# AVAYA

**Avaya™ MultiVantage™**
Call Center Software
Release 11
Network Call Redirection

**MultiVantage**$^{TM}$
**Issue 3.0**
**Network Call Redirection**

# Contents

## Network Call Redirection

# Contents

# Network Call Redirection

## Overview

*Network Call Redirection* provides feature descriptions and information about feature administration and troubleshooting.

## Organization

*Network Call Redirection* covers the following topics:

# General information

## Overview

Today, call center customers are looking for ways to reduce their costs. One way to do this is to employ Public Switched Telephone Network (PSTN) Virtual Private Networks (VPNs) to eliminate as much private network cost as possible. These cost reductions are particularly valuable in enterprises or multi-site call-center environments and especially to Enterprise call centers where network costs are typically high. Network Call Redirection (NCR) offers a call redirection method between sites on a public network or a PSTN Virtual Private Network, to help reduce trunking costs.

## Audience

This document is intended for external customers, and for Avaya$^{TM}$ Inc. internal audiences. External customers include MultiVantage$^{TM}$ administrators and Avaya Call Management System (CMS) administrators.

## Before you start: platform

NCR is an optional MultiVantage feature. Full administration support of NCR is provided in addition to route-to-number support for **~r** vector administration. Existing CMS and Avaya Visual Vectors administration support for Avaya Best Service Routing (BSR) will support NCR. BSR is not supported on Category B switches (MultiVantage BCS and GuestWorks). NCR requires the Customer Option Activated 1227-NCR PEC. Changes provided in DEFINITY R9.5 are required for reliable operation with the MCI® WorldCom® Network Call Transfer network service. MultiVantage Release 11.5 provides support for Telcordia Two B-Channel Transfer (TBCT) and 1998 ANSI Explicit Call Transfer protocols for Network Call Transfer.

NCR may only be activated for incoming Integrated Services Digital Network (ISDN) trunk calls where the associated trunk group has been enabled by the public network service provider to use Network Call Transfer or Network Call Deflection features. Also, NCR supports Information Forwarding for AT&T In-band Transfer and Connect network service.

NCR can be activated by the MultiVantage BSR feature's **queue-to-best** vector step, which is the best approach for interflowing call center calls. For complete information on BSR and Information Forwarding, see the MultiVantage Call Vectoring/Expert Agent Selection guide.

> ⚠ **Important:**
> Until NCR has been tested on specific PSTNs, performance is not guaranteed. To verify operability of NCR, contact your CRM Regional Offer Manager.

## Compliance

MultiVantage Network Call Deflection support is compliant with ETSI Supplementary Services Network Call Deflection ETS 300 207-1 (partial call rerouting in the public network). Network Call Transfer is compliant with ANSI Explicit Network Call Transfer (ENCT) T1.643 (1995), the MCI-Nortel DMS250 Telcordia Two B-Channel Transfer (TBCT) and the 1998 version of ANSI ECT.

Network Call Transfer using the 1995 ANSI ECT specification and the MCI-Nortel variant is only supported by MCI® WorldCom in the United States on their Option 2 and 3 networks. The WorldCom DEX600 network switches require the 1995 ANSI ECT protocol while their DMS250 switches require the MCI-Nortel variant. The Telcordia Two B-Channel Transfer form of Network Call Transfer is offered by many local and network PSTNs that use the 5ESS or Nortel DMS100 network switches. The 1998 ANSI ECT may be offered by other PSTNs in the future.

Outside of the United States, there are several carriers supporting NCR (specifically Network Call Deflection). These carriers include Deutsche Telekom in Germany and British Telecom in the United Kingdom, as well as carriers in France, Australia, and Singapore. NCD works on a number of PSTN switches outside the United States, including the Alcatel M25 switch in France, the Alcatel S-12 switch in Germany, and the GTX System X switch in the United Kingdom. Some Canadian carriers support the Telcordia TBCT protocols. Other carriers and countries are expected to add support in the near future.

> ⚠ **Important:**
> Compliance requirements are needed to negotiate service with your Public Switched Telephone Network (PSTN). There are PSTN-imposed limits how many times a call can be redirected from country to country. Also, PSTNs typically charge for the redirect and User-to-User Information (UUI) transport services.

## Trunking considerations

The MCI network requires that calls being transferred are on the same Direct Access Line (DAL). MultiVantage enforces this by requesting NCT for only two calls using the same signaling group. This results in sending the request on the same D-channel used for the first call with associated signaling or on the associated D-channel when active with Non-Facility Associated Signaling (NFAS) D-channel backup configuration. This requirement is also imposed for the ANSI and TBCT forms of NCT.

With vector-invoked NCT (BSR or route-to-number), the second leg of the call is placed over an idle trunk in the same trunk group as that of the incoming call to ensure that invocation of NCT is done over the same signaling group. Therefore, vectoring activation of NCT requires that the trunk group be a two-way trunk group.

Call-by-Call Service Selection and Usage Allocation can be used to reserve a number of trunks in the two-way trunk group. Use the trunk group Call-by-Call Service Selection (CBC) Usage Allocation capabilities to reserve several trunks for outgoing calls. Set the incoming call Network Specific Service (NSF) type minimum channels to the number of channels to be reserved and the maximum to the total number of trunks, less the number of channels reserved.

With station, ACD agent, or CTI-initiated conference or transfer, if the second leg of the call is set up over an outgoing trunk with the same signaling group as the incoming call, then NCT can be invoked when the transfer is requested. If an outgoing trunk group is assigned to the same signaling group as the incoming trunk group and that outgoing trunk is selected by the outgoing call (using ARS) placed by the user or CTI application for transfer, then a two-way trunk group is not required.

