

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

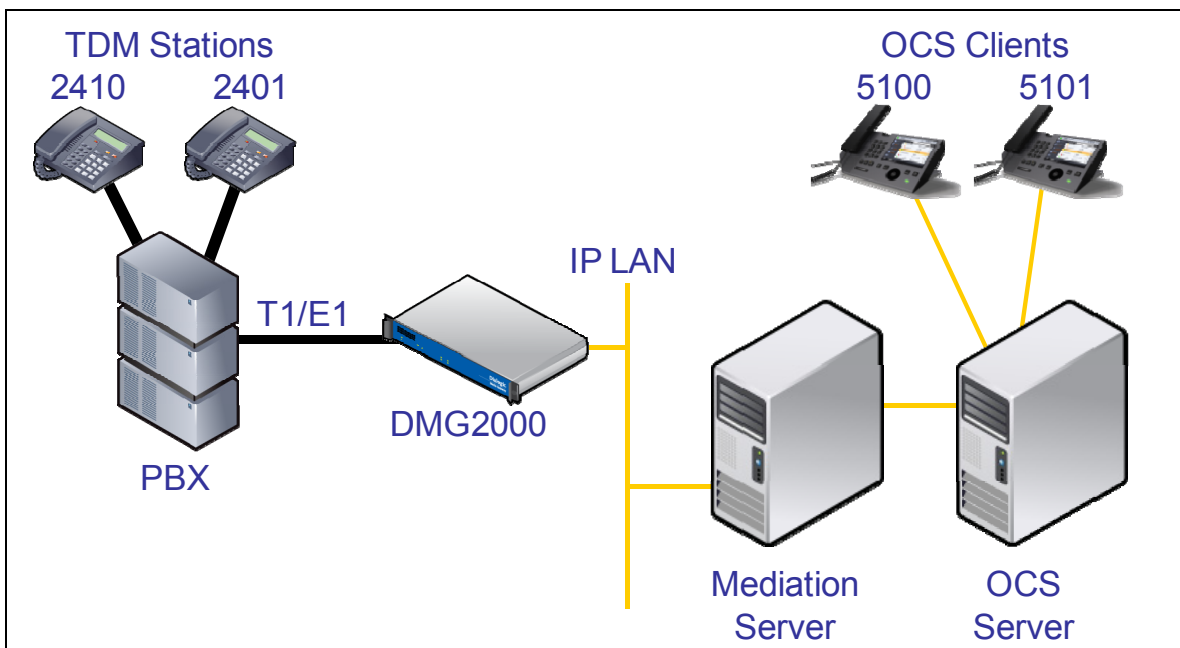
| | |
|------------------|-----------------------|
| PBX Vendor | Siemens Hipath |
| Model | 4000 |
| Software Version | Version 2.0 SMR9 SMP0 |
| Additional Notes | N/A |

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.

3.1.1 PBX Equipment Required

To support the E1 QSIG configuration as documented you need the ISDN E1- DIU-N2 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 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)

| 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/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.

| T1/E1 Port Selection | |
|-----------------------|-----------|
| Select Port to Modify | all ports |

| T1/E1 Configuration | |
|-----------------------------------|----------|
| Line Settings | |
| * Line Mode | E1 |
| * Signaling Mode | ISDN |
| * Telephony Port Interface Side | Terminal |
| E1 Line | |
| * Line Coding | HDB3 |
| * Framing | CRC_MF |
| * Selects Transmit Pulse Waveform | 75_Ohm |
| E1 ISDN protocol | |
| * ISDN Protocol | QSIG |
| ISDN Protocol Variant | None |
| Contiguous B-Channel | No |
| General ISDN Settings | |
| QSIG Protocol Specification | ISO |

- In the VoIP General page:
 - 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 |

- 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)

| VoIP Media Settings | | |
|------------------------------------|---------------|-------------------|
| Audio | | |
| * Audio Compression | G.711u/G.711a | |
| RTP Digit Relay Mode | RFC2833 | |
| RTP Fax/Modem Tone Relay Mode | Inband-Tone | |
| * RTP Source IP Address Validation | Off | |
| * RTP Source UDP Port Validation | Off | |
| Signaling Digit Relay Mode | Off | |
| Voice Activity Detection | Off | |
| RFC 3960 Early Media Support | OnDemand | |
| Codec | Frame Size | Frames per Packet |
| G.711 | 30 | 1 |
| G.723.1 | 30 | 1 |
| G.729AB | 10 | 3 |

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.

Router Configuration

Inbound TDM Rules
 Inbound VoIP Rules
 TDM Trunk Groups
 VoIP Host Groups

| VoIP Host Groups | | | | |
|------------------|-------------|---------------|----------------|---------------|
| | Name | Load-Balanced | Fault-Tolerant | Host Summary |
| Delete | HostGroup-1 | false | false | 192.168.1.21; |

The selected Host Group is referenced by the following rules:

[Inbound TDM] Inbound Local (Primary Route)

[Inbound TDM] Inbound Default (Primary Route)

| Host List | |
|--------------------|--------|
| <i>HostGroup-1</i> | |
| 192.168.1.21 | Delete |

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 screenshot shows the 'Router Configuration' interface. At the top, there are radio buttons for 'Inbound TDM Rules' (selected), 'Inbound VoIP Rules', 'TDM Trunk Groups', and 'VoIP Host Groups'. Below this is a table titled 'Inbound TDM Rules' with columns for 'Select', 'Enable', 'Rule Label', 'Request Type', and 'Trunk Group'. Two rules are listed: 'Inbound Local' and 'Inbound Default', both with 'Enable' checked and 'Request Type' and 'Trunk Group' set to 'Any'. Below the table are 'Add Rule' and 'Delete Rule' buttons.

The detailed configuration for the 'Inbound Local' rule is shown below. It includes sections for 'Inbound TDM Request Matching' (with 'CPID Matching' fields for Calling Number, Called Number, Calling Name, and Called Name, each with a '*' wildcard), 'Outbound Routes' (with 'Device Selection' for Outbound Destination, Host Group, and Route Method), and 'CPID Manipulation' (with fields for Calling Number, Called Number, Calling Name, and Called Name, each with a manipulation rule like 'S' or '+1716639'+D). At the bottom, there are radio buttons for 'Select Primary / Alternate Route' (Primary is selected) and 'Add Alternate Route' buttons.

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:

The screenshot displays the 'Router Configuration' interface. At the top, there are radio buttons for 'Inbound TDM Rules', 'Inbound VoIP Rules' (which is selected), 'TDM Trunk Groups', and 'VoIP Host Groups'. Below this is a table titled 'Inbound VoIP Rules' with columns for 'Select', 'Enable', 'Rule Label', 'Request Type', and 'Originating VoIP Host Address'. The first rule, 'Outbound Internal', is highlighted with a blue bar. Below the table are 'Add Rule' and 'Delete Rule' buttons.

The detailed configuration for the 'Outbound Internal' rule is shown below. It includes sections for 'Inbound VoIP Request Matching' (with CPID Matching fields for Calling Number, Called Number, Calling Name, and Called Name), 'Outbound Routes' (with Device Selection fields for Outbound Destination, Trunk Group, and Route Method), and 'CPID Manipulation' (with fields for Calling Number, Called Number, Calling Name, and Called Name). At the bottom, there is a 'Select Primary / Alternate Route' section with radio buttons for Primary, Alt-1, Alt-2, Alt-3, and Alt-4, and an 'Add Alternate Route' button.

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.

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 |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound Internal | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound Local | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound National | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound International | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Default | Any | * |

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

| Inbound VoIP Request Matching | | | | | |
|-------------------------------|---|---------------|-------------|-----------------|---|
| CPID Matching | | | | | |
| Calling Number | * | Called Number | x1716xxxxxx | 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"+rem(D,5) |
| Calling Name | S | Called Name | D |
| Redirect Number | R | Redirect Name | R |

Select Primary / Alternate Route

Primary
 Alt-1
 Alt-2
 Alt-3
 Alt-4

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 '+9xxxxxx' is sent.

