

1. Scope

This document is intended to detail a typical installation and configuration of a Dialogic® Media Gateway when used to interface between a PBX and a unified messaging application.

2. Configuration Details

Listed below are the specific details of the PBX and Dialogic® gateway used in the testing to construct the following documentation.

2.1 PBX

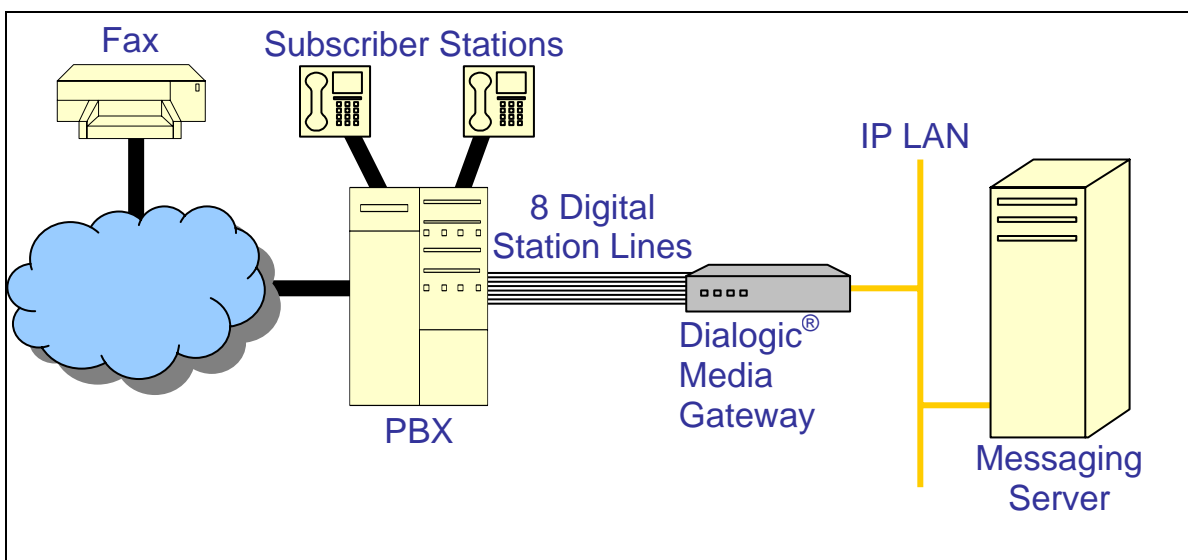
PBX Vendor	Avaya
Model(s)	Definity G3
Software Version(s)	R009i.05.122.4
Additional Notes	N/A

2.2 Dialogic® Gateway

Gateway Model	Dialogic® DMG1008DNI (former PIMG80DNI)
Software Version(s)	5.0.42
Protocol	Digital set emulation

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

Configuration requires that the PBX support the 7434ND station set type. The 8434 station set can be used instead, but the 7434ND set type is comparatively preferred.

NOTE: The hardware on the gateway physically emulates a 2-wire 8434 station set but during the PBX configuration it is more preferred to set the station type for 7434ND as detailed later in this document.

3.1.1 PBX Equipment Required

To support the 2-wire station interface as documented, you need one of the following PBX line card types:

- TN2181 (16 port)
- TN2224 (24 port)

3.1.2 PBX Cabling Requirements

It is recommended that total loop length (cable distance between PBX connection and the gateway interface) be no longer than 3000 feet (915 meters) and no shorter than 200 feet (60 meters).

3.2 Gateway Prerequisites

The gateway needs to support 8434 digital station set emulation.

4. Summary of Limitations

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

5. Gateway Setup Notes

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

- Assign 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.
- Configure the gateway for the Avaya integration.

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

- Configure the gateway with at least a single IP endpoint pointing to your messaging server. If multiple IP endpoints are to be used, then ensure they are configured as well.
- Activate fault tolerance and load balancing as required by the application and system requirements.
- Specify the required audio coders as required by the application.
- Set the hunt group extension number to the extension number you will be using for your hunt group in the PBX programming.

6. PBX Setup Notes

The basic steps of setting up the PBX are as follows:

- Setting up each gateway station port.
- Defining hunt group to act as a central point for incoming calls to the gateway and a coverage path for subscriber sets to use as a forwarding point.
- Setting up subscriber station sets.

