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

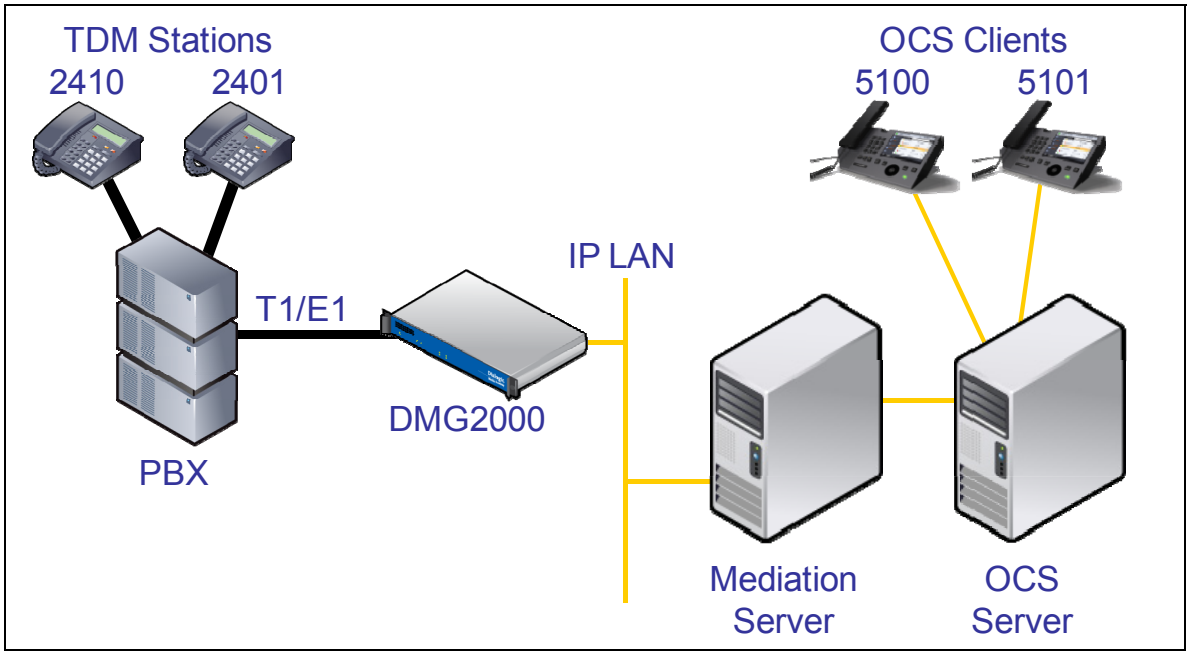
PBX Vendor	Nortel
Model	CS-1000M (Succession)
Software Version	Release 25.40
Additional Notes	See PBX Prerequisites (Section 3.1)

2.2 Gateway

Gateway Model	Dialogic® 2000 Media Gateway Series (DMG2000)
Software Version	6.0 (6.0.103)
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:

Description	Option 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 a E1 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

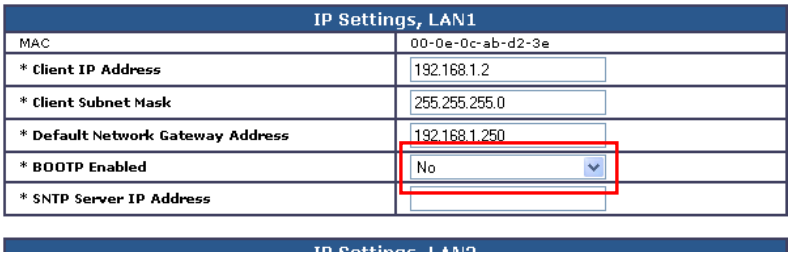
To get the gateway connected between the PBX and mediation server there are only a few configuration options that are required.

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

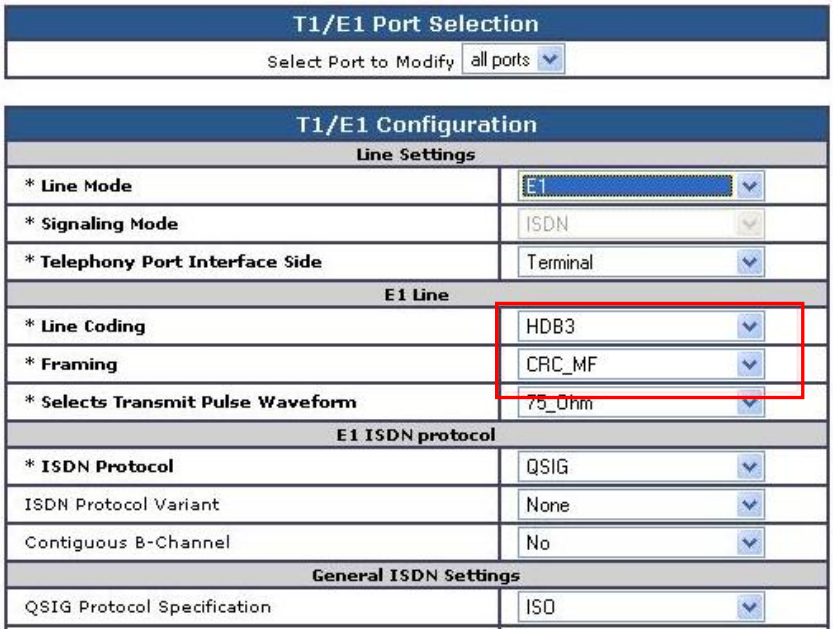
- Assign LAN 1 on the gateway a unique IP address, subnet mask and network gateway address (if the latter is required).
- Configure the gateway to use the SIP VoIP protocol.
- Set the Line Mode to E1.
- Set the Protocol to ISDN - QSIG.