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 |
|--------------------------|-------------------------------------|------------------------|--------------|-------------------------------|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound Internal | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound Local | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound National | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound International | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Default | Any | * |

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

Inbound VoIP Request Matching

| CPID Matching | | | |
|----------------|---|-----------------|------------|
| Calling Number | * | Called Number | x1xxxxxxxx |
| Calling Name | * | Called Name | * |
| | | Redirect Number | * |
| | | Redirect Name | * |

Outbound Routes

| Device Selection | | |
|--|--|---------------------------------------|
| Outbound Destination | TDM | Trunk Group |
| | | Any |
| Route Method | Bridged | |
| CPID Manipulation | | |
| Calling Number | S | Called Number |
| | | " +9"+rem(D,1) |
| Calling Name | S | Called Name |
| | | D |
| Redirect Number | R | |
| Redirect Name | R | |
| Select Primary / Alternate Route | | |
| <input checked="" type="radio"/> Primary | <input type="radio"/> Alt-1 | <input type="radio"/> Alt-2 |
| | <input type="radio"/> Alt-3 | <input type="radio"/> Alt-4 |
| | <input type="button" value="Add Alternate Route"/> | |
| | <input type="button" value="Delete"/> | <input type="button" value="Delete"/> |
| | <input type="button" value="Delete"/> | <input type="button" value="Delete"/> |

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 '+91xxxxxxxx'.

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 |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound Internal | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound Local | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound National | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Outbound International | Any | * |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Default | Any | * |

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"+rem(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

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 '+9011xxxxxxxx'.

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 a voice processing system are as follows:

- Activating the QSIG protocol.
- Administrating the Trunk configuration.
- Assigning an access code to the trunk.
- Setting up the subscribers stations.

Programming on the Hipath 4000 can be done either by using a text based GUI application or a command line interface. The programming here will be shown using the GUI commands.

6.1 Configure System Parameters

There are three types of E1 Interface Administration required to properly program the QSIG integration on the Siemens HiPath 4000 system for the T1/E1 IP Media Gateway product: Configuring System Parameters, Administering E1 Trunk Configuration, and Programming Access to the E1 Trunk.

Log into the Siemens HiPath 4000 system. Configure E1 Protocol

At prompt, type **DISP-PRODE:HD,PDSHORT**; and press [ENTER] to display a list of protocol descriptor numbers stored on the hard disk.

```
<di sp-prode: hd, pdshort;
```

| PDNO | PDSTRING | IDENT | VERSION |
|------|----------------------------------|-------------|------------------------|
| 8 | FRANKREICH VN3 NUMERIS | H/08 | BO-ELO. 10. 001 |
| 9 | S0-BUS DSS1 ETS 300 403) | H/08 | BO-EJO. 20. 001 |
| 10 | S0-BUS DKZN1 NO | H/40 | BO-ELO. 20. 002 |

Identify the protocol descriptor number that corresponds to the desired protocol descriptor string (S0-BUS DSS1 ETS); in this case, PDNO 9.

At prompt, type **DISP-PRODE:DB,PDSHORT**; and press [ENTER] to display a list of protocol descriptors stored in the database.

```
<di sp-prode: db, pdshort;
```

```
DISP-PRODE: DB, PDSHORT;
```

```
H500: AMO PRODE STARTED
```

| PDNAME | PDSTRING | IDENT | ACTIV | VERSION |
|-------------|----------------------------------|-------------|----------|------------------------|
| PD04 | EURO-ISDN REF-T NET-SIDE | H/08 | N | BO-EJO. 20. 004 |
| PD05 | S0-BUS DSS1 ETS 300 403) | H/08 | Y | BO-EJO. 20. 001 |
| PD06 | ISO QSIG Second ed. SS | H/08 | Y | BO-ELO. 20. 001 |

```
AMO-PRODE-111          PROTOCOL DESCRIPTOR FOR NETWORKING
```

```
DISPLAY COMPLETED;
```

Identify the protocol descriptor name that corresponds to the desired protocol descriptor string (S0-BUS DSS1 ETS); in this case, PD05.

Note: If a PDNAME does not exist for the desired protocol descriptor string, choose an unused protocol designator name, type **COPY-PRODE:PD,yy,PDxx**; where *yy* is the PDNO identified (in this case, 9) and *xx* is the unused PDNAME, and press [ENTER]. If all protocol designator names are already assigned, an existing configuration will need to be modified to work with the T1/E1 IP Media Gateway.

At the prompt, type **REG-PRODE**; and press [ENTER] to regenerate the protocol descriptor.

At the prompt, type **CHANGE-PRODE:VARTAB, ECMAV2,PDxx**; where xx is the PDNAME previously selected, and press [ENTER] to assign the ECMAV2 protocol variant to the chosen protocol descriptor name. The following message should be displayed:

AMO-PRODE-111 PROTOCOL DESCRIPTOR FOR NETWORKING REGENERATE COMPLETED;

Display and validate the **Protocol Variant** settings by entering **DISPLAY-PRODE:DB,VARTAB**; at the prompt, and pressing [ENTER].

```
DI SP-PRODE: DB, VARTAB;
H500:  AMO PRODE STARTED
      PVCDNO : 16 "UNITED STATES OF AMERICA " VERSION: BO-ENO. 10. 003
```

| PROTVAR | PDNAME | PDSTRING |
|---------|------------------------|------------------------------------|
| SBSS1 | PDNORM PDA1 PDA2 | PD04 EURO-1 SDN REF-T NET-SI DE |
| ECMAV2 | PDNORM PDA1 PDA2 | PD05 SO-BUS DSS1 ETS 300 403) |

6.2 Configure System Data

At the prompt, enter **CHANGE-ZAND:ALLDATA**; to change the System Data configuration.

Configure the **System Data** using the table below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| CHANGE-ZAND: System Data Configuration | | |
|---|----------|--|
| Prompt | Response | Description |
| ROUTOPTP | YES | Route Optimization only being used on primary route directions |
| ROUTOPTD | NO | Route Optimization Disabled |
| PNNO | xxx | Physical Node Number, where xxx is the PBX node number |
| PNODECD | xxx | Access Code for Physical Node, where xxx is the PBX node code |

Display and validate the changes, by typing **DISP-ZAND-ALLDATA**; at the prompt and pressing [ENTER].

```
<di sp-zand: all data
DI SP-ZAND: ALLDATA;
H500:  AMO ZAND  STARTED

GENERAL SYSTEM DATA:
=====
TRANSFER = EXTEND ,    ALERTN    = NO ,
AUTHUP    = TA ,
RNGBKTN   = YES ,        TRANSINH = NO ,
NIGHT     = TA ,
ITRFWD    = NO ,        HOLDTN   = MUSIC ,        ANATESIG = TONE ,
DSSLT     = 5 ,        CODTN    = YES ,        CONFSUB  = YES ,
DATEDIS   = MMDD,        CNTRYCD  = K ,        RCLLT    = NO ,
MELODY    = 1,         TRCD     = *69 ,        CPBLOWL  = 80 ,
CPBUPPL   = 100,        CUTHRU1A = YES ,        PREDIA   = YES ,
SIUANN    = D,         CO        = NO ,         COEXN    = 0 ,
CBKNO     = 99,        SEVDIG   = NO ,         PNNO     =            200,
DISPMODE  = MODE1,    PNODECD  = ***200,    ROUTOPTP = YES ,
ROUTOPTD  = NO ,        CALLOFF  = YES ,        PARARING = YES ,
DSSDEST   = YES ,        ONEPARTY = YES ,        MSGDELAY = NO ,
EXCOCO    = YES ,        TRDGTPR  = NO ,        COANN    = YES ,
```

```

HOTDI AL = NO ; TRANSTOG = NO ; NOCFW = YES ;
HOLDHUNT = YES ; POSTDDLY = NO ; EXBUSYOV = NO ;
OVRMST = NO ; OVRHUNT = NO ; CONI TPRO = NO ;
RECHUNT = YES ; CALLACMP = NO ;

AMO-ZAND -111 SYSTEM DATA
DI SPLAY COMPLETED;

