Dialogic® Media Gateway Installation and Configuration Integration Note

1. Scope

This document is intended to detail a typical installation and configuration of Dialogic® 2000 Media Gateway Series (DMG2000) when used to interface between PBX and Microsoft® Office Communications Server 2007 (OCS) application.

2. Configuration Details

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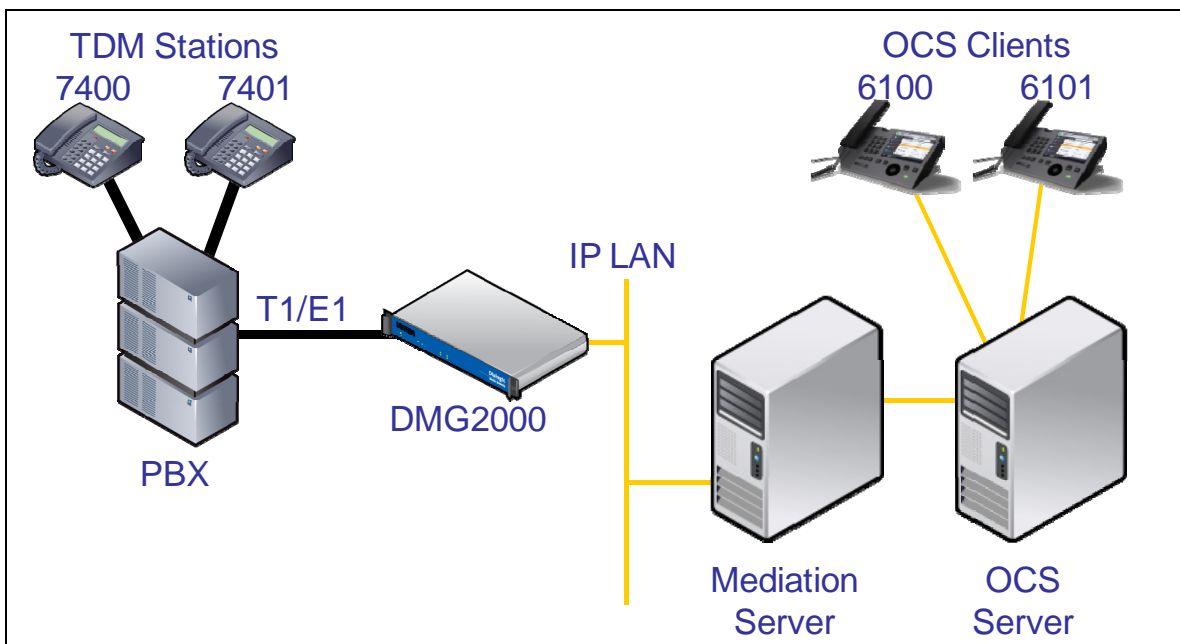
2.1 PBX

PBX Vendor	Nortel
Model	Succession
Software Version	VERSION 2121, RELEASE 4, ISSUE 00 T
Additional Notes	N/A

2.2 Gateway

Gateway Model	Dialogic® 2000 Media Gateway Series (DMG2000)
Software Version	6.0 (6.0.103)
Protocol	T1 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 support the T1 QSIG configuration as documented you need the DTI/PRI – NTAK09BA interface 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 a T1 QSIG interface.

4.   Summary of Limitations

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

5.   Gateway Setup Notes

Steps for setting up the gateway:

- Parameter Configuration
- Routing Engine Configuration

5.1   Parameter Configuration

To get the gateway connected between the PBX and mediation server there are only a few configuration options that are required.

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

- Assign LAN 1 on 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 T1.
- Set the Protocol to ISDN - QSIG.

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

- In the IP Settings page:
  - o Set the `BOOTP Enabled` parameter to 'No'. (the default is Yes)

IP Settings, LAN1	
MAC	00-0e-0c-ab-d2-3e
* Client IP Address	192.168.1.2
* Client Subnet Mask	255.255.255.0
* Default Network Gateway Address	192.168.1.250
* BOOTP Enabled	No
* SNTP Server IP Address	

- In the T1 General page:
  - o Set the Line Encoding and Line Framing as required by your T1 Interface. Typical settings are Encoding = B8ZS and Framing = ESF.

