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.
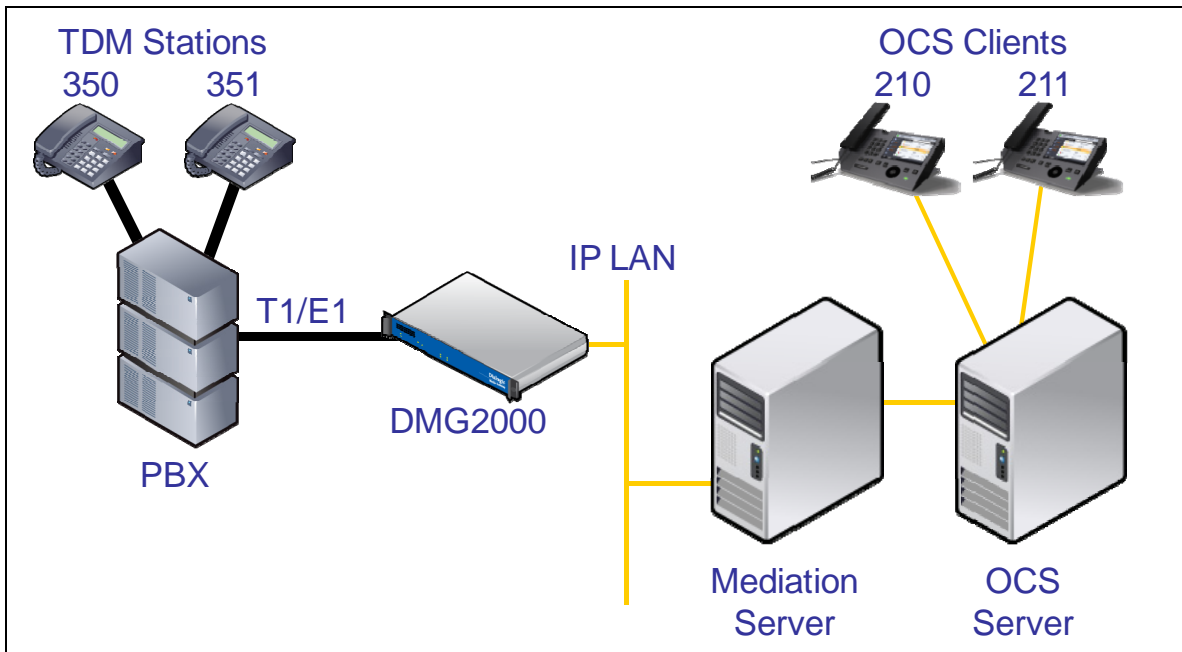
2.1 PBX

PBX Vendor	Mitel
Model	SX2000
Software Version	Lightware V34.2.0.20
Additional Notes	NSU Release 1.5 IMAT Version 7.5.1.4

2.2 Gateway

Gateway Model	Dialogic® 2000 Media Gateway Series (DMG2000)
Software Version	6.0 (6.0.103)
Protocol	T1 QSIG

2.3 System Diagram

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

3. Prerequisites

3.1 PBX Prerequisites

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

Listed below is a table of required software packages:

Description	Option Number
Message Center	31
MSAN/APNSS	37
MSDN/DPNSS Data	38
MSDN/DPNSS Public Net Access	39
MSDN/DPNSS Voice I	41
MSDN/DPNSS Voice II	42
MSDN/DPNSS Voice III	43
MSDN/DPNSS Voice IV	44
MSDN/DPNSS Voice V	45
MSDN/DPNSS Voice VI	46
QSIG	57
T1/D4	64

3.1.1 PBX Equipment Required

To support the T1 QSIG configuration as documented you need the DTI/PRI – NTAK09BA interface card.

3.1.2 PBX Cabling Requirements

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

3.2   Gateway Prerequisites

The gateway needs to support a T1 QSIG interface.

4.   Summary of Limitations

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

5.   Gateway Setup Notes

Steps for setting up the gateway:

- Parameter Configuration
- Routing Engine Configuration

5.1   Parameter Configuration

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

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

- Assign LAN 1 on the gateway a unique IP address, subnet mask and network gateway address (if the latter is required).
- Configure the gateway to use the SIP VoIP protocol.
- Set the Line Mode to T1.
- Set the Protocol to ISDN - QSIG.

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

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

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

| IP Settings, LAN2 | |

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

T1/E1 Port Selection

Select Port to Modify: all ports

T1/E1 Configuration

Line Settings	
* Line Mode	T1
* Signaling Mode	ISDN
* Telephony Port Interface Side	Terminal

T1 Line	
* Line Encoding	B8ZS
* Framing	ESF
* Selects Transmit Pulse Waveform	Short_Haul_110ft

T1 ISDN protocol	
* ISDN Protocol	QSIG
ISDN Protocol Variant	None

General ISDN Settings	
QSIG Protocol Specification	ISO
Network-Specific Facilities (NSF)	None
ISDN Answer Supervision Enable	Yes

Failover Settings	
* Enable Failover	No

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

Voip General Settings

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

Server

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

5.2   Routing Engine Configuration

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

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

- All TDM side stations have DID numbers assigned in the 3xx extension range.
- All OCS side stations have DID numbers assigned in the 2xx extension range.

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

5.2.1 VoIP Host Group configuration

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

5.2.2   TDM and VoIP Routing Rule Configuration

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

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

5.2.2.1   Inbound TDM Rules

When a local user on the PBX picks up their phone and calls one of the extensions on the OCS side within the 2xx range the gateway will receive a call with a calling party of 3 digits. It then needs to convert that number up to full E.164 format and send the call on to OCS.

In our example here we need to take any number that starts in the 2xx range and then convert it into the full E.164 format by concatenating a prefix of '+17166393' onto the front of the number. Other calls, such as DIDs that arrive over TDM trunks form the PSTN may provide a full 10 digits to the PBX or they may only provide the extension number after the prefix has been stripped off by the PBX. Depending on your site specific requirements you may need to add or build different rules to handle these cases. In our example the inbound rule we use for local PBX users is shown below:

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

Inbound TDM Rules

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

Add Rule   Delete Rule

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

Inbound TDM Request Matching

CPID Matching

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

Outbound Routes

Device Selection

Outbound Destination	VoIP	Host Group	HostGroup-1	Route Method	Bridged

CPID Manipulation

Calling Number	S	Called Number	"+17166393"+D	Redirect Number	R
Calling Name	S	Called Name	D	Redirect Name	R

Select Primary / Alternate Route

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

You can see how our rule here is out into place. The matching rule is simply a * meaning that any dialed number form a local user presented to this trunk will be seen by this rule. The CPID manipulation rule then uses the digits that are being seen (in this example case it will be a 4 digit number starting with 2 as the trunk is programmed for) and then adds the prefix of "+17166393" onto it to build the full E.164 number as we need for OCS. This rule also set s the destination to the VoIP Host group we have defined previously that points to the inbound IP address of the Mediation Server.

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

5.2.2.2   Inbound VoIP Rules

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

In our example here, OCS has been setup (as you will see latter) with a route that directs all calls that meet the pattern 5xx to the gateway in full E.164 format. The gateway then needs to know how to identify these numbers as extensions that are local on the PBX and manipulate them accordingly. To do this is needs to simply extract the right 4 digits form the called number provided to remove the prefix of "+171663935" and leave the last 3 digits remaining. Local numbers (off the PBX), as well as national and international numbers, are going to need to be manipulated also since they are going to at very least need a trunk access number, like a 9, appended onto the front of them for processing. These can also be done using manipulation rules as follows:

Router Configuration

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

Inbound VoIP Rules

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

Add Rule   Delete Rule

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

Inbound VoIP Request Matching

CPID Matching

Calling Number	*	Called Number	x171663935xx	Redirect Number	*
Calling Name	*	Called Name	*	Redirect Name	*

Outbound Routes

Device Selection

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

CPID Manipulation

Calling Number	S	Called Number	rext(D,3)	Redirect Number	R
Calling Name	S	Called Name	D	Redirect Name	R

Select Primary / Alternate Route

◉ Primary   ○ Alt-1   ○ Alt-2   ○ Alt-3   ○ Alt-4   Add Alternate Route
Delete   Delete   Delete   Delete

We can see here in this first rule labeled as 'Outbound Internal' we are looking for any outbound calls that are specifically for a called party that starts with '+171663935' and end with 2 more digits. This happens to fit into our locally defined set of TDM extensions, indicating that this call needs to stay locally on the PBX for a user. The CPID manipulation rule strips the right 3 digits off the called number provided by OCS and uses that to make the call.

Router Configuration

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

Inbound VoIP Rules

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

[Add Rule]   [Delete Rule]

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

Inbound VoIP Request Matching
CPID Matching

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

Outbound Routes
Device Selection

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

CPID Manipulation

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

Select Primary / Alternate Route

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

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

Router Configuration

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

Inbound VoIP Rules

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

[Add Rule] [Delete Rule]

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

Inbound VoIP Request Matching

CPID Matching

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

Outbound Routes

Device Selection

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

CPID Manipulation

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

Select Primary / Alternate Route

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

[Delete] [Delete] [Delete] [Delete]

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

Router Configuration

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

Inbound VoIP Rules

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

[Add Rule] [Delete Rule]

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

Inbound VoIP Request Matching

CPID Matching

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

Outbound Routes

Device Selection

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

CPID Manipulation

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

Select Primary / Alternate Route

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

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

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

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

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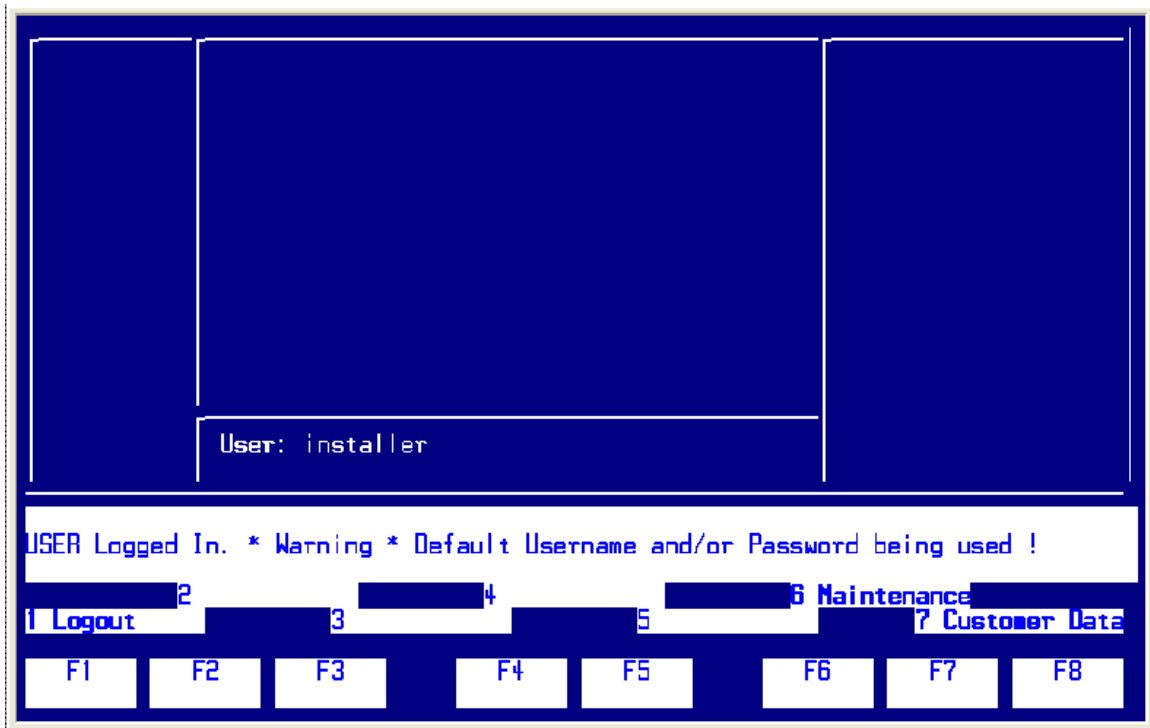
6. PBX Setup Notes

