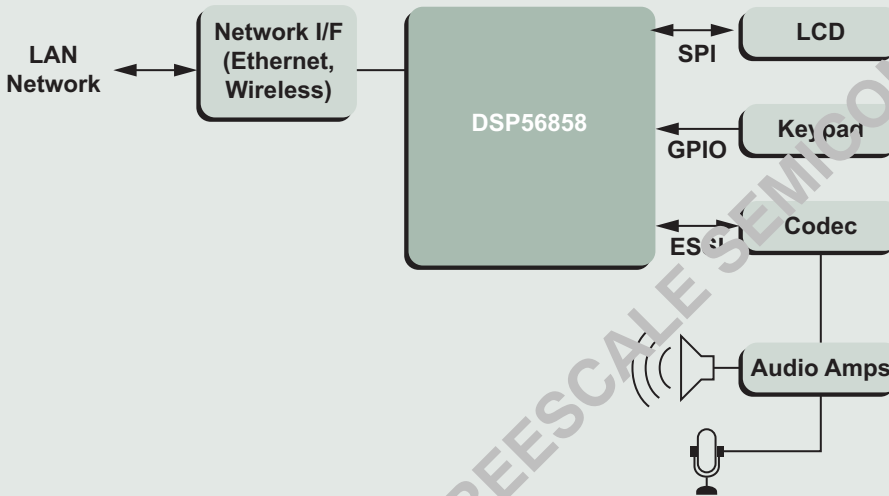# Low Cost IP Phone

Overview

Incorporating both a microcontroller (MCU) and a digital signal processor (DSP) in a hybrid-architecture device offers the peripherals required to produce a client side IP phone at a reasonable price.

IP PHONE BLOCK DIAGRAM

Key Benefits

> Achieves a balance between cost and functionality

> Combines MCU functionality and DSP processing power in a single device solution

> Performs network management and signalling without an additional MCU

> Supports a device to LAN, DAA to Telco, or RF to wireless LAN connection

> Out-of-the-box software components designed to expedite time-to-market and reduce development costs

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Freescale Ordering Information

Part Number	Product Highlights	Additional Information
DSP56855	120 MHz, 120 MIPS, 2 SCI, ESSI, EMI, COP, DMA, TOD, Quad Timer and > 1K Boot ROM > 24K Program RAM > 24K Data RAM > Up to 2M program and 8M of data	MCU-friendly instruction set, Enhanced OnCE for debug, 6 channels of DMA, up to 4 programmable chip select signals, up to 18 GPIO available in a 100-pin LQFP.
DSP56858	120 MHz, 120 MIPS, 2 SCI, SPI, 2 ESSI, HI, EMI, COP, DMA, TOD, Quad Timer and > 1K Boot ROM > 40K Program RAM > 24K Data RAM > Up to 2M program and 8M of data	MCU-friendly instruction set, Enhanced OnCE for debug, 6 channels of DMA, up to 4 programmable chip select signals, up to 47 GPIO available in both a 144-pin LQFP and a 144 MAPBGA.

Design Challenges

A fully functional low cost client side IP phone requires a variety of components, but it also must remain cost-efficient. Achieving a balance between cost and functionality is a significant challenge when both an MCU and a DSP are required to offer the necessary processing power and peripherals.

Freescale Semiconductor Solution

Freescale Semiconductor's DSP56800E family can effectively be used to implement a low cost client side IP phone, requiring fewer than four channels. These devices can perform voice compression and decompression as well as line and acoustic echo cancellation. The DSP56800E family can also fulfill IP phone DTMF detection and generation functions requirement. Additionally, the MCU-like features of the DSP56800E allow the devices to perform network management and signaling, typically requiring an additional MCU.

With MCU functionality and DSP processing power combined with a large number of peripherals and I/O, the enhanced DSP5685x chips offer a single-chip solution for client side IP phones. These devices can support all necessary system components required for an IP phone, including voice-band codec, keypad, and optional LCD. As an example, the device can connect using Ethernet or RF to wireless LAN.

The Figure on page 1 illustrates an IP phone with fewer than four channels, using the DSP56858 device as a link to any of several network interfaces. The DSP56858 SPI peripheral drives an LDC display and the GPIO is used for the keypad interface. The ESSI connects to the external Codec.

Development Tools

Tool Type	Product Name	Vendor	Description
Software	MSW3SDK000AA	Freescale Semiconductor	Software infrastructure that allows development of efficient, high level software applications that are fully portable and reusable across all DSP56800/DSP56800E family of processors.
Software	CWDSP56800E	Freescale Semiconductor	CodeWarrior Software Development Tools for DSP56800E (Metrowerks)
Hardware	DSP56858EVM	Freescale Semiconductor	Evaluation Module for the DSP56858, DSP56857, DSP56855, DSP56854, and DSP56853

Disclaimer

This document may not include all the details necessary to completely develop this design. It is provided as a reference only and is intended to demonstrate the variety of applications for the device.

Learn More: Contact the Technical Information Center at +1-800-521-6247 or +1-480-768-2130.
For more information about Freescale products, please visit www.freescale.com.

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