T1/E1 Port Selection

Select Port to Modify [all ports ∨]

T1/E1 Configuration

Line Settings	
* Line Mode	T1 ∨
* Signaling Mode	ISDN ∨
* Telephony Port Interface Side	Terminal ∨
T1 Line	
* Line Encoding	B8ZS ∨
* Framing	ESF ∨
* Selects Transmit Pulse Waveform	Short_Haul_110ft ∨
T1 ISDN protocol	
* ISDN Protocol	QSIG ∨
ISDN Protocol Variant	None ∨
General ISDN Settings	
QSIG Protocol Specification	ISO ∨
Network-Specific Facilities (NSF)	None ∨
ISDN Answer Supervision Enable	Yes ∨
Failover Settings	
* Enable Failover	No ∨

- In the VoIP General page:
  - o Set the Transport Type parameter to TCP (the default is UDP)

Voip General Settings

User-Agent	
* Host and Domain Name	pbxgw.default.com
Transport Type	TCP ∨
Call as Domain Name?	No ∨
SIPS URI Scheme Enabled	No ∨
Invite Expiration (sec)	120
Server	

- In the VoIP Media page:
  - o Set the `RTP Fax/Modem Tone Relay Mode` parameter to '`In band-Tone`' (the default is RFC2833)
  - o Set the `Signaling Digit Relay Mode` parameter to '`Off`' (the default is On)
  - o Set the `Voice Activity Detection` parameter to '`Off`' (the default is On)

5.2   Routing Engine Configuration

NOTE: For all the examples in this document going forward the term 'inbound call' refers to a call in the TDM to IP direction and the term 'outbound call' refers to a call in the IP to TDM direction.

In the example given in the system diagram at the start of this integration guide we see that we have the following dialing plans in the system:

- All TDM side stations have DID numbers assigned in the 7xxx extension range.
- All OCS side stations have DID numbers assigned in the 6xxx extension range.

We also know that we need to send all inbound calls through to the Mediation Server at a specific IP address.

5.2.1 VoIP Host Group configuration

The first item we should take care of is to set up our IP endpoint to use as our IP destination for all our inbound calls. This is done in the routing table under the section VoIP Host Groups. We define a single host group (using the default group is fine) that includes the IP address of the gateway listening side of the Mediation Server; in our example case we are using the IP address 192.168.1.21 for this.

5.2.2 TDM and VoIP Routing Rule Configuration

The second item we need to configure are the routing rules that will associate inbound or outbound calls with the proper digit manipulation rules for the type of call they need to service. This will require that the gateway perform some digit manipulation on calls that go from the TDM side to the IP side as well as in the reverse direction, IP to TDM.

The major idea here to remember is that OCS expects to get, and will send out, all addresses in E.164 format. This means that the gateway needs to recognize the need to convert up and down as needed to and from this format as calls pass through. To do this you make use of the Routing engines CPID manipulation rules.

5.2.2.1   Inbound TDM Rules

When a local user on the PBX picks up their phone and calls one of the extensions on the OCS side within the 6xxx range the gateway will receive a call with a calling party of 4 digits. It then needs to convert that number up to full E.164 format and send the call on to OCS.

In our example here we need to take any number that starts in the 6xxx range and then convert it into the full E.164 format by concatenating a prefix of '+1716639' onto the front of the number. Other calls, such as DIDs that arrive over TDM trunks form the PSTN may provide a full 10 digits to the PBX or they may only provide the extension number after the prefix has been stripped off by the PBX. Depending on your site specific requirements you may need to add or build different rules to handle these cases. In our example the inbound rule we use for local PBX users is shown below:

Router Configuration
◉ Inbound TDM Rules ◯ Inbound VoIP Rules ◯ TDM Trunk Groups ◯ VoIP Host Groups

Inbound TDM Rules					
Select	Enable	Rule Label	Request Type	Trunk Group	
	☑	Inbound Local	Any ▾	Any ▾	
	☑	Inbound Default	Any ▾	Any ▾	

[Add Rule]   [Delete Rule]

Detailed Configuration for Inbound TDM Rule: **Inbound Local**

Inbound TDM Request Matching					
CPID Matching					
Calling Number	*	Called Number	*	Redirect Number	*
Calling Name	*	Called Name	*	Redirect Name	*

Outbound Routes					
Device Selection					
Outbound Destination	VoIP ▾	Host Group	HostGroup-1 ▾	Route Method	Bridged ▾
CPID Manipulation					
Calling Number	S	Called Number	"+1716639"+D	Redirect Number	R
Calling Name	S	Called Name	D	Redirect Name	R
Select Primary / Alternate Route					
◉ Primary ◯ Alt-1 ◯ Alt-2 ◯ Alt-3 ◯ Alt-4				[Add Alternate Route]	
[Delete] [Delete] [Delete] [Delete]					

You can see how our rule here is out into place. The matching rule is simply a * meaning that any dialed number form a local user presented to this trunk will be seen by this rule. The CPID manipulation rule then uses the digits that are being seen (in this example case it will be a 4 digit number starting with 6 as the trunk is programmed for) and then adds the prefix of "+1716639" onto it to build the full E.164 number as we need for OCS. This rule also set s the destination to the VoIP Host group we have defined previously that points to the inbound IPO address of the Mediation Server.