This section provides information about the PBX-IP Media Gateway PBX administration requirements for Mitel SX-2000 Light systems. This information includes:
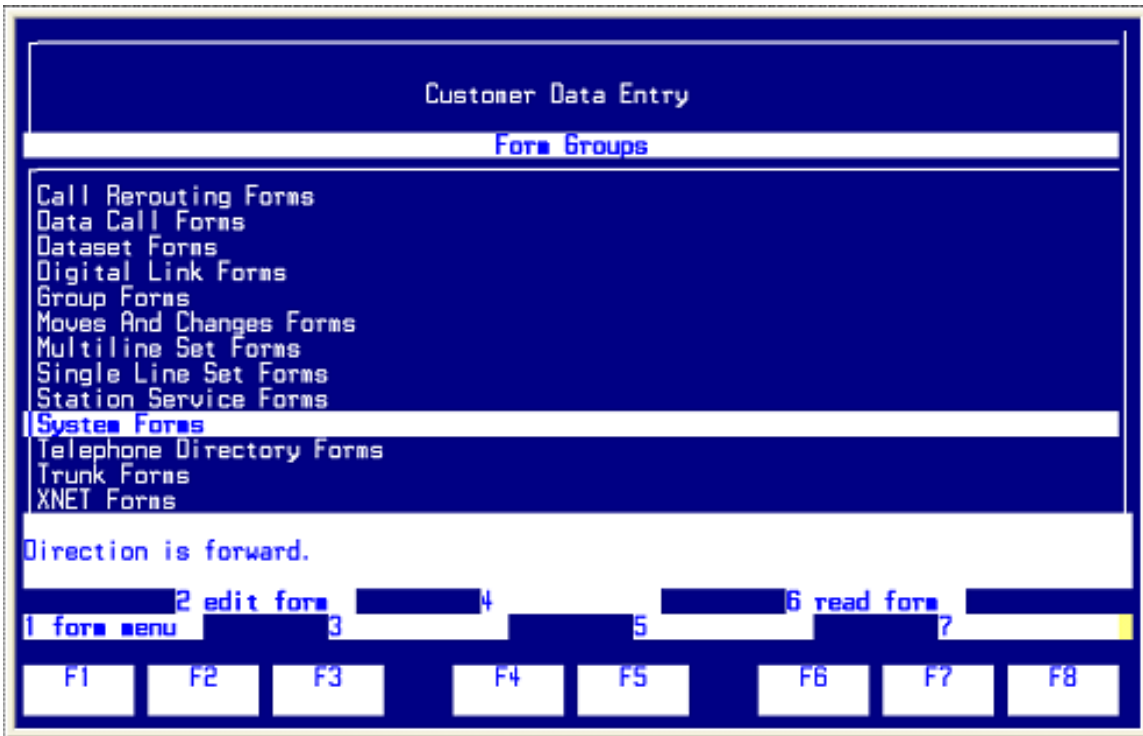
- Configure the Mitel SX-2000 Light for T1 QSIG Protocol
- Program Automatic Route Selection
- Configure T1 protocol on NSU

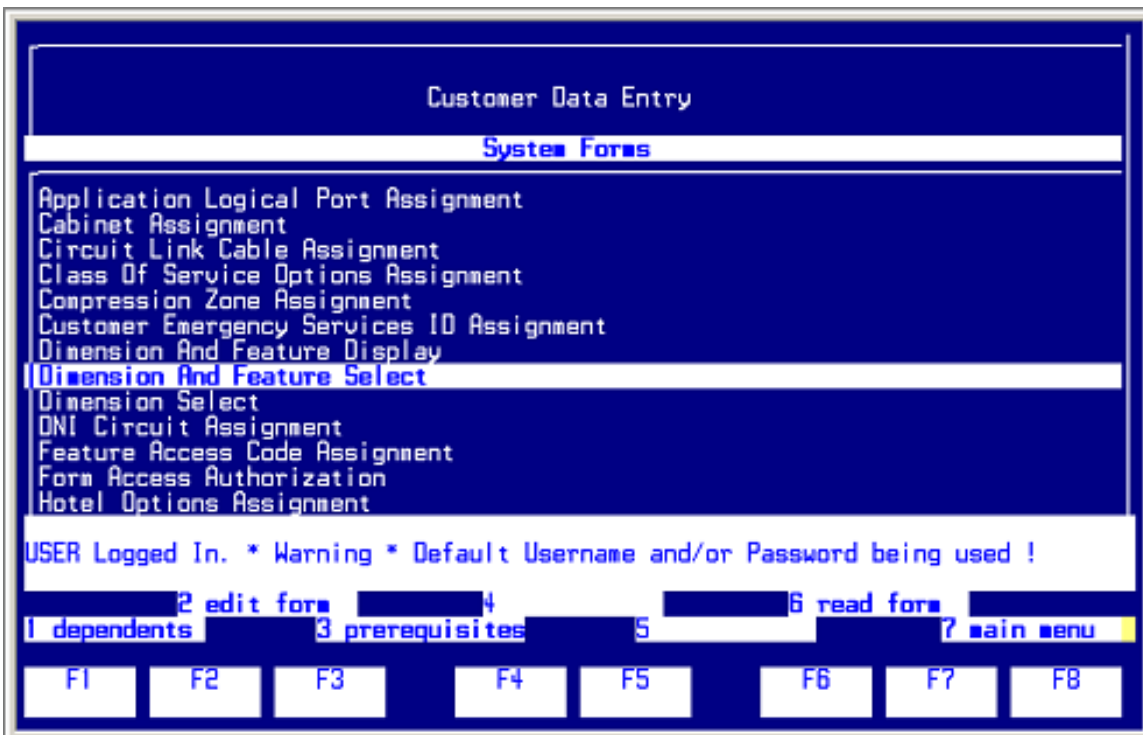## 6.1 Configure the SX2000

Log into the Mitel SX-2000 Light system.

Press [ESC] then [7] to access the Customer Data Entry menu.

```
                         Customer Data Entry
                            Form Groups

 Call Rerouting Forms
 Data Call Forms
 Dataset Forms
 Digital Link Forms
 Group Forms
 Moves And Changes Forms
 Multiline Set Forms
 Single Line Set Forms
 Station Service Forms
 System Forms
 Telephone Directory Forms
 Trunk Forms
 XNET Forms

 Direction is forward.

           2 edit form               4              6 read form
 1 form menu            3                   5                    7

    F1      F2      F3         F4      F5         F6      F7      F8
```

Select System Forms and press [ESC] then [1] to access the System Forms menu.

In the System Forms menu, select Dimension and Feature Select and press [ESC] then [2] to edit the Dimension and Feature Selections form.


```
                         Customer Data Entry

                            System Forms

 Application Logical Port Assignment
 Cabinet Assignment
 Circuit Link Cable Assignment
 Class Of Service Options Assignment
 Compression Zone Assignment
 Customer Emergency Services ID Assignment
 Dimension And Feature Display
 Dimension And Feature Select
 Dimension Select
 DNI Circuit Assignment
 Feature Access Code Assignment
 Form Access Authorization
 Hotel Options Assignment

 USER Logged In. * Warning * Default Username and/or Password being used !

           2 edit form               4              6 read form
 1 dependents          3 prerequisites     5                    7 main menu

    F1      F2      F3         F4      F5         F6      F7      F8
```

Configure the Dimension and Feature Select as follows:

```
                   DIMENSION AND FEATURE SELECTION

        MSDN/DPNSS Voice IV. . . . . . . . . . . . . . . . . . . .      Yes
        MSDN/DPNSS Voice V . . . . . . . . . . . . . . . . . . . .      Yes
        MSDN/DPNSS Voice VI. . . . . . . . . . . . . . . . . . . .      Yes
        MSDN Release Link Trunks . . . . . . . . . . . . . . . . .      No
        Networked ACD. . . . . . . . . . . . . . . . . . . . . . .      No
        DNS CLASS/CLIP Features. . . . . . . . . . . . . . . . . .      No
        Peripheral Control Redundancy. . . . . . . . . . . . . . .      No
        Peripheral Node Expansion. . . . . . . . . . . . . . . . .      No
        PRI Card - NFAS. . . . . . . . . . . . . . . . . . . . . .      No
        PRI Card - D Channel Backup. . . . . . . . . . . . . . . .      No
        PRI Card - Remote LAN Access . . . . . . . . . . . . . . .      No
        PRI Card - Min/Max . . . . . . . . . . . . . . . . . . . .      No
        PRI Card - Auto Min/Max. . . . . . . . . . . . . . . . . .      No
        Q-SIG. . . . . . . . . . . . . . . . . . . . . . . . . . .      Yes
        Record-A-Call. . . . . . . . . . . . . . . . . . . . . . .      No
        SMDR - External. . . . . . . . . . . . . . . . . . . . . .      Yes

   Direction is forward.

              2                    4 commit            6
   1 top               3 bottom            5                   7 generate

      F1      F2      F3           F4      F5          F6      F7      F8
```

Note: Any field not listed below can remain the default setting. Also note that Q-SIG is a purchased option, so please verify that you have purchased Q-SIG before you continue.

- Select Q-SIG, set it to Yes and press [ENTER].
- Press [ESC] then [4] to commit to changes and [ESC] then [1] to confirm the changes.
- Press [ESC] then [Q] to return to the System Forms menu.

In the System Forms menu, select System Configuration and press [ESC] then [2] to edit the System Configurations form.

```
                        Customer Data Entry

                           System Forms

   Message Link Cable Assignment
   Miscellaneous Assignment
   MLPP Assignment
   Node Identity Assignment
   PSC DSP Assignment
   Security Options Assignment
   SMDR Options Assignment
   SNMP Configuration Assignment
   SNMP Trap Community Assignment
   System Configuration
   System Options Assignment
   System Port Assignment
   System Speed Call Assignment



              2 edit form         4                  6 read form
   1 dependents         3 prerequisites      5                 7 main menu

      F1      F2      F3           F4      F5          F6      F7      F8
```

Configure the `System Configuration` as follows:

```
                        SYSTEM CONFIGURATION

  Cabinet  │  Shelf  │  Slot  │    Programmed      │    Installed
           │         │        │    Card Type       │    Card Type
  ─────────┼─────────┼────────┼────────────────────┼────────────────────
     3     │    2    │  14    │ No Card Present    │ No Card Present
     3     │    2    │  15    │ No Card Present    │ No Card Present
     3     │    2    │  16    │ No Card Present    │ No Card Present
     3     │    2    │  17    │ Peripheral Resource│ Peripheral Resource
     4     │    1    │   1    │ Fiber Interface    │ Fiber Interface
     4     │    1    │   2    │ Universal T1       │ Universal T1
     4     │    1    │   3    │ No Card Present    │ No Card Present
     4     │    1    │   4    │ Peripheral Resource│ Peripheral Resource
     5     │    1    │   1    │ Fiber Interface    │ Fiber Interface
     5     │    1    │   2    │ Universal E1       │ Universal E1
     5     │    1    │   3    │ No Card Present    │ No Card Present
     5     │    1    │   4    │ Peripheral Resource│ Peripheral Resource

 Direction is backward.

        2 range programming    4 commit          6 delete line
  1 top                  3 bottom          5               7

   F1      F2      F3        F4      F5        F6      F7      F8
```

- Select `Cabinet x Shelf y Slot z Circuit 1`, where `x` is the cabinet number, `y` is the shelf number, and `z` is the slot number in which the T1 QSIG line is being installed
- Set `Programmed Card Type` to `Universal T1` and press `[ENTER]`.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `System Forms` menu.

In the `System Forms` menu, select `Class of Service Options Assignment` and press `[ESC]` then `[2]` to edit the `Class of Service Options Assignment` form.