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

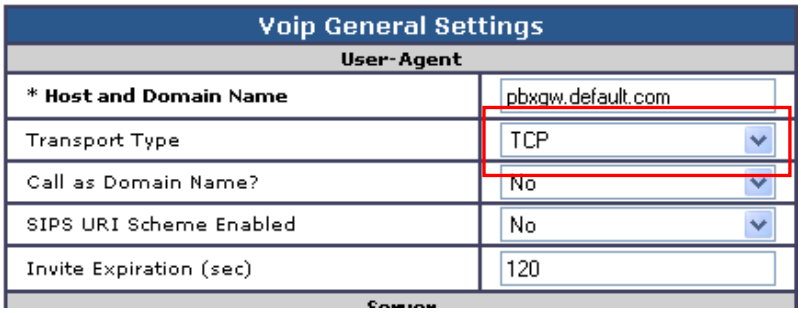
- In the IP Settings page:
  - Set the `BOOTP Enabled` parameter to '`No`'. (the default is Yes)



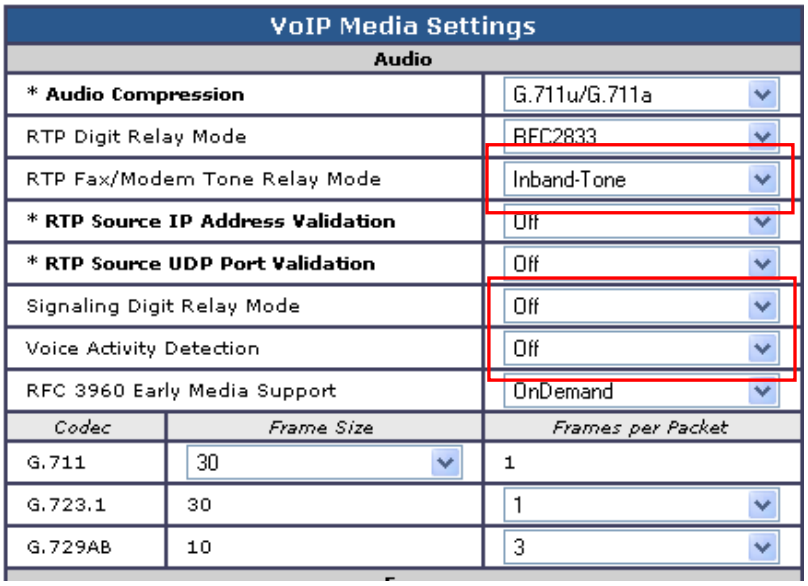
- In the T1/E1 General page:
  - Set the Line Encoding and Line Framing as required by your E1 Interface. Typical settings are Encoding = HDB3 and Framing = CRC_MF.



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



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

The example given in the system diagram at the start of this integration guide has the following dialing plans in the system:

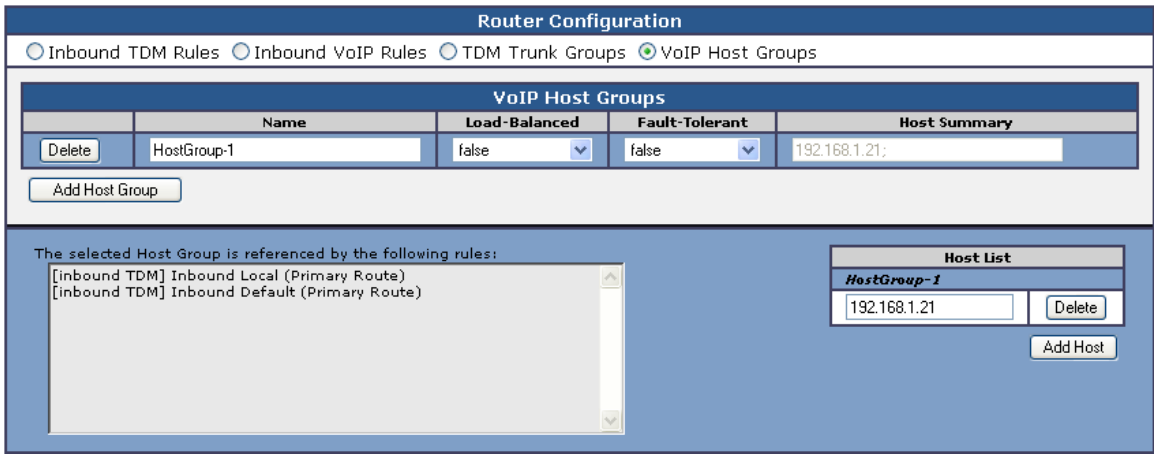
- All TDM side stations have DID numbers assigned in the 2xxx extension range.
- All OCS side stations have DID numbers assigned in the 5xxx extension range.

All inbound calls need to be sent through to the Mediation Server at a specific IP address.

5.2.1 VoIP Host Group configuration

The first item to take care of is to set up the IP endpoint to use as the IP destination for all inbound calls. This is done in the routing table under the section VoIP Host Groups. 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 this example case the IP address 192.168.1.21 is for this.



5.2.2 TDM and VoIP Routing Rule Configuration

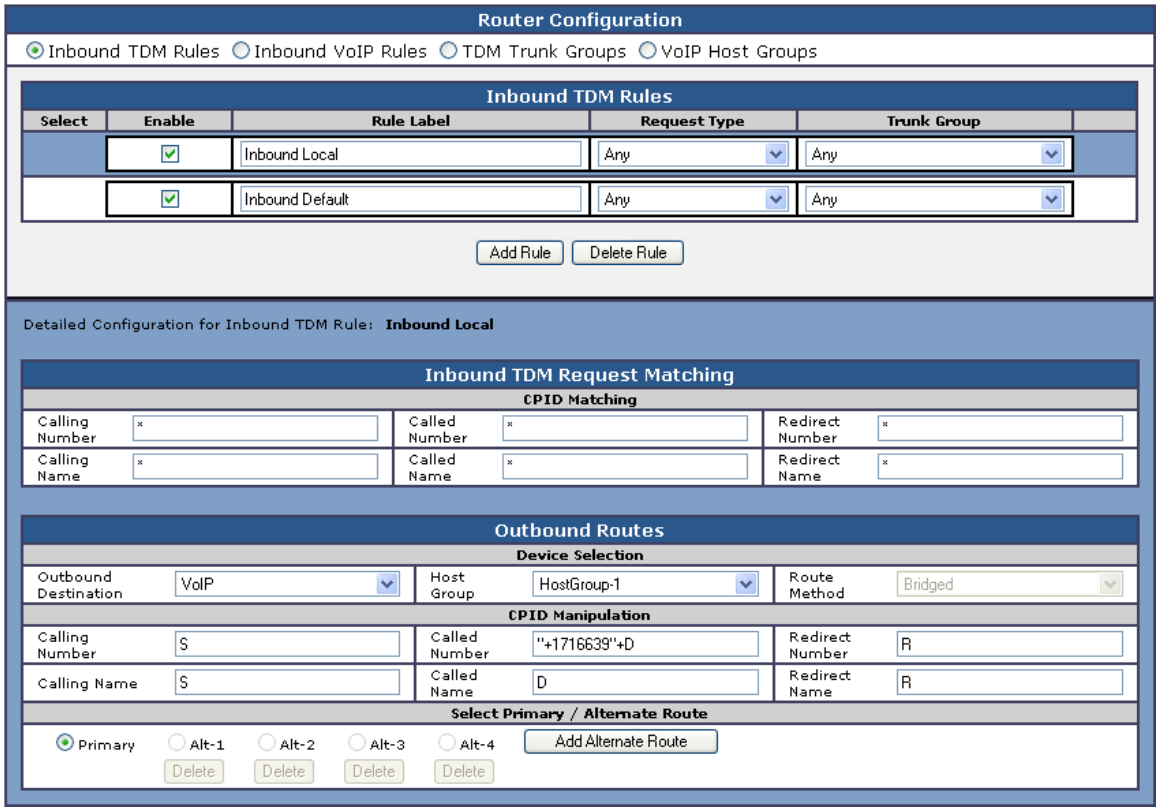
The second item is to configure the routing rules that will associate inbound or outbound calls with the proper digit manipulation rules for the type of call they need to service. This will require that the gateway perform some digit manipulation on calls that go from the TDM side to the IP side as well 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 engine's 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 5xxx 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.

