

VoIP by eZ80

IP Network Telephone Project

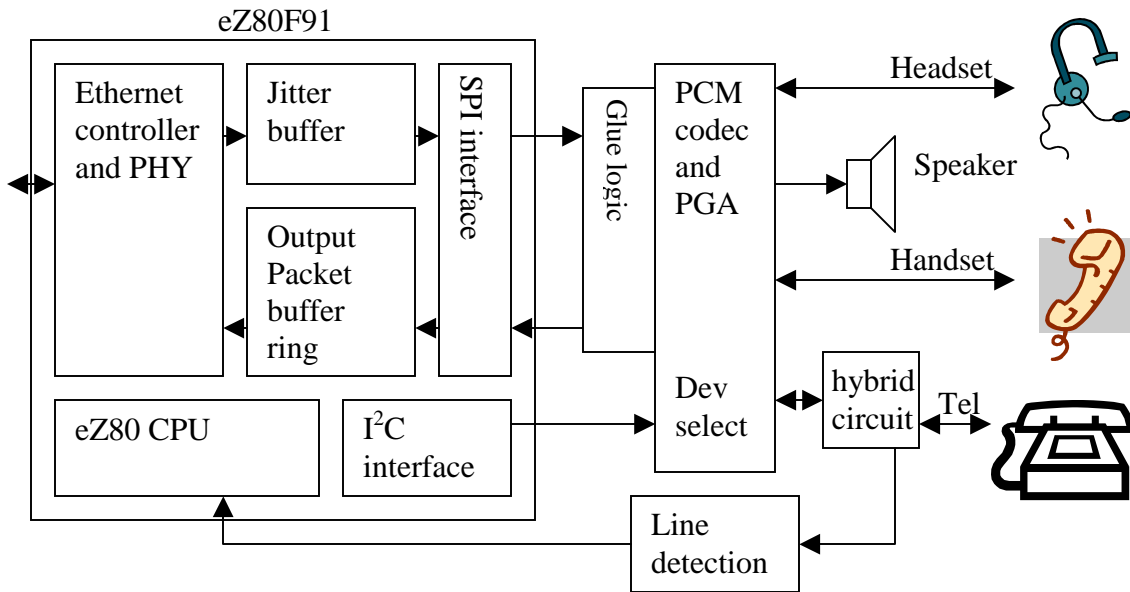
Project number: eZ2953

Abstract

VoIP, Voice over Internet Protocol, is a technology for transmitting ordinary telephone calls over the Internet using packet linked routes. Because it uses an Internet connection to pass voice data instead of using the standard public switched telephone network, you can call anywhere free without a long distance telephone charge as long as both parties are able to access the internet.

