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# Hardware Projects

NComm has expertise with a broad range of microprocessors and experience in:  
T1, E1, ISDN, T3, ADSL, HDSL2, V.35/RS-449, PBX, Internet Access via WAN/LAN, Sub-rate Switching, Frame Relay, DS3 Call Processing, & Fiber Optic Control

NComm specializes in product development for Telecommunications equipment; we are well equipped to accelerate product development. Every phase, from initial system architecture and specification through pilot productions, can be handled for you, conversely, NComm can extend your existing resources by furnishing only the phases you need.

- NComm provides a full spectrum of capabilities including electrical design, mechanical design, and extensive system software development.
- NComm supplies maintenance and support programs as well as consulting services.
- NComm serves a broad range of companies, from organizations with no internal engineering capability, to large high-technology corporations.
- NComm reacts quickly and professionally to the design requirements of their clients.

## **NComm Hardware Project Résumé**

**Internet Access** - Designed central office compliant hardware and software for a 100base-TX/WAN Internet access project. Access was provided via National ISDN-2, primary rate, network side with synchronous PPP operating on the bearer channels. User ID and password authentication was done via PAP/CHAP using the RADIUS protocol. Product is based upon the pSOS+ operating system operating on multiple MC68MH360 microprocessors. Administration of product was done via TELNET and the product "booted" off the network using the BOOTP protocol.

**DS3 Call Processing Project** – Designed central office compliant hardware for DS3 card used in a voice switching system. Design included DS3 interface and 4 T-1 interfaces using 32 T-1 framers. Call processing is performed by the on-card Motorola MH860 microprocessor using the National ISDN-2 primary rate protocol. Design included system synchronization, trunk synchronization, and DS3 protection switching. Also developed specifications for the backplane.



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**Sub-Rate Switching** - Designed, developed and integrated firmware for a platform to provide sub-rate switching capabilities for compressed voice/data for digital cellular and PCS applications. Software was developed using the MRI tool set and the VRTX operating system. Designed and implemented central office compliant sub-64Kbps switching card with embedded 68360 microprocessor. Design included 1X1 redundancy scheme. Card passed FCC part 15 testing.

**T1/Frame Relay/ISDN Project** - Designed, developed and integrated real-time embedded multitasking software for a multiple T1 span telephone switching platform for a Wide Area Network (WAN) application in C for MC68360 QUICC processor. Software was built using the MRI tools and the VRTX operating system. Designed central office compliant T-1/E-1 hardware with ISDN PRI and Frame Relay data processing support. Design consisted of one 68360 controlling the 4 T-1/E-1's and four 68360's for processing frame relay. Design included many Altera EPLDs designed on MAXPLUS II. Card passed FCC part 15, FCC part 68, and safety testing.

**V.35 Project** - Designed and developed real-time multitasking software for 8 port V.35/RS-449 interface card. Software was built using the MRI tools and the VRTX operating system. Software included diagnostics for verifying hardware operability. Designed and implemented central office compliant 8 port V.35/RS-449 interface hardware. Design included 68360 microprocessor, V.35/RS-449 port interfaces, SLIP/LOC detection. Card passed FCC part 15 and safety testing.

**ToneGen Project** - Designed, developed and implemented an Altera Megafunction that allowed for generation of fixed tones. This Megafunction allows for user control of frequency (up to two), signal level (in DB), law encoding (Mu-law or A-law), and sample encoding. NComm, Inc. sells this through the Altera Megafunction partnership program.

**Fiber Optic Control System Project** - Designed two double-sided SMT circuit boards that comprise the control system for a high speed fiber optic transport system. Designs are based on Motorola 68340 microprocessor and consisting of three Xilinx gate arrays and two local area networks: one based on the Intel 82586 LAN co-processor and one based on the Intel 80152 microprocessor. Designed the analog interface for proprietary LANs. Designed timing recovery circuit for the LAN interface.



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**PBX Project** - Designed and implemented a digital PBX system which consists of up to 32 central office lines and/or standard telephone extensions. Designed 80186 based control system. Wrote the real-time operating system. Wrote real-time, multi-process device driver and file system for an IDE hard disk drive. Wrote call-processing software. Wrote voice mail software. Wrote graphical configuration manager software.

**T3 Performance Monitoring Project** - Designed system architecture that was capable of monitoring transmission quality of 24 DS3 channels. Designed central office compliant 80186 based CPU circuit pack with central office alarm interface. System was directly power from redundant CO -48V DC power. Wrote the device drivers for real time operating system. Designed test rig for automated factory testing of the product.

**T1 Performance Monitoring Project** - Designed system architecture for monitoring the transmission performance of 120 DS1 channels. Designed central office compliant 80186 based microprocessor controller with central office alarm interface. System was directly power from redundant CO -48V DC power. Designed 24 channel HDLC serial interface circuitry. Designed DS1 performance monitoring circuitry. Wrote the device drivers for real time operating system. System passed FCC part 15 testing.

*This list is representative of the projects NComm has completed, please call NComm with any and all special requests you may have.*