```

6.3 Administer E1 Trunk Configuration

At the prompt type **DISP-BCSU:TBL,1;** and press [ENTER] to see all installed boards and identify the E1 board (DIU-N2).

```

<di sp-bcsu: tbl , 1 , ,
SLOT =
DISP-BCSU: TBL, 1, , ;
H500: AMO BCSU STARTED

ADDRESS : LTG 1 LTU 1 SOURCE GROUP 1 ALARMNO-LTU 0
-----
PEN  ASSIGNED  MODULE  FCT  S  H  AL-  I  N  S  E  R  T  E  D  H  W  M  O  D  U  L  E  S  T  A  T  U  S
     MODULE   TYPE    ID  C  Y  N  O      MODULE      STATE INFO
-----
19  Q2468-X    RG-USA           0  Q2468-X      1  -  -  READY
25  Q2246-X    SLMA24           A  0  Q2246-X      1  -10 -  READY
31  Q2168-X    SLM024          1  A  0  Q2168-X      1  -10 -  READY
37  Q2168-X    SLM024          1  A  0  *           NPR
43  Q2168-X    SLM024          1  A  0  *           NPR
49  Q2216-X    DIU2U-M         6  A  0  Q2216-X      1  -05 -  READY
55  AVAI LABLE           0  AVAI LABLE
61  Q2485-X    TMC16P           A  0  Q2485-X      1  D429-B  READY
67  AVAI LABLE           0  AVAI LABLE
73  Q2266-X    LTUCA            0  Q2266-X      1  -10 -  READY
79  Q2316-X    STMI 2          1  A  0  Q2316-X      1  -05 -  READY
-----
I P ADDRESS : 165.218. 1.254  B-CHANNELS : 60  BCHLCNT : 60
-----
85  AVAI LABLE           0  AVAI LABLE
91  AVAI LABLE           0  AVAI LABLE
97  AVAI LABLE           0  AVAI LABLE
103 Q2196-X    DIU-N2          1  A  0  Q2196-X      1  -F1 -  READY
109 AVAI LABLE           0  AVAI LABLE
115 AVAI LABLE           0  AVAI LABLE
121 AVAI LABLE           0  AVAI LABLE

AMO-BCSU -111 BOARD CONFIGURATION, SWITCHING UNIT
DI SPLAY COMPLETED;

```

At the prompt, type **ADD-BUEND;** and press [ENTER] to add the Trunk Group configuration.

Configure the **Trunk Group** using the table below; type the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [Enter].

| ADD-BUEND: Trunk Group Configuration | | |
|--------------------------------------|----------|--|
| Prompt | Response | Description |
| TGRP | xxx | Trunk Group Number, where xxx is any available trunk group number |
| NAME | yyy | Trunk Group Name, where yyy is any assigned name for the trunk group |
| NO | 30 | Maximum number of trunks to be allocated |
| TRACENO | 0 | Maximum number of trunks in a trunk group (0 = default) |
| ACDTHR | * | ACD Threshold (* = default,all trunks, no limit) |
| PRIONO or PRIORITY | 2 | Priority Class |
| TDDRFLAG | OFF | Traffic Dependent Dynamic Routing Flag |

| | | |
|----------|---------|--|
| GDTRRULE | 0 | General Digit Translation Rule (0 = default) |
| ACDPMGRP | 0 | ACD Phone Mail Group (0 = default) |
| CHARCON | NEUTRAL | Character Conversion of Name (NEUTRAL = no character conversion) |

Display and validate the **Trunk Group** settings by typing **DISP-BUEND:xxx**; at the prompt, where xxx is the number of the trunk group just added (ex: DISP-BUEND:102;), and pressing [ENTER].

Note: The table below may not contain information on allocated trunks, if the Digital Trunk (TDCSU) settings have not been configured.

```

<di sp-buend: 102;
DI SP-BUEND: 102;
H500: AMO BUEND STARTED

-----
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| TGRP NUMBER :   103 | TGRP NAME   : ECMA | MAXIMUM NO. :   30 |
|                   | CHARCON    : NEUTRAL |                   |
| SUBGROUP NO. :     4 | DEVICE TYPE : S2CONN | TRACENO      :     0 |
| SEARCH MODE  : CIRCULAR |                   | ACD THRESHOLD : * |
| NUMBER OF ASSOCIATED ROUTES : 2 |                   | PRIORITY     :     2 |
| TDDRFLAG    : OFF | TDDRTHRESHOLD : 0 | SOURCEGROUP I DX :     1 |
| GDTRRULE    : 0 | ACDPMGRP    : 0 |                   |
| THE FOLLOWING TRUNKS (LTG-LTU-SLOT-CCT) HAVE BEEN ALLOCATED: |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1- 1-103-0 | 1 | 1- 1-103-0 | 2 | 1- 1-103-0 | 3 |
| 1- 1-103-0 | 4 | 1- 1-103-0 | 5 | 1- 1-103-0 | 6 |
| 1- 1-103-0 | 7 | 1- 1-103-0 | 8 | 1- 1-103-0 | 9 |
| 1- 1-103-0 | 10 | 1- 1-103-0 | 11 | 1- 1-103-0 | 12 |
| 1- 1-103-0 | 13 | 1- 1-103-0 | 14 | 1- 1-103-0 | 15 |
| 1- 1-103-0 | 16 | 1- 1-103-0 | 17 | 1- 1-103-0 | 18 |
| 1- 1-103-0 | 19 | 1- 1-103-0 | 20 | 1- 1-103-0 | 21 |
| 1- 1-103-0 | 22 | 1- 1-103-0 | 23 | 1- 1-103-0 | 24 |
| 1- 1-103-0 | 25 | 1- 1-103-0 | 26 | 1- 1-103-0 | 27 |
| 1- 1-103-0 | 28 | 1- 1-103-0 | 29 |                   |
+-----+-----+-----+-----+-----+-----+-----+-----+
AMO-BUEND-111 TRUNK GROUP
DI SPLAY COMPLETED;

```

At the prompt, type **ADD-COT**; and press [ENTER] to add the Class of Trunk for Call Processing configuration.

Configure the **Class of Trunk for Call Processing** using the tables below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

Note: The response for PAR should not have spaces, rather it should be typed as all one string (ex: ROPT&RCL&USD&...). Spaces appear in the table for readability only. If the interface does not permit multiple parameters to be set at one time, the **ADD-COT**; command, along with the action specified in the table below, can be repeated for each PAR value individually.

| ADD-COT: Class of Trunk for Call Processing Configuration | | |
|---|--|---|
| Prompt | Response | Description |
| COTNO | xxx | Class of Trunk Number, where xxx is any available number (0-255) |
| PAR | ROPT & RCL & USD & KNOR & CEBC & CBBN & CBFN & IEVT & | -Indicates which lines support route optimization -Recall when used hangs up in consultation mode -Unrestricted Suffix Dialing -If a caller is busy, network-wide override/call waiting is possible -Transferring party can transfer call before or after answer -Automatic callback on busy network-wide -Automatic callback on free network-wide -Diagnosis parameter for registration of implausible events |

| | | |
|-----|---|---|
| | BLOC & LWNC & NLCR & TSCS & DFNN & NLRD & LINO & LRPM & NOSD & NTON; | -When pulse series counter limit is reached, sending_complete = true - Indicates a line without node code transport -Trunk parameters for LCR cannot be transmitted on the line -TSC-Signaling for network-wide features in digital networks -Default node number of line must be used -Allow use of LCR authorizations if LCR cannot be transmitted -Line with implicit numbers -Last redirecting number is send to phonemail -No simple dialog available -No tone will be supplied for analog incoming calls |
| DEV | S2CONN | Device on Trunk (S2CONN = Digital tie trunk circuit with S2-interface) |

