

Infineon Partners



With

NComm

John Brandte, VP Marketing and Business Development, NCOMM Incorporated, Salem, NH, USA

Cutting Cost, Risk and Development Time

Infineon Technologies and NComm, Inc. have partnered to provide their customers the fastest, most dependable path for developing classic WAN (Wide Area Network) access technologies. Combining state-of-the-art framer Integrated Circuits and off-the-shelf standards-compliant software with easy-to-use APIs (Application Programming Interfaces), Infineon and NComm have significantly reduced cost, risk and development time.

Transport Technologies

T1 and E1 are used for North America and Europe respectively. European standards are also used in most of the networks on other continents. Phone lines use what are referred to as “DS0s”. A T1 which runs at a rate of 1.544 Mbps (megabits per second) carries 24 DS0s or up to 24 phone calls without employing compression. Similarly, E1 running at 2.048 Mbps carries up to 30 calls. DS3 provides a higher level of aggregation, combining 28 T1s or 21 E1s within a 45 Mbps stream.

Although some 40 years old, these transport technologies still form the basis for virtually the entire network – both in North America and on a global scale. POTS (Plain Old Telephone Service) extensively uses standards-compliant implementations for configuring lines, setting up and taking down phone calls, monitoring the health of the lines, and line troubleshooting in the event of failure or performance degradation. Newer telecommunications and data communications technologies like frame relay and ATM are also frequently carried by lower-layer T1, E1 or DS3 lines. The requirement for standards compliance ensures that equipment from different manufacturers may be deployed relatively interchangeably on different ends or segments of the network.

DSU/CSU Functionality

Years ago, before highly integrated products, firms engineered pure T1/E1/DS3 offerings. On the customer side of the network, equipment like routers or PBXs (Private Branch eXchange) were connected

to the WAN via DSU/CSUs (Data Service Unit/Channel Service Unit). Now the “DSU/CSU” functionality is integrated in the product – usually as an option card. It is no longer the main function of a product and does not, therefore, differentiate the product. It is simply a generic access method.

Although “generic”, this transport capability does present certain challenges, however. The objective is to develop it in such a way as to make it standards-compliant without expending scarce development resources which are better focused on the products unique, differentiating features. Further, even if the raw staff years were available, expertise in T1/E1/DS3 technology, its design subtleties and the nuances of standards compliance is relatively hard to find. What looks like an easy job can rapidly become a major headache along the project’s critical path. The cost of delays in time-to-market – or worse, a product that gets to market with major flaws – are substantial and yet avoidable.

Partnering for Success

Infineon and NComm have partnered precisely to help customers avoid these pitfalls. Working together, they offer virtually everything that an engineering team needs to quickly and confidently develop a standards-compliant WAN access solution.

The functional integration enabled by Infineon eliminates significant critical portions of traditional hardware. Its T1/E1 combination parts permit a single analog frontend that can be operated anywhere in the world. The DS3 devices with integrated M13 Multiplexer provide a highly flexible and complaint solution for higher bandwidth interfaces. With extremely refined reference designs, the chances of less than satisfactory hardware implementations are greatly reduced.

NComm’s software combined with Infineon’s hardware products provide an end-to-end solution for developing T1, E1 or DS3 products and ensuring standards-compliant operation. Leveraging two sets of well-specified Application Programming Interfaces (APIs), the Trunk Management Software provides a rich set of functions to network-enable T1, E1 or DS3, support intelligent network communication and monitor the health of the lines. It includes fault isolation tools to quickly isolate and resolve issues. Further, it fully supports FDL

(Facility Data Link) operation and signaling functionality associated with robbed bit/channel. It also greatly assists with the implementation of diverse protection switching schemes.

Individual TMS Modules

Each TMS software module focuses on a specific area of activity. These modules interact with each other.

The Configuration Manager Module (CMM) is used to configure all purchased modules to perform their function. Examples of parameters that can be configured include

- Frame format, line coding and line build out
- Alarm declaration and clearing timers
- Selection of FDL processing standards (TR54016 and/or T1.403) (MMM)
- Registration of receiving bit-oriented codes (BOC) (MMM)
- Defining automatic processing of BOC (MMM)
- Defining loop-up and down codes (MMM)
- Defining threshold crossing alerts (TCA) (MMM)
- Defining guard, wink and debounce timers (SMM)
- Defining wink and hook flash states (SMM)
- Defining call states (SMM)
- Clock selection

The Alarm Manager Module (AMM) supports detection and reception of standard trunk alarms (red, yellow and blue). Timers for declaring and clearing alarms are configurable via the Configuration Manager. The AMM supports application overrides for generated alarms. The application can transmit a blue (AIS) alarm, for example, until a software download has been completed. The AMM communicates with the MMM for processing performance reports. It also communicates with the SMM for processing signaling bits during trunk impairments. T1 operation meets T1.231 requirements. The E1 alarm capabilities meet the standards per I.431, G.732, ETSI 300-233.