## Interactions with other call center features

NCR interacts with or affects the following MultiVantage components:

- Information Forwarding
- Station transfer by DCP set Transfer button or hang-up or switch hook flash transfer by hang up
- Station transfer by DCP set Conference button, in which the conferencing (middle) party connects the two calls and then hangs up
- ASAI third-party call transfer
- ISDN trunk administration
- Attendant Vectoring
- Call Vectoring and BSR

## CMS, Visual Vectors, and Supervisor

CMS Reporting or administration on public network calls that have been rerouted to another public network endpoint using NCR will be provided by the following Avaya Inc. products:

- CMS (reporting and administration of the **~r** vector step)
- Avaya CMS Supervisor (reporting)
- Visual Vectors (administration, BSR vector support, and administration of the **~r** vector step)
- Avaya Network Reporting (reporting)

Reporting of calls that have been rerouted to another PSTN endpoint by NCR will be available on the following products when used with a MultiVantage switch:

- CMS
- Supervisor

ISDN calls that are rerouted by NCR to multiple MultiVantage sites are reported by NICE Analyzer[TM] when used with CMS. This is accomplished by using the Universal Call ID (UCID) information that is part of the UUI for ISDN calls rerouted by NCR.

## CMS database

CMS database items are affected by NCR as follows:

- DEFLECTCALLS — In the vector and VDN tables, the DEFLECTCALLS item includes the number of calls redirected using NCR through the BSR feature by using the route-to-number **~r** or **queue-to-best** commands. Successful NCR attempts are pegged as DEFLECTCALLS.

- INTERFLOWCALLS — In the vector and VDN tables, the INTERFLOWCALLS item includes successful BSR interflows using NCR redirections.

- LOOKATTEMPTS — In the vector and VDN tables, the LOOKATTEMPTS item includes the number of times the Lookahead Interflow or BSR Interflow was attempted for calls in the vector. Successful Lookahead Interflow or BSR attempts are also counted. NCR invoke attempts (Network Call Deflection or Network Call Transfer) are also reflected in LOOKFLOWCALLS.

- LOOKFLOWCALLS — In the vector and VDN tables, the LOOKFLOWCALLS item includes the number of INTERFLOWCALLS that were redirected by the Lookahead Interflow or BSR features. LOOKFLOWCALLS is a subset of INTERFLOWCALLS and includes LOOKATTEMPTS for the Lookahead Interflow or BSR interflows. With BSR interflow via trunk-to-trunk transfer or NCR, every LOOKATTEMPT will also be counted as a LOOKFLOWCALLS unless a failure occurs.

## Station Call Transfer or Conference

An incoming ISDN call (over a trunk with NCT PSTN service) is answered at the station or voice response unit (VRU or IVR). The station user or VRU answers the call and initiates a station call transfer using the transfer feature button or a switch hook flash. The MultiVantage automatically sends the invoke NCT ISDN FACility message when the transfer is complete only if NCT is assigned to the incoming trunk group and the call is eligible for NCT — that is, if the second leg of the call has been set up over a trunk with the same signaling group as the incoming call and the second leg call has been answered. If the station user initiates and completes a three-way conference instead, the MultiVantage automatically sends an invoke NCT ISDN message when the initiating station user drops from the three-way conference.

# What is Network Call Redirection?

## Overview

Call redirection using NCR is accomplished by using either the public network's NCD or NCT options. NCD **clear call upon invocation** is offered only outside of the United States. In the United States, only NCT is offered. In the future, the NCD **retain call until alerting/connect option** may be provided by public networks outside of the United States, but it is not currently available.

## Network Call Transfer

NCT occurs after a call is initially answered. With NCT, the MultiVantage is required to set up the second leg of the call and then wait for the second site to acknowledge before requesting the PSTN to transfer the first leg of the call to the second leg, and before the PSTN drops the trunks to the MultiVantage system. The benefit is that the MultiVantage retains control over the call and can redirect the call using the trunk-to-trunk method should the NCT invocation fail. Therefore, the NCT option is the most reliable.

After the second leg of the call is initiated and acknowledged by the public switch, and then answered, the public network joins the original ISDN caller to the redirected-to endpoint and then drops both the original ISDN call and the second leg of the call at the redirecting MultiVantage system.

## Network Call Deflection

NCD occurs before a call is initially answered. With NCD, the public network sets up the second leg of a call to the redirected-to location when the MultiVantage deflects the call. There are two PSTN options for NCD, per the ETSI standards: **retain call until alerting/connect** and **clear call upon invocation**. This is called a partial call reroute.

With the **clear call on invocation**, which is the only NCD operation currently available, the MultiVantage loses control of the call once the call has been transferred to the public network for redirection. The MultiVantage does not retain control of the call until it has been acknowledged by the network, so there is no alternative transfer possible if the public switch cannot acknowledge and transfer the call to the second location.

The **retain call until alerting/connect** option is not currently available (no known PTSN offers it at this time). With this option, the PSTN sets up the second leg of the call and waits until an alerting message is received before the first leg of the call is dropped. In this case, if the second leg of the call fails, then the MultiVantage can redirect the call through another method (such as trunk-to-trunk connection) and not lose the call.

## PSTN considerations

There may be limits imposed by the public network service provider on the number of times a call may be redirected over the public network. For example, in the United States, MCI currently allows only one redirection per call. In the United Kingdom, there is a limit of 20 call deflections per call. Also, there may be additional charges associated with redirected calls.

Some public network service providers do not support forwarding UUI. UUI includes ASAI User data, collected digits, VDN name, VDN in-time (as reflected by the NETINTIME database items), and UCID. This means that Information Forwarding will be lost and the second leg of the redirected call will look like an entirely new call to the redirected-to MultiVantage at the second location. One of the data items lost is the VDN name, which is rerouted to the originally called service (DNIS) information. The indication that the call has been forwarded can be achieved by using dedicated VDNs for call forwarding, and it reduces the benefits of information forwarding inherent with NCR. Also, this option limits CTI applications as there is no ASAI information or UCID forwarded.

> ⚠️ **Important:**
> At this time, no PSTNs are offering the Network Call Deflection **retain call until alerting/connect** operation. Therefore, only the Network Call Deflection **clear call upon invocation** offer is available from PSTNs. Both methods are described in this document. It is advised that you negotiate with your PSTN as the NCR feature will work on either platform. NCR is limited by which PSTN platform is available to you.

## Information Forwarding support for AT&T In-band Transfer and Connect

Enabling NCR also provides Information Forwarding support for the AT&T Transfer and Connect In-band network service ISDN D-channel data forwarding capability. The MultiVantage Information Forwarding feature forwards the UUI associated with the call to the "transferred to" location. When NCR is active in the MultiVantage system, transferring the call using Call Vectoring and AT&T In-band Transfer and Connect, the **disconnect** vector step will include the codeset UUI IE in the ISDN DISCONNECT message.

