Intel® WAN Controllers

Product Highlights

- Multi-protocol support: async, sync HDLC/SDLC (high-level data link control/ synchronous data link control)
- On-chip 32-bit address, 16-bit data, double-buffered DMA controller for each transmitter and receiver, and two independent bit-rate generators per channel for transmit and receive
- On-chip NRZ (non-return to zero), NRZI (non-return to zero inverted), and Manchester data encoding and decoding
- DPLL (digital phase locked loop) on each receiver
- Two independent timers per channel

Product Overview

The Intel® WAN controller family includes the Intel® CD2231, Intel® CD2401, Intel® CD2431, and Intel® CD2481 devices. These highly-integrated controllers enable leased line, dial-up, and packet-based WAN connections, while providing flexible solutions that meet the demanding requirements of a broad range of communications applications, including branch office routers, remote access servers (RAS), terminal servers, and protocol converters. The controllers enable improved access, support for packet-based applications, and network convergence on IP (Internet Protocol). Each controller is a dedicated protocol engine designed to free the host CPU from WAN overhead associated with protocol processing, including time-critical, low-level tasks. The result is faster overall throughput, reduced transmission latency and optimized protocol processing performance.

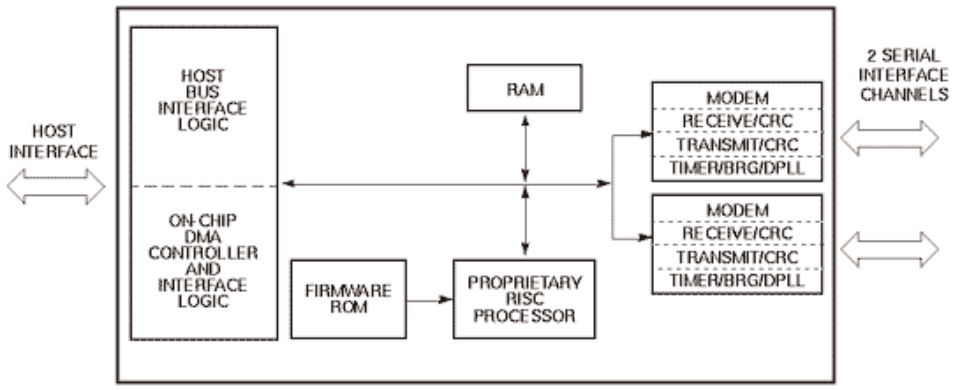
All Intel WAN controllers feature an embedded RISC engine for intelligent protocol processing and each device includes firmware on chip. The devices provide two or four ports, support for multiple protocols, and data rates ranging from 134 to 256 Kbps. Additional features include comprehensive serial interface support, synchronous or asynchronous operation, an on-chip direct memory access (DMA) controller, on-chip FIFOs, and point-to-point protocol (PPP) support. All Intel WAN controllers are validated to meet Intel standards for quality and reliability. They provide multi-channel capability and optimized protocol processing efficiency in a small footprint.

Intel® CD2231

Intelligent 2-Channel remote Access Communications Controller

Product Highlights

- Two full-duplex multi-protocol channels, each running up to 256 kbps
- Supports SLIP (serial-line Internet protocol), MNP* (Microcom* Networking Protocol) V4.2, async, PPP, async-HDLC, and HDLC/SDLC (non-multidrop applications) on both channels
- On-Chip DMA Controller
- DMA- or interrupt-driven, per channel, per direction
- Chaining/unchaining of buffers and frames
- 32-bit address, 8- or 16-bit data transfers
- PPP Features
  - Supports data link level - RFC-1661
  - Supports dual async control character maps (32 control characters) - RFC-1662
  - Compatible with ISO 3309/4335 Addendum 1 (async-HDLC)
  - Automatic insertion and deletion of control/escape characters and bit complements
  - Automatic generation and detection of 16-bit FCS (frame check sequence)



Product Highlights (continued)

- Supports data link level - RFC 1055
- HDLC/SDLC Features
  - Four 8-bit or two 16-bit frame address matching
  - FCS generation and validation
  - Programmable number of leading-pad characters and flags

Product Overview

The Intel CD2231 is a two-channel synchronous/asynchronous communications controller specifically designed to reduce host-system processing overhead and increase efficiency in a wide variety of communications applications. The Intel CD2231 is packaged in a 100-pin MQFP and provides 10 data/clock/modem pins per channel.

