Eliot SA Embeds Connect One iChip in Mobile Terminals for IP-Based GSM and GPRS Fleet Management Solutions

"GPRS provides a basic IP connection, but that was not enough for us. Connect One's iChip responded to our need for the complete Internet protocol stack. Plus, Connect One took into account our special performance requests. They delivered a product that did exactly what we needed for our telematics application. The proof is in the pudding."
-Franck Tirard, Strategy and Development Manager, Eliot SA

Eliot SA is a start-up founded in July 2001 in Grenoble, France. The company provides fleet management solutions to trucking companies in Europe. One of the company's founders, Jean-Paul Michelon, had many years of previous experience providing fleet management solutions, as he built and sold a previous company in the fleet management industry. With this experience, Mr. Michelon was determined to build a new company that would use IP technologies to provide trucking companies with a real-time, state-of-the-art productivity tool that would put trucks online with their operations center. Eliot today offers their customers a complete TCP/IP-based communication and management solution. The solution includes the onboard platforms, the access to an added-value network platform, and an information server located in the customer's premises that manages the data collected from trucks en route to or from their destination. Customers pay a monthly fee according to the services received.

Photo: Eliot's onboard platform

Eliot's solution helps the carriers to improve the management of their resources (drivers, tractors and trailers). It assures their customers that drivers do not break the French law requiring less than 10 hours drive-time per day, including loading and unloading, and a maximum of 4-1/2 uninterrupted driving hours.

Application Note

Eliot's system is a productivity tool for managing and improving the customer's transportation and logistics operation. The solution provides information for better monitoring of off-site operations, thus enabling carriers to dynamically update their planning and improve their customer-relationship management. Information can be set or retrieved in real-time or on a scheduled basis. The system warns the customer when deliveries are out-of-schedule, provides delivery reports, confirms delivery, and helps to schedule delivery routes. It can change routes, set alarms if the driver stops for too long, and schedule rendezvous points and times along the way.

With a mandatory onboard tachograph to measure and collect vehicle operating information, the French police can monitor all driver activity, thus ensuring compliance with the law. The output of the tachograph is recorded by Eliot's onboard platform and transmitted to the information server installed by Eliot in the trucking company's headquarters, via Eliot's added-value network platform. Alarms are provided to the driver in the case of any infringement of the working time regulation. Transmitted data include vehicle location, speed, engine revolutions-per-minute (RPM), mileage, identification of the trailer, and monitoring of the inside temperature of refrigerated trailers.

The system also provides connectivity for shipment tracing tools, such as bar-code readers. Goods can then be continuously traced from the warehouse to the shop, avoiding mistakes in loading/unloading operations.

The Challenge

In July 2001, Eliot's Development department began evaluating their options for developing the mobile communication platform. They wanted to use several methods of IP connectivity over GSM and GPRS—TCP sockets, binary email attachments, HTTP pages and FTP—in order to transmit data to and from the trucks. The system would have to work over the France Telecom (Orange), SFR (Vivendi/Vodaphone) or Bouygues wireless networks, all of which were rolling out different GPRS systems.

Eliot's engineers considered several approaches for integrating the IP connectivity application: (1) implementing a TCP/IP software stack in the application running on their Motorola ColdFire 32-bit processor; (2) using an Internet peripheral chip solution; (3) developing their own TCP/IP stack and integrating it in their host application; and (4) integrating the IP stack in the GSM/GPRS modem that they planned to use. The key problem was time-to-market, since Eliot had an urgent requirement to deliver a working system to their customers. Although the software approach appeared to be the most interesting solution in terms of cost of acquisition and control, it would be hard to justify on the basis of maintenance, time-to-market and overall cost of ownership.

Eliot also did not want to be tied to one particular GSM modem, since their modems need to work with all three wireless networks in France and those in other European countries. They would also be required to locally update the Internet connectivity firmware in the modem every time there was a change in the Internet protocols or configuration parameters.