In addition to this rule you see that we have left a default rule in place that acts as a catch all. This rule does not manipulation at all and just tries to send the call to the VoIP host group as dialed.

5.2.2.2   Inbound VoIP Rules

When an OCS user dials a number OCS will, through the use of normalization rules in the Location profile, provide the gateway with a number in full E.164 format so the gateway needs to be able to recognize various number patterns in inbound IP calls and properly manipulate them for the outbound TDM call that results.

In our example here, OCS has been setup (as you will see latter) with a route that directs all calls that meet the pattern 4xxx to the gateway in full E.164 format. The gateway then needs to know how to identify these numbers as extensions that are local on the PBX and manipulate them accordingly. To do this is needs to simply extract the right 4 digits form the called number provided to remove the prefix of "+1716639" and leave the last 4 digits remaining. Local numbers (off the PBX), as well as national and international numbers, are going to need to be manipulated also since they are going to at very least need a trunk access number, like a 9, appended onto the front of them for processing. These can also be done using manipulation rules as follows:

Router Configuration

○ Inbound TDM Rules ⦿ Inbound VoIP Rules ○ TDM Trunk Groups ○ VoIP Host Groups

Inbound VoIP Rules

Select	Enable	Rule Label	Request Type	Originating VoIP Host Address	
	☑	Outbound Internal	Any	*	
	☑	Outbound Local	Any	*	
	☑	Outbound National	Any	*	
	☑	Outbound International	Any	*	
	☑	Default	Any	*	

[Add Rule] [Delete Rule]

Detailed Configuration for Inbound VoIP Rule: **Outbound Internal**

Inbound VoIP Request Matching
CPID Matching

Calling Number	*	Called Number	x17166397xxx	Redirect Number	*
Calling Name	*	Called Name	*	Redirect Name	*

Outbound Routes
Device Selection

Outbound Destination	TDM	Trunk Group	Any	Route Method	Bridged

CPID Manipulation

Calling Number	S	Called Number	rext(D,4)	Redirect Number	R
Calling Name	S	Called Name	D	Redirect Name	R

Select Primary / Alternate Route

⦿ Primary   ○ Alt-1   ○ Alt-2   ○ Alt-3   ○ Alt-4   [Add Alternate Route]
[Delete] [Delete] [Delete] [Delete]

We can see here in this first rule labeled as 'Outbound Internal' we are looking for any outbound calls that are specifically for a called party that starts with '+17166397' and end with 3 more digits. This happens to fit into our locally defined set of TDM extensions, indicating that this call needs to

stay locally on the PBX for a user. The CPID manipulation rule strips the right 4 digits off the called number provided by OCS and uses that to make the call.

Router Configuration

○ Inbound TDM Rules ● Inbound VoIP Rules ○ TDM Trunk Groups ○ VoIP Host Groups

Inbound VoIP Rules

Select	Enable	Rule Label	Request Type	Originating VoIP Host Address
	☑	Outbound Internal	Any ▾	*
	☑	Outbound Local	Any ▾	*
	☑	Outbound National	Any ▾	*
	☑	Outbound International	Any ▾	*
	☑	Default	Any ▾	*

[Add Rule]   [Delete Rule]

Detailed Configuration for Inbound VoIP Rule: **Outbound Local**

Inbound VoIP Request Matching

CPID Matching

Calling Number	*	Called Number	x1716xxxxxxx	Redirect Number	*
Calling Name	*	Called Name	*	Redirect Name	*

Outbound Routes

Device Selection

Outbound Destination	TDM ▾	Trunk Group	Any ▾	Route Method	Bridged ▾

CPID Manipulation

Calling Number	S	Called Number	"+9"+lrem(D,5)	Redirect Number	R
Calling Name	S	Called Name	D	Redirect Name	R

Select Primary / Alternate Route

● Primary   ○ Alt-1   ○ Alt-2   ○ Alt-3   ○ Alt-4   [Add Alternate Route]
[Delete] [Delete] [Delete] [Delete]

In this rule labeled as 'Outbound Local' we are looking for any number that has been dialed that starts with '+1716' and ends with 7 digits. This indicates to us that it is a local number (off the PBX but within the local calling area) and does not need the area code dialed as part of the number. In the CPID manipulation area we add a trunk access code to the string and strip off the leading 5 characters (the '+1716') and send the full string out as '+9xxxxxxx'.

