAN allocation (Spectrum IMT to XPM access with external ECAN)

Case #	Originator (Spectrum IMT)				Terminator (XPM access)
	SPM ECIDX	BK2BK	FAREC (Note 1)	Spectrum ECAN status	ECSTAT = EXTERNAL
1	N	Y or N	Y or N	Not provisioned	Y (Note 3)
2	Y	N	Y or N	Provisioned, but not activated	Y (Note 3)
3	Y	Y	Y or N	Note 2	Y (Note 3)

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

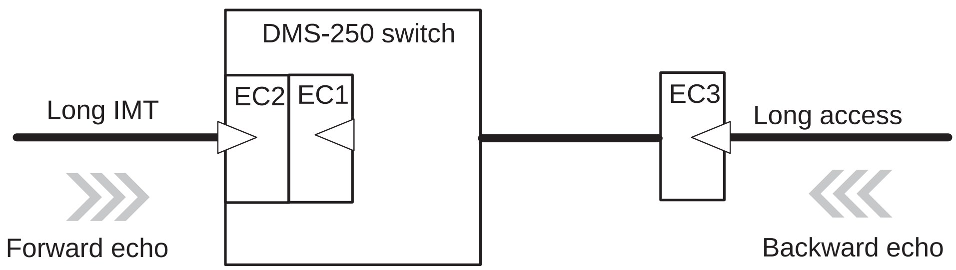
Note 2: Cancels forward echo; allocated in access mode if the Echo Control bit in the Nature of Connection Indicator is not set.

Note 3: Cancels backward echo; ECSTAT = EXTERNAL must be on and provisioned in access mode.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-44 illustrates case 3.

Figure 2-44
Echo cancellation scenario (Case 3, Table 2-16)



Legend:
EC2 = ECAN cancels forward echo. Allocated only if the Echo Control bit in the Nature of Connection Indicator field of IAM is not set.
EC3 = External ECAN cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum IMT to XPM IMT with external ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-18 illustrates these rules.

Rule 1 — A Spectrum ECAN on the IMT originator is allocated in network mode if the Echo Control bit in the Backward Call Indicator field of the received ACM/ANM is not set.

Rule 2 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated.

Rule 3 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set to reflect the status of the external XPM ECAN on the IMT terminator. This bit is also set when the originating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

Table 2-18
Spectrum ECAN allocation (Spectrum IMT to XPM IMT with external ECAN)

Case #	Originator (Spectrum IMT)				Terminator (XPM IMT)
	SPM ECIDX	**BK2BK**	**FAREC (Note 1)**	**Spectrum ECAN status**	**ECSTAT = EXTERNAL**
1	N	Y or N	Y or N	Not provisioned	Y (Note 2)
2	Y	N	Y or N	Note 3	Y (Note 2)
3	Y	Y	Y or N	Note 3	Y (Note 2)

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo; ECSTAT = EXTERNAL must be on and provisioned in network mode.

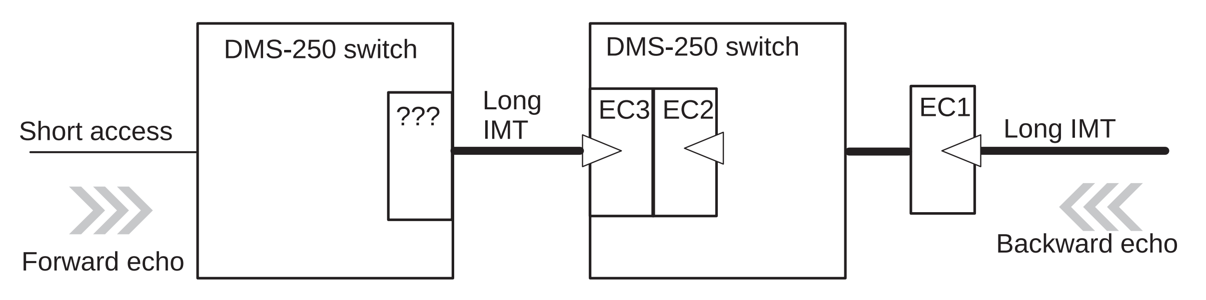
Note 3: Cancels backward echo; allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Restrict the back-to-back configuration on IMT trunks to situations when the ECAN provisioning capability upstream is not under the provisioning party's jurisdiction.

As shown in Figure 2-45, case 3 bypasses the "Adjacent IMT ECAN" rule.

Figure 2-45
Echo cancellation scenario (Case 3, Table 2-17)



Legend:
EC1 = External ECAN cancels forward echo.
EC2 = ECAN cancels backward echo. Allocated only if the Echo Control bit in the Backward Call Indicator of ACM/ANM is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum origination to an XPM termination with internal ECAN

Refer to “XPM origination with internal ECAN to a Spectrum termination” for the strategy adopted by the Spectrum ECAN call control agorithm for interworking with the XPM ECAN algorithm.

The following pages discuss the four basic scenarios of when the Spectrum terminates to an XPM with an internal ECAN:

- Spectrum access to XPM access with internal ECAN
- Spectrum access to XPM IMT with internal ECAN
- Spectrum IMT to XPM access with internal ECAN
- Spectrum IMT to XPM IMT with internal ECAN

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum access to XPM access with internal ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-19 illustrates these rules.

Rule 1 — If a Spectrum ECAN is provisioned, it is allocated on an access terminator in access mode only if an external ECAN is not present at the distant end of the trunk.

Rule 2 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated or when an external ECAN is present at the distant end of the originating Spectrum trunk provisioned with a Spectrum ECAN with the FAREC field set to "Y."

Rule 3 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status of the internal XPM ECAN.

Table 2-19
Spectrum ECAN allocation (Spectrum access to XPM access with internal ECAN)

Case #	Originator (Spectrum access)				Terminator (XPM access)
	SPM ECIDX	**BK2BK**	**FAREC**	**Spectrum ECAN status**	**ECSTAT = EXTERNAL**
1	N	Y or N	Y or N	Not provisioned	Y (Note 2)
2	Y	N	N	Note 1	Y (Note 2)
3	Y	Y	N	Note 1	Y (Note 2)
4	Y	N	Y	Provisioned, but not activated	Y (Note 2)

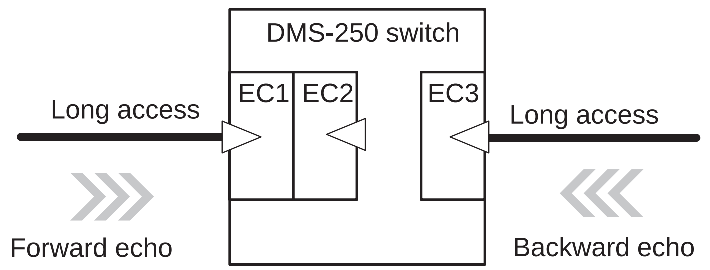
Note 1: Cancels forward echo; allocated in access mode.

Note 2: Cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-46 illustrates case 3.

Figure 2-46
Echo cancellation scenario (Case 3, Table 2-18)



Legend:
EC2 = ECAN cancels forward echo.
EC3 = ECAN cancels backward echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum access to XPM IMT with internal ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-20 illustrates these rules.

Rule 1 — A Spectrum ECAN on the access originator is allocated in network mode if the following statements are true:

- The originator is provisioned with back-to-back Spectrum ECANs or is provisioned with a Spectrum ECAN when an external ECAN is present at the distant end of the trunk.
- The Echo Control bit in the Backward Call Indicator field of the received ACM/ANM is not set.

Rule 2 — The Echo Control bit in the Backward Call Indicator field of the outgoing ACM/ANM is set when Spectrum ECAN cancelling backward echo is allocated.

Rule 3 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set to reflect the status of the internal XPM ECAN on the IMT terminator. This bit is also set when an external ECAN is present at the distant end of the originating Spectrum trunk indicated by the FAREC field being set to “Y.”

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-20
Spectrum ECAN allocation (Spectrum access to XPM IMT with internal ECAN)

Case #	Originator (Spectrum access)				Terminator (XPM IMT) (Note 1)
	SPM ECIDX	**BK2BK**	**FAREC**	**Spectrum ECAN status**	**ECSTAT = EXTERNAL**
1	N	Y or N	Y or N	Not provisioned	Y (Note 2)
2	Y	N	N	Provisioned, but not activated	Y (Note 2)
3	Y	Y	N	Note 3	Y (Note 2)
4	Y	N	Y (Note 2)	Note 3	Y (Note 2)

Note 1: The ECAN on the terminator is activated by the existing XPM ECAN algorithm.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo; allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

Avoid provisioning case 4 as shown in the previous table because it wastes an internal ECAN by provisioning redundant ECANs.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum IMT to XPM access with internal ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-21 illustrates these rules.

Rule 1 — When a Spectrum ECAN is provisioned on the IMT originator, it is allocated in access mode if the following statements are true:

- The IMT originator is provisioned with a back-to-back Spectrum ECAN pair.
- The Echo Control bit in the Nature of Connection Indicator field of the received IAM is not set.

Rule 2 — The Echo Control bit in the Nature of Connection Indicator field of the outgoing IAM is set when the Spectrum ECAN cancelling forward echo is allocated or when the originating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.”

Rule 3 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set to reflect the status of the internal XPM ECAN on the terminating access trunk.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-21
Spectrum ECAN allocation (Spectrum IMT to XPM access with internal ECAN)

Case #	Originator (Spectrum IMT)				Terminator (XPM access) (Note 1)
	SPM ECIDX	**BK2BK**	**FAREC (Note 2)**	**Spectrum ECAN status**	**ECSTAT = INTERNAL/ INNOTONE**
1	N	Y or N	Y or N	Not provisioned	Y (Note 4)
2	Y	N	Y or N	Provisioned, but not activated	Y (Note 4)
3	Y	Y	Y or N	Note 3	Y (Note 4)

Note 1: The XPM ECAN algorithm activates the internal ECAN on the access terminator.

Note 2: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 3: Cancels forward echo; allocated in access mode.

Note 4: Cancels backward echo.

A Spectrum ECAN is not allocated in case 2 due to the “Adjacent IMT ECAN” rule. Use case 3 when the upstream provisioning of ECANs is not under the provisioning party’s control. There is a possibility of redundant ECANs if the Echo Control bit in the Nature of Connection Indicator field of the received IAM is not correctly set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Spectrum IMT to XPM IMT with internal ECAN

Spectrum ECAN is allocated according to the following rules. Table 2-22 illustrates these rules.

Rule 1 — A Spectrum ECAN on the IMT originator is allocated in network mode if the Echo Control bit in the Backward Call Indicator of the received ACM/ANM is not set.

Rule 2 — A Spectrum ECAN of a back-to-back pair is allocated in access mode if the following statements are true:

- The OFCVAR “IMT_TANDEM_EC_ENABLE” is set to “N.”

  Note: The XPM ECAN algorithm activates an internal ECAN on an IMT trunk (if provisioned) only when the value of the OFCVAR office parameter “IMT_TANDEM_EC_ENABLE” is set to “Y.”

- The Echo Control bit in the Nature of Connection Indicator field of the received IAM is not set.

Rule 3 — The Echo Control bit in the Nature of Connection Indicator of the outgoing IAM is set when a Spectrum ECAN cancelling forward echo is allocated or when the originating IMT trunk is provisioned with a single Spectrum ECAN with the FAREC field set to “Y.” This bit is also set to reflect the status of the internal XPM ECAN on the terminator when the OFCVAR office parameter “IMT_TANDEM_EC_ENABLE” is set to “N.”

Rule 4 — The Echo Control bit in the Backward Call Indicator of the outgoing ACM/ANM is set when a Spectrum ECAN cancelling backward echo is allocated.

AD9959
Spectrum Echo Canceller Call Control (continued)

Table 2-22
Spectrum ECAN allocation (Spectrum IMT to XPM IMT with internal ECAN)

Case #	Originator (Spectrum IMT)				Terminator (XPM IMT)	
	SPM ECIDX	BK2BK	FAREC (Note 1)	Spectrum ECAN status	ECSTAT = INTERNAL/ INNOTONE	IMT_ TANDEM_ EC_ENABLE
1	N	Y or N	Y or N	Not provisioned	Y	N
2	N	Y or N	Y or N	Not provisioned	Y (Note 2)	Y
3	Y	N	Y or N	Note 3	Y	N
4	Y	N	Y or N	Note 3	Y (Note 2)	Y
5	Y	Y	Y or N	Note 4	Y	N
6	Y	Y	Y or N	Note 3	Y (Note 2)	Y

Note 1: FAREC on IMT is not considered since an ECAN provisioned at one end implies an ECAN is present at the other end.

Note 2: Cancels forward echo.

Note 3: Cancels backward echo; allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

Note 4: Equipped with back-to-back ECANs. One cancels forward echo and and is allocated in access mode if the Echo Control bit in Nature of Connection Indicator of IAM is not set. The other cancels backward echo and is allocated in network mode if the Echo Control bit in the Backward Call Indicator is not set.

AD9959
Spectrum Echo Canceller Call Control (continued)

Message Protocols

Requirements

Every time an outgoing Spectrum half echo control device is activated, the forward half echo control device indicator, which is located in the Nature of Connection block of the IAM message, is set if the terminating trunk is an SS7 trunk. Every time an incoming Spectrum half echo control device is activated, the backward half echo control device indicator, which is located in the Backward Call Indicator of either the ACM or ANM message, is set if the originating trunk is an SS7 trunk.

Specifications

In interswitch call scenarios, the IAM and the ACM/ANM provide an Echo Control bit which can be set indicating whether an ECAN is activated.

The Echo Control Device Indicator bit is set to 1 when the Spectrum ECAN call control agorithm allocates a Spectrum ECAN cancelling forward echo.

Figure 2-47 shows the Echo Control Device Indicator bit.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-47
Forward echo control device indicator bit

IAM format

Parameter	Type	Length (octets)
Message Type	Fixed Mandatory	1
Nature of Connection Indicators	Fixed Mandatory	1
Forward Call Indicators	Fixed Mandatory	2
Calling Party’s Category	Fixed Mandatory	1
User Service Information	Variable Mandatory	4
Called Party Number	Variable Mandatory	2–11
Calling Party Number	Variable Mandatory	6–12
Charge Number	Optional	3–9
Originating Line Information	Optional	3
Transit Network Selection	Optional	5
Carrier Selection	Optional	3
Service Code	Optional	3
Carrier Identification Code Parameter	Optional	5
Hop Counter	Optional	3

Nature of Connection Indicators

7	6	5	4	3	2	1	0
H	G	F	E	D	C	B	A

E is the Echo Control Device Indicator bit. If set to 0, the outgoing half echo control device is not included. If set to 1, the outgoing half echo control device is included.

AD9959 Spectrum Echo Canceller Call Control (continued)

The Echo Control Device Indicator bit is set to 1 when the Spectrum ECAN call control agorithm allocates a Spectrum ECAN cancelling backward echo. Figure 2-48 illustrates the backward Echo Control Indicator bit.

Note: For more information on the format of the IAM, ACM, and ANM, refer to GR-394-CORE Switching System, Generic Requirements for Interexchange Carrier Connection using ISUP.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-48
Backward echo control indicator bit

ACM format

Parameter	Type	Length (octets)
Message Type	Fixed Mandatory	1
Backward Call Indicators	Fixed Mandatory	2
Optional Backward Call Indicators	Optional	3
Cause Indicators	Optional	3–4

ANM format

Parameter	Type	Length (octets)
Message Type	Fixed Mandatory	1
Backward Call Indicators	Optional	4

Backward Call indicators

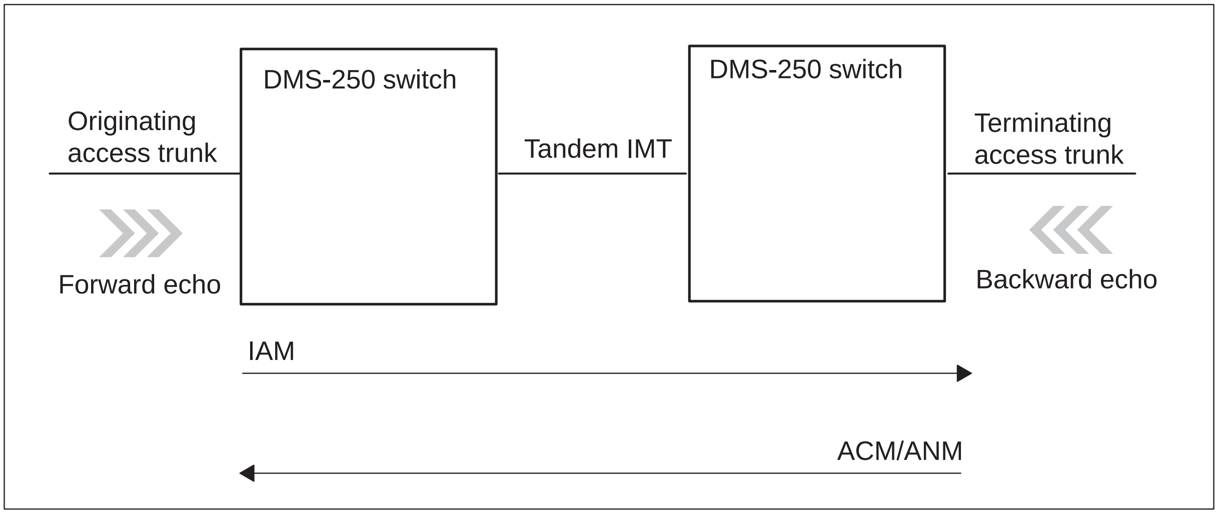
7	6	5	4	3	2	1	0
H	G	F	E	D	C	B	A
P	O	N	M	L	K	J	I

N is the Echo Control Device Indicator bit. If set to 0, the incoming half echo control device is not included (default). If set to 1, the incoming half echo control device is included.

The outgoing echo travels in the same direction as the ISUP IAM, and the incoming echo travels in the same direction as the ISUP ACM/ANM. Figure 2-49 shows incoming and outgoing echo.

AD9959
Spectrum Echo Canceller Call Control (continued)

Figure 2-49
Incoming and outgoing echo in SS7 signals



When a forward half Spectrum ECAN is enabled cancelling the outgoing echo, the Spectrum ECAN call control agorithm sets the Echo Control bit in the IAM. After this bit is set, all subsequent Spectrum ECANs in the network that cancel forward echo are not activated. The Echo Control bit is also set when the originating Spectrum trunk is provisioned with a Spectrum ECAN with the FAREC field set to “Y.”

When a backward half Spectrum ECAN is activated, the Spectrum ECAN call control agorithm sets the Echo Control bit in the ANM. After this bit is set, all preceding Spectrum ECANs in the network that cancel backward echo are not activated. This Echo Control bit is also set when the terminating Spectrum trunk is provisioned with a Spectrum ECAN with the FAREC field set to “Y.”

Error Handling

If a call needs a Spectrum ECAN resource, but none are available in the pool, normal call processing continues. The call is not blocked because a Spectrum ECAN resource is not available.

AD9959
Spectrum Echo Canceller Call Control (continued)

Hardware requirements

None

Limitations and restrictions

The following limitations and restrictions apply to this feature:

- This feature does not support interactions with per-call control of external ECANs on a DTCO.
- An external ECAN on the XPM (near-side of the DMS-250 switch) is always assumed to be in access mode on an access trunk and in network mode on an IMT trunk.
- Spectrum PTS EXEC support must be datafilled for PTS trunks to be supported on Spectrum.
- During the MCCS UA call, the auto ACM message generates during the process of collecting a card number on the UA trunk (including SS7 IMT and SS7 FGD) before executing the two-party call control algorithm. Due to the lack of ECAN knowledge of the called party in the auto ACM message, a redundant Spectrum ECAN is allocated in the MCCS UA call scenario.

Note: A call can traverse more than one DMS-250 switch, probably encountering more than the required number of ECANs (two) in its path. Therefore, a set of provisioning rules ensures that no more ECAN resources are assigned to a call than are required.

Interactions

This feature interacts with the following features:

- Interaction is required with RLT. Refer to “Release link trunk” in Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions.”
- Interaction is required with DCR. Refer to “Dynamically controlled routing” in Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions.”
- Interaction is required with reorigination. Refer to “Reorigination” in Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions.”
- Interaction is required with Suspend/Resume messages. Refer to “Suspend/Resume messages” in Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions.”

AD9959
Spectrum Echo Canceller Call Control (end)

- Interaction is required with DCR. Refer to “Dynamically controlled routing” in Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions.”
- Interaction is required with Dialable Wideband Services. Refer to “Dialable Wideband Service” in Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions.”
- Interaction is required with data calls. Refer to “Data calls” in Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions.”

Datafill

Datafill the SPMECIDX option in table TRKSGRP to indicate the presence of a Spectrum ECAN. For AXXESS trunks, datafill the SPMECIDX option in table TRKSIG.

Service orders

No affect

Operational measurements

No affect

Logs

No affect

User interface

No affect

Billing

No affect

AD9960 — UCS Spectrum ECAN Feature Interactions

The feature ,UCS Spectrum Echo Canceller (ECAN) Feature Interactions, allows the Spectrum ECAN to interwork with several UCS custom features.

This chapter describes the feature, UCS Spectrum Echo Canceller (ECAN) Feature Interactions.

AD9960
Spectrum ECAN Feature Interactions

Functionality name

UCS Spectrum Echo Canceller (ECAN) Feature Interactions

Description

This feature, “UCS Spectrum ECAN Feature Interactions,” allows the Spectrum ECAN to interwork with the following UCS custom features. The interworkings are described in this chapter in the order listed here.

- reorigination
  - — normal reorigination
  - — boomerang reorigination with service platform
  - — reorigination for non-operator release link trunk (RLT) calls
- RLT
  - — ECAN reconfiguration
  - — third-party interaction
  - — services platform initiated
  - — redirection
- route advance
- software answer
- suspend/resume
- automatic trunk routing (ATR) system
- data calls
- Dialable Wideband Services (DWS)
- FlexDial
- Carrier Advanced Intelligent Network (CAIN)
- dynamically controlled routing (DCR)

The supporting trunk agency for UCS Spectrum ECAN call control is documented in Chapter 2, “AD9959 — Spectrum Echo Canceller Call Control.”

AD9960
Spectrum ECAN Feature Interactions (continued)

Reorigination

When a call is processed, the subscriber may choose to invoke reorigination. Reorigination allows the caller to place subsequent calls without having to enter the authorization code information again. Reorigination is invoked either manually or automatically.

The principal ECAN control rule for reorigination is to deallocate ECANs on the original call and allocate ECANs for the reoriginated call.

The following types of reorigination are described in this section:

- normal reorigination
- boomerang reorigination with service platform
- reorigination for non-operator RLT calls

Normal reorigination

Normal reorigination provides a dial tone to the calling party so that another call can be made by entering only a new address with or without services platform interaction. Call reorigination has the capability for a subscriber to dial an asterisk (*), two asterisks (**) (FlexDial reorigination only), or pound (#), as appropriate, to return to carrier or standard dial tone without the necessity of again entering the carrier’s access number and the subscriber’s authorization code or travel card number.

Normal reorigination is invoked either manually or automatically. In both cases, dial tone is provided to the calling party as a prompt to enter new address digits. If no operator prefix digits are dialed, the call is routed to its destination based on the new address digits entered. This origination is specific for two-party calls without services platform interaction.

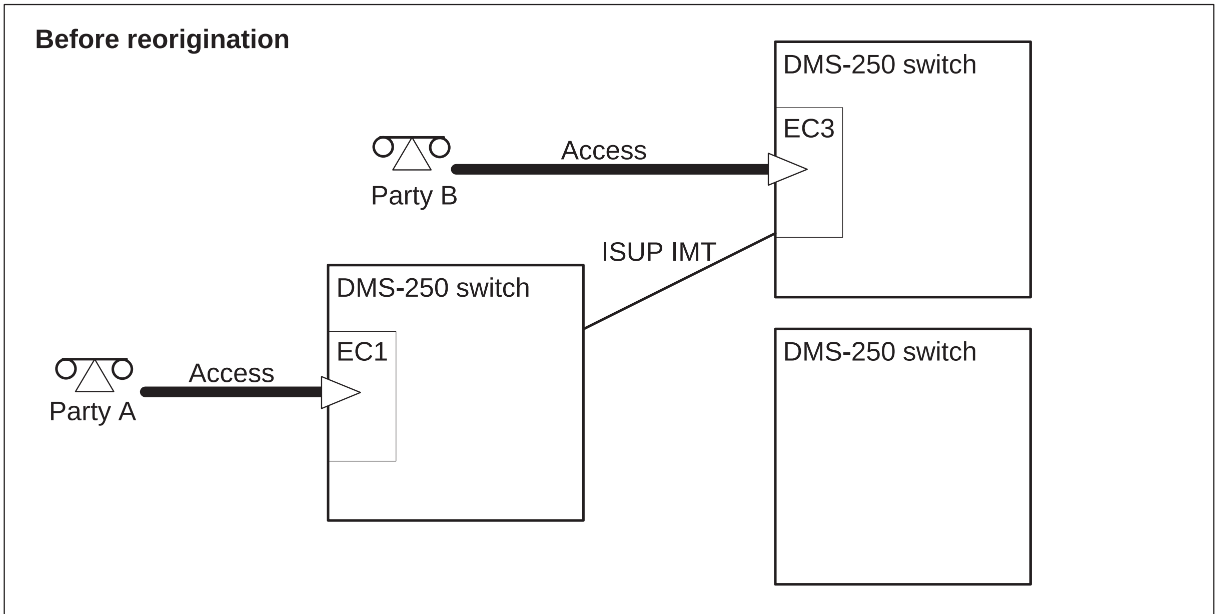
On a Party A to Party B call, Party A may be allowed to reoriginate and terminate to Party C. Party A can reoriginate when Party B is at ring stage, Parties A and B are talking, or Party B has gone onhook. In any of these cases, Party B drops out of the call and Party A reoriginates to a new call to Party C.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 1: Normal reoriginated call with only Spectrum ECANs

Figure 3-1 illustrates the scenario, for Party A to Party B, where EC1 and EC3 activate to cancel the forward echo and backward echo, respectively.

Figure 3-1
Normal reoriginated call with only Spectrum ECANs (scenario 1, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC3 = Spectrum ECAN cancels backward echo.

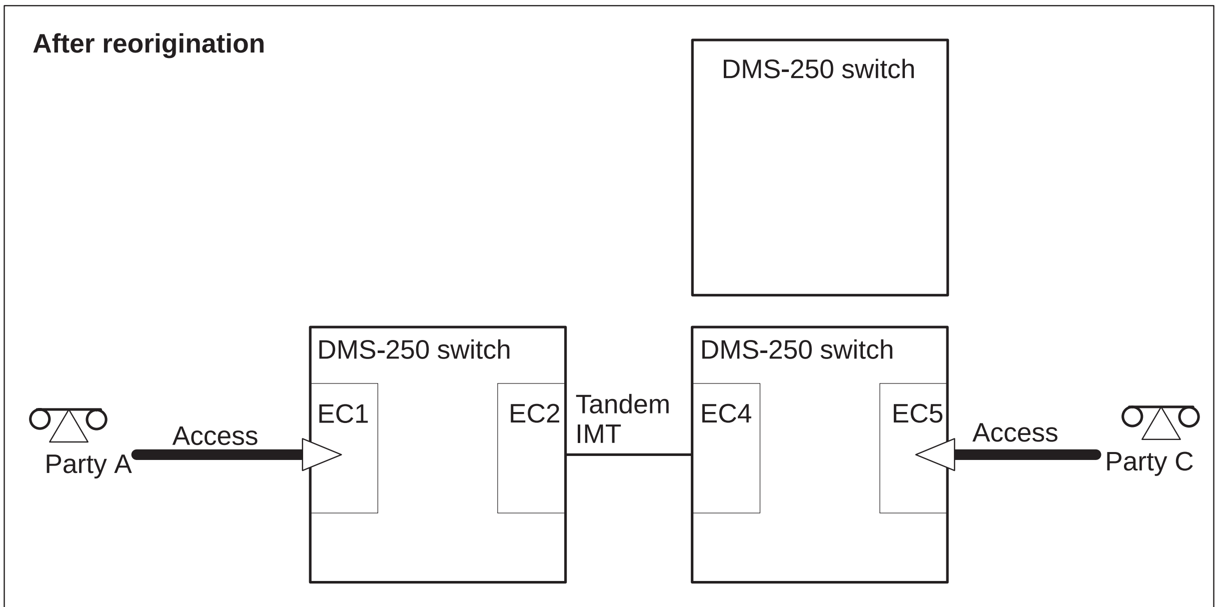
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-2 illustrates the scenario, where Party A reoriginates a call to Party C, EC3 deallocates by taking down the Party A to Party B call. On the Party A to Party C call, EC5 activates by the ECAN call control algorithm.

The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- Party B connects through Spectrum: FAREC = N; BK2BK = N.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-2
Normal reoriginated call with only Spectrum ECANs (scenario 1, part 2)



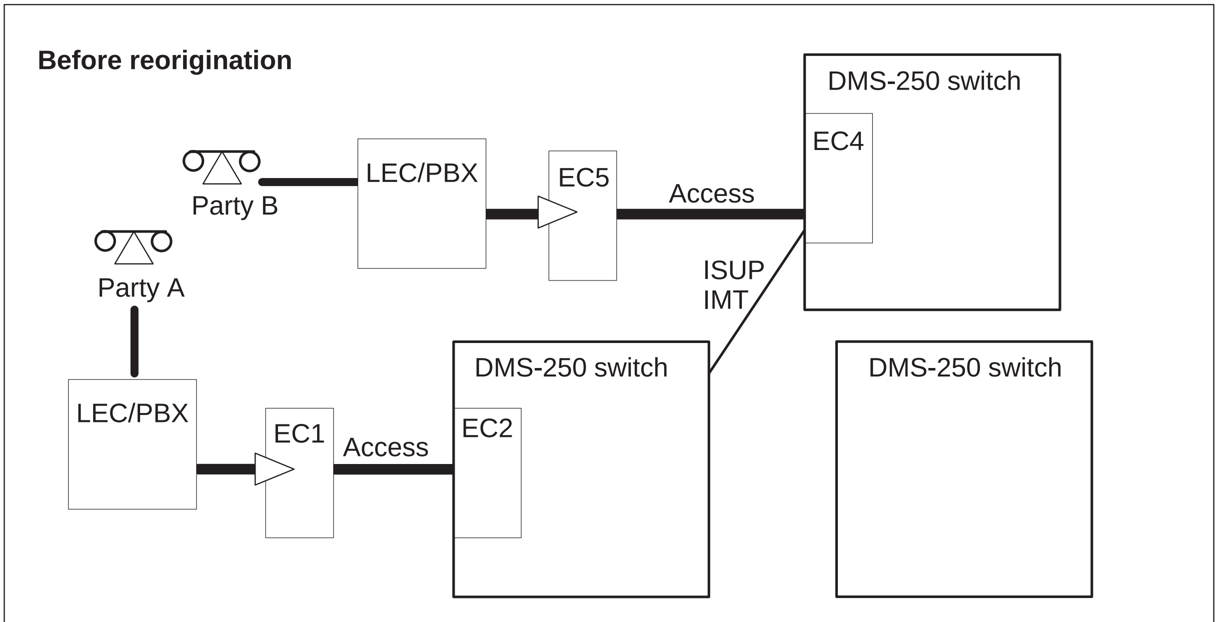
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC5 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 2: Normal reoriginated call with FAREC datafilled for Spectrum ECANs

Figure 3-3 illustrates the scenario for the original Party A to Party B call. EC1 and EC5 are assumed to be activated to cancel the forward and backward echo, respectively, since both parties are datafilled as FAREC.

Figure 3-3
Normal reoriginated call with FAREC datafilled for Spectrum ECANs (scenario 2, part 1)



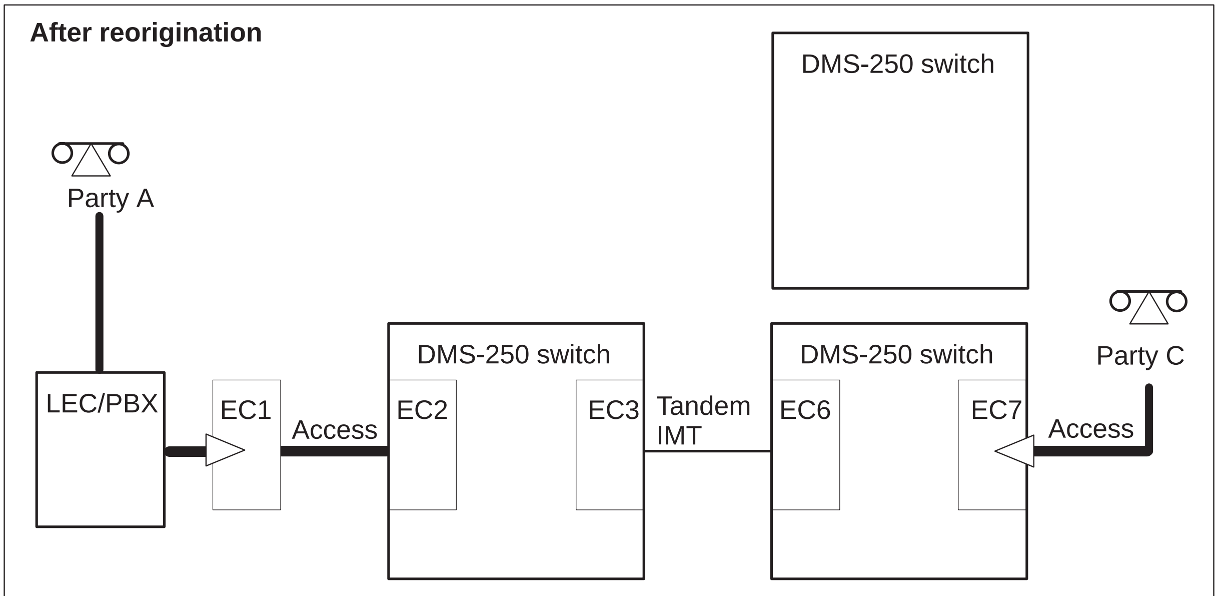
Legend:
EC1 = ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC5 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-4 illustrates the scenario where Party A reoriginates a call to Party C and EC7 allocates by the call control algorithm. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = Y; BK2BK = N.
- Party B connects through Spectrum: FAREC = Y; BK2BK = N.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-4
Normal reoriginated call with FAREC datafilled for Spectrum ECANs (scenario 2, part 2)



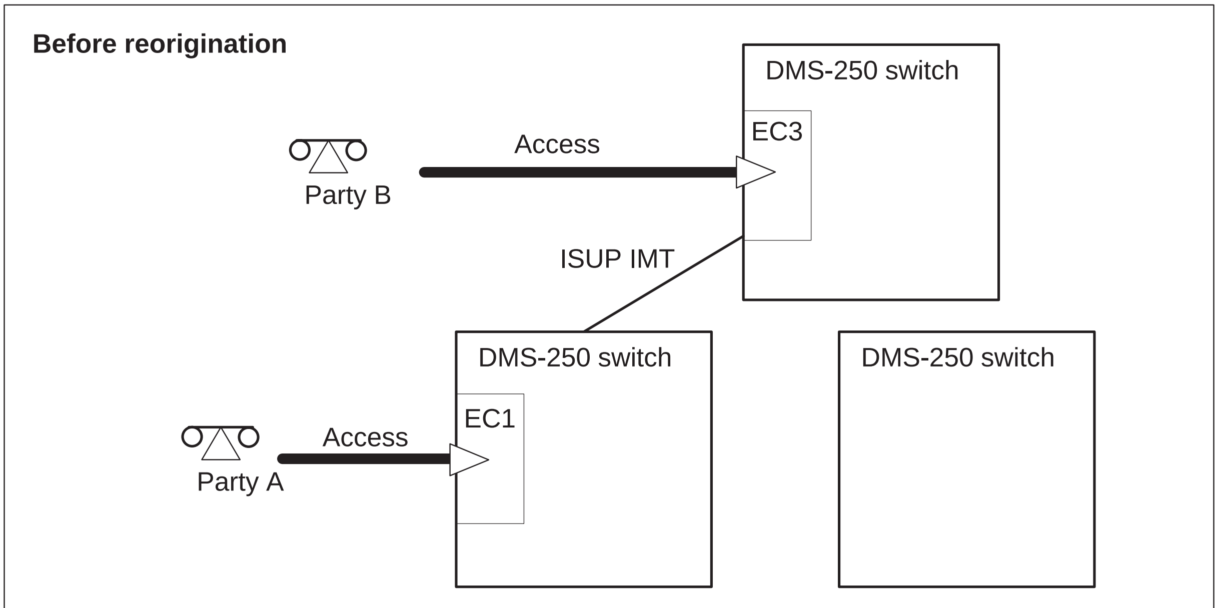
Legend:
EC1 = ECAN cancels forward echo.
EC2, EC3, EC6 = Spectrum ECAN is available, but not activated.
EC7 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 3: Normal reoriginated call interacted with an XPM internal ECAN

Figure 3-5 illustrates the scenario for the original Party A to Party B call. EC1 and EC3 (EC3 is NT6X50EC) activate to cancel the forward echo and backward echo, respectively.

Figure 3-5
Normal reoriginated call interaction with XPM internal ECAN (scenario 3, part 1)



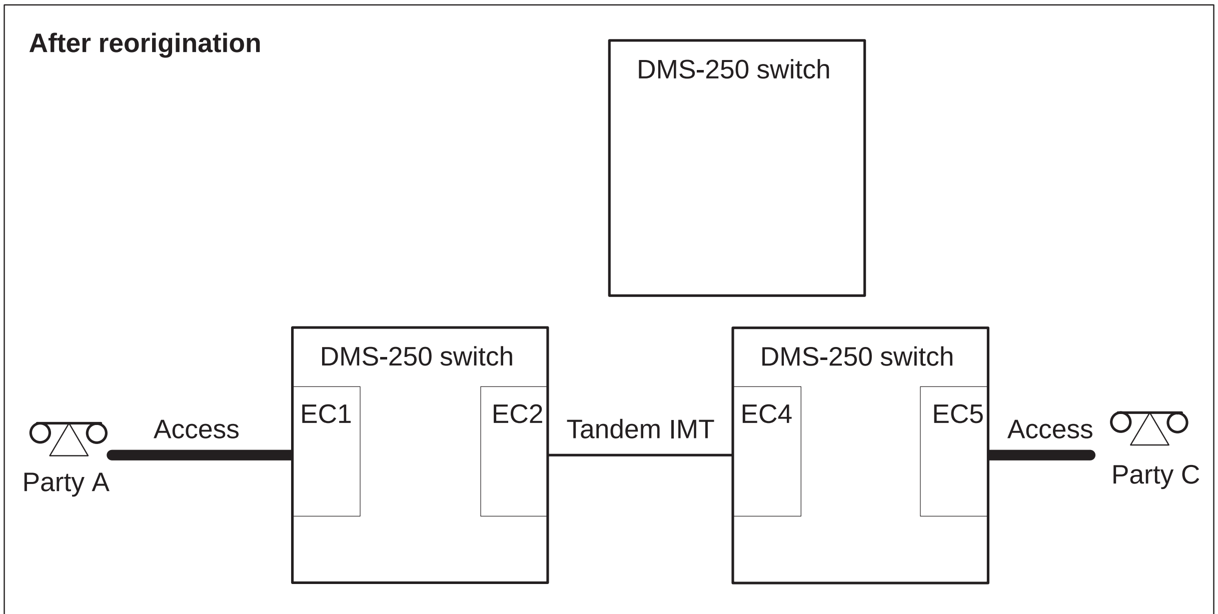
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC3 = XPM ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-6 illustrates the scenario where Party A reoriginates a call to Party C, and EC1 deallocates by call processing. On the Party A to Party C call, EC1 and EC5 (EC5 is NT6X50EC) activate by the ECAN call control algorithm. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- Party B connects through XPM: ECSTAT = INTERNAL.
- Party C connects through XPM: ECSTAT = INTERNAL.

Figure 3-6
Normal reoriginated call interaction with XPM internal ECAN (scenario 3, part 2)



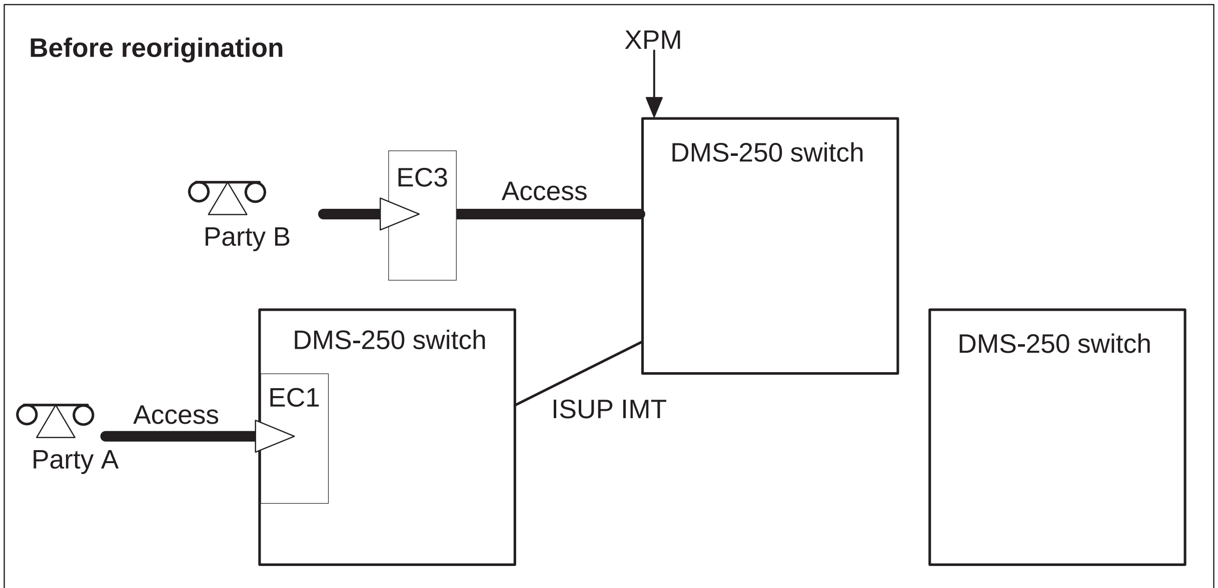
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC5 = XPM ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 4: Normal reoriginated call interacted with an XPM external ECAN

Figure 3-7 illustrates the scenario for the original Party A to Party B call where EC1 and EC3 (EC3 is an external ECAN) activate to cancel the forward echo and backward echo, respectively.

Figure 3-7
Normal reoriginated call interaction with XPM external ECAN (scenario 4, part 1)



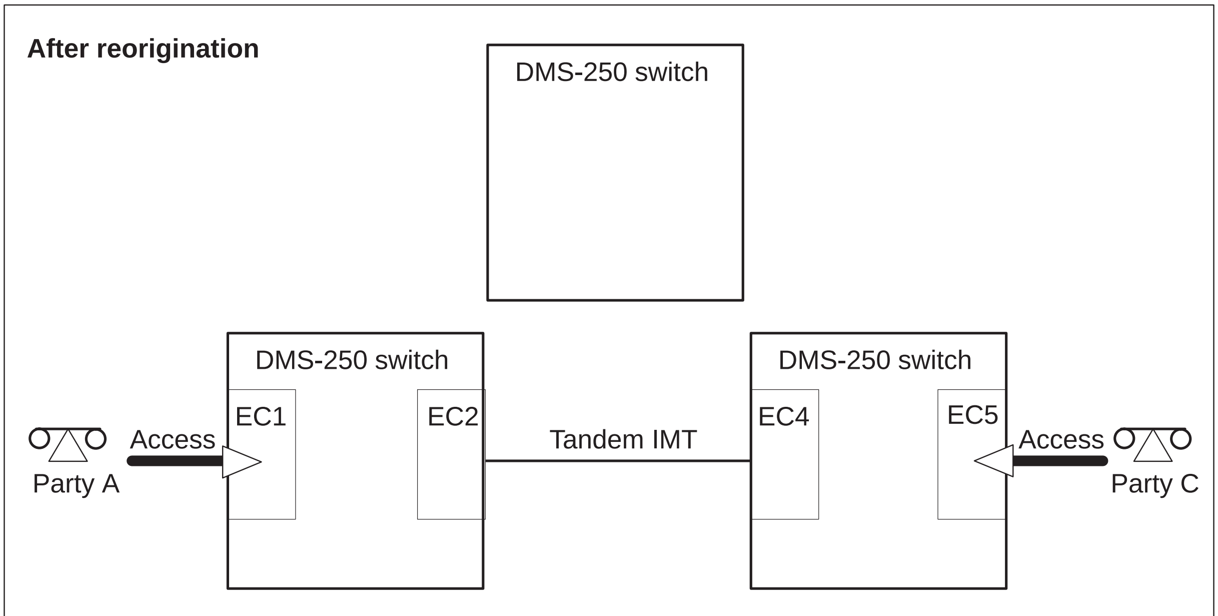
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC3 = External ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-8 illustrates the scenario where Party A reoriginates a call to Party C. EC5 (which is NT6X50EC) activates by the ECAN call control algorithm. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- Party B connects through XPM: ECSTAT = EXTERNAL.
- Party C connects through XPM: ECSTAT = EXTERNAL.

Figure 3-8
Normal reoriginated call interaction with XPM external ECAN (scenario 4, part 2)



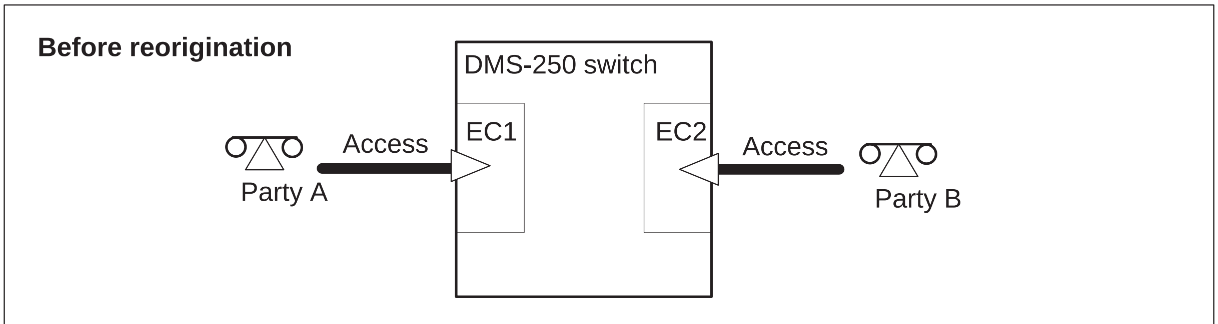
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC5 = XPM ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 5: Normal reoriginated call with only a Spectrum ECAN

Figure 3-9 illustrates the scenario for the original Party A to Party B call. EC1 and EC2 are allocated.

Figure 3-9
Normal reoriginated call with Spectrum ECAN, single switch (scenario 5, part 1)



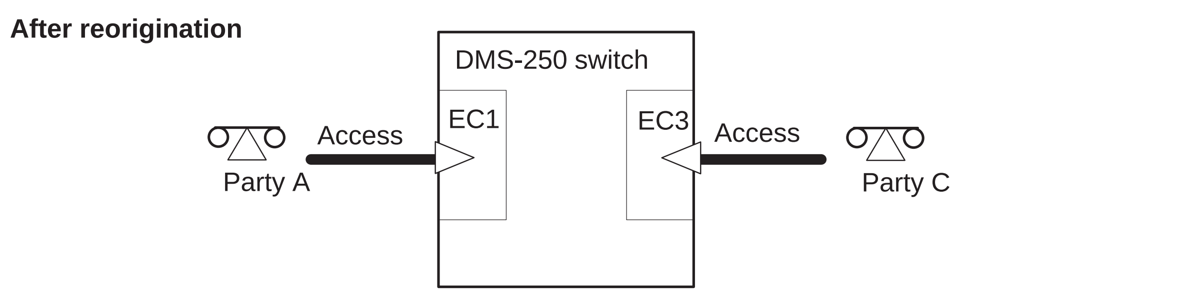
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-10 illustrates the scenario where Party A reoriginates a call to Party C. EC2 deallocates by call take down. EC3 then allocates for the Party A to Party C call by the ECAN call control algorithm to cancel backward echo. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- Party B connects through Spectrum: FAREC = N; BK2BK = N.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-10
Normal reoriginated call with Spectrum ECAN, single switch (scenario 5, part 2)



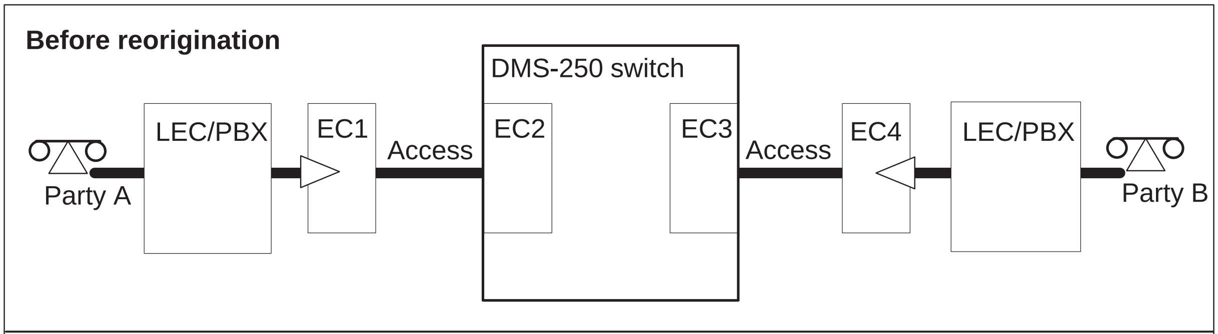
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 6: Normal reoriginated call with FAREC datafill for the Spectrum ECAN

Figure 3-11 illustrates the scenario for the original Party A to Party B call. EC1 and EC4 (both parties with FAREC datafill) are assumed to be allocated.

