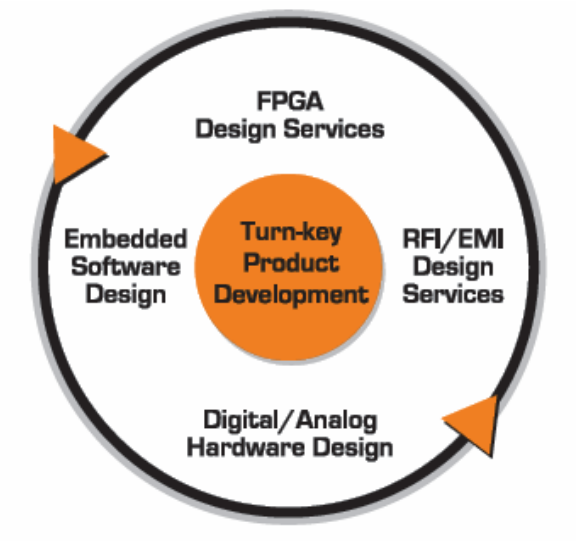
Mantaro Product Development Services
Service Offering

Mantaro offers a variety of Product Development Services suitable for any company throughout their product development process. We are able to develop a subsystem or complete product from concept until it is ready for manufacturing. In every scenario, working with Mantaro allows you to focus on your core business; from developing specialty components to complete systems.



Mantaro's highly experienced team can step into projects at any stage. During product definition, we can research technology options, develop product requirements, define system architecture, and construct a development plan that will reduce technology risks and accelerate time to market.

About Mantaro

Mantaro Networks provides a full range of product development services to our technology clients. Our technical staff comprises highly talented professional engineers with a history of successful product development and innovative design experience. The Mantaro team has many years of industry expertise with leading companies that develop telecommunications systems, software applications, semiconductors, and test and measurement instrumentation.

Development Capabilities

Whether it is designing a new high-speed interface for a client's existing product line or developing a new product or system to address a new market opportunity, Mantaro can develop a project plan to meet the challenge. Our areas of applications expertise include:

- Embedded software systems
- Telecom switching technology
- Digital signal processing
- Signaling and control systems
- Test and instrumentation
- Carrier test equipment and systems
- Network management (EMS) and diagnostic systems
- Wireless communications systems
- Evaluation platforms and reference designs

Product Development Process

Mantaro is a valuable partner and provides assistance during each stage of the product development process. These stages include:

- System design and architecture development
- Detailed design development
- Prototyping and solution modeling
- Prototype testing
- Pilot release delivery
- Pilot evaluation/acceptance test

At the end of each stage, a design review is conducted with the client to ensure the development is meeting the requirements. This is in addition to distribution of regular status reports and meetings to keep you informed of the project's progress.

Turn-Key Product Development

Mantaro's Turn-key Product Development Service leverages all of our resources and partners to produce a complete solution. Examples of complete solutions include:

- Development of a daughter card for an already existing system
- Server and PC cards that utilize standard Linux, UNIX, Windows or other operating systems
- Packaged products that include industrial design support and are ready for manufacturing.

You may decide to have Mantaro develop this solution for a variety of reasons. Many companies want to stay focused on development of their proprietary component or software and decide to use Mantaro as their partner to develop the support hardware and software systems. Some companies prefer not to sustain a full engineering organization after a product is initially developed and decide to keep only a key group of system architects and designers on board. Other companies are interested in only providing professional services to a market segment and decide to have Mantaro develop a customized solution for them that gives them a competitive advantage.

In every scenario, our customers view Mantaro as a valuable partner that allows them to stay focused and grow their business.

Digital/Analog Hardware Design

Mantaro Hardware Design Services allows you to take advantage of our extensive experience designing hardware for telecommunication networks, industrial applications, and commercial devices. Our combination of digital, analog, and RF design experience products to be designed to meet your performance, power, reliability, and regulatory requirements without lengthy project delays. Mantaro can also be the right solution to pin point elusive power supply problems or update designs to overcome parts obsolescence issues. With our digital signal processing (DSP) and wireless experience, Mantaro can develop products that utilize the latest technology. Mantaro's hardware design team works closely with our FPGA and embedded system engineers to provide turn-key solutions that are optimized to meet your specifications.

