

Customer

Canadian company, the North American entertainment industry leader.

Objective

The objective is to design the BF533 processor based device prototype, to estimate production efficiency, to develop software model.

Basic hardware requirements:

- 3 output stereo audio channels;
- input stereo audio channel;
- USB Host;
- WiFi;
- Ethernet 10/100 BaseT;
- Radio-communication channel controllability by using remote-control device.

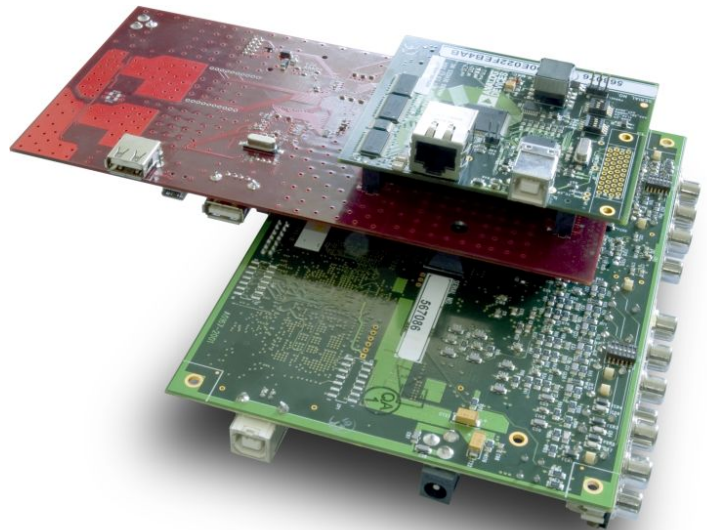
Basic software requirements:

- Reproduction of audio-streams coming through Ethernet 10/100 BaseT or WiFi to 3 output stereo audio channels;
- Independent loudness control in each output audio channel;
- Various audio-streams reproducibility at different channels;
- USB Flash device support, file system support, audio data reproduction from USB Flash device;
- Real-time Transport Protocol (RTP) and Web-interface support.

Solution

Hardware platform

Analog Devices ADSP-BF533 EZ-KIT Lite developer's toolkit has been applied as basic module which USB-LAN EZ-Extender card is connected to. Application-specific WiFi-ZigBee-USB extender card has been developed for the purpose of WiFi and ZigBee interfaces support. ZigBee interface based on ZigBeePro module has been proposed for remote-control device wireless interface.

