Dialogic®

Application Note

Dialogic® 1000 Media Gateway Series Serial CPID Configuration and Timing

Executive Summary

The Dialogic® 1000 Media Gateway Series basic theory and operation is explained in this application note. This includes analog versus digital deployments and serial protocol overview. It provides the theory of operations across the serial link, shows how a typical serial link operates with master/slave gateways, provides the configuration of serial protocol parameters, and discusses the protocol configuration pages for the various call party identification (CPID) modes.

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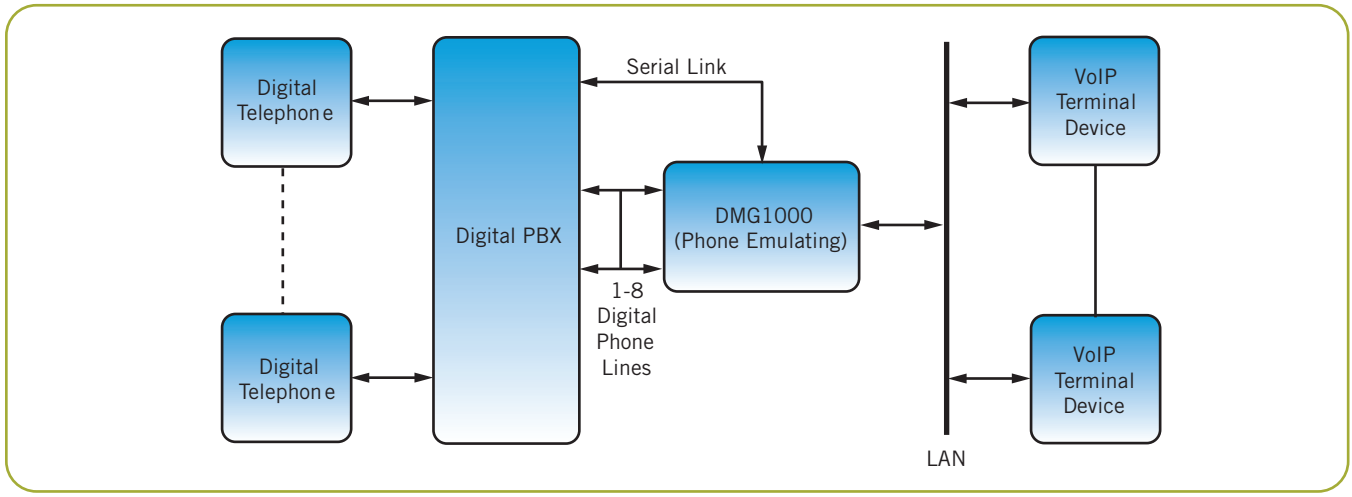

Figure 1. DMG1000 Serial Topology

Introduction

This application note explains the theory and operation of the Dialogic® 1000 Media Gateway Series, formerly known as the Dialogic® PBX-IP Media Gateway. Note that there are multiple gateways in the series, but DMG1000 is used to refer to them collectively for the sake of clarity throughout this application note. It discusses analog versus digital deployments and serial protocol overview for serial integrations, including:

- Hardware
- Theory of operation
- Master/slave mode
- Configuration
- Call party identification (CPID)

It also presents use cases for DMG1000 units deployed in serial protocol environments. This document is intended for DMG1000 customers and support personnel.

Analog versus Digital Deployments

There are numerous drawbacks to an analog integration, one of which is inconsistent CPID information retrieval, which can affect voice mail applications. Some switches provide this information in-band as dual-tone multi-frequency (DTMF) digits after the call is answered. Another alternative is the use of serial protocols, such as simple message desk interface (SMDI). In this out-of-band interface, CPID information and message waiting indicator (MWI) support is provided to the DMG1000 in a reliable manner, thereby enabling voice mail customers to "one-stop shop" for all of their integration needs.

