# LDGW OMAP-L138

## Low Density Gateway

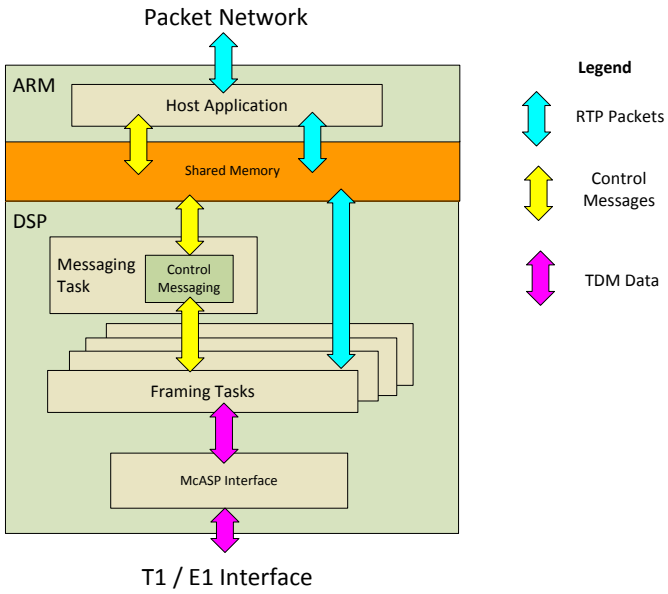
### TARGET APPLICATIONS

*IP PBX/Gateway*

*VoIP Transcoding*

### OVERVIEW

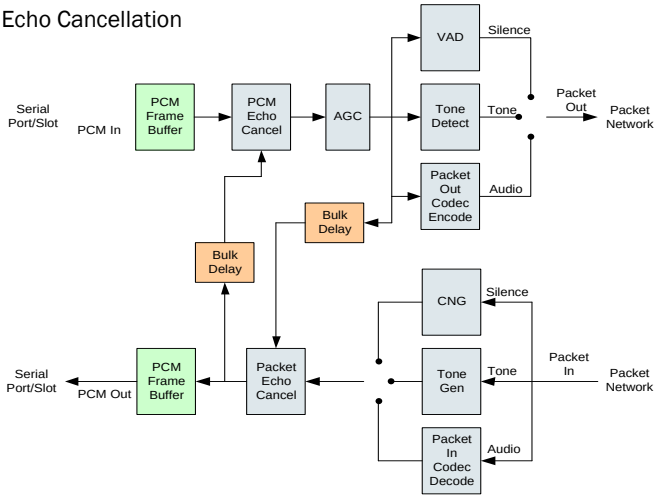
*Adaptive Digital's Low Density Gateway product combines Adaptive Digital's DSP software plus host APIs along with Texas Instruments' OMAP-L138 DSP+ARM to form a turnkey soft-chip for use in VoIP gateway equipment.*




Chip Block diagram

### SOFTWARE FEATURE

- Voice Transcoding
- AGC
- VAD
- Tone generation
- DTMF Detection
- RFC 4733 Tone Relay
- G.168 Echo Cancellation
- Acoustic Echo Cancellation
- MELPe
- Speex
- Narrow or WB TDM operation
- Network Stack
- Codecs
- G.711
- L16 (16-bit linear PCM - wideband and narrowband)




Software Block diagram

### Optional Software Features

- T.38 FAX Relay

## HARDWARE FEATURES

- OMAP-L138 DSP+ARM9 @ 375 MHz
- 32 KB L1 Program Cache
- 32 KB L1 Data Cache
- 256 KB L2 RAM/Cache Memory
- 128 KB RAM Shared Memory
- 2 EDMA Controllers
- 1 McASP TDM Buses
- Up to 512 MB External Memory

### ADDITIONAL HARDWARE FEATURES

- 10/100 Mb/s EMAC with MII, RMII, GMII and RGMII
- USB 1.1 with integrated PHY
- 2 McBSP TDM Buses
- 3 UART Modules
- 1 VPIF (Video port interface)
- $I^2C$ Bus

## SPECIFICATIONS

| Product Number/Silicon | Channel Count | Description |
|---|---|---|
| OMAPL138/300 | 12 G.711 | G.711 with DTMF detection, AGC, VAD, and G.168 echo cancellation |
| | 12 L16_WB | L16_WB with DTMF detection, AGC, VAD, and G.168 echo cancellation |
| | 11 L16_WB<br>1 G.729AB | L16_WB and G.729AB with DTMF detection, AGC, VAD, and G.168 echo cancellation |
| | 11 L16<br>1 Melpe | L16 and Melpe with DTMF detection, AGC, VAD, and G.168 echo cancellation |
| | 1 Speex | Wideband speex with DTMF detection, AGC, VAD, and G.168 echo cancellation |

## DETAILED DESCRIPTION

Adaptive Digital's Low Density Gateway product combines Adaptive Digital's G.PAK DSP software plus host APIs along with Texas Instruments' OMAP-L138 DSP+ARM to form a turnkey soft-chip for use in VoIP gateway equipment. This product provides the functionality necessary to bridge traditional analog telephone lines and digital trunks to a digital Voice Over IP network.