Figure 3-11
Normal reoriginated call with FAREC datafilled for Spectrum ECAN, single switch (scenario 6, part 1)



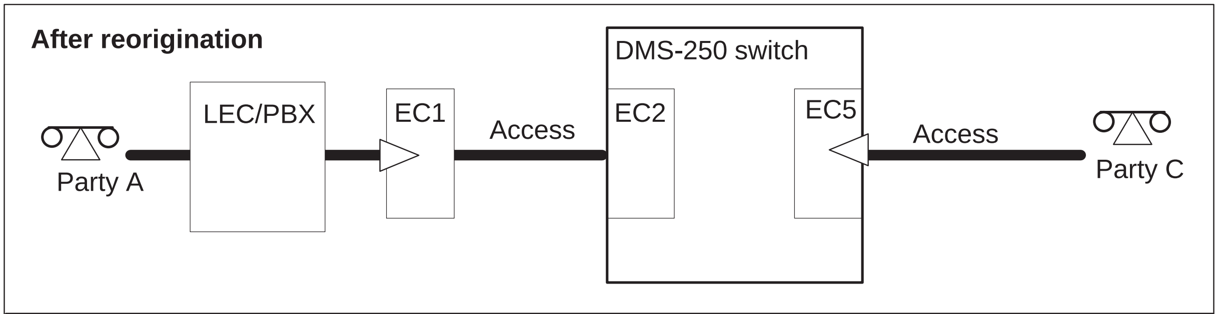
Legend:
EC1 = ECAN cancels forward echo.
EC2, EC3 = Spectrum ECAN is available, but not activated.
EC4 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-12 illustrates the scenario where Party A reoriginates a call to Party C. EC5 allocates for the Party A to Party C call by the ECAN call control algorithm. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = Y; BK2BK = N.
- Party B connects through Spectrum: FAREC = Y; BK2BK = N.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-12
Normal reoriginated call with FAREC datafilled for Spectrum ECAN, single switch (scenario 6, part 2)



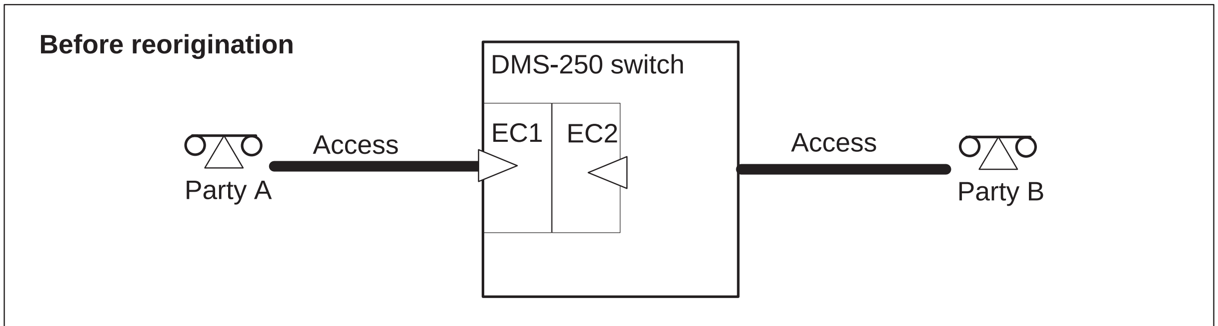
Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC5 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 7: Normal reoriginated call with BK2BK datafill for the Spectrum ECAN

Figure 3-13 illustrates the scenario for the original Party A to Party B. EC1 and EC2 (BK2BK datafill at Party A) are allocated.

Figure 3-13
Normal reoriginated call with BK2BK datafilled for Spectrum ECAN, single switch (scenario 7, part 1)



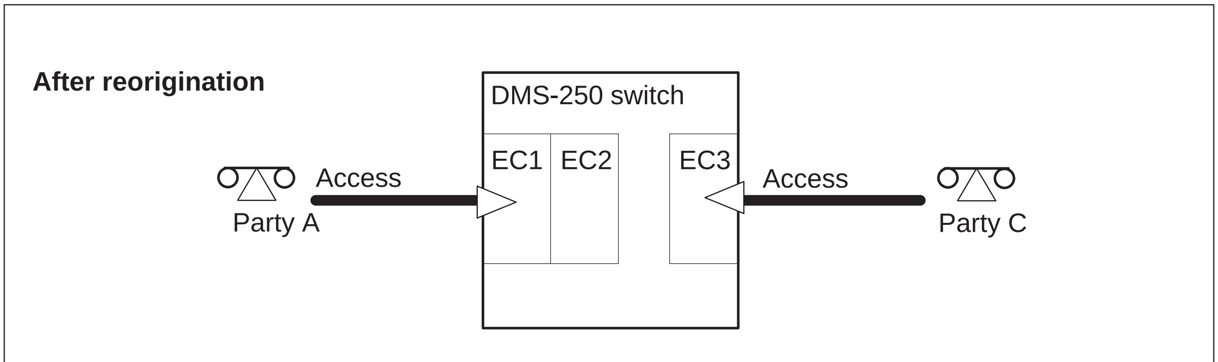
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-14 illustrates the scenario where Party A reoriginates a call to Party C. Reconfiguration occurs to deallocate EC2 and allocate EC3 for the reoriginated call. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y
- Party B connects through Spectrum without Spectrum ECAN resources.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-14
Normal reoriginated call with BK2BK datafilled for Spectrum ECAN, single switch (scenario 7, part 2)



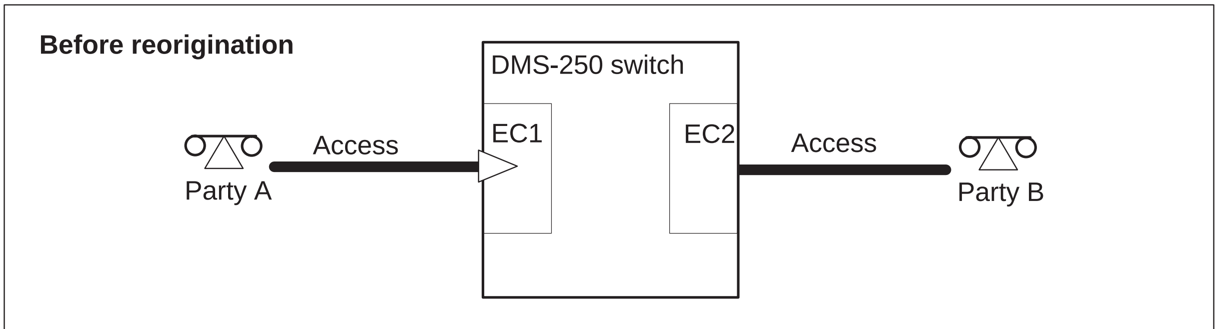
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 8: Normal reoriginated call interacted with an XPM internal ECAN

Figure 3-15 illustrates the scenario for the original Party A to Party B call. EC1 and EC2 (EC2 is NT6X50EC) are allocated.

Figure 3-15
Normal reoriginated call interaction with XPM internal ECAN, single switch (scenario 8, part 1)



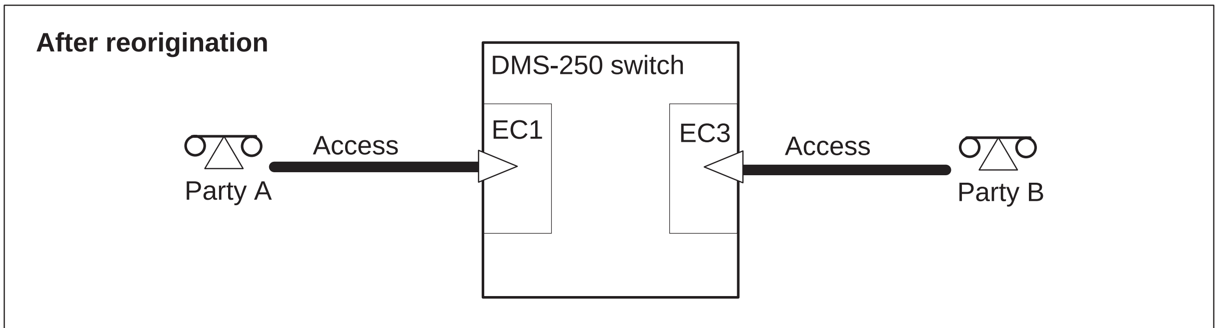
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-16 illustrates the scenario where Party A reoriginates a call to Party C. EC2 deallocates by call take down. EC3 (which is NT6X50EC) then allocates for the Party A to Party C call by the ECAN call control algorithm. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through XPM: ECSTAT = INTERNAL.
- Party C connects through XPM: ECSTAT = INTERNAL.

Figure 3-16
Normal reoriginated call with interaction with XPM internal ECAN, single switch (scenario 8, part 2)



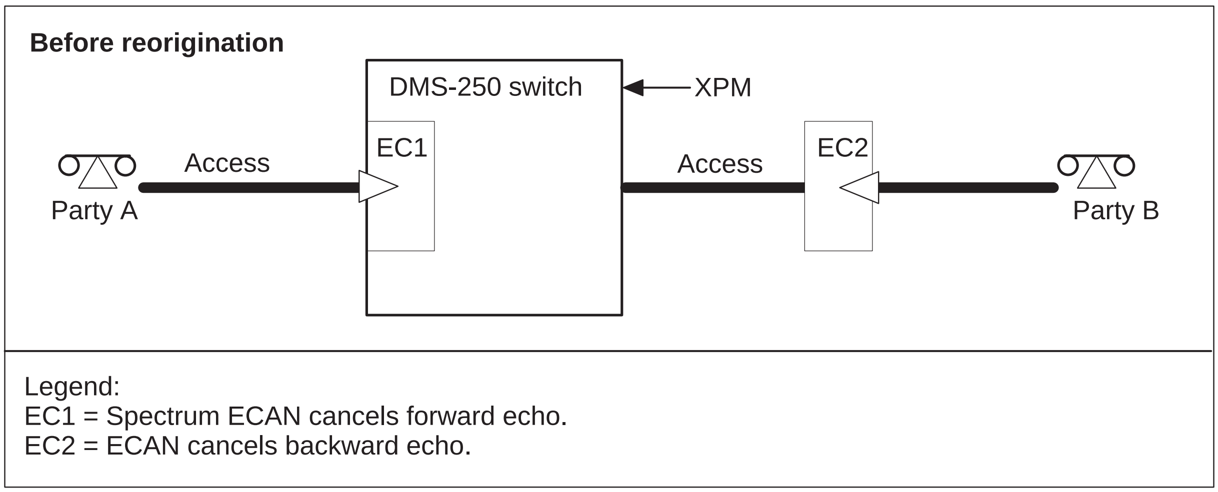
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC3 = XPM ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 9: Normal reoriginated call interacted with XPM External ECAN

Figure 3-17 illustrates the scenario for the original Party A to Party B call. EC1 and EC2 (EC2 is an external ECAN) are allocated.

Figure 3-17
Normal reoriginated call interaction with XPM external ECAN, single switch (scenario 9, part 1)

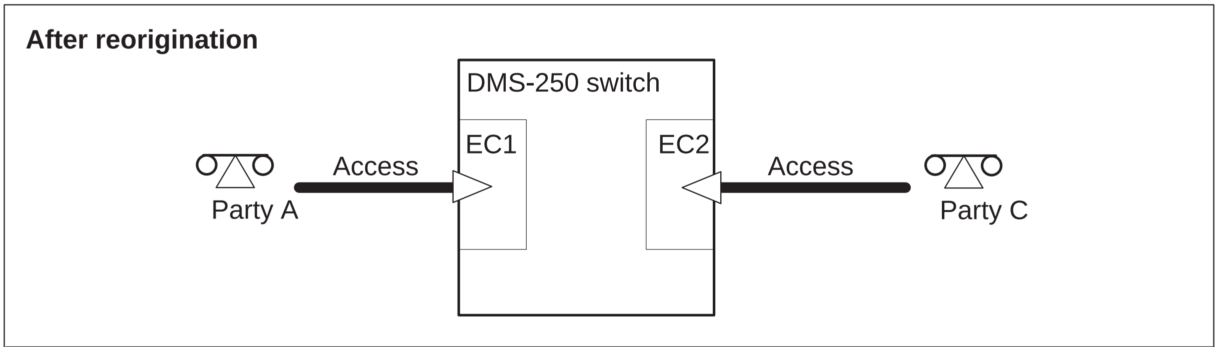


AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-18 illustrates the scenario where Party A reoriginates a call to Party C. EC2 deactivates by call take down. EC3 is then allocated for the Party A to Party C call. The datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- Party B connects through XPM: ECSTAT = EXTERNAL.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-18
Normal reoriginated call interaction with XPM external ECAN, single switch (scenario 9, part 2)



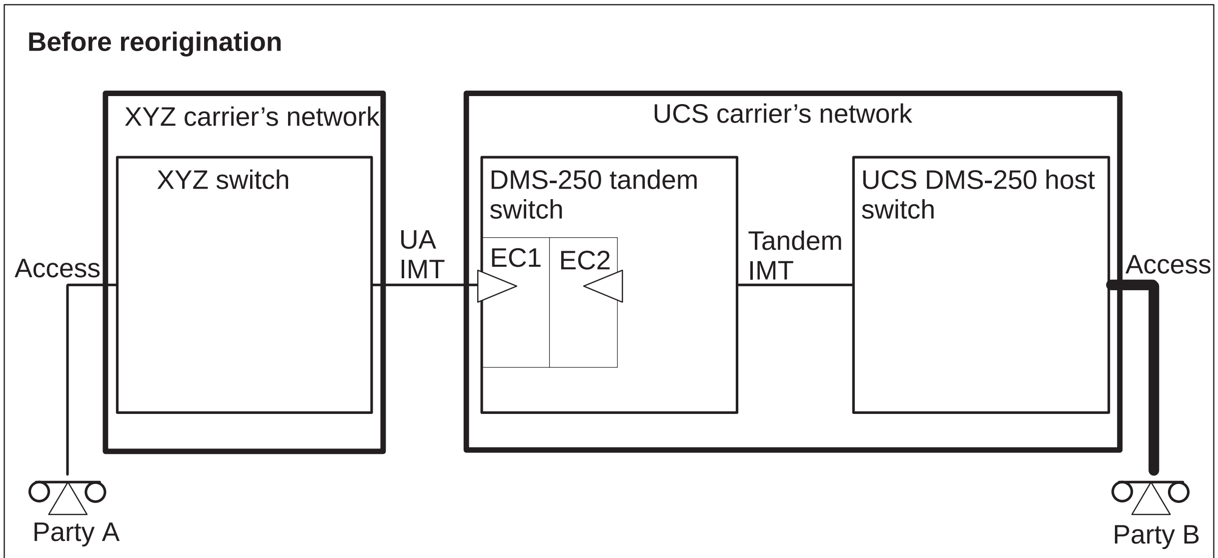
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 10: Universal access (UA) intermachine trunk (IMT) reoriginated call with only a Spectrum ECAN

Figure 3-19 illustrates the scenario where EC1 and EC2 (BK2BK) are provisioned at the UCS DMS-250 tandem switch for the UA IMT trunk. EC1 and EC2 are allocated for the original Party A to Party B call that is originated at another carrier's network. The switch in the middle is the reoriginating switch.

Figure 3-19
Universal access reoriginated call with Spectrum ECAN (scenario 10, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-20 illustrates the scenario where UA IMT reorigination is initiated by Party C. Reconfiguration occurs to deallocate EC2 and allocate EC3 for the reoriginated call.

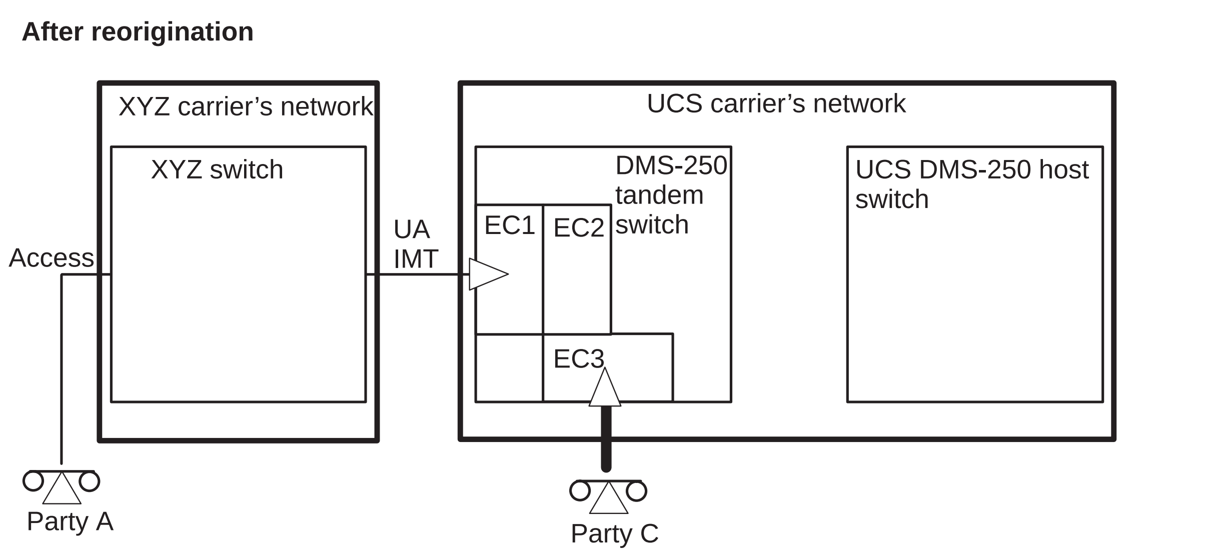
Provisioning rules for the UA IMT trunk (datafilled as inter-network IMT trunk at table TRKGRP) are as follows:

1. Datafill as BK2BK Spectrum ECAN (BK2BK = Y) if there is no knowledge of an ECAN at the other carrier's network.
2. Datafill as Spectrum ECAN (FAREC = N and BK2BK = N) if the ECAN to cancel forward echo is always provided by the other carrier's network.

Datafill requirements are as follows:

- UA IMT between originating switch and tandem switch: FAREC = N; BK2BK = Y.
- UA IMT: NETWKSPC in table TRKGRP is not INTRA.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-20
Universal access reoriginated call with Spectrum ECAN (scenario 10, part 2)



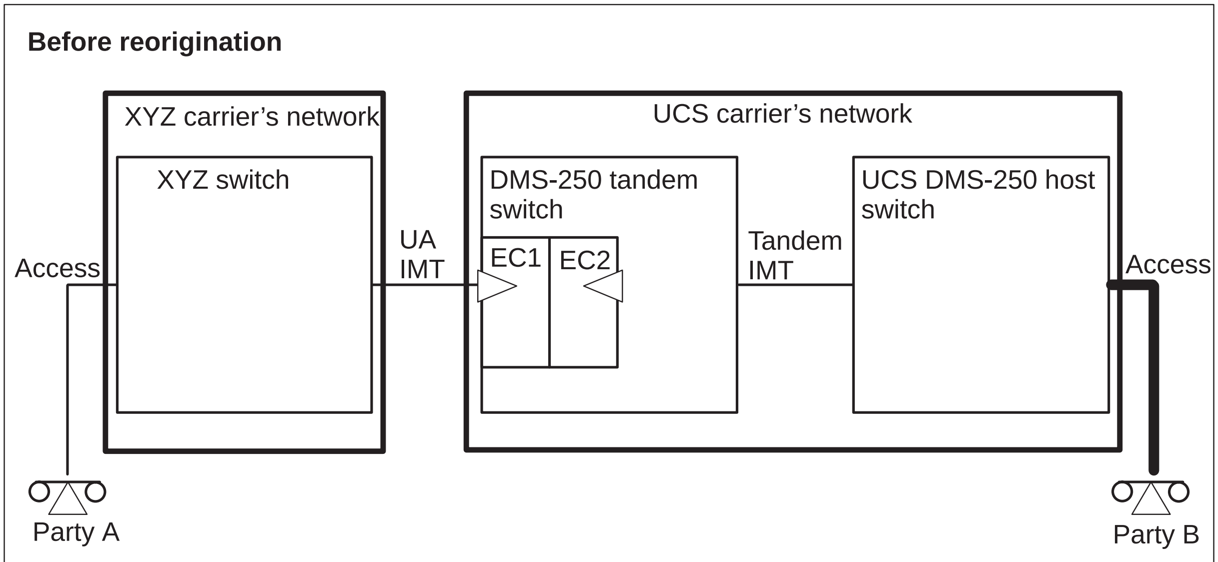
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 11: UA IMT reoriginated call with XPM Internal ECAN

Figure 3-21 illustrates the scenario where EC1 and EC2 (BK2BK) are provisioned at the UCS DMS-250 tandem switch for the UA IMT trunk. EC1 and EC2 are allocated for the original Party A to Party B call that is originated at another carrier's network. The switch in the middle is the reoriginating switch.

Figure 3-21
Universal access reoriginated call with XPM internal ECAN (scenario 11, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

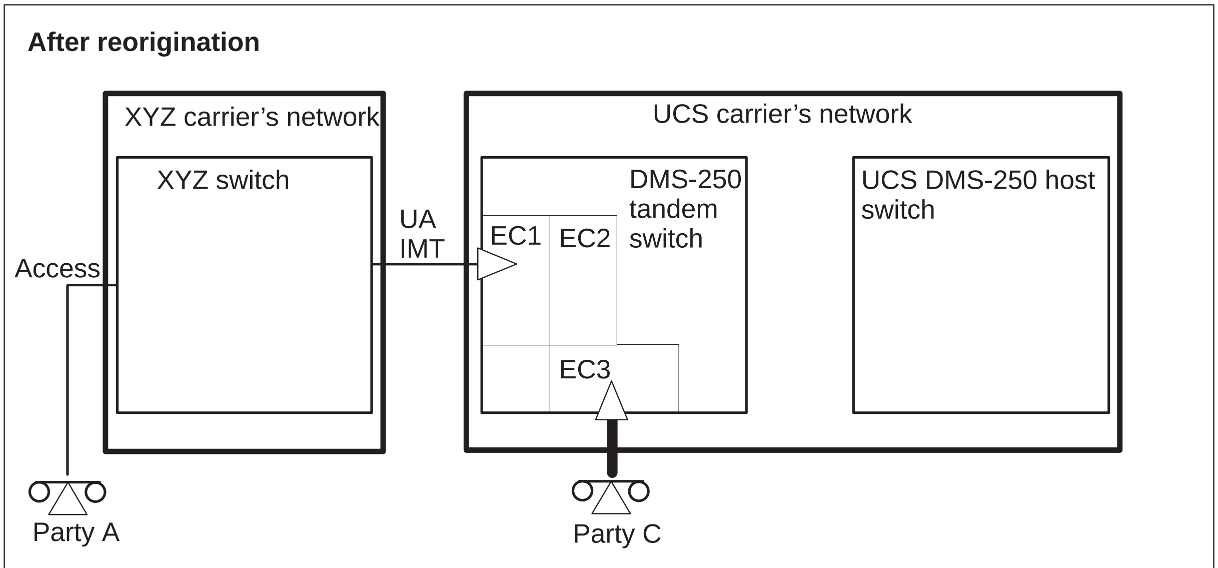
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-22 illustrates the scenario where UA IMT reorigination is initiated to Party C. EC2 deallocates by call processing. EC1 and EC3 (XPM internal ECAN) allocate to cancel forward echo and backward echo, respectively. The same ECAN configuration result also applies if Party C is datafilled with EXTERNAL in ECSTAT at table TRKSGRP.

Datafill requirements are as follows:

- UA IMT between originating switch and tandem switch: FAREC = N; BK2BK = Y.
- UA IMT: NETWKSPC in table TRKGRP is not INTRA.
- Party C connects through XPM: ECSTAT = INTERNAL.

Figure 3-22
Universal access reoriginated call with XPM internal ECAN (scenario 11, part 2)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN is available, but not activated.
EC3 = XPM ECAN cancels backward echo.

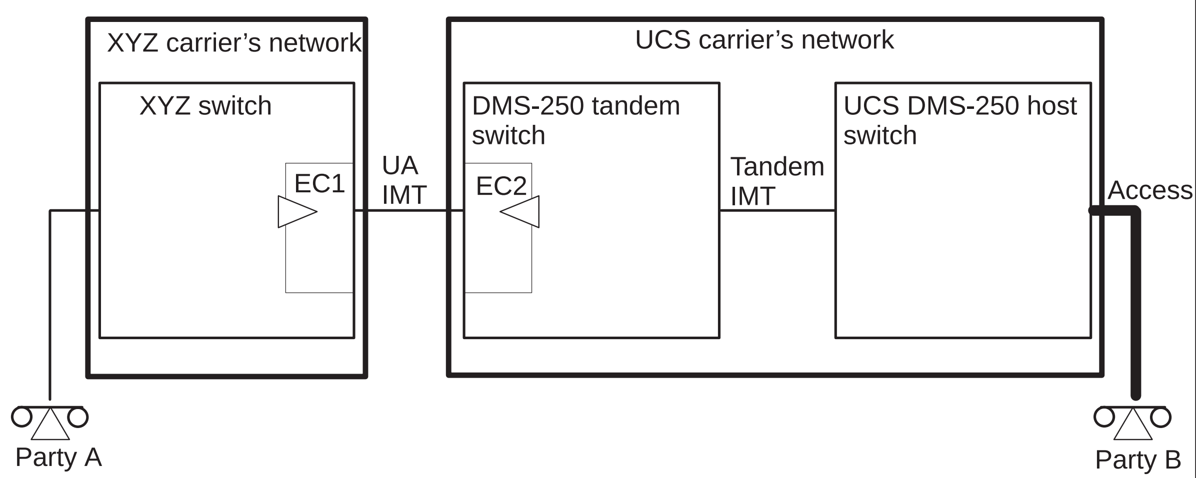
AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 12: UA IMT reoriginated call with only Spectrum ECAN

Figure 3-23 illustrates the scenario where only EC2 is provisioned for the UA IMT trunk at the DMS-250 tandem switch since the ECAN, EC1, that cancels forward echo is assumed to be allocated by another carrier's network. EC2 is allocated to cancel backward echo for the original call. The switch in the middle is the reoriginating switch.

Figure 3-23
Universal access reoriginated call with only Spectrum ECAN (scenario 12, part 1)

Before reorigination



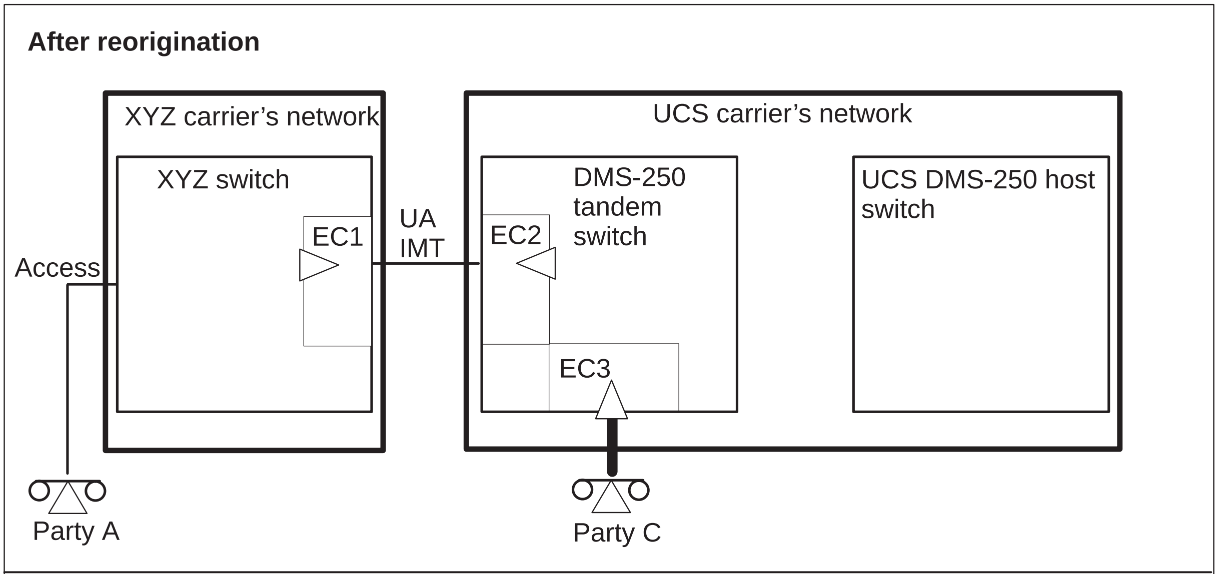
Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-24 illustrates the scenario where UA IMT reorigination is initiated to Party C. EC2 deallocates by call processing and EC3 is allocated to cancel backward echo. Datafill requirements are as follows:

- UA IMT between originating switch and tandem switch: FAREC = N; BK2BK = N.
- UA IMT: NETWKSPC in table TRKGRP is not INTRA.
- Party C connects through Spectrum: FAREC = N; BK2BK = N.

Figure 3-24
Universal access reoriginated call with only Spectrum ECAN (scenario 12, part 2)



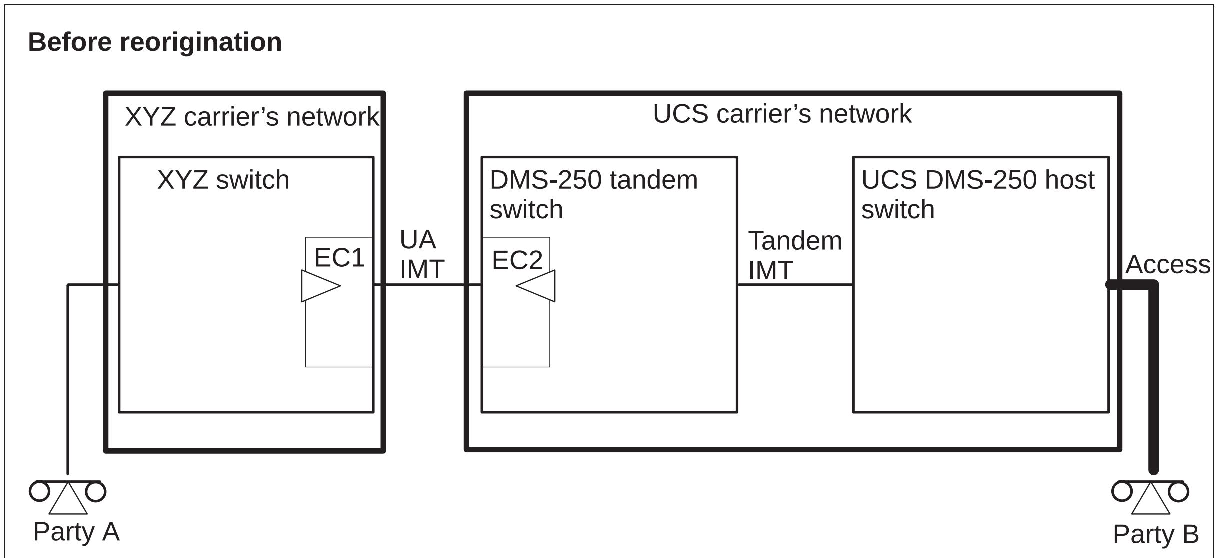
Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 13: UA IMT reoriginated call with only Spectrum ECAN

Figure 3-25 illustrates the scenario where only EC2 is provisioned for the UA IMT trunk at the UCS DMS-250 tandem switch since the EC1 is assumed to be allocated to cancel forward echo by another carrier's network. EC2 is allocated to cancel backward echo for the original call. The switch in the middle is the reoriginating switch.

Figure 3-25
Universal access reoriginated call with only Spectrum ECAN (Scenario 13, part 1)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

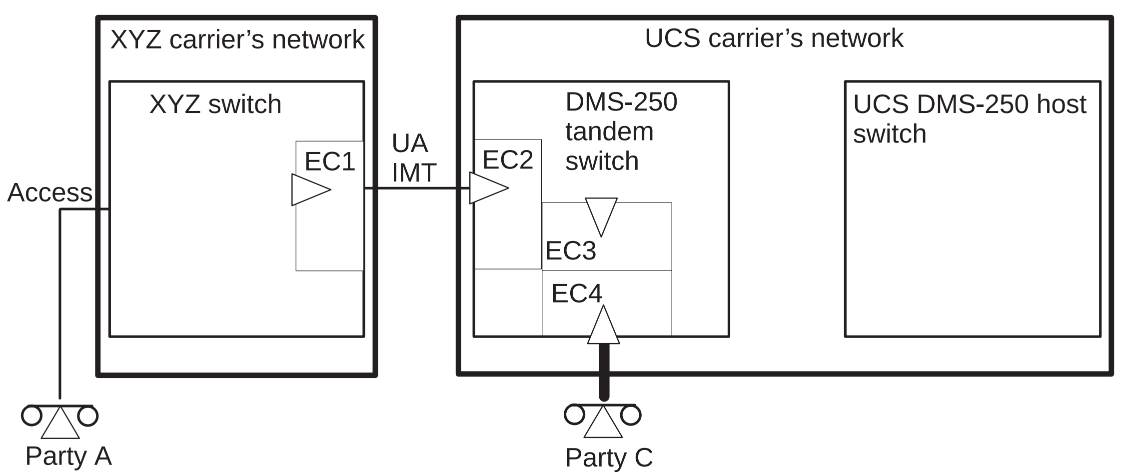
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-26 illustrates the scenario where UA IMT reorigination occurs. EC2 deallocates by call processing and EC3 and EC4 allocate to cancel forward echo and backward echo, respectively, at the UCS DMS-250 tandem switch. Datafill requirements are as follows:

- UA IMT between originating switch and tandem switch: FAREC = N; BK2BK = N.
- UA IMT: NETWKSPC in table TRKGRP is not INTRA.
- Party C connects through Spectrum: FAREC = N; BK2BK = Y.

Figure 3-26
Universal access reoriginated call with only Spectrum ECAN (scenario 13, part 2)

After reorigination



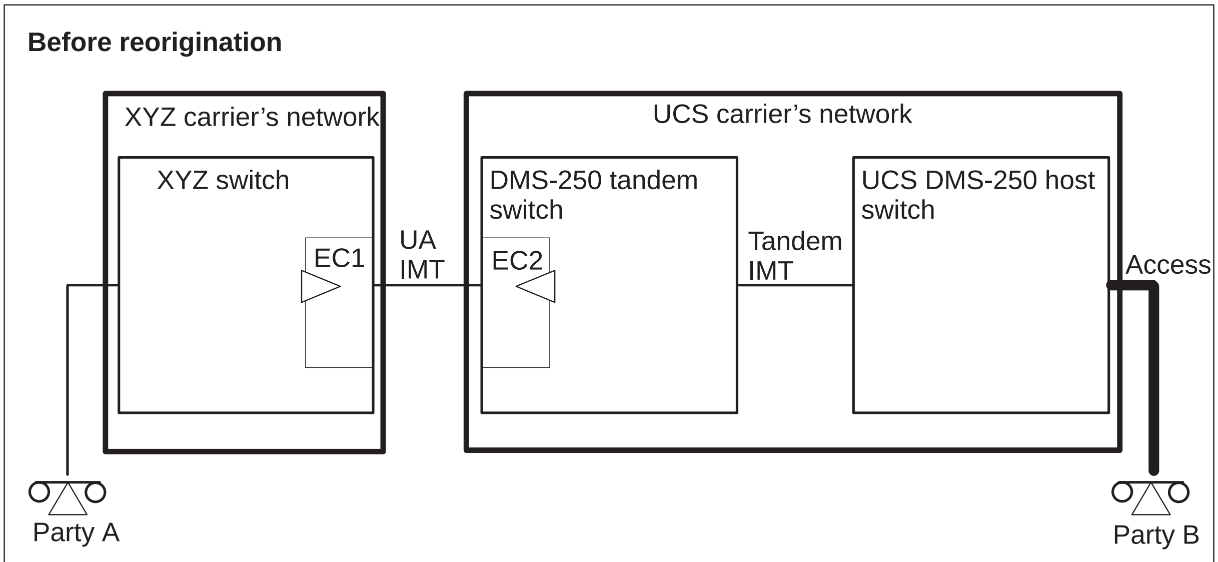
Legend:
EC1, EC3 = ECAN cancels forward echo.
EC2 = Spectrum is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 14: UA IMT reoriginated call with XPM internal ECAN

3-27 illustrates the scenario where only EC2 is provisioned for the UA IMT trunk at the DMS-250 tandem switch since EC1 is assumed to be allocated to cancel forward echo by another carrier's network. EC2 is allocated to cancel backward echo for the original call. The switch in the middle is the reoriginating switch.

Figure 3-27
Universal access reoriginated call with XPM internal ECAN (scenario 14, part 1)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

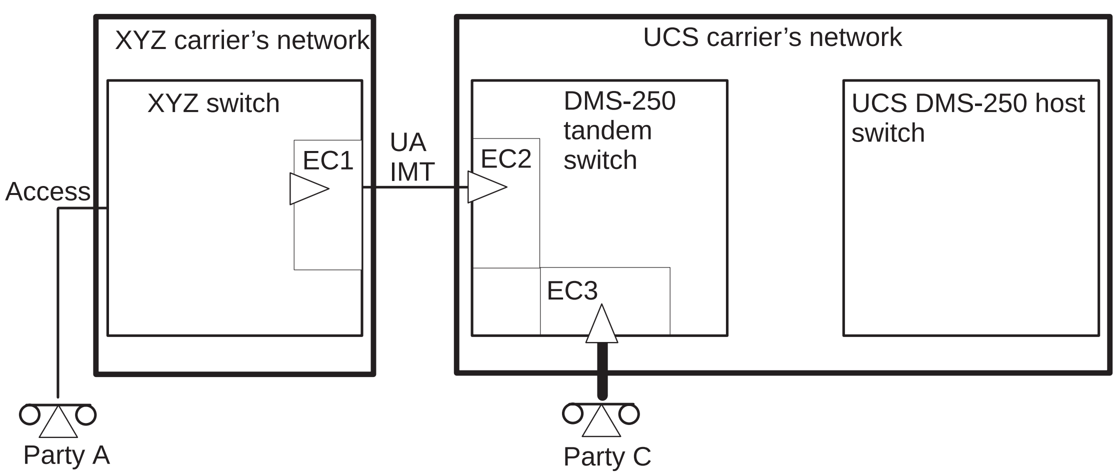
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-28 illustrates the scenario where UA IMT reorigination is initiated to Party C. EC2 deallocates by call processing and EC3 (XPM internal ECAN) allocates to cancel backward echo. Datafill requirements are as follows:

- UA IMT between originating switch and tandem switch: FAREC = N; BK2BK = N
- UA IMT: NETWKSPC in table TRKGRP is not INTRA.
- Party C connects through XPM: ECSTAT = INTERNAL.

Figure 3-28
Universal access reoriginated call with XPM internal ECAN (scenario 14, part 2)

After reorigination



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum is available, but not activated.
EC3 = XPM ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Boomerang reorigination with service platform

Boomerang reorigination uses the original dialed number to route the reoriginated call instead of prompting for a new address, which is the case for normal reorigination. This type of reorigination must interact with a service platform such as an Enhanced Services Provider (ESP).

An ESP is a services platform that provides specialized switching, billing, and call processing functionality capable of producing the SS7 messaging required to originate or terminate calls on a UCS DMS-250 switch. An ESP platform provides either ESP type services, operator type services, or both.

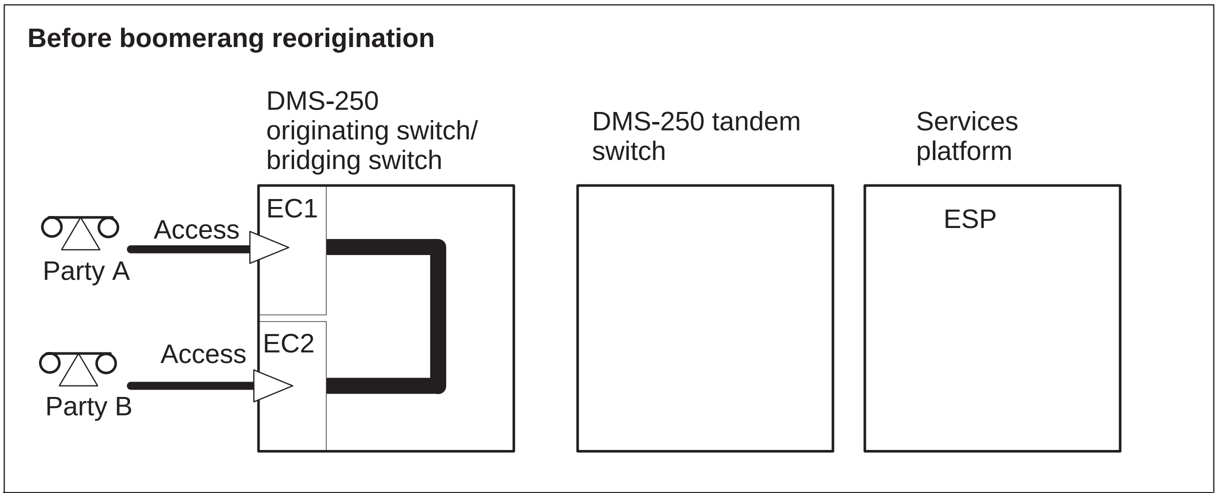
Boomerang reorigination returns operator assisted calls to the ESP for processing. During an initial operator services call, the originating party enters address digits that include an operator prefix digit (0-, 0+, or 01+). If the originating party selects to invoke reorigination, the DMS-250 switch uses the original called number to route the caller back to the ESP, rather than supply dial tone to prompt for new address digits (which is the case with normal reorigination). The ESP then collects new address digits and processes the call.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 1: Boomerang reorigination with only Spectrum ECAN

Figure 3-29 illustrates the scenario where EC1 and EC2 are allocated for the bridged call between Party A and Party B through the ESP.

Figure 3-29
Boomerang reoriginated call with only Spectrum ECAN (scenario 1, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

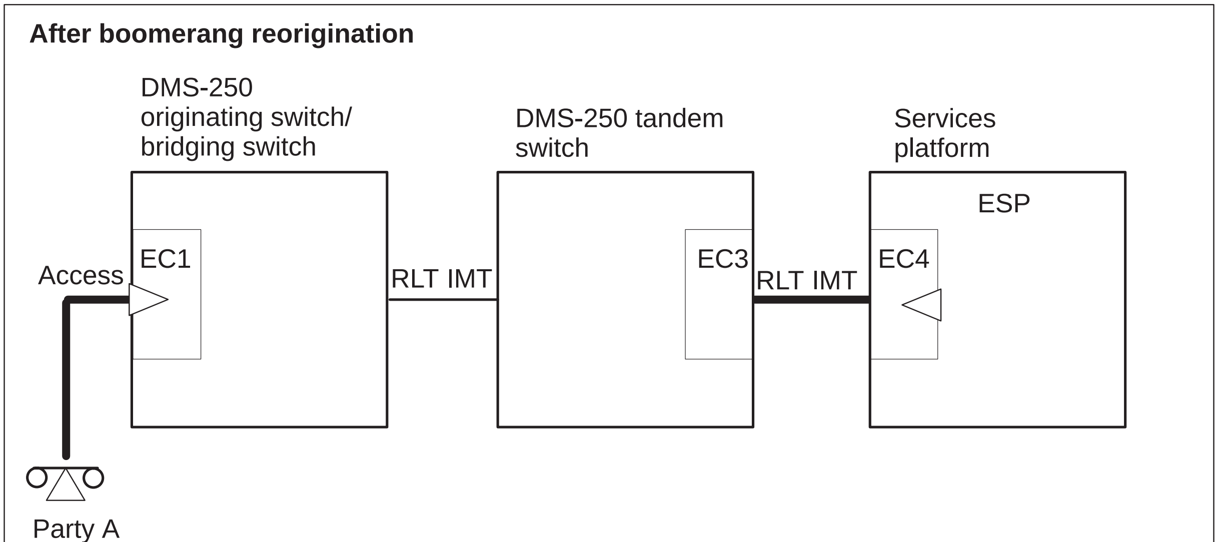
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-30 illustrates the scenario where Party A initiates an Initial Address Message (IAM) message to the ESP for requesting boomerang reorigination. EC2 deallocates. Next, EC4 allocates for the boomerang reoriginated call from Party A to the ESP to cancel backward echo. EC1 remains on the call for cancelling forward echo.

Datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- Party B connects through Spectrum: FAREC = N; BK2BK = N.
- UA IMT between originating switch and tandem switch: FAREC = N; BK2BK = N.

Figure 3-30
Boomerang reoriginated call with only Spectrum ECAN (scenario 1, part 2)



Legend:
EC1 = ECAN cancels forward echo.
EC3 = Spectrum is available, but not activated.
EC4 = XPM ECAN cancels backward echo.

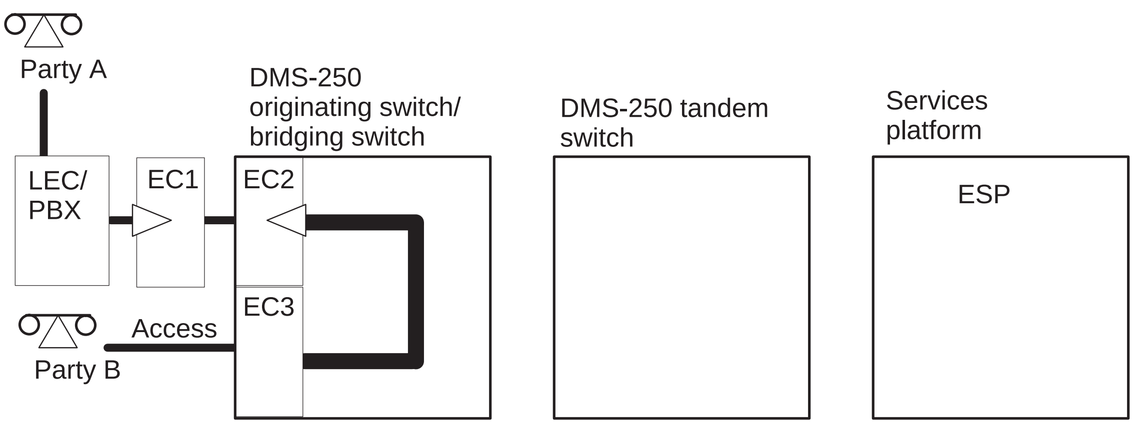
AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 2: Boomerang reorigination with FAREC datafill for Spectrum ECAN

Figure 3-31 illustrates the scenario where EC1 (FAREC) is assumed to be allocated to cancel forward echo, and EC2 is allocated to cancel backward echo for the bridged call between Party A and Party B.

Figure 3-31
Boomerang reoriginated call with FAREC datafill for Spectrum ECAN (scenario 2, part 1)

Before boomerang reorigination



Note: Party A and Party B are bridged through the ESP.

Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.

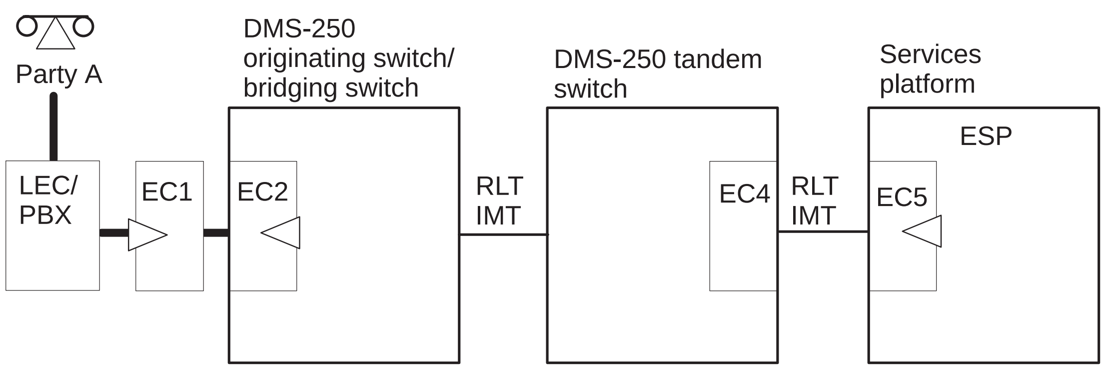
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-32 illustrates the scenario where Party A initiates an IAM message to ESP for requesting boomerang reorigination. EC1 and EC2 remain on the call, and EC5 is allocated. Datafill requirements are as follows:

- Party A connects through Spectrum: FAREC= Y; BK2BK = N.
- Party B connects through Spectrum: FAREC= N; BK2BK = N.
- ISUP RLT between tandem switch and host switch
  - — tandem switch side through Spectrum: FAREC = N; BK2BK = N
  - — host switch side through XPM: ECSTAT = INTERNAL

Figure 3-32
Boomerang reoriginated call with FAREC datafill for Spectrum ECAN (scenario 2, part 2)

After boomerang reorigination



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.
EC4 = Spectrum ECAN is available, but not activated.
EC5 = XPM ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Reorigination for non-operator RLT calls

When the office parameter ALL_RLT_OPR_CALLS is set to Y, all calls made over RLT trunks, including non-operator calls (non 0+ or 0- operator services calls), are treated as operator services calls. When this office parameter is set to N, non-operator RLT calls are treated differently than operator services calls. The separation of these two call types also provides the ability for non-operator RLT calls to reoriginate before bridging or reoriginate in the case where no bridging occurs. The reorigination restrictions used at bridging for operator services calls are also used for non-operator calls with the exception of the office parameter REORIG_FOR_OPERATOR_SERVICES, found in table OFCVAR. Non-operator calls are not restricted by this office parameter. Reorigination for non-operator RLT calls are identical to the ESP service platform. This type of reorigination also allows for both the normal reorigination and the boomerang reorigination interacting with the service platform.

The reorigination for non-operator RLT calls supports both normal reorigination and boomerang reorigination by setting the REORIG_TYPE field in the Operator Information parameter of the Answer Message (ANM) message. Spectrum ECAN call control rule for normal reorigination calls applies for the reorigination for non-operator RLT calls—specifically, deallocation of Spectrum ECAN for the original call, then allocation of Spectrum ECAN for the reoriginated call.

The originating switch receives a non-operator call and allows it to normally reoriginate. The switch allocates reorigination resources to the call. The Initial Address Message (IAM) message is sent to the services platform, then the Address Complete (ACM) and Answer (ANM) messages are received in the originating switch from the services platform. The ANM message specifies the type of reorigination (normal or boomerang). After the reorigination resources are allocated, the Facility Request (FAR) message is sent from the services platform for initiating a redirection RLT on the originating switch.