It is also possible that a customer may run into a situation where a digital integration (supported by the DMG1000) does not provide any or all of the required CPID information via the station interface. Rather than having to move to an analog integration in an attempt to take advantage of in-band CPID, the customer can use the serial interface if the switch supports it.

Serial Protocol Overview

By emulating digital telephone sets off a proprietary private branch exchange (PBX), the DMG1000 provides call party information over the IP network using the session initiation protocol (SIP). However, the amount of call party information that the DMG1000 can provide is limited to the amount of data that the proprietary PBX provides to its station sets. (This differs by switch.) It is likely that analog integrations frequently will not be able to provide this information (unless it can be provided using in-band DTMF, for example). PBX switches that provide little or no call party information will typically provide full call party information across a separate serial interface connection. For this reason, the DMG1000 supports a serial link interface to the PBX and supports these standard and switch serial protocols:

- SMDI
- MCI (NEC Systems only)
- MD110 (Ericsson Systems only)

Figure 1 shows how the DMG1000 connects to proprietary PBX switches that use a serial link to provide call party information.

Hardware

The serial link from the PBX is connected to the serial port interface on the DMG1000, which is labeled "DIAGNOSTICS". When the DMG1000 is used in serial protocol mode, this connector is used for the serial link. Otherwise, the connector is used for diagnostics/maintenance. The serial port has a female DB-9 connector that enables connectivity to the PBX serial interface. This permits bi-directional flow of call information (for example, calling/called party and MWI operational codes/responses) between the PBX and the DMG1000. Table 1 shows the pin-out of the diagnostic connector.

Pin	Description
1	Not used
2	Transmit
3	Receive
4	Not used
5	Ground
6	Not used
7	Not used
8	Not used
9	Not used

Table 1. Serial Pin-out of the DMG1000 Diagnostic Connector

Note that a special cable may be required in order to properly connect the DMG1000 to a serial switch interface. If the PBX requires usage of serial control signals (for example, CTS, CD), then some form of loopback functionality will be required at the switch connector. Consult the switch vendor's documentation for the required serial interface configuration parameter values (that is, baud rate, parity, data bits, and stop bits) and the serial port pin-out for the PBX. These configuration parameters can be changed to match the switch on the DMG1000's system parameters web page in the serial port group.

Theory of Operation

When a call arrives at a telephony port on the DMG1000, the PBX will send a data packet across the serial link containing the call party information associated with the call. If configured to use the serial interface, the DMG1000 will use the data in the serial packet as the call party information when the call notification is sent across the IP network to the VoIP terminal device for which the call is intended. This data supersedes any call information that may have arrived across the station set interface. The serial protocols also support the MWI feature that allows the DMG1000 to control MWIs on subscribers connected to the PBX. In this case, message waiting activation and deactivation notifications received from the IP network (in the form of either SIP or H.323 VoIP protocols) will result in the appropriate packet being sent across the serial link.

Master/Slave Mode

The PBX only provides a single serial link connection. At a site where there are multiple DMG1000 units, only one of the units can be physically connected to the PBX serial link. This unit is the serial protocol master DMG1000; the remaining units are considered serial protocol slaves.

Figure 2 shows how multiple DMG1000s connect to proprietary PBX switches that use a serial link to provide call party information. It is the responsibility of the master gateway to send all serial link data to the slave gateways across the IP network. Similarly, any time a slave gateway needs to communicate to the PBX across the PBX's serial link, the slave gateway sends the data across the IP link to the master gateway, which then sends the data across the serial link. Figure 2 shows a typical device topology for several DMG1000s in a master/slave serial integration.

