

iChip Internet-Enables InTagral Next Time-and-Attendance Terminal

“Because of Connect One’s unique concept of a complete hardware and software solution, it was extremely easy to integrate Internet connectivity into our new design.”

-Hayim Shechter, Micronet VP of Engineering

Micronet is an ISO-9002 certified manufacturer of mobile, handheld and stationary data collection terminals located in Azor, Israel. Micronet has shipped tens of thousands of terminals worldwide since the company was founded in 1982. Micronet’s terminals operate in a wide variety of applications, including monitoring of General Electric commercial washing machines; utility meter reading for the Athens municipality; debiting of RF smart-cards used by British Petroleum; and vehicle messaging by Teletrac, a leading U.S. supplier of car fleet management systems.

The Challenge

In early 2000, Micronet began development of a new time-and-attendance clock, named InTagral™ Next. This product is a next-generation version of the company’s previous stand-alone InTagral terminal, which includes a serial port for connectivity.

At the time, a number of Micronet’s customers approached the company with the request to provide them with the ability to remotely access their time-and-attendance terminals in any location from any location. Previous connectivity for InTagral was via the terminal’s serial port for local access, or remote access via an external modem connected to the serial port, which was used to update the application’s parameters.



Photo: Micronet InTagral Next

Application Note

The design goal for the new terminal was to capture information read from encoded badges (magnetic, bar code or proximity badges). Sliding one of the pre-coded badges through InTagral Next's card reader records in the terminal's memory a transaction that easily can be sent to a central site via a communication peripheral. In addition to time-and-attendance recording, applications for InTagral Next include project management tracking, shop floor data collection, and access control.

For the next-generation version, InTagral required a total redesign, including upgrade to a 386 running DOS. In addition to dial-up connectivity via the serial port, InTagral required connectivity to a 10BaseT LAN, RS-485 connectivity for simultaneous connection of several terminals to a single PC, and infrared support.

Micronet's management decided that they would use the Internet to provide remote access capability for InTagral Next and would utilize an FTP server for point-to-point remote file transfer. In November 2000, they began to research Connect One's CO561AD-L iChip LAN™ Internet Controller and an alternative solution.

The Solution

In December 2000, Micronet began testing Connect One's iLAN™, the evaluation platform for Connect One's iChip LAN. Micronet was attracted by the fact that iChip LAN is an updateable solution that includes onboard flash and SRAM, and that does not require significant hardware engineering. iChip LAN also requires minimal software engineering, as it includes software drivers that support 10BaseT Ethernet connectivity via the Crystal CS8900A Ethernet controller from Cirrus Logic.

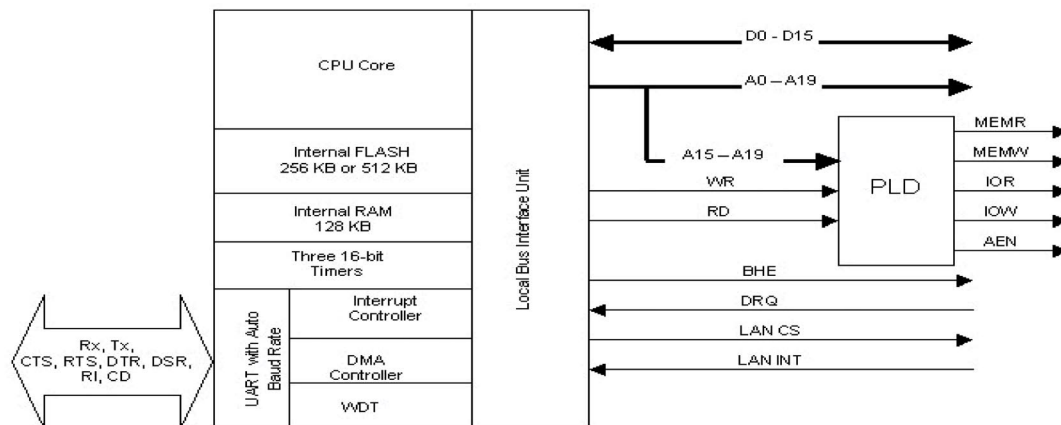


Figure: Connect One iChip LAN block diagram with Host/LAN interfaces



Micronet's engineers also appreciated the fact that they did not have to do any Internet programming, since iChip LAN comes bundled with Connect One's AT+i™ Application Programming Interface, which uses high-level ASCII commands for configuring the device and for invoking iChip's Internet protocols with just a few lines of code on the host processor.

As a means of evaluating the performance of iChip LAN, Micronet received Connect One's iLAN, which also served as a reference platform for Micronet to check their embedded application with the Internet connectivity code during the development process. Micronet received iLAN together with a reference design showing the exact details of how to integrate iChip LAN with the Crystal CS8900A Ethernet controller on their target board, just as Connect One has done in iLAN.

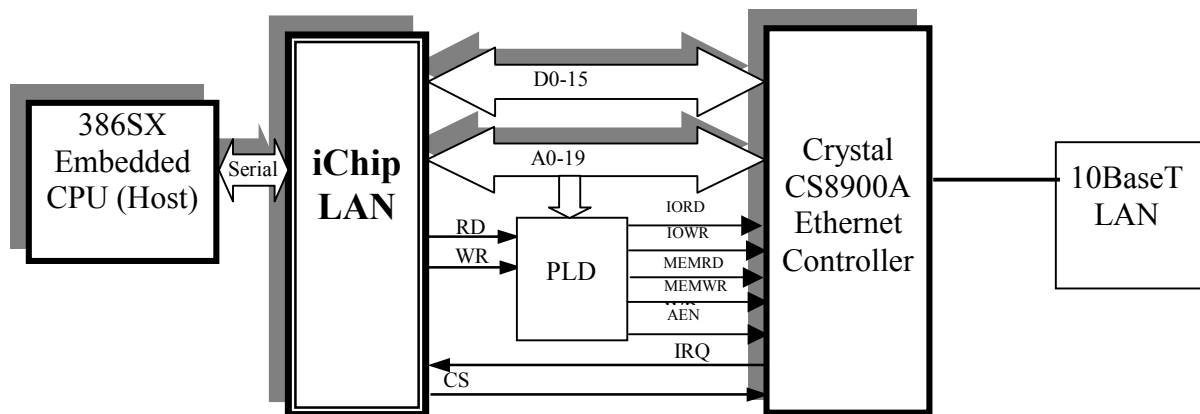


Figure: Reference of design of iChip LAN with host processor and Ethernet controller

