

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

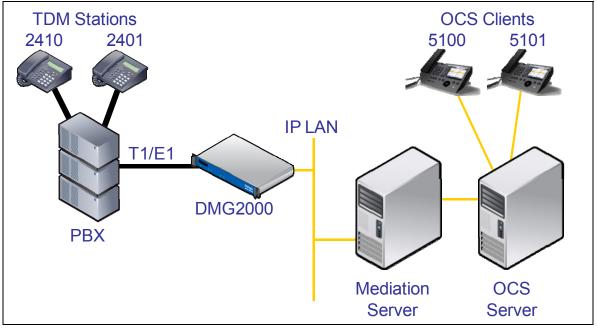
PBX Vendor	Aastra (former Ericsson)
Model	MD110
Software Version	MX1 TSW R2A (BC13)
Additional Notes	N/A

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 connect to the PBX using E1 QSIG you must use a TLU 76 (ISDN DTI/PRI 2.0) line 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 Settin	gs, 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	

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- 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.
 - Set the ISDN Protocol Variant to Ericsson.

T1/E1 Port Selection
Select Port to Modify all ports 💌

T1/E1 Configura	ition
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	120_Ohm 💌
E1 ISDN protoco	
* ISDN Protocol	QSIG
ISDN Protocol Variant	Ericsson
Contiguous B-Channel	No
General ISDN Sett	ings
QSIG Protocol Specification	ISO

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

Voip General S	ettings
User-Ager	nt
* Host and Domain Name	pbxgw.default.com
Transport Type	TCP 💌
Call as Domain Name?	No
SIPS URI Scheme Enabled	No 💌
Invite Expiration (sec)	120
Comica	

- 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 Sett	ings			
	Audio				
* Audio Comp	pression	G.711u/G.711a 🛛 💌			
RTP Digit Rel	ay Mode	BEC2833			
RTP Fax/Mod	em Tone Relay Mode	Inband-Tone 💌			
* RTP Source	IP Address Validation	Off 💌			
* RTP Source	UDP Port Validation	Off 🔽 🔽			
Signaling Digi	t Relay Mode	Off 🛛 🗸			
Voice Activity	Detection	Off 🛛 🗸			
RFC 3960 Ear	ly 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 Config	juration	
🔘 Inbound	TDM Rules 🔘 Inbound VoIP Rules	🔘 TDM Trunk Grou	ps 💿 VoIP Host Gr	oups
		VoIP Host G	roups	
	Name	Load-Balanced	Fault-Tolerant	Host Summa ry
Delete	HostGroup-1	false 💌	false 💌	192.168.1.21;
Add Host G	iroup			
[inbound]	d Host Group is referenced by the followin TDM] Inbound Local (Primary Route) TDM] Inbound Default (Primary Route)	ng rules:		Host List HostGroup-1 192.168.1.21 Delete Add Host

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:

0		<u></u>		nfiguration	-		
🖲 Inboun	d TDM Rules	OInbound VoIP Rul	es OTDM Trunk G	roups 🔾 VoIP Host (Groups		
			Inbound	TDM Rules			
Select	Enable	Rule	Label	Request Type		Trunk Group	
	V	Inbound Local		Any	Any		~
	v	Inbound Default		Any	🖌 Any		~
			Add Rule	Delete Rule			
Detailed Co	- 6: 6 7	Inbound TDM Rule: Int					
Detailed Co	ntiguration for I	INDOUND IDM Rule: IN	bound Local				
				equest Matching			
				latching			
Calling Number	×		Called × Number		Redirect Number	×	
Calling Name	×		Called × Name		Redirect Name	×	
				d Routes			
Outbound			L	Selection	Route		
Destinatio		*	Group	iroup-1 💌	Method	Bridged	×
				nipulation			
Calling Number	S		Called "+171 Number	6639''+D	Redirect Number	R	
Calling Na	me S		Called D Name		Redirect Name	R	
			Select Primary /	Alternate Route			
📀 Prim	ary 🔿 Alt-1	🔿 Alt-2 🔷 Alt-3	🔿 Alt-4 📃 🖂 Ad	d Alternate Route			
	Delete	Delete	Delete				
-							

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:

🔿 tus la su una		Inbound VoIP Rule		uter Cont	_	U			
OInbound	I DM Rules					Host G	oups		
Colort.	r			bound Vo		T	Orisia		. dalar second
Select	Enable	Outbound Internal	e Label		Request	-	Vrigin	ating VoIP Host .	Address
					Ally	_			
	V	Outbound Local			Any		*		
	V	Outbound National			Any		×		
	V	Outbound International			Any		×		
Γ	v	Default			Any		*		
Detailed Co	nfiguration for 1	Inbound VoIP Rule: 0							
			Inbound		juest Match	ing			
Calling	×	1	Called	CPID Ma			Redirect	×	
Number			Number	x17166395x>	×		Number		
Calling Name	×		Called Name	×			Redirect Name	×	
			(Dutbound Device Se					
Outbound Destinatio	n TDM	*	Trunk Group	Any		*	Route Method	Bridged	*
				CPID Mani	oulation				
Calling Number	S		Called Number	rext(D,4)			Redirect Number	R	
Calling Na	me S		Called Name	D			Redirect Name	R	
			Select	Primary / A	lternate Route				
📀 Prim	ary OAlt-1 Delete	O Alt-2 O Alt-: Delete Delete		Add A	lternate Route				
	Deiete	Delete Delete	Delete						

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.

Inbound VoIP Request Matching CPID Matching Called Number Redirect * Number Redirect * Outbound Routes Device Selection Outbound Routes Device Selection Outbound Routes Device Selection Outbound Routes Outbound Routes Outbound Routes Outbound Routes Outbound Routes Outbound Routes Called Any Route Method Outbound Called Name Calling Name S Called Number "+9"+Irem[D.5] Redirect Number R Redirect Number R Redirect Number R Redirect Name R	🔿 Inbound	d TDM Rules	⊙ Inbound VoIP Ru			iguration	Host Grou	ıps		
Image: Select primary Atternate Route Image: Select primary Atternate Route				In	bound Vo	oIP Rules				
Image: Control of the term Image: Control of term Image: Contr	Select	Enable	Rule	e Label		Request 1	Гуре	Origina	ting VoIP Host Address	
Image: Control of the second state		>	Outbound Internal			Any	~	×]
Image: Control of the second seco		v	Outbound Local			Any	*	×]
Image: Control of the second seco	[v	Outbound National			Any	~	×]
Add Rule Delete Rule Detetailed Configuration for Inbound VoIP Rule: Outbound Local Inbound VoIP Request Matching Called Number Calling X Number Called Name Calling X Called X Name Redirect Name Outbound Routes Device Selection Outbound Trunk Group Any Calling S Calling Called Number Calling Called Number Calling Called Number Calling Name Called Name S Called D Redirect R Name Redirect		v	Outbound International			Any	~	×]
Detailed Configuration for Inbound VoIP Rule: Dutbound Local Inbound VoIP Request Matching Called Number Calling Called Number Redirect × Calling Called × Redirect × Number Name Called × Name Redirect × Name Device Selection Outbound Routes Called Nampulation Called Number Redirect R Name Select Primary / Alternate Route Select Primary / Alternate Route	[Default			Any	~	×]
Called x1716xxxxxx Redirect x Number Called x1716xxxxxx Redirect x Name Called x Name Called x Called x Name Called x Called x Number x Called x Callex x Callex x Callex x Callex x Callex x Callex x Ca	etailed Co	nfiguration for I	nbound VoIP Rule: O							
Calling Number Called Number k1716xxxxxx Redirect Number * Calling Name Called Name * Redirect Redirect * Outbound Routes Device Selection Outbound Routes Called Number Route Method Bridged Calling Name S Called Called Name "+9"+Irem[D.5] Redirect Number R Select Primary / Alternate Route Outbound AddAlternate Route				Inbound			ng			
Calling Name Called Name Redirect Name Redirect Name Outbound Routes Device Selection Outbound Destination TDM Trunk Group Route Method Bridged CPID Manipulation Calling Number Called Number "+9"+Irem(D.5) Redirect Number R Calling Name S Called Name Redirect Name R Select Primary / Alternate Route Image Alt-4 Add Alternate Route		×				_			×	
Device Selection Outbound Destination TDM Trunk Group Any Route Method Bridged CPID Manipulation Called Number "+9"+Irem(D,5) Redirect Number R Calling Name S Called D Redirect Name R Select Primary / Alternate Route Image: Primary Alt-1 Alt-2 Alt-3 Alt-4 Add Alternate Route	Calling	×		Called	×		R	edirect	×	
Device Selection Outbound Destination TDM Trunk Group Any Route Method Bridged CPID Manipulation Called Number "+9"+Irem(D,5) Redirect Number R Calling Name S Called Name D Redirect Name R Select Primary / Alternate Route Image: Primary Alt-1 Alt-2 Alt-4 Add Alternate Route					Juthound	Routes				
Destination IDM Group Any Method Bridged CPID Manipulation Calling Number S Called Number "+9"+Irem(D,5) Redirect Number R Calling Name S Called Name D Redirect Name R Select Primary / Alternate Route Image: Operation of the state of the st										
Calling Number S Called Number "+9"+Irem(D.5) Redirect Number R Calling Name S Called Name D Redirect Name R Select Primary Alternate Route Add Alternate Route			~		Any				Bridged	~
Number 3 Number +3 +item(0,3) Number n Calling Name S Called Name D Redirect Name R Select Primary / Alternate Route Image: Primary Alt-1 Alt-2 Alt-3 Alt-4 Add Alternate Route	0.11:									
Calling Name Name Name Select Primary / Alternate Route • Primary • Alt-1 • Alt-2 • Alt-3 • Alt-4 • Add Alternate Route • • Add Alternate Route • • • • • • • • • • • • •		S		Number	"+9"+lre	m(D,5)		lumber	R	
Primary Alt-1 Alt-2 Alt-3 Alt-4 Add Alternate Route	Calling Na	me S			D				R	
				Select	Primary / F	lternate Route				
Delete Delete Delete	💿 Prim	ary OAlt-1 Delete	O Alt-2 O Alt-3 Delete Delete	B O Alt-4	Add /	Alternate Route]			