Intel® CD2401

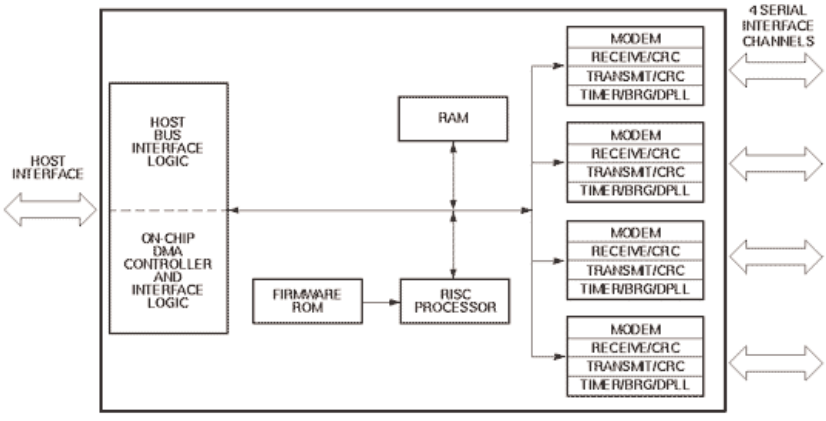
Intelligent Multi-Protocol Communications Controller

Product Highlights

- Four serial channels
- Supports async, bisync, sync HDLC/SDLC (non-multidrop applications), and X.21 protocols
- Full-duplex bit rates to 134.4 Kbps
- Two 16-byte FIFOs per channel, one per direction
- Independent bit-rate generators for transmit and receive
- 100-pin MQFP package
- On-Chip DMA Controller
  - DMA- or interrupt-driven, per channel, per direction
  - Chaining/unchaining of buffers and frames
  - 32-bit address, 8- or 16-bit data transfers
- Asynchronous
  - DMA supports either block or append mode buffers
  - Good Data* interrupts simplify software
  - In-band or out-of-band flow control
  - Special character recognition and transmission
  - HDLC/SDLC
  - Match either 2 x 16-bit addresses or 4 x 8-bit addresses
  - CRC generation and validation
  - On-chip NRZ, NRZI, and Manchester data encoding and decoding
  - DPLL (digital phase-locked loop) on each receiver

Product Overview

The Intel CD2401 is a universal synchronous/asynchronous communications controller. DMA and protocol controllers are designed into the device to provide a more efficient host interface and facilitate programming. In addition, the controller features an efficient, vectored interrupt scheme. Designs using the Intel CD2401 are efficient, easy to program, and require minimal board space. The Intel CD2401 provides 10 data/clock/modem pins per channel.



Intel® CD2431

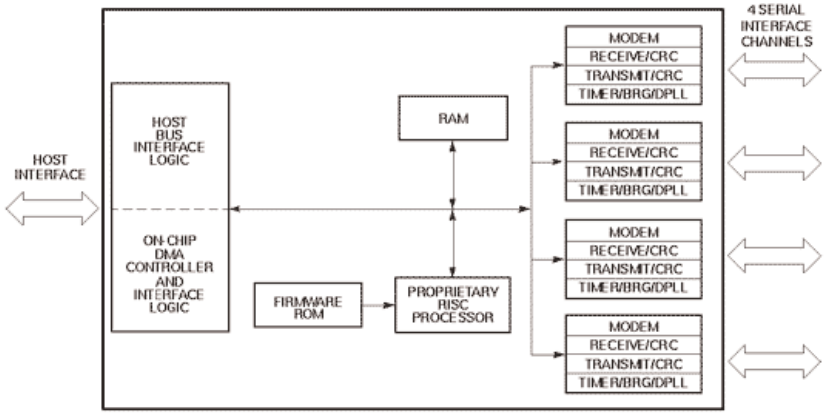
Intelligent 4-Channel Multi-Protocol Communications Controller

Product Highlights

- Four full-duplex multi-protocol channels, each running up to 134.4 Kbps
- Supports async, PPP, async-HDLC, and sync HDLC/SDLC (non-multidrop applications) on all channels
- Two independent bit-rate generators per channel for transmit and receive
- On-chip NRZ, NRZI, and Manchester data encoding and decoding
- DPLL (digital phase-locked loop) on each receiver
- Two independent timers per channel
- On-Chip DMA Controller
  - DMA- or interrupt-driven, per channel, per direction
  - Chaining/unchaining of buffers and frames
  - 32-bit address, 8- or 16-bit data transfers
- PPP Features
  - Supports data link level - RFC-1661
  - Supports dual async control character maps (32 control characters) - RFC-1662
- Async-HDLC Features
  - Compatible with ISO 3309/4335 Addendum 1
  - Automatic insertion and deletion of control/escape characters and bit complements

Product Overview

The Intel® CD2431 is a 4-channel synchronous/asynchronous communications controller specifically designed to reduce host-system processing overhead and increase efficiency in a wide variety of communication applications. The Intel® CD2431 has four fully independent serial channels that support asynchronous, asynchronous-HDLC, and synchronous (HDLC/SDLC) protocols. The Intel® CD2431 provides 10 data/clock/modem pins per channel.