Router Configuration

○ Inbound TDM Rules ● Inbound VoIP Rules ○ TDM Trunk Groups ○ VoIP Host Groups

Inbound VoIP Rules

Select	Enable	Rule Label	Request Type	Originating VoIP Host Address	
	☑	Outbound Internal	Any ▼	*	
	☑	Outbound Local	Any ▼	*	
	☑	Outbound National	Any ▼	*	
	☑	Outbound International	Any ▼	*	
	☑	Default	Any ▼	*	

[Add Rule] [Delete Rule]

Detailed Configuration for Inbound VoIP Rule: **Outbound National**

Inbound VoIP Request Matching

CPID Matching

Calling Number	*	Called Number	x1xxxxxxxxxx	Redirect Number	*
Calling Name	*	Called Name	*	Redirect Name	*

Outbound Routes

Device Selection

Outbound Destination	TDM ▼	Trunk Group	Any ▼	Route Method	Bridged ▼

CPID Manipulation

Calling Number	S	Called Number	"+9"+Irem(D,1)	Redirect Number	R
Calling Name	S	Called Name	D	Redirect Name	R

Select Primary / Alternate Route

● Primary   ○ Alt-1   ○ Alt-2   ○ Alt-3   ○ Alt-4   [Add Alternate Route]
 [Delete] [Delete] [Delete] [Delete]

In this rule labeled as 'Outbound National' we are looking for any number dialed that starts with '+1' and includes 10 digits indicating a number that is not in our local area code. In this case the CPID manipulation simply adds a +9 to the start of the number and strips off the leading + creating a result of '91xxxxxxxxxx'.

Router Configuration

○ Inbound TDM Rules ● Inbound VoIP Rules ○ TDM Trunk Groups ○ VoIP Host Groups

Inbound VoIP Rules

Select	Enable	Rule Label	Request Type	Originating VoIP Host Address	
	☑	Outbound Internal	Any ▾	*	
	☑	Outbound Local	Any ▾	*	
	☑	Outbound National	Any ▾	*	
	☑	Outbound International	Any ▾	*	
	☑	Default	Any ▾	*	

[Add Rule] [Delete Rule]

Detailed Configuration for Inbound VoIP Rule: **Outbound International**

Inbound VoIP Request Matching

CPID Matching

Calling Number	*	Called Number	x011.	Redirect Number	*
Calling Name	*	Called Name	*	Redirect Name	*

Outbound Routes

Device Selection

Outbound Destination	TDM ▾	Trunk Group	Any ▾	Route Method	Bridged ▾

CPID Manipulation

Calling Number	S	Called Number	"+9"+lrem(D,1)	Redirect Number	R
Calling Name	S	Called Name	D	Redirect Name	R

Select Primary / Alternate Route

● Primary ○ Alt-1 ○ Alt-2 ○ Alt-3 ○ Alt-4 [Add Alternate Route]
[Delete] [Delete] [Delete] [Delete]

In this rule labeled as 'Outbound International' we are looking for any number dialed that starts with '+011' and includes any number of digits after that indicating a number that is not in our local area code and is indeed an international number. In this case the CPID manipulation simply adds a '+9' to the start of the number and strips off the leading + creating a result of '9011xxxxxxxxxx'.

The last rule that you see defined is another default rule that acts as a catch all and simply attempts to dial any number provided that has not matched the previous rules in the list.

Note 1: The last two rules labeled as 'Outbound National' and 'Outbound International' COULD have been combined into one rule since the CPID manipulation was the same in both. We have split them out here in this example simply for clarity of the example. Also, if your environment uses different trunks for local, national (long Distance) and international calls, creaking these rules out into separate segments allows you to also define trunk groups and direct calls of these specific types to those individual trunks.

Note 2: The rules are evaluated in the order they are listed, top down. The first rule that matches is used so the order is important. Always consider placing your more specific rules at the top of the order and the more general at the bottom.

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:

- Configuring the D-channel.
- Configuring the route data block.
- Adding the trunk members to the D-channel.
- Enabling the hardware and D-channel.
- Defining a route list and coordinated dialing plan.
- 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 D-Channel	LD17
Add Route Data Block	LD16
Add Trunk Members	LD14
Enable MSDL card	LD96
Enable D-Channel	LD96
Define Route List	LD86
Define Coordinated Dialing Plan	LD87

6.1 Configuring 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.

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

```
Type, Adan, Ctyp, Cdno, Des, Usr, Ifc, Pinx, Isdn_Mcnt, Clid,
Dchl, Side.
```

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.

```
REQ  chg
TYPE cfn
ADAN new dch 1
CTYP msdl
CDNO 1
PORT 1
DES
USR  pri
IFC  isgf
PINX_CUST 0
ISDN_MCNT 300
CLID opt0
DCHL
PRI
OTBF
DRAT
SIDE net
CNEG
```

```
RLS
RCAP COLP NDI CCBI DV3I CTI
OVLR
OVLS
MBGA
TIMR
LAPD
```