# Implementation

## Overview

NCR uses either the Network Call Transfer (NCT) or Network Call Deflection (NCD) operations provided by the PSTN to redirect an incoming ISDN call from a MultiVantage system to another PSTN endpoint. In the call center environment, NCR is intended for multi-site configurations where ISDN calls are interflowed between MultiVantage switches over the PSTN by the BSR feature's **queue-to-best** vector step, which is the best approach for administration.

NCR can also be used to redirect an incoming ISDN call by either of the following methods:

- As a substitute for the Lookahead Interflow or non-attendant call vectoring using the **~r route-to-number** vector step

- Attendant call vectoring, by using the **~r route-to-number** vector step

- ASAI Third-Party Merge or Call Transfer Operation (Network Call Transfer only)

- Station transfer by DCP set Transfer button or hangup or switch hook flash transfer by hangup

- Station transfer by DCP set Conference button, in which the conferencing (middle) party connects the two calls and then hangs up

The NCR feature is designed to optimize the rerouting of ISDN calls over the public network since no MultiVantage trunks are retained at the redirecting MultiVantage after the call is rerouted.

Additionally, NCR may be activated and tracked with ASAI or CTI. The ASAI event reporting capabilities enable tracking of the NCR-redirected calls by their Universal Call ID or ASAI UUI.

## Before you start: platform

Network Call Redirection is a new MultiVantage feature available starting with the Release 8.3 ECS. Full administration support of the feature is provided. For detailed information, see of this document.

## NCR activation using MultiVantage Call Vectoring

If NCR is activated using either the route-to-number or **queue-to-best** vector steps, either the NCT or the NCD options may be used to redirect an incoming call while the call is still being processed by the MultiVantage vector.

The NCR feature is activated by MultiVantage call vectoring if:

- The BSR feature selection of a "best location" has been administered with the Net Redir? option set to **y** on the BSR Application Table form (with both BSR and LAI active), followed by the execution of the **queue-to-best** vector step (see Administration on page 19).

- The route-to-number vector step is administered with a **~r** as the first item in the number field (with or without the LAI option set to **y** or with Attendant Call Vectoring active — the administration for **~r** in route-to-number vector steps will be supported by R3V9 and later CMS and Visual Vectors).

## NCT

If the NCT feature is enabled for the trunk over which an incoming call is routed to the MultiVantage switch, then NCR redirection will be attempted only if a CONNect ISDN message (answer supervision) has been sent to the public network for the original call. Any vector step of this type, such as wait hearing music or collect *x* digits will send the CONNect ISDN message to the public network and NCR will be attempted with either the route-to-number or **queue-to-best** vector steps. If none of the vector steps listed below have been executed, then the MultiVantage will automatically send a CONNect ISDN message to the public network *before* call transfer is requested from the PSTN. This starts PSTN charging for the call, after the second leg call is established.

If NCT is used, a second call is set up by the redirecting MultiVantage to redirect the call using the public network. That call must be answered (sends a CONNECT ISDN message) by the redirected-to location before the call is requested from the PSTN. This is necessary for reliable NCT operation with MCI's network switches. Answering the second call before invoking NCT is not required with the TBCT and 1998 ANSI protocols. The call needs only to be in the alerting state.

## NCT call success

With NCT, a call transfer is considered to be successful if:

- The public network responds to the FACility message that requested the NCT operation with a FACility message to the requesting MultiVantage indicating PSTN success. The requesting MultiVantage should then receive a DISConnect message for both the first and second leg of the call after the original call and the second leg are joined by the PSTN.

- If the public network responds with a PSTN failure FACility message to the requesting MultiVantage switch, a trunk-to-trunk connection between the first leg of the call and the second leg of the call will occur. MultiVantage vector call processing considers this to be successful for the NCR attempt because the original call was not lost; however, a vector event will be generated indicating that the NCT public network operation failed, and this call will not be indicated as "deflected" in CMS.

## NCD

NCD may be activated only if a CONNect ISDN message has not been sent to the public network for a call; this is call answer supervision. In that case, the following vector steps should *not* be used by a vector in prior steps if the NCD feature is to be used for NCR:

```
wait hearing music

collect x digits

announcement

converse-on split
```

If NCD is used, the MultiVantage system does not set up a second call to redirect the call on the public network, and only the incoming ISDN D-channel is used by the public network to redirect the call. The second call is actually set up by the public network.

## NCD call success

With NCD, an NCR attempt is considered successful if:

- The public network has validated the NCR request and returned a call reroute return result in a DISConnect message to the requesting MultiVantage switch for the first leg of the call if the NCD **clear call on invocation** public network service has been subscribed to for the incoming ISDN call's trunk group. This indicates invoke success.

- The public network has sent a call reroute return result indication in a FACility message, followed some time later by a DISConnect message (for the first leg of the call) to the requesting MultiVantage system if the NCD **retain call until alerting/connect** operation has been subscribed to for the incoming ISDN call's trunk group. The DISConnect is sent after the PSTN has successfully set up the second leg of the call (that is, the public network has received an ALERTing or CONNect ISDN message from the redirected-to public network endpoint). This indicates successful call deflection.

## NCR activation by BSR vector processing

Network Call Redirection of ISDN calls will be attempted if the following vector administration has occurred within BSR. Network Call Redirection on the MultiVantage Customer Options form must have been set to Y for this installation to be able to administer NCR:

1. An incoming ISDN call enters MultiVantage vector processing.

2. The call may or may not encounter a vector step, such as an announcement, that causes an "answer" ISDN message (the ISDN CONNect message) to be returned to the trunk associated with the call.

3. The call encounters one or more **consider location** BSR vector steps that returned valid data (such as Expected Wait Time) and then executed a **queue-to-best** BSR vector step.

4. MultiVantage BSR call processing determines that the call should be interflowed to one of the remote BSR locations previously considered as the best location.

5. The interflow VDN number, in the BSR Application Table, associated with the best location has been administered with the Net Redir? field set to Y.

