CMG4 Signaling

Chakavak Telecommunication

LAN 1   USB 1   USB 2   Console   E1-1   Error   PWR 1   E1-1   E1-2   E1-3   E1-4
E1-2   Media   PWR 2
E1-3   Run
E1-4

CMG 4
Media Gateway

Made in IRAN

Features

- Supports SIP, SIP-TLS signaling, and RTP, SRTP media streams
- SS7 and PRI signaling over E1 links
- Multi-Unit stacked support
- Up to 64 independent total E1 can be defined in a Multi-Unit mode
- Online SIP and PSTN signaling packets trace
- Offline SIP and PSTN signaling packets trace (PCAP file)
- CDR report
- Radius support
- Support remote system log over UDP, TCP, and TLS
- Remote access as web and SSH
- Dual power support
- Hot Plug and unplug power module support
- AC and DC input power support
- Low power consumption

Overview

The CMG4 can be used as a trunking gateway to convert signaling and media streams between TDM and SIP networks. It is feature-rich, strictly complied with requirements and standards, and offers carrier-grade reliability, allowing service providers to use CMG4 in their networks, as Figure 1 reliably.
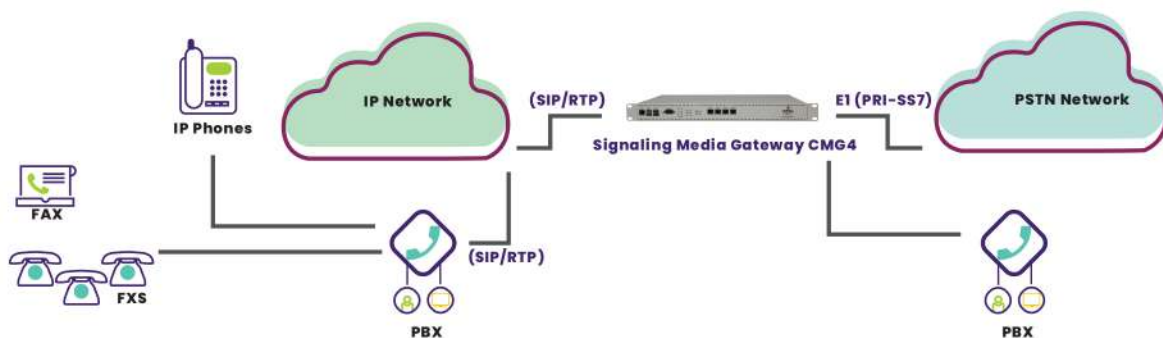

Figure 1- SIP/E1 Gateway Connection Block Diagram

CMG4 is built with scalability as consider. It can work in standalone and multi-unit modes. The gateway supports up to 4 E1 streams (SS7, PRI) and 128 VoIP channels in standalone mode. The multi-unit mode can be used to increase the total capacity of the deployment to a maximum of 64 E1.

Compatibility

Strict compliance with up-to-date protocols' requirements, recommendations, and standards provides functional compatibility with various equipment: digital PBX, IP PBX, Soft switches, VoIP gateways, SIP phones, programmable SIP clients, etc.

Applications

The CMG4 provides signaling and media conversion between VoIP and PSTN networks. The CMG4 main applications are listed below and mentioned in Figure 2.

- Call Control application
- SIP stack
- PRI signaling application
- SS7 signaling application
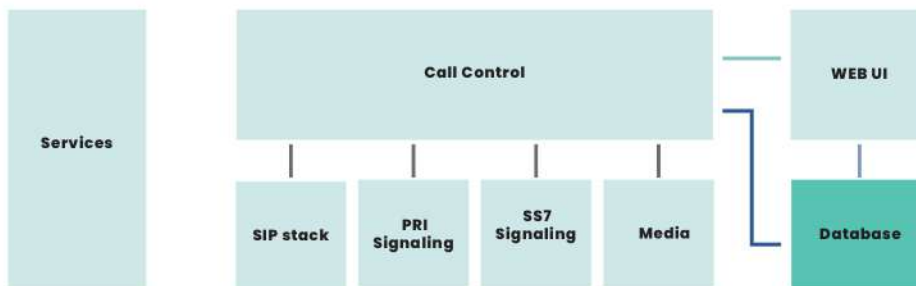- Media application
- Web user interface
- Services
- Database

