

1. Scope

This document is intended to detail a typical installation and configuration of a PBX IP-Media Gateway when used to interface between a PBX and a unified messaging type application.

2. Configuration Details

Listed below are the specific details of the PBX and gateways used in the testing to construct the following documentation.

2.1 PBX

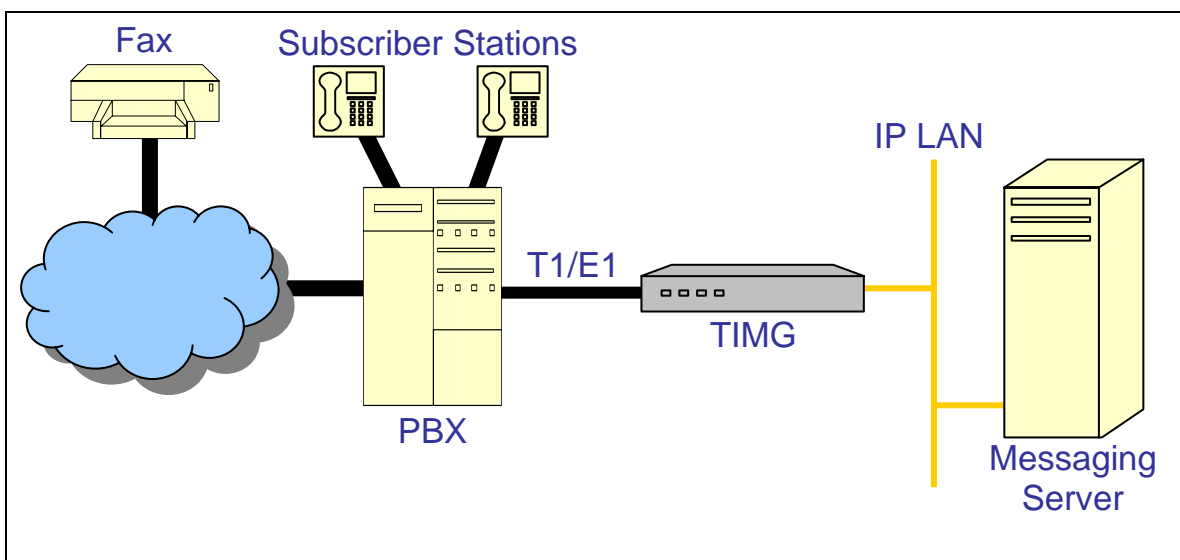
PBX Vendor	Nortel
Model(s)	Option 11c
Software Version(s)	Release 25
Additional Notes	See PBX Prerequisites (Section 3.1)

2.2 Gateway

Gateway Model	TIMG300DTI
Software Version(s)	5.1.70
Protocol	E1 QSIG

2.3 System Diagram

The diagram below details the setup used in the testing and creation of the technical document.



3. Prerequisites

3.1 PBX Prerequisites

PBX must have all supplemental service packages installed for the QSIG protocol to operate properly and provide all advanced supplemental services.

Listed below is a table of required software packages:

Package Name	Package Number
End to End Signaling package (EES)	10
Integrated Message System package (IMS)	35
Message Waiting Center package (MWC)	46
ISDN Signaling package (ISDN)	145
Advanced ISDN Network Services (NTWK)	148
1.5 Mb Primary Rate Access package (PRA)	146 or
2.0 Mb Primary Rate Interface package (PRI2)	154
International Primary Rate Interface package (IPRA)	202
Message Waiting Indication (MWI)	219
Multi Purpose Serial Data Link package (MSDL)	222
QM reference signaling point Interface package (QSIG)	263
QSIG Generic Functional protocol package (QSIGGF)	305
QSIG Supplementary Services package (QSIG-SS)	316
MCDN End to End Transparency package (MEET)	348

3.1.1 PBX Equipment Required

To connect to the PBX using E1 QSIG you must use a NTAK09 (ISDN DTI/PRI 2.0) line card with a NTBK51 (DCHI daughter card).

3.1.2 PBX Cabling Requirements

Cabling for QSIG connections must be CAT5e or better. Standard voice quality cable will not provide optimum signal quality and the gateway will have problems establishing connection on the D-Channel.