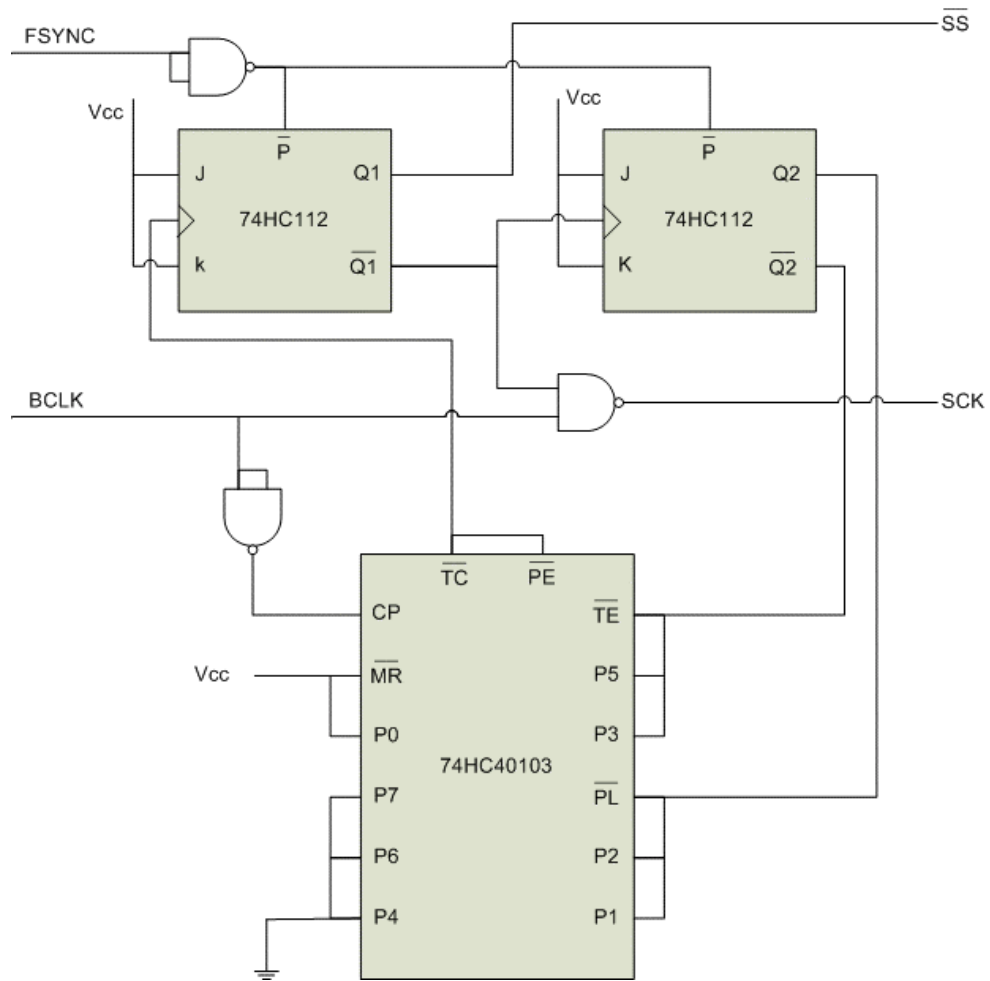
Our project goal is to use the Zilog MCU eZ80F91 to build a basic, practical, low-cost VoIP system. A voice band PCM (Pulse Coded Modulation) codec is connected to the eZ80F91 through SPI and I²C interfaces. Through the PCM codec, a variety of audio devices—including a normal telephone, a telephone handset, or a headset—can be easily connected to the VoIP system. A speaker is also included in the system for delivering a ring tone to notify the recipient when an incoming call arrives. The speakerphone feature can also be easily configured.

This VoIP system is running on the Zilog real time operating system XINU and the Zilog TCP/IP software suite (ZTP). On top of UDP (User Datagram Protocol) from the ZTP software stack, an RTP (Real Time Protocol) layer is built to synchronize the voice data transmitting and receiving, and to control the telephone calling process. By taking advantage of the XINU multi-tasking kernel, processes run simultaneously to control the multiple RTP/RTCP sessions as well as handle the PCM codec interface. The system is designed to meet the challenge of fast response to hardware interrupts from the PCM codec serial data interface.