AD9960
Spectrum ECAN Feature Interactions (continued)

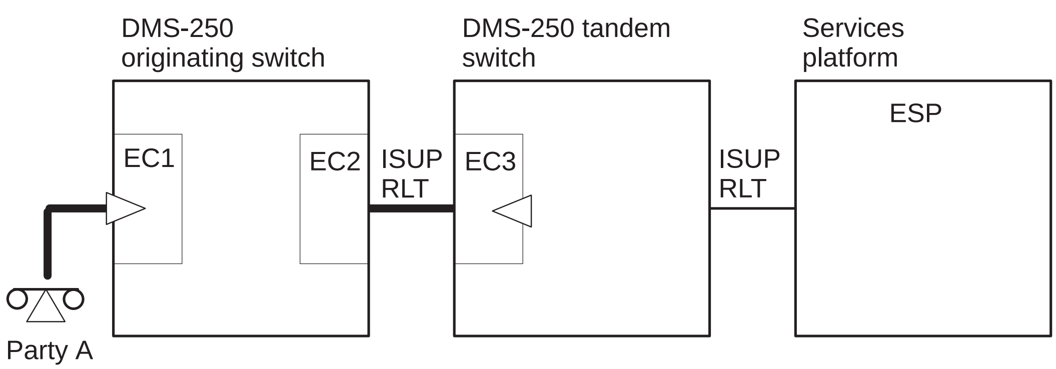
Figure 3-33 illustrates the scenarios where EC1 and EC3 are allocated for the first call from Party A to the service platform. EC4 is allocated when the RLT bridges the new call from Party A to Party B. The figure only show the normal reorigination since the REORIG_TYPE is “Normal Reorigination.” The boomerang reorigination for a non-operator RLT call is the same call flow except that the REORIG_TYPE is “Boomerang Reorigination.”

Datafill requirements are as follows:

- Party A connects through Spectrum: FAREC= N; BK2BK = N.
- Party B connects through Spectrum: FAREC= N; BK2BK = N.
- ISUP RLT originating switch and tandem switch (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-33
Nonoperator RLT call, normal reorigination

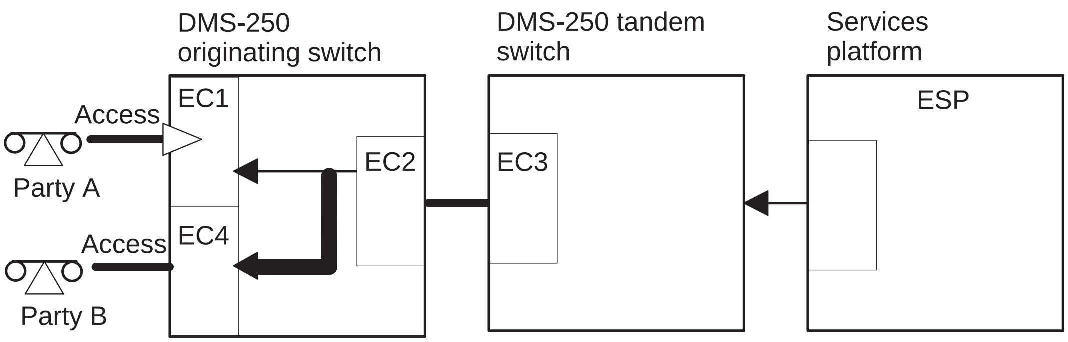
After receiving ANM message with REORIG TYPE = Normal Reorigination



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

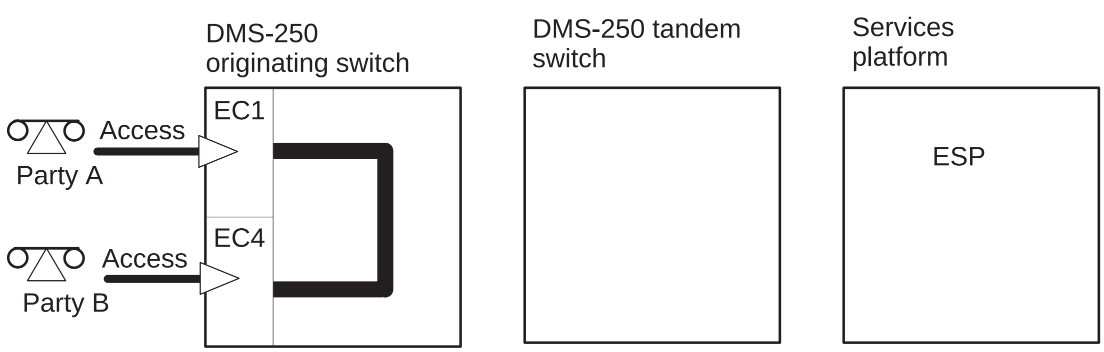
AD9960
Spectrum ECAN Feature Interactions (continued)

Redirect FAR at originating switch



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC3, EC4 = Spectrum ECAN is available, but not activated.

Party A and Party B released from ESP



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Release link trunk

Using elements of ISUP protocol, an SS7 RLT connects UCS DMS-250 switches to a services platform. Although UCS DMS-250 switches provide the RLT capability, services platforms initiate release link trunking. The RLT functionality allows a UCS DMS-250 switch to bridge calls and release SS7 IMT(s). The releasing of these trunks increases a UCS DMS-250 switch’s traffic handling capacity and saves resources during call routing. Without release link trunking, the ESP and the trunks involved must maintain at least one call connection until a call is over.

The following are common services provided on UCS DMS-250 switches that perform SS7 RLT:

- third-party interaction

  This scenario involves a call leg terminating to the services platform and a call leg originating from the services platform. When the services platform wishes to disconnect itself from the call, a message is sent to the bridging switch in order to request bridging the two calls.

- services platform initiated

  This scenario occurs when the services platform originates both legs of the call, then requests bridging the call once the call legs have been established.

- redirection

  This scenario utilizes only one trunk to connect to the services platform. The services platform sends a message to the bridging UCS DMS-250 switch requesting routing to a specified number. The trunks connecting the services platform to the bridging UCS DMS-250 switch are then released.

AD9960
Spectrum ECAN Feature Interactions (continued)

ECAN reconfiguration for RLT calls

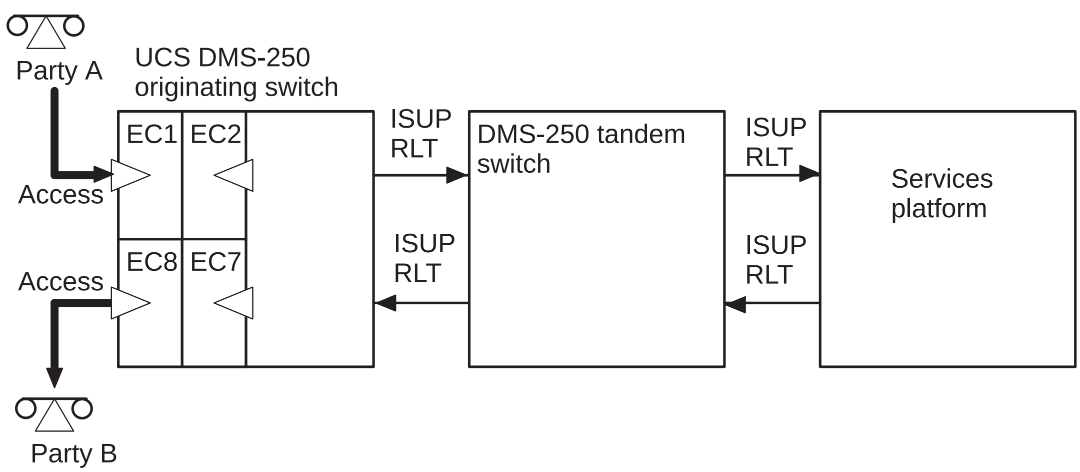
Six ECAN reconfiguration scenarios for RLT calls are shown on the following pages.

RLT scenario 1: The ECAN reconfiguration at RLT occurs only at the bridging switch when both trunks to be bridged are datafilled with a Spectrum ECAN. Any additional Spectrum ECAN(s) on the bridged call are deallocated. The bridging switch could be the originating switch, the tandem (remote) switch, or the services platform.

Figure 3-34 illustrates the scenario where on the bridging switch, Spectrum ECANs with BK2BK datafill are allocated for both Party A and Party B before bridging occurs.

Figure 3-34
Spectrum ECAN reconfiguration at RLT before bridging

RLT ESP call



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC7 = ECAN cancels forward echo.
EC8 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

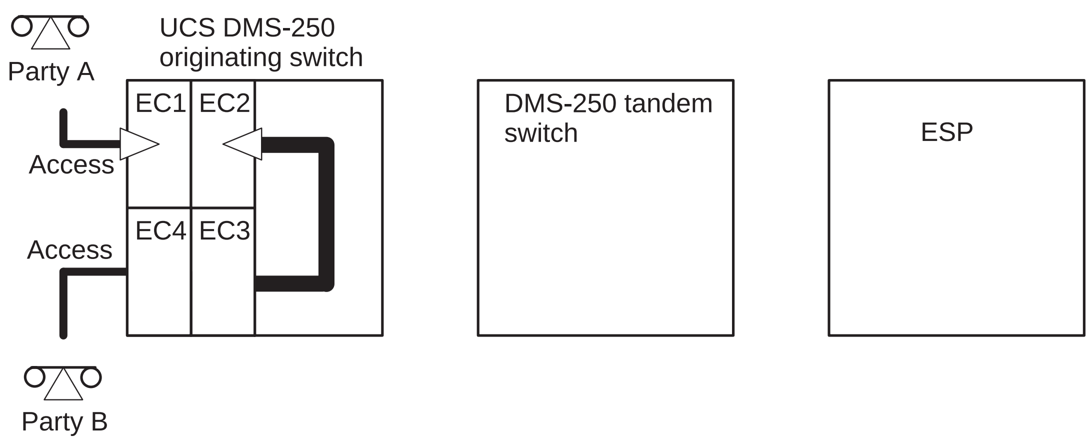
According to the reconfiguration rule at the bridging switch, when Party A and Party B are bridged, extra Spectrum ECANs, EC3 and EC4, are deallocated. Figure 3-35 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = Y.
- Party B connected through Spectrum: FAREC = N; BK2BK = Y.

Figure 3-35
Spectrum ECAN deallocation after bridging

Bridging RLT ESP call at originating switch



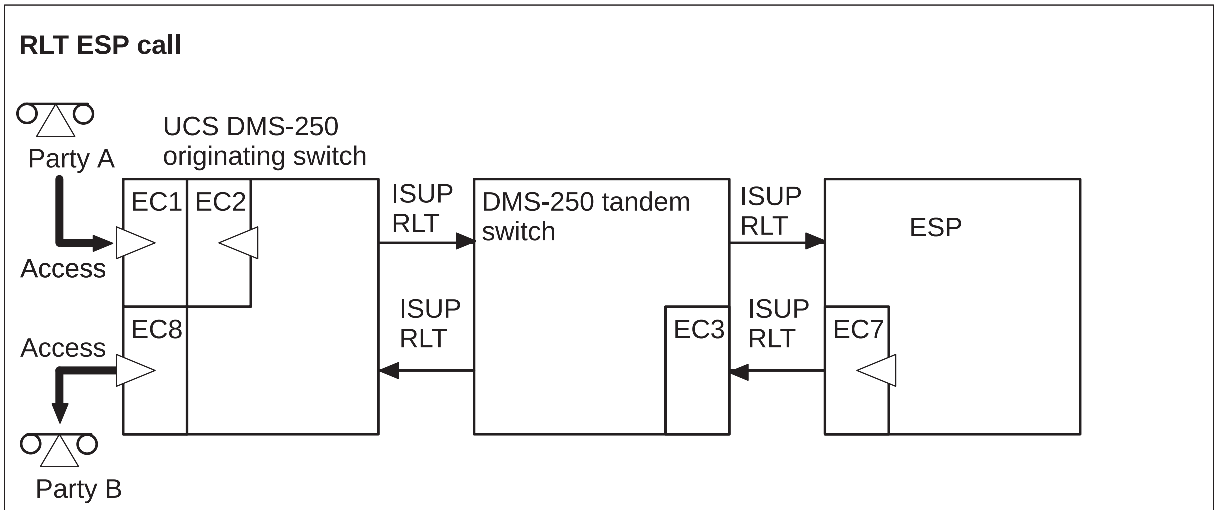
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = ECAN is available, but not activated.
EC4 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

RLT scenario 2:

Figure 3-36 illustrates the scenario where Spectrum ECANs on the bridging switch with BK2BK datafill are allocated for Party A before bridging occurs.

Figure 3-36
Spectrum ECAN allocation for Party A before bridging



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = ECAN is available, but not activated.
EC7 = ECAN cancels forward echo.
EC8 = Spectrum ECAN cancels backward echo.

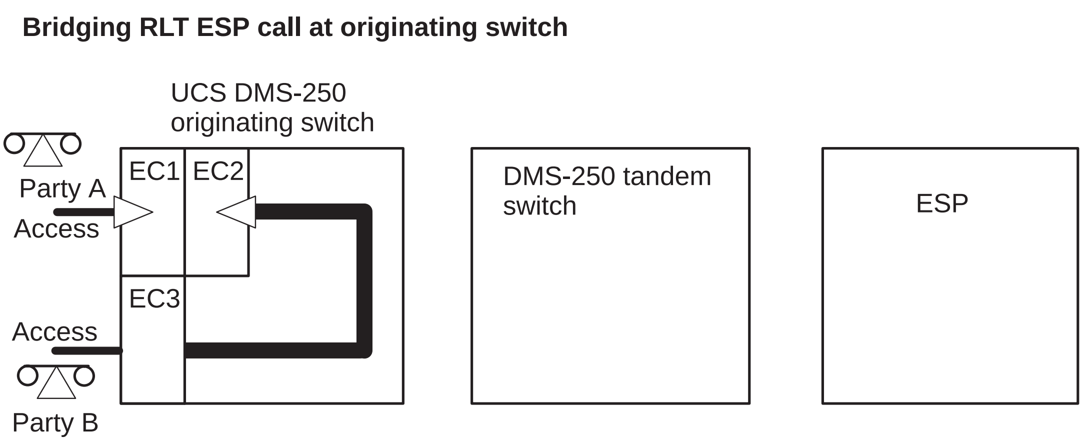
AD9960
Spectrum ECAN Feature Interactions (continued)

At the bridging switch, when Party A and Party B are bridged, the extra Spectrum ECAN, EC3, is deallocated for the bridged call. Figure 3-37 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = Y.
- Party B connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between tandem switch and host switch (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-37
Spectrum ECAN deallocation after bridging



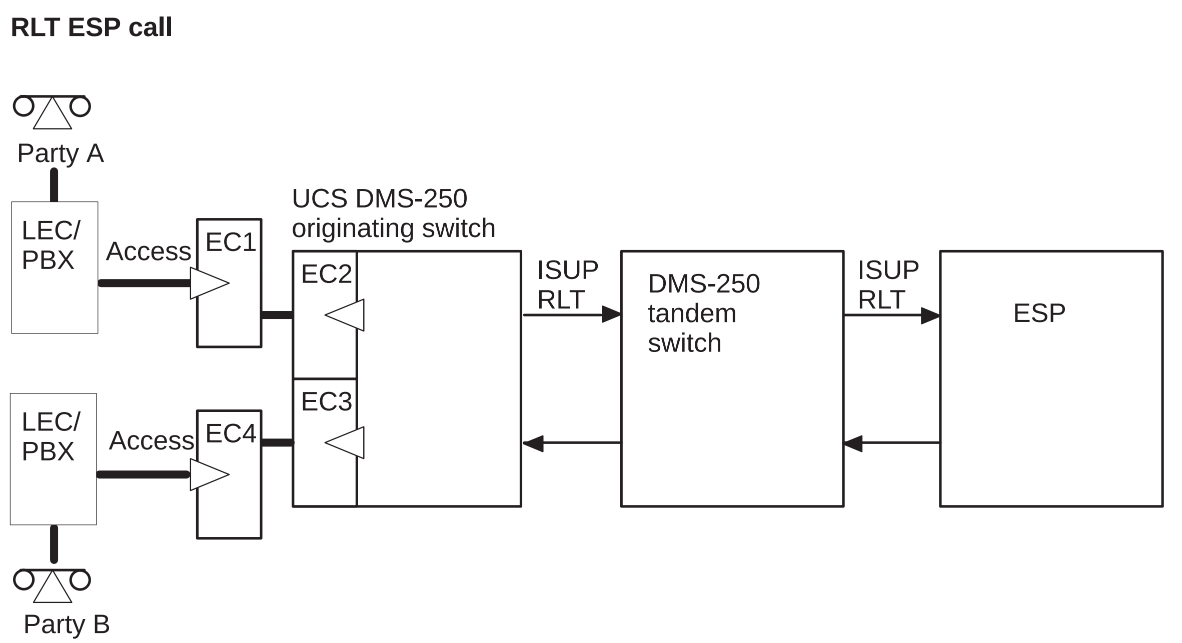
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

RLT scenario 3: ECAN reconfiguration of RLT call

Figure 3-38 illustrates the scenario where Spectrum ECANs on the bridging switch with FAREC datafill are allocated for both Party A and Party B before bridging occurs.

Figure 3-38
Spectrum ECAN allocation on bridging switch with FAREC datafill before bridging



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.
EC3 = Spectrum ECAN cancels forward echo.
EC4 = ECAN cancels backward echo.

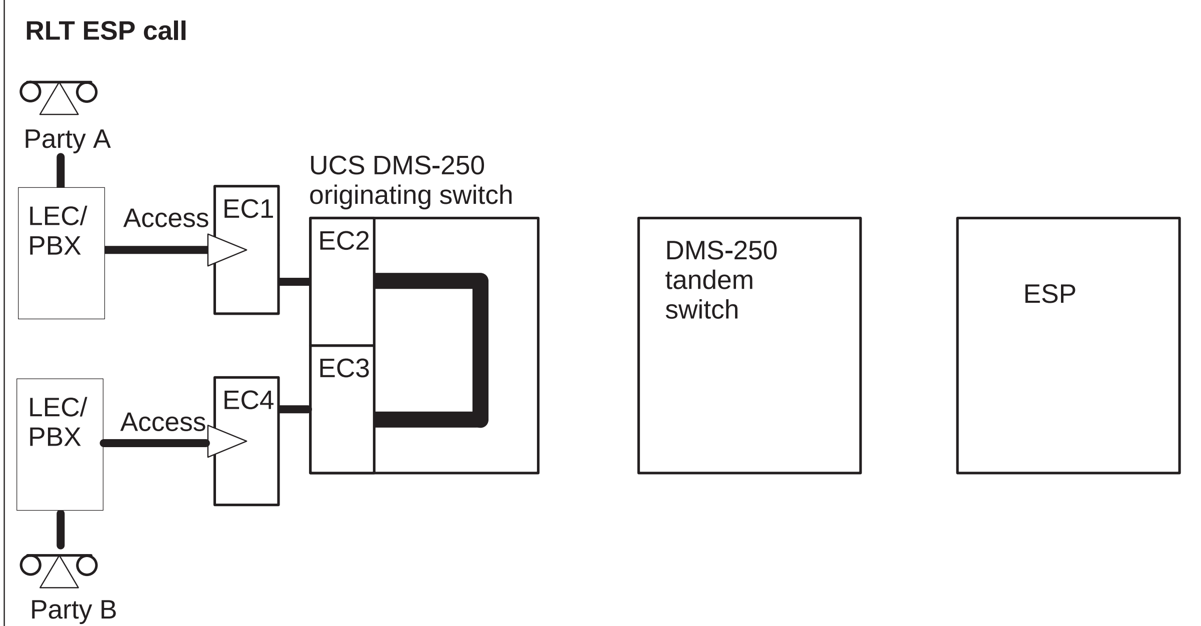
AD9960
Spectrum ECAN Feature Interactions (continued)

When Party A and Party B are bridged, extra Spectrum ECANs, EC2 and EC3, are deallocated for the call. Figure 3-39 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = Y; BK2BK = N.
- Party B connects through Spectrum: FAREC = Y; BK2BK = N.

Figure 3-39
Spectrum ECAN deallocation on bridging switch with FAREC datafill after bridging



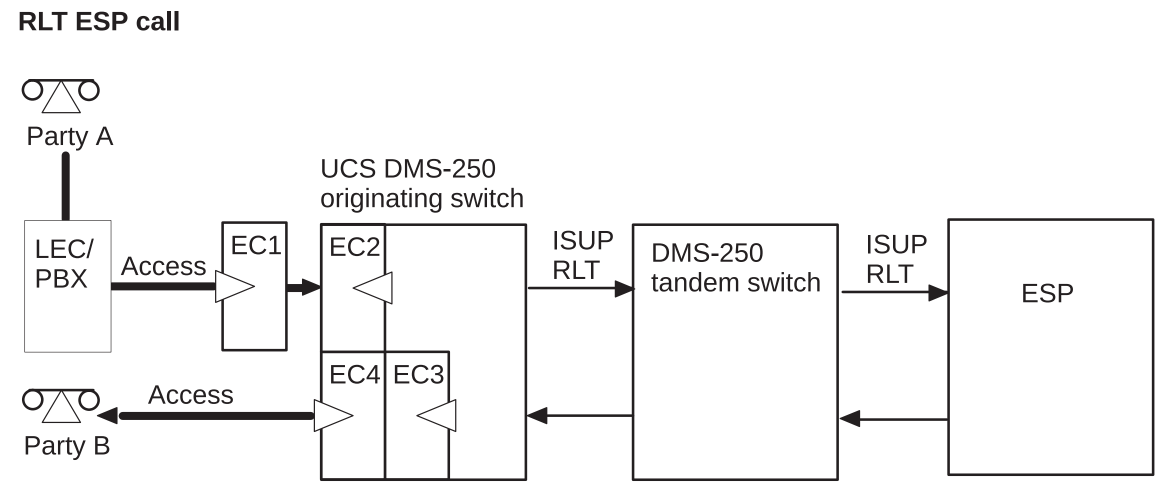
Legend:
EC1 = ECAN cancels forward echo.
EC2, EC3= Spectrum ECAN is available, but not activated.
EC4 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

RLT scenario 4:

Figure 3-40 illustrates the scenario for the originating switch before the bridging occurs. Spectrum ECANs with FAREC datafill, EC1 and EC2, are allocated for Party A, and Spectrum ECANs with BK2BK datafill, EC3 and EC4, are allocated for Party B.

Figure 3-40
Spectrum ECAN allocation on originating switch before bridging



Legend:
EC1, EC3 = ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.

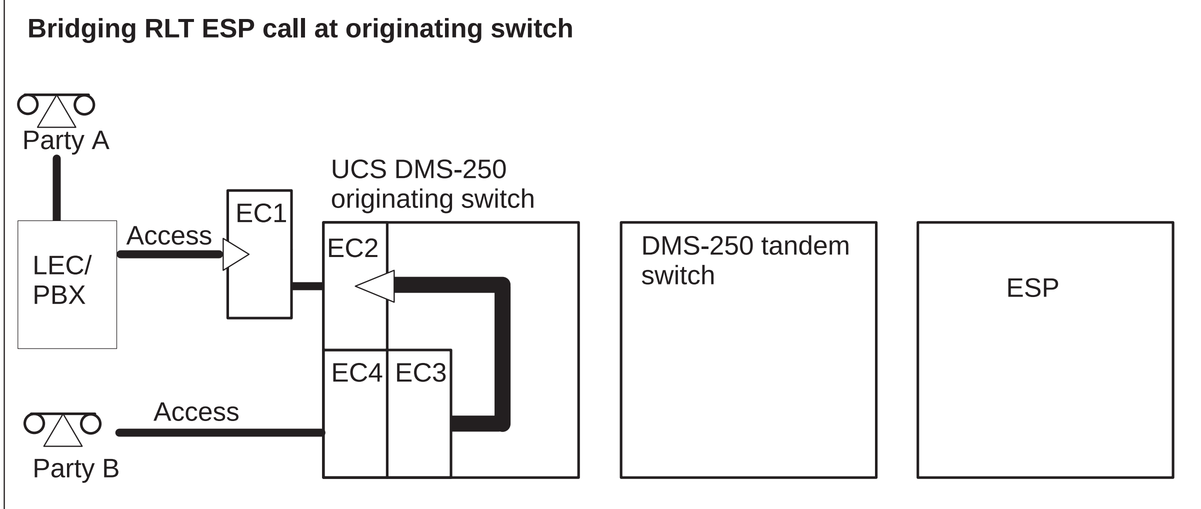
AD9960
Spectrum ECAN Feature Interactions (continued)

According to Spectrum ECAN reconfiguration rule on the bridged call, extra Spectrum ECANs, EC3 and EC4, deallocate on the call between Party A and Party B. Figure 3-41 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = Y; BK2BK = N.
- Party B connects through Spectrum: FAREC = N; BK2BK = Y.

Figure 3-41
Spectrum ECAN deallocation on originating switch after bridging



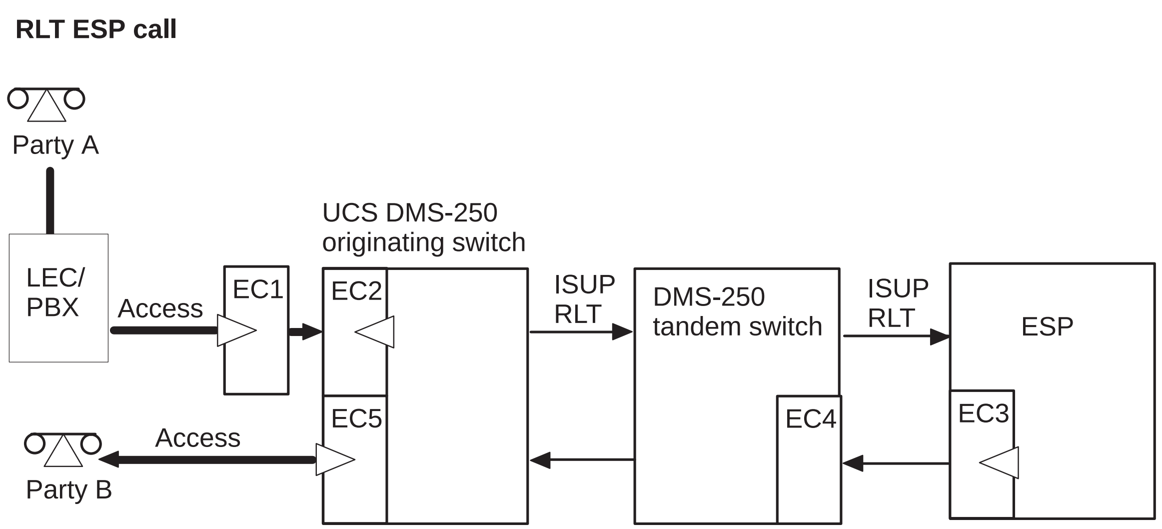
Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.
EC3 = ECAN is available, but not activated.
EC4 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

RLT scenario 5:

Figure 3-42 illustrates the scenario for the originating switch before bridging occurs. Spectrum ECANs with FAREC datafill, EC1 and EC2, allocate for Party A and Spectrum ECAN, EC5, allocates for Party B.

Figure 3-42
Spectrum ECANs allocation on originating switch before bridging



Legend:
EC1, EC3 = ECAN cancels forward echo.
EC2, EC5 = Spectrum ECAN cancels backward echo.
EC4 = ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

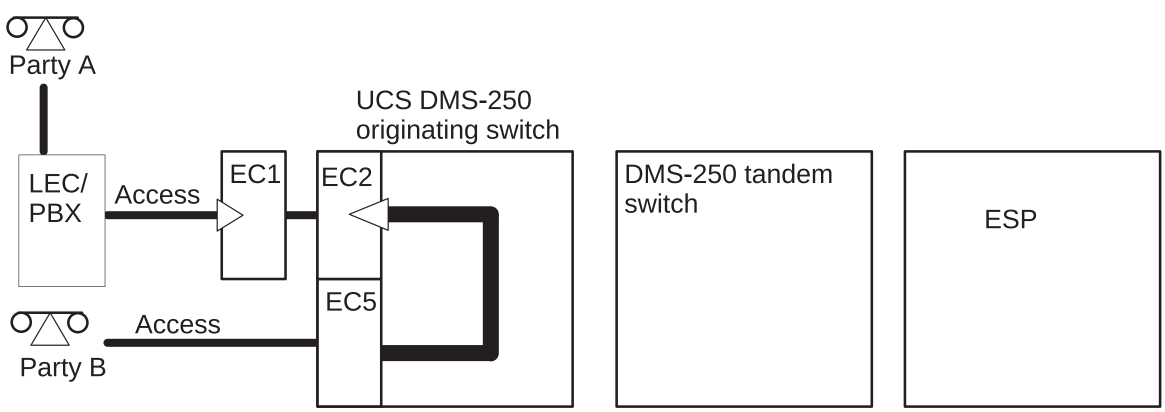
According to the reconfiguration rule at the bridging switch, when Party A and Party B are bridged, an extra Spectrum ECAN, EC5, is deallocated for the bridged call. Figure 3-43 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = Y; BK2BK = N.
- Party B connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between tandem switch and host switch (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-43
Spectrum ECAN deallocation on originating switch after bridging

Bridging RLT ESP call at originating switch



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.
EC5 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

Third-party interaction scenario

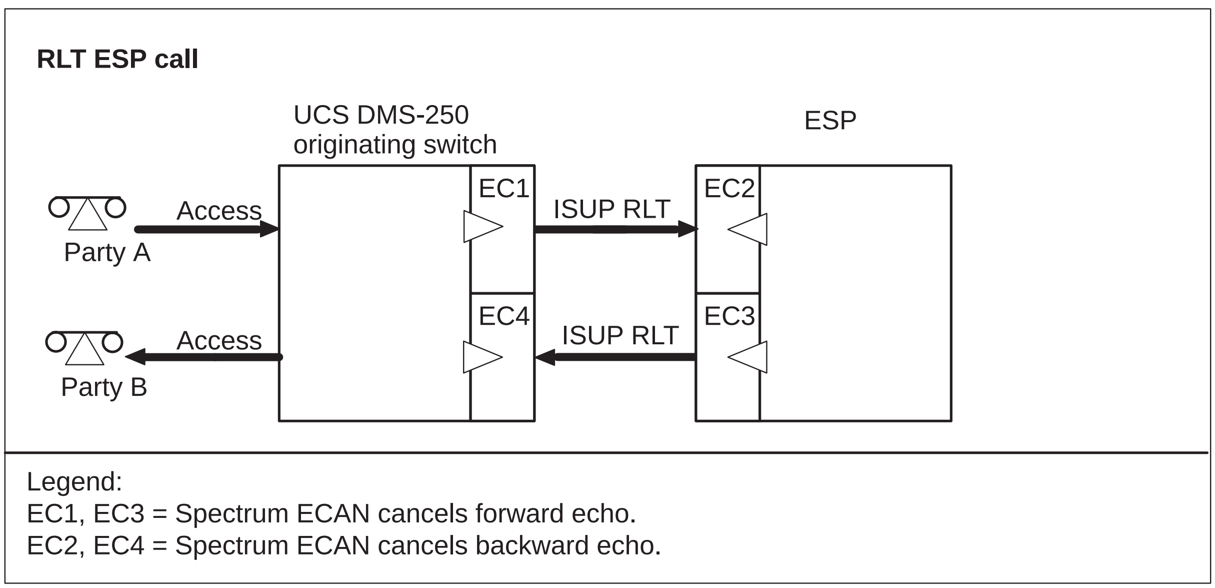
This scenario involves a call leg (Party A) terminating to the services platform and a call leg (Party B) originating from the ESP. When the ESP wishes to disconnect itself from the call, a FAR message is sent to the bridging switch in order to request the bridging of the two calls.

Thirty third-party interaction scenarios are included in this chapter.

Scenario 1: Bridging RLT ESP call at originating switch

Figure 3-44 illustrates the scenario where EC1 and EC2 activate for the call that is destined for ESP since the IMT RLT between the originating switch and the ESP is a long IMT trunk. EC3 and EC4 are allocated for the call that is initiated by ESP.

Figure 3-44
Bridging RLT ESP call at originating switch, third-party interaction



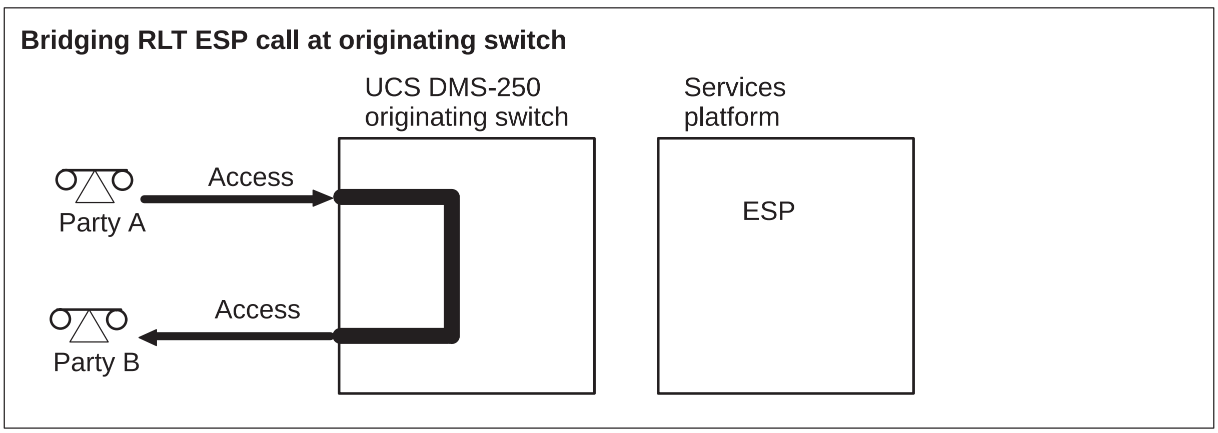
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-45 illustrates the scenario where bridging occurs on the originating switch. All the ECANs (EC1, EC2, EC3, and EC4) deallocate. This scenario does not require reconfiguration.

Datafill requirements are as follows:

- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-45
Spectrum ECAN deallocation, third-party interaction

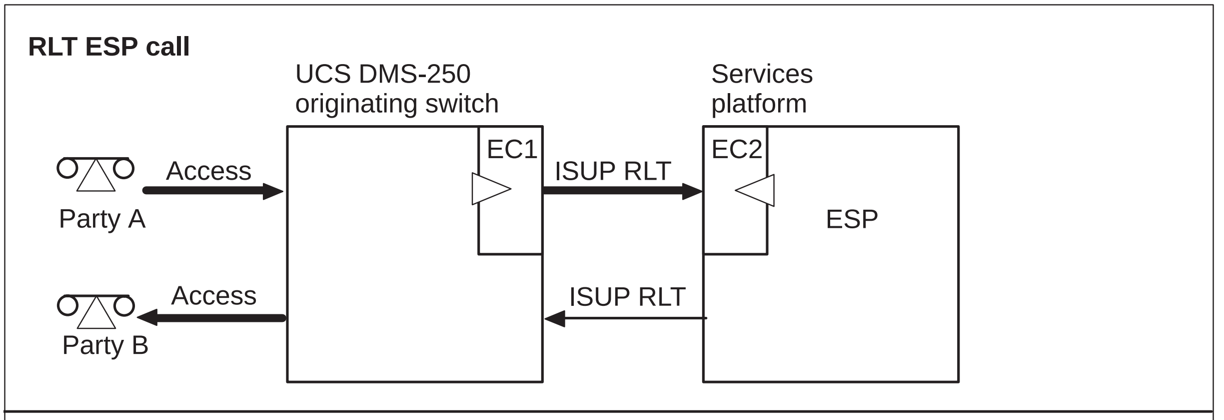


AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 2: Bridging RLT ESP call at ESP

Figure 3-46 illustrates the scenario where EC1 and EC2 allocate for the call from Party A to ESP. ECANs are not provisioned for the call initiated by ESP to Party B.

Figure 3-46
Bridging RLT ESP call at ESP, Spectrum ECAN allocation for first call leg only



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

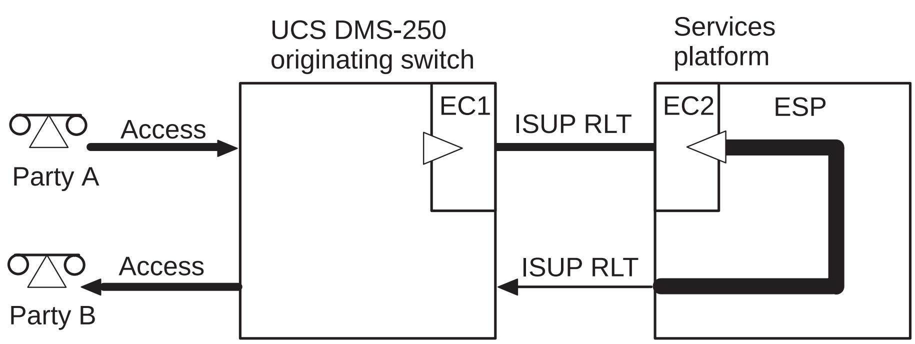
Figure 3-47 illustrates the scenario where bridging occurs on the services platform. EC1 and EC2 remain on the bridged call. This scenario does not require reconfiguration.

Datafill requirement is as follows:

- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-47
Bridging RLT ESP call at ESP, Spectrum ECAN allocation remains on bridged call

Bridging RLT ESP call at ESP



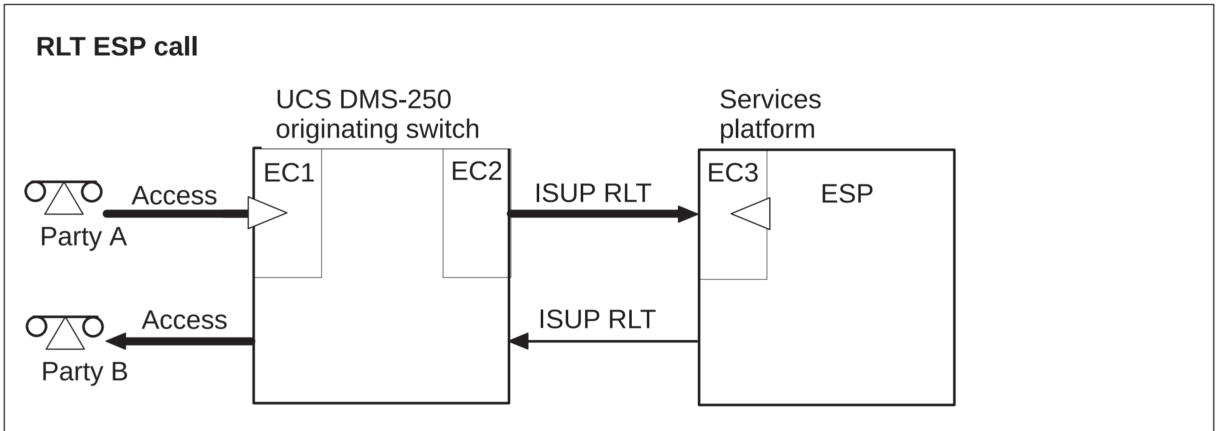
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 3: Bridging RLT ESP call at ESP

Figure 3-48 illustrates the scenario where EC1 and EC3 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-48
Bridging RLT ESP call at ESP, EC1 allocation at originating switch, EC3 allocation at ESP



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

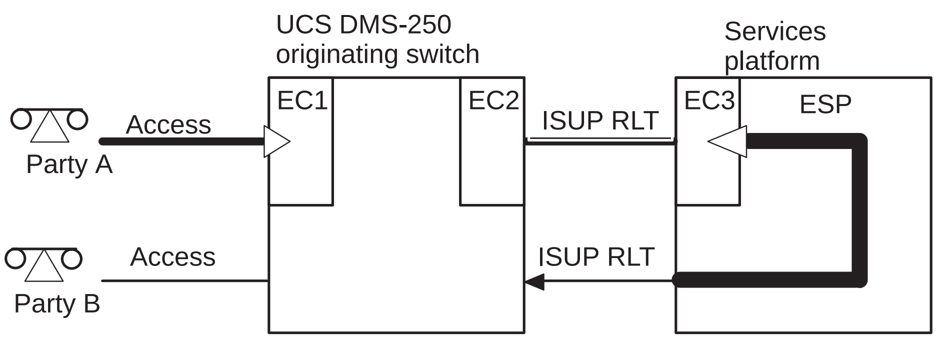
Figure 3-49 illustrates the scenario where bridging occurs on the services platform. EC1 and EC3 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-49
Bridging RLT ESP call at ESP, EC1 and EC3 remain active on bridged call

Bridging RLT ESP call at ESP



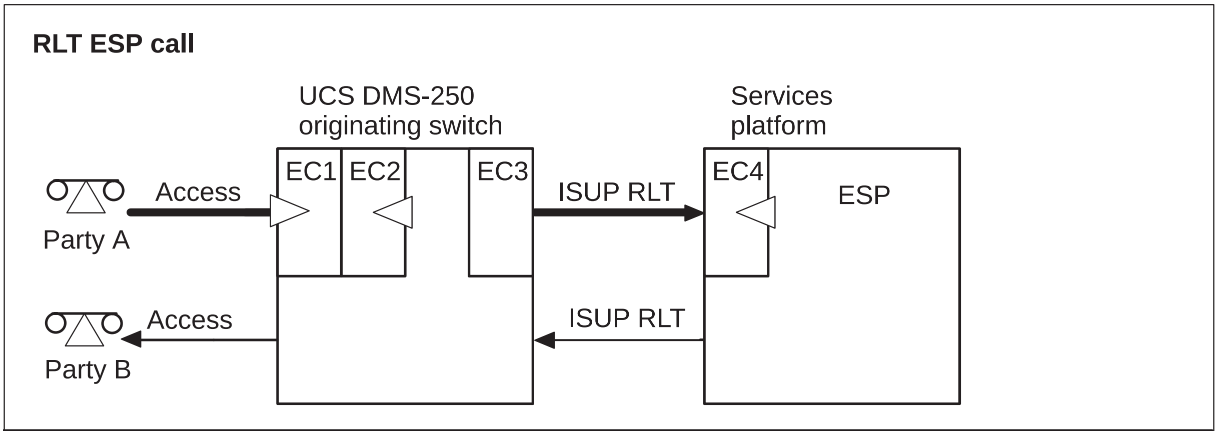
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 4: Bridging RLT ESP call at ESP

Figure 3-50 illustrates the scenario where EC1, EC2, and EC4 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-50
Bridging RLT ESP call at ESP (EC1, EC2, and EC4 allocation for call)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

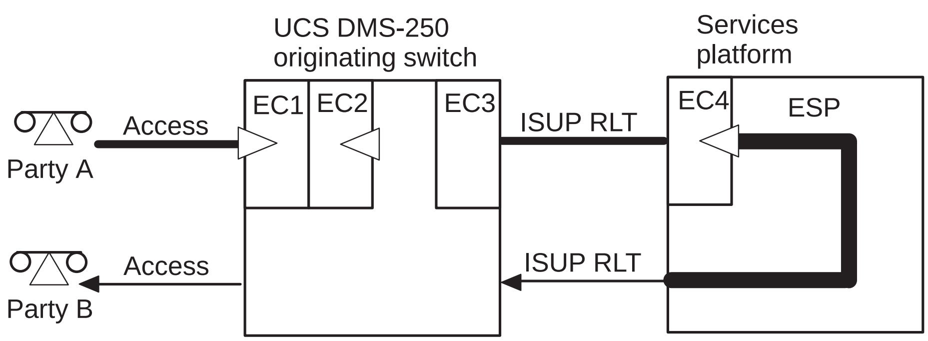
Figure 3-51 illustrates the scenario where bridging occurs on the services platform switch, EC1, EC2, and EC4 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-51
Bridging RLT ESP call at ESP (EC1, EC2, and EC4 remain active on bridged call)

Bridging RLT ESP call at ESP



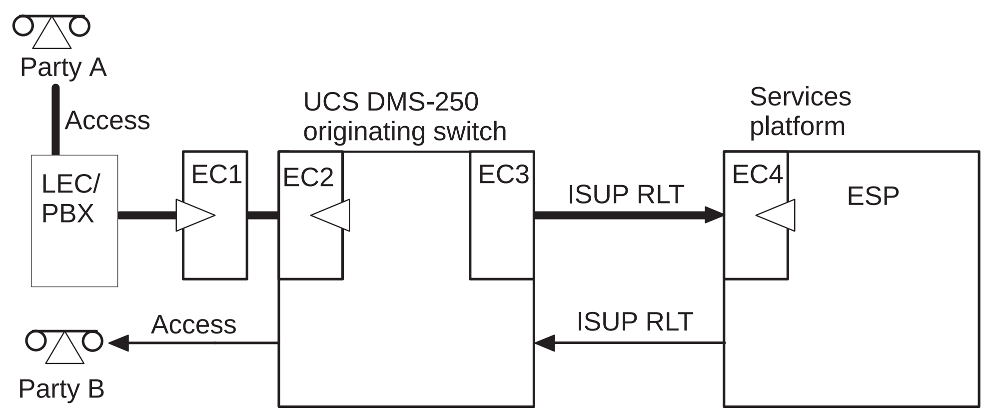
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 5: Bridging RLT ESP call at ESP

Figure 3-52 illustrates the scenario where EC1, EC2, and EC4 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-52
Bridging RLT ESP call at ESP (scenario 5, part 1)



Legend:
EC1 = ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.

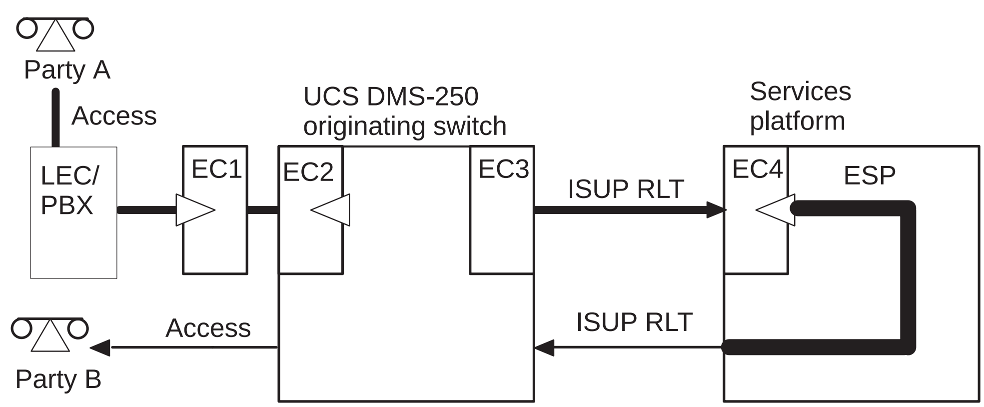
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-53 illustrates the scenario where bridging occurs on the services platform. EC1, EC2, and EC4 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = Y; BK2BK = Y.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-53
Bridging RLT ESP call at ESP (scenario 5, part 2)



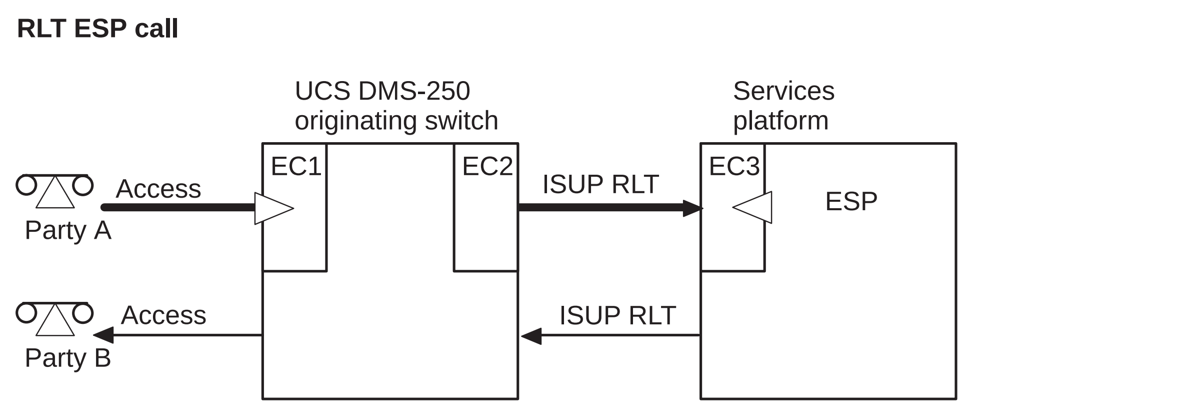
Legend:
EC1 = ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 6: Bridging RLT ESP call at ESP

Figure 3-54 illustrates the scenario where EC1 (ECSTAT = INTERNAL) and EC3 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-54
Bridging RLT ESP call at ESP (scenario 6, part 1)



Legend:
EC1 = XPM ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

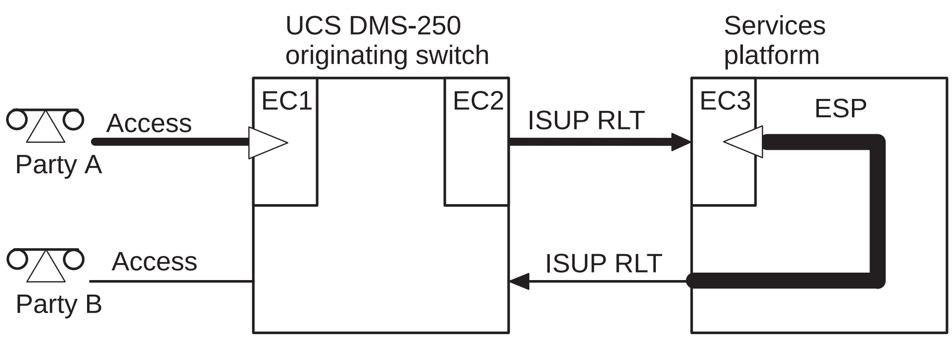
Figure 3-55 illustrates the scenario where bridging occurs on the services platform. EC1 and EC3 remain on the bridged call. Reconfiguration does not occur in this scenario. The same ECAN allocation is also applied for this scenario if Party A's datafill is ECSTAT = EXTERNAL in table TRKSGRP.