3.2 Gateway Prerequisites

The gateway needs to support E1 QSIG interface.

4. Summary of Limitations

No limitations noted as of the last update to this document.

5. Gateway Setup Notes

During the initial setup of the Dialogic gateway using the serial port you must:

- Assign the gateway a Unique IP address, subnet mask and network gateway address (if the latter is required).
- Configure the gateway to use the SIP VoIP protocol.
- Set the Line Mode to E1.
- Set the Protocol to ISDN - QSIG.

During the solution specific setup of the Dialogic gateway using the web interface you must:

- Configure the gateway with at least a single IP endpoint pointing to your voice server.
- Set the Voice coder to be either G7.11 (default) or G.273 if required.
- Set the Line Encoding and Line Framing as required by your E1 Interface. Typical settings are Encoding = HDB3 and Framing = CRC_MF.

6. PBX Setup Notes

The basic steps of setting up the PBX for use with this gateway and a voice processing system are as follows:

- Adding the E1 Board and D-channel.
- Defining the PRI customer
- Configuring the route data block.
- Adding the trunk members to the D-channel.
- Initiating system timers and clock controller.
- Configuring the electronic service network.
- Defining a route list and coordinated dialing plan.
- Enabling the hardware and D-channel.
- Setting up the subscribers stations.

All PBX programming is done via a serial terminal connected to the PBXs administration port.

The basic commands that you will encounter on the PBX to perform these actions are:

Add E1 Board and D-Channel	LD17
Define PRI Customer	LD15
Configure Route Data Block	LD16
Add Trunk Members	LD14
Initiate System Timers and Clock Controller	LD73
Configure Electronic Service Network	LD86
Define Route List	LD86
Define Coordinated Dialing Plan	LD87
Enable MSDL card and D-Channel	LD96
Setup Subscriber Station Sets	LD11 & LD10

6.1 Adding E1 Board

Add E1 board using overlay LD17. Several of the fields require site specific entries, these are:

- PRI2 requires a slot number where the E1 board will be installed.

The fields of this overlay that must be modified in this step are:

REQ, TYPE, PRI2.

The programming example below shows how to add the E1 board using LD17. For all other fields not noted in the example press RETURN to use default values.

```
> LD 17
REQ  CHG
TYPE CEQU
TDS
CONF
DLOP
PRI2 8
DTI2
```

- At the prompt REQ enter CHG press RETURN
- At the prompt TYPE enter CEQU press RETURN
- At the prompt PRI2 enter XX
 - where XX is the slot location of the E1 board and press RETURN

6.2 Adding the D-channel

Add the D-channel (ADAN) using overlay LD17. Several of the fields require site specific entries, these are:

- ADAN requires a d-channel number that is independent of other d-channel numbers on the switch.
- CDNO and DCHL require an independent trunk access code number.
- RCAP requires all supplementary services you would like to add

The fields of this overlay that must be modified in this step are:

REQ, TYPE, ADAN, CTYP, CDNO, DES, USR, IFC, PINX_CUST, CLID, DCHL, SIDE, RCAP, PR_TRIGS

The programming example below shows how to configure a D-Channel using LD17. For all other fields not noted in the example press RETURN to use default values.

```
> LD 17
REQ  CHG
TYPE CFN
ADAN NEW DCH 8
  CTYP MSDL
  CDNO 8
  PORT 1
  DES  E1_QSIG
  USR  PRI
  IFC  ISGF
    PINX_CUST 0
    ISDN_MCNT
  CLID OPT0
  DCHL 8
  PRI2
  OTBF
  SIDE NET
  CNEG
  RLS
  QCHID
  RCAP CCBI CCNI PRI DV3I CTI QMWI
  RCAP
  PR_TRIGS DIV 2 1
  PR_TRIGS CNG 2 1
  PR_TRIGS CON 2 1
```

```
PR_TRIGS CTR1 2 1
PR_TRIGS
PR_RTN
OVLR
OVLS
MBGA
TIMR
LAPD
```