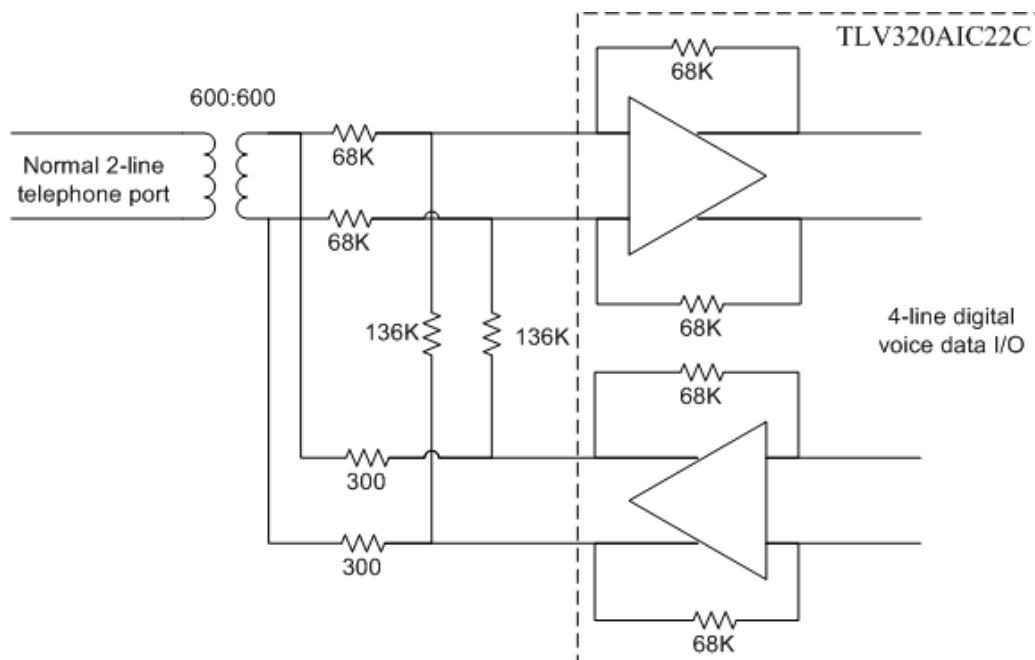


Hardware block diagram of the VoIP system

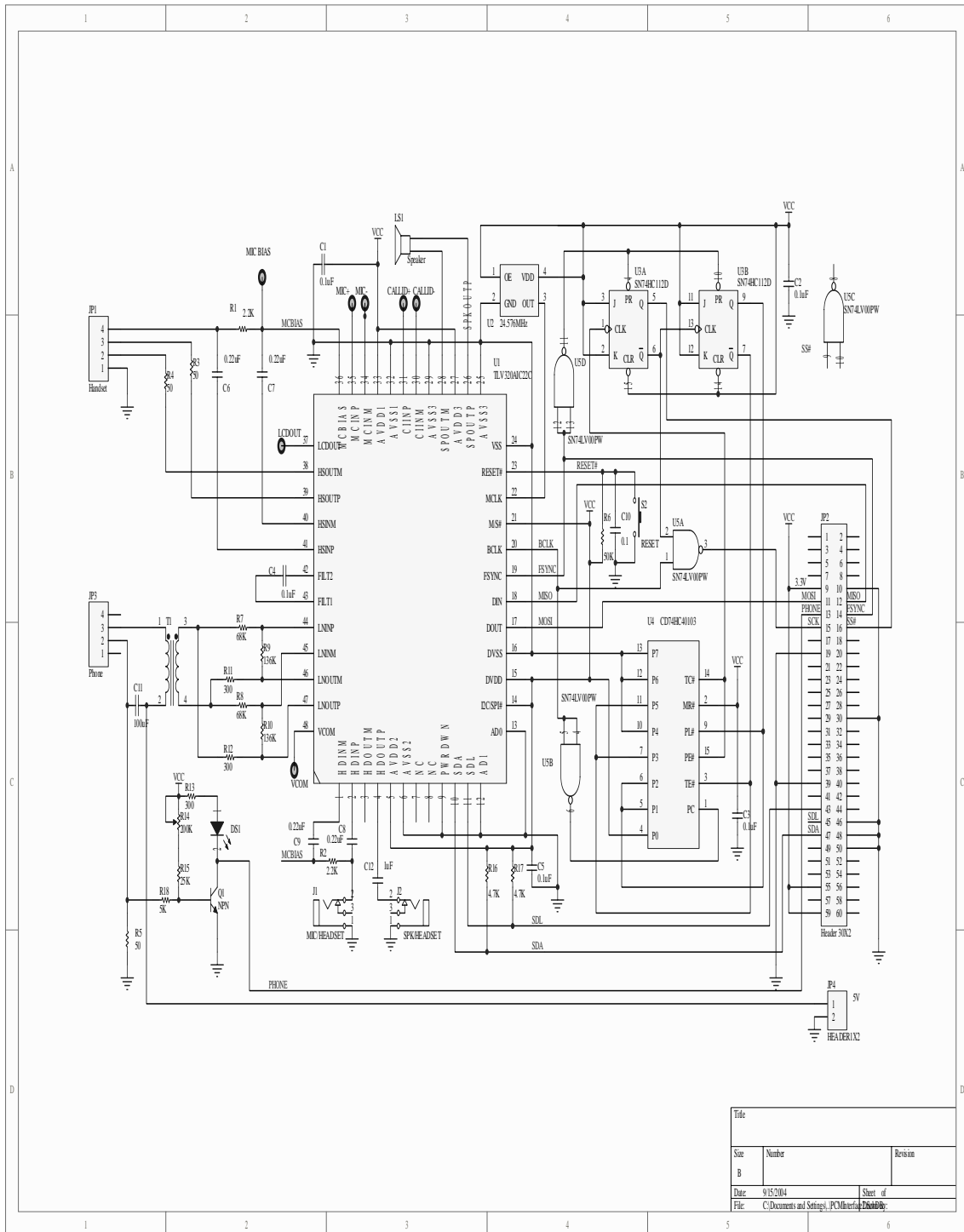
For the simplicity and fast prototyping, this system is implemented using unicast IP. Only two parties joint for conversation at a time. However, since it provides all basic VoIP functions, it is can be easily extended to use multicast protocol so that three or even more parties can join the phone conversation. With further development, it is able to comply with a standard VoIP protocol, such as H.232.