Datafill requirements are as follows:

- Party A connects through XPM: ECSTAT = INTERNAL.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-55
Bridging RLT ESP call at ESP (scenario 6, part 2)

Bridging RLT ESP call at ESP



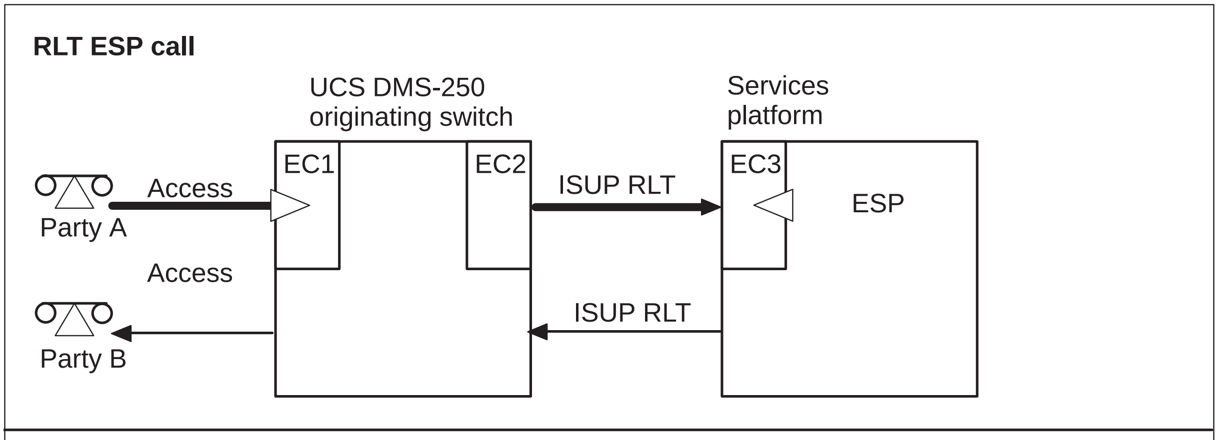
Legend:
EC1 = XPM ECAN cancels forward echo..
EC2 = Spectrum ECAN is available, but not activated
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 7: Bridging RLT ESP call at originating switch

Figure 3-56 illustrates the scenario where EC1 and EC3 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-56
Bridging RLT ESP call at originating switch (scenario 7, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

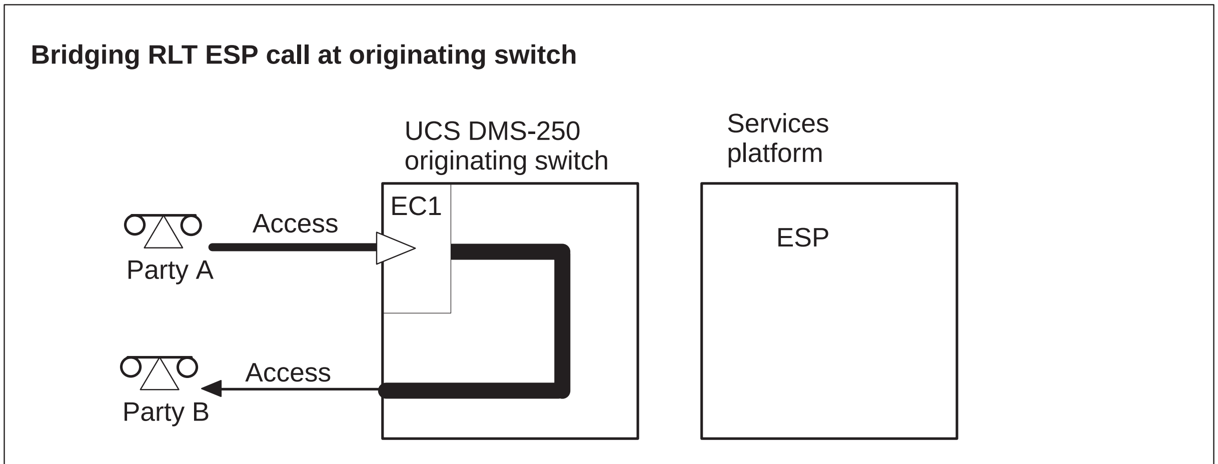
AD9960
Spectrum ECAN Feature Interactions (end)

Figure 3-57 illustrates the scenario where bridging occurs on the originating switch. EC3 is deallocated when the connection between the originating switch and the services platform is taken down. EC1 remains on the bridged call. This scenario only allocates one ECAN for the bridged call. To avoid the shortage of an ECAN on the call as shown in this scenario, the provisioning rule states that the datafill in table SPMECAN for a long access mode trunk should always be either BK2BK or FAREC.

Datafill requirements are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-57
Bridging RLT ESP call at originating switch (scenario 7, part 2)



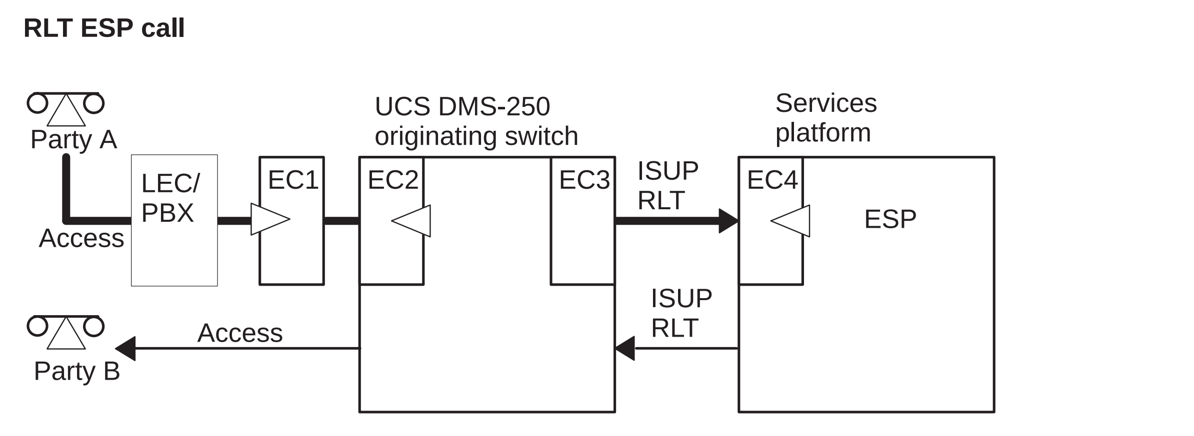
Legend:
EC1 = Spectrum ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 8: Bridging RLT ESP call at originating switch

Figure 3-58 illustrates the scenario where EC1, EC2, and EC4 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-58
Bridging RLT ESP call at originating switch (scenario 8, part 1)



Legend:
EC1 = ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

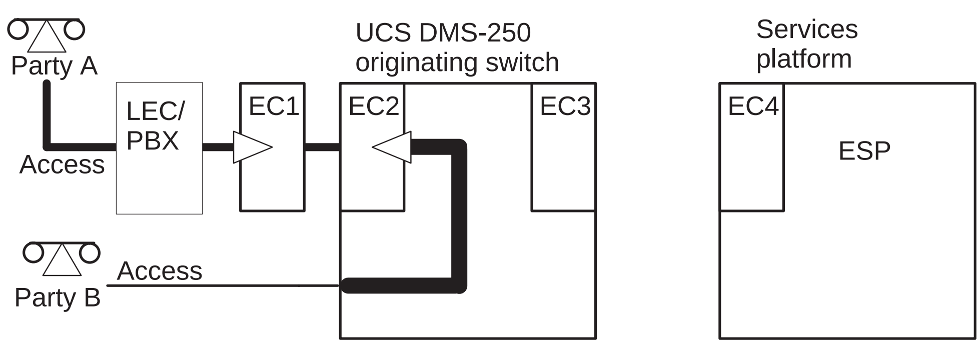
Figure 3-59 illustrates the scenario where bridging occurs on the originating switch. EC1 and EC2 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = Y; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-59
Bridging RLT ESP call at originating switch (scenario 8, part 2)

Bridging RLT ESP call at the originating switch



Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.
EC3, EC4 = ECAN is available, but not activated.

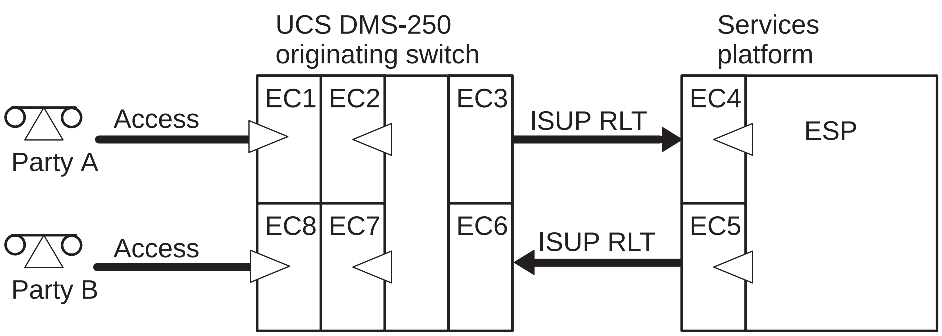
AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 9: Bridging RLT ESP call at originating switch

Figure 3-60 illustrates the scenario for the incoming call from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is allocated because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, both EC7 and EC8 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC5 is allocated because all ECANs that cancel forward echo in an ESP initiated call are always allocated.

Figure 3-60
Bridging RLT ESP call at originating switch (scenario 9, part 1)

RLT ESP call



Legend:
EC1, EC5 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, E6 = Spectrum ECAN is available, but not activated.
EC4, EC8 = Spectrum ECAN cancels backward echo.
EC7 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

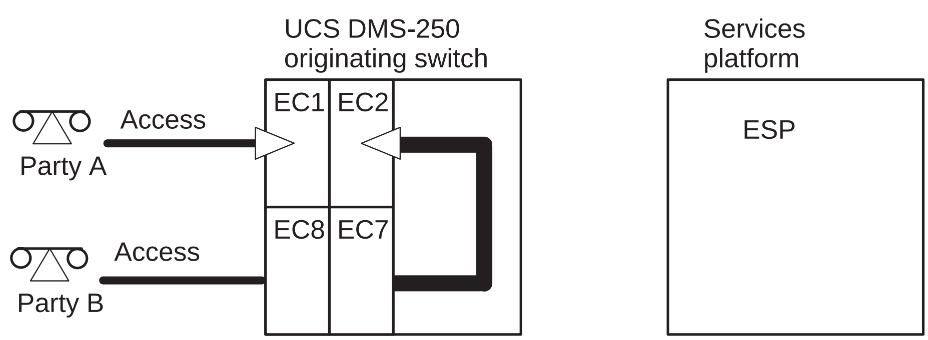
Figure 3-61 illustrates the scenario where bridging occurs at the originating switch, EC4 and EC5 are deallocated for the call being taken down. ECAN reconfiguration takes place to deallocate EC7 and EC8 invoked by the computing module call processing. EC1 and EC2 remain on the bridged call to cancel forward echo and backward echo in the bridged call, respectively.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-61
Bridging RLT ESP call at originating switch (scenario 9, part 2)

Bridging RLT ESP call at the originating switch



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC7 = ECAN is available, but not activated.
EC8 = Spectrum ECAN is available, but not activated.

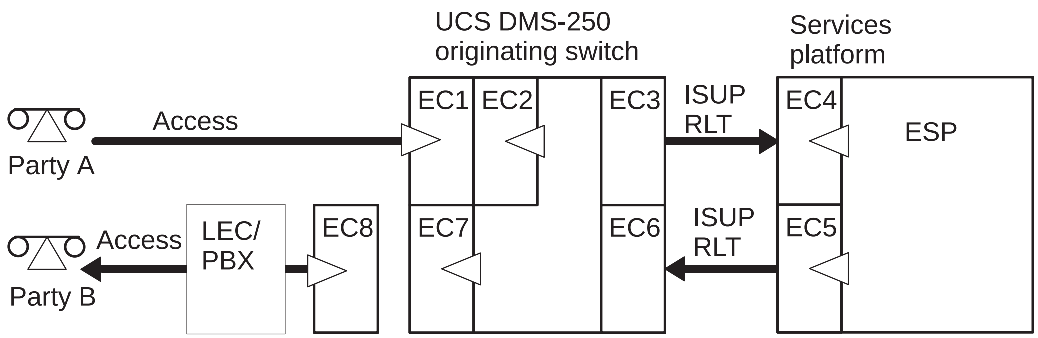
AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 10: Bridging RLT ESP call at originating switch

Figure 3-62 illustrates the scenario for the incoming call from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, both EC7 and EC8 (provisioning as FAREC) are allocated for a long access trunk in an ESP call. EC5 is also allocated in the call because all ECANs that cancel forward echo in an ESP initiated call are always allocated.

Figure 3-62
Bridging RLT ESP call at originating switch (scenario 10, part 1)

RLT ESP call



Legend:
EC1, EC5 = Spectrum ECAN cancels forward echo.
EC2, EC8 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.
EC7 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-63 illustrates the scenario where bridging occurs at the originating switch. The following actions take place:

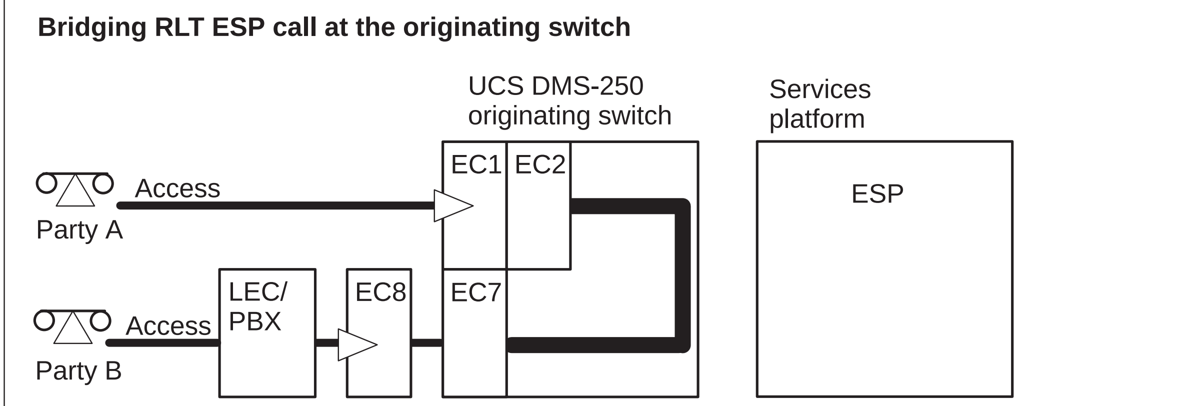
1. EC4 and EC5 are deallocated for the call being taken down.
2. The ECAN reconfiguration deallocates EC2 and EC7 invoked by the computing module call processor.
3. EC1 and EC8 remain on the bridged call to cancel forward echo and backward echo in the bridged call, respectively.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-63
Bridging RLT ESP call at originating switch (scenario 10, part 2)



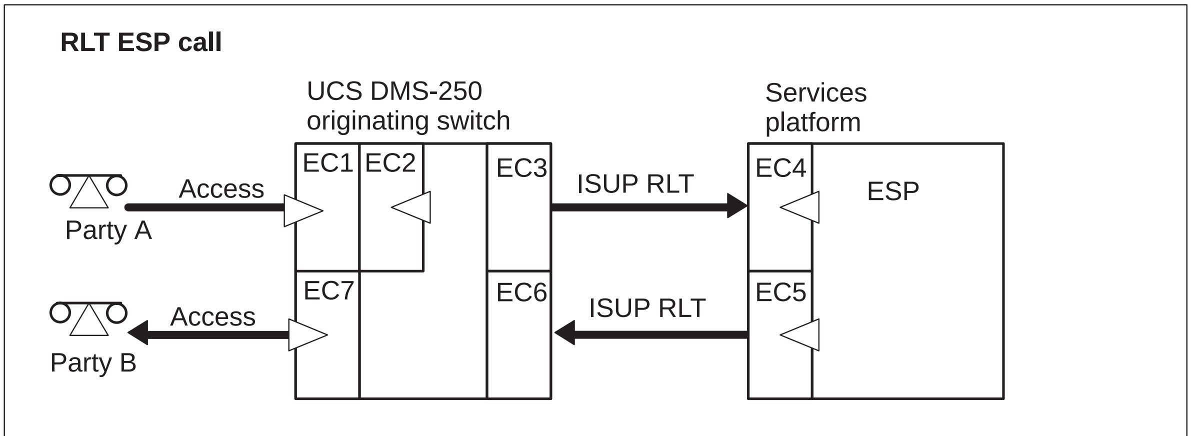
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN is available, but not activated.
EC7 = Spectrum ECAN is available, but not activated.
EC8 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 11: Bridging RLT ESP call at originating switch

Figure 3-64 illustrates the scenario for the incoming call from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing leg of the call from the ESP to Party B, both EC5 and EC7 are allocated to cancel forward echo and backward echo, respectively.

Figure 3-64
Bridging RLT ESP call at originating switch (scenario 11, part 1)



Legend:
EC1, EC5 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4, EC7 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

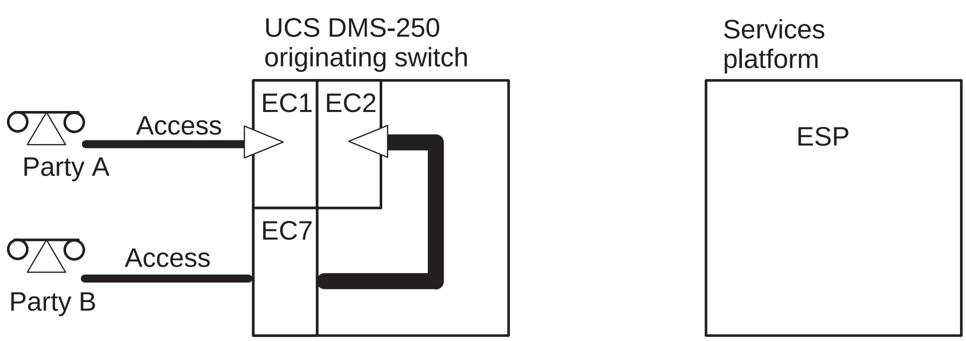
Figure 3-65 illustrates the scenario where bridging occurs at the originating switch. EC4 and EC5 are deallocated for the call being taken down. ECAN reconfiguration takes place to deallocate EC7 invoked by the computing module call processing. EC1 and EC2 remain on the bridged call to cancel forward echo and backward echo, respectively.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-65
Bridging RLT ESP call at originating switch (scenario 11, part 2)

Bridging RLT ESP call at the originating switch



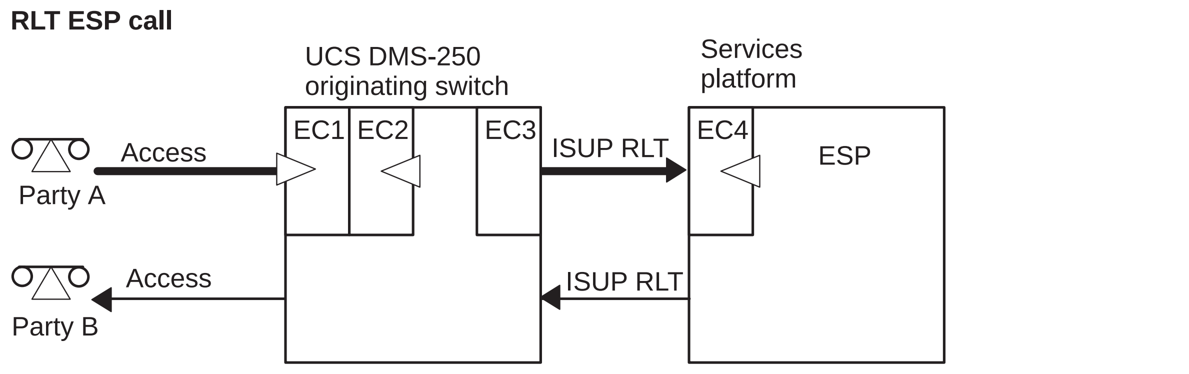
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC7 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 12: Bridging RLT ESP call at originating switch

Figure 3-66 illustrates the scenario for the incoming call leg from Party A to the ESP, both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, no ECAN is provisioned.

Figure 3-66
Bridging RLT ESP call at originating switch (scenario 12, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

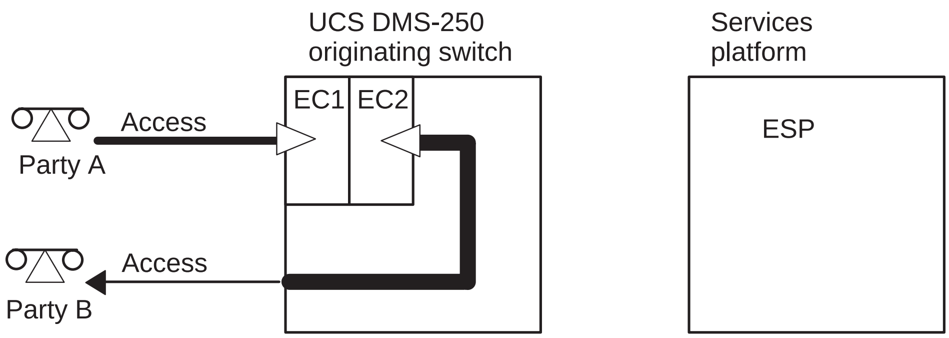
Figure 3-67 illustrates the scenario where bridging occurs at the originating switch. EC4 is deallocated for the call being taken down. EC1 and EC2 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between originating switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-67
Bridging RLT ESP call at originating switch (scenario 12, part 2)

Bridging RLT ESP call at the originating switch



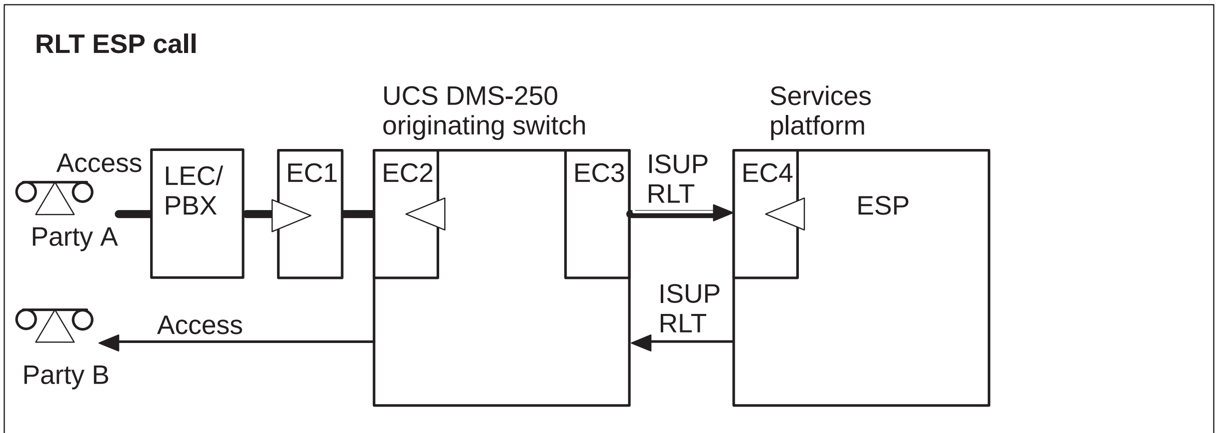
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 13: Bridging RLT ESP call at originating switch

Figure 3-68 illustrates the scenario for the incoming call leg from Party A to the ESP. Both EC1 and EC2 (provisioned as FAREC) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, an ECAN is not provisioned.

Figure 3-68
Bridging RLT ESP call at originating switch (scenario 13, part 1)



Legend:
EC1 = ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

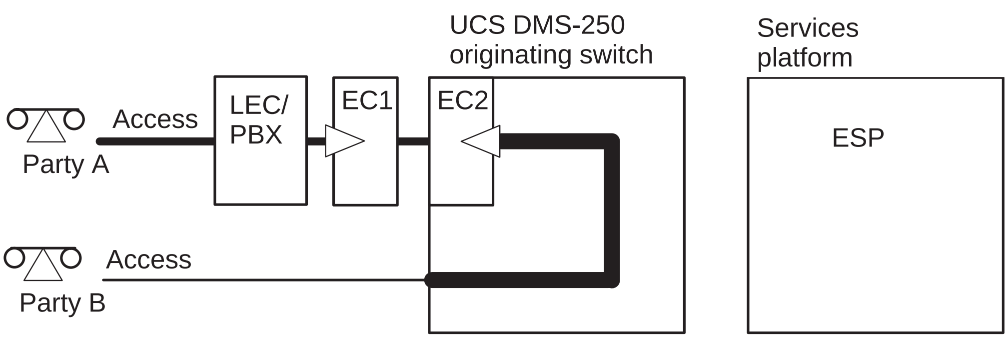
Figure 3-69 illustrates the scenario where bridging occurs at the originating switch. EC4 is deallocated for the call being taken down. EC1 and EC2 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = Y; BK2BK = N.
- ISUP RLT between originating switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-69
Bridging RLT ESP call at originating switch (scenario 13, part 2)

Bridging RLT ESP call at the originating switch



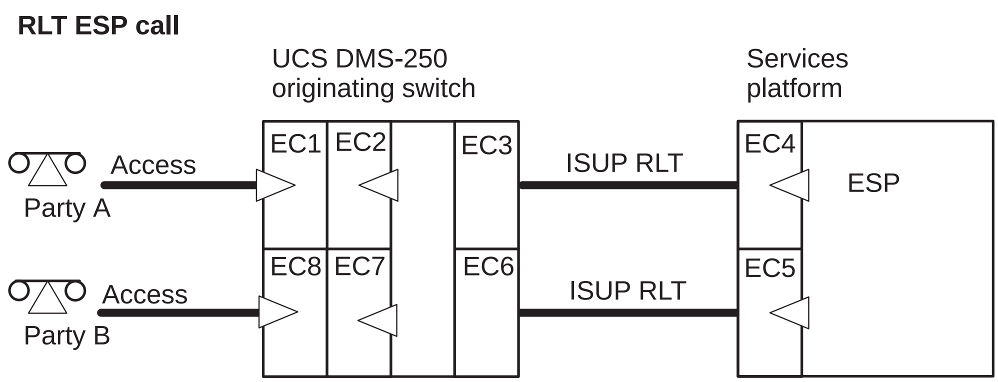
Legend:
EC1 = ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 14: Bridging RLT ESP call at services platform

Figure 3-70 illustrates the scenario for the incoming call from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, both EC7 and EC8 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC5 is also allocated in the call because all ECANs that cancel forward echo in an ESP initiated call are always allocated.

Figure 3-70
Bridging RLT ESP call at services platform (scenario 14, part 1)



Legend:
EC1, EC5 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4, EC8 = Spectrum ECAN cancels backward echo.
EC7 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-71 illustrates the scenario where the bridging FAR is sent by the ESP to the originating switch. The Facility Reject (FRJ) message is sent to the ESP to attempt to bridge the call since the RLT resource is insufficient. EC1, EC2, EC4, EC5, EC7, and EC8 remain on the call. EC2, EC4, EC5, and EC7 are redundant ECANs at the bridged call. ECAN reconfiguration does not occur in this scenario.

The same ECAN configuration also applies if Party A and Party B are datafilled FAREC = Y.

Datafill requirements for this scenario are as follows:

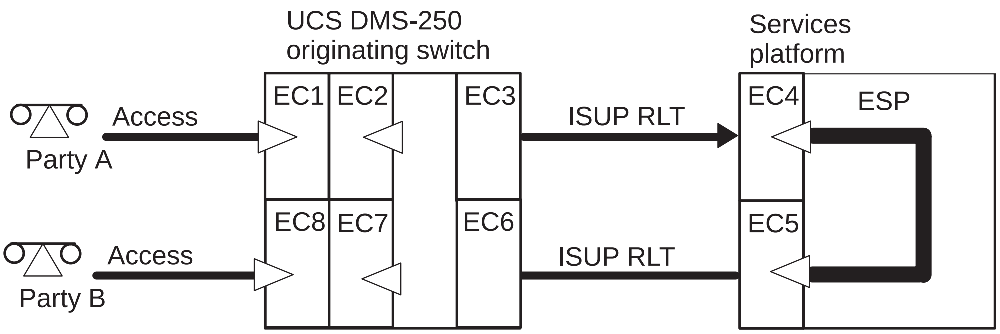
- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between the originating switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Note: This scenario is an error case for RLT, but is still supported by this feature.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-71
Bridging RLT ESP call at services platform (scenario 14, part 2)

Bridging RLT ESP call at the ESP



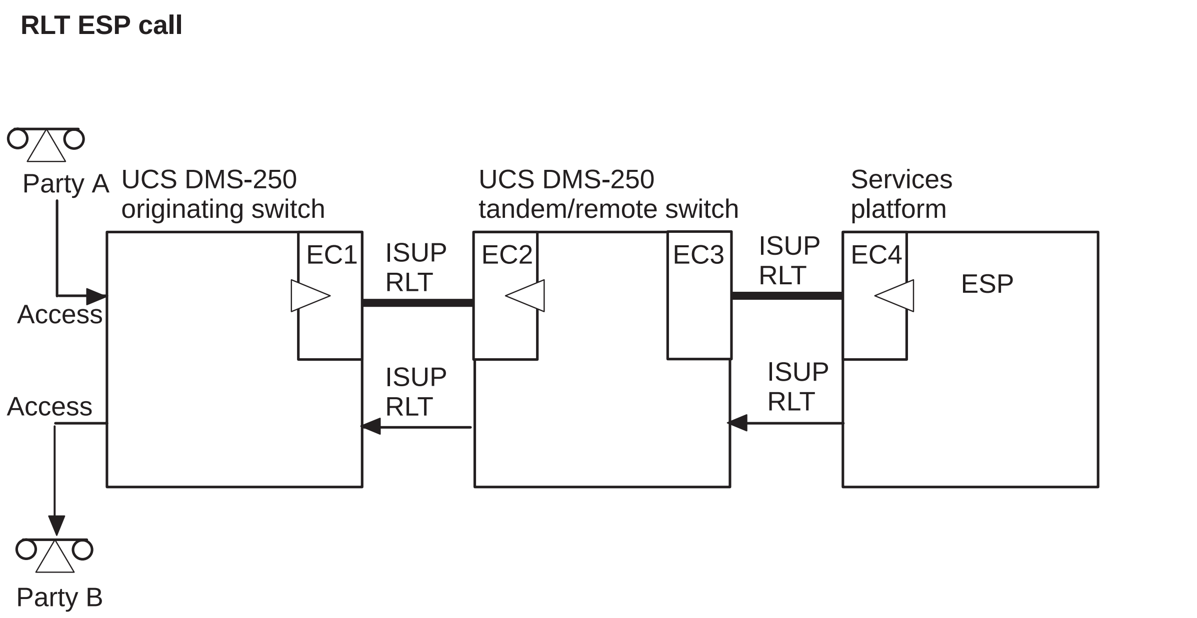
Legend:
EC1, EC5 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4, EC8 = Spectrum ECAN cancels backward echo.
EC7 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 15: Bridging RLT ESP call at tandem switch

Figure 3-72 illustrates the scenario where EC1, EC2, and EC4 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-72
Bridging RLT ESP call at tandem switch (scenario 15, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.

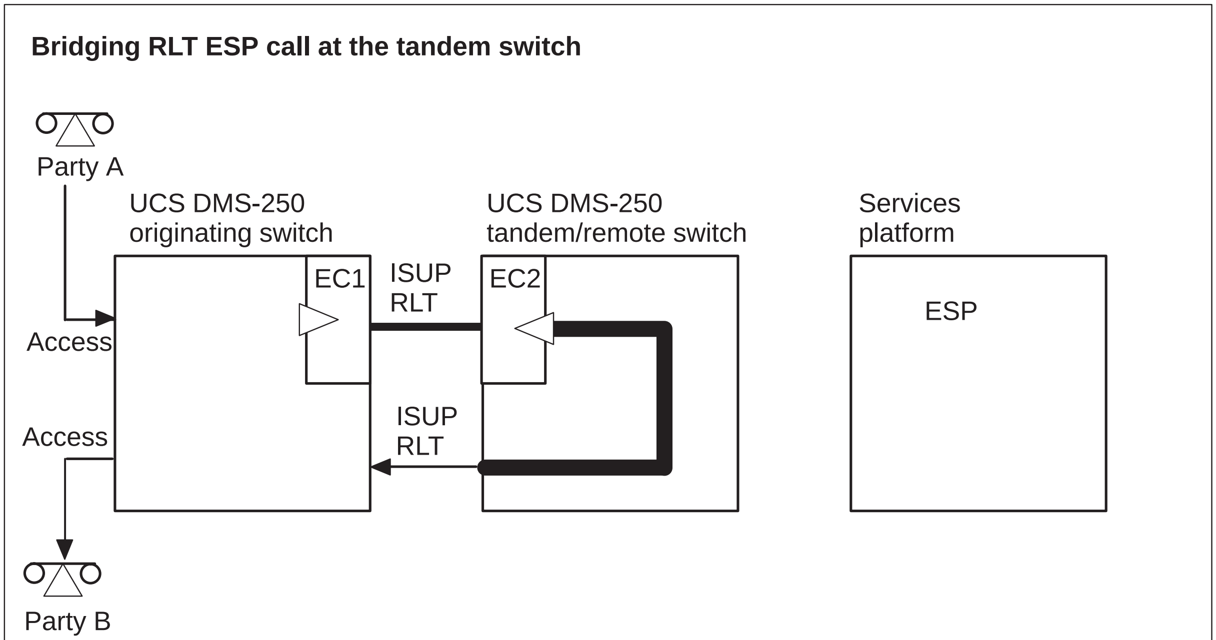
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-73 illustrates the scenario where the RLT occurs on the tandem (remote) switch. EC4 is deallocated when the connection between the tandem (remote) switch and the services platform is taken down. EC1 and EC2 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

- ISUP RLT between originating switch and tandem switch (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-73
Bridging RLT ESP call at tandem switch (scenario 15, part 2)



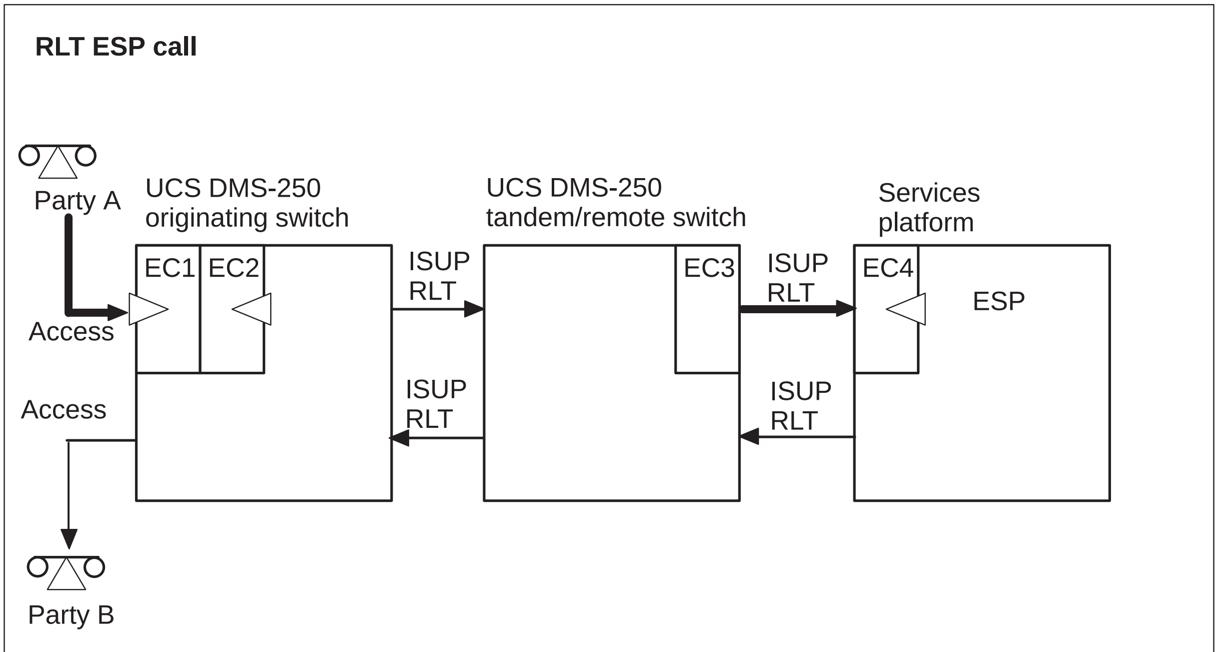
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 16: Bridging RLT ESP call at services platform

Figure 3-74 illustrates the scenario where EC1, EC2, and EC4 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-74
Bridging RLT ESP call at services platform (scenario 16, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

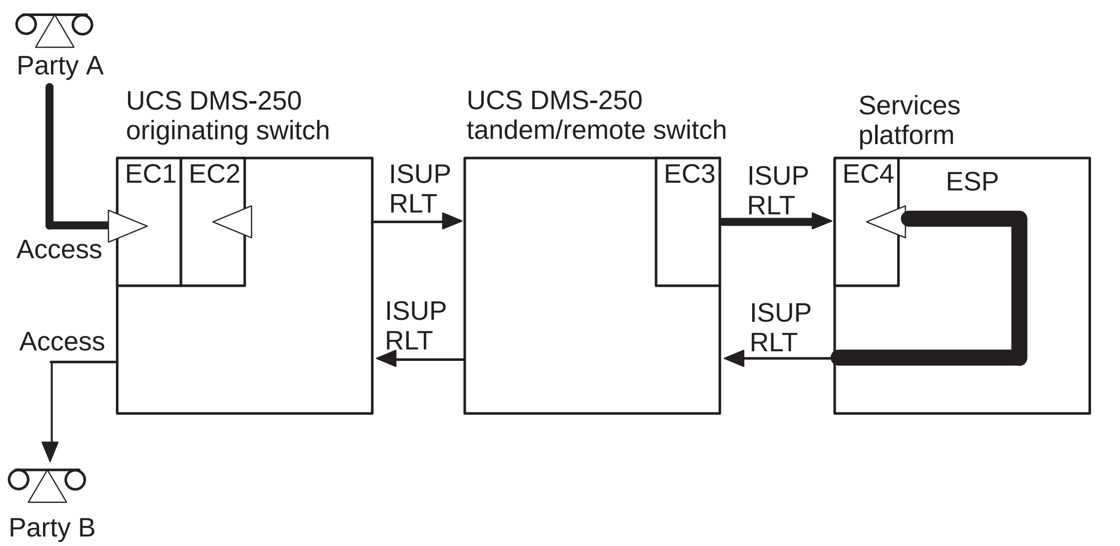
Figure 3-75 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC1, EC2, and EC4 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between tandem switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-75
Bridging RLT ESP call at services platform (scenario 16, part 2)

Bridging RLT ESP call at services platform



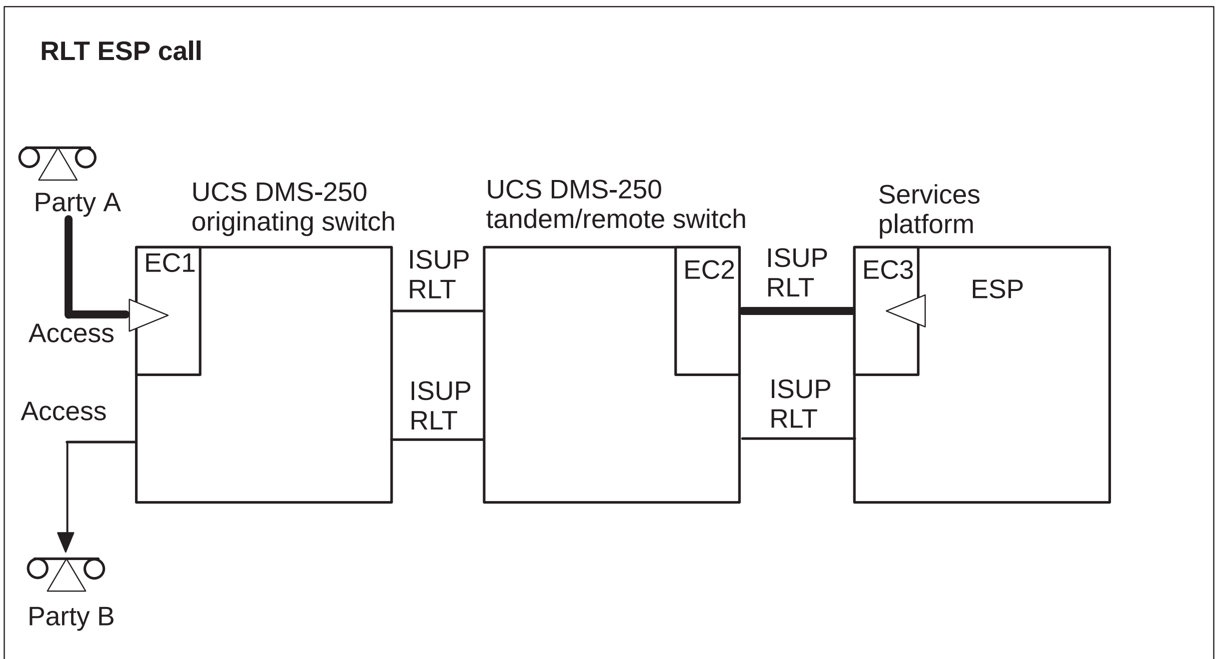
Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 17: Bridging RLT ESP call at tandem switch

Figure 3-76 illustrates the scenario where EC1 and EC3 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-76
Bridging RLT ESP call at tandem switch (scenario 17, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

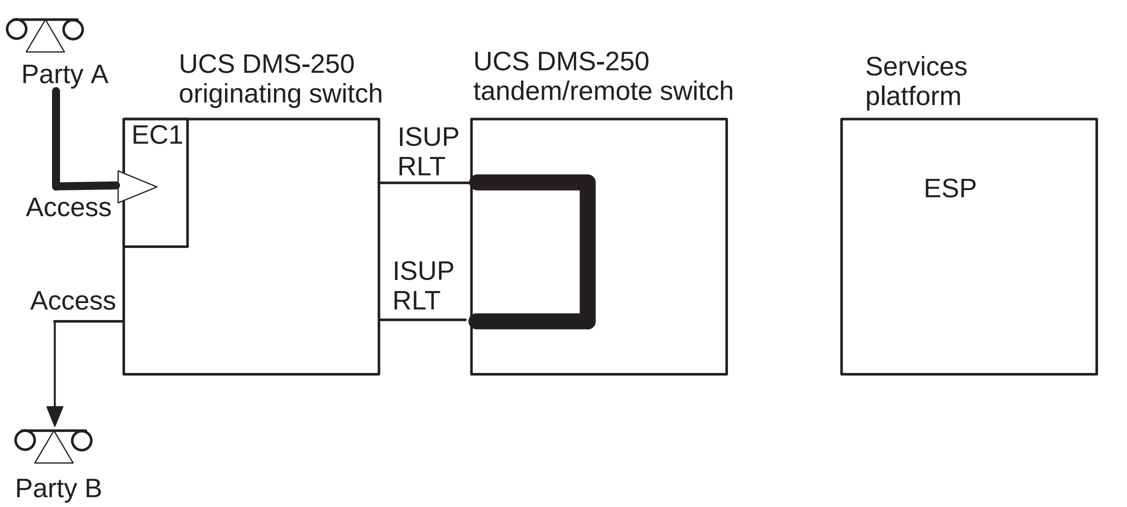
When the RLT occurs on the tandem (remote) switch, EC3 is deallocated when the connection between the tandem (remote) switch and the services platform is taken down. EC1 remains on the bridged call. This scenario allocates only one ECAN for the bridged call. To avoid the shortage of an ECAN on the call as shown in this scenario, the provisioning rule states that the datafill on table SPMECAN for a long access trunk should be either BK2BK or FAREC. Figure 3-77 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between tandem switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-77
Bridging RLT ESP call at tandem switch (scenario 17, part 2)

Bridging RLT ESP call at the tandem switch



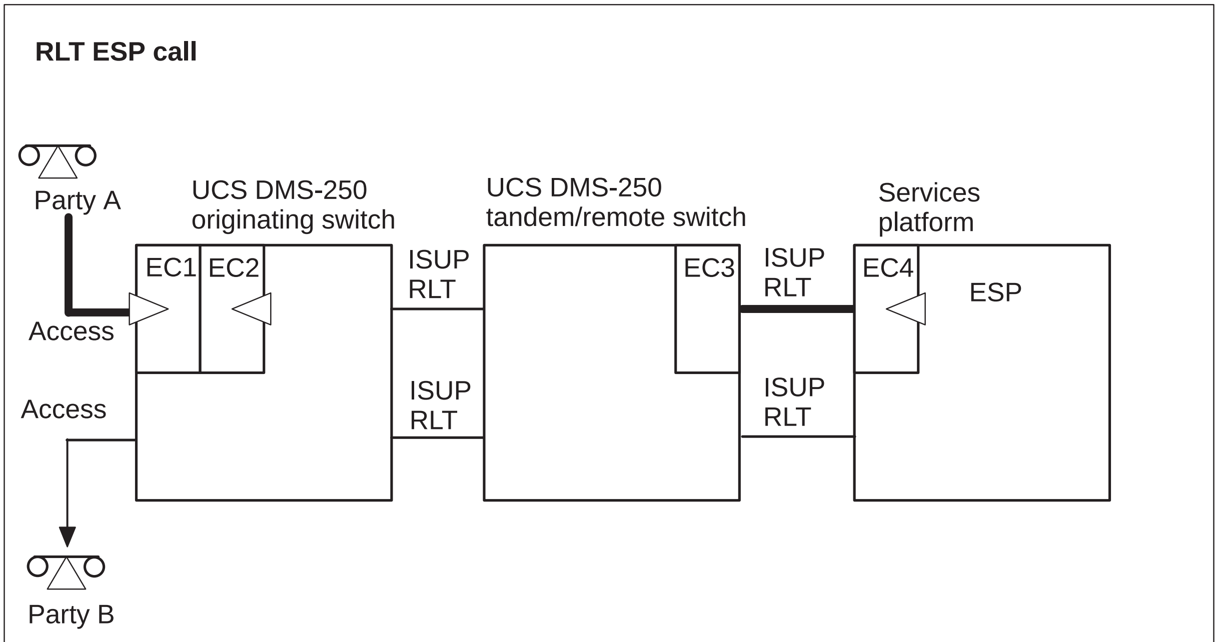
Legend:
EC1 = Spectrum ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 18: Bridging RLT ESP call at tandem switch

Figure 3-78 illustrates the scenario where EC1, EC2 (provisioned as BK2BK), and EC4 are allocated for the call from Party A to ESP. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-78
Bridging RLT ESP call at tandem switch (scenario 18, part 1)



Legend:
EC1 = ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

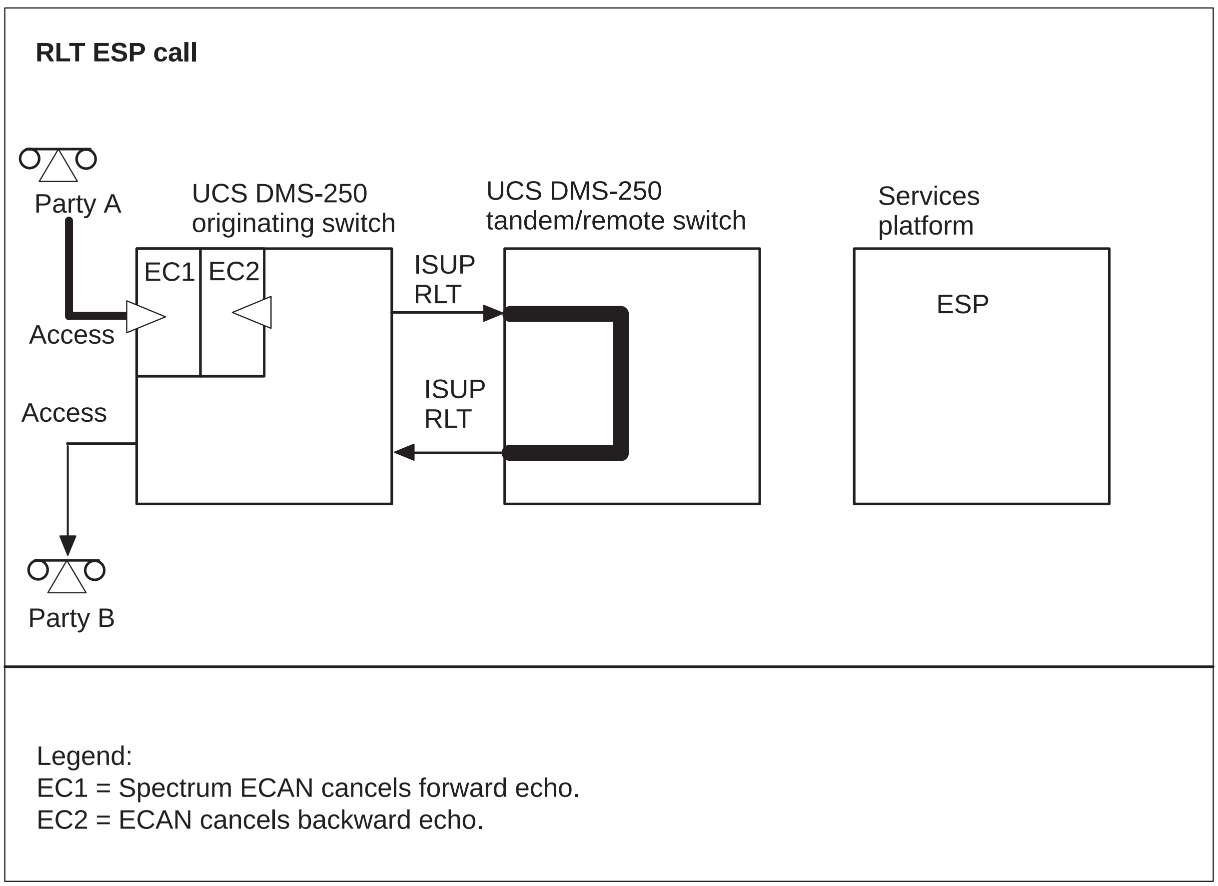
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-79 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC4 is deallocated when the connection between the tandem (remote) switch and the services platform is taken down. EC1 and EC2 remain on the bridged call. Reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between tandem switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-79
Bridging RLT ESP call at tandem switch (scenario 18, part 2)

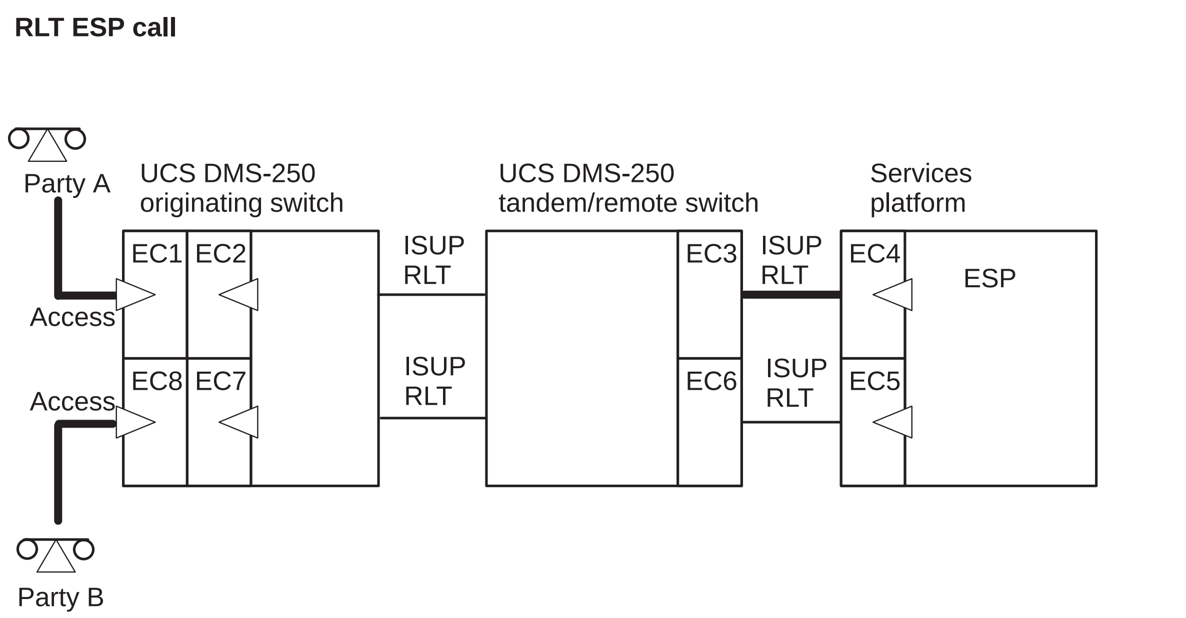


AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 19: Bridging RLT ESP call at originating switch

Figure 3-80 illustrates the scenario for the incoming call from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, both EC7 and EC8 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC5 is also allocated in the call because all ECANs that cancel forward echo in an ESP initiated call are always allocated.

