

## Features

- **ISDN B-Channel HDLC**
- **Data modulations:**
  - K56Flex (30k-56k)
  - ITU-T V.34: 33600 bits/s-2400 bits/s
  - CCITT V.32bis: 14400 bits/s-7200 bits/s
  - CCITT V.32: 9600 bits/s, 4800 bits/s
  - CCITT V.22/V.22bis: 2400, 1200, 600 bits/s
  - CCITT V.21: 300 bits/s
  - Bell 212A: 1200 bits/s
- **Start-up procedures**
  - ITU-T V.8
- **CCITT V.42 error correction (LAPM & MNP2-4)**
- **CCITT V.42bis data & MNP Class 5 compression**
- **PPP asynchronous framing support**
- **Low power**
  - 140mW typical active
  - Low power and sleep modes
- **High density**
  - 100 pin TQFP package
  - On-chip DS0/DS1 interface
  - Full function DMA port
  - 0.4 in<sup>2</sup> per complete modem port
- **3.3V supply**
- **Fast download**
  - Full image in 5ms.

## Introduction

The ADSP-21mod870-100 is a complete single chip, full-duplex digital modem combining a highly-integrated DSP processor with down-loadable software. All data pump and controller functions are implemented on a single 0.4 inch square chip. This allows for the highest modem port density while achieving the lowest power consumption in a software upgradable platform.

The ADSP-21mod870-100 meets the digital modem needs of high density systems such as remote access servers. Its high performance DSP core, large on-chip SRAM, TDM serials port, and 16-bit DMA port provide efficient control and data communication with minimal chip count. The modem software provides a number of data modulations such as V.34, 56K bps PCM, and ISDN with a software upgrade path to future standards.

The host interface allows system access to modem statistics such as call progress, connect speed, and modulation parameters such as retrain count and symbol rate.

## On-Chip SRAM

The ADSP-21mod870 processor integrates 160K bytes of on-chip memory. The modem data pump and controller software, as well as data storage, are all contained in the on-chip SRAM. The SRAM cells are designed by Analog Devices. These cells are optimized for high-speed DSP and low power consumption. Dynamic configuration of the ADSP-21mod870 via software is performed through the 16-bit DMA interface.

## DMA Interface

The 16-bit internal DMA port (IDMA port) provides transparent, direct access to the on-chip RAM of the ADSP-21mod870 processor. This high-speed access to on-chip memory simplifies control and data communication as well as system debug. Dynamic configuration of the ADSP-21mod870 via software is performed through the 16-bit DMA interface.

## Serial Ports

The ADSP-21mod870 processor incorporates two complete synchronous, double-buffered serial ports for serial communications. The serial ports interface directly to a time-division multiplexed (TDM) 1544 kbps (T1) or 2048 kbps (E1) serial stream to an 8K sample/s data stream or to an 8-bit companded (64 kb/s) data stream (DS0). The serial ports operate under modem software control.

## Software Interface

Analog Devices provides sample C code to serve as an example for the software interface to the ADSP-21mod870. The software interface encompasses the following four areas—download, control interface, data interface, and modem statistics.

### Download

The IDMA port on the ADSP-21mod870 contains an auto-incrementing address generator. The host first

writes the starting address of the transfer and then writes the first word of data. After the first write, the IDMA address generator automatically increments; the host writes the next data word and the IDMA transfers that word to the next location in ADSP-21mod870 memory.

The executable image contains both code and data which must be loaded into both program and data memory. Program memory on the ADSP-21mod870 is 24-bits wide therefore two transfers are used to load each word of program memory.

The host begins the download by asserting the RESET/pin of the ADSP-21mod870. The host then transfers all code and data. The ADSP-21mod870 begins execution after the last word of program code is written to location 0. All internal memory can be loaded in 5 ms.

### Control Interface

The ADSP-21mod870 is controlled via two unidirectional mailboxes. The host sends a command by writing to the *host-to-modem* mailbox. After the modem reads the command, it clears the mailbox. The ADSP-21mod870 sends a response to the host by writing an indication back to the *modem-to-host* mailbox. Analog Devices provides a list of mailbox commands and indications.

### Data Interface

All data transferred to and from the ADSP-21mod870 passes through byte-FIFOs located in internal memory on the ADSP-21mod870. The two FIFOs are accessed through a control structure which contains: a pointer to the start of the FIFO in memory, the length of the FIFO in 16-bit words, a pointer to the next address to be read,

a pointer to the next address to be written, and two words indicating whether there are an odd or even number of bytes to be read and written in the next word. The transmit and receive FIFOs are each 328 bytes deep.

Example code providing primitives for accessing the byte-FIFOs is available from Analog Devices.

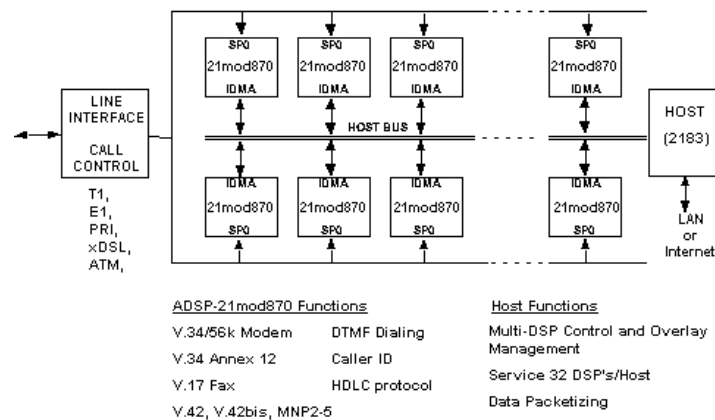
### Modem Statistics

Several modem statistics can be gathered through the IDMA port. These include the following: call status, modulation in use, connect rate, transmit and receive data rate, symbol rate, retrain count, rate re-negotiation count and others.

### Software Interface Summary

A description of the API for the example code is shown in the following table.

Function	Example
Download	download_image()
Control	send_command() read_indication()
Data	read_fifo() write_fifo() get_space_in_fifo() get_bytes_in_fifo()
Statistics	read_modem_parameter()



**Figure 1 ADSP-21mod870 Network Access System**

This information applies to a product under development. Its characteristics and specifications are subject to change without notice. Analog Devices assumes no obligation regarding future manufacturing unless otherwise agreed to in writing.