
Samsung DCS Application Note

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Topic ON RAMP ISDN ON DCS & DCS-Compact

Introduction

This Application Note describes the installation, configuration and operation of the BRI cards with Telstra's On Ramp basic rate ISDN service.

DCS BRI ISDN Features

The DCS and Compact support Direct Dial In (DDI), Multiple Subscriber Number (MSN), and Calling Line Identification Presentation (CLIP). The systems are able to display either the CLI number or the CLIP name, using a number-to-name translation table.

The DCS and Compact do not support Calling Line Identification Restriction (CLIR), Malicious Call Trace (MCT) or Sub-Addressing. Customers requiring Calling Line Identification Restriction should arrange for this facility to be provided in the network by Telstra.

The Telstra On Ramp service does not support certain MicroLink supplementary services such as Advice of Charge or Semi-Permanent Connections.

Installing the BRI Card

To install a BRI card in a DCS or DCS Compact system -

1. Turn off the power to the DCS or Compact.
2. Insert the BRI card into a spare slot in the system. Note that the BRI card can only be fitted in the DCS basic KSU. The BRI card will not operate in a DCS expansion cabinet. The BRI card can be fitted to any expansion slot in the Compact **However the first or second expansion slots are the preferred slots.**
3. Connect the DCS BRI card to the SDF using a 10 pair tail cable. The Compact BRI card is connected to the SDF via the standard expansion backplane tail cable. Connect the BRI lines from the SDF to the NT1 as per Austel Customer Premises Cabling Manual.
4. Bus end termination resistors are not fitted to the BRI card on the DCS or Compact. Ensure that a Bus End Termination is fitted to the end of the ISDN line furthest from the NT1. See Tips, page 12.

5. Power on the system and do a 'System Reset' or, for a new DCS/Compact installation, do a 'Clear Memory' using MMC811.
6. If the BRI card is being added to an existing DCS/Compact installation, use MMC724 to allocate line numbers to the BRI card.
7. Set the BRI mode for Normal/MSN/DID as required using MMC 419 (see below).
8. Do a "Card Restart" on the BRI card using MMC418. (The MSN/DID/Normal programming will not take effect until the card is reset).

Cabling - TX & RX Pair Polarity

If the DCS or Compact is operating in point to point mode, the operation of the BRI line is independent of the polarity of the TX and RX pairs ie it does not matter which way round TX+ and TX- are connected.

If the DCS or Compact is sharing the ISDN line (or might share the line in future) with other equipment, it is essential that the TX+ and TX- wires are connected with the correct polarity. Symptoms - if the DCS is sharing the S Bus with another terminal and the TX pair is connected the wrong way round, neither the DCS or other terminal will be able to use the ISDN line. As soon as either the DCS or the other equipment is disconnected, the ISDN line will operate normally.

Details on how to install the cable from the NT1 to the SDF is covered by Austel's (now ACA) cabling regulations. A revised version of Austel Technical Standard 09 was released in 1996 (TS009-1996) included a six page appendix on basic rate cabling. This information should also be included in the new version of the Customer Premises Cabling Manual (CPCM).

Distinguishing Receive & Transmit Pairs

Telstra phantom feed DC power to a basic rate On Ramp line. The voltage is nominally 40V DC but it could fall as low as 24V if it is loaded down by the ISDN terminals connected to it.

The polarity of the DC feed can be used to distinguish between the TX and RX pairs. However, the polarity of the DC feed changes depending on whether the NT1 is receiving power from a plugpack.

If there is a plugpack connected to the NT1 (and the plugpack is on) the NT1 is operating in 'normal power conditions'.

If there is no plugpack connected to the NT1 (or the plugpack is turned off) the NT1 is operating in 'restricted power conditions'

Under Restricted Power conditions, the **DCS Tx Pair is -40V relative to the DCS Rx Pair**

Under Normal Power conditions, the **DCS Tx pair is +40V relative to the DCS Rx pair.**

Normally, an NT1 used with the DCS would operate in restricted power conditions since the DCS does not need any power from the NT1.