This example will take any number and then convert it into the full E.164 format by concatenating a prefix of '+1716639' onto the front of the number where 716 is the area code and 639 is the local exchange.
Other calls, such as DIDs that arrive over TDM trunks from 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. An example of the inbound rule for local PBX users is shown below:



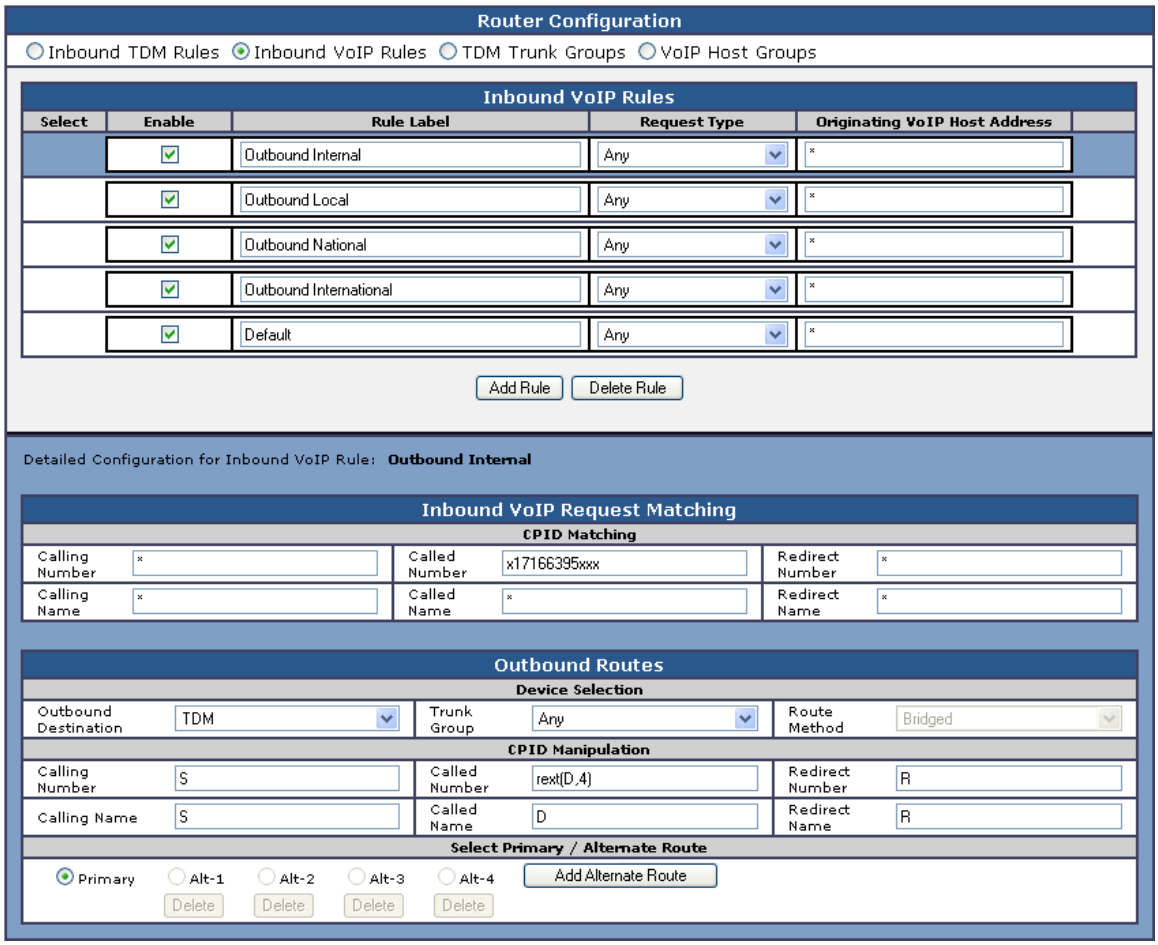
The CPID matching rule is simply a * meaning that any dialed number from a local user presented to this trunk will be seen by this rule. The CPID manipulation rule then uses the digits that are being seen (in this example it will be a 4 digit number because that is how the trunk is programmed) and then adds the prefix of “+1716639” onto it to build the full E.164 number that is needed for OCS. This rule also sets the destination to the VoIP Host group defined previously that points to the inbound IP address of the Mediation Server.

In addition to this rule a default rule has been left in place that acts as a catch all. This rule performs no CPID manipulation at all and just tries to send the call to the VoIP host group as dialed.

