

Internet Email Reporting Engine

A ZiLOG/EE Times Driven to Design Contest Entry by Michael W. Johnson

The Internet, it's everywhere these days. It is mostly inhabited by people browsing the web or using email. This may soon change however, as devices start leveraging the Internet infrastructure to do reporting and receive configuration. The following is a design for an email reporting engine that can be embedded inside a device, allowing it to dialup, connect to an internet service provider, and send email reports to anywhere on the internet.

This engine could be used with: vending machines, weather stations, power meters, vehicle traffic counters, alarm systems and many other devices to report status and events via email.

The Hardware

The hardware design leverages off-the-shelf technologies to provide a simple and low-cost system. Shown in **Figure 1** is the hardware block diagram. A detailed circuit diagram is found at the end of this document. A description of the major blocks follows.

A Zilog Z020400 Modem module provides the connection to the real world via a phone line.

The Seiko iChip (S7600A) provides PPP and PAP authentication and the Internet protocols IP/UDP/TCP and ICMP.

Next, a Zilog Z8 processor, taking commands from a serial connection, communicates to the Seiko iChip via an 8bit parallel CPU interface to control the modem and the iChip's Internet functionality. It also provides higher level command and Internet functionality described below in the software section.

Finally an optional RS-232 level converter or if the controlling device needs RS-232 voltage levels.

The Software

The software running on the Zilog Z8 CPU is shown as a block diagram in **Figure 2**. Its job is to take commands via a serial interface and process them. Based on those commands, dialup and connect to the Internet, establish an Internet connection to an ISP via PPP (authenticated with PAP), open a connection to a mail server, send a message, and hang up.

Commands are sent to the engine via a serial port that is implemented as a software UART running at 2400bps on the Z8 processor. These commands are processed, the state of the email engine is updated, and a command status code is reported back through the software UART.

The commands are shown in **Table 1**. Following

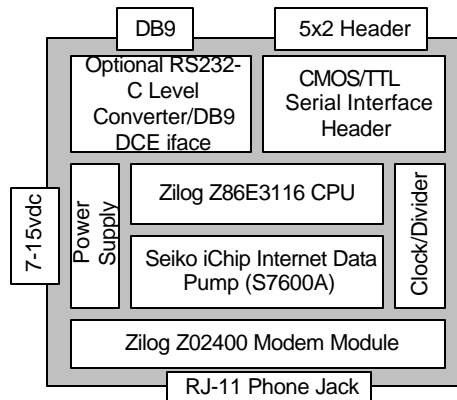


Figure 1 - Block diagram of the Email Reporting Engine

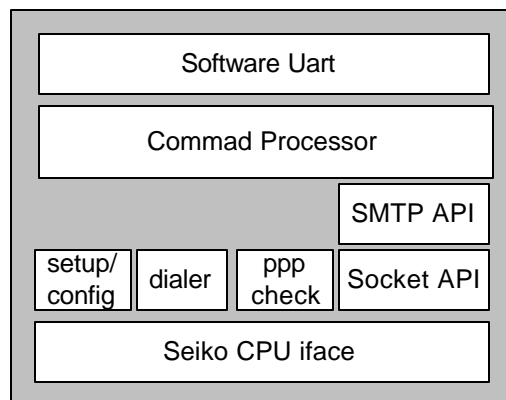


Figure 2 - Software block diagram of the Email Reporting Engine.

each command is a parameter string terminated with a return and linefeed. The software will respond to each command using a return code terminated with a return and linefeed.

On power-up, the email engine needs to be configured with several parameters before it can be used to send mail. A phone number, username, and password need to be set before a connection can be made to the Internet. Once a connection is made to the Internet, sending email is as simple as configuring an email server to connect, and setting a desired recipient and sending some text as the body of the email.

Commands:

```
sn - set phone number
sl - set login name
sp - set password
sd - set dns server ip
sr - set recipient email address
ss - set src email address
du - dialup and connect to ISP
cs - connect to email server
ps - print message to email body
ms - message send.
hu - hangup.
```

Table 1 - Serial Commands

Conclusion

The software described is one possibility of how the hardware design can be leveraged. Web serving, remote configuration, reporting using Internet transports besides email, and other configurations are possible. Canned email messages, configurations and even data acquisition code can be programmed into the Z8, enabling a simpler event or device to send data into the Internet.

Resources

Seiko iChip S7600A Technical Specification - <http://www.seiko-usa-ecd.com/intcir/pdf/techspecs/s7600a.pdf>

Zilog Z02400 -- 2400bps Modem Module Product Specification- Z02400 - <http://www.zilog.com/pdfs/modem/z02400.pdf>

Zilog Z86E30/E31/E40 Z8 4K OTP Microcontroller Product Specification - <http://www.zilog.com/pdfs/z8otp/e303140.pdf>

Zilog Application Note, Serial Communications Using the Z8 CPP Software UART - http://www.zilog.com/pdfs/z8otp/sccw_z8.pdf