Pin-Outs of NT1

The pin-outs of the RJ45 connector on the NT1 on shown below

NT1 RJ45 Pins	Description	DCS Connection
3 & 6	NT1 Rx pair	to DCS Tx Pair
4 & 5	NT1 Tx pair	to DCS Rx Pair

Trunk Numbering

The DCS assigns a line number to each B channel of each ISDN line in the system ie. eight numbers per BRI card. After doing a 'Clear Memory' with MMC811, the DCS will assign numbers to the BRI card in the 700 number range, the same as with analogue trunks. For example, on a DCS with a TRK-A card in slot 1 and a BRI card in slot 2, the BRI card is assigned line numbers 703 to 710. If a 'Clear Memory' is not done after installing the BRI card, the line numbers for the BRI card will have to be assigned using MMC724. The ISDN lines can be assigned to line keys using MMC 722, the same as with analogue lines. From a system users point of view, the ISDN lines appear to operate like a normal PSTN line.

BRI Mode

The BRI card can be configured for three different modes using MMC 419 -

- Normal
- DDI (indial)
- MSN (multiple subscriber number)

In Normal and MSN mode the DCS can be connected to an S Bus with other ISDN devices on the Bus (Point to MultiPoint operation).

In DDI mode, the DCS is the only device on the ISDN line (Point to Point operation).

If the DCS is to be used for Indial, the DCS must be configured for DDI with no other equipment connected to the line.

In Normal mode, incoming calls are routed according to the Trunk Ring assignments (MMC406). Calls on unassigned lines are routed to the operator group.

In DDI mode, incoming calls are routed according to the DID table. Unrecognised numbers are sent to the operator group.

In MSN mode, incoming calls are routed according to the MSN table. Unrecognised numbers are sent to the operator group.

Outgoing calls can be made as usual in all three modes.

Other MMC419 Options.

MMC419 presents extra configuration options as well as the BRI mode described above. The other parameters should be left in their default setting.

BRI Mode

Options Normal or DDI or MSN, as described above

DLSend

Options Overlap or Enblock. Leave this parameter set to its default value of Overlap.

DLReceive

Options Enblock or Overlap. Leave this parameter set to its default value of enblock.

Note: This option is not included in Version 4.X software because if the sending complete is not included in the incoming SETUP message, the DCS will wait for additional digits to come automatically.

BRI-TRK Channel Any

Options Yes or No. This parameter should be set to Yes to tell the DCS to use any idle B channel on a BRI line if the user presses a line key. The DCS treats the two channels on a BRI line as a 'mini-group' of two lines. If both B channels are idle, pressing a line key to seize a line could result in one or other of the lines in that BRI service being used.

Indial, MMC714 & DID Number & Name Translation Table

DESCRIPTION.

This command provides a flexible method of assigning incoming DDI calls to specific destinations. The system examines the Called Party Number of the incoming call and routes the call as configured in the DID table.

The table contains 200 entries and each entry consists of six fields.

- | | | |
|---|---------------|--|
| 0 | DIGITS | This field gives the indial number. On Ramp always presents the DDI number as a local number so enter the full local number for this field eg eight digits in a capital city. The wild card * may be used to replace a digit. |
| 1 | DAY DEST | This field specifies the day destination. The destination may be a station or a station group. (Calls cannot be routed to trunks or trunk groups). The character B can also be entered for Bypass. With Bypass, the system will use the last digits of the incoming Called Party number as the destination extension number (like traditional indial operation on old PABXs). See the note on Bypass operation below. |
| 2 | NIGHT DEST | This field specifies the night destination. The destination may be a station or a station group. The character B can also be entered for Bypass. With Bypass, the system will use the last digits of the Called Party number as the destination extension number. |
| 3 | CALL WAIT | Call Wait can be turned On or Off. If Call Wait is On, a DDI call to a busy destination will hear ring tone and will be camped on to the destination. If Call Wait is Off, a DDI call to a busy destination will be released (with Cause 17/user busy). Call wait would normally be turned on for an operator position so that incoming calls to a busy operator do not get busy tone. Other users may want Call Wait off. |
| 4 | NO OF DEL DGT | This figure sets how many digits will be ignored from the start of the incoming Called Party Number. This parameter is useful in Bypass operation where, for example, the indial information is the last three digits of an eight digit local number. See the note on Bypass operation below.