- At the prompt REQ enter CHG to change an entry in the configuration record and press RETURN
- At the prompt ADAN enter NEW DCH XX
  - Where xx is an available d-channel number, press RETURN
- At the prompt CTYP enter MSDL press RETURN
- At the prompt CDNO enter XX
  - where xx is the card slot location of the T-1 card, press RETURN
- At the prompt DES enter XX
  - where xx is any name designation for the T1, 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 ISDN_ MCNT enter 300 press RETURN
- At the prompt CLID enter OPT0 press RETURN
- At the prompt DCHL enter XX
  - Where xx is the card slot location of the T-1 card, press RETURN
- At the prompt SIDE enter NET to set the PBX to the network side of the connection and press RETURN

6.2   Configuring the Route Data Block

Add 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:

```
Rout, Des, Tktp. Esn, Cnvt, Sat, Rcls, Dtrk, Brip, Dgtp, Isdn, Mode,
Ifc, Pni, Chty, Ctyp, Inac, Cpfxs, Dapc, Intc, Dsel, Ptyp, Auto, Dnis,
Dcdr, Icog, Srch, Trmb, Acod, Clen Tcpp, Biln, Sigo, Drng, Cdr, Mus,
Racd, Ohq, Ohqt, Cbq, Auth, Ttbl, Plev, Alrm.
```

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

```
REQ   new
TYPE  rdb
CUST  0
DMOD
ROUT  10
DES   1
TKTP  pri
TKTP  pra
TKTP  tie
ESN   no
CNVT  no
SAT   no
```

```
RCLS ext
DTRK yes
BRIP no
DGTP pra
DGTP pri
ISDN YES
MODE pra
IFC  isgf
PNI  00000
CHTY bch
CTYP ukwn
INAC no
CPFXS  yes
DAPC no
INTC  no
DSEL vod
PTYP pri
AUTO no
DNIS no
DCDR no
IANI
ICOG iao
SRCH rrb
TRMB yes
STEP
ACOD 7000
CLEN 1
TCPP no
TARG
BILN no
SGRP
OABS
INST
IDC
ANTK
SIGO std
CNTL
DRNG no
CDR  no
MUS  no
RACD no
FRL
OHQ  no
OHQT 00
CBQ  no
AUTH no
TTBL 0
ATAN
PLEV 2
ALRM no
```

- 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 press RETURN
- At the prompt DMOD press RETURN
- At the prompt ROUT enter XX
    - where xx is an available route number then press RETURN
- At the prompt DES enter XX
    - where xx is any name designation for the trunk route press RETURN

- At the prompt `TKTP` enter `TIE` press `RETURN`
- At the prompt `ESN` enter `NO` press `RETURN`
- At the prompt `CNVT` enter `NO` press `RETURN`
- At the prompt `SAT` enter `NO` press `RETURN`
- At the prompt `RCLS` enter `EXT` press `RETURN`
- At the prompt `DTRK` enter `YES` press `RETURN`
- At the prompt `BRIP` enter `NO` press `RETURN`
- At the prompt `DGTP` enter `PRI` 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 `PNI` enter `00000` press `RETURN`
- At the prompt `CHTY` enter `BCH` press `RETURN`
- At the prompt `CTYP` enter `UKWN` press `RETURN`
- At the prompt `INAC` enter `NO` press `RETURN`
- At the prompt `CPFXS` enter `YES` press `RETURN`
- At the prompt `DAPC` enter `NO` press `RETURN`
- At the prompt `INTC` enter `NO` press `RETURN`
- At the prompt `DSEL` enter `VOD` press `RETURN`
- At the prompt `PTYP` enter `PRI` press `RETURN`
- At the prompt `AUTO` enter `NO` press `RETURN`
- At the prompt `DNIS` enter `NO` press `RETURN`
- At the prompt `DCDR` enter `NO` press `RETURN`
- At the prompt `ICOG` enter `IAO` press `RETURN`
- At the prompt `SRCH` enter `RRB` press `RETURN`
- At the prompt `TRMB` enter `YES` 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 `CLEN` enter `1` press `RETURN`
- At the prompt `TCPP` enter `NO` press `RETURN`
- At the prompt `BILN` enter `NO` press `RETURN`
- At the prompt `SIGO` enter `STD` press `RETURN`
- At the prompt `DRNG` enter `NO` press `RETURN`
- At the prompt `CDR` enter `NO` press `RETURN`
- At the prompt `MUS` enter `NO` press `RETURN`
- At the prompt `RACD` enter `NO` press `RETURN`
- At the prompt `OHQ` enter `NO` press `RETURN`
- At the prompt `OHQT` enter `00` press `RETURN`
- At the prompt `CBQ` enter `NO` press `RETURN`
- At the prompt `AUTH` enter `NO` press `RETURN`
- At the prompt `TTBL` enter `0` press `RETURN`
- At the prompt `PLEV` enter `2` press `RETURN`
- At the prompt `ALRM` enter `NO` press `RETURN`