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.

Inhour	d TDM Pulsa	⊙ Inbound VoIP Rule			iguration	Host Cr	aunc.		
/ Indouni	u TDM Rules					HUSUGN	Jups		
				bound Vo					
Select	Enable	Rule	Label		Request			ating VoIP Host Addr	ess
L	V	Outbound Internal			Any	1	*		
	>	Outbound Local			Any	1	×		
	✓	Outbound National			Any	1	×		
[>	Outbound International			Any	N	×		
[V	Default			Any	1	*		
etailed Co	nfiguration for :	inbound VoIP Rule: Out	tbound Natio	onal					
			Inhound	VoID Reg	west Match	nina			
			Inbound	VoIP Rec CPID Ma	quest Match tching	ning			
	×		Called [tching		Redirect Number	×	
Number Calling	×	I	Called Number	CPID Ma	tching		Redirect Number Redirect Name	×	
Number Calling		I	Called Number Called [CPID Ma x1xxxxxxxxxx	tching		Number Redirect		
Number Calling		I	Called Number Called Name	CPID Ma x1xxxxxxxxx * Outbound	Routes		Number Redirect		
Number Calling Name	×		Called Number [Called Name [O	CPID Ma x1xxxxxxxxxx * Outbound Device Se	Routes		Number Redirect	×	
Number Calling Name Outbound	×	I	Called Number [Called [Name] O Trunk Group	CPID Ma x1xxxxxxxxx * Dutbound Device Se Any	Routes		Number Redirect Name		
Number Calling Name Outbound Destinatio	× TDM		Called Number [Called [Name 0 Trunk Group	CPID Ma x1xxxxxxxxx * Dutbound Device Se Any CPID Manij	Routes lection		Number Redirect Name Route Method Redirect	× Bridged	
Calling Number Calling Name Outbound Destinatio Calling Number	× TDM		Called [Number [Called [Name C Called C Trunk Group Called Number	CPID Ma x1xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	Routes lection		Number Redirect Name Route Method Redirect Number	× Bridged R	
Number Calling Name Outbound Destinatio	× TDM		Called Number [Called Name [Trunk Group Called Number Called Name	CPID Ma x1xxxxxxxxxx > Dutbound Device Se Any CPID Manig "+9"+Ire D	Routes lection m(D.1)		Number Redirect Name Route Method Redirect	× Bridged	v
Number Calling Name Outbound Destinatio Calling Number Calling Na	x TDM S sme S		Called Name Called Name C Trunk Group Called Name Called Name Select I	CPID Ma x1xxxxxxxxxx > Dutbound Device Se Any CPID Manig "+9"+Ire D Primary / #	Routes lection m(D.1)		Number Redirect Name Route Method Redirect Number Redirect	× Bridged R	
Number Calling Name Outbound Destinatio Calling Number	x TDM S sme S		Called Number [Called Name [Trunk Group Called Number Called Name	CPID Ma x1xxxxxxxxxx > Dutbound Device Se Any CPID Manig "+9"+Ire D Primary / #	Routes lection m(D.1)		Number Redirect Name Route Method Redirect Number Redirect	× Bridged R	