The NO OF DEL DIGITS can be from 0 up to one less than the number of digits programmed in the digits field ie the system must examine at least one digit. For example, if the DDI digits are programmed as 98243888, the NO OF DEL DIGITS field can be programmed from 0 up to 7. |
| 5 | NAME | This is the name that will be displayed on the destination station when an incoming DDI call arrives. The names can be up to eleven characters long and are written in the same way as the Speed Name. |

BYPASS OPERATION.

In some installations, the customer will have a DID range of 1000 numbers where the last three digits of the number are the same as the destination extension. In this situation, the programming of the DID table can be simplified to a single entry using 'Bypass' operation.

In this situation, enter the first six digits of the customers local number followed by ** into the digits field of the DID table (assuming that local numbers have eight digits). For example 989992** for LSP Coms. Enter 5 for the No Of Del Digits so that the system ignores the first five digits of the called number. Enter B for the day destination. The system will then delete the first five digits of the called number and use the last three digits as the destination extension.

It is possible to program the DID table so that there is a Bypass entry, that covers all Keysets, as well as specific entries for a single Keyset . In this situation, the specific entry will override the Bypass entry. All other calls will be routed using Bypass operation.

(To enter the character B, place the cursor under the 'None' day destination and press the Volume down key. If digits are already entered for the day destination, first place the cursor under the digits and press the Hold button to return it to 'None').

DDI EXAMPLES.

Entry Number	Incoming Digits	Day Transfer	Night Transfer	Call Wait	Number of Deleted Digits	Translated Name
1	12345678	201	529	Off	0	RodWallop
2	989992**	B	529	On	5	LSP Coms
3	96342273	502	501	On	0	Sales
4	96342274	503	501	On	0	Support

Entry 1.

If the system sees an incoming call to number 12345678, it will route the call to station 201 during the daytime and to voice mail group 529 at night. The destination name 'RodWalloper' will be displayed on the station when the call arrives. If station 201 is busy (during the day) when the call arrives, the call will be rejected by the system.

Entry 2.

If the system sees an incoming call to any eight digit number starting with 989992, the system will strip the first five digits off the number and route the call to station 2** given by the last three digits of the incoming number. (Bypass operation). Any station that receives the call will display the name 'LSP Coms'. If the destination station is busy, the call will be camped on. At night, the calls will be routed to voice mail group 529.

Entry 3.

If the system see an incoming call to 96342273, the call will be routed to group 502 by day and the DID name 'Sales' will be displayed on the keyset. If all members of group 502 are busy, the call will be camped on. At night the call will be routed to group 501.

Entry 4.

If the system see an incoming call to 96342274, the call will be routed to group 503 by day and the DID name 'Support' will be displayed on the keyset. If all members of group 503 are busy, the call will be camped on. At night the call will be routed to group 501.

DISPLAY KEYSETS.

An incoming DDI call to a display keyset will show both the called number and the name of the destination programmed into the DDI table using MMC714.

For example, if a call arrives for Rod Walloper, as shown in the DDI table above, the lower line of the LCD will show -
12345678/RodWall

An incoming DDI call to an unrecognised number will be presented to the operator group with an invalid message eg
12345677/INVALID

The keyset will also show the CLI information in the top line of the LCD, as described below.

MSN

DESCRIPTION

MSN or Multiple Subscriber Number operates in a point to multipoint mode which allows up to 8 ISDN terminals to be connected to the BRA. This allows the DCS or DCS Compact to be connected in addition to say an ISDN Terminal adaptor or Router. For Voice applications, MSN operates like a 'poor man's DDI' and offers a similar way of routing incoming calls to a particular station or station group based on the called number.

MSN can have a range from two numbers up to eight numbers per line. Two numbers are supplied as standard but up to eight are available by subscription.

In general, DDI provides a far more flexible configuration than MSN. The differences between MSN and DDI on the DCS are summarised below -

MSN	DDI
Other ISDN devices can be connected to the ISDN line in parallel with the DCS (S interface or Point to Multipoint operation)	The DCS is the only device connected to the ISDN line (Point to point operation or T interface)
Telstra assign 2 directory numbers to each line by default. Up to 8 directory numbers can be assigned to each line by subscription.	Telstra assign 100 DDI addresses by default. The address range can be increased by subscription.
Calls to an MSN number will get Busy if both B channels on that line are busy.	Calls to a DDI number will be presented on any idle B channel in the hunt group
Calls to a Group Directory Number will be presented to the DCS providing there is one free B channel in the group	Calls to a DDI number will be presented on any idle B channel in the hunt group
The DCS MSN table accepts a max of eight entries per BRA line.	The DID table accepts a max of two hundred entries total.
It is not possible to configure separate day and night destinations in MSN mode.	The DID table provides separate day and night destinations in DDI mode.
It is not possible to enter a name for the destination keyset.	Display keysets can be configured to show the name of the indialled extension as well as the number.
The DCS does not offer 'Bypass' operation in MSN mode	The DCS can be configured for 'Bypass' operation.