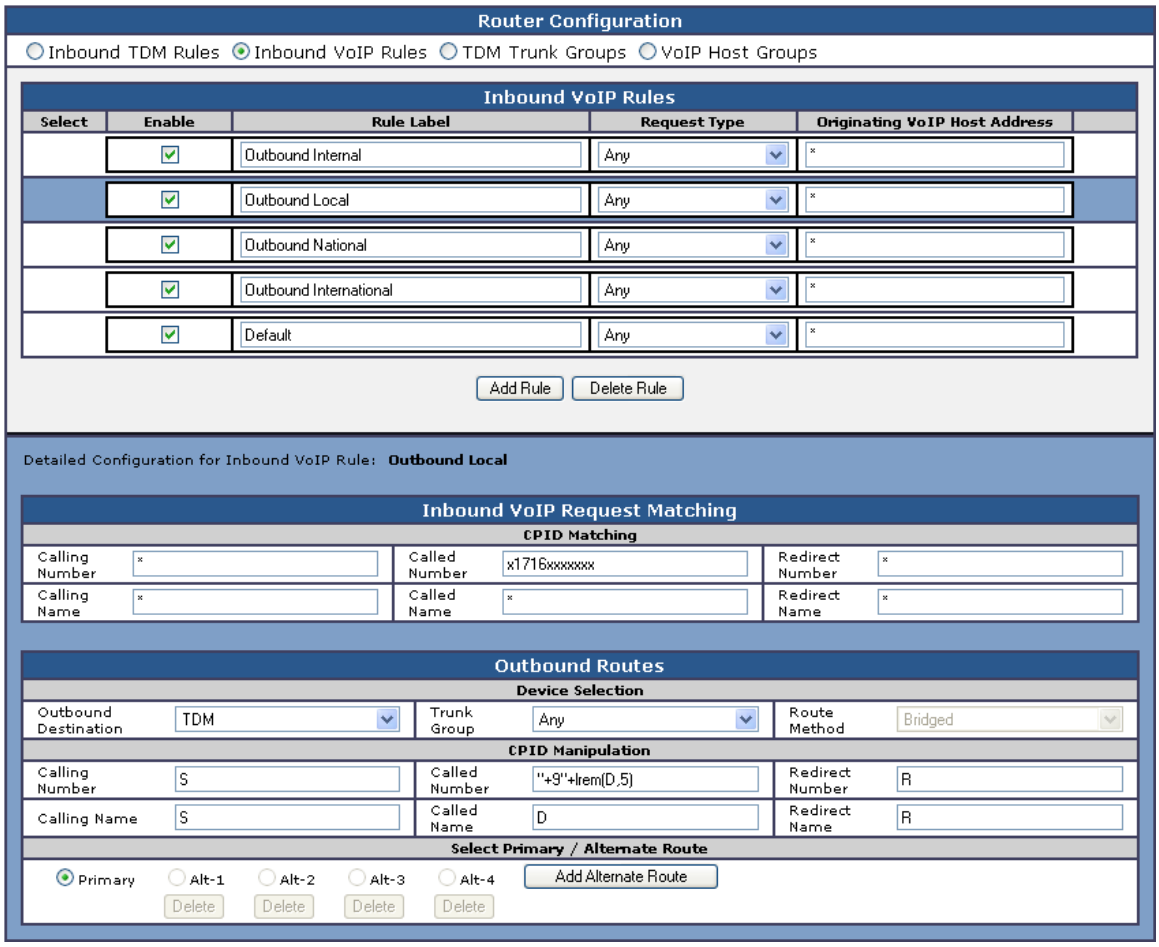
5.2.2.2 Inbound VoIP Rules

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. 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.

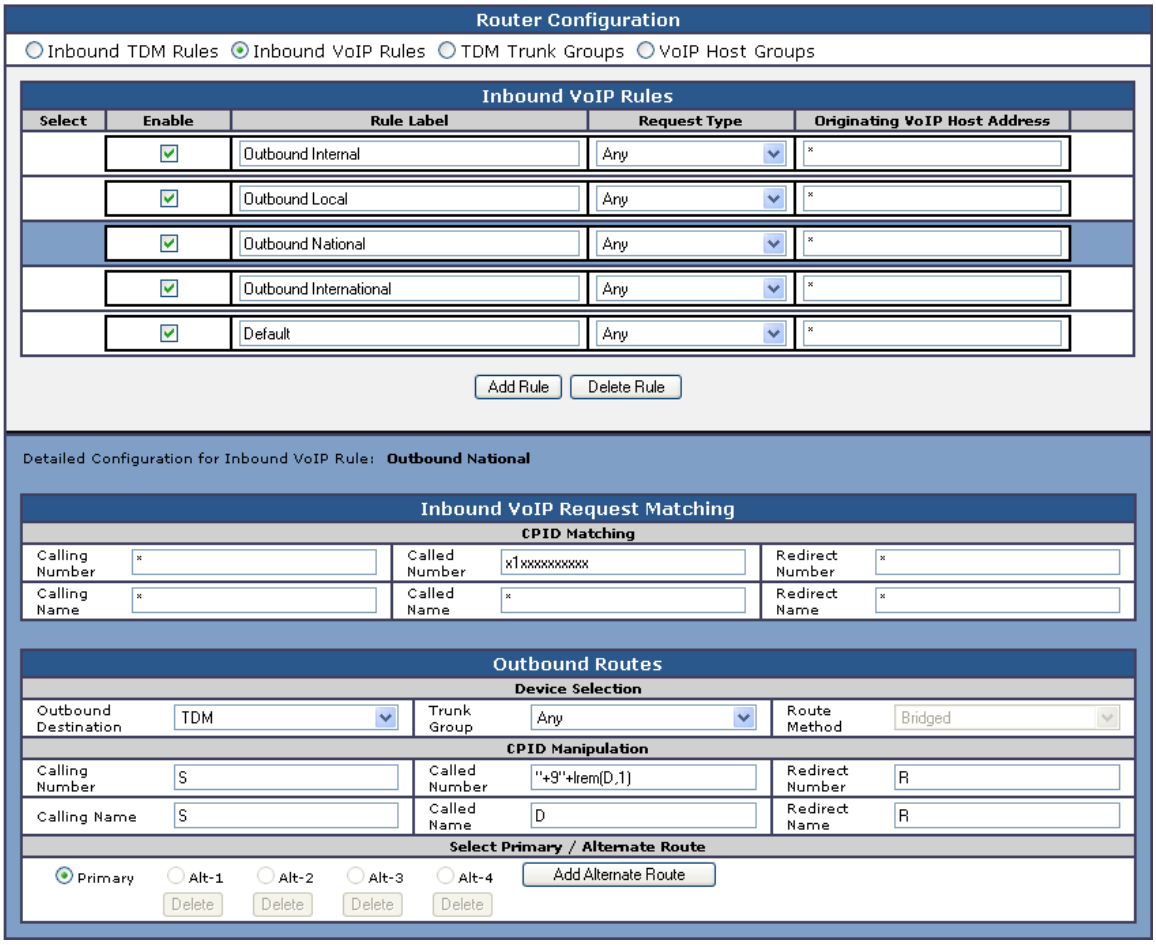
In the example here, OCS has been setup (as you will see later) with a route that directs all calls that meet the pattern 5xxx to the gateway in full E.164 format. The gateway then needs to know how to identify these numbers as extensions that are local on the PBX and manipulate them accordingly. To do this it needs to simply extract the right 4 digits from the called number provided to remove the prefix of “+1716639” and leave the last 4 digits remaining. Local, national and international numbers are going to need to be manipulated. At very least they will need a trunk access number, like a 9, pre-pended onto the front of them in order to dial an outside line. These can also be done using manipulation rules as follows:



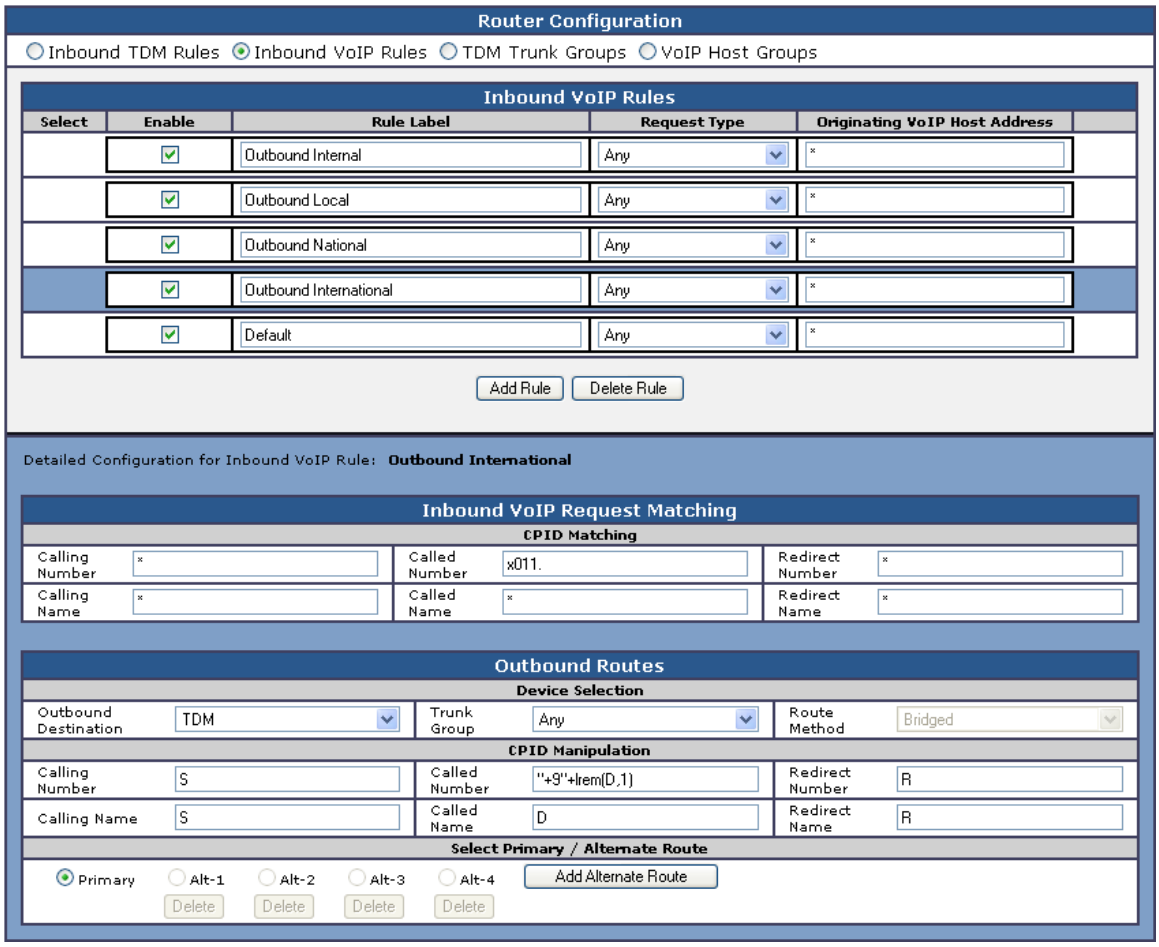
In the screen shot above, the first rule 'Outbound Internal' is selected. Notice that the blue bar near the top of the screen highlights this rule. The lower half of the screen displays the details of the currently selected rule. This rule matches outbound calls that have a called party number that starts with '+17166395' followed by any three digits. This rule is designed to match the locally defined TDM extensions as shown in the first figure in this document. Calls that match this rule are meant to go to a local user on the PBX. The CPID manipulation section of this rule extracts the last four digits from the called party number. The extracted four digits are then dialed as a local extension on the PBX.



In the screen shot above, the rule 'Outbound Local' is selected. This rule matches outbound calls that have a called party number that starts with '+1716' followed by seven digits. This rule is designed to match the calls within the same area code, but not from the same PBX. Calls that match this rule are meant to go to a local user that is not on the PBX. In the CPID manipulation area the trunk access code is added to the string and the leading 5 characters are stripped off (the '+1716'). The full string out as '+9xxxxxxx' is sent.



In this rule labeled as ‘Outbound National’ any number dialed that starts with ‘+1’ and includes 10 digits indicates a number that is not in the 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’.



In this rule labeled as ‘Outbound International’ any number dialed that starts with ‘+011’ and includes any number of digits indicates a number that is not in the 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 ‘+9011xxxxxxxxx’.

The last rule that is 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. The rules have been split out here in this example simply for clarity of the example. Also, if the environment uses different trunks for local, national (long Distance) and international calls, breaking 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 OCS 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 E1 Board	LD17
Define PRI Costumer	LD15
Add D-Channel	LD17
Add Route Data Block	LD16
Add Trunk Members	LD14
Define System Timers and Clock controller	LD73
Define Route List	LD86
Define Coordinated Dialing Plan	LD87
Enable MSDL card	LD96
Enable D-Channel	LD96

6.1 Adding E1 Board

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

- `PRI2` requires a slot number where the E1 card will be used.