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 '+91xxxxxxxxx'.

Router Configuration									
Inbound YoIP Rules									
Select	Enable	Rule L	abel		Request T	уре	Origina	ting VoIP Host Address	
	✓	Outbound Internal			Any	*	×		
[✓	Outbound Local			Any	~	×		
[v	Outbound National			Any	~	×		
[✓	Outbound International			Any	*	×		
[V	Default			Any	*	×		
etailed Co	nfiguration for I	inbound VoIP Rule: Out			juest Matchii	1q			
				CPID Mat					
Calling Number	×		Called Number 🛛 🕅	011.		- Re	edirect	×	
						Nu	mber		
Calling Name	×		Called ×			Re	mber direct me	×	
	×		Name .			Re	direct		
	×		Name Du	utbound		Re	direct		
Name	Трм		Name Du			Re Na	direct		
Name Outbound Destinatio	n TDM	∧	Name Ou Trunk Group C	utbound Device Sel Any PID Manip	lection vulation	Re Na	direct me coute Aethod	* Bridged	
Name	Трм	∧	Trunk Group Called Number	utbound Device Sel Any	lection vulation	F F	toute Route Aethod Redirect Sumber	×	
Name Outbound Destinatio	TDM	∧	Name Ou Trunk Group Called	utbound Device Sel Any PID Manip	lection vulation	F F F F F F	edirect me Route Aethod	* Bridged	
Name Outbound Destinatio Calling Number Calling Na	n TDM S ame S	∧	Trunk Group Called Name	Ltbound Device Sel Any PID Manip "+9"+Iren D trimary / A	ection pulation n(D,1) Itemate Route	F F F F F F	direct me Route Aethod Redirect Redirect	* Bridged R	
Name Outbound Destinatio Calling Number	n TDM S ame S	∧	Trunk Group Called Name	Ltbound Device Sel Any PID Manip "+9"+Iren D trimary / A	ection pulation n(D,1)	F F F F F F	direct me Route Aethod Redirect Redirect	* Bridged R	

In this rule labeled as 'Outbound International' any number dialed that starts with '+011' and includes any number of digits indicates a number that is not in the local area code. In this case the CPID manipulation simply adds a +9 to the start of the number and strips off the leading + creating a result of '+9011xxxxxxxxx'.

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

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

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

6. PBX Setup Notes

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

- Initiate Route Category.
- Initiate Route Data.
- Initiate Route Equipment.
- Initiate External Destination Route Data.
- Initiate Number Analysis.
- Configure Application System Parameters.
- Setting up the subscribers stations.
- Configuring Call Diversion for stations.

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

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

Initiate Route Category.	ROCAI
Initiate Route Data.	RODAI
Initiate Route Equipment.	ROEQI
Initiate External Destination Route Data.	RODDI
Initiate Number Analysis.	NANSI
Configure Application System Parameters.	ASPAC
Configuring Call Diversion for Subscribers.	CDINI

6.1 Initiating Route Category

Initiate the E1 route category using the command ROCAI. Several of the fields require site specific entries, these are:

• ROU requires an open route number for the E1 board to use. The command ROCAP:ROU=ALL; will print all used ROU numbers; select any available number from 1-250. For this example, 8 was selected.

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

ROU, SEL, SERV, TRAF, SIG, BCAP.