14
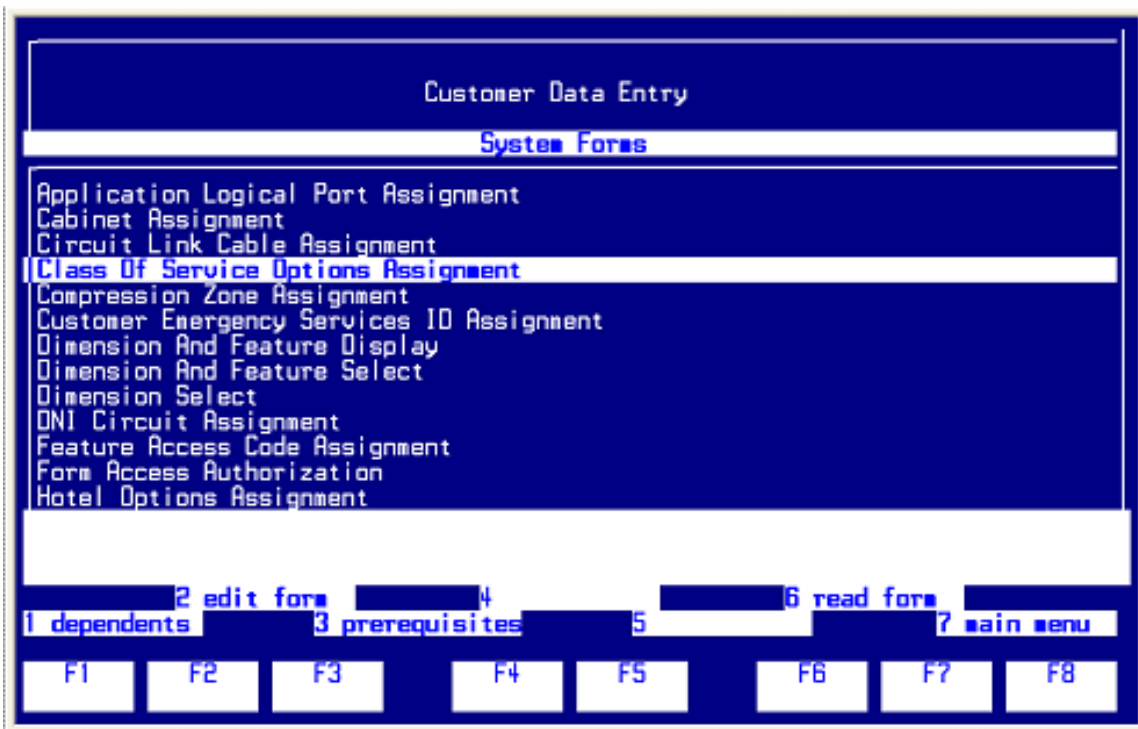
Configure the `Class of Service Options Assignment` as follows:
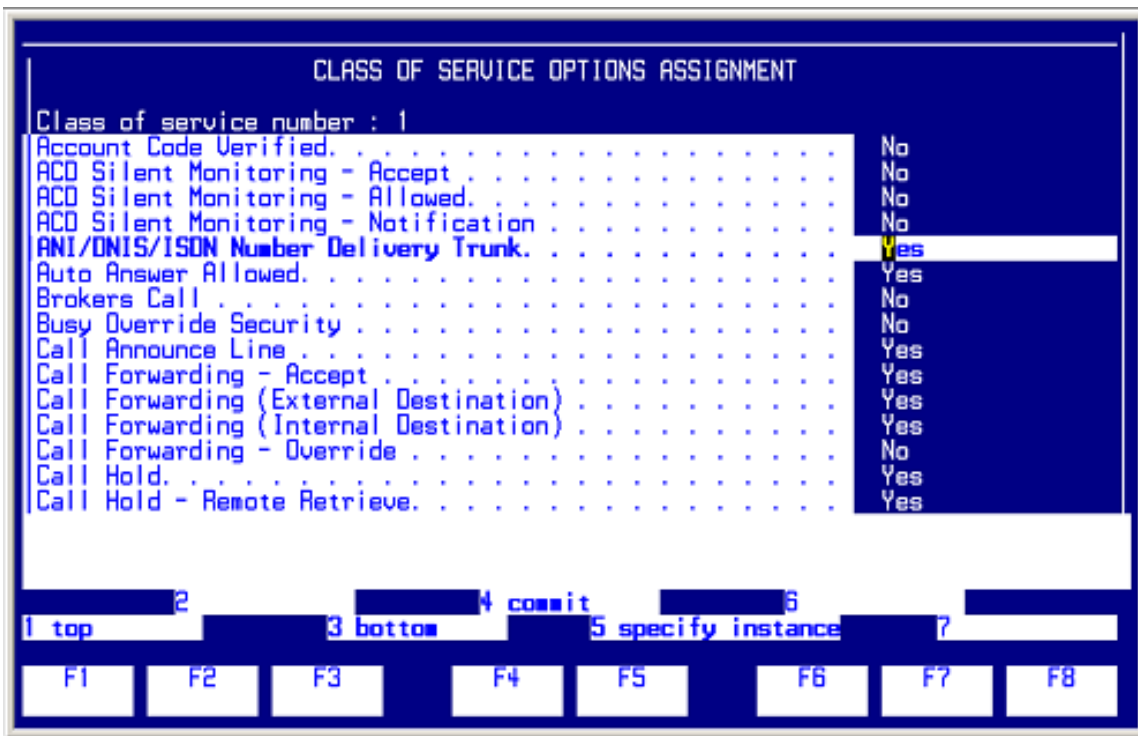
- Set `Class of service number`: to `x`, where x is an unused class of service number.
- Press `[ESC]` then `[1]` to create the new class of service.
- Set `ANI/DNIS/ISDN Number Delivery Trunk` to `Yes`.
- Set `Call Announce Line` to `Yes`.
- Set Call `Forwarding (External Destination)` to `Yes`.
- Set `Display ANI/DNIS/ISDN Calling/Called Number` to `Yes`.
- Set `Display Caller ID on Multicall/Keylines` to `Yes`.
- Set `Handsfree Answerback Allowed` to `Yes`.

- Set `Message Waiting - Audible Tone Notification` to `Yes`.
- Set `Message Waiting - Deactivate on Off-Hook` to `No`.
- Set `Public Network Access via DPNSS` to `Yes`.
- Set `Public Trunk` to `Yes`.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `System Forms` menu.
- Press `[ESC]` then `[7]` to return to the `Customer Data Entry` interface.

In the `Customer Data Entry` menu, select `Digital Link Forms` and press `[ESC]` then `[1]` to access the `Digital Link Form` menu.

In the `Digital Link Forms` menu, select `Link Descriptor Assignment` and press `[ESC]` then `[1]` to edit the `Link Descriptor Assignment` form.

```
                        Customer Data Entry
                        Digital Link Forms

Digital Link Assignment
Link Descriptor Assignment
Network Synchronization




                    2 edit form              4                    6 read form
1 dependents            3 prerequisites      5                    7 main menu

     F1       F2       F3           F4       F5           F6       F7       F8
```
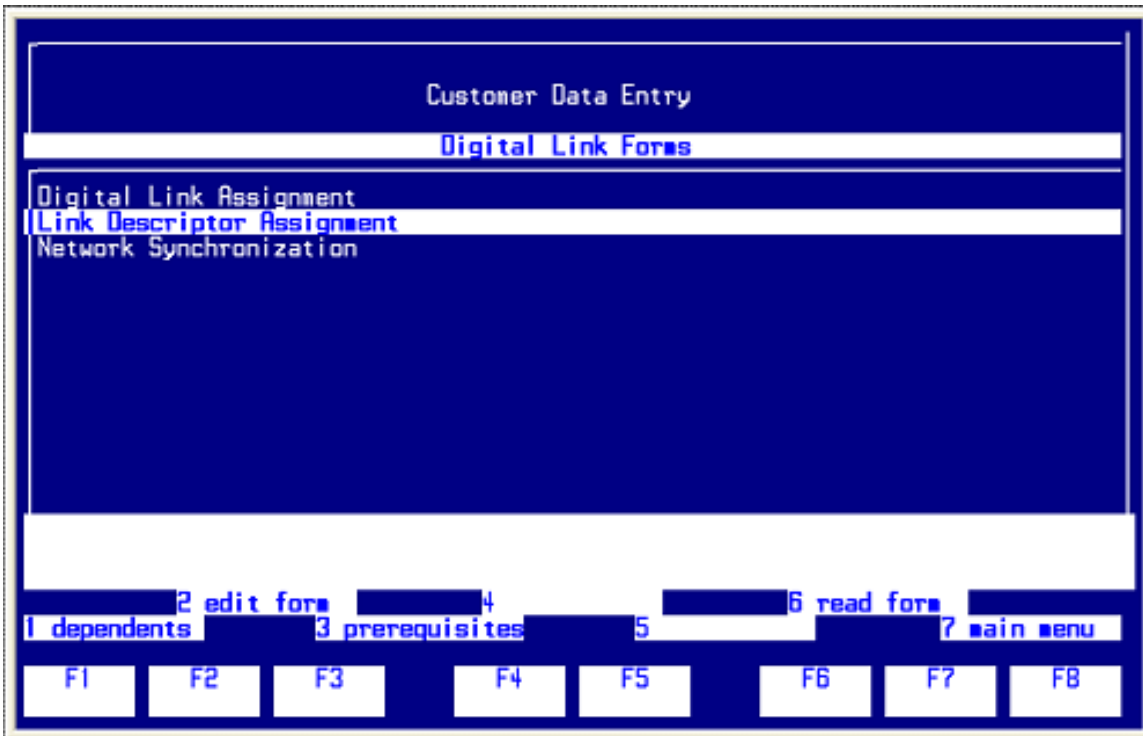
Configure the `Link Descriptor Assignment` as follows:

```
                    LINK DESCRIPTOR ASSIGNMENT

Digital Link Descriptor Number:   2

                    Description                         |       Value

   DS1 Parameters:
Alarm Debounce Timer - Service Limit (300-3200). . . . . .      500
B8ZS Zero Code Suppression - (Yes/No). . . . . . . . . . .      Yes

    Universal T1 and Enhanced Dual T1 Card only:
Operation Mode (CSU/DSX-1) . . . . . . . . . . . . . . . .      CSU
CSU Tx Line Build-Out(0,7.5,15,22.5 db). . . . . . . . . .      0
DSX-1 line Length(0-133,134-266,267-399,400-533,534-655 ft)    0-133
Extended Super Frame (Yes/No). . . . . . . . . . . . . . .      Yes
Inverted D channel ( DPNSS only ) (Yes/No) . . . . . . . .      No

    Universal E1 and Enhanced Dual E1 only:

QUIT will cause uncommitted changes to be lost. Please confirm or cancel.

               2                    4 commit            6
1 top                 3 bottom           5 specify instance  7 delete instance

     F1       F2       F3           F4       F5           F6       F7       F8
```

17

```
                    LINK DESCRIPTOR ASSIGNMENT
 Digital Link Descriptor Number:  3

                      Description                        |    Value

      Universal E1 and Enhanced Dual E1 only:
 CRC-4 enabled(Yes,No). . . . . . . . . . . . . . . . .         No
 E1 line Length(0-133,134-266,267-399,400-533,534-655 ft) :   0-133
 E1 Impedance (75,120 ohms) . . . . . . . . . . . . . .        120

      Italian Parameters:
 Digital Link Fault Delay Timer (0-360 sec) . . . . . . .      240

      Universal T1/E1 Coding Conversion Parameters:
 Voice conversion (Nil/ADI/Invert/Inverted ADI). . . . . .   Invert
 Data conversion (Nil/ADI/Invert/Inverted ADI). . . . . .    Nil

 You are at end of form.

            2                      4 commit            6
 1 top              3 bottom            5 specify instance  7 delete instance

     F1      F2      F3         F4      F5         F6      F7      F8
```