Display and validate the **Class of Trunk for Call Processing** settings by typing **DISP-COT:xxx,L;** at the prompt, where xxx is the COTNO used in this step and L is (L)ong format (ex: DISP-COT:103,L;), and pressing [ENTER].

```
<di sp-cot: 103, L;
DISP-COT: 103, L;
H500: AMO COT STARTED

COT: 103 INFO:
DEVICE: INDEP SOURCE: DB
PARAMETER:
RECALL IF USER HANGS UP IN CONSULTATION CALL RCL
UNRESTRICTED SUFFIX DIALING USD
KNOCKING OVERRIDE POSSIBLE KNOR
CALL EXTEND FOR BUSY, RING OR CALL STATE CEBC
NETWORKWIDE AUTOMATIC CALLBACK ON BUSY CBBN
NETWORKWIDE AUTOMATIC CALLBACK ON FREE CBFN
REGISTRATION OF IMPLAUSIBLE EVENTS IEVT
END-OF-DIAL FOR BLOCK IS SET BLOC
SEND NO NODE NUMBER TO PARTNER LWNC
CONNECTION TO ROUTE OPTIMIZATION NODE ROPT
INCOMING CIRCUIT FROM SYSTEM WITHOUT LCR NLCR
TSC-SIGNALING FOR NETWORKWIDE FEATURES (MANDATORY) TSCS
USE DEFAULT NODE NUMBER OF LINE DFNN
INCOMING CIRCUIT FROM SYSTEM WITHOUT LCR (DATA) NLRD
LINE WITH IMPLICIT NUMBERS LINO
LAST REDIRECTING NUMBER IS SEND TO PHONEMAIL LRPM
NO SIMPLE DIALOG AVAILABLE NOSD
NO TONE NTON

AMO-COT -111 CLASS OF TRUNK FOR CALL PROCESSING
DISPLAY COMPLETED;
```

At the prompt, type **ADD-COP;** and press [ENTER] to add the Class of Parameter for Device Handler configuration.

Configure the **Class of Parameter for Device Handler** using the tables below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

Note: The response for PAR should not have spaces, rather it should be typed as all one string (ex: L3AR&LKNQ&RRST). Spaces appear in the table for readability only. If the interface does not permit multiple parameters to be set at one time, the **ADD-COP;** command, along with the action specified in the table below, can be repeated for each PAR value individually.

| ADD-COP: Class of Parameter for Device Handler | | |
|--|---------------------------|--|
| Prompt | Response | Description |
| COPNO | xxx | Class of Parameter, where xxx is any available number (0-255) |
| PAR | SFRM & SDL & TIM1 & | Parameters to be assigned: Special Mode Line Line transmits start dial signal to indicate incoming seizure Start dialing signal timer 1 |

| | | |
|--|-------|------------------------------------|
| | L3AR; | Registration of layer 3 advisories |
|--|-------|------------------------------------|

Display and validate the **Class of Parameter for Device Handler** settings by entering **DISP-COP:xxx,L;** at the prompt, where xxx is the COPNO used in this step and L is (L)ong format (ex: DISP-COP:103,L;), and pressing [ENTER].

```
<di sp-cop: 103, L;
DISP-COP: 103, L;
H500: AMO COP STARTED

COP: 103 INFO:
DEVI CE: INDEP SOURCE: DB
PARAMETER:
LINE WITH START-DIAL-SIGNAL SDL
SPECIAL MODE SFRM
REGISTRATION OF LAYER 3 ADVISORIES L3AR
START-DIALING-SIGNAL TIMER 1 (AMO DTIM2: PARAMETER STADIAL1) TIM1

AMO-COP -111 CLASS OF PARAMETER FOR DEVICE HANDLER
DI SPLAY COMPLETED;
```

At the prompt, type **ADD-COSSU;** and press [ENTER] to add the Class of Service configuration.

Configure the **Class of Service** using the tables below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

Note: The response for ADTE should not have spaces, rather it should be typed as all one string (ex: TA&TNOTCR&TTT). Spaces appear in the table for readability only. If the interface does not permit multiple parameters to be set at one time, the **ADD-COSSU;** command, along with the action specified in the table below, can be repeated for each PAR value individually.

| ADD-COSSU: Class of Service | | |
|-----------------------------|--------------------------|--|
| Prompt | Response | Description |
| COS | Xxx | Class of COS, where xxx is any available number (0-255) |
| AVCE | TA & TNOTCR & TTT; | Voice Classmarks to be added: Unrestricted Toll Access TIE line with no toll code restriction Transfer Trunk to Trunk |

Display and validate the **Class of Service** settings by entering **DISP-COSSU: COS,xxx,L;** at the prompt, where xxx is the COS used in this step and L is (L)ong format (ex: DISP-COSSU: COS,100,L;), and pressing [ENTER].

```
<di sp-coossu: cos, 30, L;
DISP-COSSU: COS, 30, L;
H500: AMO COSSU STARTED

+-----+-----+-----+-----+
| COS | VOICE | FAX | DTE |
+-----+-----+-----+-----+
| 30 | > | | |
| | | NOCO | NOCO |
| | | NOTIE | NOTIE |
| | | TTT | |
+-----+-----+-----+-----+

AMO-COSSU-111 CLASSES OF SERVICE
DI SPLAY COMPLETED;
```

At the prompt, enter **ADD-TDCSU**; to add the Digital Trunk configuration.

Configure the **Digital Trunk** using the table below; enter the provided Response at the appropriate Prompt

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| ADD-TDCSU: Digital Trunk Configuration | | |
|---|-----------------|---|
| Prompt | Response | Description |
| OPT | NEW | Option to create a new B-channel group |
| PEN | x-xx-xxx-x | Port Equipment Number, where x-xx-xxx-x is the location of the E1 board |
| COTNO | xxx | Class of Trunk, where xxx is the class of trunk number (COTNO) assigned in Step 4 of Administer E1 Trunk Configuration |
| COPNO | xxx | Class of Parameter, where xxx is the class of parameter number (COPNO) assigned in Step 5 of Administer E1 Trunk Configuration |
| DPLN | 0 | Dial Plan Group |
| ITR | 0 | Internal Traffic Restriction Group |
| COS | xxx | Class of Service, where xxx is the class of service (COS) assigned in Step 6 of Administer E1 Trunk Configuration |
| LCOSV | 1 | Least Cost Routing Class of Service for Voice |
| LCOSD | 5 | Least Cost Routing Class of Service for Data |
| CCT | yyy | Circuit / Trunk Information for Maintenance, where yyy is a text string, up to 12 characters (ex. E1 ECMA) |
| DESTNO | xxx | Destination System Number, where xxx is the trunk group (TGRP) number assigned in Step 3 of Administer E1 Trunk Configuration |
| PROTVAR | ECMAV2 | Protocol Variant (ECMAV2 = CorNet-NQ Issue 2.1 Dec. 96 basis ETSI) |
| SEGMENT | 1 | Segmentation |
| DEDSVC | NONE | Dedicated Service |
| TRTBL | GDTR | Translation Table (GDTR = General Digital Translation) |
| SIDANI | N | SID / ANI service allowed (N = No) |
| ATNTYP | TIE | Attenuation Type (TIE = TIE line) |
| CBMATTR | NONE | Central Byte Manipulation |
| TCHARG | N | Telecharging per call (N = No) |
| SUPPRESS | 0 | Number of Digits to be Suppressed |
| TRACOUNT | 31 | Transit Counter |
| SATCOUNT | MANY | Number of Satellite Hops |
| NNO | zz-yyy-xxx | Virtual Node Number of adjacent node, where xxx is the trunk group (TRGP) number assigned in Step 3 of Administer E1 Trunk Configuration, known as a level 0 node, and yyy and zz represent level 1 and 2 nodes. For most cases, 0-0-xxx (or xxx) will be used. |
| ALARMNO | 0 | Alarm Number |
| FIDX | 1 | Index to fault type combination |
| CARRIER | 1 | Network Carrier |
| ZONE | EMPTY | Tariff Zone |
| COTX | xxx | Class of Trunk of adjacent PBX, where xxx is the class of trunk number (COTNO) assigned in Step 4 of Administer E1 Trunk Configuration |
| FWDX | 10 | Maximum Number of Diversions |
| CHIMAP | N | Multiple Bearer Channel (N= No) |
| DOMTYPE | UNKNOWN | Partner Domain Type |
| DOMAINNO | 0 | Partner Domain Number |
| UUSCCX | 16 | UUS Congestion Control X (16 = default) |