The programming example below shows how to initiate the E1 route category using ROCAI. To print the results, use the command ROCAP.

```
<ROCAI:ROU=8, SEL=713000000000010, SERV=2110000001, TRAF=03151515, SIG=511100000031,
BCAP=111111;
<ROCAP:ROU=8;
ROUTE CATEGORY DATA
ROU SEL TRM SERV NODG DIST DISL TRAF SIG BCAP
8 713000000000010 5 2110000001 0 5 128 03151515 511100000031 111111
END
```

- At the prompt < enter ROCAI : ROU=X, SEL=713000000000010, SERV=2110000001, TRAF=03151515, SIG=511100000031, BCAP=111111; press RETURN
 - $\circ \quad$ where x is the open ROU number to use for the E1 route.

6.2 Initiating Route Data

Initiate the E1 route data using the command RODAI. Several of the fields require site specific entries, these are:

• ROU requires the ROU number for the E1 board selected previously.

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

ROU, TYPE, VARC, VARI, VARO.

The programming example below shows how to initiate route data for the E1 trunk using RODAI. To print the results, use the command RODAP.

```
<RODAI: ROU=8, TYPE=SL60, VARC=00200070, VARI=75540000, VAR0=06300000;
<RODAP: ROU=8;
ROUTE DATA
ROU TYPE VARC VARI VARO FILTER
8 SL60 H' 00200070 H' 75540000 H' 06300000 NO
END
```

- At the prompt < enter RODAI : ROU=X, TYPE=SL60, VARC=00200070, VARI=75540000, VAR0=06300000; press RETURN
 - Where x is the ROU number for the E1 board selected previously

6.3 Initiating Route Equipment

Initiate the route equipment of the E1 board using command ROEQI. Several of the fields require site specific entries, these are:

- ROU requires the ROU number for the E1 board selected previously.
- TRU requires trunk number, where the first 3 digits are the LIM number, and the last 2 are the channel number.
- EQU requires the equipment position number for the E1 board.

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

ROU, TRU, EQU.

The programming example below shows how to initiate the route equipment for the E1 trunk using ROEQI. To print the results, use the command ROEDP.

Г	<r0f0< th=""><th>1 : ROU=8.</th><th>TRU=001-1&&001</th><th>I-15, EQU=001-0-4</th><th>0-1&&001-0-</th><th>40-15:</th><th></th></r0f0<>	1 : ROU=8.	TRU=001-1&&001	I-15, EQU=001-0-4	0-1&&001-0-	40-15:	
	<pre><roeqi :="" equ="001-0-40-17&001-0-40-31;</pre" rou="8," tru="001-17&001-31,"></roeqi></pre>						
	<pre></pre>						
					2011		CNTDI
	ROU	TRU	EQU	I P ADDRESS	SQU	I NDDAT	CNTRL
	8	001-1	001-0-40-01			H' 00000000000	
	8	001-2	001-0-40-02			H' 00000000000	
	8	001-3	001-0-40-03			H' 000000000000	
	8	001-4	001-0-40-04			H' 000000000000	
	8	001-5	001-0-40-05			H' 000000000000	
	8	001-6	001-0-40-06			H' 000000000000	
	8	001-7	001-0-40-07			H' 000000000000	
	8	001-8	001-0-40-08			H' 000000000000	
	8	001-9	001-0-40-09			H' 000000000000	
	8	001-10	001-0-40-10			H' 0000000000000	
	8	001-11	001-0-40-11			H' 0000000000000	
	8	001-12	001-0-40-12			H' 000000000000	
	8	001-12	001-0-40-12			H' 000000000000	
	8	001-13	001-0-40-13			H' 000000000000000000000000000000000000	
	8	001-14	001-0-40-14			H' 000000000000000000000000000000000000	
	8	001-17	001-0-40-17			H' 00000000000	
	8	001-18	001-0-40-18			H' 000000000000	
1	8	001-19	001-0-40-19			H' 000000000000	

8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	001-20 001-21 001-22 001-23 001-24 001-25 001-26 001-27 001-28 001-29 001-30 001-30	001-0-40-20 001-0-40-21 001-0-40-22 001-0-40-23 001-0-40-24 001-0-40-25 001-0-40-25 001-0-40-27 001-0-40-27 001-0-40-28 001-0-40-29 001-0-40-30	H' 00000000000 H' 00000000000 H' 0000000000
8 END	001-31	001-0-40-31	H' 0000000000