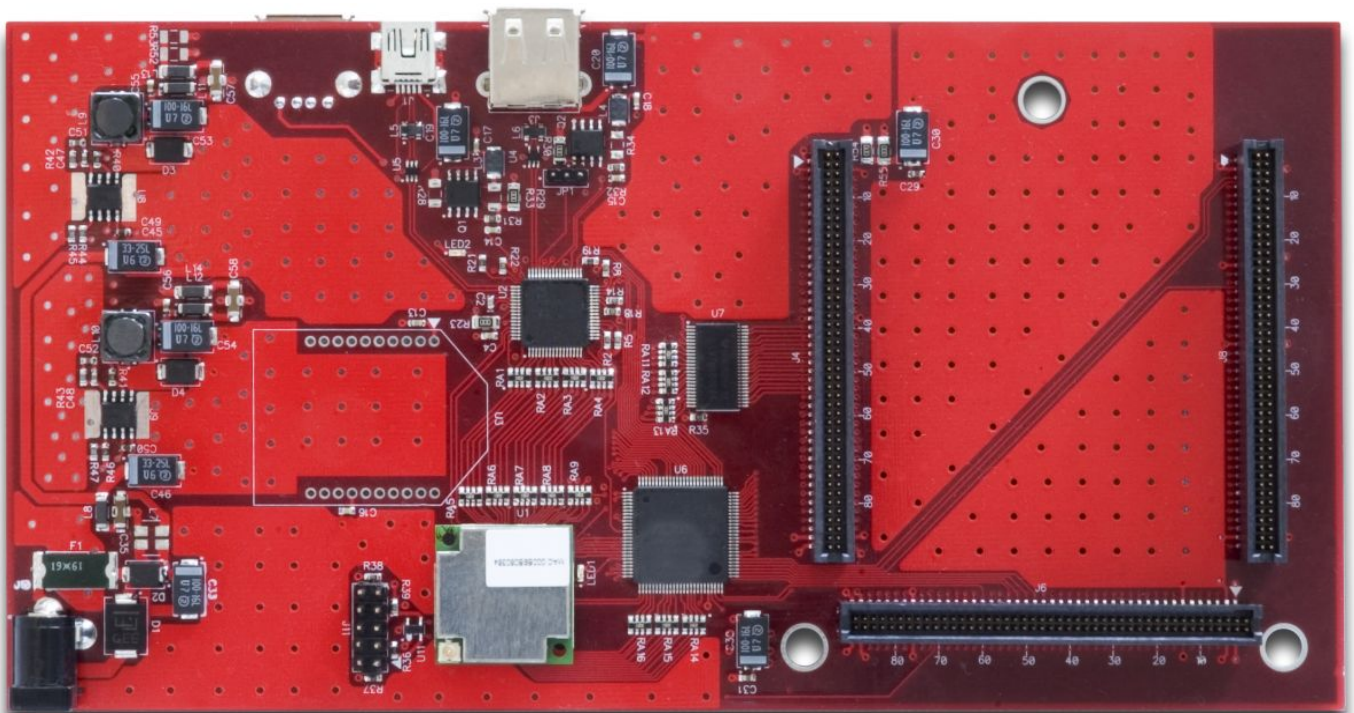




WiFi-ZigBee-USB board is plugged into the motherboard through 90-pin expansion slots. 802.11g wireless communication module and ZigBee Pro module are connected to the WiFi-ZigBee-USB board.

The developed WiFi-ZigBee-USB extender card is compatible with the other Blackfin processors developer's toolkit such as ADSP-BF537 EZ-KIT Lite or ADSP-BF561 EZ-KIT Lite.

Within the framework of the implemented work electrical circuit, printed-circuit board, CPLD configuration, documentation package have been developed.



Unex RM5 WiFi module based on Marvell M8385 chip, MAXII EPM570T100 CPLD microchip, USB Philips ISP1362 controller operating in the USB Host, USB device and USB OTG modes have been placed on the extender card.

Software

The basic functions of the developed software are:

- Web-interface based device management;
- Audio data reproduction from the USB Flash device;
- RTP (Real-time transport protocol) audio data reproduction;
- Audio data reproduction from line input;
- Loudness control over every channel;
- A single audio-stream reproduction to 3 channels;
- 3 different audio-streams reproduction to each channel separately.



Support package (BSP) has been developed on the basis of u-boot initial program loader and uClinux operational system for ADI Blackfin processor. WiFi driver (libertas) for Marvell M8385 chip has been ported in the course of uClinux accommodation for the Blackfin processor.

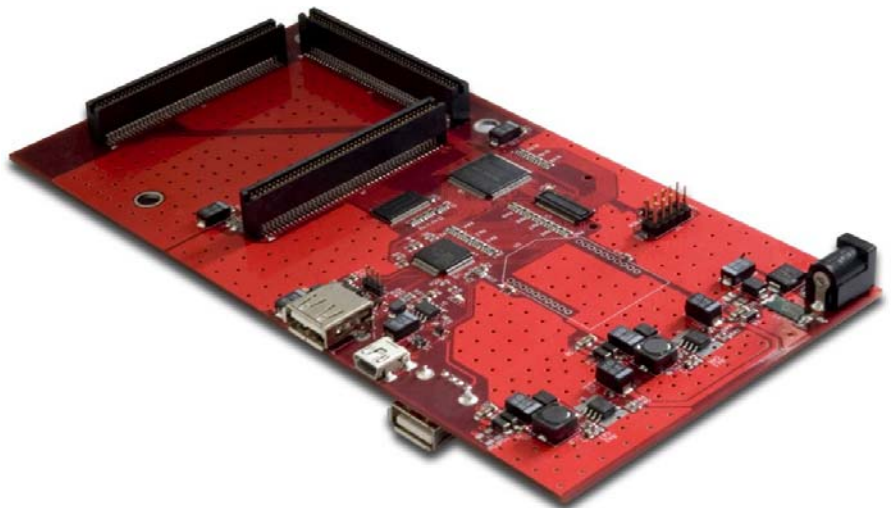
User interface has been implemented through Web-interface for the purpose of easy device network management. As Web-server boa is applied owing to its simplicity and little Web-server system recourse consumption. CGI is implemented as shell scripts.

In addition software distribution kit includes:

- Busybox command shell;
- MPlayer for network audio-stream reproduction;
- ALSA-based utility (arecord, aplay) for line-in test.

Benefits and specifications

- Cardboard design renders possible to combine up to 3 boards for various purposes.
- USB controller chip and connectors allow operating with the devices supporting USB host, USB device and USB OTG.
- The installed CPLD helps flexible changing of the addressing space for USB, WiFi, ZigBee.



Design facilities	GNU Toolchain (gcc, gdb), P-CAD, Quartus
Technologies	RS232, USB2.0 (Host, OTG, Slave), WiFi, ZigBee, CFII+
Programming languages	C, C++, VHDL
Project controlling tools	dotProject, MSProject, CVS
Labour content	90 man-days
Project lead time	4 months