6. The administered interflow number is the public network phone number (without trunk or ARS or AAR access codes) that reaches the remote call center site. The long-distance access (dial **1** in the United States) may also be required depending on the PSTN requirements for the trunk group. This number is used variously during the invoke process depending on which redirection service is available from the public network service provider.

7. With call vectoring activation of NCR, either NCT or NCD is initiated based on which type of redirection is administered to the trunk group for the incoming call. In either case, a FACility message is sent to the public network over the D-channel associated with the incoming trunk to invoke redirection of the call.

A *successful* NCR completion (when the PSTN indicates a successful NCT invoke) terminates vector call processing while the original call is connected through the interflowed to call center site by the public network. CMS tracks this as a successful network call redirection for the call.

An *unsuccessful* NCR attempt (NCD invoke failure or NCT secondary call failure) results in vector processing going to the next step in the vector following the **queue-to-best** vector step prior to Release 10. Starting with load 37 of Release 10, the call will queue to a local best split/skill, if one has been considered, and it has staffed agents. NCT invocation failure after the second call is established results in the MultiVantage reverting to the trunk-to-trunk call connection.

## NCR activation by route-to number vector processing

The following steps are used when the **~r route-to-number** vector step is used for Network Call Redirection:

1. The call arrives at the first location.

2. The call is processed by a vector that has a **~r** in the leftmost two character positions in the number field or the Network Redir? field on BSR Application Table form is set to Y for the location specified in the **consider** step for the active VDN application.

3. The MultiVantage system sets up the second leg of the call using the public network and passes the codeset 0 UUI information in the SETUP message if this is supported. This call is then answered at the remote end. With NCD, the second leg of the call is set up by the public network.

4. The MultiVantage switch "tells" the public switch to transfer the call over the public network.

5. The public network merges the second leg of the call to the second site and drops the MultiVantage. With NCT, at this point, if the second call fails, the MultiVantage can maintain control of the call and revert to trunk-to-trunk transfer.

## Sample vectors

The following is a sample BSR vector where NCR is used:

1. wait 2 seconds hearing ringback

2. consider skill 1 pri l adjust-by 0

3. consider location 1 adjust-by 20

4. consider location 2 adjust-by 40

5. queue-to-best

If the Network Redir? field is set to y for the best BSR location, then the NCR feature will be activated.

The following vectors are examples of vectors administered using the route-to-number command to use NCR:

Sample ACD vector:

1. wait 0 seconds hearing ringback

2. goto step 4 if skill oldest-call < 30 secs

3. route-to number ~r13035403001

4. queue-to skill 35 priority m

5. . . .

Sample Attendant vector:

1. goto step 6 if time-of-day is all 17:00 to 09:00

2. wait 0 seconds hearing ringback

3. queue-to attd-group

4. wait 999 secs hearing music

5. stop

6. route-to number ~r13035551002

# NCR and ASAI

NCR is activated by ASAI call processing when the Third-Party Merge or Call Transfer operation is requested by a CTI operation. This occurs in the following manner:

1. This is typically initiated by the CTI user selecting an icon, menu item, or button to transfer an incoming ISDN call to another user on the public network.

2. Since the incoming ISDN call must have been connected to a station user before the Third-Party Merge or Call Transfer operation was requested, NCR can initiate the call redirection only if NCT is an option on the trunk.

3. If a call arrives at an ASAI monitored VDN and either the NCT or NCD feature is used, then ASAI will send appropriate information in the disconnect event to tell the application that the call has been redirected by NCR.

ASAI event reporting allows tracking of ISDN ACD calls that are redirected by NCR in a multi-MultiVantage call center environment. These calls can be tracked by the UCID assigned to each call or by the UUI information inserted by the application through either the Third Party Make Call or Adjunct Routing features.

## Station Call Transfer or Conference

The following steps provide additional information about NCR activation using station call transfer or conference:

1. An incoming ISDN call (over a trunk with NCT PSTN service) is answered at the MultiVantage station or VRU line port.

2. A station or ACD agent user initiates station call transfer using feature button or switch-hook flash.

3. VRU (out of vector processing) initiates station call transfer using a switch-hook flash.

4. The MultiVantage automatically sends an invoke NCT ISDN FACility message when the transfer is complete and after the second leg is set up.

5. If the station user initiates and completes a three-way conference instead, the MultiVantage automatically sends an invoke NCT ISDN message when the initiating station or VRU user drops from the three-way conference.

After initiating the transfer, the initiator (station user, agent user, or VRU) dials the second leg connection by using an access code plus the PSTN number. The access code must select an idle outgoing trunk in a trunk group with the same signaling group as the incoming call and with NCT active. The transfer is complete when the Transfer button is pressed or the initiator hangs up.

# CTI or Station Transfer considerations for administration

The NCR feature is activated automatically for a station-user or CTI call transfer when:

- The ISDN Network Call Redirection field is set on page 3 of the System Parameters Customer Options form
- The second leg of the call transfer for an incoming ISDN call is made using the same trunk group with a trunk that has the same D-channel as the incoming call

For the PSTN switch to complete the station-user or CTI invocation of NCT operation successfully, the PSTN number that a station-user of CTI would dial to transfer an incoming call to another PSTN endpoint must be added (in some fashion) to the ARS digit analysis form. For the routing pattern associated with this ARS digit analysis form entry, the following settings must also be administered in an entry line on the lower part of the route-pattern form:

- Service/Feature field = **sdn**
- Number Format = **levl10-pvt**

Also, the PSTN service provider should be contacted to verify that the configuration of the PSTN switch used for the Network Call Transfer operation has been properly configured to accept the outgoing digits used by the MultiVantage station-user or CTI application to set up the second leg of the call transfer.

# Administration

## Overview

This section describes how NCR is administered on the MultiVantage system.

