High-Density Electrical Line Interface for Optical Networks

The M28335 is a 12-port line interface unit (LIU) which includes integrated receivers and transmitters for use in implementing digital loop carriers (DLCs), digital subscriber line access multiplexers (DSLAMs), multi-service access concentrators, and packet and ATM cell switches. The device is ideal for use in time division multiplex (TDM) switches and add/drop multiplexers (ADMs) that are used to aggregate lower-speed electrical network connections into higher-speed optical connections.

Proven, Robust Design

Based on the same design used in the industry’s first multi-port LIU in 1999, each M28335 channel is composed of completely separate transmit and receive sections with a common reference clock and dedicated power and ground connections that eliminate crosstalk. In addition to providing breakthrough port density, the M28335 LIU offers an industry-low 330 mW per port of power dissipation. It meets all International Telecommunications Union (ITU), Bellcore and AT&T standards, features zero code suppression encoders and decoders, and is supported by Mindspeed’s complete line of software driver products and a comprehensive evaluation module with all necessary reference-design components.

High-Density Interface for Metropolitan Area Networks

Mindspeed’s M28335 LIU device provides the industry’s most efficient and economical solution for edge and core access equipment such as ADMs for metropolitan optical networks, to enable carriers to offer expanded services such as DS3. In this application, asynchronous T3 frames are mapped into synchronous SONET frames and can be used to transport ATM or narrow-band voice and data traffic time division multiplex (TDM) service. The M28335 LIU provides an ideal solution in this application because it may be used on combined DS3/E3/STS-1 line cards without changes to transformers or front-end circuitry. Alternatively, it may be paired with the most suitable framer and mapper ASICs for the intended service type.

Simple External Circuitry

The M28335 LIU includes 12 independent transceivers on a single chip and only requires the addition of 1:1 coupling transformers, termination resistors and supply bypass capacitors to create a complete solution. It includes both a parallel processor port and a serial processor port (selectable via control mode pins) that allows each port on the device to be independently configured using a common control interface.

Optimum equalizer settings are automatically selected by the device depending on configuration of an individual...
port for E3 or DS3/STS-1 mode, unlike existing solutions which require reconfiguration if the line length changes. Each channel on the M28335 LIU has a transmit pulse shaper that can be set to ensure that the cross-connect pulse mask requirement is met for transmit cable lengths up to 450 feet, as defined by ANSI and Telcordia standards. In addition, optional line build out (LBO) may be enabled individually per port which is useful in installations with very short cable runs and sensitive far-end receivers. The transmit pulse is retimed by an internal phase locked loop (PLL) so that the transmit pulse is dependent only on the period of the transmit clock and not its duty cycle.

What is DS3?
DS3 [Digital Service Level 3] lines, or T3 lines as they are also called, are dedicated phone connections supporting data rates of about 45 Mbps, usually consisting of 672 individual channels, each of which supports 64 Kbps. These lines are used in the Internet backbone and for Internet service providers (ISPs) to connect to this high-speed backbone. STS-1 lines use the basic SONET building block signal to transmit at 51.84 Mbps data rates. E3 lines are similar but incompatible, somewhat lower-speed connections of 34 Mbps used outside North America.

Product Highlights
- Can be used as a data transceiver over a maximum of 900 feet of type 734/728 coaxial cable or equivalent in a user's premises
- Programmable pulse filtering to meet cross-connect pulse masks (ANSI T1.102-1993)
- SRAM-like eight-bit parallel microprocessor interface or hard-wired pin connections
- Meets jitter specifications of Bellcore GR-499, GR-253, and TBR 24 (with external JAT)
- Alarms for coding violations and loss of signal
- Full diagnostic loopback capability
- Minimal external components required
- Compatible with ITU-T G.703 and G.823
- Independent per-channel power-down mode
- Easily interfaced to the T3/E3 framer ICs (CX28342/3/4/6/8, CN8330 and CX28365)
- Selectable B3ZS/HDB3 encoding/decoding
- Superior input receiver sensitivity (< 25 mV peak)
- Transmit monitor inputs for a faulty transmit or shorted output

Physical Characteristics
- 35 mm TBGA package
- Single 3.3 V power supply
- 4 W maximum power dissipation
- -40°C to +85°C temperature range
- 5 V-tolerant pins
- TTL digital pins

Applications
- Digital cross-connect systems
- High-end routers
- Multiservice ATM switches
- Optical add/drop multiplexers
- Metropolitan optical access switches

The M28335 LIU is part of a comprehensive portfolio of Mindspeed products that encompass all of the circuit-aggregation functions required for a typical T3/E3 line card. This includes the industry's highest-density, 12-port T3/E3 framer, plus network processors and asynchronous transfer mode (ATM) segmentation and reassembly (SAR) devices.