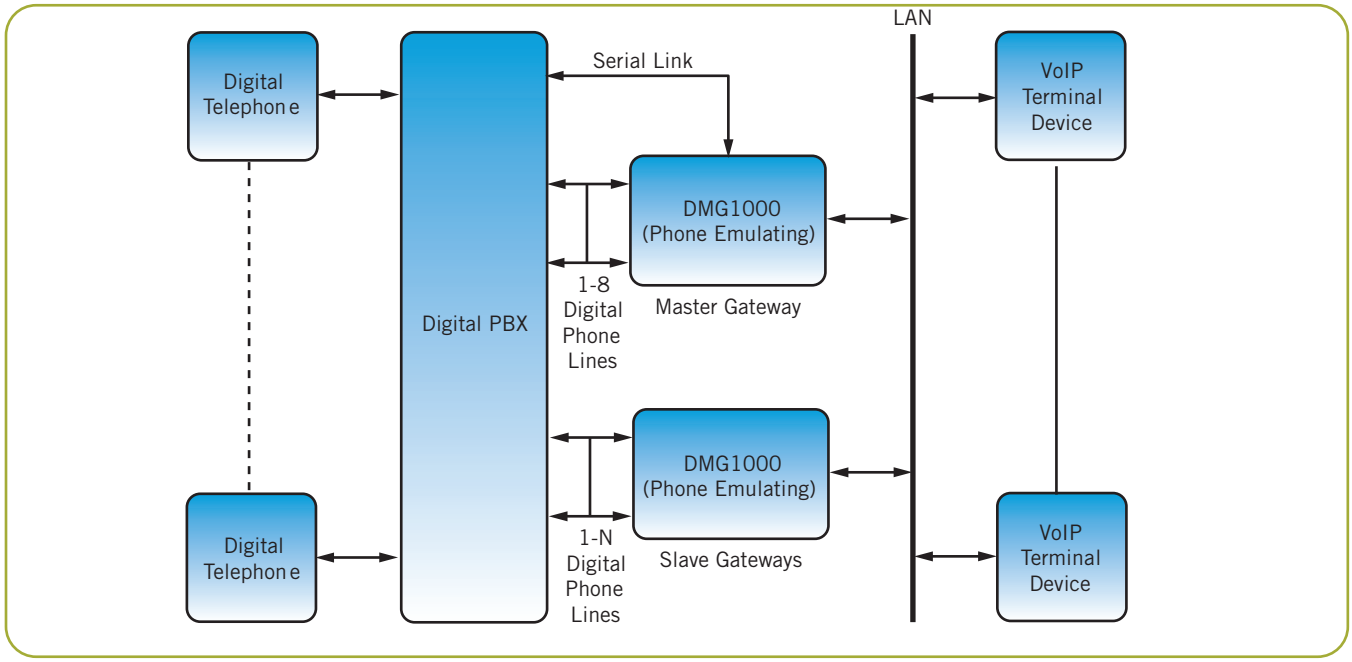

Figure 2. Typical Device Topology for Multiple DMG1000s

Configuration

Configuration of serial protocol parameters is discussed in detail in Section 3.5 of the *Dialogic® 1000 and 2000 Media Gateway Series User's Guide* (see For More Information) and context-sensitive help is provided in the Web interface. Two DMG1000 serial protocol timing parameters and their implications for CPID and MWI processing are listed here (excerpted from the user's guide), addressing specific issues that may arise when configuring a DMG1000 to use the desired serial protocol.

- **MWI Response Timeout (Section 3.5.7)**

Description: Specifies the time in milliseconds the media gateway serial protocol Master will wait for a failed response from the PBX before sending a success message to a serial protocol Slave in response to a message MWI request from the slave. This parameter is only required when this media gateway is configured as the Serial Protocol Master.

Allowed Values: 100 to 60000 milliseconds

Default Value = 2000 milliseconds

INI File Parameter Name = telSerMwiRspToutMs

- **Serial CPID Expiration (Section 3.5.9)**

Description: Specifies the time in milliseconds that serial CPID information received by a media gateway (Master or Slave) remains valid. If the timeout expires before an inbound call is received on the media gateway PBX port indicated by the serial CPID information, the serial CPID information is discarded.