The glue logic for bridge TLV320AIC22C and eZ80F91



The 4-line to 2-line hybrid circuit.



Schematic of the PCM codes and interface to eZ80F91 kit

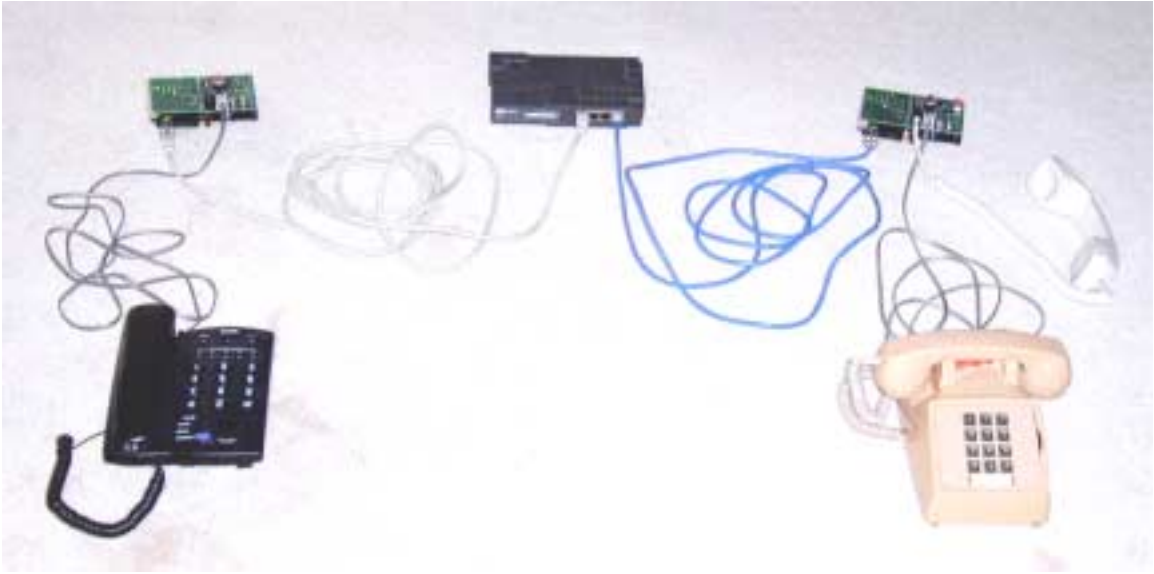


Figure 17. The two VoIP boards are connected using an Ethernet router/switch box for testing.