

## LESSONS FROM THE TRENCHES

George Martin

### The Race is On Catching Internet Connectivity Fever

Do you want your toaster hooked up to the Internet? It may sound absurd, but people are racing to connect their households. Until now, even thinking about it was daunting, however, George discovered an easy way to get “iConnected”.



In case you haven't been keeping up on the latest technology, the

Internet's next big adventure revolves around embedded systems. Even our bathroom scales, toasters, and reclining chairs will be connected.

I am a little skeptical and suspect that the reality of this ideal will be an interesting surprise. Nevertheless, the day will come when you have to—or may want to—put one of your products on the 'Net.

#### WARMING UP

Imagine that the boss (customer) just asked you (told you) to get the new instrument (the one you're still testing) on the 'Net for the tradeshow (for sale) next month (next week). If you build instruments, then I assume that you're aware of this predicament and have already started scanning magazines and checking the usual links (i.e., [www.circuitcellar.com](http://www.circuitcellar.com)).

Eventually, you'll come across articles like “How I Hooked the Burn-

In Ovens to the Internet.” Reading the article, you'll find out that the ovens create a signal that goes to a PC, and the PC is on a network with a full-time, live Internet connection.

Although it's an Internet connection, it's not much help to you. You then read about the \$200 CPU cards that are Internet ready. And, once again, you find they have a 10BaseT port and need a connection to an internal network with a live Internet line.

What gives? When you finally come across a chip or a software that packages supporting TCP/IP, you find it's for a '386 or involves 4 MB of code. It looks like hype has outrun reality, and your boss is going to be disappointed.

#### JUMPING THE NETWORK HURDLE

Remember what the Internet is, a collection (network) of networks. An individual computer can't be connected directly to the Internet. The computer must be part of a network, and that network is connected. However, a single computer can masquerade as a network, so if you hook your instrument directly to the 'Net, then you have to provide all the network support as part of your product.

If your product has a disk drive and enough CPU horsepower, that's no problem. But, if you're working with a lowly bathroom scale or a toaster, you need to connect to a network before you can support the Internet interface.

I design many systems that are instruments with at least one serial port, so my clients can move to the Internet as their next step. Although most have already made the connection, they're using a PC as part of the solution. This seemed like an expensive solution, so I looked for a better approach.

Finally, I came across a product that offers a simple solution. I was

not the only person at *Circuit Cellar* to say, "Eureka!" In February's issue (*Circuit Cellar* 115), Tom Cantrell wrote about the chip part of the solution. My angle is to show you how to connect this product to a device and become "iConnected."

## AND THE WINNER IS...

Connect One Ltd. is the best source for my solution. As Tom describes it, the chip (iChip) and modem (iModem) provide Internet connectivity.

Don't scoff yet, this time I believe the products are actually useful.

Connect One's design provides you with a serial port to your product and a modem to connect to your ISP (Internet Service Provider). You're part of the ISP network, and that network is connected to other networks via the Internet. And, because there are a lot of companies offering free e-mail, perhaps you could do it for free! Let's see how long that lasts.

## IMODEM

iModem has an RS-232 input and a modem output. After you set up the phone numbers, IP addresses, and passwords, you can send and receive e-mail messages. The e-mail messages are in ASCII text but can include data sent from an instrument to HQ, or be the new settings sent from HQ to the instrument. Connect One informed me that the latest firmware lets you send a MIME attachment.

iModem defines a new set of commands that look like an extension to the Hayes AT commands. These extensions permit Internet connectivity through the built-in modem. Depending on your situation, the iChip may be a better solution for you. However, I'd like to show you how I used the iModem.

## ON YOUR MARK...

Connect One provides an evaluation program with iModem that emulates an embedded application. Install the evaluation package on your PC

```
Connect One Ltd.                               Ver. 1.30
iModem Equipment Information

iChip Model :                                CO561AD-S
iChip Firmware Rev. :                       IC401d02 1.12.1999

Modem Firmware/Interface:                   V2.210T-V34_2M_DLS
Modem Model:                                RCV336DPF-PLL L8571A Rev 33.00/33.00
Modem Product code:                         33600
Modem Country code:                         022

Hit any Key to Exit

ESC to exit                                   Baud Rate: 9600 8-N-1
```

Figure 1—It always helps when you know what you're working with. The iModem Equipment Information was the first thing I looked for when I got things going.

and connect iModem via the RS-232 cable to your PC. The first screen that comes up is DOS and its test. Yeah, I know, it should be a Windows thing. Anyway, from there, I selected #2, "Equipment Information," and got the screen shown in Figure 1.