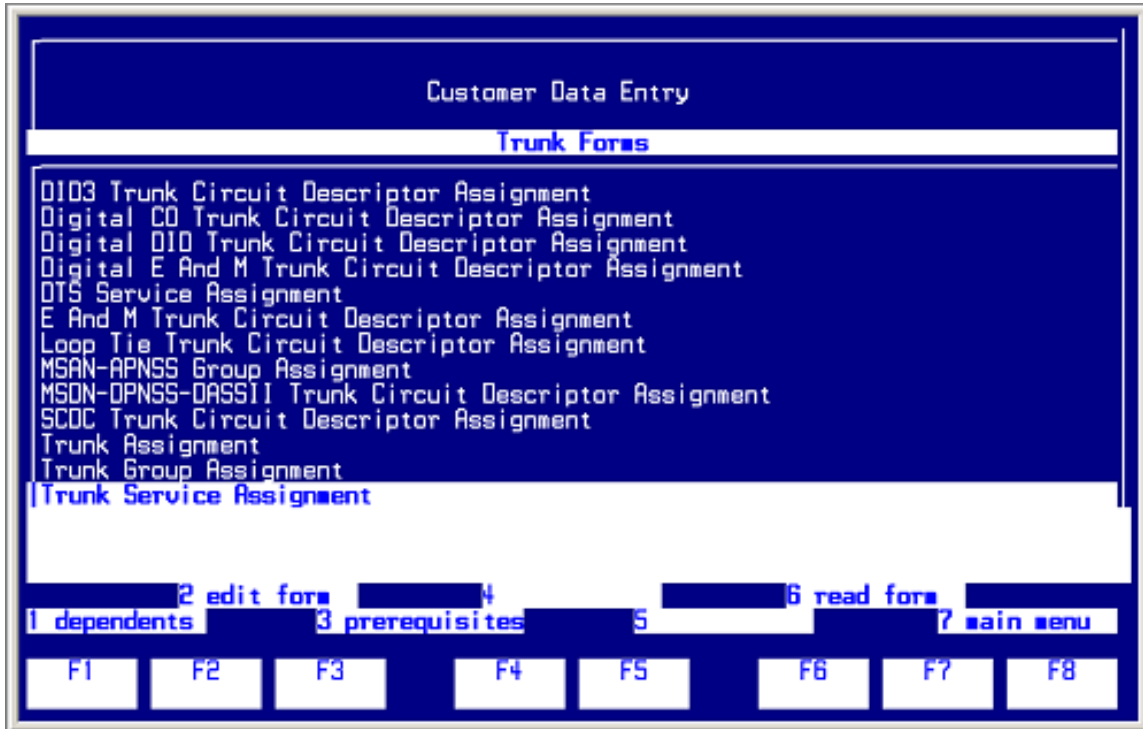*Note: Any field not listed below can remain the default setting.*

- Set Digital Link Descriptor Number to x, where x is an unused digital link descriptor number.
- Set Address for Message Control to A.
- Set Integrated Digital Access to ISDN Node.
- Set QSIG Private Network Access to Yes.
- Set Termination Mode to NT.
- Set Operation Mode to CSU.
- Set CSU Tx Line Build-Out (dB.) to 0.
- Set Extended Super Frame to Yes.
- Set Inverted D Channel to No.
- Set Voice Conversion to Invert.
- Press [ESC] then [4] to commit to changes and [ESC] then [1] to confirm the changes.
- Press [ESC] then [Q] to return to the Digital Link Forms menu.

In the Digital Link Forms menu, select Digital Link Assignment and press [ESC] then [2] to edit the Digital Link Assignment form.
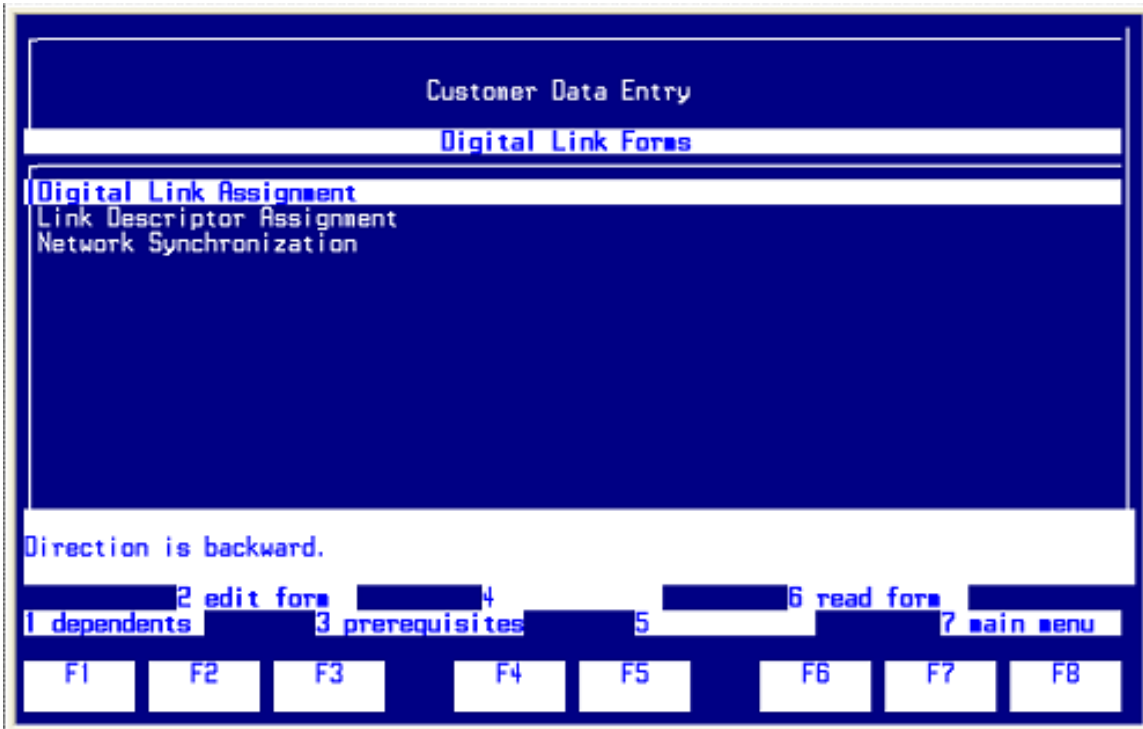
Configure the `Digital Link Assignment` as follows:
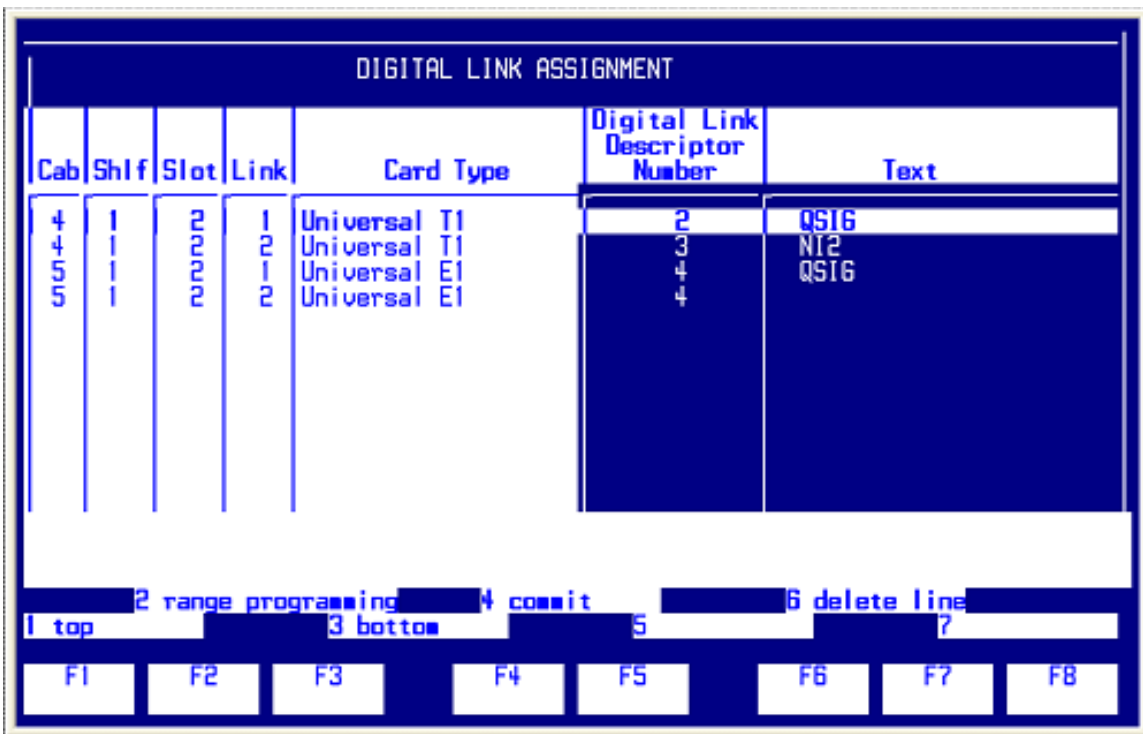
- Select `Cabinet x Shelf y Slot z Circuit 1`, where `x` is the cabinet number, `y` is the shelf number, and `z` is the slot number in which the T1 QSIG line is being installed
- Set `Digital Link Descriptor Number` to `x`, where `x` is the link `descriptor assignment number` defined above and press `[ENTER]`.
- The `Text` field can be left blank or a description of the link can be entered.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `Digital Link Forms` menu.

- Press [ESC] then [7] to return to the Customer Data Entry interface.

In the Customer Data Entry menu, select System Forms and press [ESC] then [2] to access the System Forms menu.

```
                          Customer Data Entry
                              Form Groups

 Call Rerouting Forms
 Data Call Forms
 Dataset Forms
 Digital Link Forms
 Group Forms
 Moves And Changes Forms
 Multiline Set Forms
 Single Line Set Forms
 Station Service Forms
 System Forms
 Telephone Directory Forms
 Trunk Forms
 XNET Forms

 Direction is forward.

         2 edit form          4              6 read form
 1 form menu          3              5              7

    F1      F2      F3      F4      F5      F6      F7      F8
```
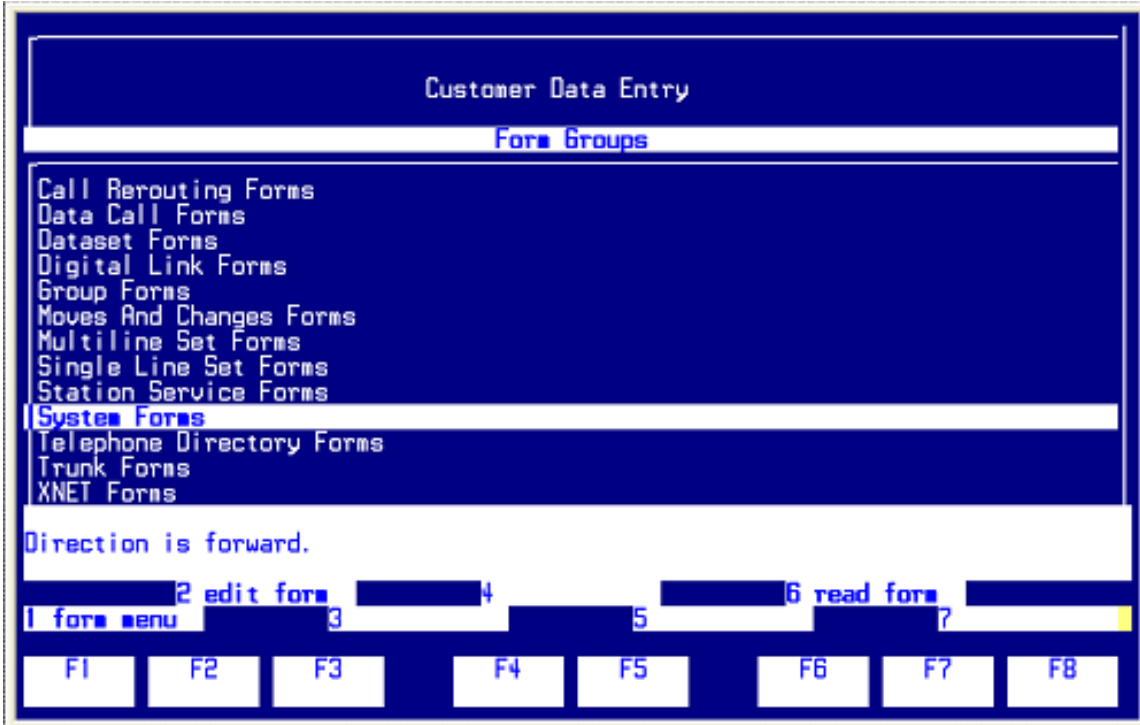
In the System Forms menu, select System Options Assignment and press [ESC] then [2] to edit the System Options Assignment form.

```
                          Customer Data Entry
                              System Forms

 Node Identity Assignment
 PSC DSP Assignment
 Security Options Assignment
 SMDR Options Assignment
 SNMP Configuration Assignment
 SNMP Trap Community Assignment
 System Configuration
 System Options Assignment
 System Port Assignment
 System Speed Call Assignment
 Tenant Assignment
 Traffic Options Assignment
 User Authorization Profile

         2 edit form          4              6 read form
 1 dependents        3 prerequisites    5              7 main menu

    F1      F2      F3      F4      F5      F6      F7      F8
```

Configure the System Options Assignment as follows:

```
                    SYSTEM OPTIONS ASSIGNMENT

       Option                                        Value

Interconnect Checking for Conference Calls (Yes/No). . . .        No
Last Number Redial Source (All Trunks/CO Trunks/All Calls)    All Trunks
Route Optimization Establishment Timer (5s - 120s). . . .        10
Route Optimization Attempts (0-3). . . . . . . . . . . .         3
Route Optimization Network Id (max of 7 digits). . . . .       5648
Route Optimization Trailing Digits (2-26). . . . . . . .         2
Dialed Number Editing For Trunks (Yes/No). . . . . . . .        No
Number Of Forward Hops (2 - 10). . . . . . . . . . . . .         2
Multiline Set Display 24 Hour Format (Yes/No). . . . . .        No
Att Cancel-All Feature Access (None/CFWD/DND/Both) . . . .      Both
ACD 2000-Auto Logout Last Agent On No Answer (Yes/No). . .      No
Night Answer Prompt for Network Configuration (Yes/No) . .      No
DISA Number Lock-Out Timer (0 - 15 minutes). . . . . . .        15


                2                  4 commit            6
1 top                       3 bottom            5               7

    F1      F2      F3          F4      F5          F6      F7      F8
```

Note: Any field not listed below can remain the default setting.