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

- change; delete; and add

6.1 Setting Up Each Gateway Station Port

Use the `change station` or `add station` command to configure as many station ports as required for your configuration (8 ports per gateway). The example below shows performing this command on one station.

```
change station 501                                     Page 1 of 5
                                                    STATION
Extension: 501                                         Lock Messages? n
  Type: 7434ND                                         Security Code:      TN: 1
  Port: 01A0501                                       Coverage Path 1:   COR: 1
  Name: VoiceMail                                       Coverage Path 2:   COS: 1
                                                    Hunt-to Station:

STATION OPTIONS
  Loss Group: 2                                         Personalized Ringing Pattern: 1
  Data Module? n                                       Message Lamp Ext: 575
  Display Module? y
  Display Language: english                             Coverage Module? n
```

```
change station 501                                     Page 2 of 5
                                                    STATION
FEATURE OPTIONS
  LWC Reception: msa-spe                               Auto Select Any Idle Appearance? n
  LWC Activation? y                                   Coverage Msg Retrieval? y
  LWC Log External Calls? n                           Auto Answer: none
  CDR Privacy? n                                     Data Restriction? n
  Redirect Notification? y                             Idle Appearance Preference? n
  Per Button Ring Control? n                           Restrict Last Appearance? y
  Bridged Call Alerting? n
  Active Station Ringing: single

  H.320 Conversion? n                                Per Station CPN - Send Calling Number? y
                                                    Audible Message Waiting? n
                                                    Display Client Redirection? y
                                                    Select Last Used Appearance? n
                                                    Coverage After Forwarding? S
```

change station 501

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STATION

SITE DATA

Room:	Headset?	n
Jack:	Speaker?	n
Cable:	Mounting:	d
Floor:	Cord Length:	0
Building:	Set Color:	

ABBREVIATED DIALING

List1: List2: List3:

BUTTON ASSIGNMENTS

1: call-appr	6:
2: call-appr	7:
3:	8:
4:	9: lwc-store
5:	10: lwc-cancel

change station 501

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STATION

FEATURE BUTTON ASSIGNMENTS

1:	13:
2:	14:
3:	15:
4:	16:
5:	17:
6:	18:
7:	19:
8:	20:
9:	21:
10:	22:
11:	23:
12:	24:

change station 575

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STATION

DISPLAY BUTTON ASSIGNMENTS

1: normal
2:
3:
4:
5:
6:
7:

Important notes about the above programming:

Page 1

- The station `Type` is important. A beneficial configuration will have the gateway ports set up as '7434ND' (note the ND at the end of the type).
- Because you are selecting a station type that has an option display module, and the gateway requires that display to be present for integration data, you must set the `Display Module` option to 'y' and then set the `Display Language` to 'english'.

Page 2

- For a channel that is going to be used for processing MWIs, you must set the `LWC Activation` parameter to 'y'. This gives that specific port the ability to process MWI sets and clears.
- Because the Avaya PBX requires that you configure the station set with two call appearances (as seen on the next page), if you are going to do transfers you must configure each port with the `Restrict Last Appearance` parameter set to 'y'. This will ensure that you always have the second appearance in an idle state for doing transfers.

Page 3

- Because of a requirement of the Avaya PBX, you must configure each channel that is going to do transfers with two call appearances. These two appearances must be on the first 2 buttons (Buttons # 1 & 2) of the station.
- For a channel that will be used to process MWIs, you must administer both a `LWC-Store` and a `LWC-Cancel` key on the last two buttons (Buttons # 9 & 10) of the station set.

Page 4

- Ensure that all feature buttons listed on this page are blank.

Page 5

- Because you have administered a display module on this station set, you are required to administer a `Normal` key on the first button of the display module. Ensure that all other buttons are defined as blank. The PBX will not allow you to complete the programming until you set up the button as shown.

6.2 Defining Hunt Group and Coverage Path

Use the `change hunt-group` or `add hunt-group` command to a single hunt group to act as a central inbound route for all calls.

```
change hunt-group 10                                     Page 1 of 10
                                     HUNT GROUP
      Group Number: 10                               ACD? n
      Group Name: UM Hunt                             Queue? n
      Group Extension: 500                             Vector? n
      Group Type: ucd-mia                             Coverage Path:
      TN: 1                                           Night Service Destination:
      COR: 1                                           MM Early Answer? n
      Security Code:
      ISDN Caller Display:
```

change hunt-group 10

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HUNT GROUP

Group Number: 10 Group Extension: 500 Group Type: ucd-mia
 Voice Mail Number: Administered Members (min/max): 1 /8
 Total Administered Members: 8