6.3   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:

`Type, TN, Cust, Cden, Trk, Pcml, Ncos, Rtmb, Tgar, Ast, Iapg, Cls.`

The programming example below shows how to add trunk members to the D-Channel using `LD14`. This needs to be repeated for each B-Channel you are adding to the D-Channel (23 times per span). For all other fields not noted in the example press RETURN to use default values.

```
REQ  new
TYPE tie
TN   1 1
DES
PDCA
PCML
CUST 0
NCOS 0
RTMB 10 1
B-CHANNEL SIGNALING
MNDN
TGAR 1
AST
CLS  unr dtn
TKID
```

- 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 press `RETURN`
- At the prompt `CUST` enter `XX`
    - where `xx` is the defined customer number press `RETURN`
- At the prompt `CDEN` press `RETURN`
- At the prompt `TRK` enter `PRI` press `RETURN`
- At the prompt `PCML` press `RETURN`
- At the prompt `NCOS` enter `0` press `RETURN`
- At the prompt `RTMB` enter `XX  XX`
    - where `xx  xx` is the rout number and member defined previously in `LD16` press `RETURN`
- At the prompt `TGAR` enter `1` press `RETURN`
- At the prompt `AST` enter `NO` press `RETURN`
- At the prompt `IAPG` enter `0` press `RETURN`
- At the prompt `CLS` enter `UNR DTN` press `RETURN`

6.4   Enable the MSDL Board and D-Channel

To use the newly added card 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`

6.5   Define a Route List

Use overlay `LD86` to define a route list.

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

`Req, Cust, Feat, Rli, Entr, Lter, Rout, Tod, Cnv, Exp, Frl, Dmi, Fci,
Fsni, Ohq, Cbq, Iset, Mfrl, Ovll.`

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

```
>ld 86
ESN000
REQ  new
CUST 0
FEAT
FEAT rlb
RLI  10
ENTR 0
LTER no
ROUT 10
TOD
CNV  no
EXP  no
FRL  0
DMI  0
FCI  0
FSNI 0
SBOC
OHQ  no
CBQ  no
ENTR
ISET 0
NALT
MFRL 0
OVLL 0
```

- At the prompt `REQ` enter `NEW` press `RETURN`
- At the prompt `CUST` enter `XX`
  - where `xx` is the defined customer number 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 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 `LTER` enter `NO` press `RETURN`
- At the prompt `ROUT` enter `X`
  - where `x` is the route number defined in the previous steps and press `RETURN`
- At the prompt `CNV` enter `NO` press `RETURN`
- At the prompt `EXP` enter `NO` press `RETURN`
- At the prompt `FRL` enter `0`
  - Where Facility restriction level it should be set as low as possible. press `RETURN`
- At the prompt `DMI` enter `0` press `RETURN`
- At the prompt `FCI` enter `0` press `RETURN`
- At the prompt `FSNI` enter `0` press `RETURN`
- At the prompt `OHQ` enter `NO` press `RETURN`
- At the prompt `CBQ` enter `NO` press `RETURN`
- At the prompt `ISET` enter `0` press `RETURN`
- At the prompt `MFRL` enter `0` press `RETURN`
- At the prompt `OVLL` enter `0` press `RETURN`

