Digital Residential Gateway, DRG

DESCRIPTION

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TRADEMARKS

1 GENERAL

The Digital Residential Gateway 22i (DRG22i) is an analog telephone set to VoIP gateway.

In MX-ONE solutions, the following applications are provided by the DRG22i:

- The connection of analog G3 faxes to an IP infrastructure
- The connection of analog telephones to an IP infrastructure

This document gives a high level description of the DRG when used in an MX-ONE environment.

For details on the configuration of the DRG, see DRG 11/22 SW R2N Configuration Guide

For the configuration of MX-ONE, the DRG is not visible; the telephone sets used shall be initiated as single line SIP extensions.

The DRG22i supports both H.323 and SIP and either protocol can be used with MX-ONE. However, H.323 is not recommended as the following features are not available or unreliable:

- T.38 for connection of faxes, with H.323 G.711 fax pass through must be used
- DTMF transport, DRG does not support the proprietary method used in MX-ONE.

2 GLOSSARY

For a complete list of abbreviations and glossary, see the description for *ACRONYMS, ABBREVIATIONS AND GLOSSARY*.

3 DRG CHARACTERISTICS

The DRG22i is designed for connection to an Ethernet-based network running IPv4.

- The DRG22i is uses the copper version for standard Unshielded Twisted Pair (UTP) Cat5 with an RJ45 connector.
- The DRG22i can be situated up to 100 meters from the switch.
- The DRG22i can be placed on a flat surface or wall mounted.

Each DRG22i can handle the following:

- One or two analog telephones.
- One or two fax machines.
- One analog telephone and one fax machine.

The DRG has five LEDs that give information about the operational mode.

Power
is lit (steady) when the DRG is connected to power.

Line I
is lit (steady) when the line is connected to the IP telephony system.

Line II
is lit (steady) when the line is connected to the IP telephony system.

LAN
is lit when a LAN network is detected, and is flashing when traffic is ongoing.

WAN
is lit when a WAN detected, and is flashing when traffic is ongoing.

3.1 MAIN FEATURES

Built on standard protocols, the DRG22i supports compressed and uncompressed telephony codecs, silence suppression with comfort noise, line echo cancellation, and regional telephone parameters.

It also supports a number of services, such as calling number identification and network time. MX-ONE telephony services are supported with DTMF signaling using SIP info.

3.1.1 POTS INTERFACE

The DRG22i has two interfaces for two different telephone numbers and two simultaneous telephone calls. The DRG22i uses just one IP address even if both telephone interfaces have individual telephone numbers. Five telephone sets can be connected to each telephone interface, thus allowing the end-user to have as many as 10 telephones.

3.1.2 SPEECH CODECS

Depending on the WAN network capabilities, either narrow-band or wide-band codecs can be used. The DRG22i fully supports both G.711 and G.729ab.

3.1.3 REGIONAL SETTING PROPERTIES

Regional telephone parameters for ring signals, tones, cadences, and telephony voltages can be set to fulfill different national or operator-specific requirements of the telephony service. The parameters will be downloaded to the DRG22i automatically in case the default settings in the DRG22i are not sufficient.

3.1.4 SILENCE SUPPRESSION WITH COMFORT NOISE

The DRG22i supports silence suppression with comfort noise. Silence suppression improves bandwidth utilization with ~30% since data are only sent when voice is generated. During the silent periods a comfort noise is generated. This is necessary to give the caller the feeling of still being connected to the other party. This function can be switched on or off.

3.1.5 LEC

In order to improve voice quality, the DRG22i supports Line Echo Cancellation (LEC). LEC algorithms are used to fully remove echo that occurs due to a mismatch in impedance in different analog telephones. The line echo cancellation eliminates a maximum delay of 30 ms.

3.1.6 CNI

The DRG22i can send and receive Calling Number Identification (CNI). This means that a CNI capable device connected to the telephony interfaces will present the calling number.