Figure 3-80
Bridging RLT ESP call at originating switch (scenario 19, part 1)



Legend:
EC1, EC5 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4, EC8 = Spectrum ECAN cancels backward echo.
EC7 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

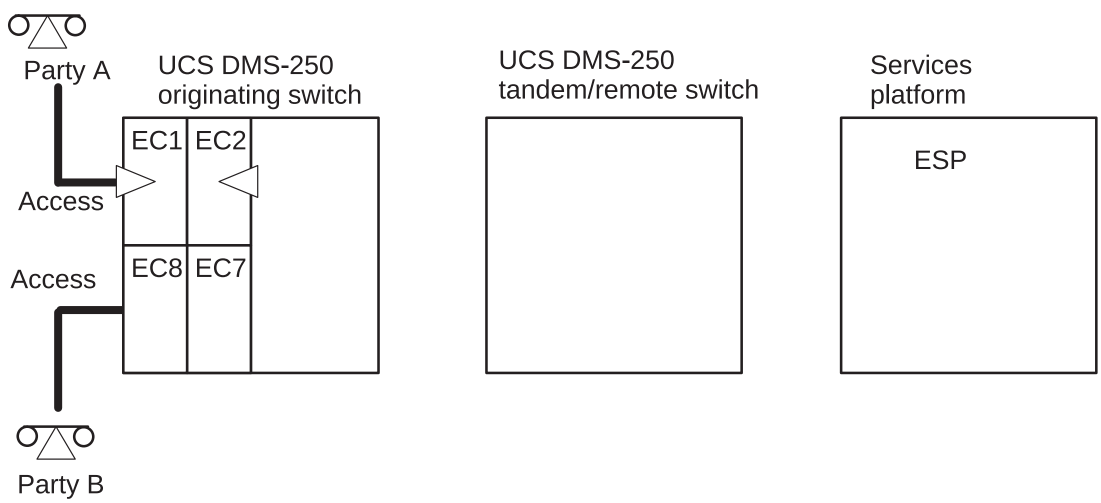
Figure 3-81 illustrates the scenario where the RLT occurs at the originating switch. EC4 and EC5 are deallocated for the call being taken down. In the meantime, ECAN reconfiguration takes place to disable EC7 and EC8 invoked by the computing module call processing. EC1 and EC2 remain on the bridged call to cancel forward echo and backward echo, respectively.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N ; BK2BK = Y.
- ISUP RLT between tandem switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between tandem switch and services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-81
Bridging RLT ESP call at originating switch (scenario 19, part 2)

Bridging RLT ESP call at the originating switch



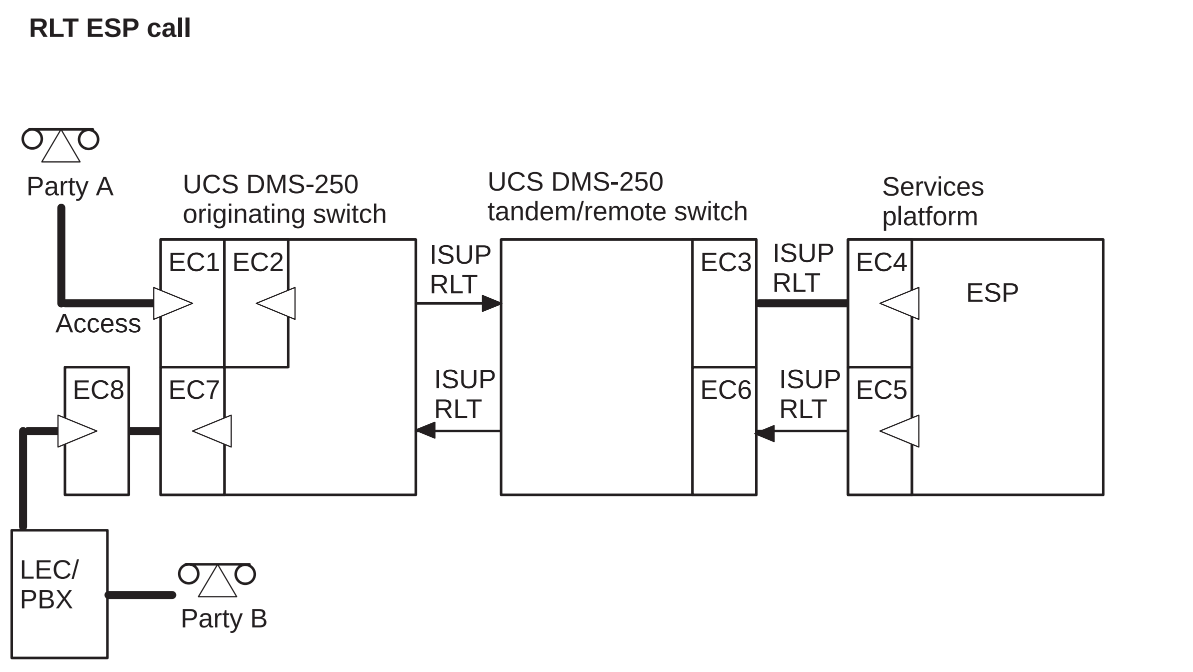
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC7 = ECAN is available, but not activated.
EC8 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 20: Bridging RLT ESP call at originating switch

Figure 3-82 illustrates the scenario for the incoming call from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, both EC7 and EC8 (provisioned as FAREC) are allocated for a long access trunk in an ESP call. EC5 is also allocated in the call because all ECANs that cancel forward echo in an ESP initiated call are always allocated.

Figure 3-82
Bridging RLT ESP call at originating switch (scenario 20, part 1)



Legend:
EC1, EC5, EC7 = Spectrum ECAN cancels forward echo.
EC2, EC8 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4= Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

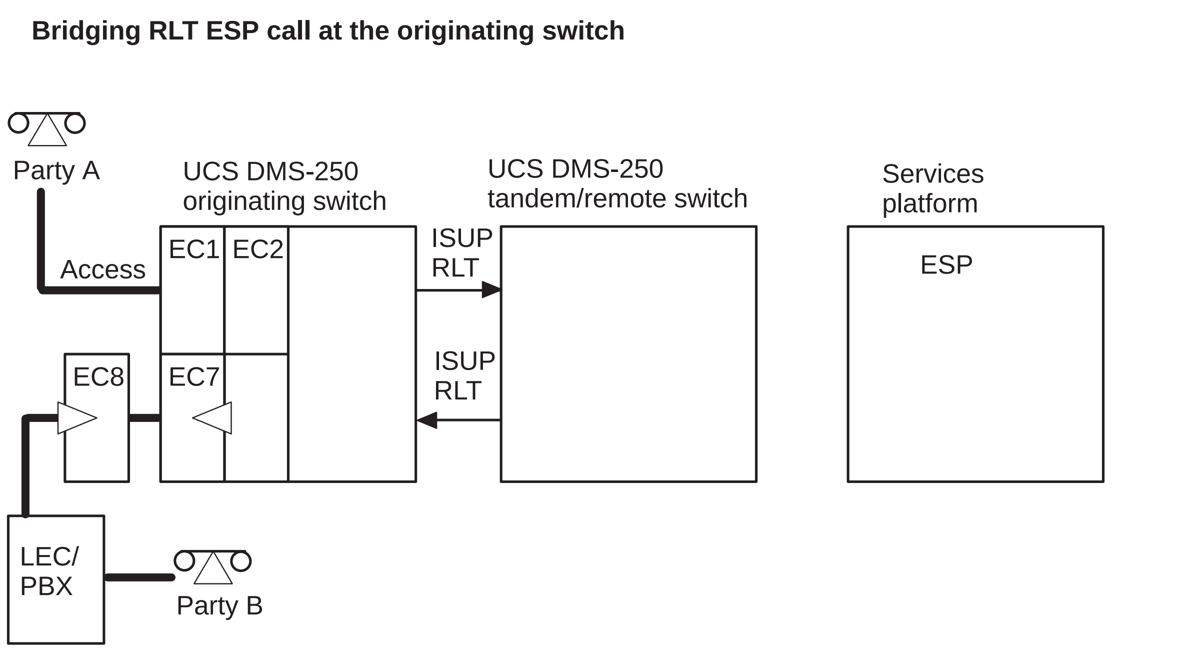
Figure 3-83 illustrates the scenario where bridging occurs at the originating switch. EC4 and EC5 are deallocated for the call being taken down. In the meantime, ECAN reconfiguration takes place to disable EC1 and EC2 invoked by the computing module call processing. EC7 and EC8 remain on the bridged call to cancel forward echo and backward echo, respectively.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = Y ; BK2BK = N.
- ISUP RLT between tandem switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between tandem switch and services platform (from ESP to Party B): FAREC = N; BK2BK = N.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-83
Bridging RLT ESP call at originating switch (scenario 20, part 2)



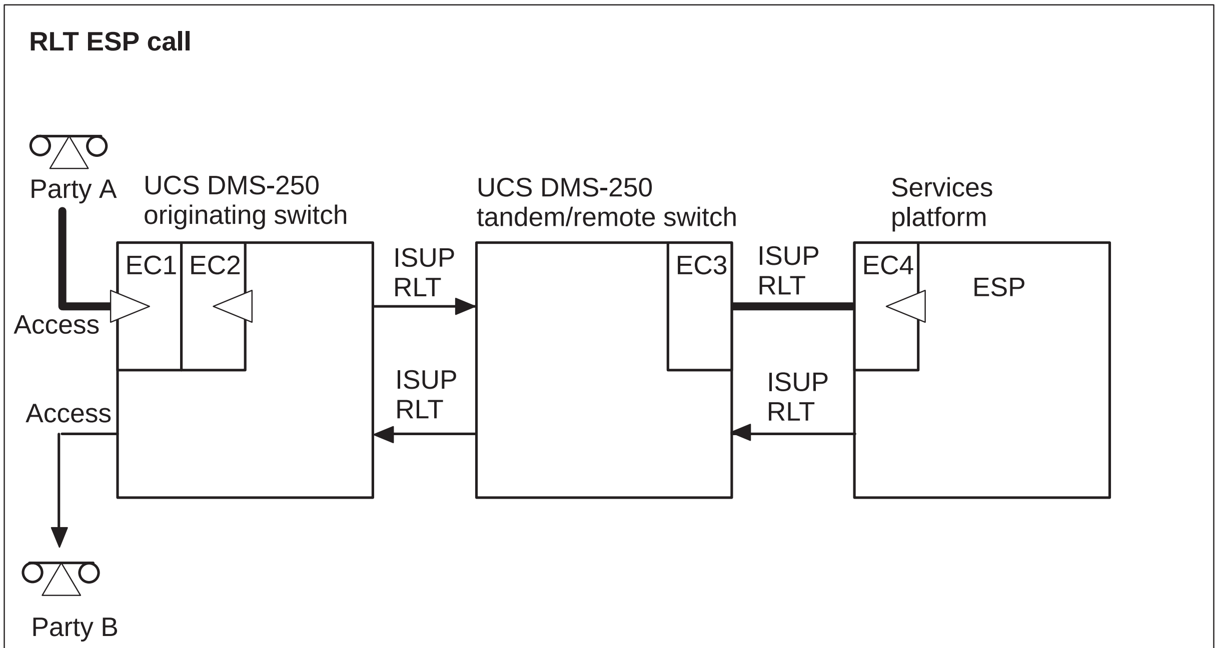
Legend:
EC1 = Spectrum ECAN is available, but not activated.
EC2 = ECAN is available, but not activated.
EC7 = Spectrum ECAN cancels forward echo.
EC8 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 21: Bridging RLT ESP call at the originating switch

Figure 3-84 illustrates the scenario for the incoming call leg from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, an ECAN is not provisioned.

Figure 3-84
Bridging RLT ESP call at originating switch (scenario 21, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

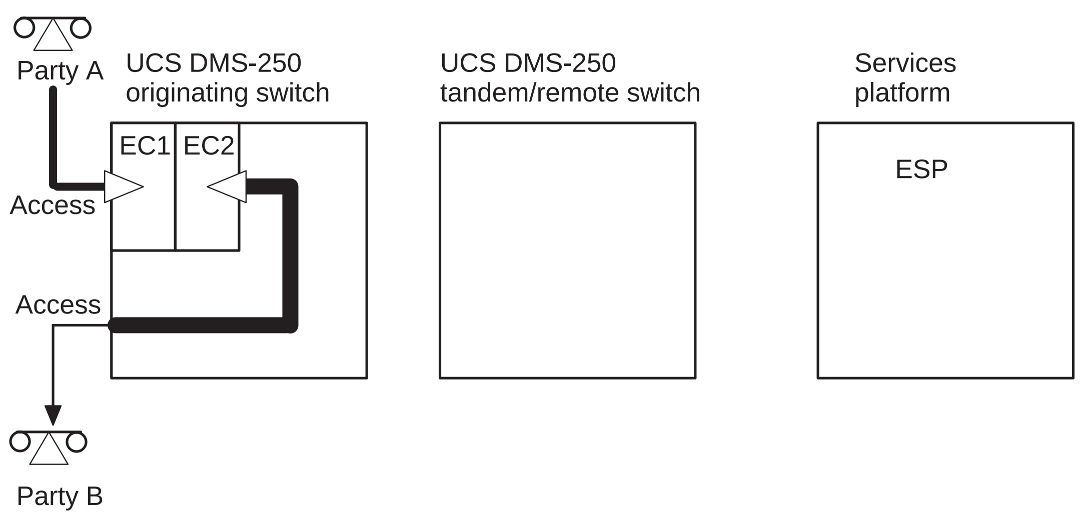
Figure 3-85 illustrates the scenario where bridging occurs at the originating switch. EC4 is deallocated for the call being taken down. EC1 and EC2 remain on the bridged call to cancel forward echo and backward echo, respectively. Reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between the tandem switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-85
Bridging RLT ESP call at originating switch (scenario 21, part 2)

Bridging RLT ESP call at the originating switch



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.

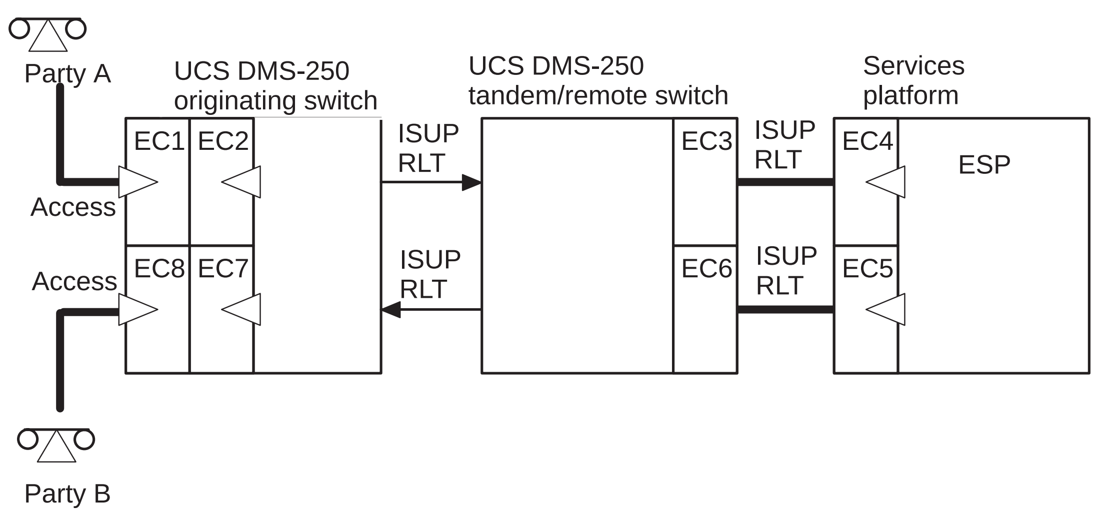
AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 22: Bridging RLT ESP call at the originating switch

Figure 3-86 illustrates the scenario for the incoming call from Party A to the ESP. Both EC1 and EC2 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC4 is also allocated in the call because all ECANs that cancel backward echo in a call destined for ESP are always allocated. For the outgoing call leg from the ESP to Party B, both EC7 and EC8 (provisioned as BK2BK) are allocated for a long access trunk in an ESP call. EC5 is also allocated in the call because all ECANs that cancel forward echo in an ESP initiated call are always allocated.

Figure 3-86
Bridging RLT ESP call at originating switch (scenario 22, part 1)

RLT ESP call



Legend:
EC1, E5 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4 , EC8= Spectrum ECAN cancels backward echo.
EC7 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-87 illustrates the scenario where the bridging FAR is sent by the ESP to the originating switch. The FRJ message is sent to the tandem switch to attempt to bridge the call since the RLT resource is insufficient. If the resource at the tandem switch is still not sufficient, the FRJ message is sent back to the ESP and the call is bridged at the ESP. EC1, EC2, EC4, EC5, EC7, and EC8 remain on the call. EC2, EC4, EC5, and EC7 are redundant ECANs for the bridged call. ECAN reconfiguration does not occur in this scenario.

Datafill requirements for this scenario are as follows:

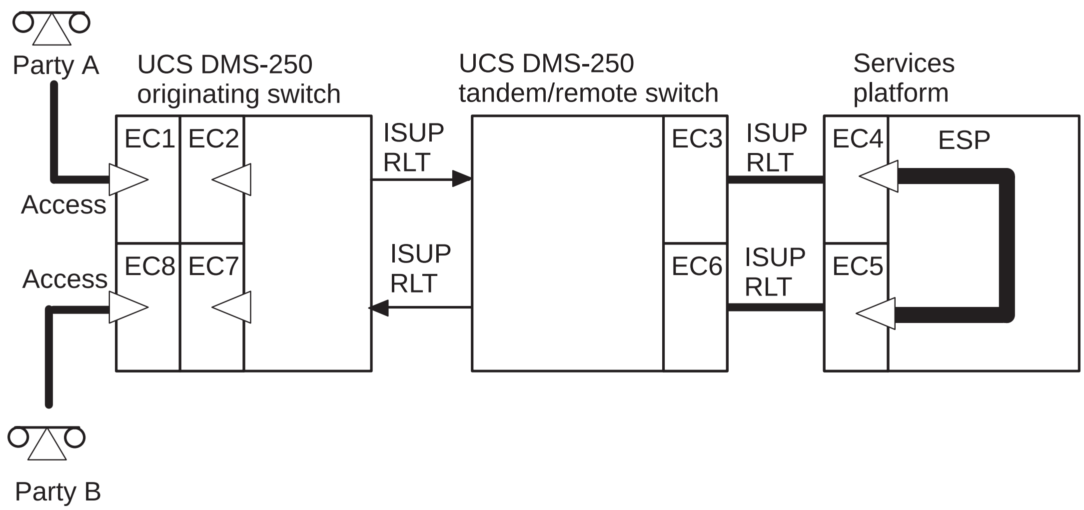
- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N ; BK2BK = Y.
- ISUP RLT between the tandem switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Note: This scenario is an error case for RLT, but is still supported by this feature.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-87
Bridging RLT ESP call at originating switch (scenario 22, part 2)

Bridging RLT ESP call at the originating switch



Legend:
EC1, E5 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4 , EC8= Spectrum eCAN cancels backward echo.
EC7 = ECAN cancels forward echo.

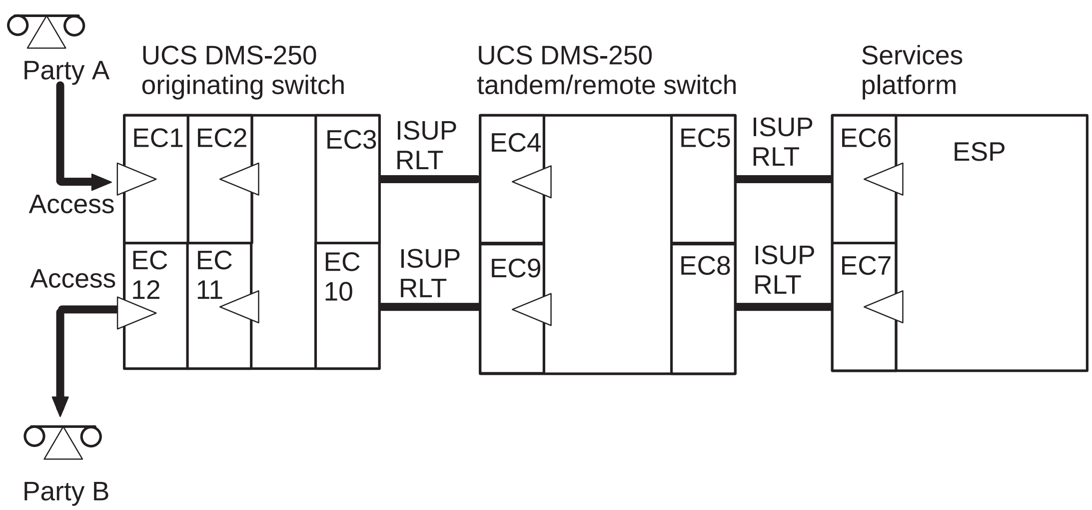
AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 23: Bridging RLT ESP call at the originating switch

Figure 3-88 illustrates the scenario where two more ECANs are provisioned on the IMT RLT trunk between the originating switch and the tandem switch. The rule for ECAN allocation in an ESP call also applies. For the incoming call leg, EC1, EC2, EC4, EC6 are allocated. For the outgoing call leg, EC7, EC9, EC11, and EC12 are allocated.

Figure 3-88
Bridging RLT ESP call at originating switch (scenario 23, part 1)

RLT ESP call



Legend:
EC1, EC7, EC9 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC5, EC8, EC10 = Spectrum ECAN is available, but not activated.
EC4, EC6, EC12 = Spectrum ECAN cancels backward echo.
EC11 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-89 illustrates the scenario where bridging occurs on the services platform. All the ECANs allocated before the bridging remain on the bridged call. Reconfiguration does not occur in this scenario. Six ECANs are redundant for the bridged call.

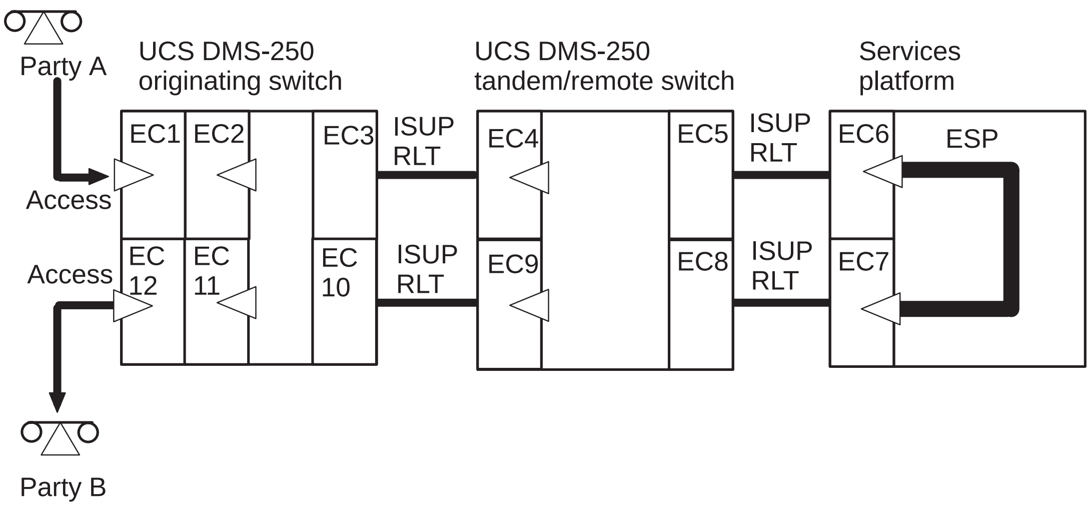
Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N ; BK2BK = Y.
- ISUP RLT between originating switch and tandem switch (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between originating switch and tandem switch (from ESP to Party B): FAREC = N; BK2BK = N.
- ISUP RLT between tandem switch and services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between tandem switch and services platform (from ESP to Party B): FAREC = N; BK2BK = N.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-89
Bridging RLT ESP call at services platform (scenario 23, part 2)

Bridging RLT ESP call at originating switch



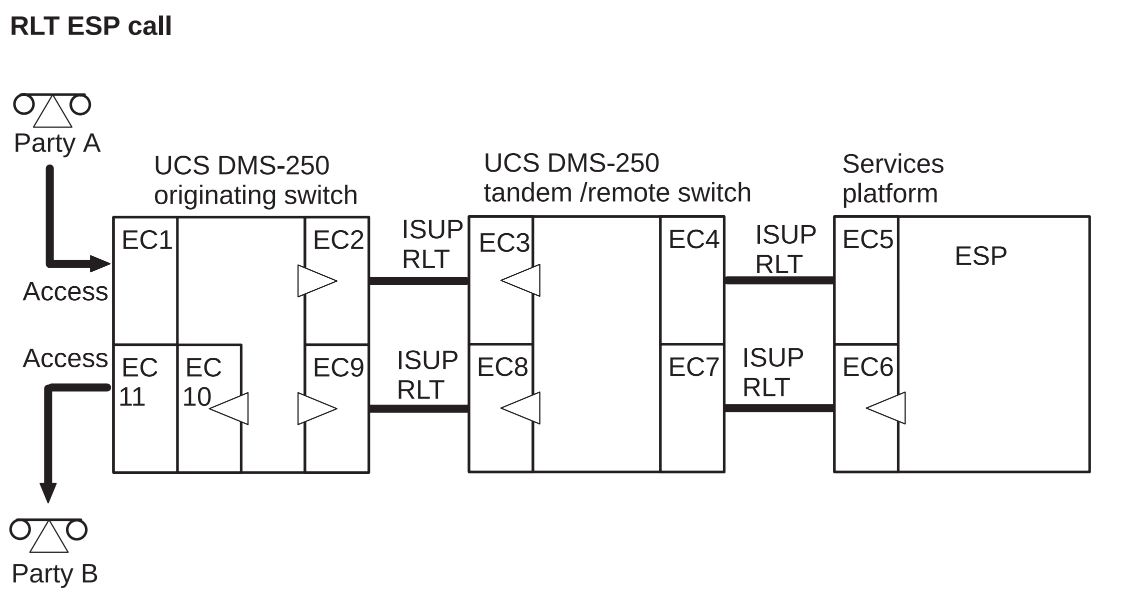
Legend:
EC1, EC7, EC9 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC5, EC8, EC10 = Spectrum ECAN is available, but not activated.
EC4, EC6, EC12 = Spectrum ECAN cancels backward echo.
EC11 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 24: Bridging RLT ESP call at the ESP

Figure 3-90 illustrates the scenario for the incoming call leg. EC2 and EC3 are allocated by the two-party call control algorithm. For the outgoing call leg, EC6, EC8, EC10, and EC11 are allocated.

Figure 3-90
Bridging RLT ESP call at ESP (scenario 24, part 1)



Legend:
EC1, EC4, EC5 = XPM ECAN is available, but not activated.
EC2 = XPM ECAN cancels forward echo.
EC3 = Spectrum ECAN cancels backward echo.
EC6. EC8 = Spectrum ECAN cancels forward echo.
EC7, EC11 = Spectrum ECAN is available, but not activated.
EC9 = XPM ECAN cancels backward echo.
EC10 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

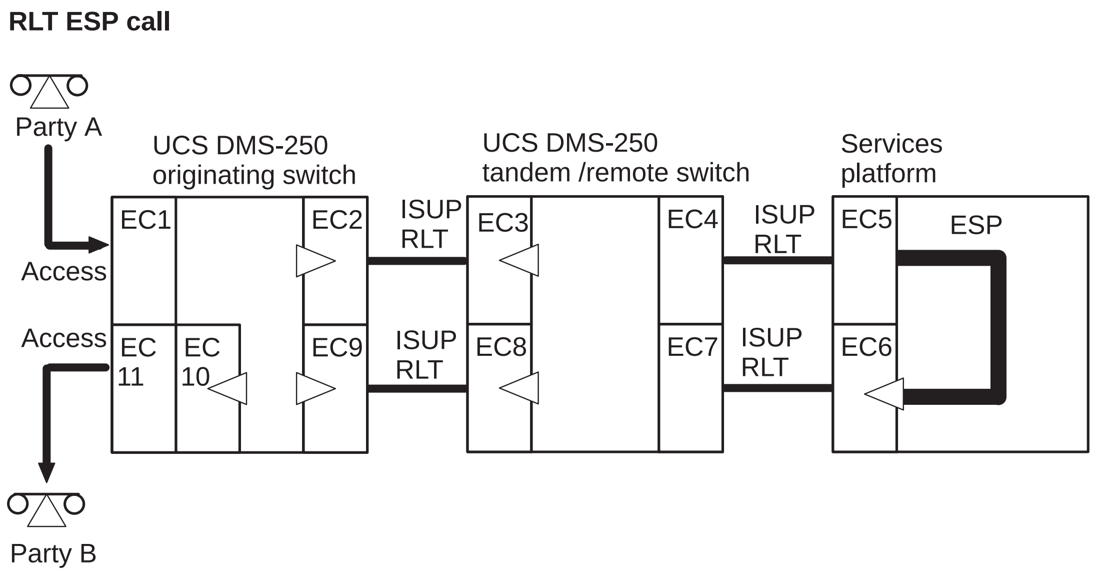
Figure 3-91 illustrates the scenario where bridging occurs on the services platform. All the ECANs allocated before bridging remain on the bridged call. Reconfiguration does not occur. Four ECANs are redundant for the bridged call.

Datafill requirements for this scenario are as follows:

- Party A connects through XPM: ECSTAT = INTERNAL.
- Party B connects through Spectrum: FAREC = N ; BK2BK = Y.
- ISUP RLT on the originating switch (from originating switch to tandem switch): ECSTAT = INTERNAL.
- ISUP RLT on the tandem switch (from tandem switch to services platform): ECSTAT = INTERNAL.
- ISUP RLT on the tandem switch (from originating switch to tandem switch): FAREC = N; BK2BK = N.
- ISUP RLT on the services platform (from tandem switch to services platform): ECSTAT = INTERNAL.
- ISUP RLT on the services platform (from services platform to tandem switch): FAREC = N; BK2BK = N.
- ISUP RLT on the tandem switch (from services platform to tandem switch): FAREC = N; BK2BK = N.
- ISUP RLT on the tandem switch (from tandem switch to originating switch): FAREC = N; BK2BK = N.
- ISUP RLT on the originating switch (from tandem switch to originating switch): ECSTAT = INTERNAL.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-91
Bridging RLT ESP call at ESP (scenario 24, part 2)



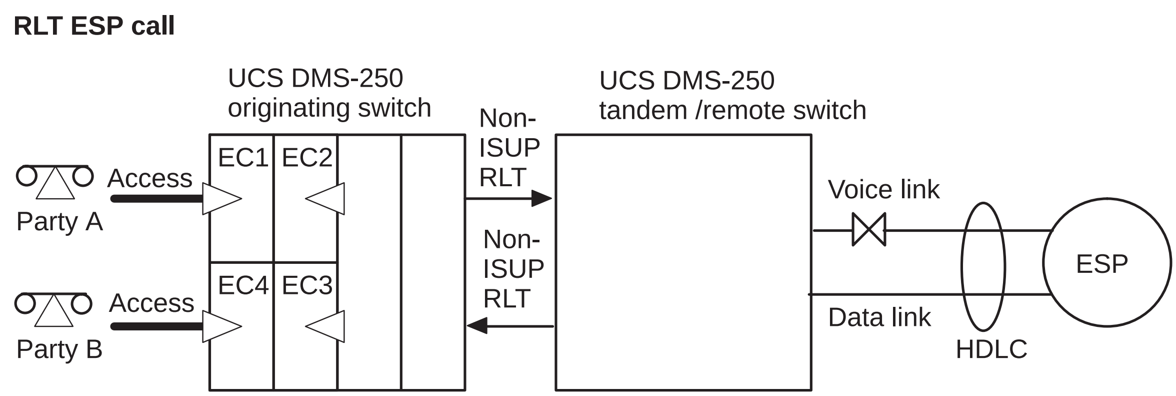
Legend:
EC1, EC4, EC5 = XPM ECAN is available, but not activated.
EC2 = XPM ECAN cancels forward echo.
EC3 = Spectrum ECAN cancels backward echo.
EC6. EC8 = Spectrum ECAN cancels forward echo.
EC7, EC11 = Spectrum ECAN is available, but not activated.
EC9 = XPM ECAN cancels backward echo.
EC10 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 25: Bridging RLT ESP call at the tandem/remote switch

Figure 3-92 illustrates the scenario where EC1 and EC2 are allocated for Party A terminating to ESP for cancelling forward echo and backward echo, respectively. The high-level data link control (HDLC) connection between the tandem (remote) switch and the service platform is a typical UCS network configuration. When the ESP initiates the second call to Party B, EC3 and EC4 are allocated and activated for cancelling forward echo and backward echo, respectively.

Figure 3-92
Bridging RLT ESP call at tandem/remote switch (scenario 25, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.

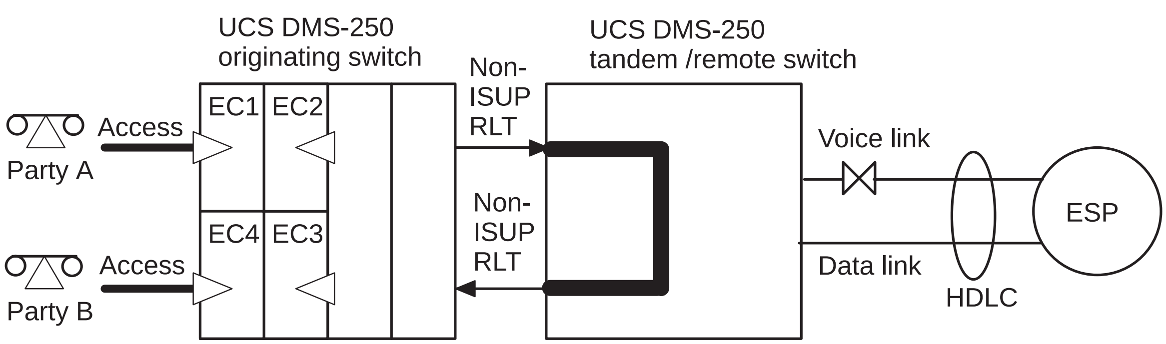
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-93 illustrates the scenario where the RLT occurs on the tandem (remote) switch. ECAN reconfiguration is not allowed from the tandem (remote) switch to the originating switch. EC1, EC2, EC3, and EC4 remain activated on the bridged call. EC2 and EC3 are redundant ECANs for the bridged call.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N ; BK2BK = Y.

Figure 3-93
Bridging RLT ESP call at tandem/remote switch (scenario 25, part 2)



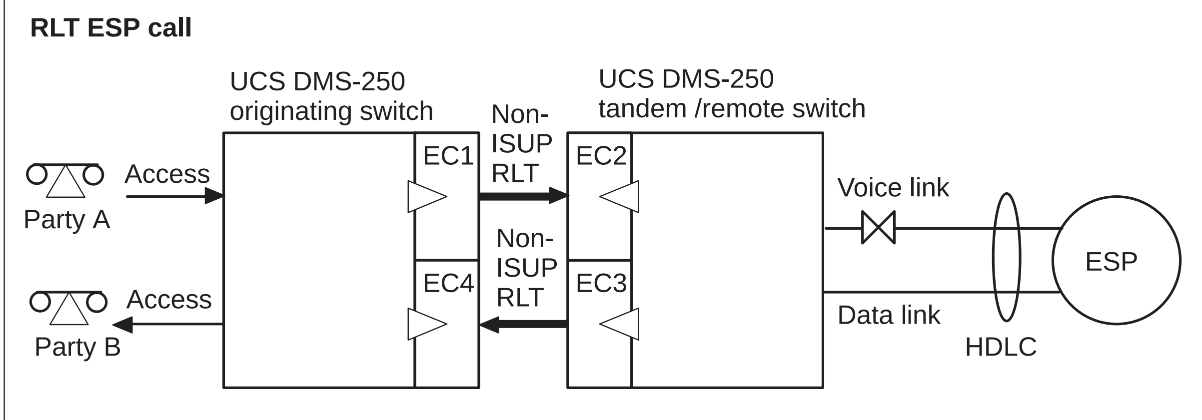
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 26: Bridging RLT ESP call at the tandem/remote switch

Figure 3-94 illustrates the scenario where EC1 and EC2 are allocated for Party A terminating to ESP for cancelling forward echo and backward echo, respectively. The HDLC connection between the tandem (remote) switch and the service platform is a typical UCS network configuration.

Figure 3-94
Bridging RLT ESP call at tandem/remote switch (scenario 26, part 1)



Legend:
EC1, EC3 = Spectrum ECAN cancels forward echo.
EC2. EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

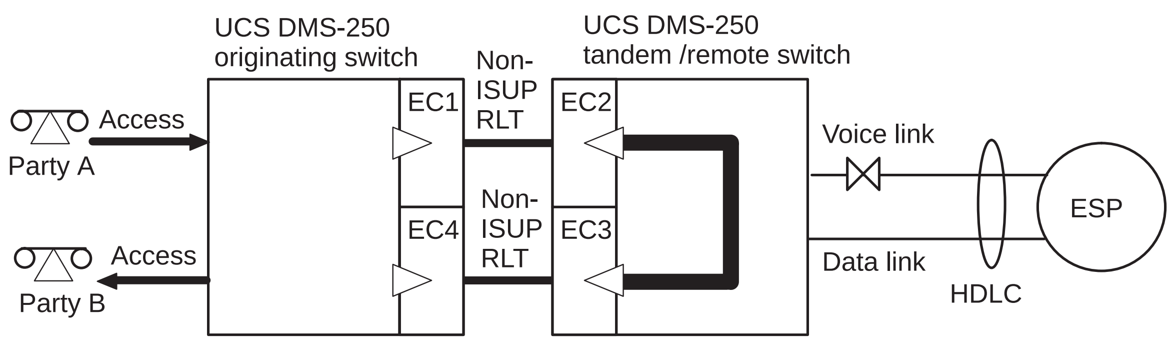
Figure 3-95 illustrates the scenario where ESP initiates the second call to Party B, EC3 and EC4 are allocated for cancelling forward echo and backward echo, respectively. When bridging occurs on the tandem (remote) switch, ECAN reconfiguration does not occur, and EC1, EC2, EC3, and EC4 remain activated on the bridged call. EC2 and EC3 are redundant ECANs for the bridged call.

Datafill requirements for this scenario are as follows:

- ISUP RLT between the originating and the tandem/remote switch (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the originating and the tandem/remote switch (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-95
Bridging RLT ESP call at tandem/remote switch (scenario 26, part 2)

Bridging RLT ESP call at the tandem/remote switch



Legend:
EC1, EC3 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.

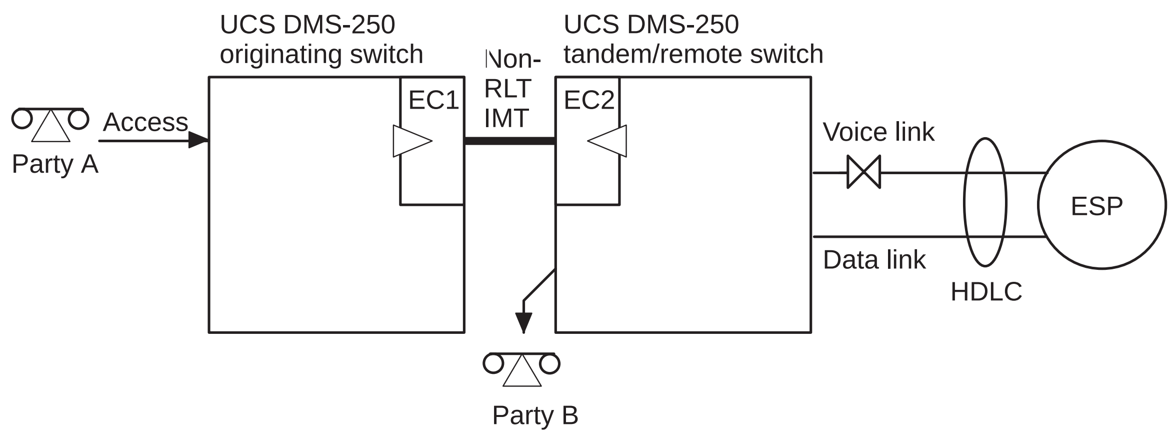
AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 27: Bridging RLT ESP call at the tandem/remote switch

Figure 3-96 illustrates the scenario where EC1 and EC2 are allocated for Party A terminating to ESP. The HDLC connection between the tandem (remote) switch and the service platform is a typical UCS network configuration. An ECAN is not required for the second call initiated from the ESP since Party B is a short access trunk.

Figure 3-96
Bridging RLT ESP call tandem/remote switch (scenario 27, part 1)

RLT ESP call



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

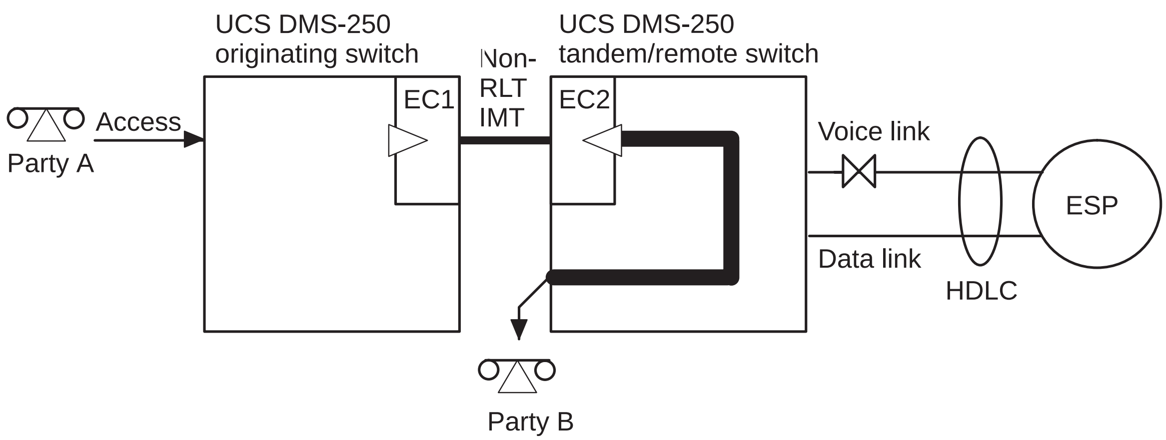
Figure 3-97 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC1 and EC2 remain activated on the bridged call at the tandem (remote) switch.

Datafill requirements for this scenario are as follows:

- ISUP RLT between the originating and the tandem/remote switch (from Party A to ESP): FAREC = N; BK2BK = N.

Figure 3-97
Bridging RLT ESP call at tandem/remote switch (scenario 27, part 2)

Bridging RLT ESP call at the tandem/remote switch



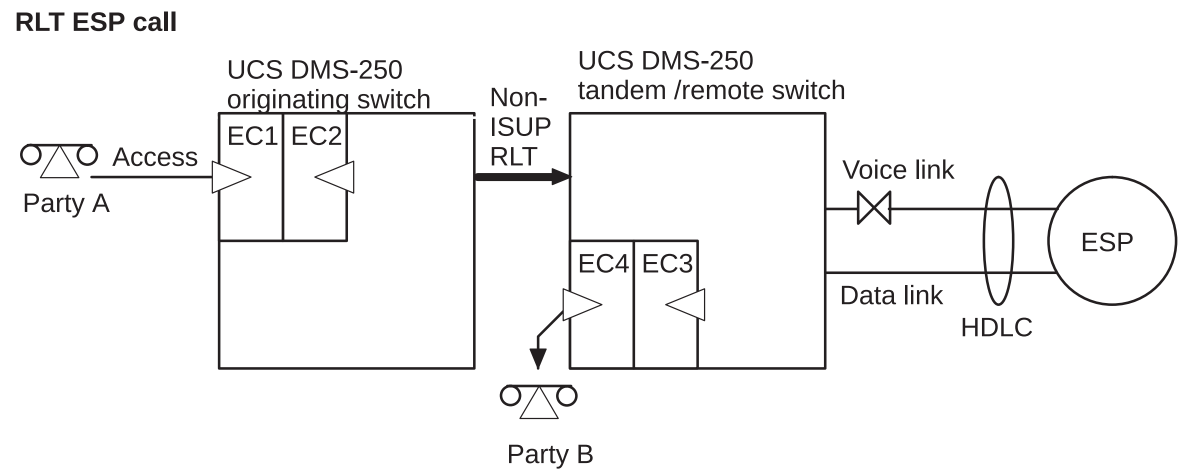
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 28: Bridging RLT ESP call at the tandem/remote switch

Figure 3-98 illustrates the scenario where EC1 and EC2 are allocated for Party A terminating to ESP for cancelling forward echo and backward echo, respectively. The HDLC connection between the tandem (remote) switch and the service platform is a typical UCS network configuration. When the ESP initiates the second call to Party B, EC3 and EC4 are allocated and activated for cancelling forward echo and backward echo, respectively.

Figure 3-98
Bridging RLT ESP call at tandem/remote switch (scenario 28, part 1)



Legend:
EC1, EC3 = ECAN cancels forward echo.
EC2, EC4 = ECAN cancels backward echo.

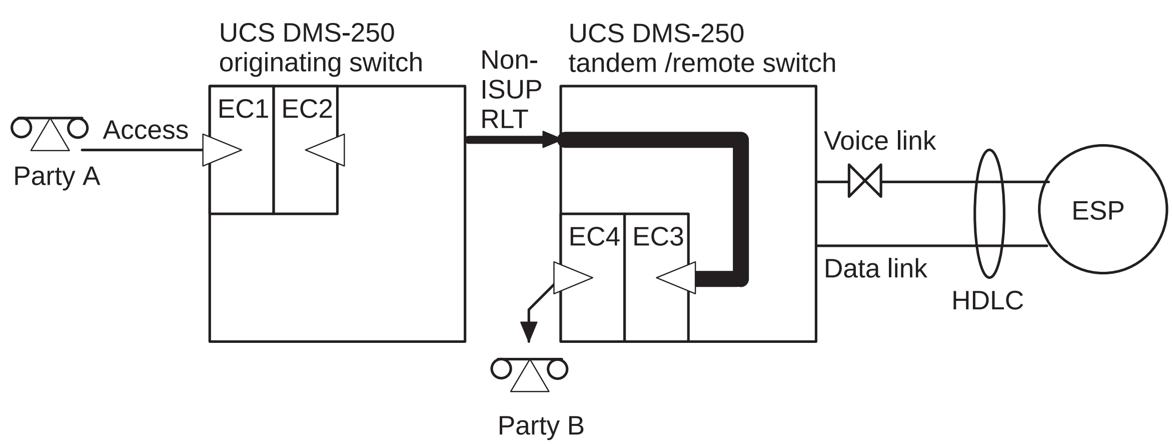
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-99 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC1, EC2, EC3, and EC4 remain activated on the bridged call. EC2 and EC3 are redundant for the bridged call. The same scenario also applies for Party A or Party B with FAREC datafilled in table SPMECAN.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N; BK2BK = Y.

Figure 3-99
Bridging RLT ESP call at tandem/remote switch (scenario 28, part 2)



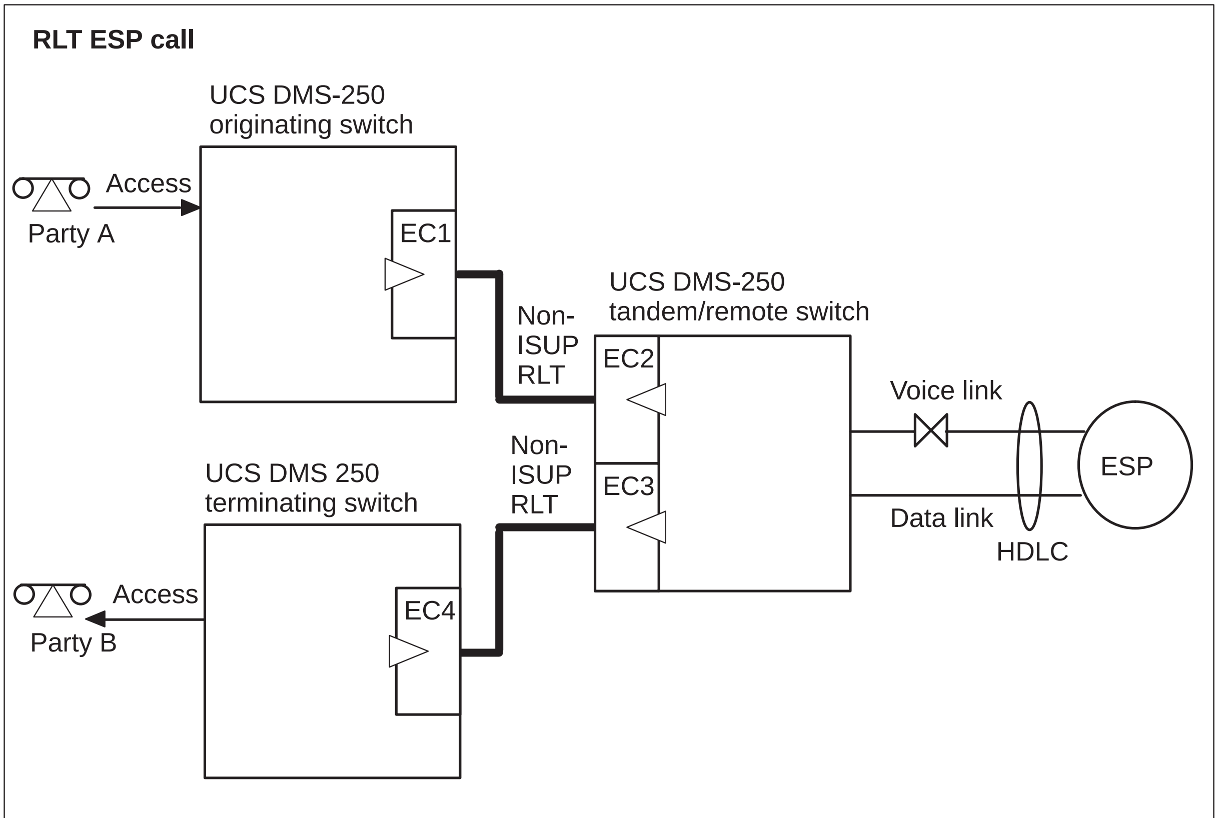
Legend:
EC1, EC3 = ECAN cancels forward echo.
EC2, EC4 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 29: Bridging RLT ESP call at the tandem/remote switch

Figure 3-100 illustrates the scenario where EC1 and EC2 are allocated for Party A terminating to the ESP. When the ESP initiates the second call to Party B at the terminating switch, EC3 and EC4 are allocated for cancelling forward echo and backward echo, respectively.