An Internet peripheral chip represented the best compromise, since it included a complete Internet protocol stack and responded to their needs. However, Eliot's engineers had some special requests. For example, they wanted to manage the POP3 mailbox from the chip, not only doing a sort, but also by removing emails from the mailbox. It also was critical that they would be able to make a dial-up connection to the Remote Access Server resident in the network platform, transfer data via one or more emails, and to disconnect. Furthermore, all this had to occur within one minute, since GSM communication cost is billed in thirty-seconds intervals after the first minute that is fully due to the operator.

The Solution

In September 2001, Eliot's engineers decided to implement a hardware solution and contacted Connect One. In October they received from Connect One an SEB-100 serial evaluation board for testing iChip™ with their motherboard via an external Wavecom Integra GSM/GPRS modem.

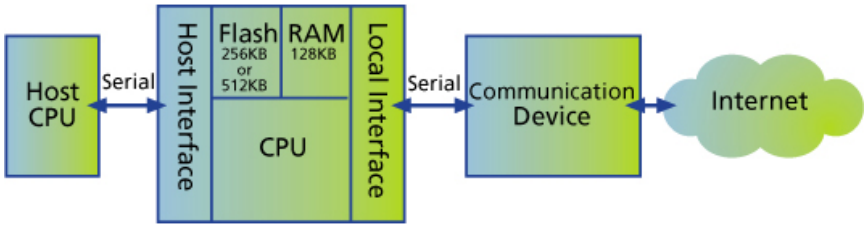

Figure 1: iChip Block Diagram

Connect One's iChip is a firmware-based Internet Controller™ that completely offloads Internet connectivity tasks from a host processor and negotiates the connection to the Internet via a communication device (see Figure 1). Because iChip's firmware is stored in on-chip flash memory, the Internet protocols and device configuration parameters can be remotely updated without touching the host application. Furthermore, its functionality can be enhanced remotely at any time via a software download over the Internet.

During the subsequent four months they tested iChip and other Internet peripheral chip solutions. During this period, Stewart Cox, Eliot's Network Project Leader and co-founder, received prompt assistance from Connect One's technical support staff.

Application Note

iChip firmware was modified to include functionality requested by Stewart. After comparing iChip with the other hardware solutions, it was clear that iChip delivered the fastest bi-directional transmission, an important criterion for Eliot. Also, it was the only hardware solution with proven support for all GPRS modems.

iChip can work with any GSM or GPRS modem of Eliot's choice, as it includes onboard software drivers for the most popular GSM modems (all makes) and GPRS modems (Siemens 3618, 6618, and MC 35; Nokia M30; Falcom A2D, A3D and F35; Motorola P7389i and G18; SonyEricsson GM47; and Wavecom Wismo and Integra).

In February, Stewart concluded that iChip satisfied all of Eliot's technical requirements, and recommended to Mr. Franck Tirard, Eliot's co-founder and Strategy and Development Manager, that they design iChip into their mobile terminal. In April, prototypes were built and, in May, Eliot ordered iChips for production.

Technical Implementation

Each tractor and trailer is outfitted with an onboard platform that includes iChip, which converts serial data into TCP/IP packets, and vice versa. Connect One's groundbreaking AT+i™ protocol interfaces iChip to the application running on the onboard platform. AT+i enables the user to easily select the Internet protocol that is best suited to his data communication requirement.

For example, frequent updates of vehicle status can be done least expensively using the FTP protocol for point-to-point communication over GPRS, which is an "always-on" packet-based protocol. Infrequent updates can be done by email using the SMTP protocol. TCP sockets can be used for remote maintenance of the onboard communication platform. Both modem firmware and iChip firmware can be updated in this manner, as well via the HTTP protocol. iChip typically transmits around 5k bytes of data daily from the mobile platform, in two or three subsets per day or more, depending on the activity profile of the customer and if using GSM or GPRS mode.

Tractors communicate via GSM or GPRS with a private communications network that Eliot built for remote access between the vehicles and the operation center located in the customer's premises. The private network ensures the highest quality of service for their customer's mission-critical daily operations and guarantees the bandwidth that an Internet Service Provider cannot ensure.