## MultiVantage administration overview

The following fields must be set on the MultiVantage administration forms for NCR to work:

| Form | Field | Value |
|---|---|---|
| For both NCT and NCD | | |
| System Parameters Customer options | Call Center Release | 8.3 or later (G3 Version on customer option form must be V11 or later for TBCT or Enhanced ECT) |
| System Parameters Customer options | ISDN Network Call Redirection | Y |
| Best Service Routing Application form (for the location to receive the call) | Net Redir? | Y |
| For NCT or 1998 Enhanced ANSI ECT | | |
| | Group Type | isdn |
| | Supplementary Services Protocol | g |
| Trunk Group form | Network Call Redirection | Nortel-transfer (for MCI DMS250 switches), ANSI-transfer (for MCI DEX600 switches) or Enhanced ANSI transfer (for future use) |
| Signaling Group form | Network Call Transfer | Y |
| DS1 form | Country Protocol | Any, typically 1a |

| Form | Field | Value |
|---|---|---|
| For NCD | | |
| Trunk Group form | Group Type | isdn |
| | Supplementary Services Protocol | c |
| | Network Call Redirection | deflect |
| Signaling Group form | Network Call Transfer | N |
| For TBCT version of NCT | | |
| Trunk Group form | Group Type | isdn |
| | Supplementary Services Protocol | a |
| | Network Call Redirection | Telcordia-TBCT (for Lucent 5ESS or Nortel DMS100 switches) |
| Signaling Group form | Network Call Transfer | Y |
| DS1 form | Country Protocol | 1b or 1d |
| For non-BSR applications or for standard or enhanced Lookahead Interflow applications replaced by NCR supplementing BSR applications | | |
| Call Vector form | leftmost position in the route-to number vector step | **~r** for each vector that will invoke NCR |

The **~r** command takes up two digit positions in the vector step. This works with **queue-to-best** or **check-best** vector steps. No change to the vector steps is required for NCR with BSR.

## Trunk Group form

If the NCT feature is subscribed to for the MultiVantage NCR feature, only PRI ISDN 2-way trunks may be used for the incoming-call trunk groups to be administered for vectoring activation of NCT, since the software selects a trunk from the same trunk group to set up the second leg call. See the following figures:

## Supplementary Service Protocol for NCT

```
change trunk group 29                                      Page   1 of 23
                              TRUNK GROUP
Group Number: 29          Group Type: isdn            CDR Reports: y
  Group Name: MCI-1              COR: 1          TN: 1      TAC: 729
    Direction: two-way Outgoing Display? y
 Dial Access? n        Busy Threshold: 255           Night Service:
Queue Length: 0
Service Type: cbc          Auth Code? n              TestCall ITC: rest
TestCall BCC: 4
TRUNK PARAMETERS
      Codeset to Send Display: 7      Codeset to send National IEs: 7
      Max Message Size to Send: 260   Charge Advice: none
Supplementary Service Protocol: g     Digit Handling (in/out): enbloc/enbloc

           Trunk Hunt: descend

Calling Number - Delete:     Insert:               Numbering Format:
Bit Rate: 1200       Synchronization: async         Duplex: full
Disconnect Supervision - In? y Out? y
Answer Supervision Timeout: 0
```

## Supplementary Service Protocol for Telcordia-TBCT

```
change trunk group 29                                    Page    1 of 23
                            TRUNK GROUP
Group Number: 29           Group Type: isdn          CDR Reports: y
  Group Name: 5ESS-1            COR: 1          TN: 1      TAC: 729
    Direction: two-way Outgoing Display? y
 Dial Access? n          Busy Threshold: 255        Night Service:
Queue Length: 0
Service Type: cbc         Auth Code? n            TestCall ITC: rest
TestCall BCC: 4
TRUNK PARAMETERS
      Codeset to Send Display: 7      Codeset to send National IEs: 7
      Max Message Size to Send: 260   Charge Advice: none
Supplementary Service Protocol: a     Digit Handling (in/out): enbloc/enbloc


          Trunk Hunt: descend


Calling Number - Delete:     Insert:                  Numbering Format:
Bit Rate: 1200         Synchronization: async      Duplex: full
Disconnect Supervision - In? y Out? y
Answer Supervision Timeout: 0
```

## Network Call Redirection for NCT

```
change trunk group 29                                    Page    2 of 23
TRUNK FEATURES
     ACA Assignment? n           Measured: both      Wideband Support? n
                                                 Maintenance Tests? y
                        Data Restriction? n     NCA-TSC Trunk Member:
                            Send Name: n        Send Calling Number: n
       Used for DCS? n
Suppress+Outpulsing? n
Outgoing Channel ID Encoding: preferred    UUI IE Treatment: shared
                                    Maximum Size of UUI IE Contents: 128
                                          Replace Restricted Numbers? n
                                        Replace Unavailable Numbers? n
                                            Send Connected Number: n
Network Call Redirection: Nortel-Transfer
            Send UCID? y          BSR Reply-best DISC Cause Value: 31
Send Codeset 6/7 LAI IE? n
                    Network (Japan) Needs Connect Before Disconnect? N
```

For NCD, the Supplementary Service Protocol field must be set to **c** and the Network Call Redirection field must be set to **deflect**. See the following figures:

### Supplementary Services field for NCD

```
change trunk-group 30                                        Page   1 of  23
                              TRUNK GROUP

Group Number: 30                    Group Type: isdn        CDR Reports: y
  Group Name: BT-1                          COR: 1      TN: 1       TAC: 729
    Direction: two-way       Outgoing Display? y
 Dial Access? n                    Busy Threshold: 255      Night Service:
Queue Length: 0
Service Type: sdn                        Auth Code? n         TestCall ITC: rest
                      Far End Test Line No:
TestCall BCC: 4
TRUNK PARAMETERS
          Codeset to Send Display: 7     Codeset to Send National IEs: 7
         Max Message Size to Send: 260   Charge Advice: none
   Supplementary Service Protocol: c     Digit Handling (in/out): enbloc/enbloc

             Trunk Hunt: descend
                                              Digital Loss Group: 13
Calling Number - Delete:     Insert:               Numbering Format:
             Bit Rate: 1200       Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? y
 Answer Supervision Timeout: 0
```

### Network Call Transfer field for NCD

```
change trunk-group 30                                          Page   2 of  23
TRUNK FEATURES
          ACA Assignment? n              Measured: both      Wideband Support? n
                                                            Maintenance Tests? y
                              Data Restriction? n    NCA-TSC Trunk Member:
                                   Send Name: n      Send Calling Number: n
          Used for DCS? n
   Suppress # Outpulsing? n
 Outgoing Channel ID Encoding: preferred      UUI IE Treatment: shared
                                       Maximum Size of UUI IE Contents: 128
                                           Replace Restricted Numbers? n
                                          Replace Unavailable Numbers? n
                                              Send Connected Number: n

Network Call Redirection: deflect
             Send UCID? y              BSR Reply-best DISC Cause Value: 31
 Send Codeset 6/7 LAI IE? n


                        Network (Japan) Needs Connect Before Disconnect? N
```

NCT invocation using Call Vectoring requires that the trunk group used for the incoming calls be two-way since the second outgoing call will be placed over an idle trunk in the same trunk group used by the incoming call.