- At the prompt > enter ROEQI : ROU=X, TRU=YYY-1&&YYY-15, EQU=YYY-M-ZZ-1&&YYY-M-ZZ-15; press RETURN.
 - \circ Where x is the ROU number for the E1 board selected previously
 - Where YYY is the LIM Number for the E1 board
 - $\circ\quad$ Where $\,\,{}_{\mathbb M}\,$ is the MAG/DSU number for the E1 board
 - Where zz is the Board Position number for the E1 board
- At the prompt > enter ROEQI: ROU=X, TRU=YYY-17&&YYY-31, EQU=YYY-M-ZZ-17&&YYY-M-ZZ-31; press RETURN.
 - \circ $\;$ Where $\; x \;$ is the ROU number for the E1 board selected previously
 - Where YYY is the LIM Number for the E1 board
 - $\circ\quad$ Where $\,\,{}_{\mathbb M}\,$ is the MAG/DSU number for the E1 board
 - \circ ~ Where $~\mbox{zz}~$ is the Board Position number for the E1 board

6.4 Initiating External Destination Route Data

Initiate the External Destination Route Data using command RODDI. Several of the fields require site specific entries, these are:

- DEST requires an unused number in the dial plan.
- ROU requires the ROU number for the E1 board selected previously.

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

DEST, ROU, ADC.

The programming example below shows how to initiate the external destination route data using RODDI. To print the results, use the command RODDP.

```
        <RODDI:DEST=81, ROU=8, ADC=0606200000002501060000001;</td>

        <RODDP:DEST=81;</td>

        EXTERNAL DESTINATION ROUTE DATA

        DEST DRN ROU CHO CUST ADC
        TRC SRT NUMACK PRE

        8
        0606200000002501060000001 0 1 0

        END
```

- At the prompt < enter RODDI : DEST=YY, ROU=X, ADC=0606200000002501060000001; press RETURN
 - Where x is the ROU number for the E1 board selected previously
 - Where YY is the DEST number chosen to route calls to the E1 Trunk

6.5 Initiating Number Analysis

6.5.1 E1 Trunk Destination Number

Now that the destination number is assigned, it must be added to the PBX Number analysis using the command NANSI. Several of the fields require site specific entries, these are:

• NUMSE requires the DEST number assigned to the E1 trunk previously.

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

NUMTYP, NUMSE.

The programming example below shows how to add the trunk number series to the PBX Number Analysis using NANSI. To print the results, use the command NADAP.

<NANSI:NUMTYP=ED, NUMSE=81; <NADAP:NUMTYP=ED; NUMBER ANALYSIS DATA TYPE OF SERIES EXTERNAL DESTINATION CODE 81

At the < prompt enter NANSI : NUMTYP=ED, NUMSE=YY; press RETURN
 Where YY is the DEST number to route calls to the E1 Trunk selected previously.

6.5.2 PBX Own Exchange Destination Number

In order for Path Replacement on Join Transfer and Call Redirection, the PBX must have an Own Exchange Number Series assigned to route calls back to itself. The Own Exchange Number must be added to the PBX Number analysis using the command NANSI. Several of the fields require site specific entries, these are:

• NUMSE requires an unused number in the dial plan for the Own Exchange Number.

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

NUMTYP, NUMSE.

The programming example below shows how to add the own exchange number series to the PBX Number Analysis using NANSI. To print the results, use the command NADAP.

<pre><nansi:numtyp=en, numse="80;<br"><nadap:numtyp=en; NUMBER ANALYSIS DATA TYPE OF SERIES OWN EXCHANGE NUMBER SERIES</nadap:numtyp=en; </nansi:numtyp=en,></pre>	NUMBER SERIES 80	
---	---------------------	--

- At the < prompt enter NANSI : NUMTYP=EN, NUMSE=XX; press RETURN
 - Where XX is the unused Number Series number to identify the PBX in the private network.

6.6 Configuring Application System Parameters

Configure the Application System Parameters using the command ASPAC.

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

PARNUM, PARVAL.