- Set `Route Optimization Network ID` to `x`, where `x` is a string of digits (the same length as the phone extension) and press `[ENTER]`.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `System Forms` menu.
- Press `[ESC]` then `[7]` to return to the `Customer Data Entry` interface

In the `Customer Data Entry` menu, select `Trunk Forms` and press `[ESC]` then `[1]` to access the `Trunk Forms` menu.
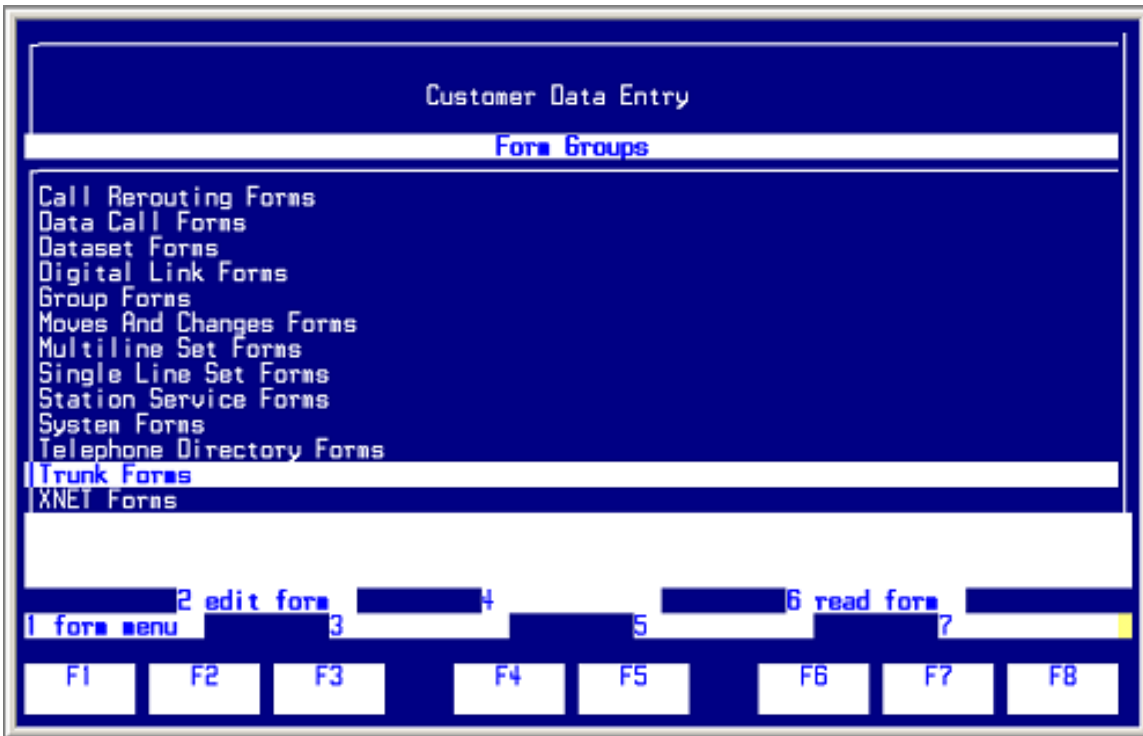
In the `Trunk Forms` menu, select `MSDN-DPNSS-DASSII Trunk Circuit Descriptor Assignment` and press `[ESC]` then `[2]` to edit the `MSDN-DPNSS-DASSII Trunk Circuit Descriptor Assignment` form.

Configure the `MSDN-DPNSS-DASSII Trunk Circuit Descriptor` as follows:
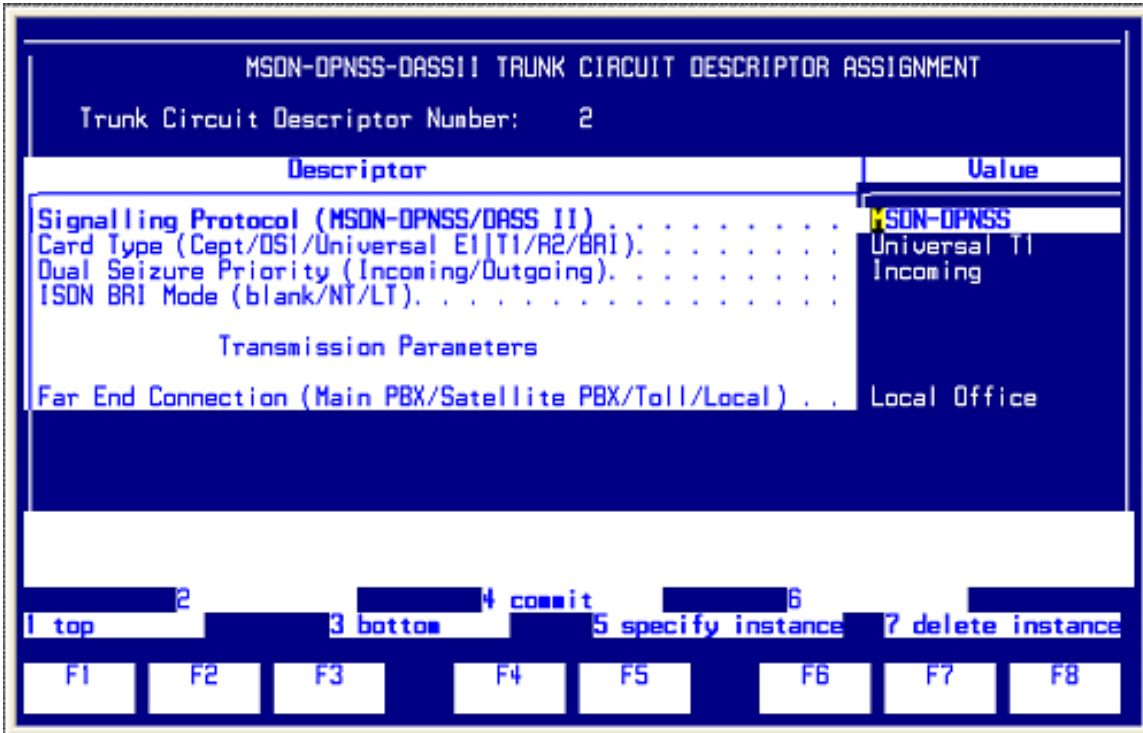
Note: Any field not listed below can remain the default setting.

- Set `Trunk Circuit Descriptor Number` to `x`, where `x` is an unused trunk circuit descriptor number.

- Set `Signaling Protocol` to `MSDN-DPNSS`.
- Set `Dual Seizure Priority` to `Incoming`.
- Set `Far End Connection` to **Local Office**.
- Set `Card Type` to `Universal T1`.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `Trunk Forms` menu.

In the `Trunk Forms` menu, select `Trunk Service Assignment` and press `[ESC]` then `[2]` to edit the `Trunk Service Assignment` form.

```
                         Customer Data Entry
                            Trunk Forms

DID3 Trunk Circuit Descriptor Assignment
Digital CO Trunk Circuit Descriptor Assignment
Digital DID Trunk Circuit Descriptor Assignment
Digital E And M Trunk Circuit Descriptor Assignment
DTS Service Assignment
E And M Trunk Circuit Descriptor Assignment
Loop Tie Trunk Circuit Descriptor Assignment
MSAN-APNSS Group Assignment
MSDN-DPNSS-DASSII Trunk Circuit Descriptor Assignment
SCDC Trunk Circuit Descriptor Assignment
Trunk Assignment
Trunk Group Assignment
Trunk Service Assignment


            2 edit form                      6 read form
1 dependents         3 prerequisites    5              7 main menu

   F1      F2      F3        F4      F5        F6      F7      F8
```

Configure the `Trunk Service Assignment` as follows:

```
                    TRUNK SERVICE ASSIGNMENT

 Trunk                      Inter   Non-dial In Trunks    Dial In Trunks
 Ser-                       cept      Answer Points       Incoming Digit
 vice  RLT COS COR Baud      No.                           Modification    Trunk
 No.             Rate            Day  |Night 1|Night 2  Absorb| Insert      Label
```

Trunk Service No.	RLT	COS	COR	Baud Rate	Intercept No.	Non-dial In Trunks Answer Points Day	Night 1	Night 2	Dial In Trunks Incoming Digit Modification Absorb	Insert	Trunk Label
1	No	1	1	300	1	636	636	636			
2	No	1	2	300	1				0		radbrook
3	No	3	2	300	1				0		NI2
4	No	1	1	300	1						
5	No	1	1	300	1						
6	No	1	1	300	1						
7	No	1	1	300	1						
8	No	1	1	300	1						
9	No	1	1	300	1						
10	No	1	1	300	1						
11	No	1	1	300	1						

```
        2 range programming      4 commit              6 delete line
 1 top                  3 bottom            5               7

  F1       F2       F3         F4       F5        F6       F7       F8
```

Note: Any field not listed below can remain the default setting.

- Select an unused Trunk Service Number.
- Set COS (Class of Service) to x, where x is the class of service number defined above.
- Set COR (Class of Restriction) to x, where x is a valid class of restriction number.
- Set Absorb to 0.
- Press [ESC] then [4] to commit to changes and [ESC] then [1] to confirm the changes.
- Press [ESC] then [Q] to return to the Trunk Forms menu.