GROUP MEMBER ASSIGNMENTS

Ext	Name	Ext	Name
1 :	501 VoiceMail	14 :	
2 :	502 VoiceMail	15 :	
3 :	503 VoiceMail	16 :	
4 :	504 VoiceMail	17 :	
5 :	505 VoiceMail	18 :	
6 :	506 VoiceMail	19 :	
7 :	507 VoiceMail	20 :	
8 :	508 VoiceMail	21 :	
9 :		22 :	
10 :		23 :	
11 :		24 :	
12 :		25 :	
13 :		26 :	

At End of Member List

Important notes about the above programming:

Page 1

- To change the type of hunting performed by this group, you can change the `Group Type` parameter. These settings can be changed between a uniform style of call distribution (round robin) and a linear style.
- If desired, you can also activate queuing on the hunt group to allow a call to ring into the group even if all the ports in the group are busy.

Page 2

- This is the page where you add each of the gateway ports that are going to be part of your inbound hunt group. If required, you may add additional channels past the limits of this page.

Use the `change coverage path` or `add coverage path` command to configure a single coverage path to act as a forwarding rule to be assigned to each subscriber.

change coverage path 20

Page 1 of 1

COVERAGE PATH

Coverage Path Number: 20 Hunt after Coverage? n
 Next Path Number: Linkage

COVERAGE CRITERIA

Station/Group Status	Inside Call	Outside Call	
Active?	n	n	
Busy?	y	y	
Don't Answer?	y	y	Number of Rings: 4
All?	n	n	
DND/SAC/Goto Cover?	y	y	

COVERAGE POINTS

Terminate to Coverage Pts. with Bridged Appearances? n

Point1: h10	Point2:	Point3:
Point4:	Point5:	Point6:

Important notes about the above programming:

Page 1

- To set forwarding for both internal and external busy and ring no answer calls, set the appropriate configuration sections to 'y'.
- To set the number of rings that constitute a ring no answer condition, set the required number of rings in the `Number of Rings` field.
- To route any calls that will follow this coverage path, place the hunt group number into the `Point1` field.

6.3 Setting Up Subscriber Station Sets

This is an example of how to set up a subscriber's station set to forward correctly to the server via the coverage path that was administered. Use the `change station` command to alter an existing station or the `add station` command to add a new users station. The only modification needed is to ensure that the `Coverage Path 1` configuration section is set to use the coverage path that has been defined.

```
change station 585                                     Page 1 of 5
                                                    STATION
Extension: 585                                         Lock Messages? n
  Type: 8434D                                         Security Code:      TN: 1
  Port: 01A0511                                       Coverage Path 1: 20 COR: 1
  Name: Smith, John                                       Coverage Path 2:      COS: 1
                                                    Hunt-to Station:

STATION OPTIONS
  Loss Group: 2                                       Personalized Ringing Pattern: 1
  Data Module? n                                       Message Lamp Ext: 585
  Speakerphone: 2-way                                   Mute Button Enabled? y
  Display Language: english                               Expansion Module? n
```

6.4 Additional Comments

6.4.1 Phone Set Type Selection

This configuration requires the use of the 7434ND station set type for each of the gateway ports. If you do not have this station type as an option when doing your configuration, then you may need to enable this option in the PBX's system configuration area. You should be able to locate an option there that specifically states 'Enable 7434ND support?' and should set that parameter to 'y'. This station type is important because it allows you to not have to make any changes to the subscriber's name fields in the PBX to get integration to work. If you do not use this (7434ND) station type and instead opt to use the 8434 station type, then you will be required to configure the name field of each subscriber's phone set to make sure that it includes their extension number in the name field, somewhere within the first 15 characters. Below is an example of what to change on all your subscribers (change shown in red type) if you do not use the 7434ND station set type on the gateway ports.

```

change station 585
                                                    Page 1 of 5

                                STATION

Extension: 585                                Lock Messages? n
Type: 8434D                                  Security Code:          TN: 1
Port: 01A0511                               Coverage Path 1: 20    COR: 1
Name: 585 Smith, John                       Coverage Path 2:      COS: 1
                                                Hunt-to Station:

STATION OPTIONS
Loss Group: 2                                Personalized Ringing Pattern: 1
Data Module? n                               Message Lamp Ext: 585
Speakerphone: 2-way                         Mute Button Enabled? y
Display Language: english                   Expansion Module? n

```

6.4.2 MWI Considerations

The Avaya PBX requires that the same port be used to turn off an MWI that is turned on. Keep this in mind when troubleshooting any MWI issues. Consider this requirement when performing a system cut-over from another solution. Message indicators on subscriber phones that are already activated prior to a cut-over will most likely not be able to be turned off by the gateway. These lights will need to be manually cleared by the PBX administrator. For these same reasons, any ports of the gateway that are not planned to be used should be marked as disabled in the port capabilities configuration area of the gateway.