Allowed Values: 100 to 60000 milliseconds

Default Value = 2000 milliseconds

INI File Parameter Name = telSerCpidExpMs

Call Party Identification (CPID)

This section discusses CPID information extraction from serial protocol packets received by the DMG1000 and subsequently included in VoIP packets (SETUP for H.323/INVITE for SIP). The client DMG1000 units register their logical extension numbers with the master unit, so the master only sends serial protocol packets to the units that need them.

Note that the syntax and less important fields in the serial protocol packets contained in subsequent sections are not addressed.

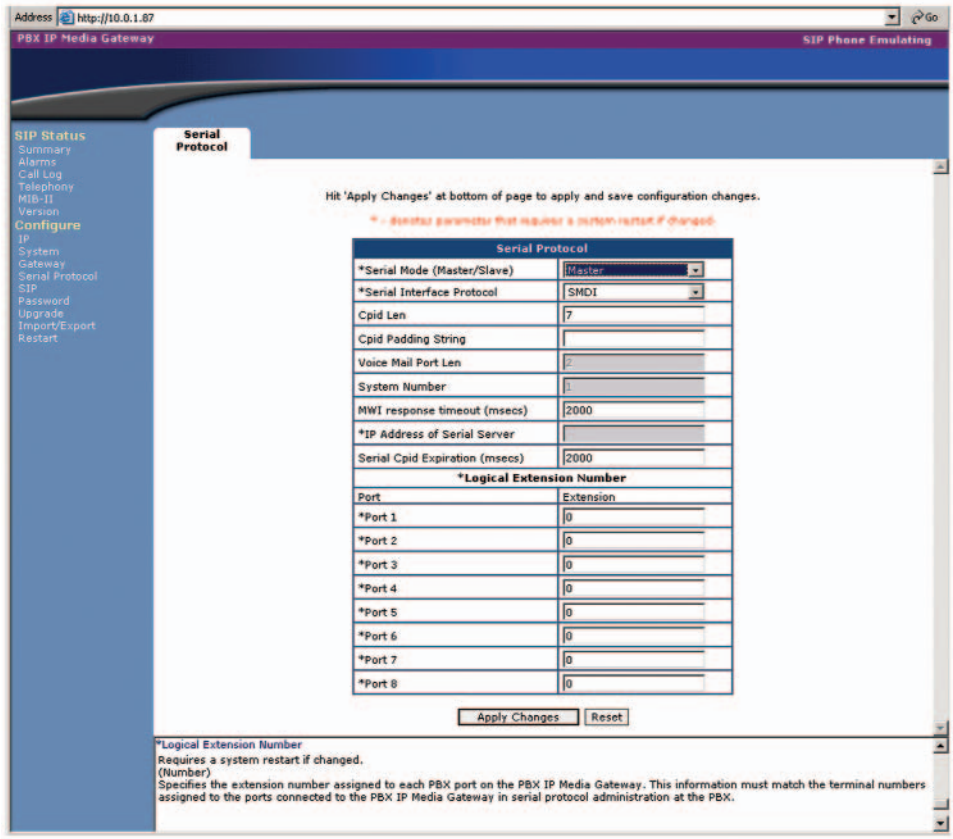

Figure 3. DMG1000 Serial Protocol Configuration Page Set to SMDI Mode

SMDI

Figure 3 shows the DMG1000 serial protocol configuration page set to SMDI mode.

This is a representative SMDI packet (CPID) for a call from 546, no answer redirected (the "N" after the logical terminal number [LTN]) by 545 to LTN 0232:

\r\nMD0010232N0000000545 0000000546 \r\n^y

The LTN from the SMDI packet is matched with the logical extension number configured on the serial protocol page (see Figure 3) to determine which DMG1000 port should be associated with the CPID information. This CPID information is retained for *Serial CPID Expiration (msecs)* (see Configuration), waiting for an incoming call on that port. When the call arrives, the saved CPID information is placed in either the from/diversion headers of an INVITE for SIP or the calling party/H.450 diversion PDU fields of an H.323 SETUP.