The Values of the Application System Parameters that must be modified are:

- PARNUM=44 Rerouting on no reply on a call to private external line
- PARNUM=66 Route optimization availability
- PARNUM=70 Time before route optimization starts on alternative routing
- PARNUM=71 Time before route optimization starts on transfer
- PARNUM=72
 Time before restart of route optimization when request denied
- PARNUM=73 Attempts on route optimization when the request denied
- PARNUM=77 Traffic category check at diversion
- PARNUM=78 Traffic category check at diversion on no answer
- PARNUM=79 Extension's permission to dial message diversion service codes
- PARNUM=85 Rerouting incoming call before complete internal number received
- PARNUM=93 ISDN call diversion mode
- PARNUM=98 Automatic activation of diversion on busy
- PARNUM=105 Automatic activation of diversion on no answer
- PARNUM=156 Call discrimination check for Deflect/SST case
- PARNUM=223 Type of network services

The programming example below shows how to configure the application system parameters using ASPAC. To print the results, use the command ASPAP.

<ASPAC: PARNUM=223, PARVAL=7; <ASPAP: PARNUM=223; APPLICATION SYSTEM PARAMETERS PARNUM PARVAL 223 7 END

- At the prompt < enter ASPAC: PARNUM=XX, PARVAL=YY; press RETURN
 - o Where XX is the Parameter Number
 - Where YY is the Value to be assigned to the Parameter, as defined below
- Repeat for each PARNUM and PARVAL combination below:
 - PARNUM=44 PARVAL=3
 - PARNUM=66 PARVAL=1
 - PARNUM=70 PARVAL=1
 - PARNUM=71 PARVAL=1
 - PARNUM=72 PARVAL=1
 - PARNUM=73 PARVAL=3
 - PARNUM=77 PARVAL=0
 - PARNUM=78 PARVAL=0
 - PARNUM=79 PARVAL=1
 - PARNUM=85 PARVAL=1
 - PARNUM=93 PARVAL=0
 - PARNUM=98 PARVAL=1
 - PARNUM=105 PARVAL=1
 - PARNUM=156 PARVAL=0
 - PARNUM=223 PARVAL=7

6.7 Configuring Call Diversion for Subscriber Stations

Configure call forwarding for individual subscribers to the E1 Trunk using the command CDINI. Several of the fields require site specific entries, these are:

- DIR requires the directory number in the dial plan for the Subscriber Station
- DIV requires the DEST number of the E1 trunk assigned previously

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

DIR, DIV.

The programming example below shows how to configure a diversion destination for a subscriber using CDINI. To print the results, use the command CDI DP.

```
<CDI NI : DI R=1017, DI V=81;
<CDI DP: DI R=1017;
CALL DI VERSI ON I NDI VI DUAL DATA
DI R DI V
1017 81
END
```

- At the prompt < enter CDI NI : DI R=XXXX, DI V=YY; press RETURN
 - Where XXXX is the directory number defined for the subscriber station
 - Where YY is the DEST number of the E1 Trunk previously assigned

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 \rightarrow Administrative Tools \rightarrow 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.

Edit Location Profile	×
Name: Location1	
Description:	
Test Location profile	A •
Normalization Rules	
Normalization rules are processed in list order; please use the b side for adjusting the order.	uttons on the
2xxx Local National International	<u>⊔</u> p D <u>o</u> wn
Add <u>E</u> dit <u>R</u> emove	
OK Cancel	Help

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

Edit Phone Number Normali	zation Rule	×			
<u>N</u> ame:	2ххх				
Click to copy an existing rule.	,	<u>С</u> ору			
Description:					
Normalize 2xxx to E.164					
Translation					
Phone pattern regular expres	ssion:				
^(2[0-9]{3})\$					
<u>Translation pattern regular e</u>	xpression:				
+1716639\$1					
Valid translation characters a	are +, numbers, and \$. Example: +1-	425\$1.			
Click Helper for assistance in regular expressions and tran-	n creating common phone number slations.	<u>H</u> elper			
Test translation					
To test the translation, enter pattern, the translation will be	a sample dialed number. If it match e shown.	es the phone			
Sample dialed number:					
1					
Translated number:					
	OK Cancel	Help			

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.