Figure 2 – CMG4 Applications block diagram

Call Controller

Call control is the main application in CMG4 and processes PSTN and SIP signaling events and handles call and media events. In addition, It supports trunk groups, numbering plans, routing, and CDR.

Call control specifications listed as below:

- Trunk group support
- Channel selection method
- Call routing
- Add or remove prefix digit(s)
- All TDM signaling (SS7, PRI) routing to TDM signaling or SIP trunk
- SIP trunk routing to TDM signaling or SIP trunk
- Multiple numbering plan
- Call Detail Records (CDR)
- Send CDR as remote Syslog

- MAX 4 PRI signaling support per Unit
- MAX 4 SS7 signaling support per Unit
- Combined SS7 and PRI support

The call controller can route calls between several signaling (SS7, PRI, and SIP).

- SS7 <-> PRI
- SS7 <-> SIP
- PRI <-> SIP
- SIP <-> SIP
- PRI <-> PRI
- SS7 <-> SS7

For example, CMG4 can convert SS7 signaling to PRI and vice versa as Figure 3.
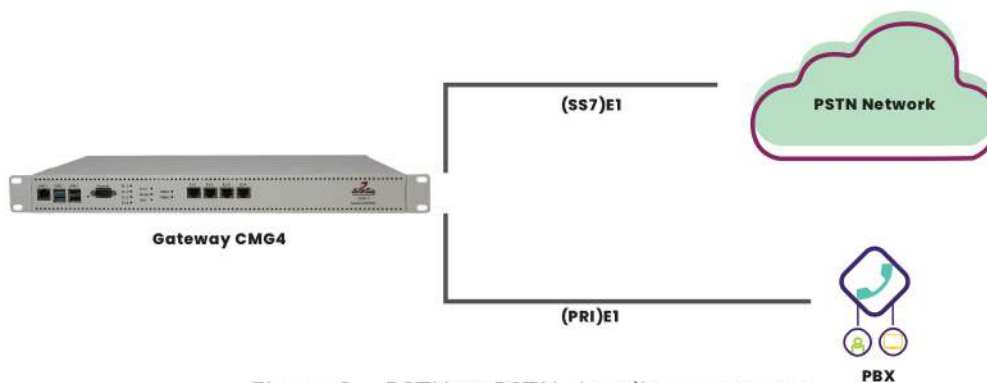

Figure 3 – PSTN to PSTN signaling convertor

In addition, CMG4 can convert PSTN signaling to SIP and vice versa, as Figure 1. To route calls between each signaling, CMG4 uses a trunk group.

Media streams specification
CMG4 media specs are as below:
- Up to 128 concurrent TDM to RTP media channel per Unit
- G.711A/U (PCMA/PCMU) codec
- G729 codec
- RTP and RTCP (RFC 3550, RFC 3551)
- Jitter buffer
- Echo cancellation
  ▸ DTMF detection
  ▸ In-band
  ▸ RFC 2833

Media transcoding
CMG4 supports various speech codecs and can convert them to each other. It helps to negotiate media streams with different VoIP codecs, which use in up-to-date networks.

Jitter buffer

Variations in packet arrival time, called jitter, can occur because of network congestion, timing drift, or route changes. To decrease the effect of jitter, CMG4 used a jitter buffer.

Echo cancellation

Echo is an inherent part of PSTN telephony. The PSTN network uses a hybrid interface to convert two wire to four-wire and is the main culprit of the PSTN network echo. CMG4 for use echo cancellation as digital signal processing to increase the quality of speech media.