Note that the CPID length and CPID padding strings (see Figure 3) must match the corresponding SMDI configuration in the PBX in order for the DMG1000 to properly parse these packets.

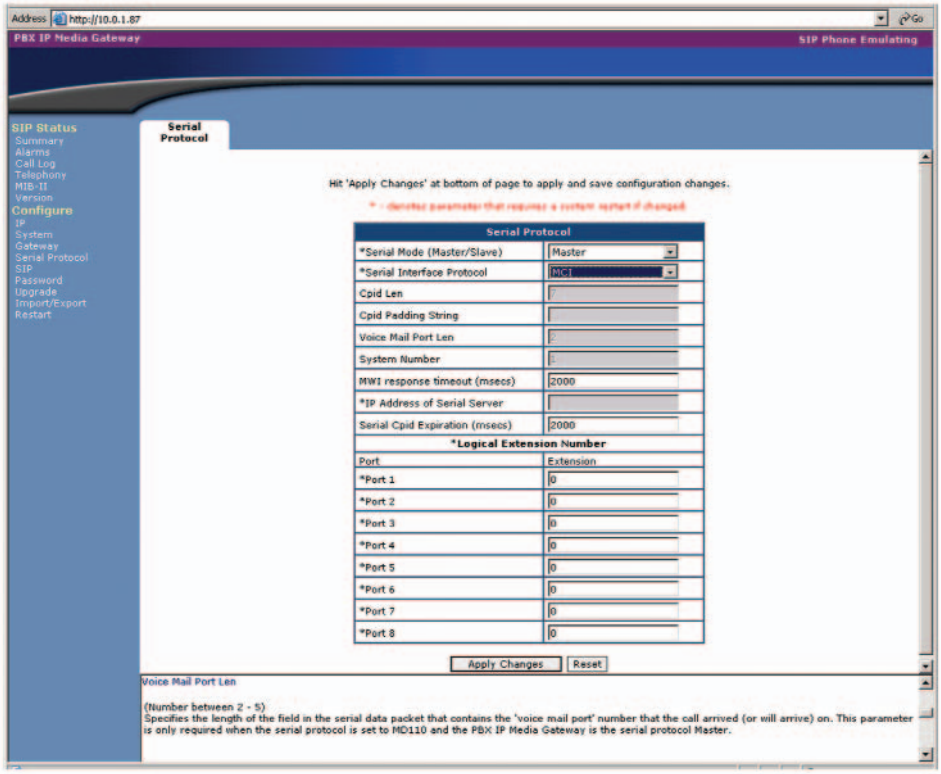

Figure 4. DMG1000 Serial Protocol Configuration Page Set to MCI Mode

MCI

Figure 4 shows the DMG1000 serial protocol configuration page set to MCI mode.

This is a representative MCI packet (CPID) for a call from 123456, no answer redirected (call type 40) by 987654 to destination party 1 (similar to an LTN).

20!J0011 4000112345600198765 43

The destination party from the MCI packet is matched with the logical extension number configured on the serial protocol page (see Figure 3) to determine which DMG1000 port should be associated with the CPID information. This CPID information is retained for *Serial CPID Expiration (msecs)* (see Configuration), waiting for an incoming call on that port. When the call arrives, the saved CPID information is placed in either the from/diversion headers of an INVITE for SIP or the calling party/H.450 diversion PDU fields of an H.323 SETUP.

Note that there are no additional configuration requirements for the MCI protocol (see Figure 4).