In the Trunk Forms menu, select Trunk Assignment and press [ESC] then [2] to edit the Trunk Assignment form.
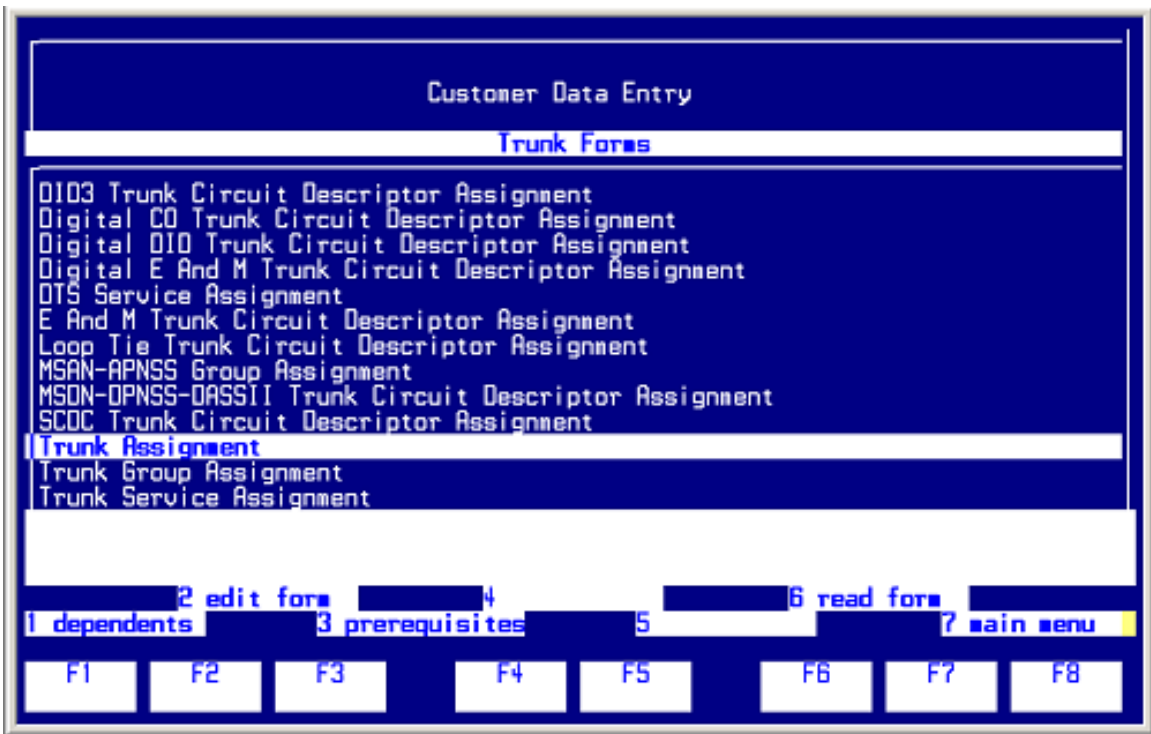
Configure the `Trunk Assignment` as follows:

Note: Any field not listed below can remain the default setting.

- Select `Cabinet x Shelf y Slot z Circuit 1`, where x is the cabinet number, y is the shelf number, and z is the slot number in which the T1 QSIG line is being installed.
- Set `Trunk Num` to x**,** where x is an unused trunk number that has at least 22 unused trunk numbers available after it (ex. If you select 100, 101-122 must also be available).
- Set `Trunk Service Number` to x**,** where x is the trunk service number defined above.

- Set `Circuit Desc. Number` to `x`, where `x` is the circuit descriptor number defined in Step 8 (of SX-2000 Light Administration).
- Set `Interconnect Number` to `x`, where `x` is a valid `interconnect` number.
- Press `[ESC]` then `[2]` to define the range programming, a `RANGE PROGRAMMING Parameters` data entry field will appear in the main screen.
    - Set `Trunk Num` to `x`, where `x` is the trunk number defined earlier in this step, and press `[TAB]`.
    - Set `Trunk Service Number` to `0`, and press `[TAB]`.
    - Set `Circuit Desc. Number` to `0`, and press `[TAB]`.
    - Set `Interconnect Number` to `0`, and press `[TAB]`.
    - Set `Comp Zone IO` to `0`, and press `[TAB]`.
    - Set `Tenant Number` to `0`, and press `[TAB]`.
- Press `[ESC]` then `[2]` to define the range programming, a `Specify number of lines` data entry field will appear in the main screen.
    - Set `Specify number of lines` to `22` and press `[ENTER]`
    - Press `[ESC]` then `[4]` to execute the command.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `Trunk Forms` menu.

In the `Trunk Forms` menu, select `Trunk Group Assignment` and press `[ESC]` then `[2]` to edit the `Trunk Group Assignment` form.
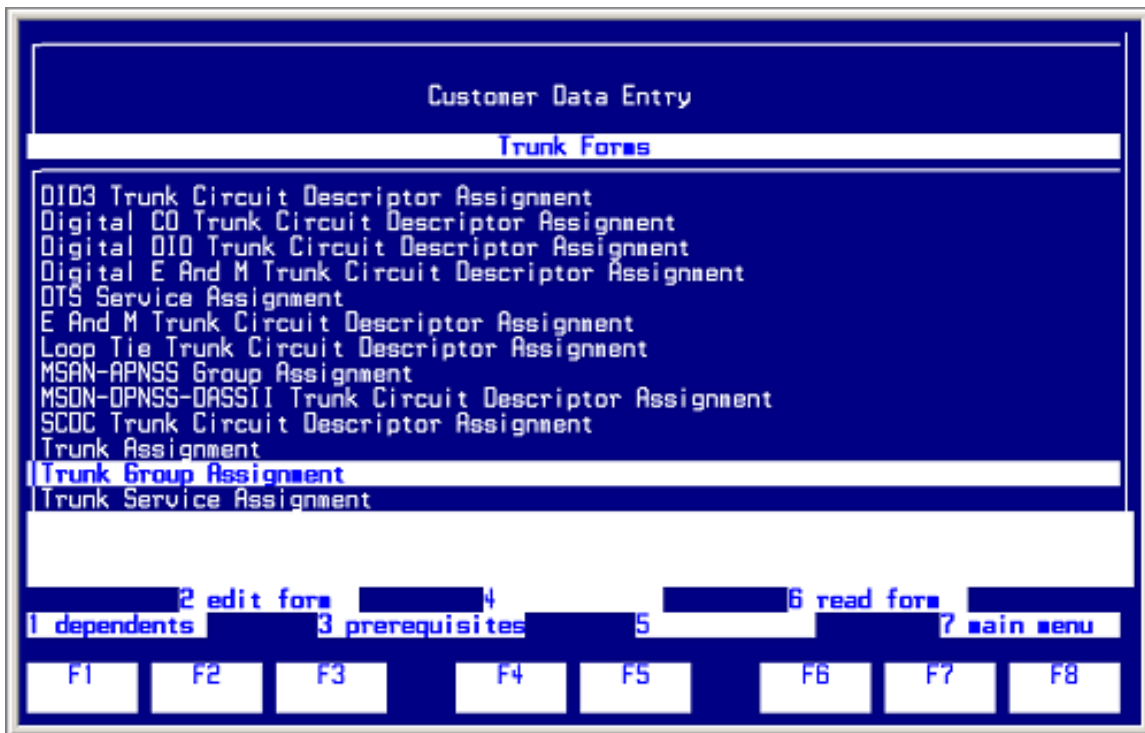
Configure the `Trunk Group Assignment` as follows:

```
                        TRUNK GROUP ASSIGNMENT

 Trunk Group Number:  2                    Comments: RADBROOK QSIG
 Hunt Mode (Circular or Terminal): Terminal
 Trunk Group Busy RAD:
 Maximum Network Hops:

    Member              Trunk Number

       1                    100
       2                    101
       3                    102
       4                    103
       5                    104
       6                    105
       7                    106
       8                    107
       9                    108



        2 range programming        4 commit              6 delete line
 1 top               3 bottom           5 specify instance   7 delete instance

   F1        F2        F3          F4        F5          F6        F7        F8
```

Note: Any field not listed below can remain the default setting.

- Set `Trunk Group Number` to `x`, where `x` is an unused trunk group number.
- Set `Hunt Mode` to `Terminal`.
- Press `[ESC]` then `[1]` to recall a list of members.
- Select `Member # 1` to `x`, where `x` is the first trunk number defined above.
- Press `[ESC]` then `[2]` to define the range programming, `RANGE PROGRAMMING Parameters` data entry field will appear in the main screen.
    - Set `Trunk Number` to `1`, and press `[ESC]` then `[2]`.
    - Set `Specify number of lines` to `22` and press `[ENTER]`.
    - Press `[ESC]` then `[4]` to execute the command.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `Trunk Forms` menu.
- Press `[ESC]` then `[7]` to return to the `Customer Data Entry` interface.

6.2   Configure ARS

Log into the Mitel SX-2000 Light system.

Press [ESC] then [7] to access the Customer Data Entry menu.

Select `Automatic Route Selection Forms` and press `[ESC]` then `[1]` to access the `ARS Forms` menu.

In the `ARS menu`, select `Digital Modification Assignment` and press `[ESC]` then `[2]` to edit the `Digital Modification Assignment` form.

```
                        Customer Data Entry
                   Automatic Route Selection Forms

Automatic Route Select Assignment
Call Progress Tone Detection Plan Assignment
Class Of Restriction Group Assignment
Day And Time Zone Assignment
Digit Modification Assignment
Route Assignment
Route List Assignment
Route Plan Assignment




           2 edit form              4                  6 read form
1 dependents            3 prerequisites     5                      7 main menu

  F1       F2       F3          F4       F5          F6       F7       F8
```

Configure the `Digital Modification Assignment` as follows:


```
                    DIGIT MODIFICATION ASSIGNMENT

   Digit    |Number of|                              |  Final Tone
Modification|Digits to|    Digits to be Inserted      |Plan/Information
   Number   | Absorb  |                              |    Marker

     1           2
     2           0
     3           0
     4           0
     5           0
     6           0
     7           0
     8           0
     9           0
    10           0
    11           0
    12           0


           2 range programming      4 commit            6 delete line
1 top                   3 bottom              5                     7

  F1       F2       F3          F4       F5          F6       F7       F8
```

Note: Any field not listed below can remain the default setting.

- Select an unused digital modification number.
- Set the `Number of Digits to Absorb` to `0`.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `ARS Forms` menu.

29

In the `ARS Forms` menu, select `Route Assignment` and press `[ESC]` then `[2]` to edit the `Route Assignment` form.

```
                          Customer Data Entry

                     Automatic Route Selection Forms

 Automatic Route Select Assignment
 Call Progress Tone Detection Plan Assignment
 Class Of Restriction Group Assignment
 Day And Time Zone Assignment
 Digit Modification Assignment
 Route Assignment
 Route List Assignment
 Route Plan Assignment




          2 edit form              4                    6 read form
 1 dependents              3 prerequisites        5                  7 main menu

   F1        F2       F3          F4       F5          F6       F7       F8
```

Configure the `Route Assignment` as follows:

```
                          ROUTE ASSIGNMENT

 Route   Trunk   XNET    COR     Digit        Digits     Route   COMP
 Number  Group   Trunk   Group   Modification Before     Type
         Number  Group   Number  Number       Outpulsing
                 Number

    1       1             1       1                               No
    2       2             1       2            5                  No
    3       3             1       2            5                  No
    4       4             1       2            5                  No
    5                     1       1                               No
    6                     1       1                               No
    7                     1       1                               No
    8                     1       1                               No
    9                     1       1                               No
   10                     1       1                               No
   11                     1       1                               No

 Data in current field is not in proper format. Please correct.

          2 range programming       4 commit           6 delete line
 1 top                    3 bottom             5                  7

   F1        F2       F3          F4       F5          F6       F7       F8
```

Note: Any field not listed below can remain the default setting.

- Select an unused route number.
- Set `Trunk Group Number` to `x`, where `x` is the trunk group number defined above.
- Set `COR Group Number` to `1`.
- Set `Digital Modification Number` to `x`, where `x` is the digital modification number defined above.
- Set `Digits Before Outpulsing` to `5`.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press `[ESC]` then `[Q]` to return to the `ARS Forms` menu.