To increase the chance that there will be a trunk available to place the second leg call, some trunks in the two-way trunk group can be reserved for outgoing-only use by using Call-by-Call Service Selection Usage Allocation capabilities.

1. On the ISDN Trunk Group form, set the following fields:

   Direction = **two-way**

   Service Type = **cbc**

   Usage Alloc = **y**

   Disconnect Supervision In? = **y**

   Disconnect Supervision Out? = **y**

2. Assign the incoming call NSF (Network Specific Service) types on the ISDN Trunk Group form, CBC Trunk Group Usage Allocation page to limit how many trunks will be used for incoming calls. For example, if all incoming calls are mega800 and two trunks of 100 are to be reserved, set the Service field to **mega800** and set the Min# Chan field to **2** and the Max# Chan field to **98**. If the incoming calls are received with two different NSF types (for example, **sdn** and **mega800**), then assign both for the same Min# and Max# values. See the following figure.

```
change-trunk-group 29                                         Page  6 of 25

                       CBC TRUNK GROUP ALLOCATION

Usage Allocation Plan 1Usage Allocation Plan 2Usage Allocation Plan 3


                    Min# Max#                 Min# Max#                 Min# Max#
Service/FeatureChan Chan Service/Feature Chan Chan Service/Feature  Chan Chan
mega800            2    98
sdn                2    98


```

**Note:**

On the MultiVantage system, the NSF coding for MCI WorldCom VNET service is defined as **SDN**, and the MCI 800 service is defined as **mega800**.

# Signaling Group form

For NCT, the Network Call Transfer field on the Signaling Group form must be set to **y**. See the following figure:

```
change signaling-group 4                                      Page   1 of   5
                            SIGNALING GROUP

 Group Number: 4
                    Associated Signaling? y        Max number of NCA TSC: 0
                        Primary D-Channel: 01B1024   Max number of CA TSC: 0
                                                   Trunk Group for NCA TSC:
     Trunk Group for Channel Selection:
       Supplementary Service Protocol: a         Network Call Transfer? y
```

For NCD, the Network Call Transfer field on the Signaling Group form must be set to **n**. See the following figure:

```
change signaling-group 4                                         Page   1 of   5
                              SIGNALING GROUP

 Group Number: 4
                      Associated Signaling? y        Max number of NCA TSC: 0
                        Primary D-Channel: 01B1024     Max number of CA TSC: 0
                                                     Trunk Group for NCA TSC:
        Trunk Group for Channel Selection:
          Supplementary Service Protocol: a          Network Call Transfer? n
```

# Best Service Routing Application form

On the MultiVantage Best Service Routing Application form, the Net Redir? field must be set to **y** for each location to which calls are to be directed using NCR. See the following figure.

> ⚠️ **CAUTION:**
> The number administered in the interflow VDN field on the Best Service Routing Application form (or in the **~r** vector step on the Call Vector form) should *not* have an ARS prefix or a trunk access code. Some PSTN numbers must include the long-distance access code. Contact your PSTN for specific information.

```
                    BEST SERVICE ROUTING APPLICATION

 Number: 1      Name: ARS               Maximum Suppression Time: 30    Lock? n

Num   Location Name    Switch Node   Status Poll VDN   Interflow VDN    Net Redir?
1                                    95022011          3035551222          y
2                                    95022111          3035551111          Y
3                                    95032211          95032221            n
```

## Call Vector form

For non-BSR applications or for standard or enhanced Lookahead Interflow applications replaced by NCR and supplementing BSR applications — on the MultiVantage Call Vector form, the leftmost position in the route-to vector step (vector step 2 in the example on the next page) must be set to **~r** for each vector that will invoke NCR.

> ⚠ **CAUTION:**
> The number administered in the **~r** vector step on the Call Vector form should *not* have an ARS prefix or a trunk access code. See the following figure.

```
                              CALL VECTOR                                    \

  Number: 37                      Name _Reroute using NCR_Feature_         Lock? n

      Basic? y    EAS? y   G3V4 Enhanced? y    ANI/II-Digits? y   ASAI Routing? y
  Prompting? y    LAI? y  G3V4 Adv Route? y            CINFO? n            BSR? y

01 wait          0      secs hearing ringback
02 route-to      number ~r3035551222
03
04
05
06
07
08
09
10
11
12
13
14
15
```

# Troubleshooting and things to know

## Overview

This section contains basic information on troubleshooting, as well as important information about administering NCR.

## General troubleshooting

General troubleshooting of NCR can be accomplished by using the following techniques:

- Review the ISDN message trace information provided by the Message Sequence Tool (MST).

- Review vector events displayed by the **display events** MultiVantage system administration command.

- To see the behavior of a particular VDN or vector, use the **list trace vdn** command or **list trace vector** command to check for NCR errors.

- To check for NCR errors using BSR processing, enter the **ch MST** switch administration terminal command to set the BSR and vector fields to y, and use the **enable mst** switch administration terminal command and the **list mist cont** switch administration terminal command to see NCR-related MST trace data.

- If logged in at the switch administration terminal (SAT) through the **init** login, enter the **go tcm** SAT command followed by the **rdd:dp_mgr Bsr_applloc** command to see the total attempts, internal error, network error, successful redirection, and disconnect peg counts associated with BSR call interflows where NCR was invoked. These peg counts are free running and are reset only when the BSR Best Service Routing Application form is accessed using the **ch best** SAT command for a particular BSR application number.