DTMF

DTMF signals in the RTP stream processed in three methods: in-band, RFC2833 and SIP Info.

Signaling specification

CMG4 supports SIP, PRI, SS7 signaling and converts them to each other. The specifications of these signaling described in the below sections.

SIP

Some SIP features/extensions that CMG4 supports are as below:

- Base and call
  - Core methods: RFC 3261: INVITE, CANCEL, BYE, REGISTER, OPTIONS, INFO
  - Digest authentication (RFC 2617)
  - AKA, AKA-v2 authentication (RFC 3310, RFC 4169)
  - UDP, TCP, TLS Transports
  - DNS SRV resolution (RFC 3263)
  - Offer/answer (RFC 3264)
  - Hold, unhold
  - Redirection
  - Transfer/REFER (attended and unattended):
  - Base (RFC 3515)
  - Replaces (RFC 3891)
  - Referred by (RFC 3892)
  - Sipfrag support (RFC 3420)
  - Norefersub (RFC 4488)
  - UPDATE (RFC 3311)
  - 100rel/PRACK (RFC 3262)
  - Tel: URI (RFC 3966)
  - Session Timers (RFC 4028)
  - Reason header (RFC 3326, partially supported)
  - P-Header (RFC 3325, partially supported)
  - INFO
- Routing/NAT
  - Rport (RFC 3581)
  - Service-Route header (RFC 3608)
  - SIP outbound for TCP/TLS (RFC 5626)
  - Path header (with SIP outbound) (RFC 3327)

- **SDP**
  - ▸ RFC 2327 (obsoleted by RFC 4566)
  - ▸ RTCP attribute (RFC 3605)
  - ▸ IPv6 support (RFC 3266)
- **NAT Traversal**
  - ▸ **STUN:**
    - RFC 5389
    - Some RFC 3489 compatibility
    - DNS SRV resolution
    - Short/long term authentication
    - Fingerprinting
  - ▸ **TURN:**
    - RFC 5766
    - DNS SRV resolution
    - UDP and TCP client connection
    - TCP allocations (RFC 6062)
  - ▸ **ICE:**
    - RFC 5245
    - Host, srflx, and relayed candidates
    - Aggressive and regular nomination
    - ICE option tag (RFC 5768)
  - ▸ **NAT type detection:**
    - Legacy RFC 3489

PRI

PRI signaling support the User and Network interface separately for each E1.

SS7

SS7 signaling on the CMG4 supports ITU and ANSI standards.
In addition, the CMG4 can support multiple OPC and DPC for each SS7 Linkset.
In the CMG4 system, SS7 FISU and LSSU packets repeat automatically by hardware to increase the FISU rate.

User Interface

The CMG4 uses a web interface for configurations, management, and report purposes. To increase the security of the web interface, CMG4 supports HTTPS protocol, and the web interface can upgrade all firmware. Also, SSH and the serial console are available for advance debugging of the system.

Trace, Alarms, and Log

The CMG4 has a log management service and the user administrator can enable or disable appropriate logs with different severity for an application. In addition, the logging service can be configured to send logs to remote Syslog system.

For Debugging purpose the CMG4 provide online and off-line packet capturing on any signaling.

Some specs of trace, alarm, and log listed as below:

- Online SIP and PSTN packets trace
- Offline SIP and PSTN packets trace (PCAP file)
- Online E1 channel status monitoring
- Online E1 status
- Remote Syslog support on UDP, TCP, and TLS
- Log management
- Log report
- Send alarm to the email address

Power

The CMG4 system is designed to use low electrical power and is an eco-friendly product.

The main features of the CMG4 power system are described below list.

- Modular power system
- Dual power support
- Plug and unplug power module support
- AC and DC input power support
  - ▶ DC input voltage 48V
  - ▶ AC input voltage 220V
- Power consumption: Up to 30W

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