The network consists of Remote Access Server/Routers, a system for authenticating and logging user access, and servers for managing and monitoring access. Eliot's network connects via ISDN, xDSL or VPN to an Eliot information server located in the operations center on the customer premises. See Figure 2.

The operations center includes an information server for feeding the customer's planning and operations ERP software with vehicle information. In return, new assignments, modifications of planning, change in missions, any kind of information prepared by the customer's ERP are then uploaded to the information server, which manages the interchange with Eliot's network platform. Each operation center manages about 100 vehicles. Most of the time, the carriers have several operation centers located in different places. Eliot's network can cope with several dozen simultaneous communications, whether with vehicles (via GSM or GPRS) or with information servers (via ISDN, xDSL, or VPN).

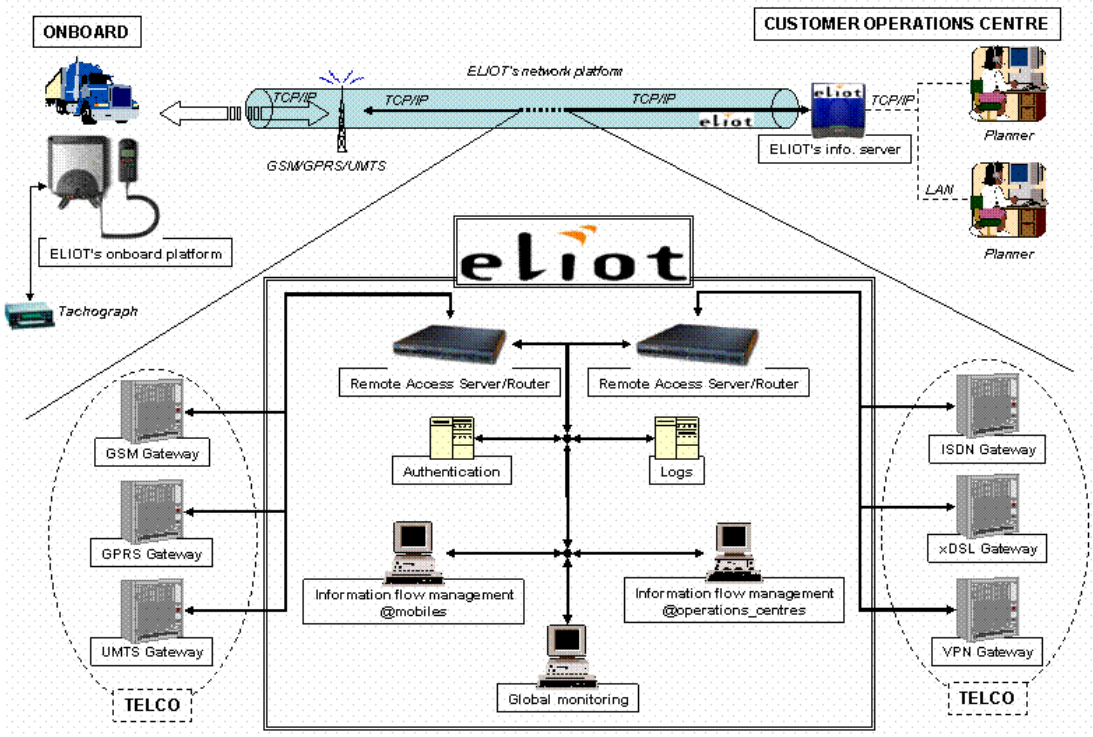

Figure 2: Eliot System

Eliot will produce and deploy terminals for their first customers in July 2002. "Implementing iChip speeded up our time-to-market significantly. As a result, our system will be the first TCP/IP-based fleet management system in Europe with end-to-end monitoring of all data and all traffic, by truck, in real-time," says Mr. Tirard. "The potential is for tens of thousands of units."

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Application Note