In the `ARS Forms` menu, select `Automatic Route Selection Assignment` and press `[ESC]` then `[2]` to edit the `Automatic Route Selection Assignment` form.
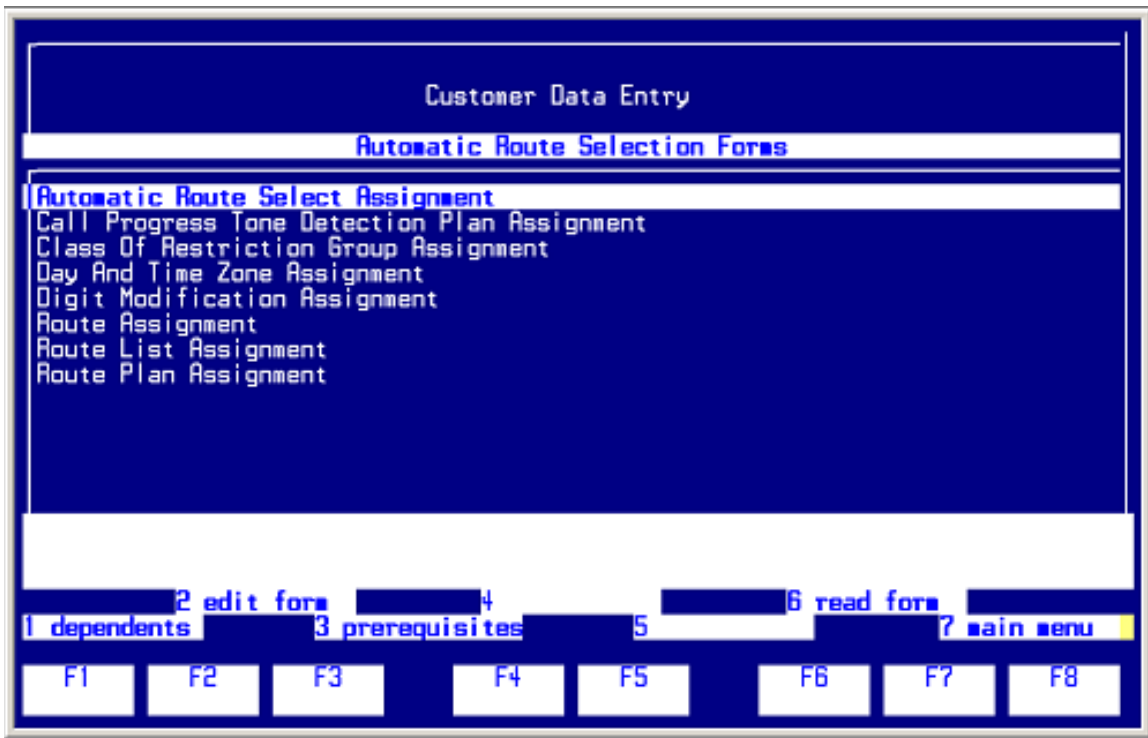
Configure the **Automatic Route Selection Assignment** as follows:

```
                    AUTOMATIC ROUTE SELECTION ASSIGNMENT

  Leading Digits: 9
  Second Dial Tone (Yes/No/Alternate): No          COR Group Number:      1

  ┌─────────────────────────────┬──────────────┬─────────────────────────┐
  │                             │  Number of   │       Termination        │
  │                             │  Digits to   │                          │
  │        Digits Dialed        │    Follow    │   Type    │   Number     │
  ├─────────────────────────────┼──────────────┼───────────┼──────────────┤
  │ 12                          │      2       │  Route    │      2       │
  │ 13                          │      2       │  Route    │      3       │
  │ 20                          │      2       │  Route    │      4       │
  │                             │              │           │              │
  │                             │              │           │              │
  │                             │              │           │              │
  └─────────────────────────────┴──────────────┴───────────┴──────────────┘


        2 range programming      4 commit                6 delete line
  1 top                  3 bottom          5 specify instance  7 delete instance

     F1       F2       F3         F4       F5         F6       F7       F8
```

Note: Any field not listed below can remain the default setting.

- Set `Leading Digits` to `x`, where `x` is a currently unassigned ARS number.
- Set `Digits Dialed` to `xx`, where `xx` is an unused 2-digit string.
- Set `Number of Digits to Follow` to `2`.
- Set `Termination Type` to `Route`.
- Set `Termination Number` to `2`.
- Press `[ESC]` then `[4]` to commit to changes and `[ESC]` then `[1]` to confirm the changes.
- Press **[ESC]** then `[Q]` to return to the `ARS Forms` menu.
- Continue to press `[ESC]` then `[Q]` until you are logged out of the system.

6.3 Configuring the NSU

Open up IMAT and create a new database as follows:
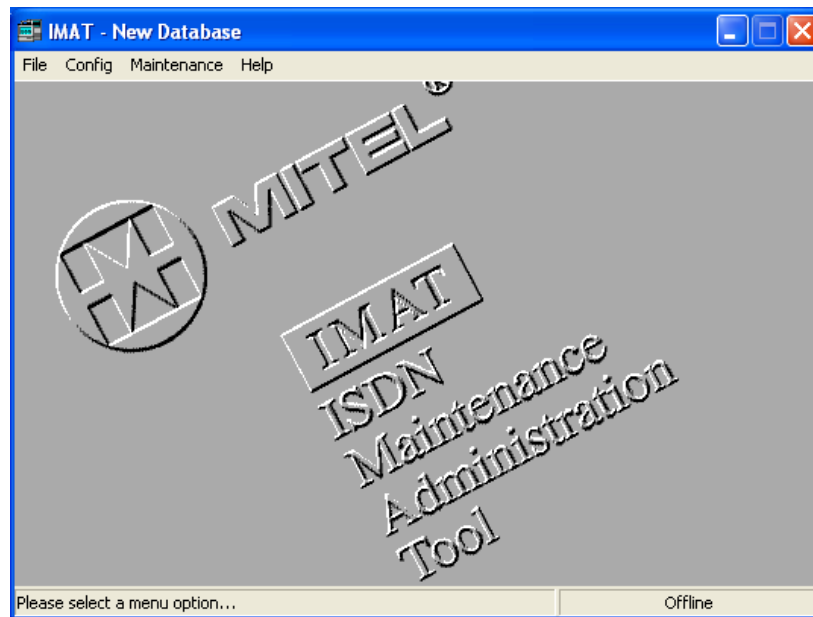
Select `File` then `New Database`
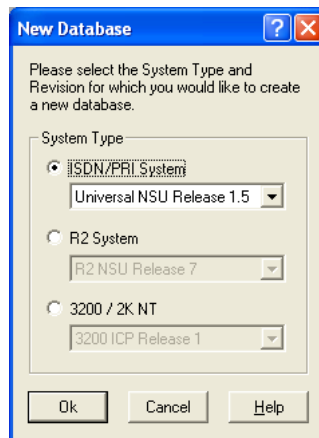
- Select the appropriate version of the database based on the version of Mitel SX-2000 Light Software being used. For example, for SX-2000 Light software version 34.2.0.20 the `Universal NSU Release 1.5` would be selected from the dropdown menu for ISDN/PRI System.
- Click `OK` to create the new database.

Configure the Site Options as follows:

Select **Config** then **System Configuration** then **Site Options.**

- Under System Type, select Universal NSU.
- Under Connected Platforms, select SX-2000 Light.
- Under Options, select **Network-side Interface** and then Qsig.
- Select Update and then select Close.

Configure the PRI Link Characteristics as follows:

Select Config then System Configuration then PRI Link Characteristics.

Note: Any field not listed below can remain the default setting.

- Set `PRI Link Number*` to x, where x is the link number that the T1 QSIG is installed.
- Set `Protocol Type` to `QSIG`.
- Set `Protocol Variant` to `ISO`.
- Set `Physical Type` to `T1/CSU`.
- Set `Network-side / Qsig master` (checkmark in box).
- Select the `Characteristics` button.
- Configure the `T1/CSU Characteristics` as follows:
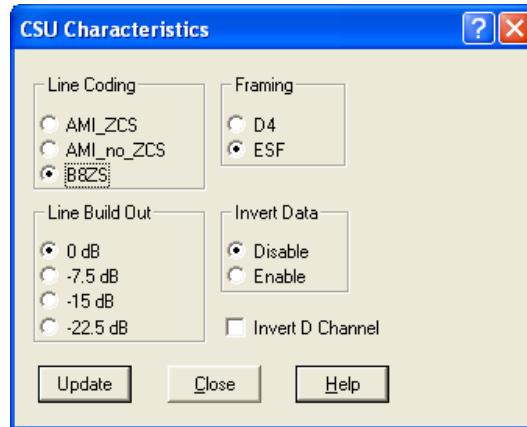
- o Under `Line Coding`, select `B8ZS`.
- o Under `Framing`, select `ESF`.
- o Under `Line Build Out`, select `0 dB`.
- o Under `Invert Data`, select `Disable`.
- o Select `Update` and select `Close`.

Configure the Incoming Call Characteristics as follows:

Select `Config` then `Incoming Call Characteristics`.
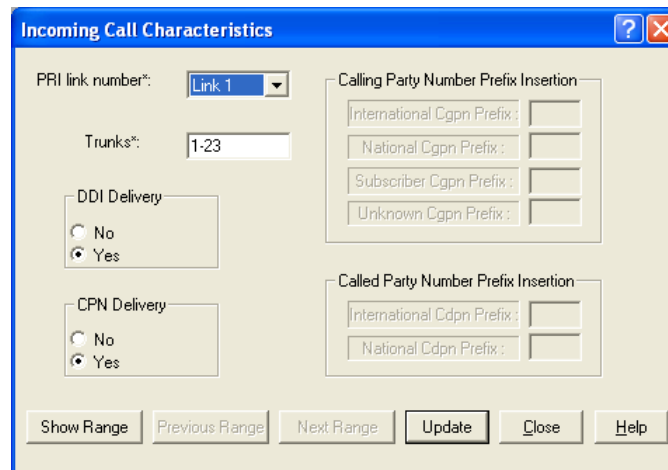
- Set `PRI Link Number*` to x, where x is the link number that the T1 QSIG is installed.
- Set `Trunks*` to `1-23`.
- Set `DDI Delivery` to `Yes`.
- Set `CPN Delivery` to `Yes`.
- Select `Update` and select `Close`.

Configure the Outgoing Call Characteristics as follows:

Select **Config** then **Outgoing Call Characteristics.**
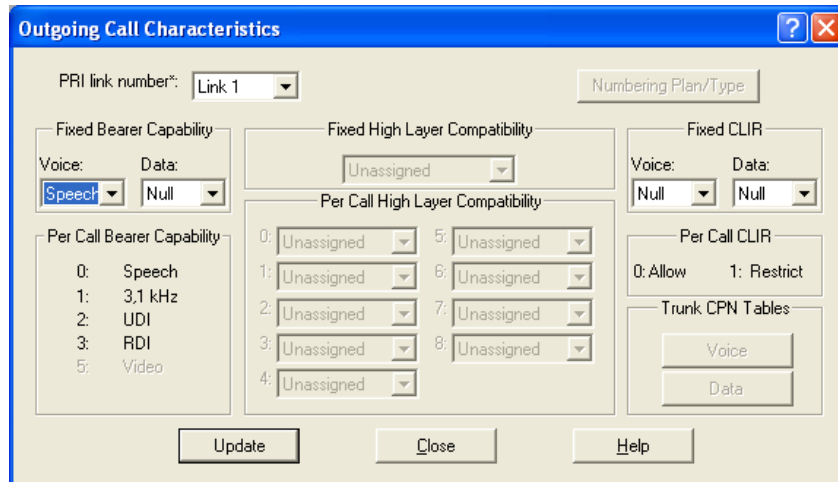
Note: Any field not listed below can remain the default setting.

- Set `PRI Link Number*` to `x`, where `x` is the link number that the T1 QSIG is installed.
- Under `Fixed Bearer Capability`, set `Voice` to `Speech`.
- Select `Update` and select `Close`.

Configure the Connection to Remote Sites as follows:

Select **File** then **Connect to Remote Site.**
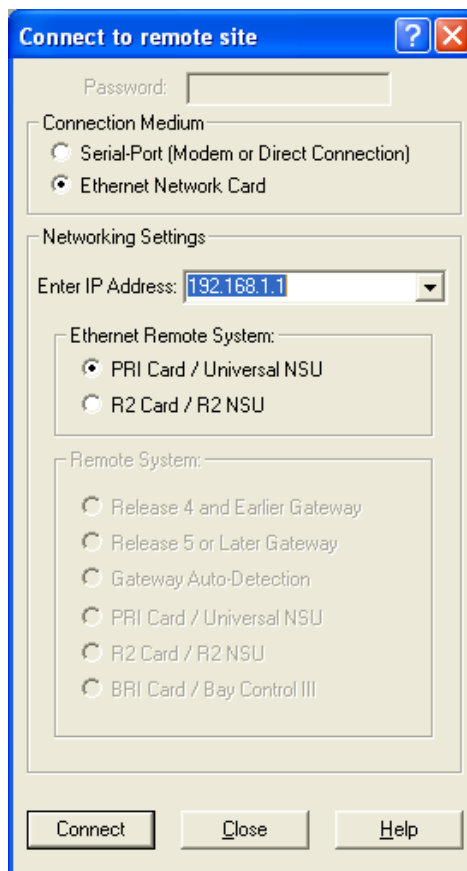
Note: Any field not listed below can remain the default setting.