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

- `TYPE, PRI2.`

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

```
REQ  chg
TYPE cequ
TDS
CONF
DLOP
PRI2 8
DTI2
```

- At the prompt `REQ` enter `CHG` to change an entry in the configuration record and press `RETURN`
- At the prompt `TYPE` enter `CEQU` and press `RETURN`
- At the prompt `PRI2` enter `XX`
    - Where `XX` is the card slot location of the E1 card, press `RETURN`

6.2 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.
- RCAP requires all supplementary services you would like to add

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

TYPE, ADAN, CTYP, CDNO, DES, USR, IFC, PINX, 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.

```
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 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 E1 card, press RETURN

- At the prompt DES enter XX
  - Where XX is any name designation for the E1, 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 and press RETURN
  - Where XX is the card slot location of the E card, 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.

6.3 Define 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:

TYPE, CUST, AC2, ISDN, and PNI.

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

```
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 to change an entry in the configuration record and press RETURN
- At the prompt TYPE enter net_data and press RETURN
- At the prompt CUST enter XX
  - Where XX is the customer number used for E1 card and press RETURN.
- At the prompt AC2 enter NPA LOC and press RETURN.
- At the prompt ISDN enter YES and 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

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:

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

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 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:

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.

```
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 press RETURN
  - Where XX is the number of members you would like to add to the D-Channel
- 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

Use overlay LD73 to Initiate System Timers and Clock Controller.

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 System Timers and the Clock Controller using LD73. For all other fields not noted in the example press RETURN to use default values.

```
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 where already initiated, enter CHG and press RETURN
- At the prompt TYPE enter PRI2
- At the prompt FEAT enter SYTI press RETURN
- At the prompt CC0 enter XX
  - Where XX is the slot number of E1 card and press RETURN

6.7 Configure Electronic Services Network (ESN)

Use overlay LD86 to configure Electronic Services Network (ESN) .

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 define a rout list using LD86. For all other fields not noted in the example press RETURN to use default values.

```
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

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, ROUT.

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.

```
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

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.

```
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 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

6.11 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.