- At the prompt `REQ` enter `CHG` press `RETURN`
- At the prompt `TYPE` enter `CFN` press `RETURN`
- At the prompt `ADAN` enter `NEW DCH XX`
 - Where `XX` is an available d-channel number and press `RETURN`
- At the prompt `CTYP` enter `MSDL` press `RETURN`
- At the prompt `CDNO` enter `XX`
 - Where `XX` is the slot location of the E1 board and press `RETURN`
- At the prompt `DES` enter `XX`
 - Where `XX` is any name designation for the E1 and press `RETURN`
- At the prompt `USR` enter `PRI` press `RETURN`
- At the prompt `IFC` enter `ISGF` press `RETURN`
- At the prompt `PINX_CUST` enter `0` press `RETURN`
- At the prompt `CLID` enter `OPT0` press `RETURN`
- At the prompt `DCHL` enter `XX`
 - Where `XX` is the slot location of the E1 board and press `RETURN`
- At the prompt `SIDE` enter `NET` to set the PBX to the network side of the connection and press `RETURN`
- At the prompt `RCAP` enter `XX`
 - Where `XX` are all remote capabilities and press `RETURN`
- At the prompt `PR_TRIGS` enter `XX Y Z`
 - Where `XX` is the path replacement trigger, `Y` is the number of path replacement attempts, and `Z` is the delay between attempts and press `RETURN`

6.3 Defining PRI Customer

Define PRI Customer using overlay `LD15`. Several of the fields require site specific entries, these are:

- `CUST` requires a customer number you would like to use for your setup.
- `PNI` requires a private network identifier.

The fields of this overlay that must be modified in this step are:

`REQ`, `TYPE`, `CUST`, `AC2`, `ISDN`, `PNI`.

The programming example below shows how to define a PRI customer using LD15. For all other fields not noted in the example press RETURN to use default values.

```
> LD 15
REQ CHG
TYPE NET_DATA
CUST 0
OPT
AC2 NPA LOC
FNP
CLID
ISDN yes
  VPNI
  PNI
  PINX_DN
  MBG
  BSGC
  PFX1
  PFX2
  HLOC
  LSC
  RCNT
  PSTN
  TNDM
  PCMC
  SATD
  OCLI
DITI
TRNX
EXTT
FTOP
VNR
NIT
NAS ATCL
NAS ACTV
FOPT
CNTC
NATC
INTC
```

- At the prompt REQ enter CHG press RETURN .
- At the prompt TYPE enter NET_DATA press RETURN
- At the prompt CUST enter XX
 - Where XX is the customer number used for E1 board and press RETURN
- At the prompt AC2 enter NPA LOC press RETURN
- At the prompt ISDN enter YES press RETURN
- At the prompt PNI enter XX
 - Where XX is a customer private network identifier and press RETURN

6.4 Configuring the Route Data Block

Configure the trunk Route Data Block (RDB) using overlay LD16. In this overlay several of the fields require site specific entries, these are:

- ROUT requires a route number that is independent of other route numbers on the switch.
- ACOD requires an independent trunk access code number.

The fields of this overlay that must be modified in this step are:

REQ, TYPE, CUST, ROUT, DES, TKTP, DTRK, DGTP, ISDN, MODE, IFC, CTYP, INAC, ICOG, ACOD, TARG.

The programming example below shows how to configure the RDB using LD16. For all other fields not noted in the example press RETURN to use default values.

```
> LD 16
REQ NEW
TYPE RDB
CUST 0
DMOD
ROUT 8
DES E1_QSIG
TKTP TIE
ESN
CNVT
SAT
RCLS
VTRK
DTRK YES
BRIP
DGTP PRI2
ISDN YES
MODE PRA
IFC ISGF
PNI
CTYP UKWN CDP
INAC YES
CPFXS
DAPC
INTC
DSEL
PTYP
AUTO
DNIS
DCDR
IANI
ICOG IAO
SRCH
TRMB
STEP
ACOD 3410
CLEN
TCPP
TARG 0
BILN
SGRP
OABS
INST
ANTK
SIGO
CNTL
DRNG
CDR
VRAT
MUS
FRL
OHQ
```