| | | |
|----------|-----------------|--|
| UUSCCY | 8 | UUS Congestion Control Y (8 = default) |
| FNIDX | 1 | Index to Assumption Table (0-255) |
| NWMUXTIM | 10 | Supervision Time (10 = default) |
| CLASSMRK | EC&G711&G729OPT | Classmarks for IP Connections (EC = Echo Cancellation, G711 = G.711 voice compression, G729OPT = optional G.729A voice compression) |
| TGRP | xxx | Trunk Group Number, where xxx is the trunk group (TGRP) number assigned in Step 3 of Administer E1 Trunk Configuration |
| SRCHMODE | DSC | Search Mode (DSC = linear, descending order) |
| INS | Y | In-service activation of the circuit (Y = Yes) |
| DEV | S2CONN | Device (S2CONN = digital tie trunk circuit with s2-interface) |
| BCHAN | 1&&30 | B-Channels |
| BCNEG | N | B-Channel Negotiation (N = No) |
| BCGR | 1 | B-Channel Group |
| LWPAR | 12 | Loadware Parameter Block |

Display and validate the **Digital Trunk** settings by typing **DISP-TDCSU: x-x-xxx-x;** at the prompt, where x-x-xxx-x is the number of the Port Equipment Number (PEN) just added (ex: DIS-TDCSU:1-1-103-0;), and pressing [ENTER].

```

<di sp-tdcsu: 1-1-103-0;
DI SP-TDCSU: 1-1-103-0;
H500: AMO TDCSU STARTED
-----
DEV = S2CONN          DIGITAL TRUNK (FORMAT=L) -----
PEN = 1-01-103-0     TGRP = 103
-----
PROTVAR = ECMAV2      INS = N          SRCHMODE = CIR
COTNO = 103           COPNO = 103        DPLN = 0
LTR = 0               COS = 30          LCOSV = 1
LCOSD = 1            CCT = E1 ECMA    DESTNO = 103
SEGMENT = 1          DEDSCC =          DEDSVC = NONE
FACILITY =          DI TIDX =          SRTIDX =
TRTBL = GDTR         SI DANI = N       ATNTYP = TIE
CBMATR = NONE        NWMUXTIM = 10    TCHARG = N
SUPPRESS = 0         DGTPR =          CHI MAP = N
ISDNIP =            ISDNNP =          PNPAC =
PNPL2P =             PNPL1P =          NNO = 103
TRACOUNT = 31        SATCOUNT = MANY CARRIER = 1
ALARMNO = 0          FIDX = 1          FWDX = 10
ZONE = EMPTY         COTX = 103        TPROFNO =
DOMTYPE = UNKNOWN   DOMAINNO = 0      CCHDL =
INI GHT =            UUSCCY = 8        FNI DX = 1
UUSCCX = 16          & G711 & G729OPT SRCGRP =
CLASSMRK = EC
TCCID =
-----
BCNEG = N            BCGR = 1          LWPAR = 12
LWPP = 0             LWLT = 0         LWPS = 0
LWR1 = 0             LWR2 = 0
DMCALLWD =          DMCSEC =
SVCDDOM =
BCHAN = 1 && 30
-----
AMOUNT OF B-CHANNELS IN THIS DISPLAY-OUTPUT: 29
AMO-TDCSU-111      DIGITAL TRUNKS
DISPLAY COMPLETED;

```

6.4 Program Access to the E1 Trunk

Configure Digital Analysis (Dial Plan)

At the prompt, enter **ADD-WABE** to add the Digit Analysis configuration.

Configure the **Digital Analysis** using the tables below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| ADD-WABE: Digit Analysis Configuration | | |
|--|----------|--|
| Prompt | Response | Description |
| CD | xxx | Station Number, where xxx is the PBX Node code, same as Access Code for Physical Node Number used in Step 3 of Configuring System Parameters |
| DAR | OWNNODE | Digit Analysis Result (OWNNODE = Code number for own node) |

At the prompt, enter **ADD-WABE** to continue adding the Digit Analysis configuration.

Configure the **Digital Analysis** using the tables below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| ADD-WABE: Digit Analysis Configuration - Neutral Route | | |
|--|----------|--|
| Prompt | Response | Description |
| CD | xxx | Station Number, where xxx is an available Neutral Route number |
| DAR | NETRTE | Digit Analysis Result (NETRTE = Auxiliary DAR for Networking) |

At the prompt, enter **ADD-WABE** to continue adding the Digit Analysis configuration.

Configure the **Digital Analysis – Phone Mail Route** using the tables below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| ADD-WABE: Digit Analysis Configuration - Phone Mail Route | | |
|---|----------|--|
| Prompt | Response | Description |
| CD | xxx | Station Number, where xxx is an available Phone Mail Route number |
| DAR | STN | Digit Analysis Result (DTN = Station) |
| DESTNO | xxx | Destination Number, where xxx is the Neutral Route number assigned above |

Display and validate the changes by typing **DISPLAY-WABE:GEN**; at the prompt and pressing [ENTER].

```
<di sp-wabe: gen;
DI SP-WABE: GEN, , , ;
H500: AMO WABE STARTED
```

| DIGIT INTERPRETATION | | VALID FOR ALL DIAL PLANS | |
|----------------------|---|--------------------------|--|
| CODE | CALL PROGRESS STATE 1 1111 1112 22 0 12345 67890 12345 67890 12 | DIGIT ANALYSIS RESULT | RESERVED/CONVERT DNI /ADD-INFO *-OWN NODE |
| 0 |* | CCS | |
| 0 |* | ATNDI ND | R |
| 1000 - 1003 | **** * * * * * | ATNDI ND | |
| 1004 - 1005 |* | ATNDI D | |
| 1004 - 1005 |* | ATNDI D | |
| 1050 - 1051 | **** * * * * * | ATND | |
| | | STN | |
| 1052 - 1053 |* | STN | DESTNO 0 |
| | | | DNNO 0- 0-200* |
| | | | R |
| | | | DESTNO 0 |
| | | | DNNO 0- 0-200* |
| 1234 |* | DFWDVCE | |
| 136 |* | OWNNODE | |
| 20 |* | NETRTE | |
| 2000 - 2009 | **** * * * * * | STN | |
| | | | DESTNO 0 |
| | | | DNNO 0- 0-200* |

| DIGIT INTERPRETATION | | VALID FOR ALL DIAL PLANS | | | | |
|-------------------------------|---------------------|--------------------------|-------|----------------|-----------------------|---|
| CODE | CALL PROGRESS STATE | | | | DIGIT ANALYSIS RESULT | RESERVED/CONVERT DNI /ADD-INFO * =OWN NODE |
| | 0 | 12345 | 67890 | 12345 67890 12 | | |
| 2010 - 2012 | . **** | ***** | ** | * | STN | R DESTNO 0 DNNNO 0- 0-200* |
| 2013 - 2019 | . **** | ***** | ** | * | STN | DESTNO 0 DNNNO 0- 0-200* |
| 2020 - 2021 | . **** | ***** | ** | * | STN | R DESTNO 0 DNNNO 0- 0-200* |
| 2022 - 2043 | . **** | ***** | ** | * | STN | DESTNO 0 DNNNO 0- 0-200* |
| 2044 - 2095 | . **** | ***** | ** | * | STN | R DESTNO 0 DNNNO 0- 0-200* |
| 22 - 23 2500 | * | | | * | NETRTE HUNT | DESTNO 0 DNNNO 0- 0-200* |