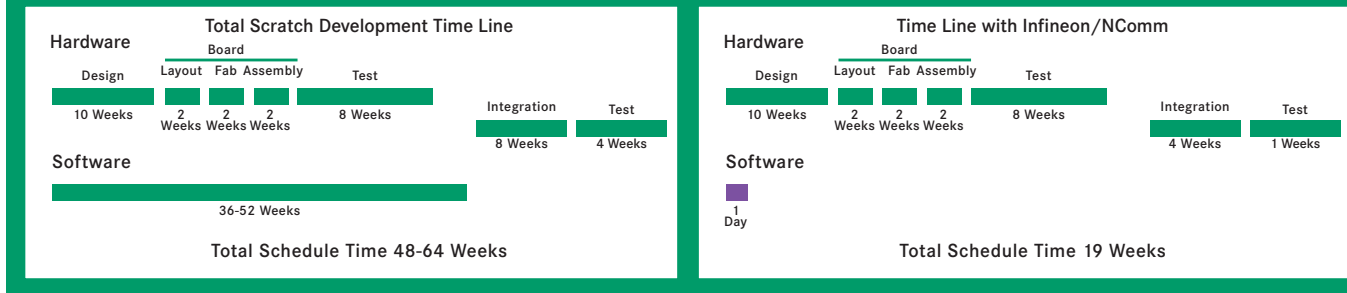
The Maintenance Manager Module (MMM) supports processing of loop-up/loop-down codes, facility data link communication and performance reporting. The data pattern for loop-up/loop-down is configurable (provided the framer chip supports it). It supports FDL processing for the ESF framing format, including ANSI T1.403 and ATT PUB 54016. The FDL processing method is a configurable option. The MMM also supports sending and processing of the bit-oriented code (BOC) sent over the FDL. The codes corresponding to loopbacks are implemented. Using the CMM, the application software can request that the MMM implement loopback codes. The application software can request BOC and send BOC words on request.

The Maintenance Manager collects performance data as specified in ANSI T1.403, TR54016 and T1.231. The application can request current performance reports from the MMM for both the remote side (assuming the remote side reports performance information via ANSI T1.403 and/or TR54016) and the local side. The application can set threshold crossing alerts (TCA) per ANSI T1.231. The application is automatically notified if the TCAs are crossed. The MMM implements the time-of-day requirements as specified in ANSI T1.231, which means that the 15-minute buckets and 24-hour performance data are automatically adjusted when the time of day is changed.

DS3 performance is monitored according to T1.231. For E1, performance monitoring complies with the standards per G.826 and also provides a 15-min./24-hour data performance database. SA bit processing complies with G.704.

For T1 and E1, the Signaling Manager Module (SMM) processes signaling bits included in a trunk. The SMM debounces the bits, freezes signaling bits during alarm conditions, and processes signaling bits processing during trunk failures. The SMM decodes the signaling bits into call states defined by the application. Different signaling schemes (such as FXO/FXS/E&M/LS/GS) can be defined for each time slot on the T1 or E1 trunk. T1 signaling models are those defined in ANSI T1.403, Telcordia TR-08, and Telcordia GR-303 Tables

Generic Telecom Module Schedule



12-3 and 12-4. E1 signaling models correspond to those defined in Q.421, Q.422. Timers associated with signaling, such as wink and hook flash, are programmable on a timeslot basis.

Device Driver Modules (DDM) are included with the base software. They map the NComm trunk management software to the actual hardware. The DDM serves a control function and reports low-level events in the framer. For example, trunk is experiencing a loss of signal condition (either NComm TMS or the licensee's trunk management software will determine the red conditions in this event).

Device Driver Modules for T1 and E1 applications are available for the following Infineon products:

- FALC-56
- QuadFALC
- FALC-LH
- FALC-54

A DS3 driver is available for Infineon's TE3-MUX.

Bottom Line

All in all, this combination cuts development time dramatically and frees up a high percentage of the internal resources required to add this much-needed WAN access. As you can see from the charts above, hardware, software, integration and testing time are all radically reduced.

With this new development paradigm, roll-your-own, internal development is akin to reinventing the wheel. Business-savvy development groups know that getting a high-quality product to the marketplace quickly is the key to product success. It isn't often that developers get to minimize time-to-market while reducing development costs and project risks.

About NComm

NComm Incorporated, founded in 1996, is a privately held company based in Salem, New Hampshire. NComm's mission is to reduce their client's time-to-market through turn-key telecommunications software offerings and custom engineering. Software offerings include both NComm TMS™, a communications trunk management software suite in which customers obtain software and its source code to embed into their own equipment, and Altera® Megafunctions software. Additional offerings include NComm TMS™ Development Platforms, a further accelerant to new product design, and custom engineering services encompassing a wide range of communications expertise. NComm customers range from start-up to well-established communications companies. For more information, please visit the NComm website at www.ncomm.com.

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