OHQT
CBQ
AUTH
TTBL
ATAN
PLEV
ALRM

- At the prompt REQ enter NEW press RETURN
- At the prompt TYPE enter RDB press RETURN
- At the prompt CUST enter XX
 - Where XX is the defined customer number and press RETURN
- At the prompt ROUT enter XX
 - Where XX is an available route number and press RETURN
- At the prompt DES enter XX
 - Where XX is any name designation for the trunk route and press RETURN
- At the prompt TKTP enter TIE press RETURN
- At the prompt DTRK enter YES press RETURN
- At the prompt DGTP enter PRI2 press RETURN
- At the prompt ISDN enter YES press RETURN
- At the prompt MODE enter PRA press RETURN
- At the prompt IFC type ISGF press RETURN
- At the prompt CTYP enter UKWN CDP press RETURN
- At the prompt INAC enter YES press RETURN
- At the prompt ICOG enter IAO press RETURN
- At the prompt ACOD enter XXXX
 - Where XXXX is an available trunk access code number the same length as the phone extension numbers and press RETURN
- At the prompt TARG enter 0 press RETURN

6.5 Adding Trunk Members to the D-Channel

Now that the trunk and D-Channel are created you must assign each member of the trunk to this route group using overlay LD14.

The fields of this overlay that must be modified in this step are:

REQ, TYPE, TN, PCML, CUST, RTMB, TGAR, CLS.

The programming example below shows how to add trunk members to the D-Channel using LD14. For all other fields not noted in the example press RETURN to use default values.

```
> LD 14
REQ NEW 30
TYPE TIE
TN 8 1
DES E1_QSIG
PDCA
PCML MU
CUST 0
NCOS
RTMB 8 1

B-CHANNEL SIGNALING
INC
MNDN
TGAR 0
AST
CLS UNR DTN
TKID
```

- At the REQ prompt enter NEW XX
 - Where XX is the number of members you would like to add to the D-Channel and press RETURN
- At the prompt TYPE enter TIE press RETURN
- At the prompt TN enter XX XX
 - Where XX XX is the slot and port number of each channel of the T1 hardware and press RETURN
- At the prompt DES enter XX
 - where XX is any name designation for the trunk members and press RETURN
- At the prompt PCML enter MU press RETURN
- At the prompt CUST enter XX
 - Where XX is the defined customer number and press RETURN
- At the prompt RTMB enter XX XX
 - Where XX XX is the rout number and member defined previously in LD16 and press RETURN
- At the prompt TGAR enter 0 press RETURN
- At the prompt CLS enter UNR DTN press RETURN

6.6 Initiating System Timers and Clock Controller

Initiate the System Timers and Clock Controller using overlay LD73. One of the fields requires a site specific entry, it is:

- CC0 requires a slot number where the E1 board is installed.

The fields of this overlay that must be modified in this step are:

REQ, TYPE, FEAT, CC0.

The programming example below shows how to initiate the system timers and the clock controller using LD73. For all other fields not noted in the example press RETURN to use default values.

```
> LD 73
REQ chg
TYPE pri2
FEAT syti
CC0 8
PREF CC0
SREF CC0
CCGD
CCAR
```

- At the prompt REQ enter NEW press RETURN
 - Note: If the timers were already initiated, enter CHG and press RETURN
- At the prompt TYPE enter PRI2 press RETURN
- At the prompt FEAT enter SYTI press RETURN
- At the prompt CC0 enter XX
 - Where XX is the slot location of E1 board and press RETURN

6.7 Configuring Electronic Services Network

Configure the trunk Electronic Services Network (ESN) using overlay LD86.

The fields of this overlay that must be modified in this step are:

REQ, CUST, FEAT, NCDP, AC2, RTCL, TGAR.