| DIGIT INTERPRETATION | | VALID FOR ALL DIAL PLANS | | | | |
|------------------------------|---------------------|--------------------------|-------|----------------|---------------------------------|--|
| CODE | CALL PROGRESS STATE | | | | DIGIT ANALYSIS RESULT | RESERVED/CONVERT DNI /ADD-INFO * =OWN NODE |
| | 0 | 12345 | 67890 | 12345 67890 12 | | |
| 2600 2700 2800 3000 | . **** | ***** | ** | * | HUNT AHTVCE DHTVCE STN | R DESTNO 20 DNNNO 0- 0-100 PDNNO 0- 0-100 |
| 3002 | . **** | ***** | ** | * | STN | DESTNO 20 DNNNO 0- 0-100 PDNNO 0- 0-100 |
| 3003 | . **** | ***** | ** | * | STN | DESTNO 22 DNNNO 0- 0- 0 PDNNO 0- 0-102 |

| DIGIT INTERPRETATION | | VALID FOR ALL DIAL PLANS | | | | |
|---|---------------------|--------------------------|-------|----------------|---|---|
| CODE | CALL PROGRESS STATE | | | | DIGIT ANALYSIS RESULT | RESERVED/CONVERT DNI /ADD-INFO * =OWN NODE |
| | 0 | 12345 | 67890 | 12345 67890 12 | | |
| 3005 | . **** | ***** | ** | * | STN | R DESTNO 0 DNNNO 0- 0-200* |
| 3006 | . **** | ***** | ** | * | STN | DESTNO 23 DNNNO 0- 0- 0 PDNNO 0- 0-103 |
| 40 51 78 - 79 8 - 9 ***200 #94 #96 #*1 #*2 #*3 | . **** | ***** | ** | * | TIE DFWDVCE TIE TIE OWNNODE AFWDB AFWDBNA MWACT MBON MBOFF | |

| DIGIT INTERPRETATION | | VALID FOR ALL DIAL PLANS | | | | |
|----------------------------------|---------------------|--------------------------|-------|----------------|---|---|
| CODE | CALL PROGRESS STATE | | | | DIGIT ANALYSIS RESULT | RESERVED/CONVERT DNI /ADD-INFO * =OWN NODE |
| | 0 | 12345 | 67890 | 12345 67890 12 | | |
| #*4 #*5 #*8 ##8 ##90 | * | | | * | AFWDB DFWDVCE MWCANORI CTLS DFWDVCE | |

AMO-WABE -111 DI ALLING PLANS, FEATURE ACCESS CODES
DISPLAY COMPLETED;

At the prompt, type **ADD-RICHT**; to add the Trunk Routing configuration.

Configure the **Trunk Routing – Neutral Route** using the table below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| ADD-RICHT: Trunk Routing Configuration - Neutral Route | | |
|---|-----------------|--|
| Prompt | Response | Description |
| MODE | CD | Route Address Mode (CD = code) |
| LRTE | xxx | Least Cost Routing Number, where xxx is the Neutral Route code assigned in Step 2 of Program Access to the E1 Trunk (ex. 23) |
| CD | xxx | Routing Code, where xxx is the same as Least Cost Routing Number (LRTE) from above |
| SVC | ALL | Communication Service (ALL = data, fax and voice) |
| NAME | yyy | Name of Route, where yyy is a text string, up to 16 characters (ex. E1 ECMA) |
| TGRP1 | xxx | Trunk Group Number 1, where xxx is the trunk group (TGRP) number from Step 3 of Administer E1 Trunk Configuration |
| DESTNO | xxx | Destination Number, where xxx is the same as Least Cost Routing Number (LRTE) from above |
| DNNO | xxx | Destination Node Number, where xxx is the same as Trunk Group Number (TGRP) from above |
| ROUTOPT | YES | Route Optimization possible |
| REROUT | YES | Set Reroute Sign |
| PDNNO | xxx | Physical Destination Node Number, where xxx is the same as Trunk Group Number 1 (TGRP1) from above |
| CHARCON | NEUTRAL | Character Conversion of Name (NEUTRAL = no character conversion) |

At the prompt, type **ADD-RICHT**; to continue adding the Trunk Routing configuration.

Configure the **Trunk Routing – LRC Route** using the table below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| ADD-RICHT: Trunk Routing Configuration - LCR Route | | |
|---|-----------------|--|
| Prompt | Response | Description |
| MODE | LRTENEW | Route Address Mode (LRTENEW = Add New LCR Route) |
| LRTE | xxx | Index of Service Access Number, where xxx is an available Least Cost Route; try to match trunk group (TGRP) number |
| TGRP | xxx | Trunk Group Number, where xxx is the trunk group (TGRP) number from Step 3 of Administer E1 Trunk Configuration |
| DNNO | xxx | Destination Node Number, where xxx is the same as Trunk Group Number (TGRP) from above |
| ROUTOPT | YES | Route Optimization possible |
| REROUT | YES | Set Reroute Sign |

At the prompt, type **ADD-RICHT**; to continue adding the Trunk Routing configuration.

Configure the **Trunk Routing – Phone Mail Route** using the table below; enter the provided Response at the appropriate Prompt and press [ENTER].

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| ADD-RICT: Trunk Routing Configuration - Phone Mail Route | | |
|--|----------|---|
| Prompt | Response | Description |
| MODE | PM | Route Address Mode (PM = Phone Mail) |
| IDX | xxx | Index of Service Access Number, where xxx is an available Phone Mail index number |
| SAN | xxx | Service Access Number, where yyy is the Neutral Route Number assigned in Step 2 of Program Access to the E1 Trunk |
| NAME | yyy | Name of Route, where yyy is a text string, up to 16 characters (ex. E1 ECMA) |

Display and validate the changes by typing **DISPLAY-RICT:ALL**; at the prompt and pressing [ENTER].

```

<di sp-ri cht: al l ;
DI SP-RI CHT: ALL;
H500: AMO RICHT STARTED

```

| ROUTES FOR ALL DPLN | | | | | | | | | | SVC = VCE | |
|---------------------|--|--------------|--------|------|-----|-----|------|------|------------------|-----------|---------------|
| CODE | NAME, COMAX, DESTNO AND CPS | TGRP CCNO | P L | DTMF | | | LRTE | CPAR | F W D B | | |
| | | | | B | CNV | DSP | | | | TEXT | PULS PAUSE |
| 20 NEUTRAL | OSIG FWD DNN0: 100 PDNNO: 100 DESTNO : 20 ROUTOPT : YES REROUT : YES | 100 | | W | W | | | 20 | | | |
| 22 NEUTRAL | ECMA E1 DNN0: 0 PDNNO: 102 DESTNO : 22 ROUTOPT : YES REROUT : YES | 102 | | W | W | | | 22 | | | |
| 23 NEUTRAL | ECMA E1 PDNNO: 103 DESTNO : 23 ROUTOPT : YES REROUT : YES | 103 | | W | W | | | 23 | | | |

| ROUTES FOR ALL DPLN | | | | | | | | | | SVC = FAX | |
|---------------------|--|--------------|--------|------|-----|-----|------|------|------------------|-----------|---------------|
| CODE | NAME, COMAX, DESTNO AND CPS | TGRP CCNO | P L | DTMF | | | LRTE | CPAR | F W D B | | |
| | | | | B | CNV | DSP | | | | TEXT | PULS PAUSE |
| 20 NEUTRAL | OSIG FWD DNN0: 100 PDNNO: 100 DESTNO : 20 ROUTOPT : YES REROUT : YES | 100 | | | | | | 20 | | | |
| 22 NEUTRAL | ECMA E1 DNN0: 0 PDNNO: 102 DESTNO : 22 ROUTOPT : YES REROUT : YES | 102 | | | | | | 22 | | | |
| 23 NEUTRAL | ECMA E1 PDNNO: 103 DESTNO : 23 ROUTOPT : YES REROUT : YES | 103 | | | | | | 23 | | | |