After evaluating iChip LAN and the alternative solution, Micronet's management was convinced that the iChip solution is the right solution for them. They realized that alternative solutions would have required additional development time and funds. Instead, they wanted a ready-to-integrate, "black box" solution that would enable them to focus on developing their core technology. By early March 2001, Micronet decided to use iChip LAN and ordered their first batch of chips.

Technical Implementation

Integration of iChip LAN into Micronet's design began in early April. According to Hayim Shechter, Micronet VP of Engineering, electrical design was straightforward using the iChip LAN datasheet. Integration occurred over two calendar months while the rest of the hardware design was being completed. "Using iLAN as the reference platform made the process extremely easy," Mr. Shechter said.



Within a couple of weeks after the hardware design was finished, Micronet's engineers wrote their file server application. Multiple clients running on PCs can simultaneously access the embedded file server in the InTagral Next.

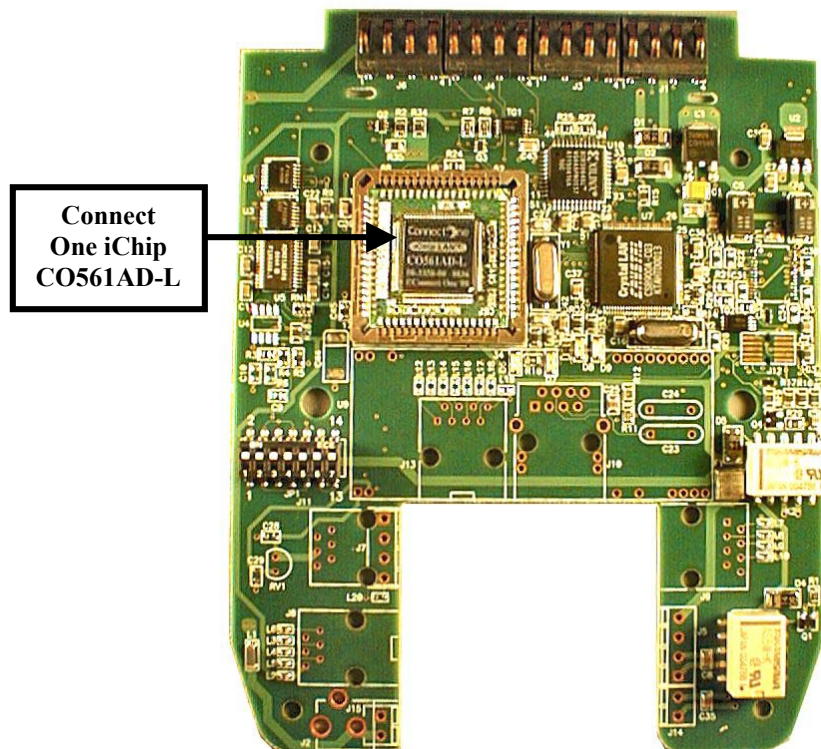
Micronet then finished the PCB design, and within one week integrated the application with the file server. Then they integrated the AT+i commands with the application, and tested this with their hardware and against the iLAN reference platform.

Following is an example of the AT+i commands for FTP connectivity:

>AT+i I/OK	(Verifies that iChip is on-line) (iChip reports successful execution of AT+i command)
>AT+iSTCP:192.213.45.6,21 I/000	(Opens TCP socket to FTP Server) (iChip handle is 0)
>AT+iSRCV:0 I/32: 220 Dragon Server v2.1, ready.	(Receives from socket 0) (iChip reports 32 chars waiting) (Server's response, 32 chars long)
>AT+iSSND%:0,16:USER anonymous<CR><LF> I/OK	(Sends login name through socket with flush) (iChip reports command was successfully executed)
>AT+iSRCV:0 I/32: 331 Password Required for anonymous	(Receives from socket)
>AT+iSSND%:1,12:PASS *****<CR><LF> I/OK	(Sends Password command)
>AT+iSRCV:0 I/74: 230-Account 1 of 5, Server 1 of 10 connections 230 anonymous user logged in.	(Receives from Socket)
>AT+iSCLS:0 I/OK I/DONE	(Logs off) (iChip reports socket was closed) (iChip reports Internet session was successfully completed)

Application Note

At the timing of this writing in August, InTagral Next passed final test and pilot production of the first 200 units is scheduled to start shortly. The entire Internet-enabling project took three calendar months from design-in until the pilot production run, and seven months from evaluation to pilot production. Production is estimated to rise to at least 3,000 units per year after the first year of production, when it will become the main product in Micronet's product line.



“We are very happy with the support that we received from Connect One,” said Mr. Shechter. “Actually,” he continued, “we required very little support, since Connect One provided excellent documentation. Because of Connect One’s unique concept of a complete hardware and software solution, it was extremely easy to integrate Internet connectivity into our new design. And we were able to finish our project much faster than with any other solution.”

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Application Note