6.6   Defining the Coordinated Dialing Plan

Use overlay `LD87` to define your CDP (Coordinated Dialing Plan). 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
ESN000
REQ  new
CUST 0
FEAT cdp
TYPE dsc
DSC  6
FLEN 4
DSP  lsc
RLI  10
NPA
NXX
DSC
```

- At the prompt `REQ` enter `NEW` press `RETURN`
- At the prompt `CUST` enter `XX`
  - where `xx` is the defined customer number 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`

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- o Where `x` is the rout list index created in `LD86` and press `RETURN`

7.   Microsoft OCS setup

7.1   Steps for configuring OCS

Normalization rules are used to convert all possible dial numbers into full E.164 formatted numbers. Microsoft OCS uses the standard E.164 format to search for all users listed in Active Directory (AD).

When an OCS user dials an internal extension number (normally 3-5 digits), the normalization rules convert it into full E.164 format. These normalization rules should cover dialed digits that are for internal extensions, local numbers, long distance numbers, and international numbers.

From the Start menu select the following to configure the OCS server:

- Programs
- Administrative Tools
- OCS 2007

On the tree presented in the configuration window right click on Forest then select `Properties` and then `Voice Properties` form the menu provided. Edit a location profile as shown in the example below.
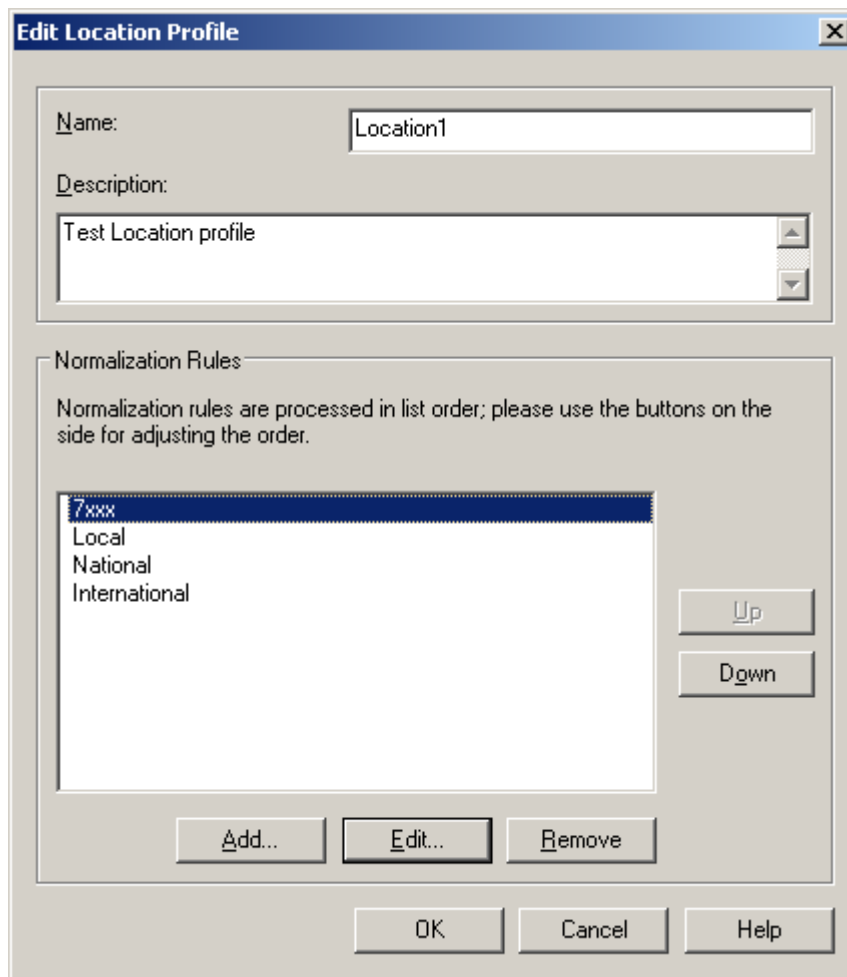
Click `Add` or `Edit` to create or change a particular rule.

In this example, when a user dials any 4-digit number starting with 7, it will be converted to its E.164 equivalent of +1716639xxxx and then that number will be searched for in AD.

More examples are shown in the following table:

Name	Phone Pattern	Translation Pattern	Descriptions
7xxx	^(7[0-9]{3})$	+1716639$1	Normalize 7xxx to E.164
Local	^(\d{7})$	+1716$1	Local number
National	^1(\d*)$	+1$1	Long distance number
International	^011(\d*)	+011$1	International number

A default route is used to route all calls to the Mediation server. If you need to route some calls to a different Mediation server, configure the Target phone numbers field accordingly.

From the Start menu select the following to configure the OCS server:

- Programs
- Administrative Tools