| ROUTES FOR ALL DPLN | | | | | | | | | | SVC = DTE | |
|---|--|--------------|---------|------|-----|-----|-------|------|------|------------------|---------------|
| CODE | NAME, COMAX, DESTNO AND CPS | TGRP CCNO | P L | DTMF | | | | LRTE | CPAR | F W D B | |
| | | | | B | CNV | DSP | TEXT | | | | PULS PAUSE |
| 20 NEUTRAL | OSIG FWD DNN0: 100 PDNNO: 100 DESTNO : 20 ROUTOPT : YES REROUT : YES | 100 | | | | | | 20 | | | |
| 22 NEUTRAL | ECMA E1 DNN0: 0 PDNNO: 102 DESTNO : 22 ROUTOPT : YES REROUT : YES | 102 | | | | | | 22 | | | |
| 23 NEUTRAL | ECMA E1 PDNNO: 103 DESTNO : 23 ROUTOPT : YES REROUT : YES | 103 | | | | | | 23 | | | |
| LRTE = 100 NAME = OSIG (NEUTRAL) LSVC = ALL DNN0 = 100 PDNNO = 100 DESTNO = 100 ROUTOPT = YES REROUT = YES PLB = NO FWDBL = NO DTMFCNV = FIX DTMFDSP = WITHOUT DTMFTEXT = DTMFPULS = PP80 BUGS = LIN ROUTATT = NO MAI NGRP = 7 EMCYRTT = NO CONFTONE = NO RERINGRP = NO RTENO = 7 INFO = NOPRCFWD = NO NI TO = NO | | | | | | | | | | | |
| CLNAMEDL = NO | | | | | | | | | | | |
| TGRP = 100 LDAT OSIG (NEUTRAL) SUBGROUP = 2 | | | | | | | | | | | |
| LRTE = 101 NAME = NI 2 (NEUTRAL) LSVC = ALL DNN0 = 101 PDNNO = 101 DESTNO = 101 ROUTOPT = YES REROUT = YES PLB = NO FWDBL = NO DTMFCNV = FIX DTMFDSP = WITHOUT DTMFTEXT = DTMFPULS = PP80 BUGS = LIN ROUTATT = YES MAI NGRP = 8 EMCYRTT = NO CONFTONE = NO RERINGRP = NO RTENO = 8 INFO = NOPRCFWD = NO NI TO = NO CLNAMEDL = NO | | | | | | | | | | | |
| TGRP = 101 LDAT NI 2 (NEUTRAL) SUBGROUP = 3 | | | | | | | | | | | |
| LRTE = 103 NAME = ECMA E1 (NEUTRAL) LSVC = ALL DNN0 = 103 PDNNO = 103 ROUTOPT = YES REROUT = YES PLB = YES FWDBL = NO DTMFCNV = FIX DTMFDSP = WITHOUT DTMFTEXT = DTMFPULS = PP300 BUGS = LIN ROUTATT = NO MAI NGRP = 13 EMCYRTT = NO CONFTONE = NO RERINGRP = NO RTENO = 13 INFO = NOPRCFWD = NO NI TO = NO CLNAMEDL = NO | | | | | | | | | | | |
| TGRP = 103 LDAT E1 ECMA (NEUTRAL) SUBGROUP = 11 | | | | | | | | | | | |
| IDX | SAN | | NAME | | | | TYPE | | | | |
| 1 | 3002 | | OSIG | | | | OTHER | | | | |
| 2 | 3005 | | | | | | OTHER | | | | |
| 3 | 3003 | | E1 OSIG | | | | OTHER | | | | |
| 4 | 3006 | | ECMA E1 | | | | OTHER | | | | |
| AMO-RI CHT-111 TRUNK ROUTING DISPLAY COMPLETED; | | | | | | | | | | | |

6.5 Configure Subscriber for MWI

At prompt, type **CHANGE-SBCSU:XXXX**; where XXXX is the extension of the subscriber to modify and press [ENTER].

Configure the **Subscriber** using the tables below; enter the provided Response at the appropriate Prompt.

Note: Any field not listed below can remain the default setting by pressing [ENTER].

| CHANGE-SBCSU: Subscriber Configuration | | |
|--|----------|--|
| Prompt | Response | Description |
| PMIDX | xxx | External Voice Mail Service Index, where xxx is the IDX number from Step 3 of Program Access to the E1 Trunk |

Display and validate the changes by typing **DISPLAY-SBCSU:XXXX**; at the prompt, where XXXX is the extension of the subscriber assigned.

```

<di sp-sbcusu: 2040;
DI SP-SBCSU: 2040;
H500: AMO SBCSU STARTED

----- USER DATA -----
STNO =2040 OPT =OPTI COS1 =23 DPLN =0
MAI NO =2040 CONN =DIR COS2 =9 I TR =0
PEN = 1- 1- 31- 16 LCOSV1 =1 COSX =0
INS =Y ASYNCT =500 LCOSV2 =1
SSTNO =N PERMACT = LCOSD1 =2
TRACE =N EXTBUS = LCOSD2 =2 CBKBMAX =5
ALARMNO =0 DFSVCANA= SPDI =0 RCBKB =N
HMUSIC =0 FLASH = SPDC1 = CBKNA =N
PMI DX =1 SPDC2 = CBKNAMB =Y
COMGRP =0
SECR =N DIGNODIS=N DSSTNA =N
STD =6 CALLOG =NONE DSSTNB =Y TEXTSEL =AMERICAN
REP =0 OPTICOM =N OPTIUSB : VPI =
IDCR =N OPTICA =0 OPTISOA :0 VCI =
APPM = OPTIDA =0 OPTISPA :0 PATTERN =
OPTIABA :0
DCFWBUSY=N HEADSET =N APMOBUSR= APICLASS=
DNI DSP =N HSKEY =NORMAL IPCODEC = SECAPPL =
DTMFBK =N DTMFCTRDN= BASICSVC= IPPASSW =*****
DVCFIG =OPTISET TSI =1 SPROT = SOPTI DX =
DPROT = DOPTI DX =
FPROT = FOPTI DX =

----- ACTIVATION IDENTIFIERS FOR FEATURES -----
HTOS :N DND :N
HTOD :N VCP :Y TWLOGIN :N
HTOF :N CWT :N

----- FEATURES AND GROUP MEMBERSHIPS -----
PUGR : ESSTN :
KEYSYS :Y NOPTNO :
SRCGRP : 1 TCLASS : 0
HUNT CD :N

----- SUBSCRIBER ATTRIBUTES (AMO SDAT) -----
NONE

AMO-SBCSU-111 STATION AND SO-BUS CONFIGURATION OF SWITCHING UNIT
DISPLAY COMPLETED;

```

6.6 Additional Comments

- Phonemail access must be configured in `RICHT` (Parameter `PM`)
- Index of `RICHT:PM` must be setup for every extension that needs access (`SBCSU => Parameter PMIDX`)
- `COS` of the extension must contain `TTT` (Trunk to Trunk Transfer) and `FWDEXT` (`ForWarDdingEXTernal / AMO COSSU`) to forward to the server
- Make sure you don't have `CFVA` set for the Trunk the server is connected to (`AMO COT -` This parameter will check the availability of the forwarding target)