## NCR troubleshooting

If NCR vector activation fails, use the **display events** switch administration terminal command to check for the following NCR vector events:

- NCR: Invoke trunk not ISDN

- NCR: Bad NCR trunk admin

- NCR: No NCT PSTN service

- NCR: No NCT outgoing trk

- NCR: NCT outgo trk drop

- NCR: PSTN NCT invoke err

- NCR: PSTN NCT netwrk err

- NCR: Used NCT trk-to-trk

- NCR: No NCD PSTN service

- NCR: NCD invalid PSTN nmbr

- NCR: NCD call connect err

- NCR: PSTN NCD invoke err

- NCR: PSTN NCD netwrk err

- NCR: PSTN NCD max redirs

- NCR: PSTN NCD no disc

- NCR: Internal system err

## Display events

If NCR vector activation fails, use the **display events** MultiVantage system administration terminal command to check for the following events. Take the suggested course of action based on the vector events displayed using this command.

| Vector event | Suggested action or explanation |
|---|---|
| NCR: Invoke trunk not ISDN | Verify that only ISDN trunks are executing the vector steps where NCR is being invoked. |
| NCR: Bad NCR trunk admin | Verify that all Trunk Form and Signaling Group form fields related to the NCR feature are correct. |
| NCR: No NCT PSTN service | Verify that the PSTN service provider has activated the NCT feature for the ISDN trunk being used for NCT call redirections. |
| NCR: No NCT outgoing trk | Verify that the ISDN trunk group is administered as a two-way trunk group and that the Usage Allocation settings for the trunk have been set up correctly. |
| NCR: NCT outgo trk drop | The second leg of the NCT call has been dropped due to a trunk hardware problem, or that a vector step has been executed that returned an ISDN DISCONNECT message (such as a **busy** vector step). |
| NCR: PSTN NCT invoke err | The PSTN switch has not accepted the NCT invocation attempt. Verify that the PSTN network switch complies with the NCT standards. |

| Vector event | Suggested action or explanation |
|---|---|
| NCR: PSTN NCT netwrk err | The PSTN switch has accepted the NCT invocation attempt, but has rejected it due to some error condition within the network switch. Verify that the Network Call Redir field on page 2 of the Trunk form is administered correctly. Ask the PSTN service provider for troubleshooting assistance. |
| NCR: Used NCT trk-to-trk | NCT has not been successfully invoked, but the incoming call is still active as a MultiVantage trunk-to-trunk connection (this is only an information message). |
| NCR: No NCD PSTN service | Verify that the PSTN service provider has activated the NCD feature for the ISDN trunk being used for NCD call redirections. |
| NCR: NCD invalid PSTN nmbr | The PSTN switch has detected that the number used for the NCR invocation that was administered in the **~r route to number** vector step or in the BSR Application Table's VDN Interflow Number field is an invalid PSTN number (the correct PSTN number used through MultiVantage administration). |
| NCR: NCD call connect err | The vector step has been executed before the vector step invoking NCD that sends an ISDN CONNECT message to the PSTN. |
| NCR: PSTN NCD invoke err | The PSTN has not accepted the NCD invocation attempt. Verify that the PSTN network switch complies with the NCD standards. Ask the PSTN service provider for troubleshooting assistance. |
| NCR: PSTN NCD netwrk err | The PSTN switch has accepted the NCD invocation attempt, but has rejected it due to some error condition within the network switch. Ask the PSTN service provider for troubleshooting assistance. |
| NCR: PSTN NCD max redirs | The PSTN has detected that the call has been redirected by NCD more than the public network maximum number of call deflections limit allows. Modify vector processing to reduce number of NCD attempts. |
| NCR: PSTN NCD no disc | The PSTN switch has not disconnected the ISDN trunk after performing the NCD or NCT call redirection. Ask to the PSTN service provider for troubleshooting assistance. |

| Vector event | Suggested action or explanation |
|---|---|
| NCR: Internal system err | The MultiVantage problem with call processing for the NCR invocation attempt. Alternately, for NCT, the first vector step at the redirected-to MultiVantage endpoint is possibly not programmed with a call treatment type of vector step such as **wait hearing ringback**, **wait hearling music** or **announcement**. Avoid the use of a vector step such as **wait hearing silence** or **wait hearing i-silent** for the first vector step at the redirected-to MultiVantage endpoint. |

## Failures

Failures can occur in NCR after the **queue-to-best** or the **~r route-to number** vector step is executed. Vector programming should be provided to route the call in another manner if the NCR operation fails.

- **Failure to invoke Network Call Transfer:** If Network Call Transfer is invoked and the public network rejects the call, the call will revert to a trunk-to-trunk transfer. In this case, the call is not lost. However, vector processing is stopped at the redirecting MultiVantage switch.

- **Failure to invoke Network Call Deflection:** If NCD is invoked and the public network rejects the call, the call is disconnected form the rerouting MultiVantage. In this case, the call is lost. No vector processing takes place at the redirecting MultiVantage switch.

## NCT and call vectoring

With NCT, the transferring vector may or may not answer the first leg of the call before redirecting the call over the public network. If the call is not answered by vector processing, MultiVantage will automatically answer the call before requesting NCT.

## NCD

With NCD, no steps in the vector can be executed that answer the call or the redirection does not occur. Vector steps that should not be used before NCD is invoked are:

```
announcement

wait hearing music

converse-on split

collect
```

## Announcement vector steps

Announcement vector steps cannot be used with NCD before NCD is to be invoked. Announcement vector steps can be used in following vector steps if NCD fails. Announcement vector steps can be used with NCT.

## ASAI drop event

Successful NCR call redirection causes an ASAI **drop** event to be sent to the CTI application with a CV_REDIR cause value of decimal(30) after the redirection is complete. Only one NCR **drop** event is received for a successful NCR operation when the NCT PSTN feature is used even though two trunks are dropped by the PSTN.

## ASAI Third-Party Merge or Call Transfer

The CTI application requests a Third-Party Merge or Call Transfer ASAI operation to transfer the call to the second switch. This is used only if Network Call Transfer is not available. Once the two calls merge, then ASAI sends a third-party acknowledgement, and when the call is completed, ASAI sends a drop event report, and the third-party call ends.