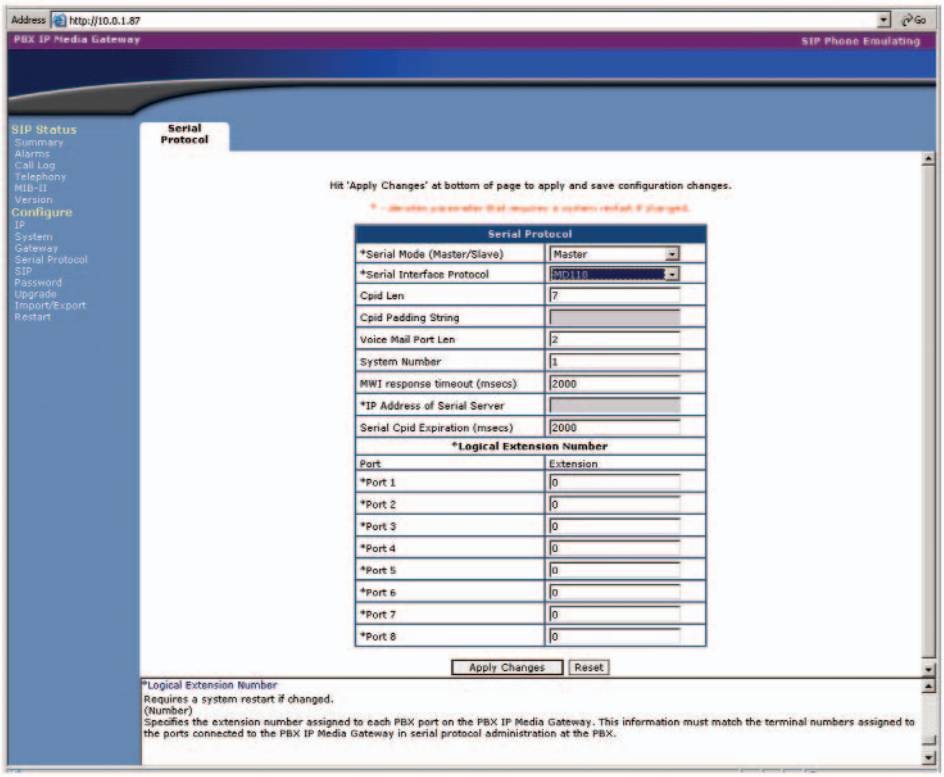

Figure 5. DMG1000 Serial Protocol Configuration Page Set to MD110 Mode

MD110

Figure 5 shows the DMG1000 serial protocol configuration page set to MD110 mode.

This is a representative MD110 packet (CPID) for a call from 9876543, no answer redirected (code 83) by 1234567 to V channel 01 (similar to an LTN).

2831234567987654301\r\n

The V channel from the MD110 packet is matched with the logical extension number configured on the serial protocol page (see Figure 3) to determine which DMG1000 port should be associated with the CPID information. This CPID information is retained for *Serial CPID Expiration (msecs)* (see Configuration), waiting for an incoming call on that port. When the call arrives, the saved CPID information is placed in either the from/diversion headers of an INVITE for SIP or the calling party/H.450 diversion PDU fields of an H.323 SETUP.

Note that the CPID length, voice mail port length, and system number (see Figure 5) must match the corresponding MD110 configuration in the PBX in order for the DMG1000 to properly parse these packets.

Acronyms

CD	Carrier detect
CPID	Call party identification
CTS	Clear to send
DMG1000	Dialogic® 1000 Media Gateway Series
IP	Internet protocol
DTMF	Dual-tone multi-frequency
LTN	Logical terminal number
MWI	Message waiting indicator
PBX	Private branch exchange
SIP	Session initiation protocol
SMDI	Simple message desk interface
VoIP	Voice over IP

For More Information

Datasheet

Dialogic® 1000 Media Gateway Series Data Sheet
http://www.dialogic.com/products/gateways/docs/7135_1000_Media_Gateway_ds.pdf

User's Guide

Dialogic® 1000 and 2000 Media Gateway Series User's Guide
http://www.dialogic.com/manuals/mediagateway/UsersGuide.pdf

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Dialogic Corporation
9800 Cavendish Blvd., 5th floor
Montreal, Quebec
CANADA H4M 2V9

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