The DRG supports both Dual-Tone Multi-Frequency (DTMF) and Frequency Shift Keying (FSK) for CNI.

3.1.7 NETWORK TIME

Devices connected to the DRG22i telephony ports can synchronize their clock time with the help of the Network Time Protocol (NTP). This might be needed for certain telephones and number displays where the current time is presented.

3.1.8 DIFFERENTIATED RING TONES

Up to nine different ring tones can be set up in the DRG22i. For each telephone line any of these ring tones can be used independently. This allows the end-user to have differentiated ring tones on the two telephones connected to the DRG, in order to easily differentiate the telephone that is ringing.

3.1.9 INBAND AND OUTBAND DTMF SIGNALING

For certain services DTMF signaling is used. These signals are usually sent with the telephony signals (inband signaling). With narrowband codecs, inband DTMF signals may be compressed in such a way that the receiver cannot recognize them anymore. With outband signaling, the DTMF signals are instead sent separately, uncompressed. The DRG22i can be set up for either inband or outband DTMF signaling bidirectional, guaranteeing good support for DTMF-based services, regardless of the codec used.

With MX-ONE, the DRG shall be configured to use SIP INFO for DTMF transport.

3.1.10 FAX SUPPORT

The DRG supports T.38 for reliable transport of fax and this is the recommended configuration when it is used with MX-ONE.

The DRG22i also has support for G3-compliant, V.17 14.4-kbps fax reception and transmitting by use of G.711 standard, that is, fax over reliable TCP/IP connection

3.1.11 DIALING SCHEMA

The DRG22i has a built-in dialing schema for optimal support of Private Numbering Plans (PNP). Using the dialing schema, the DRG22i is able to determine when the calling party has entered the last dialed digit. Using the dialing schema, short numbers in the private number plan with a various length compared with the public numbering plan can be handled in an optimal way, avoiding any timer to elapse or end digit # to be pressed by the calling party. Using the dialing schema it is also possible to activate Hot line. With Hot line the calling party will be connected directly to the destination at off-hook, without entering any digits.

3.1.12 QOS SUPPORT

The DRG22i supports layer 2 CoS and VLAN tagging and priority labeling in accordance with the IEEE 802.1P/.1Q standard as well as layer 3 ToS according to RFC 791 and RFC 2474.

The outgoing IP frames can be defined to allow an en-route layer 2 or layer 3 router or switch, which supports QoS, to give higher priority to DRG22i traffic.

3.1.12.1 ToS

Routed networks of today employ many techniques to ensure data flows at a rate relative to the perceived importance of the information. As such, many Internet proposals have been drawn up which describe how IP packets will be directed. These proposals, or RFCs, revolve around different interpretations of the ToS byte in the IP packet header.

The Internet Protocol became a ratified standard with the adoption of RFC 791. The use of the ToS octet is defined in this standard. However, many new uses have arisen since the standard was accepted in September 1981. The latest approach for interpretation of the octet is defined in Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers, RFC 2474. In accordance with this document, the Net Manager application offers a ToS field with High, Medium, Low, or a customer-programmable parameter where the administrator may enter a raw bit value (0 - 255) for the ToS byte. The DRG22i supports configuration of the ToS byte in the IP header. For details on the configuration of the DRG, see DRG 11/22 SW R2N Configuration Guide.

3.1.12.2 CoS

In addition to the layer 3 ToS value settings already available, the DRG22i offers support for IEEE 802.1P/.1Q layer 2 priority tagging. This feature allows layer 2 frames to be marked with a priority setting enabling VLAN-aware devices such as LAN switches, routers, and WAN de-vices to give priority to voice traffic, thus reducing overall latency in the network.

The software supports setting the first two parts of the Ethernet-encoded tag header, ETPID and TCI, in particular the VID value and the user priority for the following data types: voice, stream data, network management, and signaling. Both ETPID and TCI contain information for a VLAN-aware device to provide quality of service for the DRG22i. This means that the VLAN-aware device should reserve the required resources for transmitting voice packets.