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

More examples are shown in the following table:

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 \rightarrow Administrative Tools \rightarrow 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.

Edit Route			×
<u>N</u> ame:	Universal Route		
Description:			
Route all calls to this m	ediation server		4
A route requires a targe gateways, and one or n		lar expressior	n, one or more
Target phone number	's:		
<u>Target</u> regular expres	sion		
^\+?(\d*)\$			
			<u>H</u> elper
<u> </u>			
Address dmg4000.BufOCS.Ir	ocal:5061		
		<u>A</u> dd	<u>R</u> emove
Phone usages			
Default Usage			
			<u>C</u> onfigure
	OK.	Cancel	Help

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.

🚡 Console1 - [Console Root\Active Di	rectory Users and	Computers [ocstest01.BufOCS.local]\BufOCS.local\Users]
🚡 Eile Action View Favorites Wi	ndow <u>H</u> elp	
⇔ → 🗈 🖬 🐰 💼 🗙 😭	0 🖹 😫 🖬	12 🖉 ៉ 🖓 🍕 📁
Console Root	Name	Type Description
🖻 📴 Microsoft Office Communications Se		User Built-in account for admini
Erest - BufOCS.local	🖸 Bob Doe	User
⊕	Cert Publishers	Security Group Members of this group are
	CERTSVC_D	Ray Cassick Properties ? 🗙
🗄 📄 Users	Dave Bergquist	
😟 🗓 ocstest01.bufocs.k	DHCP Users	Member Of Dial-in Environment Sessions
Archiving and CDR Servers		General Address Account Profile Telephones Organization Remote control Terminal Services Profile COM+ Communications
	DnsUpdatePr	
Mediation Servers If the communications Server	Domain Admins	Enable user for Office Communications Server
	Domain Com	Sign-in name:
Services (Local)	🕵 Domain Cont	sip:rcassick (@ BufOCS.local
🖻 🗳 Active Directory Users and Comput	💯 Domain Guests	
🗄 🚊 Saved Queries	🕵 Domain Users	Server or pool:
🖻 🚮 BufOCS.local	Enterprise A	ocstest01.Buf0CS.local
i ⊕… 🚞 Builtin	Group Policy	Meetings
⊡ Computers ⊕-Ø Domain Controllers		Allow anonymous participants
ForeignSecurityPrincipals	HelpServices	Policy: Default Policy
	IUSR OCSTE	
		<u>⊻</u> iew
	John Doe	Note: Meeting settings cannot be changed unless the global setting
	RAS and IAS	allows per user configuration.
	😨 Ray Cassick	
	RTC Compon	
	🕂 💯 RTC Local Ad	Additional options: Configure
	RTC Local Re	
	RTC Local Us	
	RTC Server	
	RTC Server L	OK Cancel Apply Help
	RTCArchiving	OK Cancel Apply Help
	RTCCompon	Security Group Members can be used as
	RTCHSUniver	
		Security Group Members can be used as
	RTCService	User Service account of Office
	🕵 RTCUniversal	Security Group Members have read acces

Under Communications tab, check the Enable user for Office Communications Server option and then click the Configure button.

Jser Options		×				
	Telephony Select a telephony option. These settings affect only those calls that are routed through IP-PSTN or remote call control gateways.					
C Enable <u>P</u> C-to-PC cor	nmunication only					
C Enable <u>R</u> emote call	control					
	lice					
Enable PB <u>X</u> integ	gration					
Note: To enable both Server URI below.	n remote call control and PBX integration, you must specify a					
P <u>o</u> licy:	Default Policy					
<u>S</u> erver URI:	sip:4000	1				
Line URI:	tel:+17166395100					
Federation						
Enable remote user a	access					
Enable public IM cor	nnectivity					
Archiving						
Archive internal IM o	onversations					
Archive federated IM	conversations					
Note: Archiving settings cannot be changed unless the global setting allows per user configuration.						
Enable enhanged pres	ence					
	cannot be changed once it has been set.					
	OK Cancel Help	1				

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 ca	Il scenarios	
1	Direct call from TDM station set to OCS client.	
2	Direct call from OCS client to TDM station set.	

9. Troubleshooting

9.1 Important Debugging Tools

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

9.2 Important Gateway Trace Masks

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

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