# Feature interactions

Network Call Redirection interacts with several existing call center features. The features, and the effect NCR has on them, are described in this section.

## Attendant Vectoring

Attendant Vectoring can use the **route-to number** vector step with the **~r** option to route calls to attendants located at another MultiVantage switch node. The operation of the NCR feature using the NCD or NCT networks features to accomplish the call redirection is exactly the same as for redirecting ACD calls.

## Advice of Charge

There are new capabilities for the NCR feature for the Advice of Charge PSTN feature. Use the Advice of Charge feature with the same trunk facilities used for the NCR feature.

## BCMS

There are no changes to BCMS for support of NCR. Redirected calls will be tracked as completed calls because the PSTN disconnects the incoming facility of the original call when the call is redirected to another site.

## Enhanced Information Forwarding

For the NCR feature, Enhanced Information Forwarding will transport UUI for the incoming ISDN call to the PSTN endpoint that receives the redirected call. The use of the Enhanced Information Forwarding capability with NCR (the recommended configuration) requires that the incoming call trunk group be assigned as shared (that is, the UUI IE treatment field is set to **shared**). However, if the trunk group is set up as service provider; only the ASAI user information (or user information provided by the incoming ISDN call) is included in the UUI IE sent on a non-shared basis to the redirected-to PSTN endpoint. NCR supports Information Forwarding for AT&T In-band Transfer and Connect service. For details, see

## Lookahead Interflow

NCR activation using the **route-to number** vector step does not require Lookahead Interflow to be active to provide multi-site capabilities, which are required for considering remote locations and access to the BSR Application Plan form.

## Service Observing by VDN

If the MultiVantage Service Observing by VDN feature is used to service observe a VDN, where the NCR feature is used to redirect incoming ISDN calls, the service-observer will hear the same tones, music, or announcements heard by the incoming caller before the NCR feature reroutes the call to another PSTN endpoint. When the NCR operation is completed, the service-observer will be dropped as an observer of the incoming call and placed in the service-observing queue associated with the VDN.

## Trunk-to-Trunk Transfer

If the NCR feature is optioned and the ASAI Third-Party make Call or transfer operation is used to redirect an incoming ISDN to a PSTN endpoint, the Trunk-to-Trunk Transfer field on the System-Related Customer Options for must be set to **y** for the call redirection to succeed. If the **route-to number** or BSR **queue-to-best** vector step uses the NCR feature to redirect an incoming ISDN call to a PSTN endpoint, the Trunk-to-Trunk Transfer customer option does not have to be set to **y**.

## VDN Return Destination

If the VDN Return Destination feature is administered for the VDN associated with a vector that causes the NCR feature to be invoked, the VDN Return Destination feature is canceled when the call is redirected by NCR.

# NCR support for AT&T In-band Transfer and Connect

NCR supports Information Forwarding for the AT&T Network In-band (IB) Transfer and Connect service. The AT&T network uses the Transfer and Connect service to transfer a call within the network and drop the original trunk to the first destination by using in-band DTMF (touch tone) dialing. The Transfer and Connect Courtesy Transfer IB trigger feature allows the redirecting party to forward user data with the transferred call using out-of-band data forwarding in the ISDN PRI DISCONNECT message via message-associated UUI signaling over the D-channel. The data is forwarded with the network transferred call if the Customer Premises Equipment (CPE) PBX includes a codeset 0 (or 7) UUI IE in an ISDN DISCONNECT message sent by the CPE within three seconds of the DTMF transfer request digits. See AT&T TR 50075 for details. With NCR, the MultiVantage Information Forwarding feature forwards either the ASAI user data (with the Service Provider setting) or the full call center data set (with the Shared setting) when a call is redirected to another location.

## UUI forwarding

When NCR is active, user data can be included in the ISDN DISCONNECT message when a vectoring **disconnect** step is processed. The user data is included in a codeset **0 UUI IE**, which is then forwarded to the transferred-to remote location. The user data can then be handled by the remote MultiVantage in the same manner as an LAI or BSR interflowed call. The inclusion of the UUI IE only occurs when the **disconnect** step does not have an announcement specified. This data forwarding capability can be used with applications that invoke Courtesy Transfer that uses an announcement step in vectors followed by a **disconnect** step. The announcement has the in-band DTMF transfer trigger (*8) and the transfer to direct dial phone number recorded.

## Administration

For transfer and connect data forwarding support, the ISDN NCR customer options must be active. Only some of the trunk administration for NCR should be assigned, as compared with NCT or NCD. Complete the following fields on the MultiVantage forms specified:

| Field | Set to | Reason |
|-------|--------|--------|
| Signaling group | | |
| NCR | Y | Not applicable |
| Trunk group | | |
| NCR | none | Not applicable |

| Field | Set to | Reason |
|---|---|---|
| Supplementary Services Protocol | a | This is the National Public Network - AT&T |
| DS1 country protocol | 1a | Not applicable |
| UUI IE Treatment | service provider | If only the ASAI user data (without the shared OP code-length header) is to be included in the IE |
| UUI IE Treatment | shared | If all of the Information Forwarding user data associated with the incoming call is to be included with shared headers |
| Send UCID | Y (with UCID active for the system) | If UCID data is to be included in the shared UUI IE |
| CBC Usage Allocation | not required | The trunk group does not have to be two-way as a second call is not generated by the MultiVantage with Transfer and Connect (as it is with NCT) |

## Scenario

A typical Transfer and Connect Courtesy Transfer application uses BSR. In this scenario, local Interflow VDN numbers are assigned in the BSR Application form, allowing Transfer and Connect to have the AT&T network redirect the call to the remote location. For each location to which the call is sent, the local VDN is assigned to a vector that contains an **announcement** step with the DTMF Courtesy Transfer sequence recorded (using a telephone) to request transfer to the location. This is immediately followed by a **disconnect** step with the announcement field set to **none**. When a call is to be interflowed to a particular location by the **queue-to** vector step, the Transfer and Connect network transfer is requested for the call by routing the call to the appropriate local VDN. The user data is forwarded with the call to the remote location.