7. Microsoft OCS setup

7.1 Steps for configuring OCS

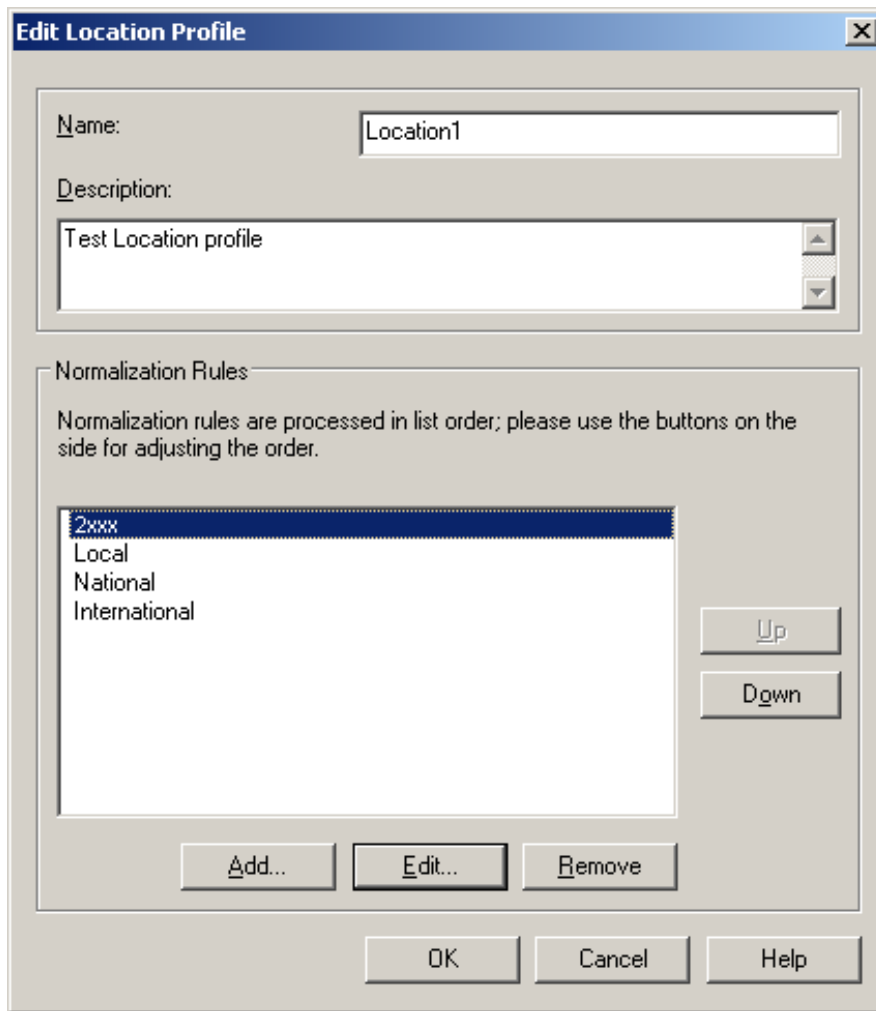
Normalization rules are used to convert all possible dial numbers into full E.164 formatted numbers. Microsoft OCS uses the standard E.164 format to search for all users listed in Active Directory (AD).

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` from the menu provided. Edit a location profile as shown in the example below.



Click Add or Edit to create or change a particular rule.

Edit Phone Number Normalization Rule

Name:

Click to copy an existing rule.

Description:

Translation

Phone pattern regular expression:

Translation pattern regular expression:

Valid translation characters are +, numbers, and \$. Example: +1425\$1.

Click Helper for assistance in creating common phone number regular expressions and translations.

Test translation

To test the translation, enter a sample dialed number. If it matches the phone pattern, the translation will be shown.

Sample dialed number:

Translated number:

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 | <code>^(2[0-9]{3})\$</code> | <code>+1716639\$1</code> | Normalize 2xxx to E.164 |
| Local | <code>^(\\d{7})\$</code> | <code>+1716\$1</code> | Local number |
| National | <code>^1(\\d*)\$</code> | <code>+1\$1</code> | Long distance number |
| International | <code>^011(\\d*)</code> | <code>+011\$1</code> | 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* from the menu provided. Edit a route as shown in the example below.

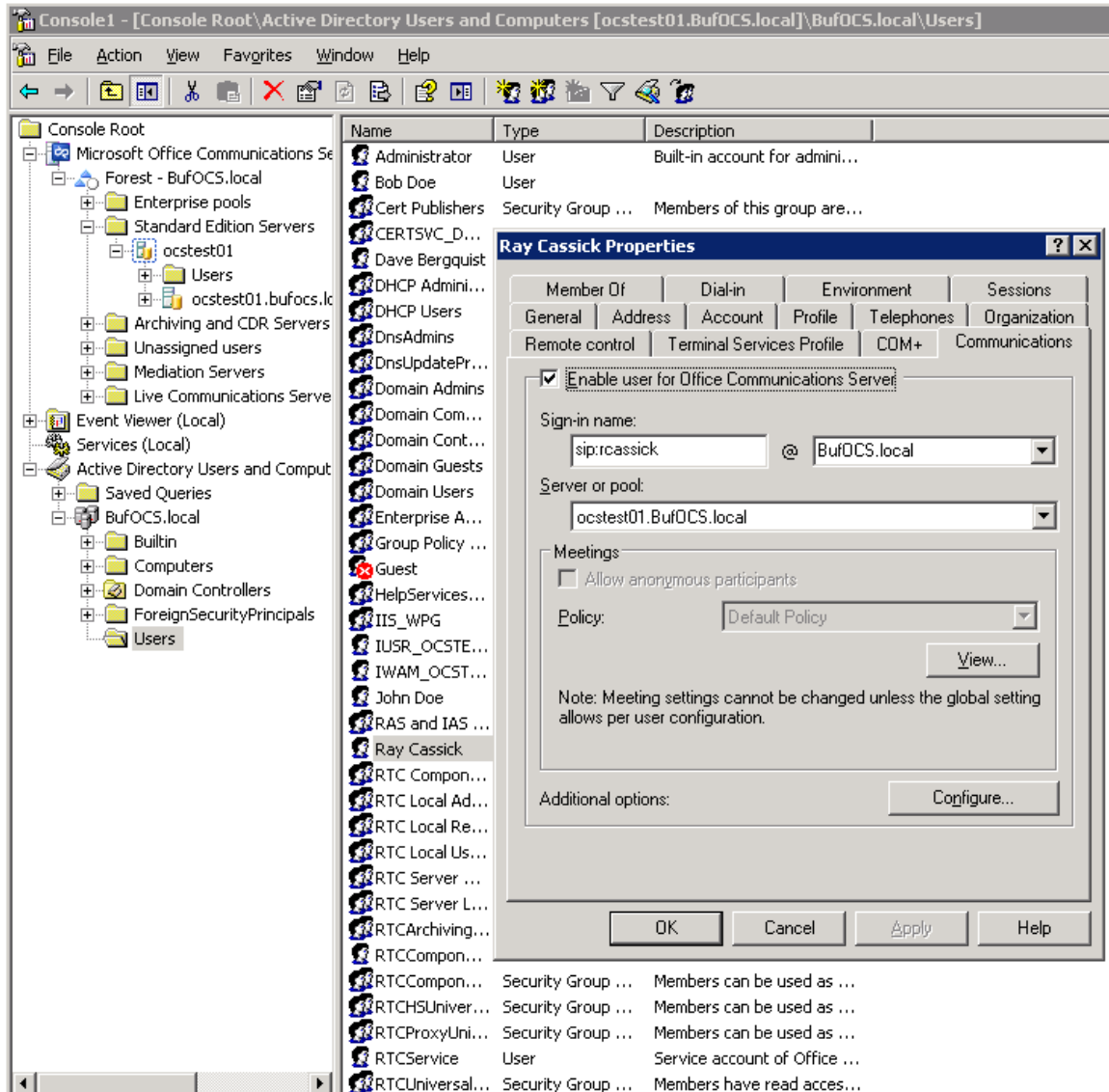
This entry routes any number with or without '+' prefix followed by any digits to Mediation server dm4000.bufocs.local

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.

User Options [X]

Telephony
 Select a telephony option. These settings affect only those calls that are routed through IP-PSTN or remote call control gateways.

Enable PC-to-PC communication only
 Enable Remote call control
 Enable Enterprise Voice
 Enable PBX integration

Note: To enable both remote call control and PBX integration, you must specify a Server URI below.

Policy:

Server URI:

Line URI:

Federation

Enable federation
 Enable remote user access
 Enable public IM connectivity

Archiving

Archive internal IM conversations
 Archive federated IM conversations

Note: Archiving settings cannot be changed unless the global setting allows per user configuration.

Enable enhanced presence

Note: Enhanced presence cannot be changed once it has been set.

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 for 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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