FPGA Design Services

Mantaro's FPGA Design Services provide our clients access to an expert engineering team with proven systems development experience in a variety of industries and applications. Our engineering team stays current with the latest FPGA technologies, tools and techniques for design through partnerships with industry leading FPGA vendors including Altera and Xilinx. Mantaro has 20 FPGA designers available to work on projects. Our design experience covers a range of programmable logic product families from simple PLDs to the largest Stratix and Virtex devices. Many times our customers require specific expertise to support a product development effort or solve a technical design issue where experienced internal resources are not immediately available. Mantaro provides focused teams dedicated to address this requirement.

Embedded Software Design

Mantaro offers a complete portfolio of software development services for our clients. Our proven experience spans low level embedded software and the associated application software to work with it. Embedded software systems are developed by working very closely with the hardware engineering design team to optimize performance and ensure seamless integration. Mantaro maintains expertise in both open source software platforms such as Linux and proprietary software solutions such as pSOS and VxWorks. This means that we are able to select the development software based solely on specific performance requirements and optimal lifecycle costs.

RFI/EMI Design Consulting

Mantaro provides EMI services at all stages of product development, whether at architecture definition or assisting with products that have failed to comply with the required standards. Generally, the most cost effective and expeditious approach is to address EMI objectives as early in the development process as possible, where EMI control strategies can be implemented with minimal impact to schedule and cost. Over the years, Mantaro's team has developed multiple high-speed digital, as well as low noise RF/ analog designs adhering to various compliance standards.

Mantaro can guide the EMI design process at each stage of development and manage the product through the compliance process with the appropriate compliance labs.

Mantaro Product Development Services
Development Capabilities

Protocol Development Experience:
- Packet Switch: ATM, Frame Relay, X.25, HDLC, Q.921, LMI, ILMI, Ethernet
- Internet Protocol: MPLS, Diffserv, IPSEC, TCP/IP, UDP, ICMP, SNMP
- Telephony: CAS Signaling, ISDN, Q.931, IS-136, MGCP, Megaco, SIP
- Wireless 802.11x, INMARSAT-B, AMPS, NAMPS, TDMA Digital Cellular
- Mobility Management IS-41, AIN 0.2, Mobile IP

Software Experience:
- Operating System integration (VxWorks, pSOS, OSE…)
- General Purpose Processors: x86, Power PC (Motorola and IBM), MIPS
- Signal Processors: TI, Analog Devices, Motorola
- Embedded real time software design and development
- C, C++ development, Assembly (Intel, Power PC, 68k, TI signal processors)
- Redundancy and state replication management
- Client-server applications and database design
- BSP development
- Windows programming and GUI design (Visual C++, Visual Basic, Java)
- Board and System level diagnostics
- SNMP Embedded Agent, HTTP agent and CLI management
- Device Driver design (requirements and data sheet to code)
- Code optimization (performance analysis and enhancement)
- Real Time Kernel Development
- DSP Technology Experience:
- Algorithm development and analysis
- Matlab, digital filters, FFT, DPLL, correlation
- Modem training, synchronization and acquisition control
- Jitter processing, measurement and analysis

Mixed Technology Experience:
- Mixed Analog-Digital design, analysis, and simulation
- DSP (Signal Processor and FPGA based) algorithm design, simulation, and development.
- Telecommunications Transmission (T1 through OC-192)

Mixed Technology Experience (continued):
- Board level design, including full electrical engineering support through placement, signal management, safety and EMI compliance
- High speed and precision DAC and ADC
- DDS
- IEEE-743

Digital Hardware Experience:
- FPGA (Altera and Xilinx) and PLD design
- ASIC design utilizing behavioral and high level languages
- High-speed modem design
- High speed (DC - GHz) digital development (impedance control and termination, bus simulation, single ended and differential transmission, crosstalk management, and interconnect management)
- Extensive state machine design experience

Analog/ RF Hardware Experience:
- High frequency analog design (DC to GHz)
- Low noise amplifier design (Voice band through 2.5GHz)
- Mixer IF up/down converter design.
- Analog filter design (high frequency passive and low frequency active)
- Transmission line design, measurement and analysis, including bus, clock distribution, impedance control and crosstalk/feed through management of sensitive signals
- EMI/RFI management, including board and system level management of signals and shielding components
- Power supply design (off-line and DC to DC converters)
- High speed driver and amplifier design
- PLL, clock recovery, timing management and timing measurement design
- POTS FXS, FXO 2 and 4 wire design

Manufacturability and Testability Experience:
- Design for manufacturability (BGA, Flip Chip, Thermal Management)
- System integrity analysis and design
- NEBS compliance
- SNMP based EMS management design
- FCAPS: Fault Management, Configuration Management, Accounting, Performance, Security modular component design
- Policy enabled management