Figure 3-100
Bridging RLT call at tandem/remote switch (scenario 29, part 1)



Legend:
EC1, EC3 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

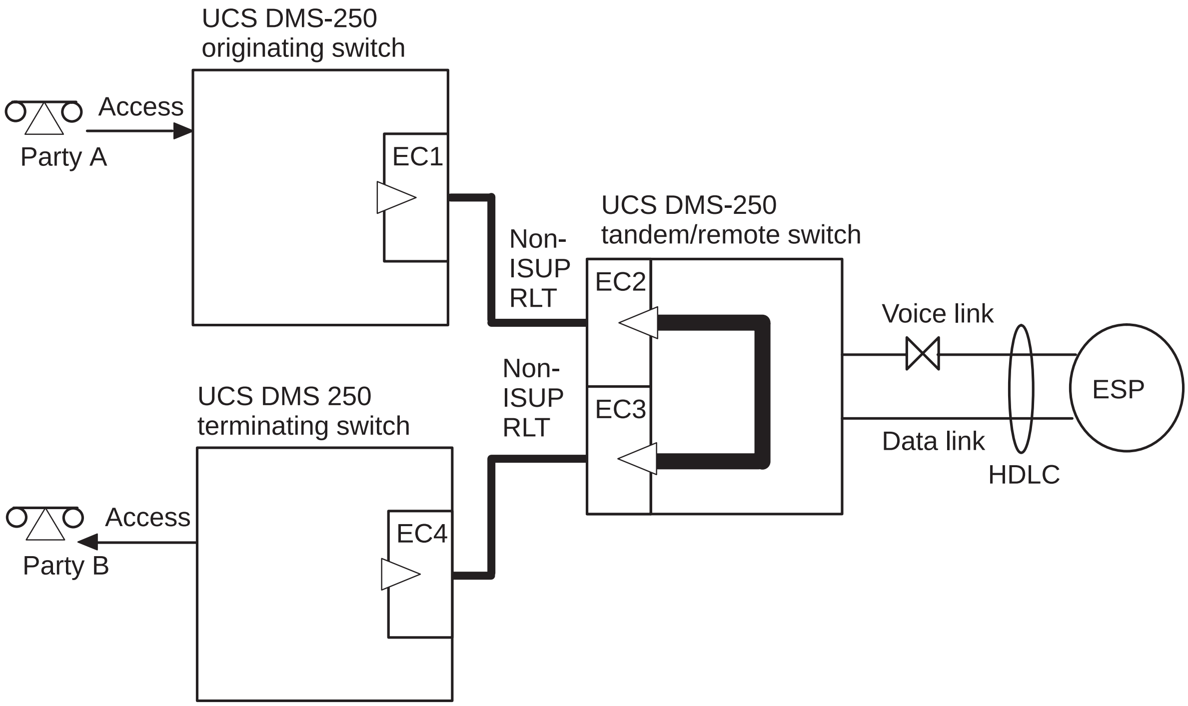
Figure 3-101 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC1, EC2, EC3, and EC4 remain activated on the bridged call since the tandem (remote) switch can not reconfigure the ECANs on the originating switch. EC2 and EC3 are redundant for the bridged call.

Datafill requirements for this scenario is as follows:

- ISUP RLT between the originating and the tandem/remote: (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the terminating and the tandem/remote (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-101
Bridging RLT ESP call at tandem/remote switch (scenario 29, part 2)

Bridging RLT ESP call at the tandem/remote switch



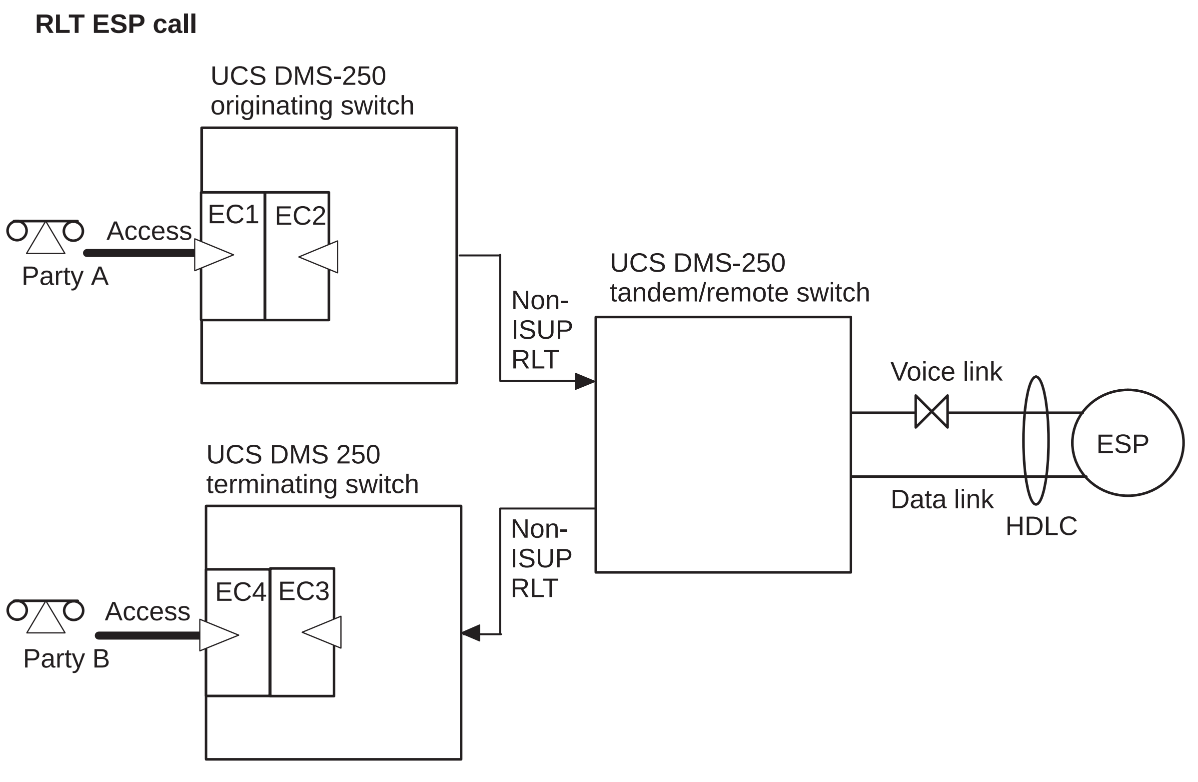
Legend:
EC1, EC3 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 30: Bridging RLT ESP call at the tandem/remote switch

Figure 3-102 illustrates the scenario where EC1 and EC2 are allocated for Party A terminating to the ESP. When the ESP initiates the second call to Party B at the terminating switch, EC3 and EC4 are allocated for cancelling the backward echo.

Figure 3-102
Bridging RLT ESP call at tandem/remote switch (scenario 30, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

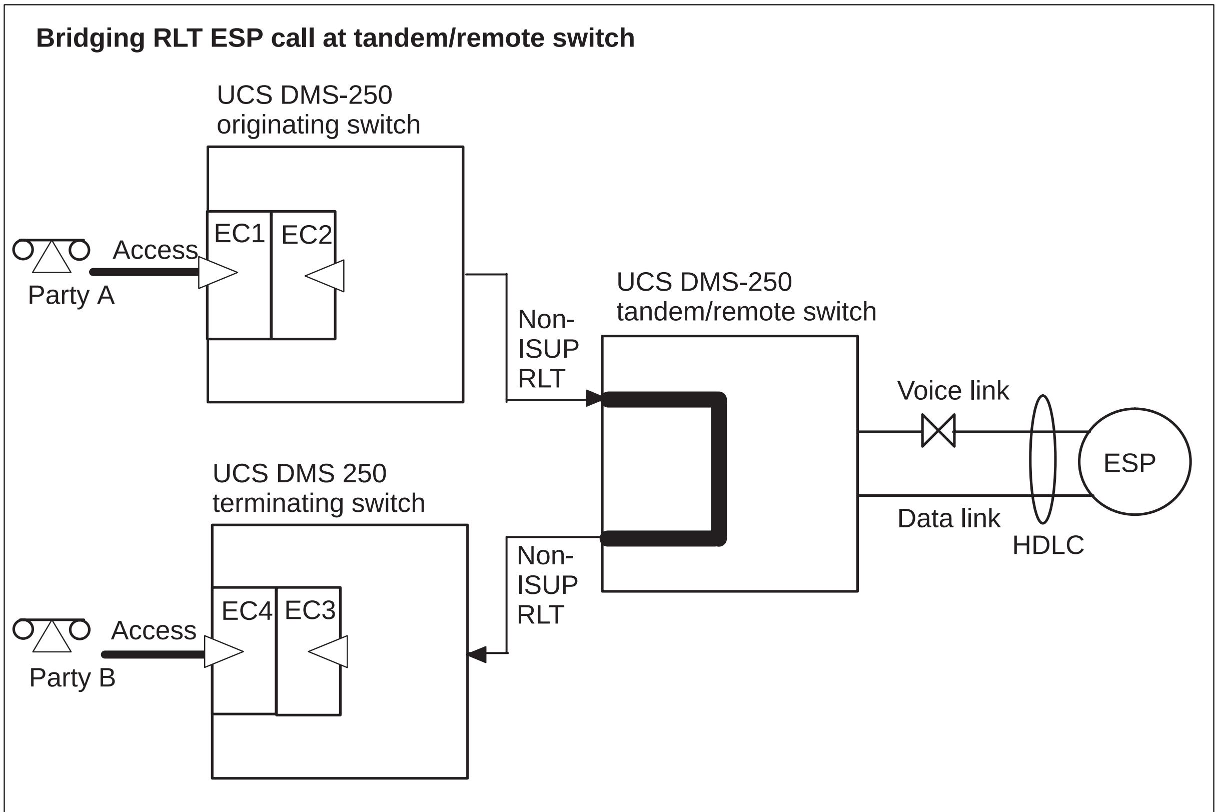
Figure 3-103 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC1, EC2, EC3, and EC4 remain on the bridged call since the tandem (remote) switch can not reconfigure the ECANs on the originating switch or the terminating switch. EC2 and EC3 are redundant for the call. The same scenario also applies for Party A or Party B with FAREC datafilled in table SPMECAN.

Datafill requirements for this scenario are as follows:

- Party A connects through Spectrum: FAREC = N; BK2BK = Y.
- Party B connects through Spectrum: FAREC = N; BK2BK = Y.

AD9960
Spectrum ECAN Feature Interactions (end)

Figure 3-103
Bridging RLT ESP call at tandem/remote switch (scenario 30, part 2)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3 = ECAN cancels forward echo.
EC4 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Services platform initiated scenario

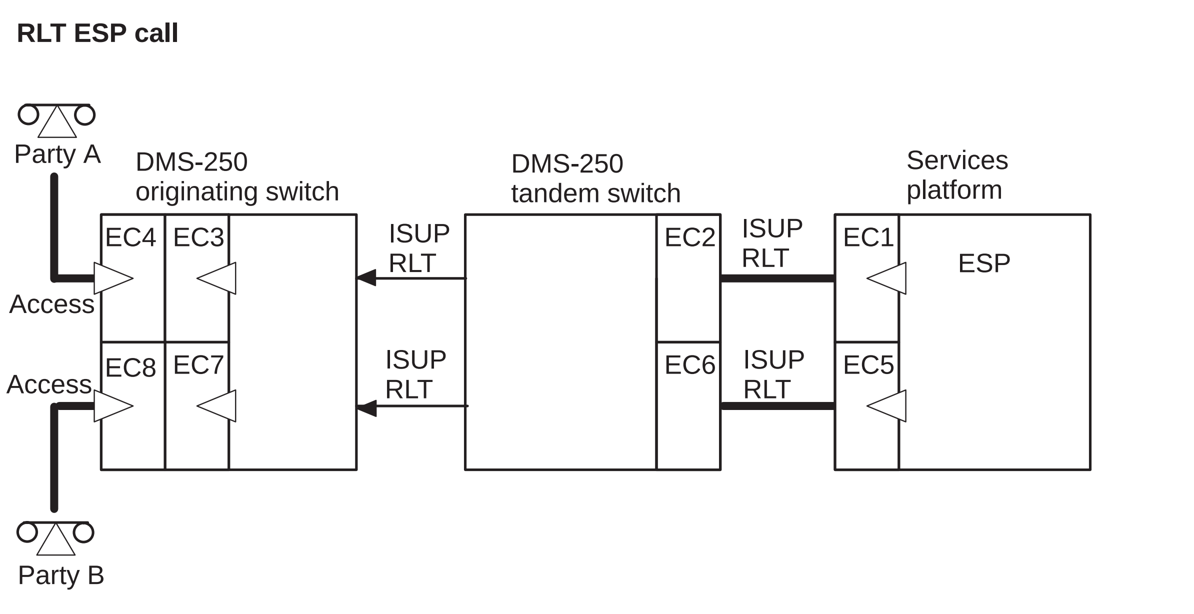
This scenario occurs when the services platform originates both legs (Party A and Party B) of the call and then requests for bridging the call once the call legs have been established.

This chapter includes six services platform initiated scenarios.

Scenario 1: Services platform initiated RLT

Figure 3-104 illustrates the scenario where EC1, EC3, EC4, EC5, EC7, and EC8 are allocated for the two outgoing calls initiated by the ESP. After the bridging FAR is sent by the ESP, Party A and Party B are connected. EC1 and EC5 are deallocated when the bridging frees the resource of the tandem switch and the services platform.

Figure 3-104
Services platform initiated RLT (scenario 1, part 1)



Legend:
EC1, EC5 = Spectrum ECAN cancels forward echo.
EC2, EC6 = Spectrum ECAN is available, but not activated.
EC3, EC7 = ECAN cancels forward echo.
EC4, EC8 = ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

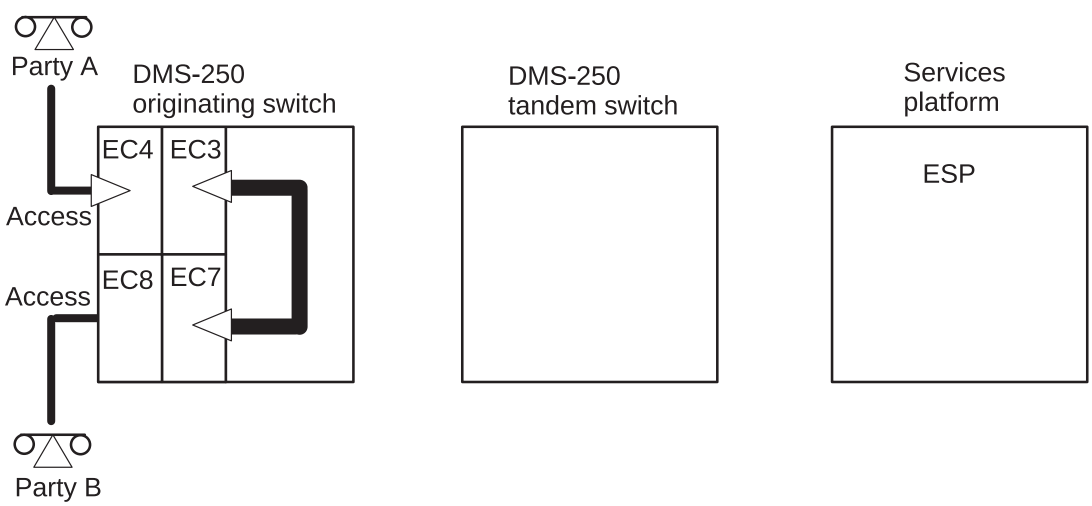
When the call is bridged at the originating switch, ECAN reconfiguration occurs to disable EC3, EC4, EC7, and EC8, then enables EC4 and EC8 to cancel forward echo and backward echo, respectively. Figure 3-105 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = Y.
- Party B connected through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-105
Services platform initiated RLT (scenario 1, part 20

Bridging RLT ESP call at the ESP



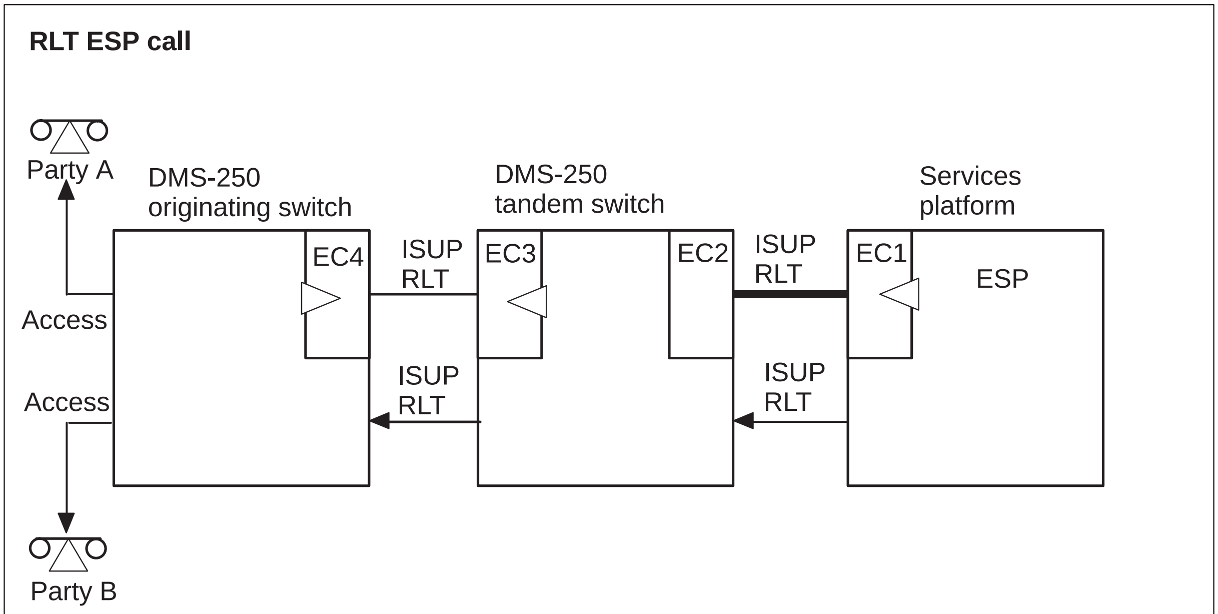
Legend:
EC3 = ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.
EC7, EC8 = Spectrum ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 2: Services platform initiated RLT

Figure 3-106 illustrates the scenario where EC1, EC3, and EC4 are allocated for the call initiated from ESP to Party A. ECANs are not provisioned for the call initiated from ESP to Party B.

Figure 3-106
Services platform initiated RLT (scenario 2, part 1)



Legend:
EC1, EC3 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

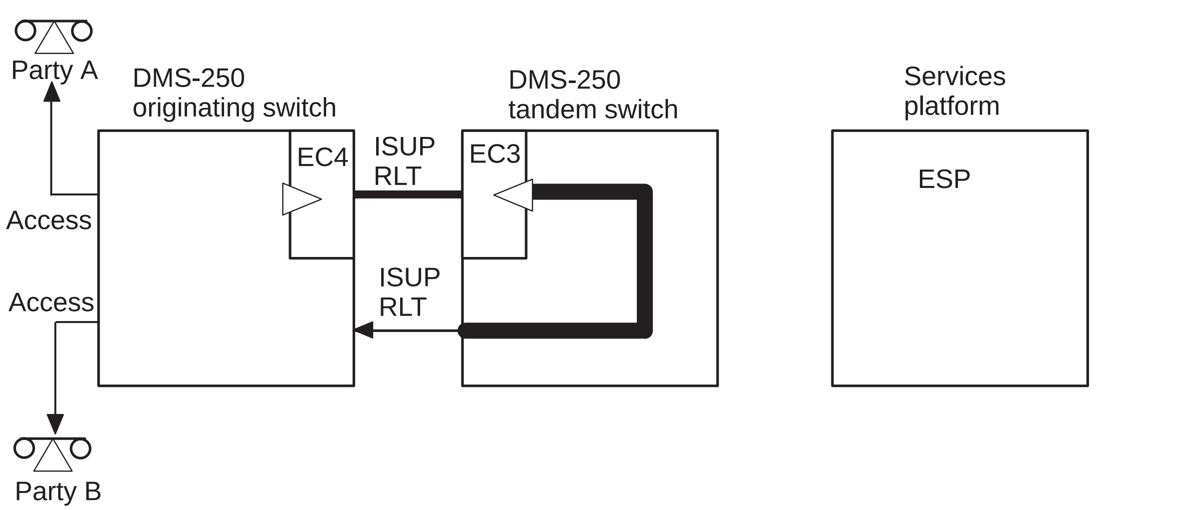
Figure 3-107 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC1 is deallocated when the connection between the tandem (remote) switch and the services platform is taken down. EC3 and EC4 remain on the bridged call. Reconfiguration does not occur for this scenario.

Datafill requirements for this scenario are as follows:

- ISUP RLT between the originating switch and the tandem switch (from ESP to Party A): FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party B): FAREC = N; BK2BK = N.

Figure 3-107
Services platform initiated RLT (scenario 2, part 2)

Bridging RLT ESP call at the tandem switch



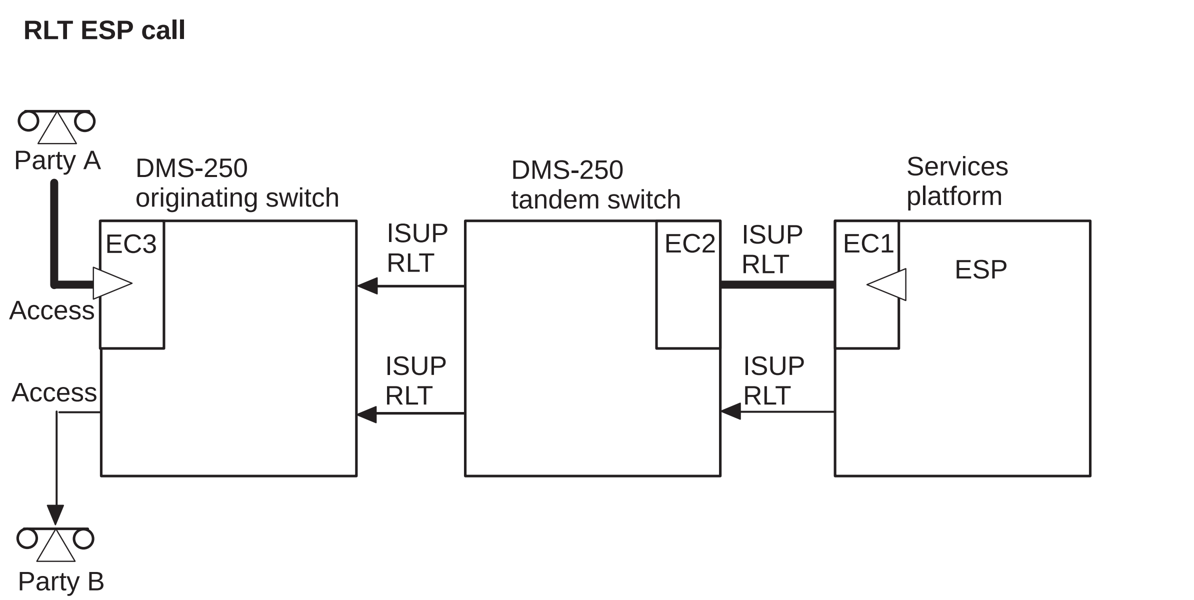
Legend:
EC3 = Spectrum ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 3: Services platform initiated RLT

Figure 3-108 illustrates the scenario where EC1 and EC3 are allocated for the call initiated from ESP to Party A. An ECAN is not provisioned for the call initiated from ESP to Party B.

Figure 3-108
Services platform initiated RLT (scenario 3, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

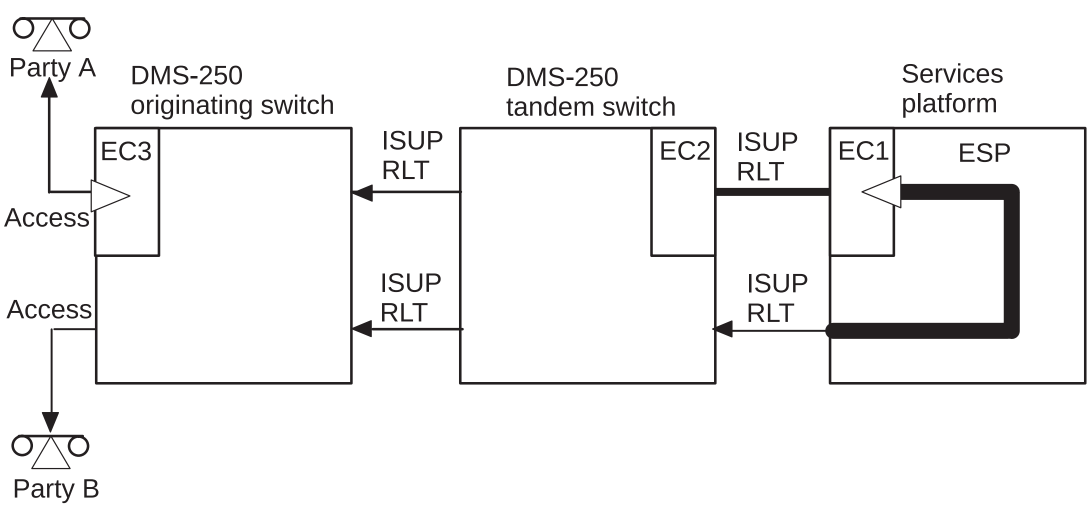
When bridging occurs on the tandem (remote) switch, EC1 and EC3 remain on the bridged call. Reconfiguration does not occur for this scenario. Figure 3-109 illustrates this scenario.

Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.

Figure 3-109
Services platform initiated RLT (scenario 3, part 2)

Bridging RLT ESP call at the host switch



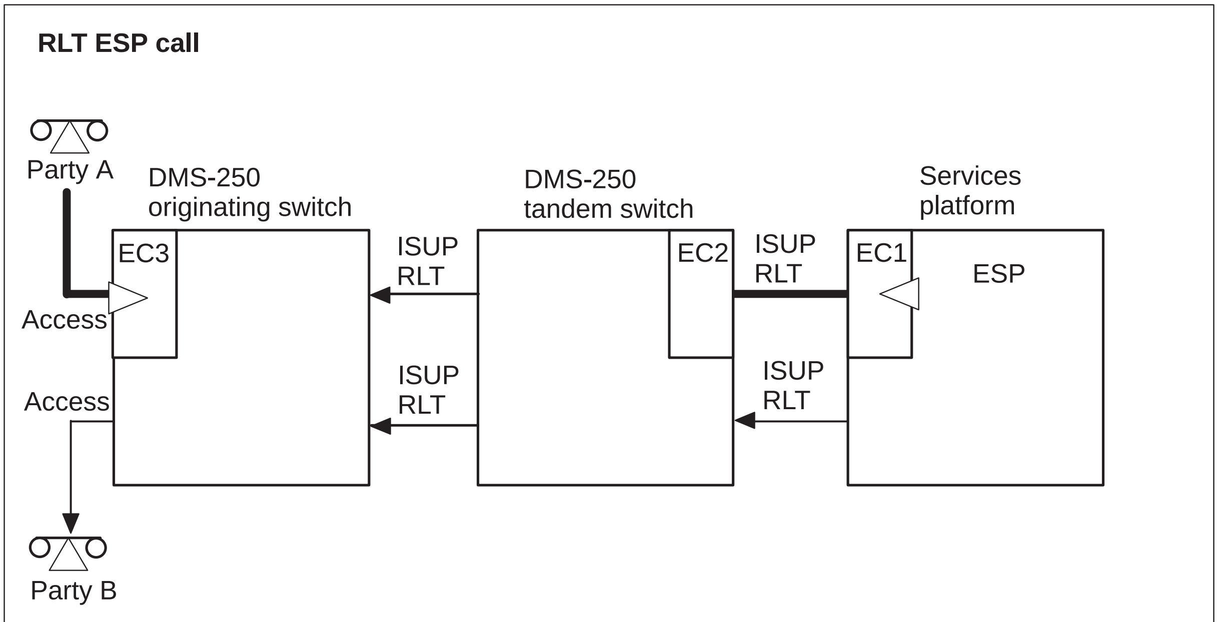
Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 4: Services platform initiated RLT

Figure 3-110 illustrates the scenario where EC1 and EC3 are allocated for the call from Party A to ESP. ECANs are not provisioned for the call initiated from ESP to Party B.

Figure 3-110
Services platform initiated RLT (scenario 4, part 1)



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

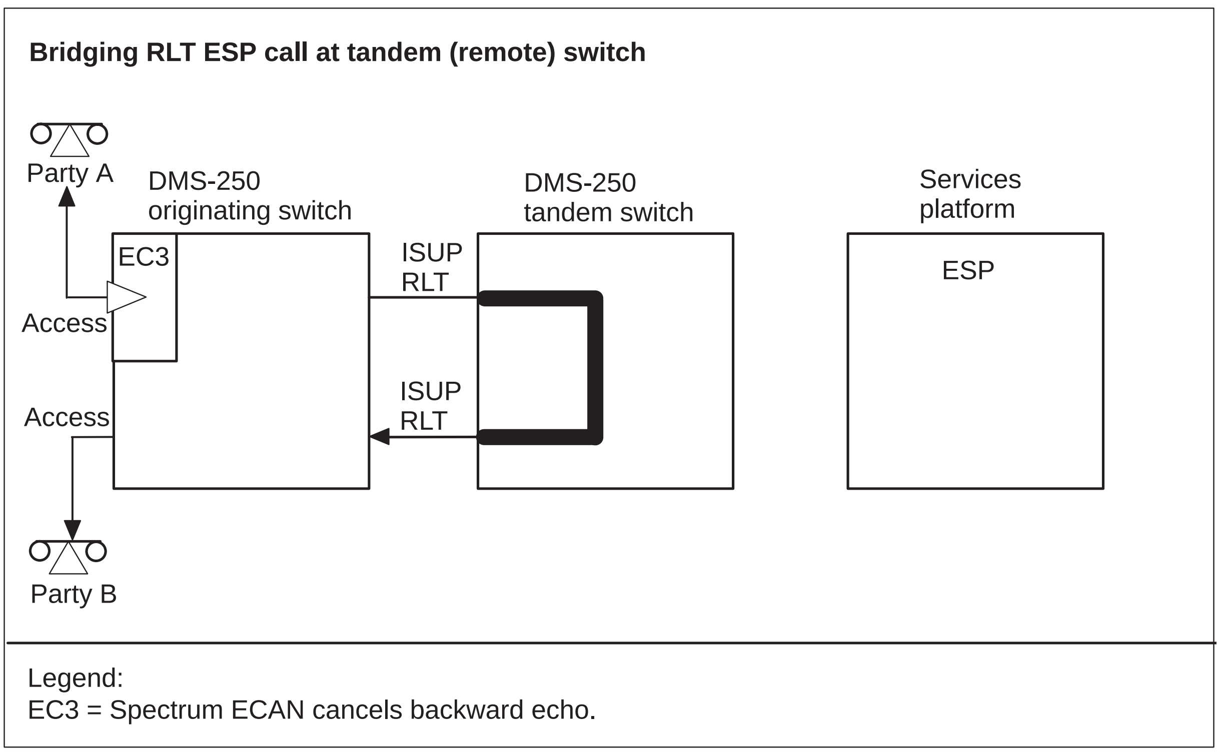
AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-111 illustrates the scenario where bridging occurs on the tandem (remote) switch. EC1 is deallocated when the connection between the tandem (remote) switch and the services platform is taken down. EC3 remains on the bridged call. This scenario allocates only one ECAN for the bridged call. To avoid the shortage of an ECAN on the call as shown in this scenario, the provisioning rule states that the datafill on table SPMECAN for a long access trunk should be either BK2BK or FAREC.

Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.

Figure 3-111
Services platform initiated RLT (scenario 4, part 2)

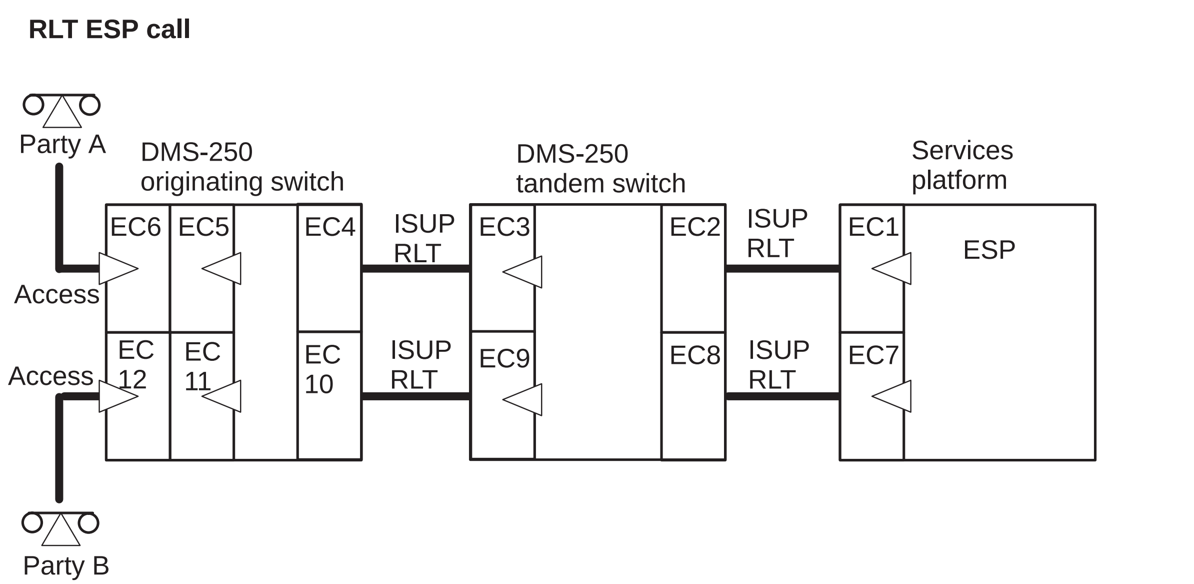


AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 5: Services platform initiated RLT

Figure 3-112 illustrates the scenario for the incoming call leg from the ESP to Party A. EC1, EC3, EC5, and EC6 are allocated for a long access trunk in a call initiated by the ESP. Note that all the ECANs for cancelling forward direction are activated. The second call from the ESP to Party B activates EC7, EC9, EC11, and EC12. All the ECANs for cancelling forward direction are activated.

Figure 3-112
Services platform initiated RLT (scenario 5, part 1)



Legend:
EC1, EC7 = Spectrum ECAN cancels forward echo.
EC2, EC8 = Spectrum ECAN is available, but not activated.
EC3, EC5, EC9, EC11 = ECAN cancels forward echo.
EC4, EC10 = ECAN is available, but not activated.
EC6, EC12 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-113 illustrates the scenario where bridging occurs on the services platform. All the ECANs remain on the bridged call. Six ECANs are redundant for the bridged call.

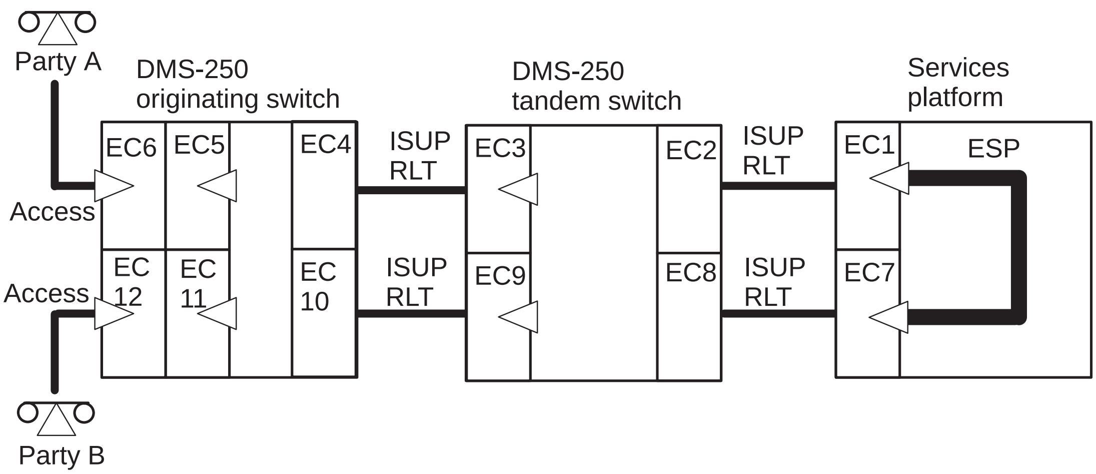
Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = N.
- Party B connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between originating switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.
- ISUP RLT between originating switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-113
Services platform initiated RLT (scenario 5, part 2)

Bridging RLT ESP call at ESP



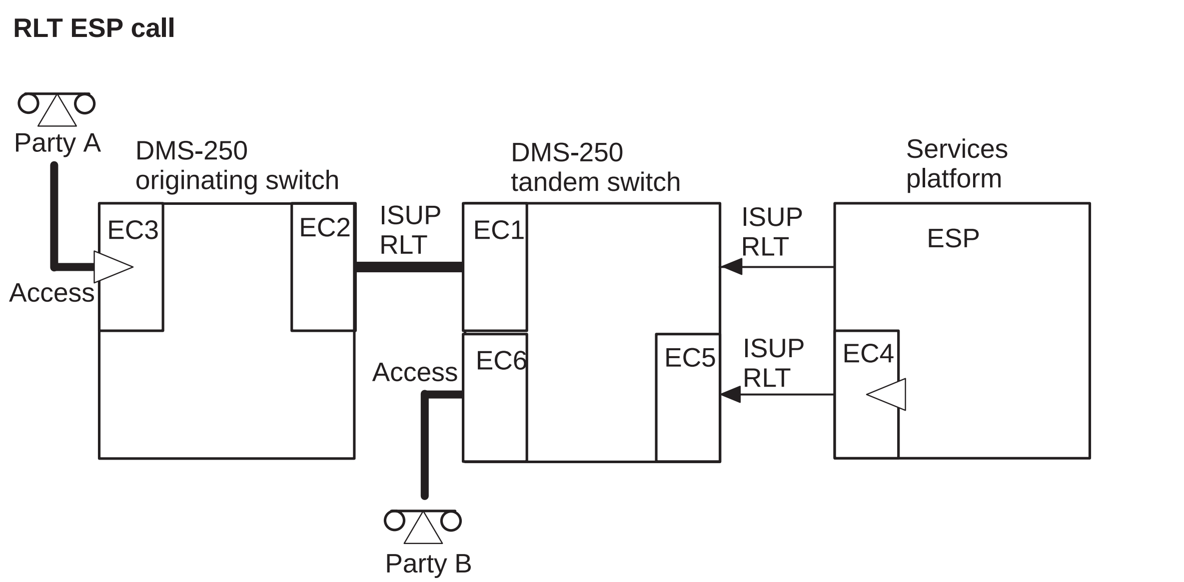
Legend:
EC1, EC7 = Spectrum ECAN cancels forward echo.
EC2, EC8 = Spectrum ECAN is available, but not activated.
EC3, EC5, EC9, EC11 = ECAN cancels forward echo.
EC4, EC10 = ECAN is available, but not activated.
EC6, EC12 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 6: Services platform initiated RLT

Figure 3-114 illustrates the scenario where the SS7 RLT between the originating switch and the tandem switch is a long IMT RLT trunk. EC1 and EC3 are allocated for cancelling outgoing (forward) and incoming (backward) echo, respectively. EC4 and EC6 are allocated for the second outgoing leg since the Party B is a long ACCESS trunk.

Figure 3-114
Services platform initiated RLT (scenario 6, part 1)



Legend:
EC1, EC4 = Spectrum ECAN cancels forward echo.
EC2 = Spectrum ECAN is available, but not activated.
EC3 = ECAN cancels backward echo.
EC6 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

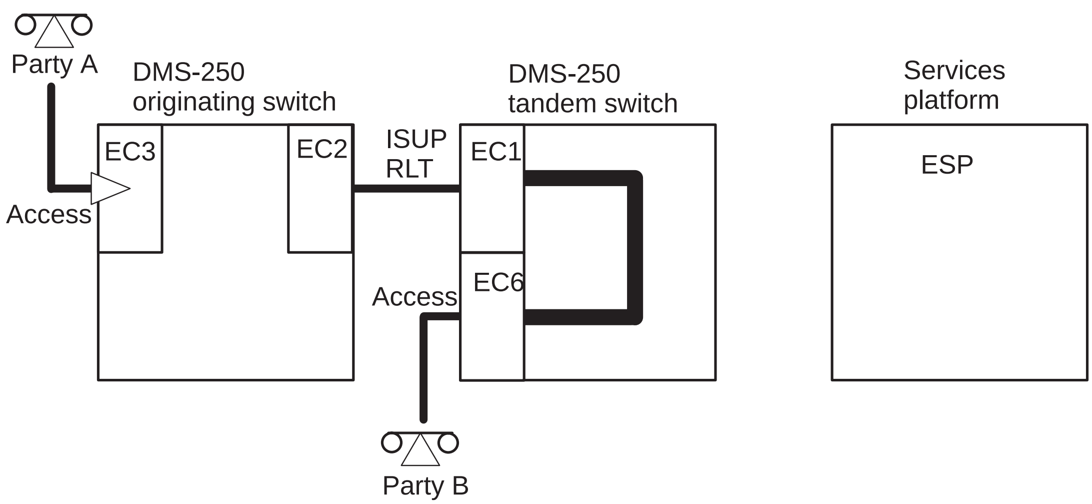
Figure 3-115 illustrates the scenario where bridging the RLT occurs. EC4 is deallocated. EC1, EC3, and EC6 remain on the bridged call for cancelling forward echo and backward echo, respectively.

Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = N.
- Party B connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from ESP to Party A): FAREC = N; BK2BK = N.

Figure 3-115
Services platform initiated RLT (scenario 6, part 2)

Bridging RLT ESP call at tandem switch



Legend:
EC1, EC2 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.
EC6 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Redirection scenario

Three redirection scenarios are described on the following pages.

Scenario 1: Redirection RLT

The redirection RLT scenario, as the three-part Figure 3-116 illustrates, utilizes only one trunk (Party A) to connect to the services platform by allocating EC1 and EC3. The services platform sends a message to the originating UCS DMS-250 switch requesting routing to a specified number (Party B). The trunks connecting the services platform to the bridging UCS DMS-250 switch are then released. EC3 is deallocated when the call is taken down. EC1 and EC4 are allocated for the redirected call by two-party call control algorithm.

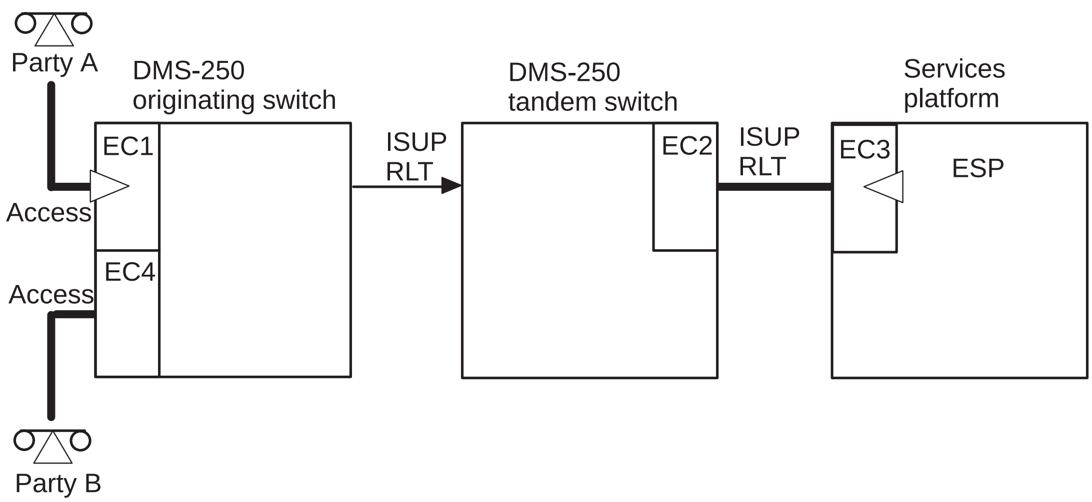
Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC(N); BK2BK = N.
- Party B connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform (from Party A to ESP): FAREC = N; BK2BK = N.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-116
Redirection RLT (scenario 1, parts 1, 2, and 3)

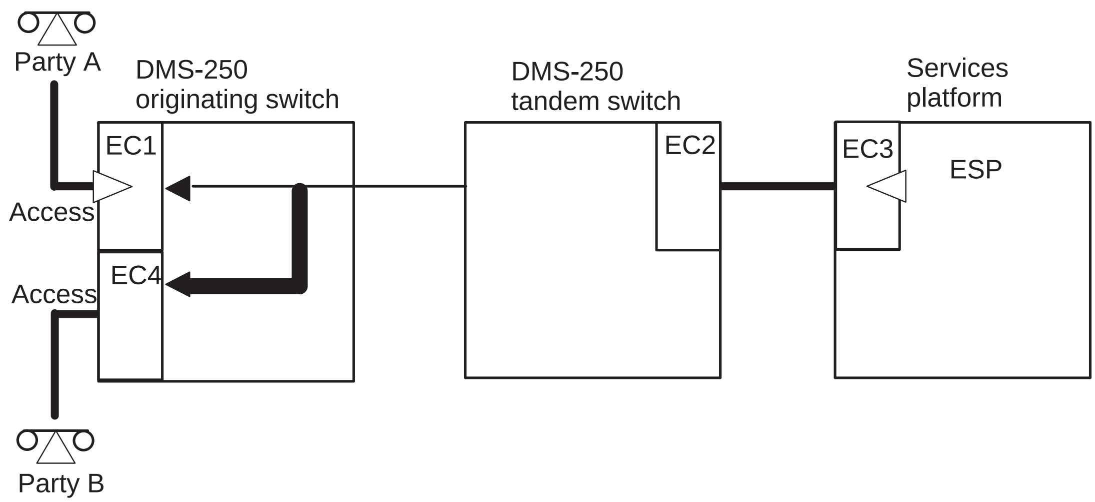
RLT ESP call



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

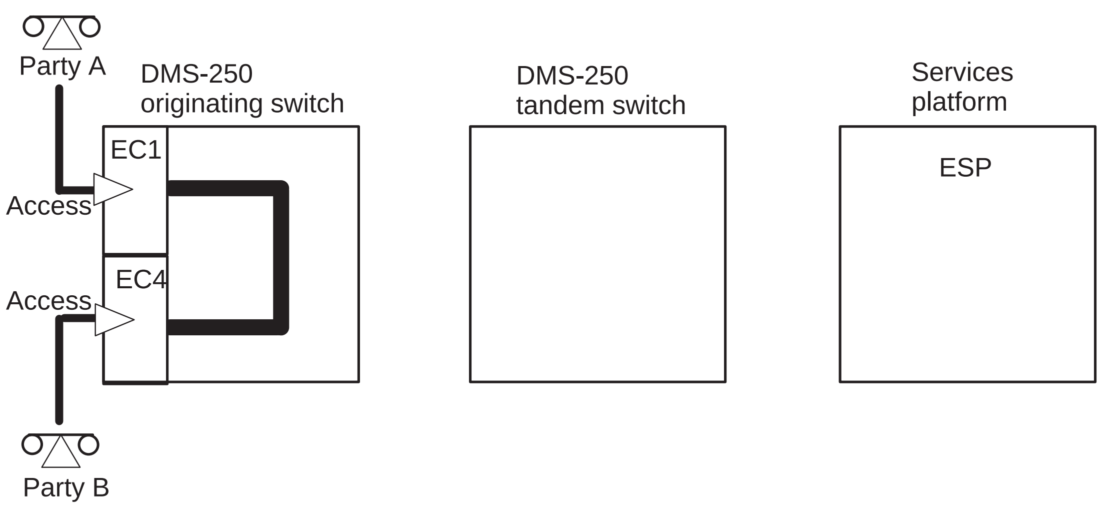
AD9960
Spectrum ECAN Feature Interactions (continued)

Redirect FAR at originating switch



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

Party A and Party B released from ESP



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 2: Redirection RLT

As the three-part Figure 3-117 illustrates, EC1 and EC3 are allocated for the call from Party A to the services platform. The services platform sends a message to the originating UCS DMS-250 switch requesting routing to a specified number (Party B). The trunks connecting the services platform to the bridging UCS DMS-250 switch are then released. EC3 is deallocated when the call is taken down. EC1 and EC4 are allocated for the redirected call by two-party call control algorithm.