Note that I have an early production version. Check the firmware revisions to confirm we're talking about the same product features described in Figure 1.

## ...GO!

From the initial screen, I selected the iModem Setup and got to the heart of it all. In the first section, you enter the telephone numbers to dial, your login, and password that enable the iModem to dial up your ISP's local access number.

If you connect to your ISP via a phone line, you need to fill in these settings. You've probably forgotten them, because it's been a long time since you clicked "remember name and password."

And, if you connect to the Internet via an office network and not a dial-up connection, then this will be a rich and rewarding experience. Most ISPs streamlined this operation, but sometimes it gets ugly, especially if you change PCs and need to get these settings into the new one.

In section #2, you enter the location of the e-mail account you're using for your instrument's data. You'll find the requested DNS settings in My Computer, Control Panel,

Internet Connections, Server Type, and TCP-IP settings.

The SMTP is for outgoing mail. Netscape users will find things under Edit, Preferences, Mail & Newsgroups, and Mail Server. POP2 defines the server used to receive mail.

Section #3 involves your e-mail name and password, which are different from your login name and password. You need to use the return address attached to e-mail messages you receive as the "from" address. That's the e-mail address you use to send data to your instrument via iModem.

The next section captures the e-mail address that you want to send mail to, and the last completes the settings. For more detailed control of the connection and how data is handled, there are other settings available. But, I'll leave that for you to explore.

After these settings are entered into iModem, they are saved in non-volatile memory. So, when iModem powers up, your settings are remembered. You can also download new firmware to iModem.

## CHARTING YOUR COURSE

I think it's time to stop and design a system. Will each machine have its own e-mail address, or will they use a limited number of addresses and specify in the e-mail which machine is sending the message? Either way is acceptable, but you must consider the details and how they apply to your situation. I can't provide much insight, except to impart that I have done this both ways, and they both work.

The next issue that comes up is how to schedule sending and receiving e-mail messages. The knee-jerk reaction is to have the iModem do it. But, the instrument should control the task, even if it means adding a clock or timer chip to the instrument. (Perhaps you could get the time off the Internet.)

If the instrument is in control, it can schedule sending and receiving.


Also, if you need to change update rates or content, the instrument can have this flexibility added. If the timing of mailing is built into iModem, you save yourself some work and money but lose flexibility.

## TRIAL RUN

Now that the iModem setup is done, you're ready for a test run. I used a Motorola ColdFire demo board that was on the bench to send data e-mail to my Hotmail account. It worked like a charm.

I believe that you'll find iModem useful. This is just the beginning for us embedded guys and gals and the Internet. Progress will be rapid.

Will we ever hook a toaster to the 'Net? I used to say, "Never." But, at least now I know how to do it.

Be sure to check out next month's article where I'll be covering regulatory issues and testing. 

*George started his career in the aerospace industry in 1969. After five years at a real job, he set out on his own and cofounded a design and manufacturing firm. Typical systems that George designs include servo-motion control, graphical input and output, data acquisition, and remote control. George is a charter member of the Ciarcia Design Works Team and most recently, he's been working on the people-tracking system for Bill Gates' new house. You can reach him at [george.martin@worldnet.att.net](mailto:george.martin@worldnet.att.net).*

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## SOURCES

iModem  
Connect One Ltd.  
+972-9-766-0456  
Fax: +972-9-766-0461  
[www.connectone.com](http://www.connectone.com)

ColdFire demo board  
Motorola  
(602) 952-4103  
Fax: (602) 952-4067  
[www.mot-sps.com](http://www.mot-sps.com)

Turbo C 3.0  
Borland  
(408) 431-1000  
Fax: (831) 431-4122  
[www.inprise.com](http://www.inprise.com)

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