PROGRAMMING

The MSN table to route incoming calls is configured using MMC421.

Each MSN table applies to only one basic rate line. For example, in a DCS with a TRK-A card in slot 1 and a BRI card in slot 2 set for MSN, there would be separate MSN tables for trunks (703 and 704), (705 and 706), (707 and 708), (709 and 710).

Enter MMC421 and select the line to be configured.

Each MSN table has up to eight entries. Select the first free entry. Enter the 'MSN digits' in the table. The MSN digits are the directory number to be routed. The MSN digits are the local number (ie 8 digits in most of Australia)

Enter the destination station or station group. Calls cannot be routed to trunk lines or trunk groups.

Set Call Wait on or off as required.

If Call Wait is on, incoming calls to a busy station will give Off Hook ring at that station.

If Call Wait is off, incoming calls to a busy station will be rejected by the DCS (Cause 17/User Busy).

Call wait would normally be turned on for an operator position so that incoming calls to a busy operator do not get busy tone. Other users may want Call Wait off.

Leave the Option set as Accept. If it is set to Reject, any incoming calls to that number will be ignored by the DCS.

Incoming CLIP

When an incoming call is presented to a display keyset, the CLI data is displayed in the top row of the LCD.

PROGRAMMING

MMC119 - Set CLIP Display

Sets whether the display Keyset will display either the CLIP name or the CLI number. The Keyset can only display the CLIP name where the CLI number provided by the network corresponds to a record programmed in the CLIP Translation table using MMC728. A keyset configured for CLIP name will show the CLI number if the incoming CLI number is not found in the translation table,

MMC312 Allow CLIP

MMC312 controls, on an extension by extension basis, whether a display Keyset can receive the CLI data with incoming calls (when it is presented by Telstra). If CLIP RCV is set to No in MMC312, the top line of a display Keyset will be blank on incoming calls.

MMC 728 CLIP Translation Table

Allows names to be associated with up to 250 CLIP numbers. The numbers programmed into the translation table should be the full national number eg 0398999277 for LSP.

When CLI is provided, Telstra provide the CLI number in national significant format eg 398999277 for LSP. However, the DCS and Compact automatically add a zero to the front of the CLI number before searching the CLIP name/number table for a match.

Note that Telstra will only present the CLIP information on calls originating in the ISDN ie. calls originating from the PSTN or mobile network will not present CLIP information. CLIP information will not be available on incoming international calls from some countries or calls where the CLIR was invoked by the caller.

Outgoing CLI DATA

MMC312 Allow CLIP

MMC312 can be used to control whether the DCS sends the CLI data on outgoing calls. If CLIP SND is set to yes, the DCS will send the trunk number programmed with MMC405 as the CLI data when making an outgoing call.

Note that MMC312 does not act as a Calling Line Identification Restriction (CLIR) feature. Even if the DCS does not send any CLI digits on an outgoing call, Telstra will still insert the default CLI number for that line before presenting the call to the destination. If the customer does not want their CLI data to be presented to the destination party, they must arrange with Telstra for CLIR to be provided when ordering their service.

MMC 405 Trunk Number

Allows trunk numbers to be entered which will be used as CLI numbers on outgoing calls. The numbers should be entered in National Significant format ie the full national number with the leading zero removed. For example 398999277 for LSP Coms.

If the trunk number programmed using MMC405 is not in the valid address range for that line or not in the correct format, Telstra will replace the CLI number with the default directory number for that line as the call passes through the network. (For MSN lines, a valid number is either one of the MSN numbers for the line or the Group Directory Number. For DDI, a valid number is either the Group Directory Number or a number in the DDI range).