```
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.

```
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. Microsoft OCS setup

7.1 Steps for configuring OCS

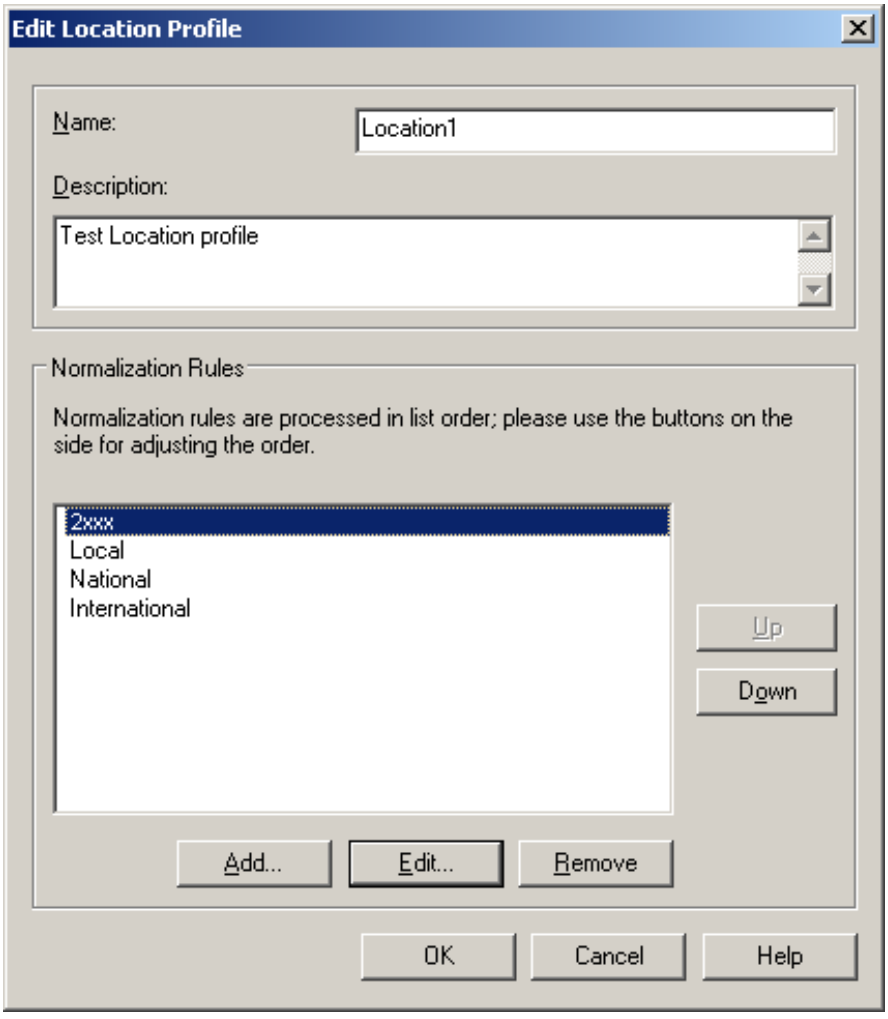
Normalization rules are used to convert all possible dial numbers into full E.164 formatted numbers. Microsoft OCS uses the standard E.164 format to search for all users listed in Active Directory (AD).

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.

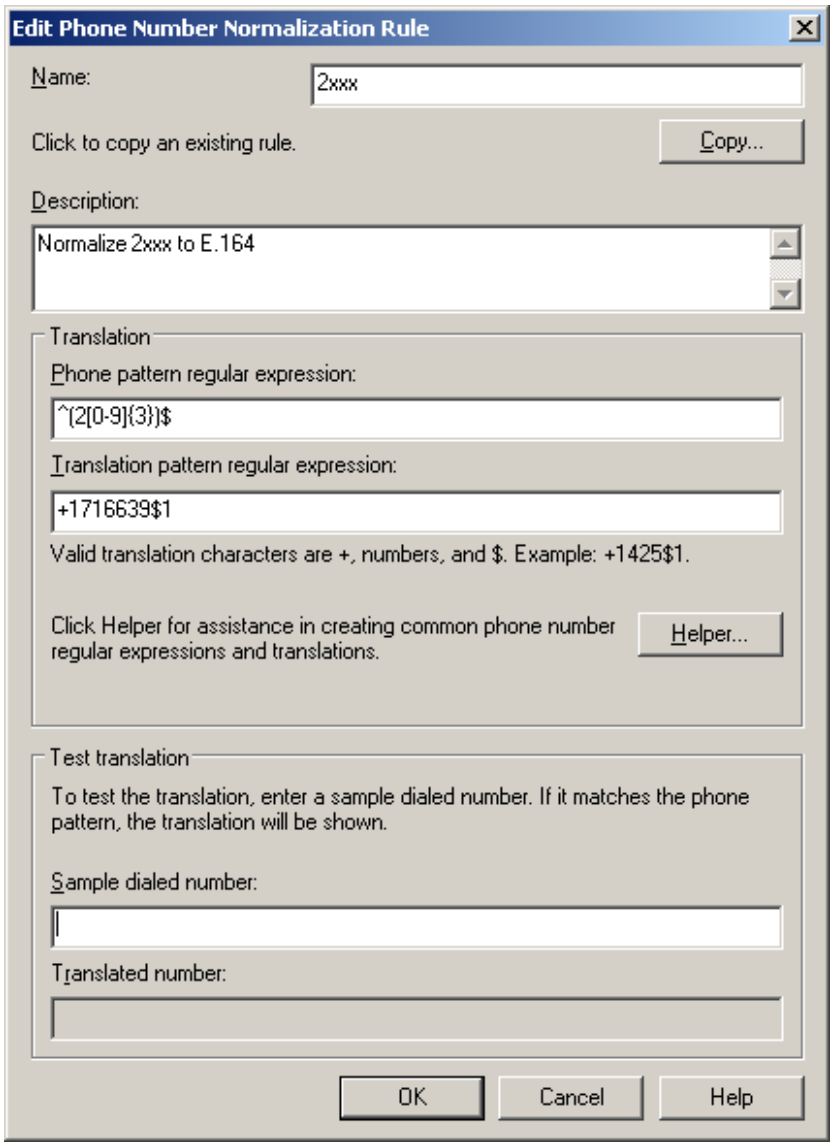
From the Start menu select the following to configure the OCS server:

- 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 2, 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:

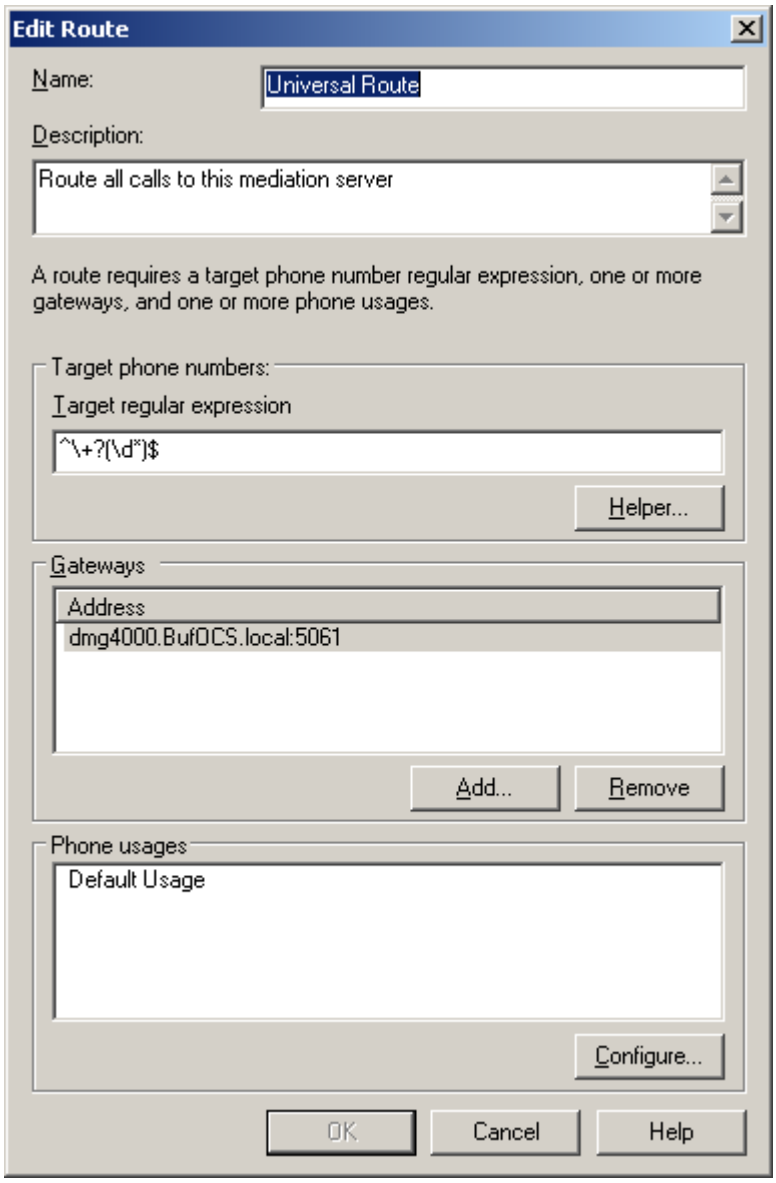
Name	Phone Pattern	Translation Pattern	Descriptions
2xxx	^(2[0-9]{3})$	+1716639$1	Normalize 2xxx to E.164
Local	^(\d{7})$	+1716$1	Local number
National	^1(\d*)$	+1$1	Long distance number