Intel® CD2481

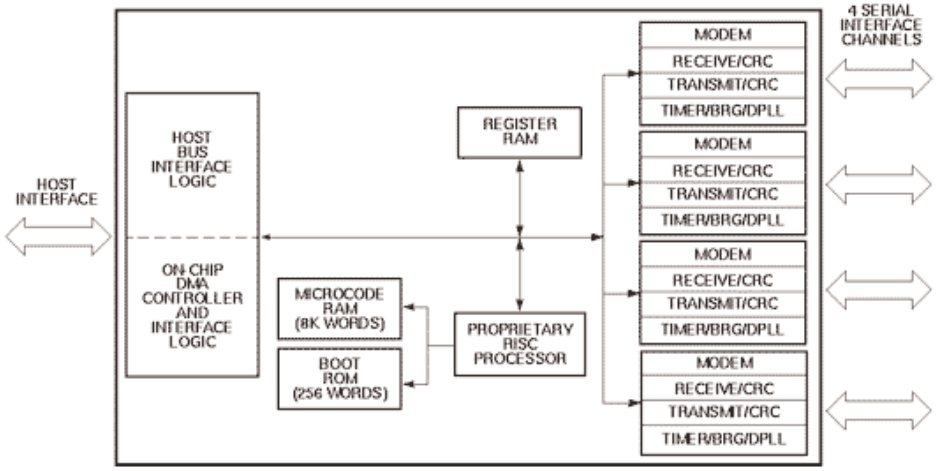
Programmable 4-Channel Communications Controller

Product Highlights

- Four full-duplex multi-protocol channels, each running up to 230.4 kbps (with 60-MHz clock)
- Microcode downloadable to on-chip storage supports asynchronous and synchronous protocols on all channels
- Supports async, PPP, async-HDLC, and HDLC/SDLC (non-multidrop applications) on all channels
- Two independent bit-rate generators per channel for transmit and receive
- On-chip NRZ, NRZI, and Manchester data encoding and decoding
- DPLL (digital phase locked loop) on each receiver
- Two independent timers per channel
- On-Chip DMA Controller
  - DMA- or interrupt-driven, per channel, per direction
  - Chaining/unchaining of buffers and frames
  - 32-bit address, 8- or 16-bit data transfers
- PPP Features
  - Supports data link level - RFC-1661
  - Supports dual async control character maps (32 control characters) - RFC-1662
  - Compatible with ISO 3309/4335 Addendum 1 (async-HDLC)
  - Automatic insertion and deletion of control/escape characters and bit complements
  - Automatic generation and detection of 16-bit FCS (frame check sequence)
- HDLC/SDLC Features
  - Four 8-bit or two 16-bit frame address matching
  - FCS generation and validation
  - Programmable leading-pad character transmission
  - Supports shared flags on receive frames
  - Programmable number of leading flags

Product Overview

The Intel CD2481 is a four-channel synchronous/asynchronous communications controller specifically designed to reduce host-system processing overhead and increase efficiency in a wide variety of communications applications. A special member of the Intel® CD24X1 family, this device allows easy field upgrades and enhancements with an on-chip 8K-word microcode store for downloaded control code. The Intel CD2481 features a 100-pin MQFP package that provides 10 data/clock/modem pins per channel, and also features four fully independent serial channels to support standard asynchronous, PPP, MNP* 4, SLIP, bit-synchronous (HDLC), and byte-synchronous (bisync, X.21) protocols. The Intel CD2481 is non-functional until the microcode is downloaded. Only a small boot ROM containing initialization code is included. A proprietary on-chip RISC processor performs all time-critical, low-level tasks otherwise executed by the host system.



Ordering Information

Contact an authorized Intel distributor for complete ordering details.

Product	Order Code
Intel® CD2231 WAN Controller	SCD223110QCD
Intel® CD2401 WAN Controller	SCD240110QCM
Intel® CD2431 WAN Controller	SCD243110QCD
Intel® CD2481 WAN Controller	SCD248110QCD
Intel® CDK2401 Evaluation Kit	CDK2401MAT03B
Intel® CDK2431 Evaluation Kit**	CDK2431DAT03B
Intel® CDK2481 Evaluation Kit	CDK2481DAT03B

**Serves as the evaluation kit for the Intel® CD2231 WAN Controller and the Intel® CD2431 WAN Controller

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