7. 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 to hunt group.	The calling party number is expected to be contained in the From header of the Invite.
2	Internal ring-no-answer forward.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as no-answer.
3	External ring-no-answer forward.	The called party will be shown in the Diversion header of the invite. The calling party (if available) will be contained in the From header. The reason of the diversion is shown as no-answer.

4	Internal busy forward from a subscriber's station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as busy.
5	External busy forward from a subscriber's station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as busy.
6	Internal all call forward from a subscriber's station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as fwd-all.
7	External all call forward from a subscriber's station set.	The called party will be shown in the Diversion header of the invite. The calling party will be contained in the From header. The reason of the diversion header is shown as fwd-all.
Transfer Scenarios		
8	Blind transfer to a station from messaging server where the destination answers the call.	The transfer is completed once the destination is judged as connected. Depending upon the speed that the destination is answered the caller and called parties may be connected together with a slight bit of the called parties voice clipped.
9	Blind transfer to a station from messaging server where the destination does not answer the call.	If the station is configured to forward back to the gateway then the call will arrive looking as a forwarded call with the called party being the transfer destination but the calling party may be the gateway port performing the transfer, depending on how quickly the transfer to the destination can be completed.
10	Blind transfer to a subscriber's station from messaging server where the destination is busy.	The transfer should fail.
11	Blind transfer to an invalid number.	The transfer should fail.

12	Supervised transfer to a subscriber's station from messaging server where the user does not answer the call.	The transfer completion speed and timing is up to the application. The application should decide to either complete the transfer and let the stations forwarding carry it back to the gateway or abort it before the forwarding happens.
13	Supervised transfer to a subscriber's station from messaging server where the user answers the call.	The transfer completion speed and timing is up to the application.
13	Supervised transfer to a subscriber's station from messaging server where the destination is busy.	The transfer completion speed and timing is up to the application. The application should decide to either complete the transfer and let the stations forwarding carry it back to the gateway or abort it before the forwarding happens.
14	Supervised transfer to an Invalid number.	The transfer completion speed and timing is up to the application.
Outbound Call Scenarios		
15	Outbound call to subscriber station that answers.	The call is flagged to the application as completed when the gateway can determine that the call has been connected through. The application should take this into account when making decision when to start the audio stream.
16	Outbound call to subscriber station that does not answer.	The application needs to take into account if the destination has been set to forward back to the gateway for a ring no answer condition and judge accordingly when to either stop waiting for an answer and cancel the call or know that it will end up arriving back to the gateway as a forwarded call.
17	Outbound call to subscriber station that is busy.	The application needs to take into account if the destination has been set to forward back to the gateway for a ring no answer condition and judge accordingly when to either cancel the call or know that it will end up arriving back to the gateway as a forwarded call.
18	Outbound call to an external number.	Depending on the state of the destination the call will either be judged as connected or fail do to busy or error tone conditions.

MWI Scenarios		
19	Turn a subscriber's light on that is currently off.	This should return success.
20	Turn a subscriber's light on that is currently on.	This will return a failure as the PBX rejects the request but the gateway is unable to determine if the rejection is the result of an invalid extension or because the far end light is already on. The application needs to make judgment based upon known remote MWI state.
21	Turn a subscriber's light off that is currently on.	This should return success.
22	Turn a subscriber's light off that is currently off.	This should return success.

8. Troubleshooting

8.1 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.

8.2 Important Gateway Trace Masks

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

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

These keys are helpful during specific issues and can be enabled for targeted troubleshooting of very specific cases. Activation of these keys may generate large amounts of data on busy systems and increase the size of the collected log files, but should not harm system performance.

- `dspcpi` (all keys) – This allows the collection of tone-related data. This data is helpful in cases where you think you have problems detecting specific tones that should be, should not be, or are expected to be present at specific times during the call. If you do not suspect a tone-related issue, this key may be left disabled. This data is important in the following scenarios:
 - Failing transfers
 - Failing outbound calls (play to phone)
 - Dropped calls (callers cut off while leaving messages, etc...)
- `adept` (all keys) – This allows the collection of rule-parsing data. This data is required in the troubleshooting of integration-related issues.

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.

9. Appendix

9.1 Abbreviations

LBRC	Low Bit Rate Coder
MWI	Message Waiting Indication
LWC	Leave Word Calling
PBX	Private Branch Exchange

For more details, go to www.dialogic.com.

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05-2564-001 8/07