- Set `Connection Medium` to `Ethernet Network Card`.
- Under `Network Setting`, set the `IP Address`, where the *IP Address* is that of the 3300 Universal NSU (default is 192.168.1.1).
- Set `Ethernet Remote Systems` to `PRI Card / Universal NSU`.
- Select `Connect`.
- Click `OK` at the "Connected over Ethernet" dialog box.
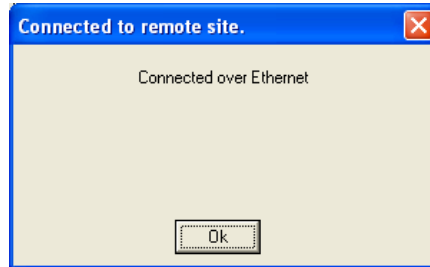
Save the Database as follows:

Select `File` then `Save` then `Database`.
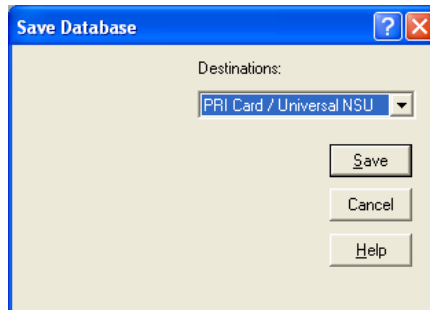
- Set `Destinations` to `PRI Card / Universal NSU`.
- Select `Save`.

Note: If a dialog box appears stating, 'Are you sure you want to save this OLDER version of MAT Database?, select `DO NOT UPGRADE` *and click* `OK`.
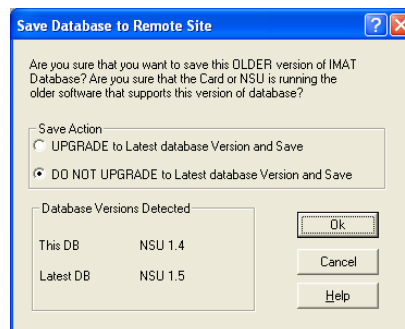
Select OK at the Database sent dialog box.

Information

Database sent. It will be active the next time you reset the remote site.

Ok
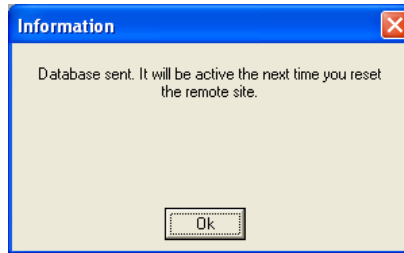
Select Maintenance then Remote Site Reset.

Reset Remote Site

Reset will disrupt service. IMAT will be automatically disconnected.
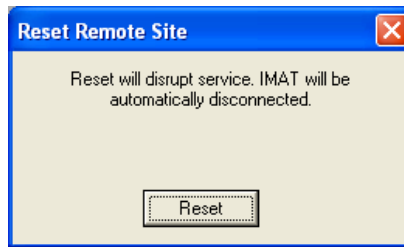
Reset

Click the Reset button.
Click OK on the Disconnected from remote site dialog box.

Information

Disconnected from remote site.

Ok
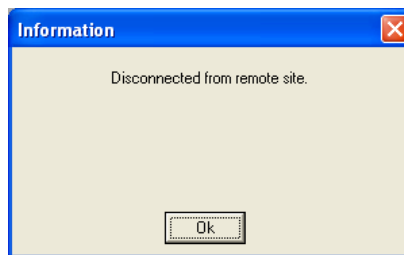
Click OK on the dialog box that states the remote site is resetting.

Information

The remote site is resetting. You have been automatically disconnected. Wait 6 minutes if you want to connect again.

Ok
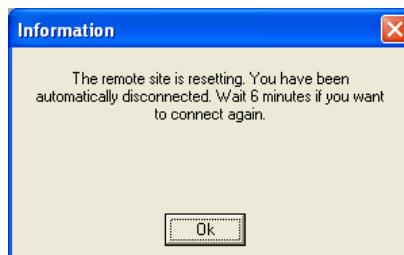
7. Microsoft OCS setup

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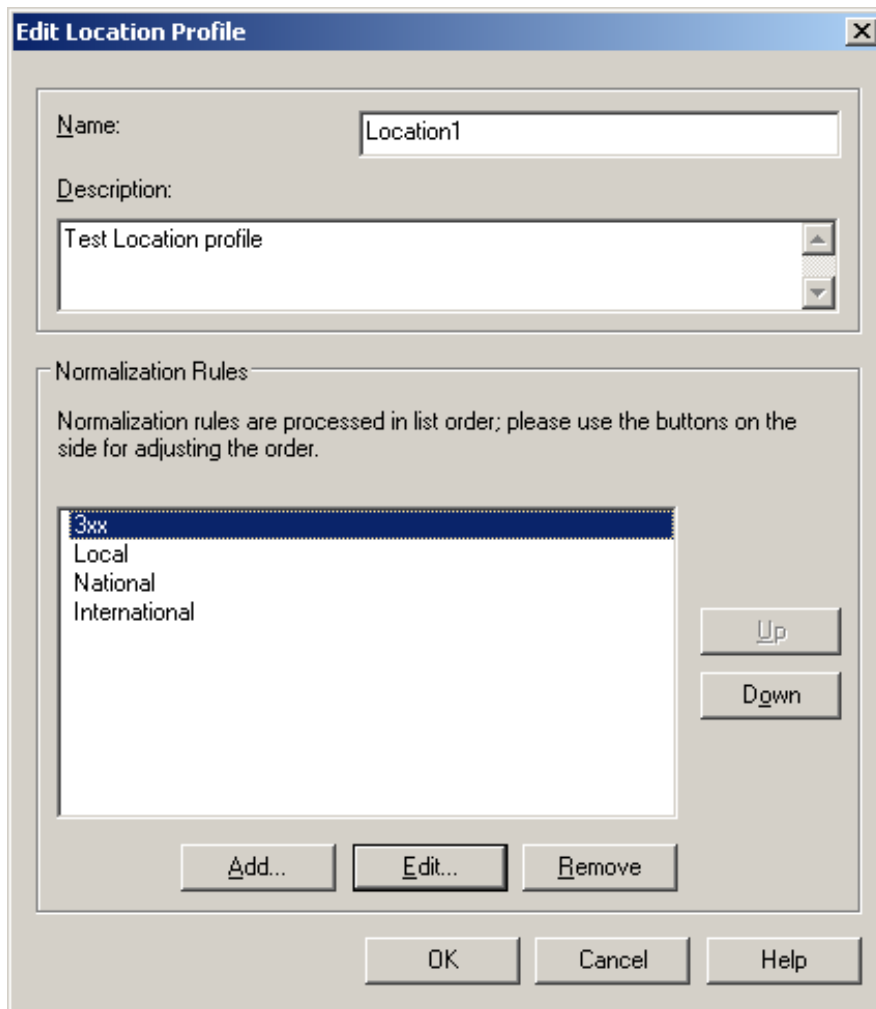
Click `Add` or `Edit` to create or change a particular rule.

Edit Phone Number Normalization Rule

Name: 3xx

Click to copy an existing rule. [Copy...]

Description:
Normalize 3xx to E.164

Translation

Phone pattern regular expression:
`^(3[0-9]{2})$`

Translation pattern regular expression:
`+17166393$1`

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

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

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:

[OK] [Cancel] [Help]

In this example, when a user dials any 3-digit number starting with 3, it will be converted to its E.164 equivalent of +17166393xxx and then that number will be searched for in AD.

More examples are shown in the following table:

Name	Phone Pattern	Translation Pattern	Descriptions
7xxx	`^(3[0-9]{2})$`	+17166393$1	Normalize 3xx to E.164
Local	`^(\d{7})$`	+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.
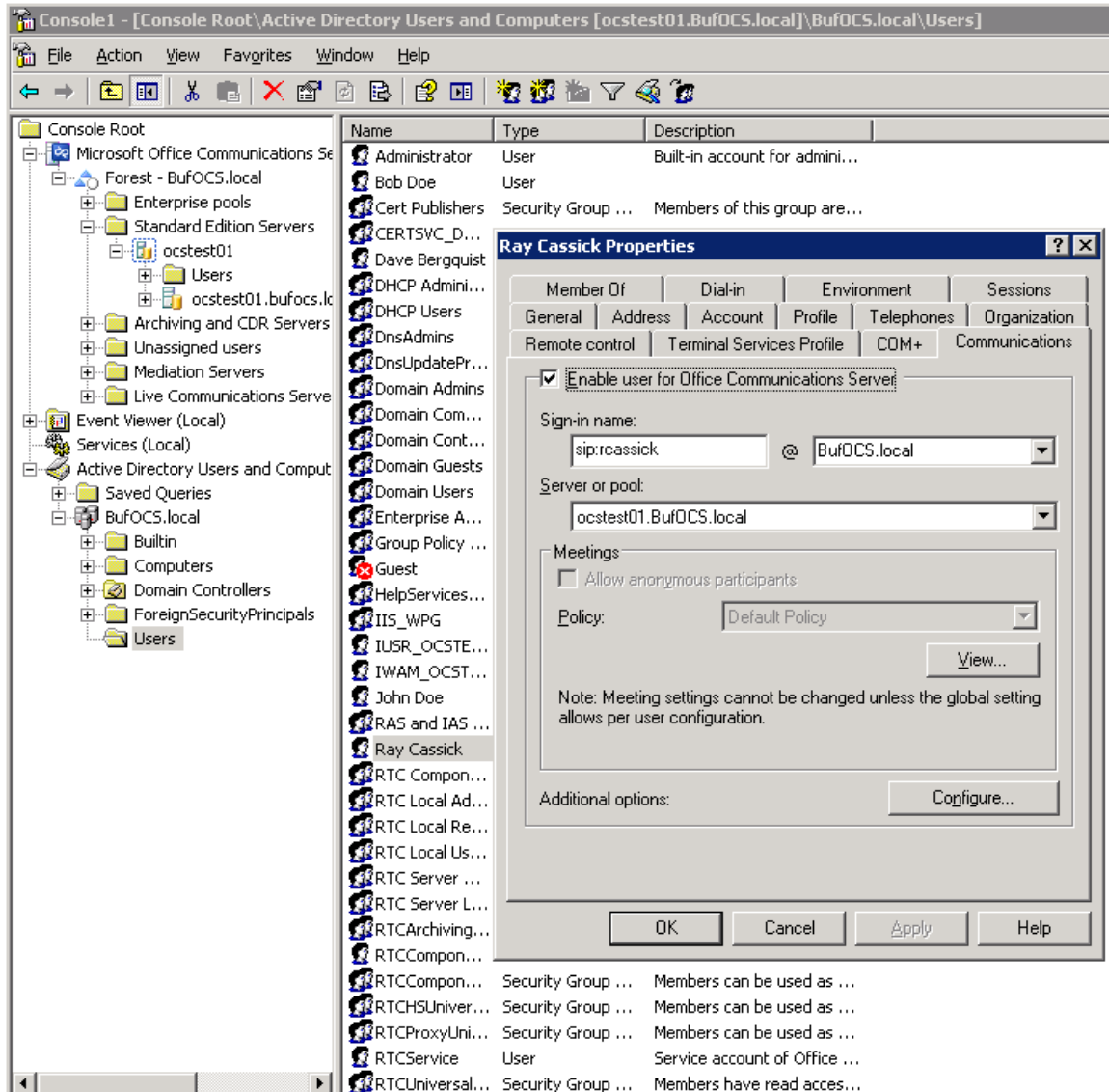
Under `Communications` tab, check the Enable user for `Office Communications Server` option and then click the `Configure` button.

In the above configuration for user Ray Cassick, when an inbound PSTN call for 211, it will be converted by the gateway CPID manipulation and routing rules into +17166393211. OCS will match that number provided by the gateway to the `Line URI` parameter for this user and ring Ray Cassick if he is logged on to OCS from Office Communicator or any OCS supported device.

8.   Testing Validation Matrix

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

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

Test Number	Call Scenario Description	Notes
Inbound call scenarios		
1	Direct call from TDM station set to OCS client.	
2	Direct call from OCS client to TDM station set.	

9.   Troubleshooting

9.1   Important Debugging Tools

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

9.2   Important Gateway Trace Masks

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

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

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

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

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