The DCS can only send the number programmed for the trunk as the CLI data. There is no provision for the DCS to send the indial number associated with the extension making the outgoing call.

Answering Incoming Calls

All speech calls for an unrecognised destination number will be presented to the operator group. Ie. Numbers not programmed in the relevant tables.

The DCS will answer any speech or 3.1kHz calls. The DCS will ignore any incoming data calls. The DCS ignores any other optional information in the ISDN call such as Sub-Address, High Layer Compatibility or Low Layer Compatibility Information.

The DCS can only route incoming calls based on the destination number (DDI or MSN operation) or based on the incoming trunk (Normal operation).

An incoming call to a display keyset will show the CLI data in the top row of the LCD, as described above.

After the call is connected, pressing the dial keys on a Keyset will send DTMF tones to line.

Making Outgoing Calls

Each B channel of an ISDN line can be treated the same as a PSTN line. (Refer to the section above on MMC419 programming for the Any Channel Yes/No option).

Each B channel will be assigned a trunk number in the range 701 upwards.

Each B channel can be programmed under a line key. The line can then be seized for an outgoing call by pressing the line key or incoming calls answered by pressing the line key.

ISDN lines can be assigned to trunk groups.

Least Cost Routing operates as usual with ISDN lines and can be used to select between ISDN and PSTN lines for outgoing calls as well as other more complex routing.

When a display keyset first seizes an ISDN line for an outgoing call, the LCD will show "Waiting for SETUP_ACK msg". The message will be shown for either a few hundred milliseconds or a couple of seconds depending on whether the line has been used in the previous 60s.

The network will then return dial tone and the keyset will display 'SETUP_ACK'.

After completion of dialling, the keyset will display 'DIGIT_CO' and may then display 'ALERT_IN' when the destination phone starts ringing.

After the call is connected, pressing the dial keys on a Keyset will send DTMF tones to line eg for use with voice mail systems.

If a user accidentally hangs up an incoming ISDN call, it is not possible to recover the call by pressing the line key (because the ISDN signalling is too quick and the call will already be cleared through the network).

Tips:

DDI and Call Forwarding No Answer

The operation of Call Forward No Answer depends on the setting of Call Wait as shown in the table below. (Call Wait is set in MMC714 for DDI operation or MMC421 for MSN operation).

Call Wait	Keyset State	Result	CLIP
On	Idle	Rings at Keyset for 15s (default) before being forwarded. (The delay is programmable).	Shown on Keyset
On	Busy	Keyset receives off-hook ring signal for 15s before the call is forwarded	Not shown on Keyset <u>but</u> can be viewed if the current call is put on hold
Off	Idle	Keyset rings for 15s before the call is forwarded	Shown on the Keyset
Off	Busy	The DCS rejects the call with cause 'User Busy'. The A party receives busy tone from Telstra.	Not shown.

In the second row, where Call Wait is On and the Keyset is busy, the Keyset user has 15s to put the current call on hold, review the CLIP data and decide whether to return to the original call or answer the incoming call.

Termination Resistors Incorrectly Fitted To BRI Cards

During the early months of 1997, Samsung were incorrectly fitting termination resistors to DCS and Compact BRI cards. The problem has now been rectified : Samsung are now not fitting termination resistors to the BRI cards.

In most instances, having an extra pair of termination resistors in circuit should not affect the operation of the BRA lines.

However, if there are unexplained , intermittent problems with the BRA lines try removing the Krone bus termination plug from the DCS end of the BRA line to see if the problems go away.

Do not remove the termination resistors from the NT1.

Changing EPROMs On The Compact BRI Card

On some Compact BRI cards manufactured in early 97, there was no marking of the EVEN and ODD EPROM sockets on the board.

The ODD EPROM goes in the socket closest to the front edge of the Compact BRI card.

DDI Number & SMDR

The DCS and Compact do not send the DDI number to the SMDR output.

Trouble Shooting

Basic Rate Access Not Functioning Correctly

- Review software versions using MMC 727 to ensure compatibility
 - Version 2.1 or lower ROM - 1.4 BRI software
 - Version 4.2 ROM - 2.0 or higher BRI software
- Ensure BRI ports are contained in the numbering plan - MMC 724 (TRKXXX)
- Reset BRI card using MMC 418