Overview
A single hybrid-architecture device, incorporating both a microcontroller (MCU) and a digital signal processor (DSP), offers the peripherals needed to produce a digital telephony answering device (DTAD) at a low cost.

Key Benefits
> Single-device solution combines MCU functionality and DSP processing power
> Inexpensive ESSI connections to Codec/DAA
> GPIO ports for LCD and keyboard connection
> Variety of vocoders and telephony algorithms available
> Integrated real-time clock
> Out-of-the-box software components designed to expedite time-to-market and reduce development costs

SAMPLE DESIGN: DIGITAL TELEPHONY ANSWERING DEVICE
Design Challenges
As telephone systems become more sophisticated, even as costs are often decreasing, consumers expect a wider variety of features when upgrading equipment. Creating a DTAD that can meet these expectations requires components that offer the right combination of peripherals in a compact package at a reasonable cost.

Freescale Semiconductor Solution
Several of Freescale Semiconductor’s 56800 devices are appropriate for a DTAD application. For example, as shown in the figure on page 1, the DSP56858 provides the following interfaces:

> SSI or ESSI peripherals for seamless connection to codecs (for user interface and Telco interface)
> A SPI for connection to a Flash card device
> An integrated time-of-day peripheral providing real-time clock
> Additional general purpose input/output (GPIO) ports for LCD and keypad support

Included in Freescale Semiconductor’s Embedded Software Development Kit are:

> A wide variety of vocoder algorithms for voice compression.
> A comprehensive set of drivers and framework code, enabling quick completion of software application.
> The out-of-the-box software components for all on-chip peripherals, in combination with software libraries for motor control, communication, and signal processing, make it easy to develop the most demanding real-time embedded applications.

The figure on page 1 shows a sample design featuring the DSP56858 and a real-time clock at the heart of a DTAD. An ESSI connection supports a codec for user and Telco interfaces, and a second ESSI connects to a codec that enables audio amplification. An SPI provides a link to a message storage unit incorporating Flash. A GPIO connects to an LCD and another GPIO connects to a keypad.
**Development Tools**

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<tr>
<th>Tool Type</th>
<th>Product Name</th>
<th>Vendor</th>
<th>Description</th>
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<tr>
<td>Software</td>
<td>MSW3SDK000AA</td>
<td>Freescale Semiconductor</td>
<td>Software infrastructure that allows development of efficient, high level software applications that are fully portable and reusable across all DSP56800/DSP56800E family of processors.</td>
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<tr>
<td>Software</td>
<td>CWDSP56800E</td>
<td>Freescale Semiconductor</td>
<td>CodeWarrior Software Development Tools for DSP56800E (Metroworks)</td>
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<tr>
<td>Hardware</td>
<td>DSP56858EVM</td>
<td>Freescale Semiconductor</td>
<td>Evaluation Module for the DSP56858, DSP56857, DSP56855, DSP56854, and DSP56853</td>
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<tr>
<td>Hardware</td>
<td>TDC1</td>
<td>Freescale Semiconductor</td>
<td>Daughter Card for DSP56858EVM that has Telephone Connector, Display, and Keypad</td>
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**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.