The programming example below shows how to configure an ESN using LD86. For all other fields not noted in the example press RETURN to use default values.

```
> LD 86
REQ NEW
CUST 0
FEAT ESN
MXLC
MXSD
MXIX
MXDM
MXRL
MXFC
MXFS
CDP
  MXSC
  NCDP 4
AC1
AC2 9
DLTN
ERWT
ERDT
TODS
RTCL YES
NMAP
ETOD
TGAR YES
```

- At the prompt `REQ` enter `NEW` press `RETURN`
- At the prompt `CUST` enter `XX`
 - Where `XX` is the defined customer number and press `RETURN`
- At the prompt `FEAT` enter `ESN` press `RETURN`
- At the prompt `NCDP` enter `XX`
 - Where `XX` is the number of digits in `CDP DN` and press `RETURN`
- At the prompt `AC2` enter `XX`
 - Where `XX` is an available `NARS` access code and press `RETURN`
- At the prompt `RTCL` enter `YES` press `RETURN`
- At the prompt `TGAR` enter `YES` press `RETURN`

6.8 Defining a Route List

Define a route list using overlay `LD86`.

The fields of this overlay that must be modified in this step are:

`REQ`, `CUST`, `FEAT`, `RLI`, `ENTR`, `ROUT`.

The programming example below shows how to define a route list using `LD86`. For all other fields not noted in the example press `RETURN` to use default values.

```
> LD 86
REQ NEW
CUST 0
FEAT RLB
RLI 9
ENTR 0
LTER
ROUT 8
TOD
CNV
EXP
FRL
DMI
FCI
FSNI
SBOC
IDBB
IOHQ
OHQ
CBQ
ENTR
ISET
NALT
MFRL
OVLL
```

- At the prompt `REQ` enter `NEW` press `RETURN`
- At the prompt `CUST` enter `XX`
 - Where `XX` is the defined customer number and press `RETURN`
- At the prompt `FEAT` enter `RLB` press `RETURN`
- At the prompt `RLI` enter `X`
 - Where `X` is the next available route list index number and press `RETURN`
- At the prompt `ENTR` enter `X`
 - Where `X` is the entry number for the `NARS/BARS` route list and press `RETURN`
- At the prompt `ROUT` enter `X`
 - Where `X` is the route number defined in the previous steps and press `RETURN`

6.9 Defining the Coordinated Dialing Plan

Define your Coordinated Dialing Plan (CDP) using overlay LD87. This is the method used to be able to access the trunk as a forwarding point for station sets using an extension number.

The fields of this overlay that must be modified in this step are:

REQ, CUST, FEAT, TYPE, DSC, FLEN, DSP, RLI.

The programming example below shows how to define a CDP using LD87. For all other fields not noted in the example press RETURN to use default values.

```
> LD 87
REQ NEW
CUST 0
FEAT CDP
TYPE DSC
DSC 3411
FLEN 0
DSP LSC
RLI 8
NPA
NXX
```

- At the prompt REQ enter NEW press RETURN
- At the prompt CUST enter XX
 - Where XX is the defined customer number and press RETURN
- At the prompt FEAT enter CDP press RETURN
- At the prompt TYPE enter DSC press RETURN
- At the prompt DSC enter XXXX
 - Where XXXX is the extension you want to use to access the trunk route list and press RETURN
- At the prompt FLEN enter X
 - Where X is the length of the extensions in this CDP and press RETURN
- At the prompt DSP enter LSC press RETURN
- At the prompt RLI enter X
 - Where X is the rout list index created in LD86 and press RETURN

6.10 Enabling the MSDL Board and D-Channel

To use the newly added board and D-Channel you need to enable both of them using overlay LD96.

- Enter the command enl msdl XX
 - Where XX is the D-Channel number defined in LD17 and press RETURN
- Enter the command enl dch XX
 - Where XX is the D-Channel; number assigned in LD17 and press RETURN

6.11 Setting Up Subscriber Station Sets

This is an example of how to set up a subscriber that uses a digital station set to forward correctly to the server. Use the `LD11` command to change the stations parameters as shown below.

```
> LD 11
REQ   CHG
TYPE  2008
TN    0 1 8 3
ECHG
DES
FDN   5000
TGAR
HUNT  5000
NCOS
RNPG
SSU
CLS   UNR FBA FNA HTA ADD HFD MWA CFTA CFXA CFHA CNDA
EFD   5000
EHT   5000
.
.
.
```

Important notes about the above programming:

1. The `FDN` field is where you specify the destination for this station set to forward to under ring no answer conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
2. The `CLS` field is required to have `UNR`, `FBA`, `FNA`, `HTA`, `ADD`, `HFD`, `MWA`, `CFTA`, `CFXA`, `CFHA`, `CNDA` configured. If these are not configured properly the remainder of the programming is not going to provide you with the proper prompts to continue.
3. The `EFD` field (only seen if the `CLS` has been set up properly) is where you specify the destination for external calls to the station to forward under ring no answer conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
4. The `HUNT` field is where you specify the destination for internal calls to the station to forward under busy conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
5. The `EHT` field (only seen if the `CLS` has been set up properly) is where you specify the destination for external calls to the station to forward under busy conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
6. The `MWA` setting in the `CLS` field allows this station to make use of its MWI light. If this is not configured the stations MWI lamp will not work.

This is an example of how to set up a subscriber that uses an analog station set to forward correctly to the server. Use the LD10 command to change the stations parameters as shown below.

```
> LD 10
REQ   CHG
TYPE  500
TN    0 0 7 1
CDEN
DES
FDN   5000
CUST
DIG
DN
HUNT  5000
TGAR
NCOS
RNPG
CLS   UNR FBA FNA HTA ADD HFD MWA CFTA CFXA CFHA CNDA
FTR
EFD   5000
EHT   5000
.
.
.
```

Important notes about the above programming:

1. The `FDN` field is where you specify the destination for this station set to forward to under ring no answer conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
2. The `CLS` field is required to have `UNR`, `FBA`, `FNA`, `HTA`, `ADD`, `HFD`, `MWA`, `CFTA`, `CFXA`, `CFHA`, and `CNDA` configured. If these are not configured properly the remainder of the programming is not going to provide you with the proper prompts to continue.
3. The `EFD` field (only seen if the `CLS` has been set up properly) is where you specify the destination for external calls to the station to forward under ring no answer conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
4. The `HUNT` field is where you specify the destination for internal calls to the station to forward under busy conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
5. The `EHT` field (only seen if the `CLS` has been set up properly) is where you specify the destination for external calls to the station to forward under busy conditions. It should be configured to send the calls to the CDP defined to access the trunk route list.
6. The `MWA` setting in the `CLS` field allows this station to make use of the MWI feature.
7. The `LPA` setting in the `CLS` field controls the phones MWI notification method. On analog stations with a neon MWI lamp this setting must be included to use it. Without this setting the analog station will only have stutter dial tone as its notification method.

7. Testing Validation Matrix

The table below shows various test scenarios that are run as typical validation scenarios when the gateway is used in a voice messaging situation. The notes column specifies any notable parts of the test.

The test scenarios below assume that all gateway configuration parameters are at their default values. For a complete sample showing call flows and states please consult the Gateway SIP Compatibility Guide.

Test Number	Call Scenario Description	Notes
Inbound call scenarios		
1	Direct call to hunt group.	The calling party number is expected to be contained in the From header of the Invite.
2	Internal ring-no-answer forward.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as no-answer.
3	External ring-no-answer forward.	The called party will be shown in the Diversion header of the invite. The calling party (if available) will be contained in the From header. The reason of the diversion is shown as no-answer.
4	Internal busy forward from a subscribers station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as busy.
5	External busy forward from a subscribers station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as busy.
6	Internal all call forward from a subscribers station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as fwd-all.
7	External all call forward from a subscribers station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as fwd-all.
Transfer Scenarios		
8	Blind transfer to a station from messaging server where the destination answers the call.	The transfer is completed once the destination is judged as connected. Depending upon the speed that the destination is answered the caller and called parties may be connected together with a slight bit of the called parties voice clipped. The calling party is not available. The transfer was by join, not a path replacement.