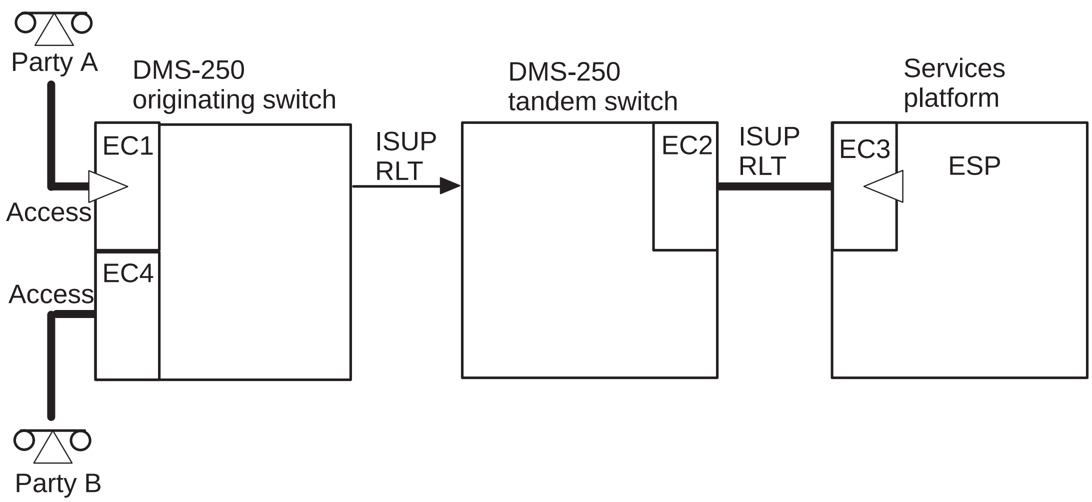
Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = N.
- Party B connected through Spectrum: FAREC = N; BK2BK = N.
- ISUP RLT between the tandem switch and the services platform: FAREC = N; BK2BK = N.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-117
Redirection RLT (scenario 2, parts 1, 2, and 3)

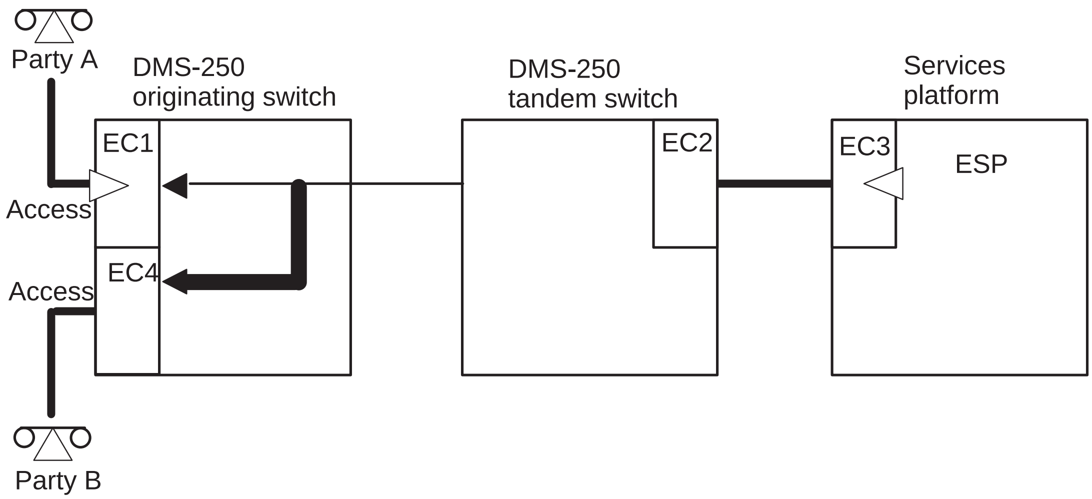
RLT ESP call



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

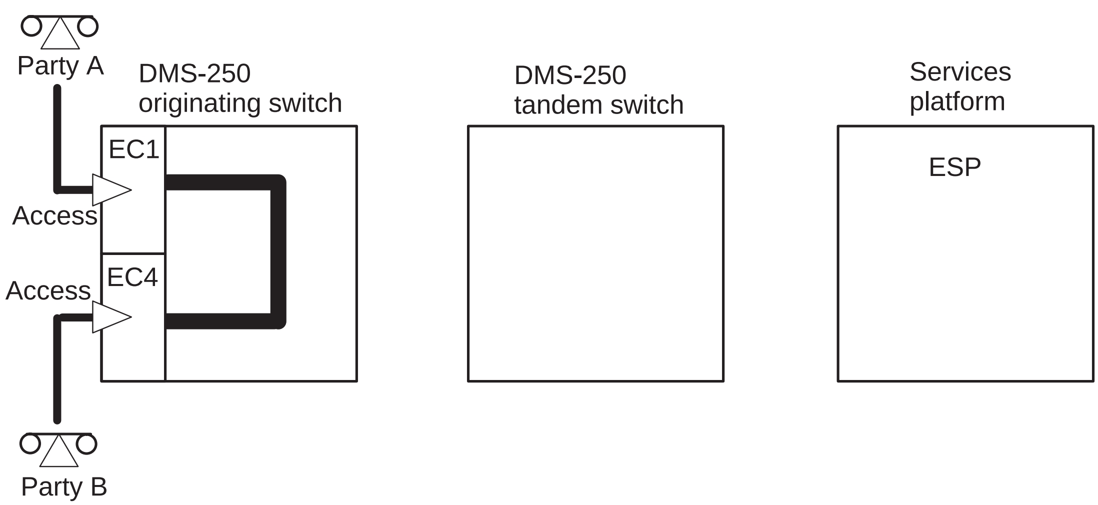
AD9960
Spectrum ECAN Feature Interactions (continued)

Redirect FAR at originating switch



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2, EC4 = Spectrum ECAN is available, but not activated.
EC3 = Spectrum ECAN cancels backward echo.

Party A and Party B released from ESP



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC4 = Spectrum ECAN cancels backward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Scenario 3: Redirection RLT

As the two-part Figure 3-118 illustrates, this scenario uses only one trunk (Party A) to connect to the services platform by allocating EC1, EC2, and EC4. The services platform sends a message to the tandem UCS DMS-250 switch requesting routing to a specified number (Party B) that is at the originating switch. The trunks connecting the services platform to the tandem (remote) UCS DMS-250 switch are then released. EC4 is deallocated when the call is taken down. EC1 and EC2 remain on the redirected call. EC5 and EC6 are allocated by the two-party call control algorithm. Reconfiguration does not occur for this scenario.

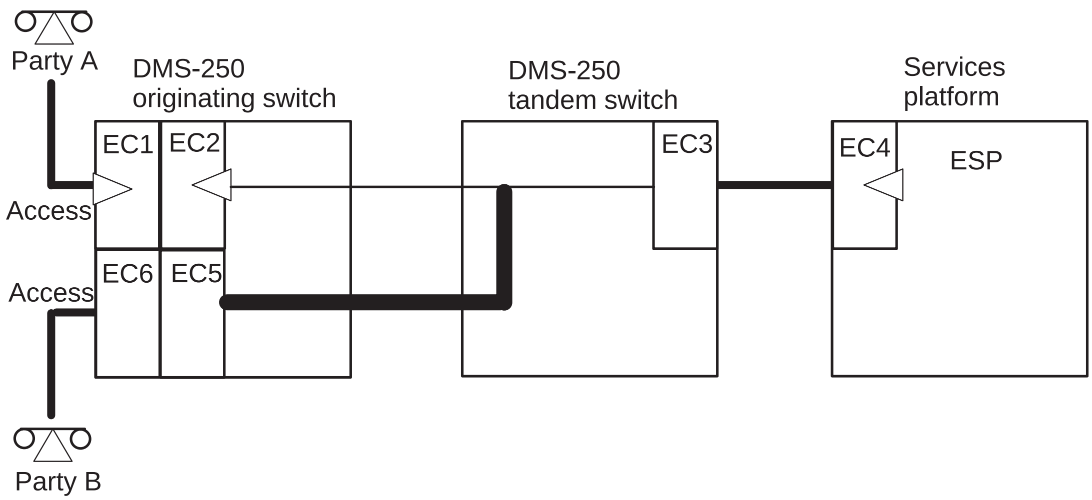
Datafill requirements for this scenario are as follows:

- Party A connected through Spectrum: FAREC = N; BK2BK = Y.
- Party B connected through Spectrum: FAREC = N; BK2BK = Y.
- ISUP RLT between the tandem switch and the services platform: FAREC = N; BK2BK = N.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-118
Redirection RLT (scenario 3, parts 1, and 2)

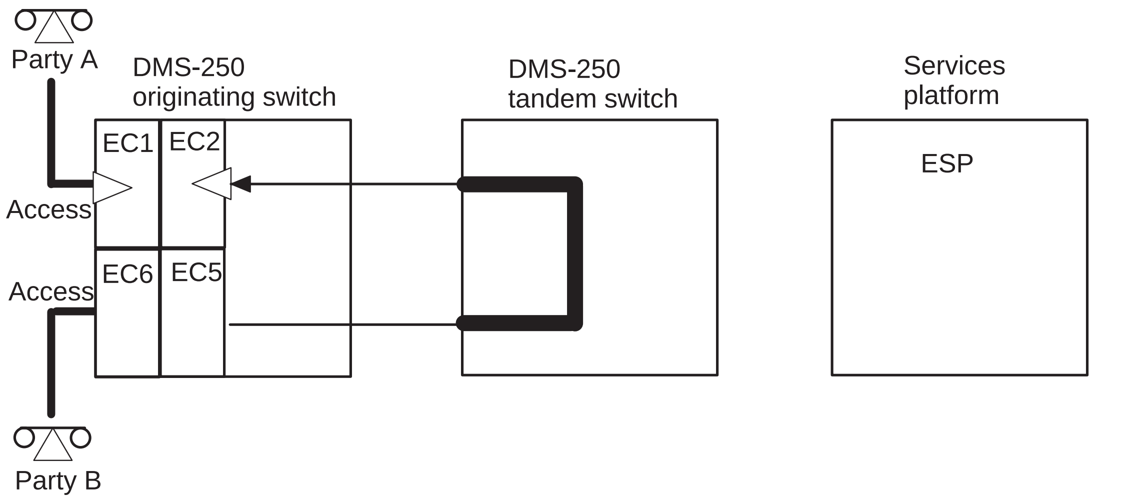
Redirect FAR at originating switch



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC3, EC6 = Spectrum ECAN is available, but not activated.
EC4 = Spectrum ECAN cancels backward echo.
EC5 = ECAN is available, but not activated.

AD9960
Spectrum ECAN Feature Interactions (continued)

Party A and Party B released from ESP



Legend:
EC1 = Spectrum ECAN cancels forward echo.
EC2 = ECAN cancels backward echo.
EC4 = Spectrum ECAN cancels backward echo.
EC5 = ECAN cancels forward echo.

AD9960
Spectrum ECAN Feature Interactions (continued)

Route advance

When the route advanced call reaches the ringing stage without answer, Spectrum call processing software does not activate Spectrum ECAN until it reaches the answer stage. When the no answer timer times out after the call is in the ringing stage, this call is taken down without Spectrum ECAN interaction. There is no ECAN reconvergence involved in this scenario.

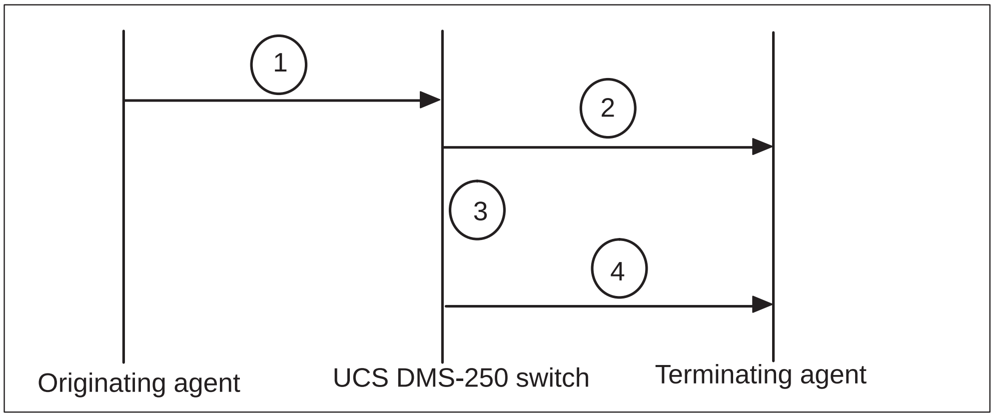
When the UCS DMS-250 switch attempts to terminate a call, an internal no answer timer is started. This no answer timer gives the maximum amount of time the seized trunk is allowed to remain in an unanswered state. If an answer message is not received before the no answer timer expiration, the terminating circuit is dropped, the no answer timer is reset, and an attempt is made to route advance to the next available route until the last choice in the route list. On the last route in the route list, the no answer timer is not started. The receipt of an answer message while the no answer timer is active signals call processing to cancel the no answer timer. The no answer timer is started for all access trunk agencies.

The following is a brief explanation of how the ring no answer route advances on the UCS DMS-250 switch. Each step matches the number shown in Figure 3-119.

1. The call originates from an access trunk agency.
2. The UCS DMS-250 switch starts no answer timer and attempts to terminate the call to the terminating agent.
3. The UCS DMS-250 switch’s call no answer timer expires.
4. The UCS DMS-250 switch route advances the call using the next route in the route list and resets the no answer timer.
5. Steps 3 and 4 repeat until the route list is exhausted or the call is answered.

AD9960
Spectrum ECAN Feature Interactions (continued)

Figure 3-119
Ring no answer route advance sequence



AD9960
Spectrum ECAN Feature Interactions (continued)

Software answer

Software answer is detected when terminating on IMT, off-network access line (ONAL), or DAL FXO trunks. When a call is terminated to an IMT with trunk group parameter ATDANS = Y or to an ONAL or DAL FXO trunk (for all cases), a network path is established from the terminating trunk to an audio tone detector (ATD).

After outpulsing is complete, the terminating trunk notifies the ATD of this condition. After delaying a period of time specified by trunk group parameter DELAYATD (160 ms to 16 seconds in 160 ms granularity), the ATD begins monitoring.

The ATD report options are as follows:

- Software Answer (Silence Detected)
- Software Answer (No Voice Detected)
- Software Answer (Audible Ringing Detected)
- Software Answer (Reorder Detected)
- Software Answer (Busy Detected)
- Software Answer (Voice Detected)
- Software Answer (ATD Hardware Error)

If no ATDs are available when an attempt is made to terminate one of the three supporting trunks, the originating trunk is selected again. If an ATD is not available at that time, the originating trunk route advances and a resource busy log generates.

Note: The activation of ECAN in the software answer is different from the regular two-party call, which activates the ECAN only when the answer message is received.

AD9960
Spectrum ECAN Feature Interactions (continued)

Suspend/Resume messages

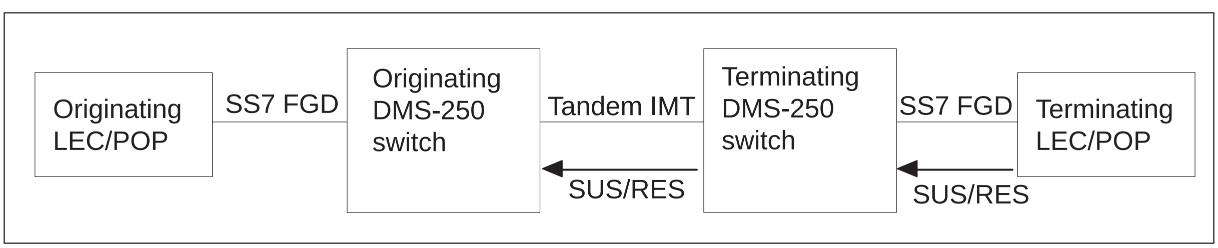
The SS7 Suspend and Resume messages prevent unintentional disconnects from the called party (only if the called party is the first to disconnect and is an ISUP terminator). Examples of unintentional disconnects are hits, flashes, or momentary unintentional disconnects.

The receipt of the Suspend (SUS) message is interpreted as a temporary on-hook from the called party. The circuit connection remains and billing continues. If the call is end-to-end SS7, the SUS is passed through the interexchange carrier network to the originating local exchange carrier (LEC)/ point of presence (POP). The receipt of the Resume (RES) message is interpreted as an off-hook from the called party and the call continues. The RES message passes through the interexchange carrier network to the originating LEC/POP. If PTS interworking is encountered at the originating UCS DMS-250 switch, an on-hook (instead of SUS) is placed on the originating circuit.

The SUS messages are sent in the backward direction from the terminating LEC/POP when the called party goes on-hook. The RES messages are sent in the backward direction from the terminating LEC/POP when the called party goes off-hook within the SUS timer. The terminating UCS DMS-250 switch propagates the SUS and RES messages back to the originating UCS DMS-250 switch where SUS and RES message handling takes place.

Figure 3-120 shows an example of a possible network scenario where SUS and RES messages are generated.

Figure 3-120
Network scenario for SUS and RES message generation example



The receipt of the SUS message is interpreted as a temporary on-hook from the called party. The circuit connection remains and billing continues. The receipt of the RES message is interpreted as an off-hook from the called party and the call continues. If ECANs are present either on the originating, terminating, or both switches, when the terminator goes on-hook the ECAN

AD9960 Spectrum ECAN Feature Interactions (continued)

on the terminating DMS-250 switch may try to reconverge because the characteristics of the terminating circuit have changed. If the terminator goes off-hook again after a few seconds, the characteristics of the terminating circuit change again, thereby causing another reconvergence of the ECAN.

AD9960
Spectrum ECAN Feature Interactions (continued)

Automatic Trunk Routing system

The Automatic Trunk Routing (ATR) system consists of trunk testing equipment that can be programmed to automatically initiate voice frequency transmission testing over a trunking network.

The ATR system is a facility to remotely test both IMT and external trunks by way of a digital, four wire, E&M trunk, referred to as an Automatic Trunk Routing Test (ATRT). Test calls generated by ATR equipment are outpulsed over the ATRT and received by the UCS DMS-250 switch. The UCS DMS-250 switch then generates a test call IAM or exec template outpulsed to the trunk under testing. This allows ATR calls to be completed even when the trunk is out of service at the terminating far end switch.

If the trunk under test is on an XPM peripheral, the external ECAN device or internal ECAN device is in service at provisioning time. In Spectrum, an ECAN is provided by the Spectrum internal ECAN resource module. If the trunk under test is on, the ECAN call control algorithm determines if the current switch is required to apply an ECAN.

AD9960
Spectrum ECAN Feature Interactions (continued)

Data calls

For fax/modem calls, the ECAN may initially be activated, but will be deactivated upon receipt of a valid G.164/G.165 tone. The ECAN may be disabled for the remainder of the call or may be enabled again when the value of the AUTON field in table SPMECAN is set.

There are three detection modes for enabling Spectrum ECAN:

- The data transmission is finished.
- The absence of the energy in both directions of the data call is detected.
- If the eighth bit of each transmitted pulse code modulation (PCM) frame is 1, the ECAN will remain disable. Once the PCM frame changes all 0 bit, which indicates the completion of the data call, Spectrum ECAN is enabled again. This is handled by Spectrum ECAN's tone disabler firmware. When the TONDS bit is set, the tone disabler disables the ECAN on reception of a valid 2100 Hz tone.

Data calls can be initiated by the dialing plan, table datafill, or the User Service Information (USI) parameter.

Switched 56 Kbyte data calls are allowed to originate on ISUP IMT, EANT, ONAT, or DAL trunks and use the following dialing plan:

- For IMT

  FC + PART + 7/10D

  where

  FC = 2-digit FAC (56)

  PART = 3-digit partition

  7/10D = 7-digit onnet or 10-digit offnet number
- For EANT, ONAT, or DAL

  # + FC + 7/10D + (prompt tone + AC)

  where:

  FC = 2 -digit FAC (56 or 99)

  7/10D = 7-digit onnet or 10-digit offnet number

  AC = optional account code

AD9960
Spectrum ECAN Feature Interactions (continued)

At the terminating switch the information digits indicate a data call and provide a compatible trunk for termination to data.

The BCNAME in table TRKGRP is used to identify a data call when it is datafilled as 56KDATA, 64KDATA, 64KRES, 64KX25, DATAUNIT, DATA_VOICE, or 64K_RATE_AD_DATA.

The BCNAME in table ANISCUP can be datafilled as 56KDATA, 64KDATA, 64KRES, 64KX25, DATAUNIT, DATA_VOICE, or 64K_RATE_AD_DATA to identify as a data call in a dialing plan by ANI delivery.

Data calls can also be identified by DC selector in the pretranslator.

For an ISUP IMT trunk, the UCS DMS-250 switch also marks an incoming call as a data call if the Information Transfer Capability (ITC) field of USI parameter of the incoming IAM indicates data (RESTRICTED DIGITAL or UNRESTRICTED DIGITAL).

ECANs are not activated for digital data calls regardless of table TRKSGRP datafill (SPMECIDX option) or the value of echo bits in an ISUP message. This allows the operating company to consolidate voice and data trunks.

AD9960
Spectrum ECAN Feature Interactions (continued)

Dialable Wideband Service

Dialable Wideband Service (DWS) is a multi-rate, circuit mode service that offers a dialable, on demand, real-time switched service. The service allows the user to establish network connections with rates as high as 1.536 Mbit/s. The narrowband voice calls can also use DWS trunks if the BLOCKNB option for the DWS trunk in table TRKGRP is not datafilled. Wideband connectivity is currently provided for the following scenarios:

- ISUP FGDs interworking with IXC
- ISUP IMT interworking with IXC
- interworking between PRIs (DTCI-based PRI) and both ISUP IMT and ISUP FGD

Wideband calls use a number of 64 kbit/s DS0 channels of one T1 span for the same call. The number of channels can range from 2 to 24. This allows the capability of providing data transfer rates ranging from 128 kbit/s (which is 64×2) to 1.536 Mbit/s (which is 64×24), in increments of 64 kbit/s, for a single call through the network. All the channels used on the incoming or outgoing wideband call must reside on the same T1.

DWS is supported for ISUP IMT, ISUP FGD, AXXESS and PRI trunks. Any trunk has to be datafilled “WIDEBAND” in SELSEQ field of table TRKGRP. Wideband trunks can allow wideband calls as well as narrowband calls. This feature provides echo cancellation based on feature AD9959 for a voice call on a wideband trunk. If a call is a wideband call, ECANs would not be allocated.

AD9960
Spectrum ECAN Feature Interactions (continued)

FlexDial

FlexDial framework controls the provisioning of features and the collection of information from the user/interface during call setup. A provisioning data model defines the desired interaction with the originating agent.

The FlexDial framework controls the provisioning of the subscriber, interface, and dialed features, and the collection of information from the user interface during call setup. FlexDial has only direct interaction with two-party Spectrum ECAN call control. From a feature interaction point of view, even though the ECAN call control may take place when FlexDial initiates other features (such as reorigination), the call control algorithm from AD9959 is applied. See Chapter 2, “AD9959 — Spectrum Echo Canceller Call Control.”

AD9960
Spectrum ECAN Feature Interactions (continued)

Carrier advanced intelligent networking

Advanced Intelligent Networking (AIN) achieves its flexibility by creating standard points in call (PIC) where simple SCP queries or complex conversational TCAP transactions may be sent. These PICs provide a finer granularity of control of the SSP than that of IN1 (Intelligent Networking) services. This control, combined with industry standard message and parameter formats, makes carrier advanced intelligent networking (CAIN) an ideal building block for traditional IN1 services, as well as any additional functionality requiring off-board database queries and routing.

The AIN 0.2 call model represents the progression of call processing through designated PICs, such as origination or routing. The CAIN UCS DMS-250 SSP provides the ability for normal call processing to be interrupted at various PICs according to the Bellcore AIN 0.2 Call Model. At each of these PICs, trigger detection points (TDP) may be encountered. In general, TDPs are points in call processing when a trigger is examined. If the conditions associated with that trigger are satisfied, then the action indicated by that trigger is taken. When the UCS DMS-250 SSP encounters a PIC with a TDP, in-switch logic and datafill are consulted to determine if normal in-switch call processing is interrupted. When the in-switch call flow is interrupted, the UCS DMS-250 SSP sends a TCAP message to the SCP requesting instructions for processing the current call. Depending on the current PIC and TDP, the SCP may respond with routing information, TCAP conversation, an announcement to be played prior to routing, or an announcement to be played prior to disconnecting the call.

CAIN provides traditional IN1 services, as well as any additional functionality requiring off-board database queries and routing. The normal CAIN reorigination or CAIN UA IMT reorigination follows the same pattern as the regular reorigination scenario.

AD9960
Spectrum ECAN Feature Interactions (continued)

Dynamically controlled routing

Dynamically controlled routing (DCR) provides the UCS DMS-250 switch with the ability to dynamically route overflow traffic that is separated by one or two links from an originating office. This dynamic routing is achieved by having each switch of the DCR network communicating with a centralized processor, called the network processor (NP), with data describing the switch's resource usage. This data is used by the NP to calculate routing recommendations for calls that overflow a trunk group, then provide the switches with these recommendations. This is a cyclic process based on a configurable time interval (for example 10 second). At each participating switch, the connectivity to destination switches, which are one or two links away, is managed by way of data tables. The NP recommendation updates these tables to provide the recommended route to these destinations.

When the DCR routing scheme is not available in an office, the routing of the whole call traffic is handled by the fixed routing (FR) scheme, for which the routing pattern is defined once at switch start-up time and is never updated at any later time unless occasionally changed by manual intervention from the switch operator. FR sends overflow traffic along routes that are pre-assigned in data tables in a fixed sequence. If the first route in a sequence is busy, then the call overflows to consecutive routes one at a time until one is available. If all alternate routes in the sequence are busy, the call is blocked.

When the DCR routing scheme is active, the routes that are proposed to route the call are periodically updated by an off-board processor, based on the current resource utilization of the whole network. Therefore, chances that the suggested route is not available to route the call are much less, compared to the FR scheme. However, if route unavailability actually occurs, the call is possibly tandemed to another switch. If this alternative is not possible, the call is routed to some other switching node, so that it is taken away from local congestion. Should all those routes be unavailable, the call is blocked.

Before the DCR successfully routes the call through an available route, the answer message is not received by Spectrum call processing.

AD9960
Spectrum ECAN Feature Interactions (continued)

Hardware requirements

None

Limitations and restrictions

This feature does not support the Programmable Service Node feature.

Interactions

Interaction is as follows:

- Interaction is required with reorigination. Refer to “Reorigination” in this chapter.
- Interaction is required with RLT. Refer to “Release link trunk” in this chapter.
- Interaction is required with route advance. Refer to “Route advance” in this chapter.
- Interaction is required with software answer. Refer to “Software answer” in this chapter.
- Interaction is required with Suspend/Resume messages. Refer to “Suspend/Resume messages” in this chapter.
- Interaction is required with ATR. Refer to “Automatic Trunk Routing system” in this chapter.
- Interaction is required with data calls. Refer to “Data calls” in this chapter.
- Interaction is required with DWS. Refer to “Dialable Wideband Service” in this chapter.
- Interaction is required with FlexDial. Refer to “FlexDial” in this chapter.
- No interaction is required with CAIN. Refer to “Carrier advanced intelligent networking” in this chapter.
- No interaction is required with DCR. Refer to “Dynamically controlled routing” in this chapter.

Datafill

No affect

Service orders

No affect

AD9960
Spectrum ECAN Feature Interactions (end)

Operational measurements

No affect

Logs

No affect

User interface

No affect

Billing

No affect

AX0096 — ATR Support on Spectrum

The ATR Support on Spectrum feature provides Automatic Trunk Routining Test support on Spectrum for the following trunk types: Spectrum per-trunk signaling and Spectrum ISUP.

This chapter describes the ATR Support on Spectrum feature.

AX0096
ATR Support on Spectrum

Functionality name

ATR Support on Spectrum

Description

This feature provides Automatic Trunk Routing (ATR) Test support on Spectrum for the following trunk types:

- Spectrum per-trunk signaling (PTS)
- Spectrum ISUP

The ATR system remotely tests both intermachine trunk (IMT) and external trunks by way of digital, four-wire, E&M trunks, referred to as ATR trunks (ATRT). Test calls generated by ATR equipment are outpulsed over the ATRTs and received by the UCS DMS-250 switch. The UCS DMS-250 switch then generates a call to the trunk under test by originating an ISUP or PTS call.

Testing Spectrum trunks

Spectrum supports ISUP and PTS equivalency to the DTC7 load with the exception of PTS IMT.

The testing switch, as shown in the following figure as the switch with external testing equipment, designates which Spectrum trunk member to test. It then outpulses a called party number to the terminating (far end) switch. The far-end switch performs translations in order to terminate to the remote test device or trunk.

Based on the incoming digits, the far-end switch terminates the test call to any remote test device available for ISUP or PTS trunk testing on the UCS DMS-250 switch.

ATRT description

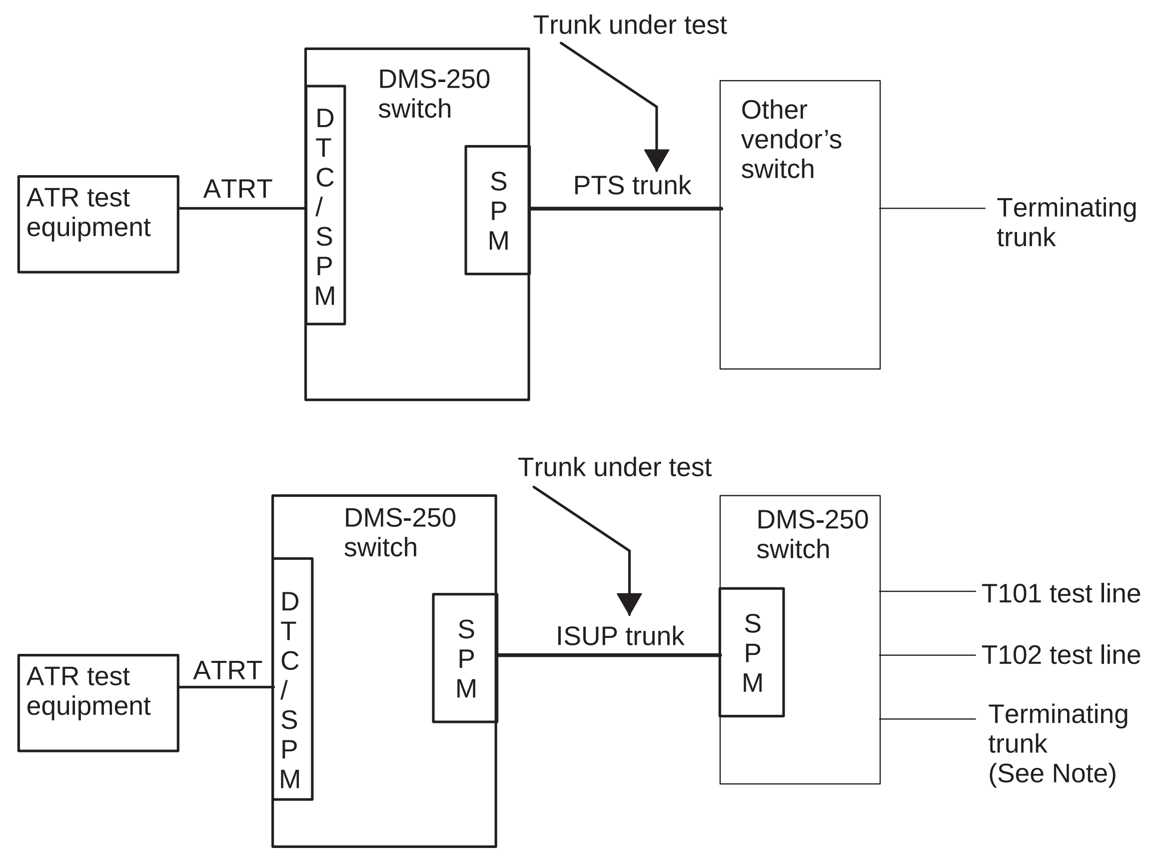
The SAGE930 test system has an analog connection to a channel bank that digitally connects to a digital trunk controller (DTC) or Spectrum.

The ATRT supports wink start and delay dial protocol.

Figure 4-1 shows the hardware configuration of the ATR system and Spectrum trunk under test.

AX0096
ATR Support on Spectrum (continued)

Figure 4-1
Hardware configuration for ATR system and Spectrum trunk under test



Legend:
SPM = Spectrum

Note: If the outpulsing digits contain a called party number with NOA = National, the test call attempts to terminate using in-switch translations.

AX0096
ATR Support on Spectrum (continued)

Dialing plan

To generate a test call from an ATRT trunk to a Spectrum ISUP or Spectrum PTS trunk, the following dialing plan is used:

XXXXXXXX + NN...N + *

where:

XXXXXXXX represents the 8-digit port identification number of the trunk to be tested.

NN...N represents the test digits outpulsed by the trunk under test (up to 17 digits).

* represents the cut-through digit.

X and N represent digits between 0 and 9.

Additionally, the dialing plan supports two 3-digit test line codes:

- 100 — to access T100 test lines (balance test line).
- 102 — to access T102 test lines (milliwatt test line).

When using the test line codes, the ATR system outpulses the 8-digit code for the trunk to be tested followed by the 3-digit test line code. Information digits or test call NPA digits are not outpulsed prior to the test line code.

The dialing plan that includes test line code digits is as follows:

XXXXXXXX + 10Y + *

where:

XXXXXXXX represents the 8-digit port identification number of the trunk to be tested.

10Y represents the test line code 100 or 102.

* represents the cut-through digit.

X represents digit between 0 to 9.

Y represents digit 0 or digit 2.

AX0096
ATR Support on Spectrum (continued)

Port identification number

The 8 digit port identification number (XXXXXXXX digits) consists of

- PM indicator
- PM number
- span number (if applicable)
- circuit number

The following describes how to apply the port identification number (XXXXXXXX digits). For the descriptions below, digit 1 is the left-most digit.

For Spectrum:

- digit 1: PM type
- digits 2–3: PM number
- digits 4–6: carrier number
- digits 7–8: circuit number (time slot)

For DTC and DCM:

- digit 1: PM type
- digits 2–4: PM number
- digits 5–6: span (carrier number)
- digits 7–8: circuit number (time slot)

For TM8 and MTM:

- digit 1: PM type
- digits 2–6: PM number
- digits 7–8: circuit number

Table 4-1 shows the supported PM indicators (digit 1 of XXXXXXXX) and the associated PM.

AX0096
ATR Support on Spectrum (continued)

Table 4-1
Supported PM indicators

Indicator digit	PM type
5	Spectrum
6	MTM
7	DTC
8	TM8
9	DCM

Test call sequence

For a normal test call, the following sequence of events occurs:

1. Test call origination — Incoming signaling protocol for ATRTs is specified in field ISTARTSIG of table TRKSGRP. The UCS DMS-250 switch supports wink start and delay dial start protocols.
2. DTMF receiver attached and dialtone provided — The UCS DMS-250 switch attempts to attach a DTMF receiver to the call and provide dialtone to the ATR system.
3. Test digits outpulsed — The ATR external equipment looks for dial tone before outpulsing digits to the ATRT. Digits outpulsed according to the dialing plan are described in “Dialing plan” in this chapter. When the cut-through digit is received, the UCS DMS-250 switch stops collecting digits and attempts to terminate on the trunk to be tested. If a cut-through digit is not received by the 18th digit, the call receives RODR (reorder) treatment. If a first digit time-out occurs, the call receives RODR treatment.
4. Terminate to the trunk under test — The XXXXXXXX digits describe the trunk member where the call will terminate. None of the test digits are received before the cut-through digit are translated. Once the cut-through digit has been received, ATRT call processing validates the terminating trunk identity.
   - If the trunk is unassigned or the XXXXXXXX digits are invalid, the call receives RODR treatment.

AX0096
ATR Support on Spectrum (continued)

— If the trunk member is busy, the call receives BUSY treatment.

— If the trunk is manually busy, the ATRT can still terminate to the trunk. The call progresses normally and normal ATR tests can be run. Upon completion of the test call, the trunk under test returns to ManB.

— If a connection/seizure to the trunk under test cannot be made, the call receives RODR treatment.

After trunk validation is complete, all test digits received before the cut-through digit are outpulsed by the trunk under test. The terminating switch translates the outpulsed digits to connect to the far-end test device. Once the call terminates, a voice path is set up and the ATR system begins testing.

5 Test call disconnect — The ATRT trunk monitors for an on-hook from the ATR system. When the on-hook is received, the call is taken down.

AX0096
ATR Support on Spectrum (continued)

Outpulsing digits

PTS call generation

If the trunk under test is a PTS trunk, MF or DTMF digits are outpulsed onto the line from the originating near-end switch to the terminating, far-end, switch. At the far-end switch the digits are collected and translated, and the call is terminated to the desired terminator.

IAM message generation

If the trunk under test is an ISUP trunk, an Initial Address Message (IAM) message is generated. This test call formatted IAM message is transmitted from the originating near-end switch to the terminating far-end switch. The test call IAM is sent over the Spectrum ISUP trunks for the ATR testing facilities.

The test call IAM contains the following parameters:

- Nature of Connection indicator
  - — Satellite Indicator field for test calls depends on TRKGRP/TRKSGRP datafill in the same way as for non-test calls.
  - — Continuity Check Indicator field for test calls contains the Continuity Check Not Required code (00), regardless of TRKGRP/TRKSGRP datafill.
  - — Echo Canceller Indicator field indicates the outgoing half echo canceller randomly provided by the Spectrum echo canceller resource pool.
- Calling Party Category
  - — Contains the test call code. This value is sent in the test call IAM, regardless of what facility initiates the test line call or the number of test digits.
- Called Party Address
  - — Nature of Address
  - — Numbering Plan Indicator
  - — destination digits

AX0096
ATR Support on Spectrum (continued)

Translations

PTS translations

Pretranslations uses table STDPRTCT to determine which routing tables translate the test digits in order to connect to the remote test device or trunk.

ISUP translations

If the Called Party Address parameter in the incoming test call IAM contains a directory number (for example, direct distance dialing and international direct distance dialing), then the Nature of Address indicates a national number, and the Numbering Plan Indicator is set to ISDN/telephony numbering plan. Pretranslations uses table STDPRTCT to determine which routing tables translate the test digits in order to connect to the remote test device or trunk.

ATR Translations

For ATR testing, if a 3-digit test line number is contained in the Called Party Address parameter, then the Nature of Address indicates a test line test call, and the Numbering Plan Indicator is set to Unknown. In this case, pretranslations uses the pretranslator name datafilled in C7_TESTCALL_PRTNM in table OFCVAR. If the value of this parameter is NPRT, the pretranslator datafilled in table TRKGRP is used.

Ordinarily, C7_TESTCALL_PRTNM was datafilled with C7PT as the pretranslator name for test line numbers. In table STDPRTCT, the following tuples are datafilled to support T100 and T102 test lines:

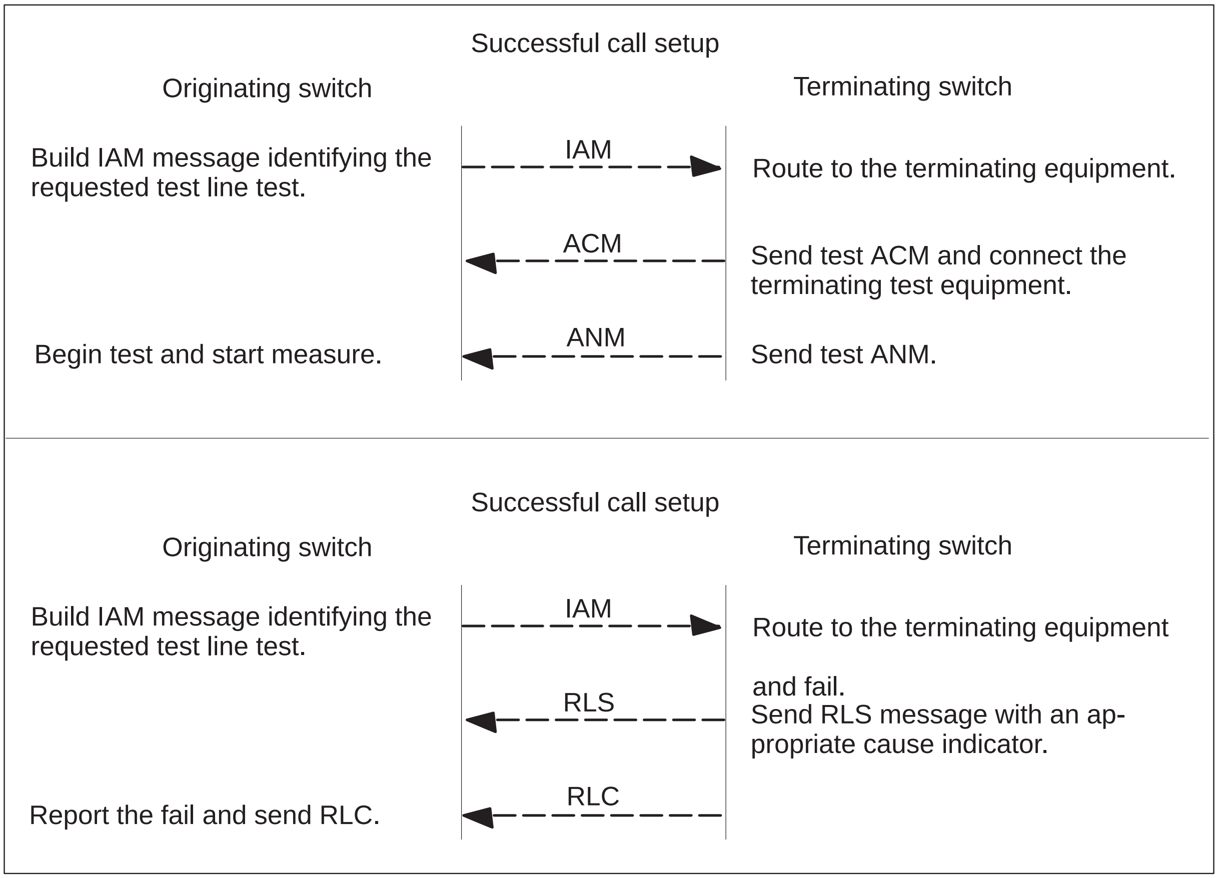
```
FROMDIGS TODIGS PRETRTE
100 100 S DD 3 TERM100Q 3 3 NONE

102 102 S DD 3 TERM102T 3 3 NONE
```

AX0096
ATR Support on Spectrum (continued)

Test line test call sequences

Figure 4-2 shows two call sequence diagrams that illustrate set-up procedures in the event of successful and unsuccessful ISUP test call attempts. Call take down follows the same procedure used in standard ISUP call procedures.

Figure 4-2
Test line test call sequence diagrams



AX0096
ATR Support on Spectrum (continued)

Hardware requirements

An ATR system is needed to perform tests on the Spectrum trunk in order to outpulse the test digits over the ATRT trunk to the UCS DMS-250 switch and perform tests on the terminating trunk.

Limitations and restrictions

The following limitations and restrictions apply to this feature:

- No billing records are generated for test calls.
- Only T100 and T102 test lines are supported for ISUP trunks.
- ATR call processing on the UCS DMS-250 supports up to 17 test digits for testing for IMT trunks.
- This feature supports existing ISUP trunks and PTS trunks with the exception of PTS IMT.
- This feature does not provide for routing of echo canceller resources. Routing of echo canceller resources is provided by the Service Test Access Test feature.

Interactions

No affect

Datafill

No affect

Service orders

No affect

Operational measurements

No affect

Logs

No affect

User interface

No affect

AX0096
ATR Support on Spectrum (end)

Billing

No affect

AX0151 — UCS PTS, RTS, and Supervision Support for Spectrum

The UCS PTS, RTS, and Supervision Support for Spectrum provides Universal Carrier Services with the specific subgroup handling and RTS supervision needed for trunk maintenance on per trunk signaling trunks for Spectrum.

This chapter describes the UCS PTS, RTS, and Supervision Support for Spectrum feature.

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Functionality name

UCS PTS, RTS, and Supervision Support for Spectrum

Description

This feature introduces return to service (RTS) functionality specific to the UCS DMS-250 switch to support Spectrum.

This feature provides Universal Carrier Services (UCS) with the specific subgroup handling and RTS supervision needed for trunk maintenance on per trunk signaling (PTS) trunks for Spectrum.

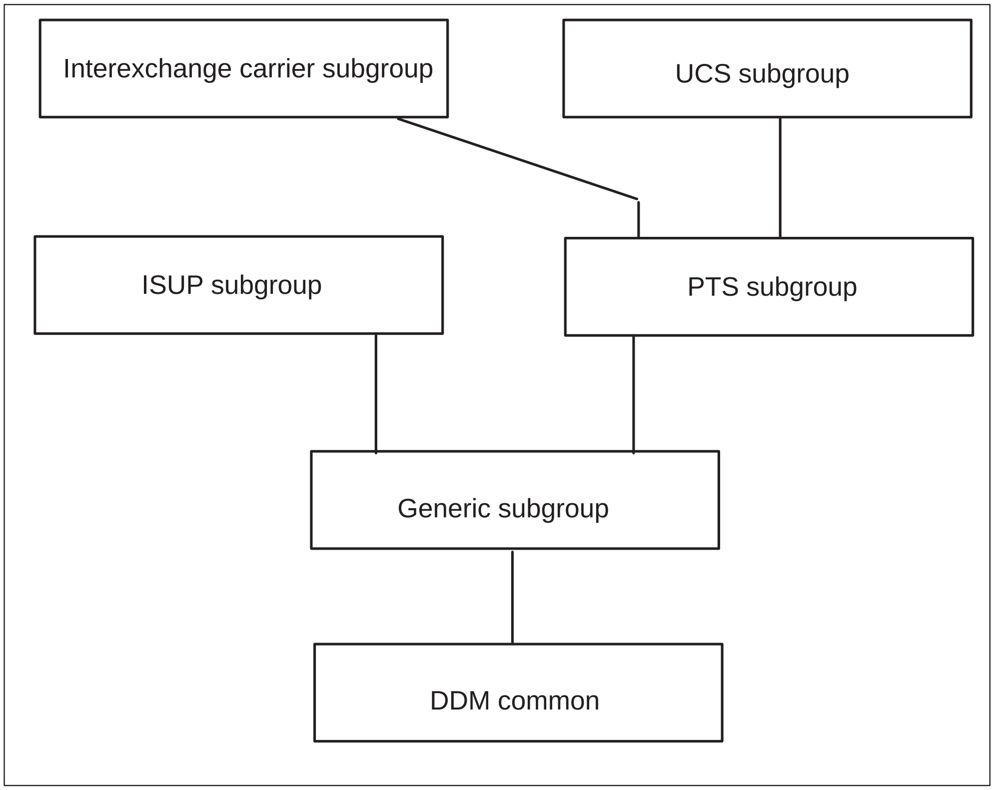
Spectrum maintenance uses dynamic downloading mechanism (DDM) to transport Spectrum datafill from the computing module to the Spectrum system. The DDM downloads trunk data from the trunk subgroup and trunk member data tables to Spectrum. When an RTS is issued to a particular trunk, the maintenance framework requests the subgroup data from the DDM to be downloaded to Spectrum. Spectrum maintenance reads all the subgroup data for Spectrum designated database and stores it in memory to be accessed.

The trunk subgroup data has shared data characteristics among PTS, ISUP, and primary rate interface (PRI) trunk subgroups. A PTS specific subgroup handles and builds PTS specific data that is common to all interexchange carriers. UCS DMS-250 switch specific functionality is created to handle additional specific subgroup data.

Figure 5-1 illustrates the procedure relationship.

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Figure 5-1
Procedure relationship for subgroup data



Agent RTS procedure

The agent RTS procedure initializes call supervision execs and datafill for a specified originating agent member. The datafill and call supervision execs for the originating agent member are based on the trunk datafill for a specific agent type. The agent RTS procedure loads the DTMF receivers, the REFLEX parameters, echo canceller, and any additional operating company specific data.

The agent RTS procedure is responsible for the following activities:

- initializing and loading the REFLEX buffer

  Messages are constructed to initialize individual trunk (TID) parameters in the peripheral processor’s REFLEX buffer. The following parameters are necessary to be loaded in the reflex buffer:

  — on-hook monitoring

  — off-hook monitoring

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

- — on-hook signal
- — off-hook signal
- — start dial and idle actions
- — outpulse and seize actions
- — interdigital time outpulsing
- — filter times

- specifying the proper exec identifiers (ID) and parameters

  An exec lineup identifies execs to be downloaded to a peripheral. Execs are usually downloaded to Spectrum during the RTS. Two exec lineups support Spectrum for the UCS DMS-250 switch.

  - — SPM250 — PTS ACCESS agents

    Note: The ACCESS agents are all trunks used to access the UCS DMS-250 network, such as FGD, FGB, FGC, and DAL.

  - — SPMAXX — PTS AXXESS agents

Refer to AX0153, “UCS PTS Feature Interactions for Spectrum,” for more details on these additional exec lineups.

The agent RTS procedure decides which exec IDs and parameters to build in the data area template. The template is then sent to Spectrum in a supervision message. The agent RTS decision is based on information obtained from the following:

- trunk group datafill
  - — table TRKGRP
- trunk subgroup datafill
  - — table TRKSGRP for ACCESS trunks
  - — table TRKSIG for AXXESS trunks

Table 5-1 provides the exec IDs according to trunk direction and signaling.