A VoIP gateway acts as a bridge between traditional telephone equipment and VoIP equipment. Traditional telephone interfaces include both analog (FXS and FXO), and digital (PCM, T1/E1 DS0). These interfaces can be found in the PSTN (Public Switched Telephone Network), PBX (Private Branch Exchange) equipment in business offices, and in residential telephone equipment. Gateways enable users of traditional telephone equipment to make use of the benefits of VoIP. Without gateways, it is impossible for VoIP equipment to place calls to users of traditional telephone equipment. Stated differently, without VoIP gateways, traditional telephone equipment and VoIP equipment could not co-exist.

By performing functions such as voice and fax compression, decompression, packetization, call routing and control signaling, a VoIP gateway enables the data infrastructure to handle voice and fax applications.

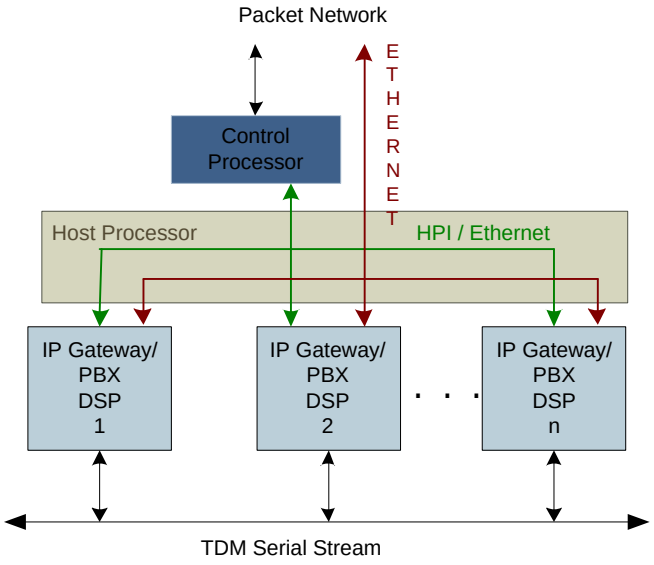



Figure (3) shows a block diagram for a typical VoIP Gateway. A VoIP Gateway usually consists of a host control processor connected to one or more LDGW OMAP-L138 chips. The host processor typically controls the LDGW via either the host port interface or via Ethernet. The voice packets can be routed between the network and the LDGW chip via the control processor. Alternatively, the IP Gateway chip can be connected directly to the network via the Ethernet interface. The LDGW OMAP-L138 chip connects to the TDM interface via the chip's TDM serial port.

The major components in an IP Gateway chip include vocoders, echo cancellation, voice quality enhancement algorithms, and telephony algorithms. The LDGW chip supports the following channel types: TDM to Packet, Packet to Packet, TDM to Conference, Packet to Conference, and Conference Composite. Channel setup (identification of input and output ports, vocoders, and voice algorithms), conference setup, and teardown operations are controlled by the host processor using a set of LDGW API functions.

### Channel Types

The LDGW OMAP-L138 provides channel types of: TDM to TDM, TDM to Packet, Packet to Packet, TDM to Conference, Packet to Conference, and Conference Composite.

A TDM channel is typically associated with one of the following types of telephone interfaces:

- FXO
- FXS
- T1/E1 time slot (DS0)

Each channel in a DSP is dynamically setup as any type. Frame sizes, vocoder types, and tone detection types are selected when a channel is setup.

All channels (except for the conference composite channel type) are designed to operate as full duplex channels. A full duplex channel may be configured to operate as a half duplex by setting the end points of one-half of the full duplex channel to NULL end-points.

HOST API

The LDGW OMAP-L138 APIs are the interface between a user's application program and OMAP-L138. The APIs execute in a host control processor connected to the DSP via either Ethernet or the DSP's Host Port Interface (HPI). The APIs support multiple DSP cores/chips and use a DSP Identifier to select a particular core. The association between a DSP Identifier and a particular DSP core/chip is made by the user modified OMAP-L138 driver support functions.

The APIs are provided as ANSI "C" source code. The APIs will work with any host application regardless of the operating system being used.

REFERENCES

1. Adaptive Digital Technologies LDGW OMAP-L138 Users Guide
2. Texas Instrument's "OMAP-L138 C6-Integra™DSP+ARM® Processor" (literature number SPRS586D). *REFERENCES*
1. Adaptive Digital Technologies HDGW C6472 Users Guide
2. Texas Instruments TMS320C647 Fixed-Point Digital Signal Processor (literature number SPRS612G.)

*Deliverables*

The deliverable items are platform dependent. In general, there is a single DSP-downloadable binary image along with host API software in C source code format. Also included in the deliverables is product documentation, which includes a users guide and usually includes release notes. Sample/test code may be included as well.

*Adaptive Digital is a member of the Texas Instruments Developer Network, and ARM Connected Community.*

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