International	^011(\d*)	+011$1	International number

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.



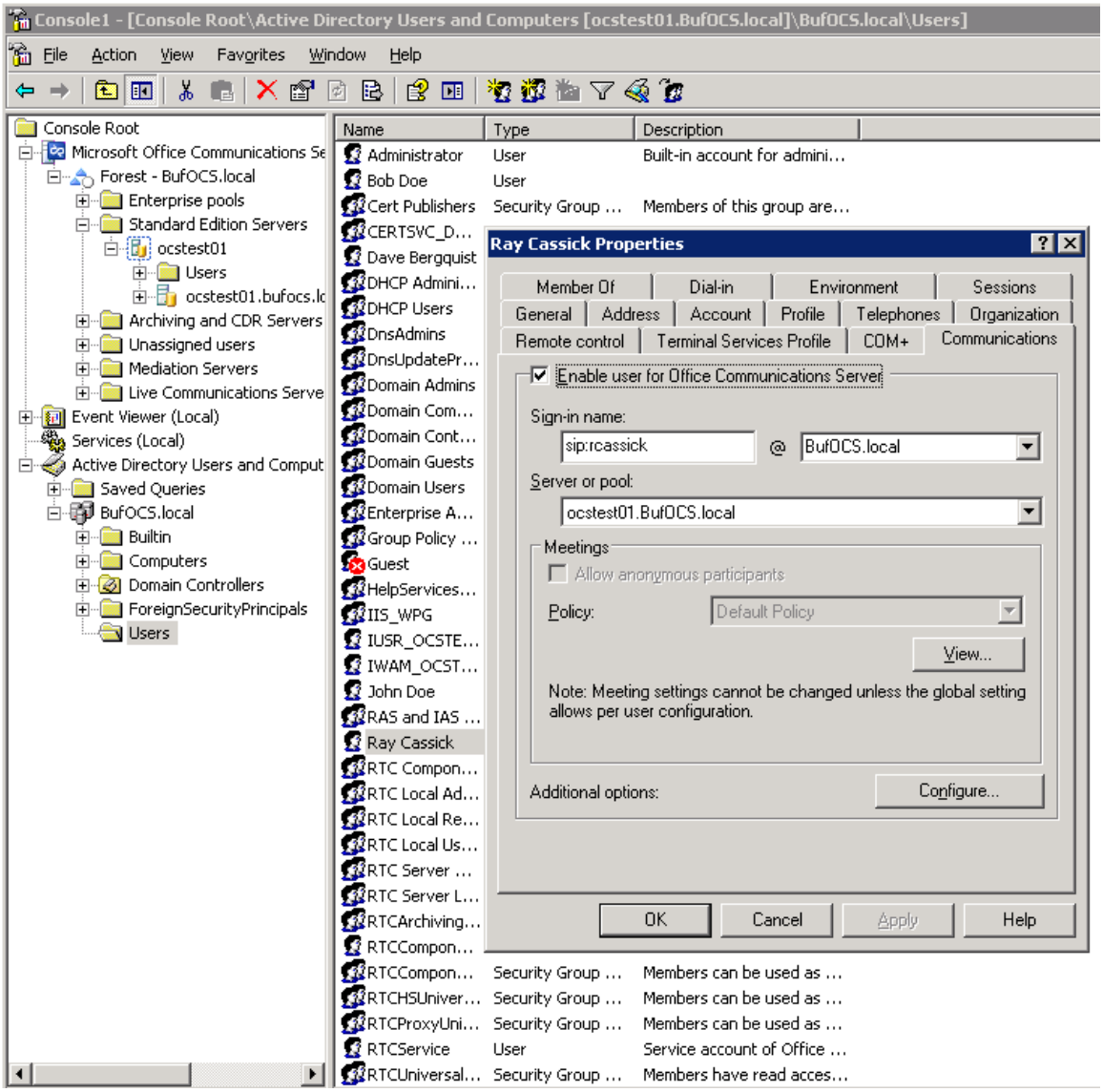
This entry routes any number with or without '+' prefix followed by any digits to Mediation server dmg4000.bufocs.local

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

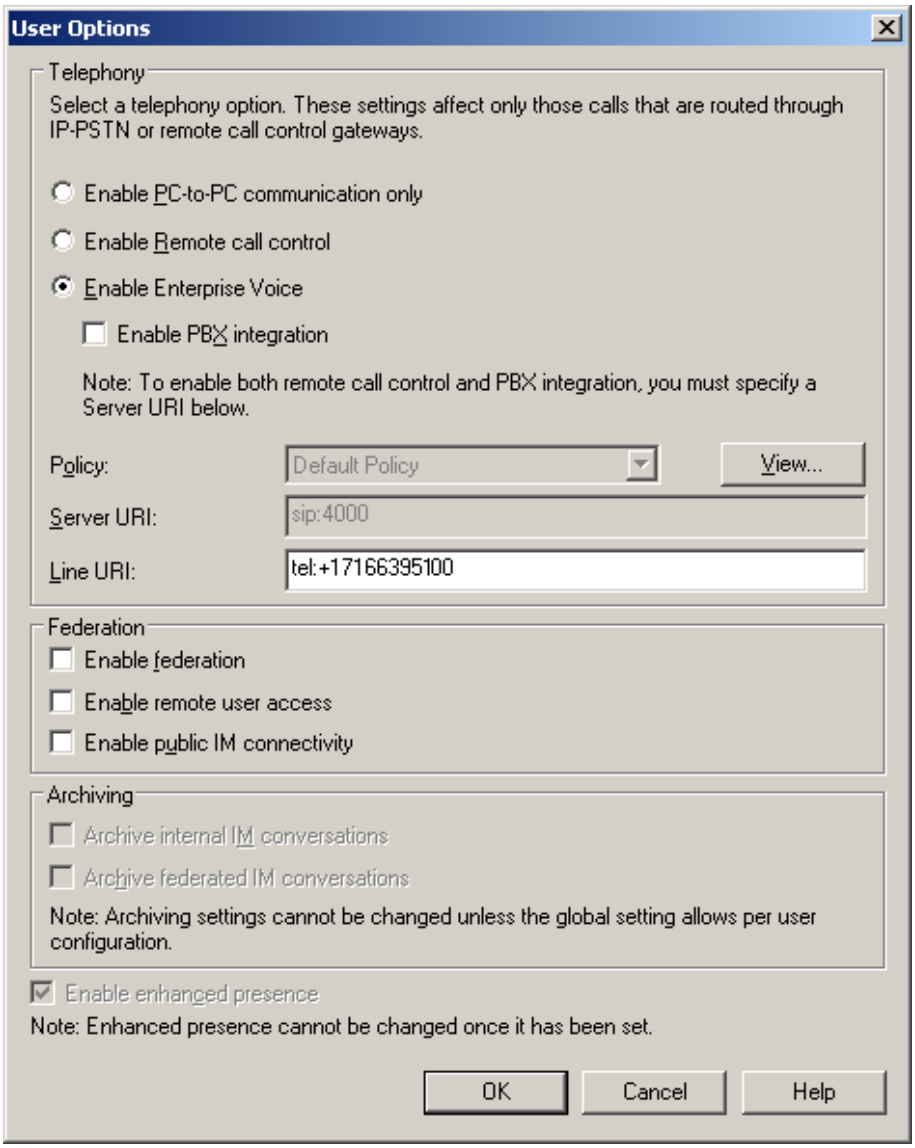
Note: Unless the dialed number from OCS client (such as Office Communicator) is in E.164 format, OCS must find a normalization rule to convert the dialed number to E.164.

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 5100, it will be converted by the gateway CPID manipulation and routing rules into +17166395100. 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:
    - 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…)
- `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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