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-1
Trunk direction and signaling exec ids

Trunk group direction	Trunk subgroup incoming signaling	Trunk subgroup outpulse signaling	Trunk subgroup outpulse type	Trunk subgroup inpulse type	Exec IDs and parameters
Incoming	Immediate start				TRUNK_IDLE WINK_MF_START SUSTAINED OFFHK_START IMM_MF _START
Incoming	Wink Start				TRUNK_IDLE WINK_MF_START
Incoming	Seize protocol				TRUNK_IDLE WINK_MF_START SUS_OFFHK _START
Incoming	Delay dial				TRUNK_IDLE DD_MF_START
Incoming	Loop start FXS			DP	AB_TRUNK_IDLE LP_FXS_ SEIZE FXS_LP_DP _START
Incoming	Loop start FXS			MF/Digit one NIL	AB_TRUNK_IDLE LP_FXS_SEIZE FXS_LP_DTMF_START
Incoming	Ground start FXS			DP	AB_TRUNK _IDLE GS-FXS_SEIZE FXS_GS_DP_START

—continued—

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-1
Trunk direction and signaling exec ids (continued)

Trunk group direction	Trunk subgroup incoming signaling	Trunk subgroup outpulse signaling	Trunk subgroup outpulse type	Trunk subgroup inpulse type	Exec IDs and parameters
Incoming	Ground start FXS			MF/ Digit one NIL	AB_TRUNK_IDLE GS_FXS_SEIZE FXS_GS_DTMF_START
Incoming	Loop start FXO			DP	AB_TRUNK_IDLE LP-FXO_SEIZE FXS_LP_DP_START
Incoming	Loop start FXO			MF/Digit one NIL	AB_TRUNK_IDLE LP_FXO_SEIZE FXS_LP_DTMF_START
Incoming	Ground start FXO			IRing Chk	AB_TRUNK_IDLE GS_FXO_SEIZE FXO_GS_NO-RNG_START
Outgoing			DP		DP_OUT
Outgoing			MF		MF_OUT
Outgoing			Digit tone		MF_OUT
Outgoing			NIL		NIL_OUT
Outgoing		Immediate start			IMMEDIATE_SEIZ TRUNK_IDLE
Outgoing		Wink start			WINK_SEIZE TRUNK_IDLE

—continued—

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-1
Trunk direction and signaling exec ids (continued)

Trunk group direction	Trunk subgroup incoming signaling	Trunk subgroup outpulse signaling	Trunk subgroup outpulse type	Trunk subgroup inpulse type	Exec IDs and parameters
Outgoing		Delay dial			DD_SEIZE TRUNK_IDLE
Outgoing		Ground start FXO			A_ON_ B _OFF _HK A_OFF_B _OFF HK GS FXO SEIZE AB TRUNK IDLE
Outgoing		Ground start FXS			NIL_OUTPULSE GS_FXS_SEIZE AB_TRUNK_IDLE
Outgoing		Loop start FXO			LP_FXO_SEIZE AB_TRUNK_IDLE
Outgoing		Loop start FXS			NIL_OUTPULSE LP_FXS_SEIZE AB_TRUNK_IDLE
Outgoing		Seize protocol	DP		DP_OUT OUTPULS
Outgoing		Seize protocol	MF		MF_OUT OUTPULS
Outgoing		Seize protocol	Digit tone		TRUNK_IDLE SUS_OFHK SEIZE DTMF_OUT OUTPULSE

—continued—

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-1
Trunk direction and signaling exec ids (continued)

Trunk group direction	Trunk subgroup incoming signaling	Trunk subgroup outpulse signaling	Trunk subgroup outpulse type	Trunk subgroup inpulse type	Exec IDs and parameters
Outgoing		Delay dial Offhk			EXPECT_DELAY_IDLE DD_SEIZE
Two-way	Wink start				TRUNK_IDLE WINK_MF_START
Two Way	Seize protocol				TRUNK_IDLE WINK_MF_START SUS_OFFHK_STA
Two Way	Immediate start				TRUNK IDLE WINK MF START IMM MF START
Two Way	Delay dial				TRUNK_IDLE DD_MF_START
Two Way	Loop start FXS			DP	FXS_LS_DP_START
Two Way	Loop start FXS			MF/Digit tone/NIL	AB_TRUNK_IDLE FXSLS_DTMF_START
Two Way	Ground start FXS			DP	AB-TRUNK_IDLE FXS_GS_DP_START
Two Way	Ground start FXS			MF/Digit tone/NIL	AB_TRUNK_IDLE FXS_GS_DTMF_START

—continued—

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-1
Trunk direction and signaling exec ids (continued)

Trunk group direction	Trunk subgroup incoming signaling	Trunk subgroup outpulse signaling	Trunk subgroup outpulse type	Trunk subgroup inpulse type	Exec IDs and parameters
Two Way	Ground start FXO			IRing Chk	FXO_GS_RING_START AB_AON_B OFF HK AB_AOFF_BOFHK
Two Way			DP		DP_OUT OUTPULS
Two Way			MF		MF_OUT OUTPUL
Two Way			Digit tone		MF_OUT DTMF_OUT
Two Way		Wink start			WINK_SEIZE
Two Way		Delay dial			DD_SEIZE
Two Way		Immediate start			IMMEDIATE_SEIZE
Two Way		Ground start FXO			GS_FXO_SEIZE
Two Way		Ground start FXS			GS_FXS_SEIZE
Two Way		Loop start FXO			LS_FXO_SEIZE NIL_OUTPULSE
Two Way		Loop start FXS			LS_FXS_SEIZE NIL_OUTPULSE
Two Way		Seize protocol			SUS_OFFHK_SEIZE
—end—					

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

UTR to exec mapping

Spectrum supports the following UTR types: FULL_MF, FULL_DTMF, and FULL_DP for ACCESS trunks. The AXXESS trunks support FULL_MF and FULL_DTMF. If a UTR/DTMF receiver is available for Spectrum once it has been returned to service, the exec lineup must be SPM250 or SPMAX. Refer to Chapter 6, "AX0153 — UCS PTS Feature Interactions for Spectrum" for more information.

Table 5-2 lists different UTR types to Execs mapping possibilities.

Table 5-2
UTR types to Exec mapping

UTR type	Access exec lineup	Terminal type	Axxess exec lineup	Terminal type
FULL MF	SPM 250	AB250	SPMAXX	ABAXX TERM
FULL DTMF	SPM 250	AB250	SPMAXX	ABAXX TERM
FULL DP	SPM 250 ***Note:*** Refer to feature AX0153 for information about the SPM250 exec.	AB250	Not supported	Not applicable

The agent RTS procedure decides which UTR parameters and execs IDs to send to Spectrum based on UTR type and trunk group type. For FULL_MF UTR, the logic is driven by the first and final digit masks. All DTMF trunk logic is driven by the receipt of special digits such as * and #. The action driven by these special digits is based on their action offset in the data area. If there are any special digit collection requirements based on features (such as hotline) or trunk types (such as ATR), then a different set of parameters and exec IDs are sent to Spectrum to meet these special requirements.

IDLE exec

The IDLE exec scans the trunk for an onhook signal and starts a timer for a specified duration. If the scan change is detected before the timer expires,

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

the trunk enters the Idle state and begins scanning for off-hook. If the timer expires before the scan change is received, the trunk enters the Lock Out state.

Table 5-3 provides a list of Idle exec IDs used with different trunk group and trunk subgroup data combinations.

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-3
Idle exec IDs for trunk group types

UTR type	Dial tone	Trunk group type	Global UTR parameters and exec IDs
FULL_MF	DIAL_TONE_350_440 DIAL_TONE_400HZ IDLE_TONE (depends on datafill)	EANT	Permanent signal as long timeout Partial DIAL signal short timeout OVLR_ID_TIME IDLE_TONE
FULL_MF	DIAL_TONE_350_440 DIAL_TONE_400HZ IDLE_TONE (depends on datafill)	ONAT	Permanent signal as long timeout Partial DIAL signal short timeout IDLE_TONE
FULL_MF	DIAL_TONE_350_440 DIAL_TONE_400HZ IDLE_TONE (depends on datafill)	DP250	IDLE_TONE LONG_PSIG_COUNT =2
FULL_DTMF	DIAL_TONE_350_440 DIAL_TONE_ 400HZ (depends on datafill)	Access and Axxess	Permanent signal as long timeout Partial DIAL signal short timeout IDLE_TONE STR_IDLE_EXEC for reorig
FULL_DP	DIAL_TONE_350_440 DIAL_TONE_ 400HZ (depends on datafill)	Access only	Permanent signal as long timeout Partial DIAL signal short timeout IDLE_TONE STR_IDLE_EXEC for reorig

AXXESS RTS procedure

The AXXESS agent type supports the FLEXDIAL framework in the UCS DMS-250 switch. PTS AXXESS agents also require an RTS agent

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

functionality and supervision to handle initialization of parameters and execs.

Refer to Chapter 6, “AX0153 — UCS PTS Feature Interactions for Spectrum” for more information.

SPMAXX exec lineup

The exec lineup used and sent to Spectrum is SPMAXX for AXXESS trunks. The SPMAXX is datafilled with terminal type ABAXX_TERM in table MNNODE.

Trunk direction

AXXESS trunks can only be two-way directional trunks. Also, for AXXESS trunks provisioned on the Spectrum, only terminating to these trunks is supported.

Table 5-4 shows AXXESS exec IDs based on table TRKSIG.

Table 5-4
AXXESS exec IDs for table TRKSIG

Trunk group direction	Trunk incoming signaling	Trunk outpulse signaling	Trunk outpulse type	Trunk inpulse type	Exec IDS
Two-way	WINK_START				TRUNK_IDLE TWO_WAY_IDLE WINK_MF_START
Two-way	Seize protocol				TRUNK_IDLE TWO_WAY_IDLE SUS_OFFHKSTRT
Two-way	Immediate start				TRUNK_IDLE TWO_WAY_IDLE IMM_MF_START

—continued—

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-4
AXXESS exec IDs for table TRKSIG (continued)

Trunk group direction	Trunk incoming signaling	Trunk outpulse signaling	Trunk outpulse type	Trunk inpulse type	Exec IDS
Two-way	Delay dial				TWO_WAY_IDLE DD_MF_START TRUNK_IDLE
Two-way	Loop start FXS			MF/Digit tone/NIL	AB_TWO_WAY_ IDLE FXS_LS DTMF_START AB_TRUNK_IDLE
Two-way	Ground start FXS			MF/Digit tone/NIL	AB_TRUNK_IDLE FXS_GS_DTMF _START AB_TWO_WAY_IDLE
Two-way	Ground start FXO			IRINGCHK	FXO_GS_RING _STAR FXO_GS_NO_RING _START AB_A_ON_B_OFF HK AB AOFF BOFF HK AB_TWO_WAY_IDLE AB_TRUNK_IDLE
Two-way			MF		MF_OUT OUTPUL
		—continued—			

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-4
AXXESS exec IDs for table TRKSIG (continued)

Trunk group direction	Trunk incoming signaling	Trunk outpulse signaling	Trunk outpulse type	Trunk inpulse type	Exec IDS
Two-way			Digit tone		MF_OUT DTMFOTP1_OFF <OSIG=SEIZE> DTMFOTP1_ON
Two-way			NIL		NIL_OUT
Two-way		WINK_START			WINK_SEIZE
Two-way		DELAY_DIAL			DD_SEIZE
Two-way		SEIZE_ PROTC			SUSTAINED_OFFHK _SEIZE
Two-way		Immediate start			IMMEDIAT_SEIZE
Two-way		Ground start FXO			GS_FXO_SEIZE
Two-way		Ground start FXS			GS_FXS_SEIZE NIL_OUT
Two-way		Loop start FXO			LS_FXO_SEIZE
Two-way		Loop start FXS			LS_FXS_SEIZE NIL_OUTPULSE
		—end—			

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

UTR Types

The AXXESS trunks support FULL_MF and FULL_DTMF UTR types only. ONLY_MF, NO_UTR, and FULL_DP are not supported for AXXESS trunks.

Hardware requirements

The following product engineering codes are used for Spectrum specific hardware:

- NTLX63AA — CEM
- NTLX65AA — DSP
- NTLX66AA — VSP
- NTLX71AA — OC-3

Limitations and restrictions

The following limitations and restrictions apply to this feature:

- AXXESS trunks only support two-way direction.
- AXXESS trunks only support UTR types: FULL_MF and FULL_DTMF.
- The PTS IMT trunks are not supported on this feature.
- Only terminations to AXXESS trunks provisioned on Spectrum are supported.

Interactions

Echo cancellers

Call control call processing uses the ECSTAT field in trunk subgroup table. The ECSTAT field has four possible values: UNEQUIPPED, INTERNAL, EXTERNAL, or INNOTONE. When the trunk is equipped with internal ECAN (NT6X50EC), the parameter ECSTAT is datafilled to INTERNAL or INNOTONE. Using primitives, call control call processing sends ECAN and 2100Hz tone detector enable/disable commands to both terminating and originating trunks that are equipped with an ECAN card at the connect time.

Refer to Chapter 2, “AD9959 — Spectrum ECAN Call Control” and Chapter 3, “AD9960 — Spectrum ECAN Feature Interactions” for more detail.

Table 5-5 provides information for ECSTAT datafill and action combinations.

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UCS PTS, RTS, and Supervision Support for Spectrum (continued)

Table 5-5
ECSTAT datafill and action combinations

ECSTAT	AUTOON	Action	Execs
Internal	Yes	Enable EC	ECMON
		Enable 2100Hz tone detector	EC_AUTO_ON
			EC_TOND_ON
Internal	No	Disable EC	ECMON
		Enable 2100Hz tone detector	EC_AUTO_OFF
			EC_TOND_ON
Innotone	Either	Enable EC	ECMON
		Disable 2100Hz tone detector	EC_AUTO_OFF
			EC_TOND_OFF

AX0151
UCS PTS, RTS, and Supervision Support for Spectrum (continued)

ATR trunks

The automatic trunk routing (ATR) system remotely tests the far end trunks. Test calls generated by ATR equipment are outpulsed over the ATRT and received by the UCS DMS-250 switch. The UCS DMS-250 switch then generates a test exec template outpulsed to the trunk under testing. This allows ATR calls to be completed even when the trunk is out of service at the terminating far end switch. To generate a test call from an ATRT trunk to a Spectrum PTS trunk, the following dialing plan is used:

XXXXXXXX + NN...N + *

This feature supports the ATR dialing plan by attaching a DTMF receiver and providing dial tone upon the receipt of a cut-through digit at the end of the dialing plan. The RTS agent sends UTR_REPORT_LAST_DIGIT_EXEC as part of the UTR capability in the data area template to the Spectrum. Refer to Chapter 4, “AX0096 — ATR Support on Spectrum” for more information.

UCS PTS feature interactions

This feature provides UCS specific development for exec lineups to support PTS on Spectrum. Two new exec lineups are developed to support Spectrum for the UCS DMS-250 switch. One lineup is intended for ACCESS PTS agents (SPM250) and the other one is for AXESS PTS (SPMAXX) agents. Refer to Chapter 6, “AX0153 — PTS Interactions for Spectrum” for more information.

Spectrum PTS subgroup data

This feature provides the PTS specific subgroup handling and loads subgroup data that is common to all interexchange customers. The agent RTS interworks with this feature to obtain common PTS subgroup data.

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UCS PTS, RTS, and Supervision Support for Spectrum (end)

Datafill

No affect

Service orders

No affect

Operational measurements

No affect

Logs

No affect

User interface

No affect

Billing

No affect

AX0153 — UCS PTS Feature Interactions

The UCS Per Trunk Signaling Feature Interactions feature validates Universal Carrier Services feature interactions for PTS agents on Spectrum.

This chapter describes the feature, UCS Per Trunk Signaling Feature Interactions.

AX0153
UCS PTS Feature Interactions

Functionality name

UCS Per Trunk Signaling (PTS) Feature Interactions

Description

This feature validates Universal Carrier Services (UCS) feature interactions for PTS agents on Spectrum.

The following areas are validated:

- dialing plans of supported originating agencies
- digit collection
- trunk group interworkings
- interworking of Spectrum and extended peripheral module (XPM)

The activities covered by this feature to support PTS on Spectrum for the UCS DMS-250 switch are as follows:

- exec lineup changes
- verification of digit collection and digit masking
- verification of dialing plans for PTS trunk agencies
- verification of computing module (CM) to Spectrum messaging for PTS call control
- verification of CM to Spectrum messaging for multi-party call control
- verification of tone and announcement processing
- verification of trunk group interworking
- verification of Spectrum and XPM interworking
- verification of feature interactions

Exec lineup changes

Two exec lineups support UCS DMS-250 switch agents on Spectrum: SPM250 and SPMAXX.

Exec lineup SPM250

The SPM250 exec lineup for Spectrum supports the ACCESS trunk agencies, similar to the UTR250 exec lineup for digital trunk controllers (DTC). The SPM250 exec lineup is datafilled with terminal type AB250 in table MNNODE. ACCESS trunk agencies include FGA, FGB, FGC, FGD and dedicated access line (DAL).

AX0153
UCS PTS Feature Interactions (continued)

Exec lineup SPMAXX

The SPMAXX exec lineup for Spectrum supports the AXXESS trunks, similar to the AXX250 for DTC. The SPMAXX exec lineup is datafilled with terminal type ABAXX_TERM in table MNNODE.

Digit collection

This feature verifies the dial pulse (DP), multi-frequency (MF), and dual tone multi-frequency (DTMF) digit collection on Spectrum. The receivers used for PTS digit collection include AB-bit handler for DP digits, and DTMF receivers for MF and DTMF digits. The prompt tones provided by Spectrum during the digit collection are also verified.

Verification of UCS PTS dialing plans

This feature verifies that Spectrum supports the following PTS trunk group types on Spectrum:

- feature group trunks
  - — FGA
  - — FGB
  - — FGC
  - — PTS FGD
- PTS intermachine trunk (IMT) trunk group
  - — PTS IMT
- DAL trunk groups
  - — DAL (2-wire)
  - — DAL TIE (4-wire)

The following dialing plans are verified for the above-mentioned trunk groups:

Note: Entries shown in parentheses are optional parts of the dialing plan.

- subscriber dialing
  - — (AUTH) + (PIN) + ADDRESS + (ACCT)
  - — ADDRESS + (AUTH) + (PIN) + (ACCT)
  - — (AUTH) + (PIN) + 011 + CC + NX..X + (ACCT) + (#)
  - — 0 + ADDRESS + TCN + (ACCT)

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UCS PTS Feature Interactions (continued)

- DAL
  - subscriber dialing
- EDAL
  - (ACCT) + ADDRESS + (PROMPT) + (AUTH)
- DAL-TIE
  - MF
    - KP + (AUTH) + (PIN) + ADDRESS + (ACCT) + ST
    - KP + ADDRESS + (AUTH) + (PIN) + (ACCT) + ST
  - DTMF
    - subscriber dialing
- FGA
  - subscriber dialing
- FGB
  - MF
    - KP + (UAC) + ST
    - KP+ II + 7-digit ANI + ST (if ANIDIGS = Y in table TRKGRP)
  - DTMF
    - Subscriber dialing
- FGC national
  - MF
    - KP + 10-digit ADDRESS + ST
- FGC Universal Access
  - MF
    - KP + 800 + NXX + XXXX + ST
  - DTMF
    - subscriber dialing
- FGD transitional
  - MF
    - KP + II+ 10-digit ANI + ST
    - KP + 800 + NXX + XXXX + ST

AX0153
UCS PTS Feature Interactions (continued)

- — DTMF
  - – subscriber dialing
- FGD pure
  - — MF
    - – KP + II+ 3 or 10-digit ANI + ST
    - – KP + ADDRESS + ST
  - — DTMF
    - – (PIN) + (ACCT)
- FGD cut-through
  - — MF
    - – KP + II+ 10-digit ANI + ST
  - — DTMF
    - – (AUTH) + ADDRESS + (ACCT)
- FGD international
  - — MF
    - – KP + 1NX + XXX + CCC + ST
    - – KP + II+ ANI + ST
    - – KP + TCC + NX...X + ST
  - — DTMF
    - – (PIN) + (ACCT)
- SPRINT IMT
  - — MF
    - – KP + FC + PART + ADDRESS + ST
  - — DTMF
    - – FC + PART + ADDRESS + (#)
- USTEL IMT (standard call)
  - — MF
    - – KP + F + C + TPART + ADDRESS + ST
  - — DTMF
    - – F + C + TPART + ADDRESS + (#)

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UCS PTS Feature Interactions (continued)

- USTEL IMT (private network call)
  - MF
    - KP + F + C + TPART + ADDRESS + OPART + ST
  - DTMF
    - F + C + TPART + ADDRESS + OPART + (#)
- GTE IMT
  - MF
    - KP + TP + ONAL + PART + ADDRESS + ST
  - DTMF
    - TP + ONAL + PART + ADDRESS + (#)
- ETN IMT
  - MF
    - KP + ADDRESS + ST
  - DTMF
    - ADDRESS + T
- SHARED IMT
  - MF
    - KP + II + COSindex + PART + ADDRESS + (#)
- DATA
  - # + FC + ADDRESS + (ACCT)
- AXXESS

This feature validates terminating to AXXESS trunks. Refer to Chapter 7, "AX0165 — UCS Digit Collection Hooks for Spectrum" for AXXESS origination validation information.

Verification of CM-to-Spectrum messaging of PTS call Control

This feature ensures the existing messaging (supervision) between the CM and XPM continues to be supported between CM and Spectrum. This messaging includes call control supervision, digit collection supervision, and tone and announcement supervision.

AX0153
UCS PTS Feature Interactions (continued)

Verification of multi-party call scenarios

The dynamics of a two-party call changes when it becomes a three-party call, as in the case of Enhanced Service Providers (ESP) calls.

Verification of tone and announcement processing

Tones

Spectrum generates or receives tones. Tones typically generate to convey information to a subscriber, such as invalid dialing or network congestion, or provide instructions for subscribers to enter digits, such as address or calling card. When tone generation is required, the CM sends a supervision message to Spectrum containing the tone to be played and the tone length. Spectrum then accesses the tone synthesizer (TONESYN), which generates the appropriate tone.

The base Spectrum software provides the same North American tone set currently available on the XPM. Since this tone set is used by the UCS DMS-250 switch, no new tones are required.

Tones are also used to represent digits. During the subscriber dialing phase of a call, Spectrum allocates a DTMF receiver to detect tones resulting from dialled digits.

Announcements

Announcements convey information or prompt users to enter information. The CM sends supervision to the digital trunk module (DTM) to make the connection to the appropriate announcement CLLI, which is on the DTM. The actual announcements are on a digital recorded announcement machine (DRAM).

Spectrum supports both active and passive announcements. Active announcements are those that can be interrupted by subscriber dialed digits. Passive announcements cannot be interrupted; the subscriber must wait until the announcement completes before entering digits.

The base Spectrum software provides the same announcement processing that is currently available on the XPM.

Verification of trunk group interworking

This feature verifies the following trunk group interworking:

- PTS to ISUP
- PTS to PTS

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UCS PTS Feature Interactions (continued)

- PTS to PRI
- PRI to PTS

The following table shows a call matrix of the different originations and terminations that are supported on the UCS DMS-250 switch.

Originators	Terminators											
	DAL/EDAL	FGA	FGB	FGC	FGD	IMT-PTS	AXXESS PTS	ISUP IMT	ISUP FGD	ISUP RLT	AXXESS ISUP	PRI
DAL/EDAL	X	X	X	X	X	X	X	X	X	X	X	X
FGA	X	X	X	X	X	X	X	X	X	X	X	X
FGB	X	X	X	X	X	X	X	X	X	X	X	X
FGC	X	X	X	X	X	X	X	X	X	X	X	X
FGD	X	X	X	X	X	X	X	X	X	X	X	X
IMT-PTS	X	X	X	X	X	X	X	X	X	X	X	X
AXXESS PTS ***Note:*** Origination on AXXESS PTS trunks is done to test the exec lineup. Refer to UCS Spectrum digit collection hooks for complete testing of AXXESS PTS and FLEXDIAL features.	X	X	X	X	X	X	X					

—continued—

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UCS PTS Feature Interactions (continued)

Originators	DAL/EDAL	FGA	FGB	FGC	FGD	IMT-PTS	AXXESS PTS	ISUP IMT	ISUP FGD	ISUP RLT	AXXESS ISUP	PRI
ISUP IMT ***Note:*** Refer to UCS Spectrum ISUP Feature Interactions for ISUP originations.												
ISUP FGD												
ISUP RLT												
AXXESS ISUP												
PRI ***Note:*** Use XPM for PRI testing.	X	X	X	X	X	X						

—end—

AX0153
UCS PTS Feature Interactions (continued)

Verification of Spectrum and XPM interworking

Since both Spectrums and XPMs (DTCs) can coexist in a single switch, interworking of the two platforms must be verified. Table 6-1 shows the scenarios for Spectrum and XPM interworking verification.

Table 6-1
Spectrum and XPM interworking verification

Call type	Peripheral module hardware
PTS to PTS	Spectrum to Spectrum Spectrum to XPM XPM to Spectrum
PTS to ISUP	Spectrum to Spectrum Spectrum to XPM XPM to Spectrum
PTS to PRI	Spectrum to XPM
PRI to PTS	XPM to Spectrum

Hardware requirements

None

Limitations and restrictions

The following limitations and restrictions apply to this feature:

- This feature provides an exec lineup for AXXESS trunks, but does not cover testing of digit collection and call processing functionality of AXXESS trunks.
- This feature does not test reorigination functionality.
- This feature supports terminal types AB250 and ABAXX_TERM for the UCS DMS-250 switch.
- PTS IMT is not supported on Spectrum.

AX0153
UCS PTS Feature Interactions (end)

Interactions

The following feature interactions are verified by this feature:

- The PTS call interactions with Carrier Advanced Intelligent Networking feature, such as digit collection with Send_to_Resource and O_Feature_Requested, are verified.
- The FlexDial feature is verified by feature AX0165 — UCS Digit Collection Hooks for Spectrum.

Datafill

No affect

Service orders

No affect

Operational measurements

No affect

Logs

No affect

User interface

No affect

Billing

No affect

AX0165 — UCS Digit Collection Hooks for Spectrum

The UCS Digit Collection Hooks for Spectrum feature provides digit collection functionality on Spectrum similar to the extended peripheral module. This allows use of XPM and Spectrum on the same UCS DMS-250 switch. This feature supports both ISUP and per trunk signaling trunks.

This chapter describes the UCS Digit Collection Hooks for Spectrum feature.

AX0165
UCS Digit Collection Hooks for Spectrum

Functionality name

UCS Digit Collection Hooks for Spectrum

Description

This feature provides the following dual tone multi-frequency (DTMF) and multi-frequency (MF) functionality for Spectrum:

- ability to detect the availability of Spectrum DTMF resources for both ISUP and per trunk signaling (PTS) during receiver resource allocation phase of digit collection
- ability to detect the availability of Spectrum MF resources for PTS during receiver resource allocation phase of digit collection

This feature provides digit collection functionality on Spectrum similar to the extended peripheral module (XPM). This allows use of XPM and Spectrum on the same UCS DMS-250 switch. This feature supports both ISUP and per trunk signaling (PTS) trunks.

The XPM digit collection is dependent on hardware resources such as specialized tone receiver (STR) and universal tone receiver (UTR).

The XPM STR is used to recognize mid-call feature requests during the following call states: ringing, conversation, and called party disconnect.

The XPM UTR is initially used to collect digits in order to place a call (call origination or after reorigination request). However, once the speech path is established, the XPM UTR is typically deallocated.

On Spectrum these resources are replaced with DTMF and MF receivers.

The Spectrum DTMF receivers provide XPM STR functionality and partial XPM UTR functionality. The remaining XPM UTR functionality is provided by the Spectrum MF receivers. The distinction between the XPM STR and

AX0165
UCS Digit Collection Hooks for Spectrum (continued)

XPM UTR functionality, however, is transparent to the Spectrum DTMF and Spectrum MF receivers.

Supervision of Spectrum by the computing module for digit collection involves the following tasks:

- allocating receiver resources
- priming the receiver to collect digits
- timing digit monitoring
- deallocating receiver resources

Resource requests (part of the allocation of receiver resources) are different from the one on the XPM. This feature involves modifications to provide compatibility. The existing messages that supervise the XPM also supervise Spectrum. The one exception is the optional utilization of SUP_EXTCALL supervision. This element and its sub-elements provide specific supervisions to all the implicit functionalities requested by SUP_REORIG_ACTIVE.

Hardware requirements

NTLX66AA — VSP PEC code is used for Spectrum specific hardware

Limitations and restrictions

The Spectrum hardware is capable of supporting a digit duration less than 500 milliseconds. However, the software to support this functionality does not exist in UCS08.

UCS08 call processing uses DTMF receivers on maintenance trunk module (MTM) for reorigination during ring and terminator disconnect stages only in the following two cases:

- REORIG_RECEIVERS in table OFCVAR is set to DTMF_ONLY
- REORIG_RECEIVERS in table OFCVAR is set to STR_AND_DTMF and there are no Spectrum DTMF receivers available. This scenario can happen only when the last Spectrum DTMF receiver in the pool that is used for digit collection goes back to the pool and immediately allocates for digit collection for another call, leaving no Spectrum DTMF receivers available in the pool. At this point, reorigination tries to allocate Spectrum DTMF receiver, but fails to do so.

AX0165
UCS Digit Collection Hooks for Spectrum (end)

The computing module is aware of the presence and datafill of the Spectrum DTMF receivers, but is not aware of the number of receivers that are free. When office parameter REORIG_RECEIVERS in table OFCVAR is set to STR_AND_DTMF and the last Spectrum DTMF receiver in the pool used for digit collection goes back to the pool to allocate for digit collection for another call, the following occur:

- no Spectrum DTMF receivers are available in the pool
- DTMF receiver on the MTM is not used
- reorigination does not work

Interactions

This feature interacts with the following features:

- AX0151 — UCS PTS RTS and Supervision Support for Spectrum
- AX0153 — UCS PTS Feature Interactions

Datafill

No affect

Service orders

No affect

Operational measurements

No affect

Logs

No affect

AX0222 — UCS CDR ECAN RM RN

The feature, UCS Call Detail Record Echo Canceller Resource Module Resource Number, captures the resource module (RM) and resource number (RN) of Echo Cancellers into the UCS CDR on a per call basis.

This chapter describes the UCS Call Detail Record Echo Canceller Resource Module Resource Number feature.

Note: Software changes for the UCS12 software release do not impact this feature.

AX0222 UCS CDR ECAN RM/RN

Functionality name

UCS Call Detail Record (CDR) Echo Canceller (ECAN) Resource Module (RM) Resource Number (RN)

Note: Software changes for the UCS12 software release do not impact this feature.

Description

This feature captures the RM and RN of ECAN into the UCS CDR on a per call basis.

Spectrum ECAN Resource Allocation

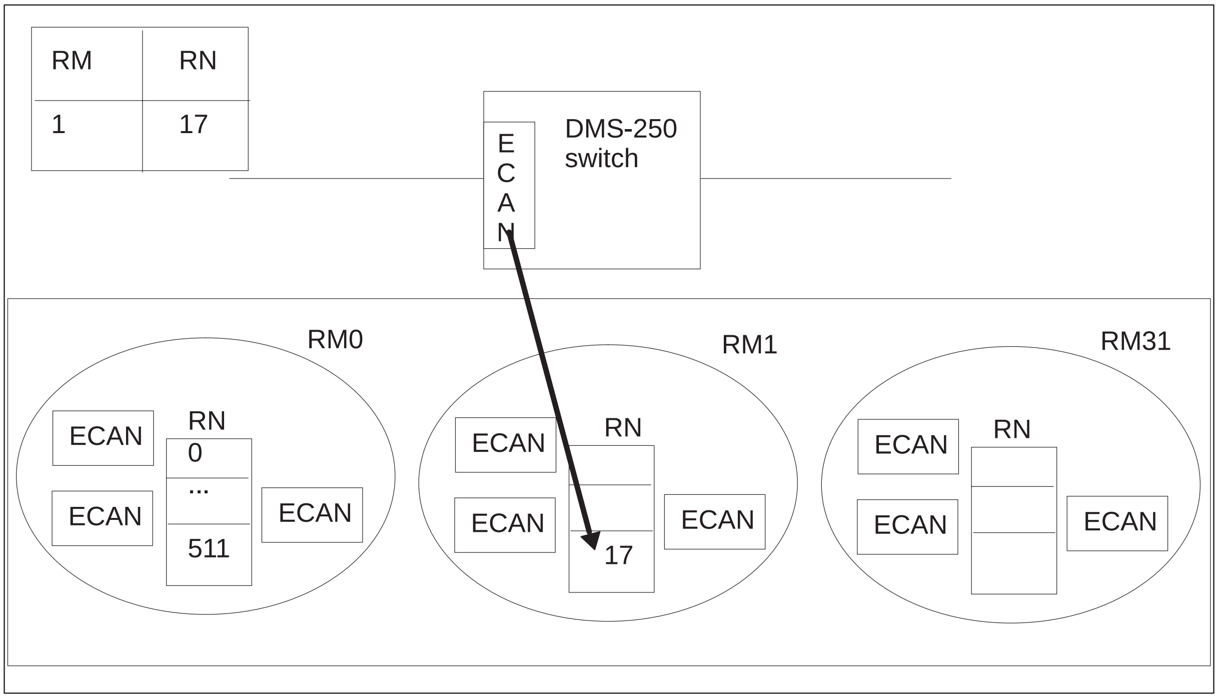
The Spectrum ECANs are dynamically attached to a trunk on a per call basis from a pool of Spectrum ECAN resources. A call may traverse through many UCS DMS-250 switches and encounter many ECAN resources in its path. Spectrum provides an optimal utilization algorithm to allocate the ECAN resources for this call. See Chapter 2, “AD9959 — Spectrum Echo Canceller Call Control.” for details.

Only two ECANs are needed for a two-party call: one for cancelling the forward echo; the other for cancelling the backward echo. The forward echo (outgoing echo) is the echo of voice from the terminator reflected by the originator’s hybrid. The backward echo (incoming echo) is the echo of voice from the originator reflected by the terminating hybrid. If an ECAN is needed in the switch for an established (in talking stage) two-party call, the ECAN is attached to the trunk for the entire duration of the call.

Figure 8-1 shows an ECAN RM and RN in resource pools.

AX0222
UCS CDR ECAN RM/RN (continued)

Figure 8-1
ECAN RM and RN resource pools



The number of RMs available in a resource pool is 32. Each RM has up to 512 ECAN resources.

From a switching network perspective, the ECAN control can be described as follows:

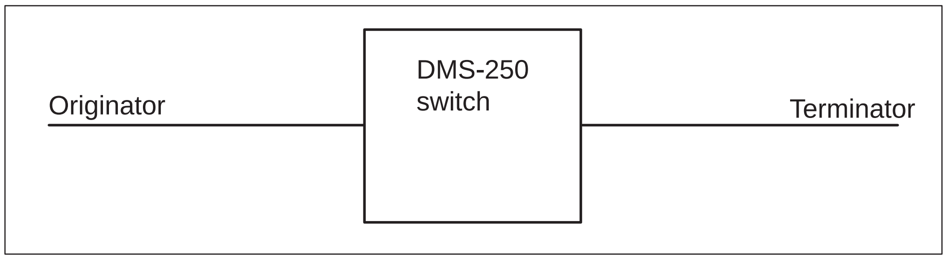
- Access mode is when the tail end of the ECAN faces away from the center of the switch.
- Network mode is when the tail end of the ECAN faces toward the center of the switch.
- Back-to-back mode is when a pair of ECANs are at the same end of a trunk member with their tail ends facing the opposite direction — one is in access mode; the other in network mode.
- The tail end is the side of the ECAN that receives the echo first.

Refer to Chapter 2, “AD9959 — Spectrum Echo Canceller Call Control” for detailed information about access mode, network mode, and back-to-back mode.

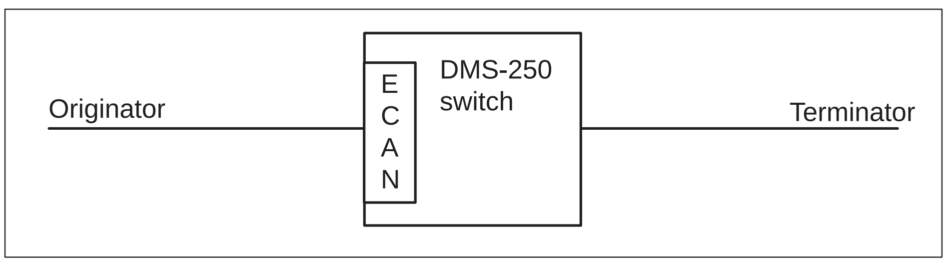
AX0222
UCS CDR ECAN RM/RN (continued)

From an individual DMS-250 switch point of view, the ECAN resource allocation per call are described in the following scenarios.

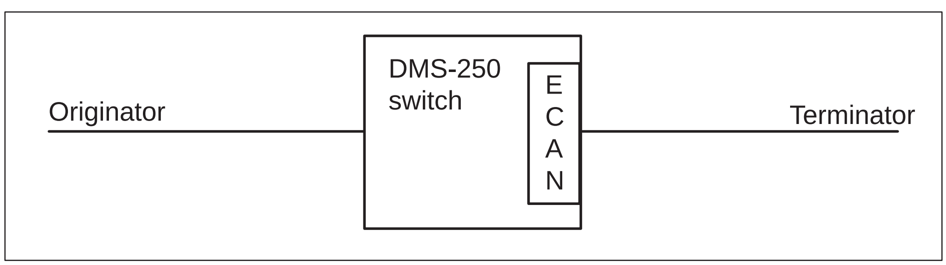
1 No ECAN resource is allocated on this switch. The ECAN resources may be picked up in other switches or by the external ECANs according to the ECAN control algorithm.



2 Only one ECAN resource is allocated for this switch, and it is attached to the switch’s incoming (originating) trunk.

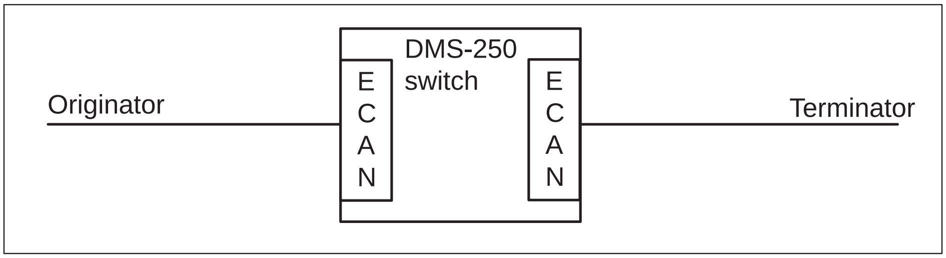


3 Only one ECAN is attached to the outgoing (terminating) trunk of the switch.

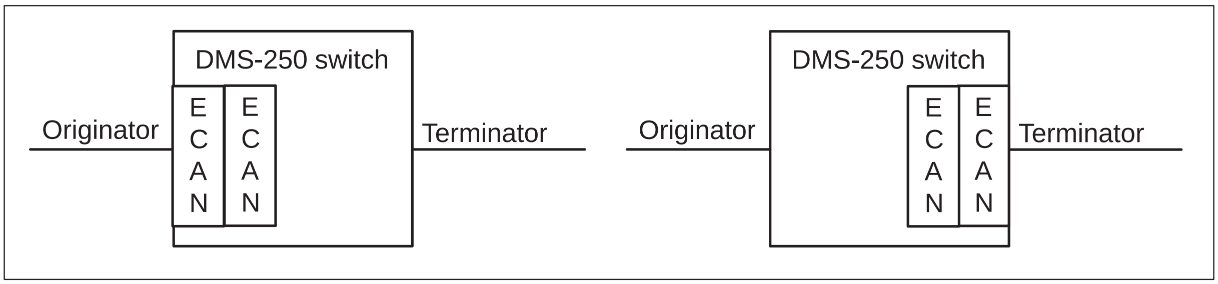


AX0222
UCS CDR ECAN RM/RN (continued)

4 Two ECAN resources are allocated on this switch: one is attached to the originating trunk, and one is attached to the terminating trunk.



5 Two ECAN resources are allocated on this switch in back-to-back mode. The two ECANs are attached to the same end of the trunk—originating or terminating.



Note: When only one ECAN is allocated on the switch (for example, attached to the originating trunk), it can be used to cancel either the backward echo or the forward echo, depending on the Spectrum ECAN call control algorithm. Therefore, it can be in either access mode or network mode. When two ECAN resources are allocated on a UCS DMS-250 switch, they must be used to cancel echoes from opposite directions (forward and backward). No more than two ECANs are needed for a two-party call; and no more than two ECANs are allocated on a switch for a particular call.

AX0222
UCS CDR ECAN RM/RN (continued)

Real time impact controlling

Although the real time impact of this feature is minimal, the real time can suffer from the Spectrum sending the ECAN resource data report to the computing module (CM) for every ECAN allocated call.

An office parameter is created by this feature to provide operating companies with flexibility on real time impact control. This office parameter, Spectrum_ECAN_REPORT_MSG_ON, controls the message sending on a per switch basis. If set to “NO,” no report generates and the CM does not receive the message.

Spectrum per call ECAN resource data

When a Spectrum ECAN is allocated for a call and after the call is answered, Spectrum first checks the office parameter value for Spectrum ECAN resource data message, Spectrum_ECAN_REPORT_MSG_ON. If set to “Y,” Spectrum will report its ECAN resource data to the CM; otherwise, no report is sent.

The message consists of the following information:

- RM, ranging from 0 to 31 (5 bits)
- RN, ranging from 0 to 511 (9 bits)
- whether the resource is attached to the originator or the terminator
- whether the ECAN is in back-to-back mode

Once a Spectrum ECAN is allocated in a call, it is attached to the trunk for the life of the call. If a call is determined to be a data call after the call has been answered and an ECAN has been allocated, the ECAN functionality is disabled, but the ECAN is still attached to the call. Therefore, the ECAN resource data is reported to the CM for this call. If the data call transits to a voice call later on, then the Spectrum ECAN functionality is automatically enabled again, given that some datafill requirements are fulfilled. Whether the ECAN being disabled or enabled again, the ECAN that is originally attached to the trunk is reported to the CM.

If a critical fault occurs on an ECAN RM during call processing, it will result in a sparing action. Spectrum’s sparing strategy is to conceal the sparing action from call processing. If the sparing action fails, it will then be tracked by the log reports. The spare RM will be configured in exactly the same way as the faulty card configuration. When the call is answered, the original ECAN RM and RN associated with the call are reported to the CM through the Spectrum ECAN data message.

AX0222
UCS CDR ECAN RM/RN (continued)

Hardware requirements

This feature requires the following Spectrum product equipment:

- NTLX63AA — CEM (common equipment modules)
- NTLX65AA — DSP (digital signal processor)
- NTLX66AA — VSP (voice service processor)
- NTLX71AA — OC-3

Limitations and restrictions

The following limitations and restrictions apply to this feature:

- This feature is for Spectrum ECAN only.
- Spare ECAN resources are not captured in the UCS CDR.

Interactions

This feature interacts with the following features:

- UCS CDR Management Design Document for the specific UCS software release
- AD9959 — Spectrum ECAN Call Control
- AD9960 — Spectrum ECAN Feature Interactions

Datafill

This feature adds office parameter SPM_ECAN_REPORT_MSG_ON to table OFCVAR. This office parameter allows the Spectrum ECAN resource data report to be turned on or off.

All table control and CI commands related to the UCS08 CDR templates are updated by feature AX0202 to include the fields: ECRM1, ECRN1, ECRM2 and ECRN2.

Note: Software changes for the UCS12 software release do not impact this feature.

Service orders

No affect

Operational measurements

No affect

AX0222
UCS CDR ECAN RM/RN (end)

Logs

This feature has impact on logs CDR272 and CDR273. These logs are listed in feature AX0202 to reflect the RMs and RNs per call.

User interface

All UCS CDR search tools are listed in feature AX0202 to operate on the fields ECRM1, ECRN1, ECRM2, and ECRN2.

Billing

Refer to AX0202 for details of the billing process.

List of terms

access mode

A Spectrum ECAN is said to be enabled in the “access” mode if the tail end of the ECAN faces away from the center of the DMS-250 switch. The tail end is the side of the ECAN that receives the echo first.

access trunk

A trunk is referred to as an access trunk if it connects the DMS-250 switch to access side network elements such as Local Exchange Carrier (LEC) or Private Branch Exchange (PBX). The following trunk agencies are some examples of access trunks: DAL, FGA, FGB, FGC, FGD (PTS and ISUP).

ACCT

The 0 to 5 digit account code

ACM

Address Complete Message

active announcement

An announcement that can be interrupted by subscriber dialed digits.

address

The 7- (NXX-XXXX) or 10-digit (NYX-NXX-XXXX) called number; Public, Private, or Special Features Hotline number

AIN

advanced intelligent network

ANI

automatic number identification; identifies the calling number

ANM

Answer message

ATD

automatic tone detector

ATR
Automated Trunk Routing

ATRT
ATR trunk

AUTH
The partially or fully dialed authcode

back-to-back mode
A pair of Spectrum ECANs is said to be enabled in back-to-back mode if the tail ends of the two ECANs face opposite directions, where one ECAN is enabled in access mode and the other in network mode.

backward echo
echo of voice from the originator reflected by the terminating hybrid.

BBF
blue box fraud

bridging switch
The switch that connects the calling and called parties. It can be located anywhere in the long distance network.

CAIN
Carrier Advanced Intelligent Network

CALLP
call processing

CAMA
centralized automatic message accounting

CC
country code; used for international calls, datafilled in table CCTR

CCC
pseudo country code

CDR
call detail record

CEM
common equipment module

COT
Continuity test

CM
computing module

convergence time
The time it takes for an ECAN to cancel echo on a new connection.

CP
call processing

CPG
Call Progress message

DAL
1) direct access line

2) dedicated access line

DCM
digital carrier module; a type of peripheral module

DCR
dynamically controlled routing

DDM
dynamic downloading mechanism

DRAM
digital recorded announcement machine

DP
dial pulse

DSP
digital signal processing

DTC
digital trunk controller

DTCI
ISDN digital trunk controller

DTM
digital trunk module

double talk
When both people talk at the same time.

DTCO
DTC overseas

DTMF
dual tone multifrequency

DTMF receivers
The dual tone multi-frequency (DTMF) receiver is responsible for collecting digits and analyzing tones coming from the associated channel and presenting the digit information to the peripheral module.

DWS
Dialable Wideband Service

ECAN
echo canceller

echo
Reflected voice energy due to impedance mismatch, when combined with a delay in reception. leads to the perception of echo.

echo return loss
The signal loss across a hybrid.

echo return loss enhancement
The improvement in ERL provided by a particular ECAN.

EDAL
enhanced dedicated access line

ERL
See echo return loss.

ERLE
See echo return loss enhancement

ESP
Enhanced Services Provider

ENET
enhanced network

FAR
Facility Request message

FC
Facility Code. As an example, the number 56 is used for data calls.

FGA
feature group A

FGB
feature group B

FGC
feature group C

FGD
feature group D

forward echo
echo of voice from the terminator reflected by the originator’s hybrid

FR
fixed routing

FRJ
Facility Reject message

FXO
foreign exchange office

FXS
foreign exchange station

HDLC
high-level data link control

IAM
Initial Address Message

ID
identifier

II
information digits screened in table STDPRTCT

IEC
interexchange carrier

IMC
intermodule communication link

IMT
intermachine trunk

IN1
intelligent networking

incoming echo
echo of voice from the originator reflected by the terminating hybrid.

intermachine trunk
A trunk is referred to as an intermachine trunk if it interconnects two DMS-250 switches or if it connects a DMS-250 switch to a DMS-300 switch. An ISUP IMT trunk serves as a good example of an IMT trunk.

ISDN
Integrated Services Digital Network

ISUP
ISDN User Part

ITU
International Telecommunications Union

IXC
interexchange carrier

LEC
local exchange carrier

access trunks 600 miles or longer are considered long access trunks, and IMT trunks 500 miles or longer are considered long IMT trunks.

LPP
link peripheral processor

ManB
Manual Busy

MF
multi-frequency

MTM
maintenance trunk module

N
A number in the range 2–9

network mode
A Spectrum ECAN is said to be enabled in the “network” mode if the tail end of the ECAN faces toward the center of DMS250 switch.

NLP
See non-linear processing.

noise matching
The addition of low level noise during non-linear processing so that the far-end listener does not perceive “dead silence.”

non-linear processing
Also called “residual echo control;” during NLP the echo is replaced by silence or low level noise (see noise matching). This is to eliminate any echo that remains after cancellation.

Nortel
Northern Telecom

NP
network processor

NTP
Northern Telecom Publication

ONAL
off-network access line

ONAT
off-network access trunk

outgoing echo
echo of voice from the terminator reflected by the originator’s hybrid

passive announcement
Announcement that cannot be interrupted; the subscriber must wait until the announcement completes before entering digits.

PBX
private branch exchange

PIC
point in call

PCM
pulse code modulation

peripheral processor’s global area
It is a data area used to store global parameters to be sent to the PM when needed.

PIN
: The 0- to 4-digit personal identification number

PM
: peripheral module

POP
: point of presence

PRI
: primary rate interface

PSN
: programmable service node

PTS
: per trunk signaling

reflex buffer
: The reflex buffer is a data area for trunk terminals in the peripheral module. Each terminal in a PM is equipped with a 16-byte REFLEX buffer. It is designed to hold a 2-byte report type and 14 bytes of primitive instructions which can be initialized using the REFLEX primitive. Whenever subsequent processing on that terminal causes a report to be closed, the report type is compared with the report type in the reflex buffer. If they match, an internal flag is set. This indicates that the reflex buffer should be executed when current processing is completed.

reconvergence time
: The total time it takes an activated ECAN to recognize a change in the characteristics of the tail circuit, correspondingly change the model, and finally cancel the echo based on the new model.

RES
: Resume message

RLC
: Release Complete Message

RLT
: release link trunk

RM
: resource module

RN
: resource number

RODR
Reorder

RSLR
Reseller

RTS
return to service

SCP
service control point

SCU
service control unit

SONET
Synchronous Optical Network

SS7
system signaling 7

STR
specialized tone receivers

supervision execs
A supervision exec is a sequence of actions, known as primitives, which are executed on the PM.

supervision execs lineup
A collection of Supervision Execs which reside on the CM. When a PM is brought into service (RTS) the exec lineup is downloaded from the CM. Any changes to the contents of an Exec lineup or the definition of a specific exec requires reloading the Exec lineup on the CM, as well as taking the PM out-of-service and executing RTS again to download the Exec lineup.

SUS
Suspend message

tail circuit
The circuit from the ECAN to the near-end hybrid.

tail delay
The delay of the offending echoes as seen by the ECAN.

tail end
The side of the ECAN facing the source of echo.

TCAP
Transaction Capabilities Application Part

TCC
true country code; datafilled in table CCTR

TCN
travel card number

TDP
trigger detection point

TID
trunk identifier

tone disabler
A control function which may bypass the ECAN, depending on certain control values. A FAX/modem emits a tone during initial handshake to remove ECANs.

TM8
a type of peripheral module

TPART
3-digit termination partition

trunk TID
A node number associated with a specific Spectrum port number and channel number.

TTP
test trunk position

UA
universal access

UAC
Uniform Access Code

UCS
Universal Carrier Software

UTR
universal tone receiver

USI
user service information

UTR
universal tone receiver

VSP
voice services processor

XPM
extended peripheral module

Ordering information

Use the following table for ordering Nortel Networks NTPs (Northern Telecom Publications) and Product Computing-Module Loads (PCLs):

Type of product	Source	Phone	Cost
Technical documents (paper or CD-ROM)	Nortel Networks Product Documentation	1-877-662-5669	Yes
Individual NTPs (paper)	Merchandising Order Service	1-800-347-4850	Yes
Marketing documents	Sales and Marketing Information Center (SMIC)	1-800-4NORTEL (1-800-466-7835)	No
PCL software	Nortel Networks	Consult your Nortel Networks sales representative	Yes

When ordering publications on CD

Please have the CD number and software version available, for example, **HLM-2621-ENCDRPDF 06.02**.

When ordering individual paper documents

Please have the document number and name available, for example, **297-2621-001, UCS DMS-250 Master Index of Publications**.

When ordering software

Please have the eight-digit ordering code, for example, **UCS00012**, as well as the ordering codes for the features you wish to purchase. Contact your Nortel Networks representative for assistance.

Digital Switching Systems

UCS DMS-250

Spectrum Feature Description Manual

Product Documentation–Dept 3423
Nortel Networks
P.O. Box 13010
RTP, NC 27709–3010
1–877-662-5669

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