- OCS 2007

On the tree presented in the configuration window right click on Forest then select `Properties` and then `Voice Properties` form the menu provided. Edit a route as shown in the example below.

This entry routes any number with or without '+' prefix followed by any digits to Mediation server dmg4000.bufocs.local

Restart the Front End Services for the above changes to take effect, including all Normalization rules. This can be done from Window Services.

Note: Unless the dialed number from OCS client (such as Office Communicator) is in E.164 format, OCS must find a normalization rule to convert the dialed number to E.164.

7.2   Steps for configuring OCS clients

The domain users need to be enabled for making calls through OCS server.
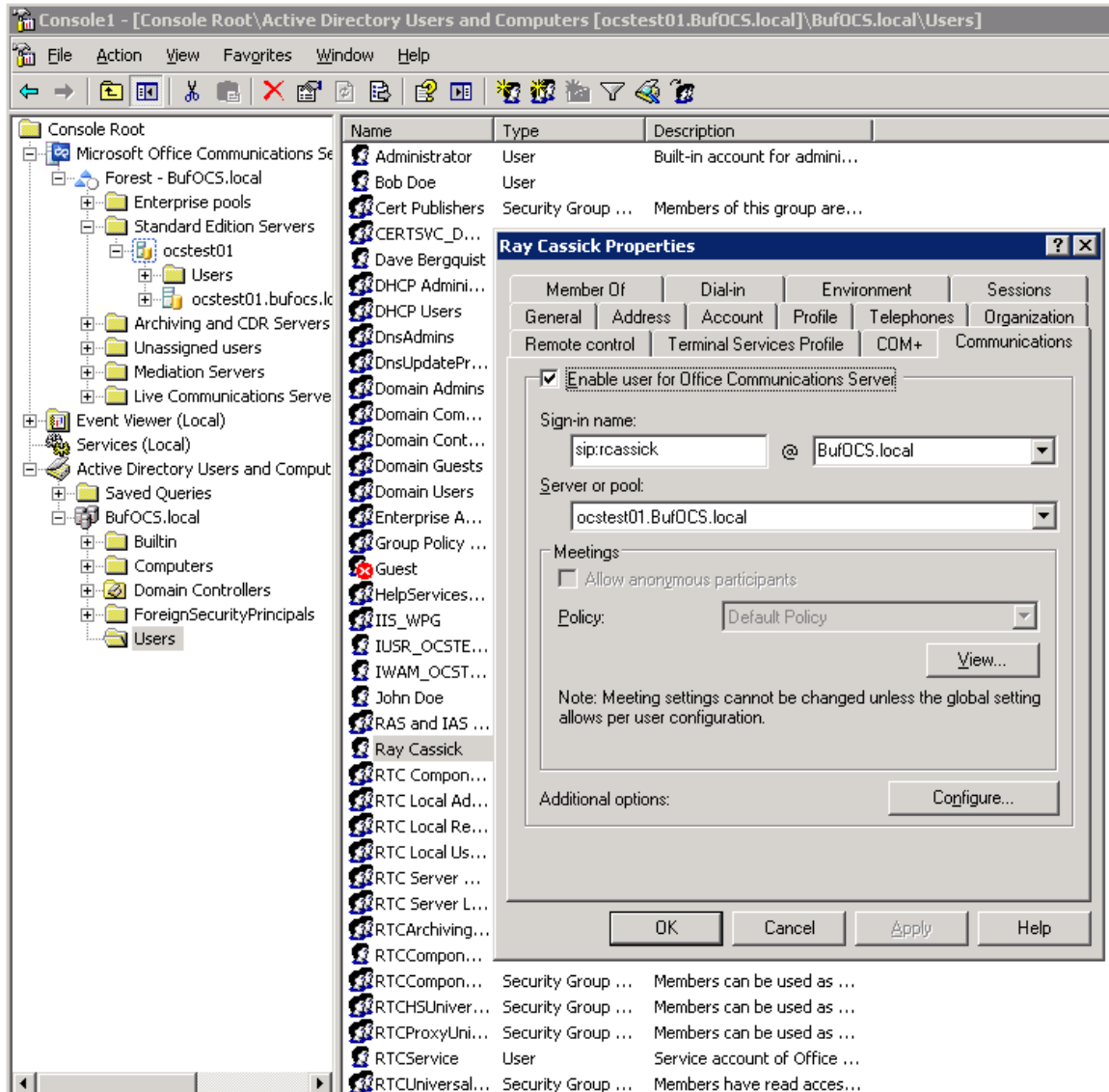
Under `Communications` tab, check the Enable user for `Office Communications Server` option and then click the `Configure` button.

In the above configuration for user Ray Cassick, when an inbound PSTN call for 6101, it will be converted by the gateway CPID manipulation and routing rules into +17166396101. OCS will match that number provided by the gateway to the `Line URI` parameter for this user and ring Ray Cassick if he is logged on to OCS from Office Communicator or any OCS supported device.

8. 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 from TDM station set to OCS client.	
2	Direct call from OCS client to TDM station set.	

9. Troubleshooting

9.1 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.

9.2 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:
  - o Call control problems (dropped calls, failing transfers, etc…)
  - o 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:
  - o Call control problems (dropped calls, failing transfers, etc…)
  - o Integration problems (incorrect mailbox placement, missed auto-attendant greetings etc…)
- `Routingtable (all keys)` – This allows you to look inside the routing table engine and see how matching rules and CPID manipulation rules work with respect to your call. This data is very important in the following scenarios:

- Call routing problem (reaching the incorrect OCS client or no client at all, etc…)

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.

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