9	Blind transfer to a station from messaging server where the destination does not answer the call.	If the station is configured to forward back to the gateway then the call will arrive looking as a forwarded call with the called party being the transfer destination but the calling party may be the gateway port performing the transfer, depending on how quickly the transfer to the destination can be completed. The calling party is not available. The transfer was by join, not a path replacement.
10	Blind transfer to a subscribers station from messaging server where the destination is busy.	The transfer should fail.
11	Blind transfer to an invalid number.	The transfer should fail.
12	Supervised transfer to a subscribers station from messaging server where the user does not answer the call.	The transfer completion speed and timing is up to the application. The application should decide to either complete the transfer and let the stations forwarding carry it back to the gateway or abort it before the forwarding happens. The calling party is not available. The transfer was by join, not a path replacement.
13	Supervised transfer to a subscribers station from messaging server where the user answers the call.	The transfer completion speed and timing is up to the application. The calling party is not available. The transfer was by join, not a path replacement.
13	Supervised transfer to a subscribers station from messaging server where the destination is busy.	The transfer completion speed and timing is up to the application. The application should decide to either complete the transfer and let the stations forwarding carry it back to the gateway or abort it before the forwarding happens. The calling party is not available. The transfer was by join, not a path replacement.
14	Supervised transfer to an Invalid number.	The transfer completion speed and timing is up to the application.
Outbound Call Scenarios		
15	Outbound call to subscriber station that answers.	The call is flagged to the application as completed when the gateway can determine that the call has been connected through. The application should take this into account when making decision when to start the audio stream.

16	Outbound call to subscriber station that does not answer.	The application needs to take into account if the destination has been set to forward back to the gateway for a ring no answer condition and judge accordingly when to either stop waiting for an answer and cancel the call or know that it will end up arriving back to the gateway as a forwarded call.
17	Outbound call to subscriber station that is busy.	The application needs to take into account if the destination has been set to forward back to the gateway for a ring no answer condition and judge accordingly when to either cancel the call or know that it will end up arriving back to the gateway as a forwarded call.
18	Outbound call to an external number.	Depending on the state of the destination the call will either be judged as connected or fail do to busy or error tone conditions.
MWI Scenarios		
19	Turn a subscribers light on that is currently off.	This should return success.
20	Turn a subscribers light on that is currently on.	This should return success.
21	Turn a subscribers light off that is currently on.	This should return success.
22	Turn a subscribers light off that is currently off.	This should return success.

8. Troubleshooting

8.1 Important Debugging Tools

- Ethereal/Wireshark – Used to view and analyze the network captures provided by the Dialogic gateway diagnostic firmware.
- Adobe Audition -- Used to review and analyze the audio extracted from the network captures to troubleshoot any audio related issues.

8.2 Important Gateway Trace Masks

These keys are helpful during all troubleshooting scenarios and should be considered keys to activate by default fro all troubleshooting cases.

- `voip prot` and `voip code` – this allows the collection of all SIP related messages as they are sent from and received by the gateway. This data is important in cases where you feel that the gateway is not able to communicate properly with the messaging server.
- `tel event` and `tel code` – This allows the collection of all circuit side activity of the emulated station set such as display updates, key presses, light transitions and hook state changes. This data is very important in the following scenarios:
 - Call control problems (dropped calls, failing transfers, etc...)
 - Integration problems (incorrect mailbox placement, missed auto-attendant greetings etc...)
- `teldrv prot` – This allows the collection of all ISDN messages both transmitted and received on the gateways front end interface. This data is very important in the following scenarios:
 - Call control problems (dropped calls, failing transfers, etc...)
 - Integration problems (incorrect mailbox placement, missed auto-attendant greetings etc...)

These keys are helpful during specific issues and can be enabled for targeted troubleshooting of very specific cases. Activation of these keys may generate large amounts of data on busy systems and increase the size of the collected log files, but will not harm system performance.

- `dspif` (all keys) – This allows the collection of tone related data. This data is very helpful in cases where you think you have problems detection specific tones that should be, should not be, or are expected to be present at specific times during the call. If you do not suspect a tone related issues this key may be left disabled.

NOTE: Turning on all traces is not recommended. Doing this floods the debug stream with significant amounts of information that can cause delays in determining the root cause of a problem.

9. Appendix

9.1 Abbreviations

LBRC	Low Bit Rate Coder
MWI	Message Waiting Indication
PBX	Private Branch Exchange

For more details, go to www.dialogic.com.

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