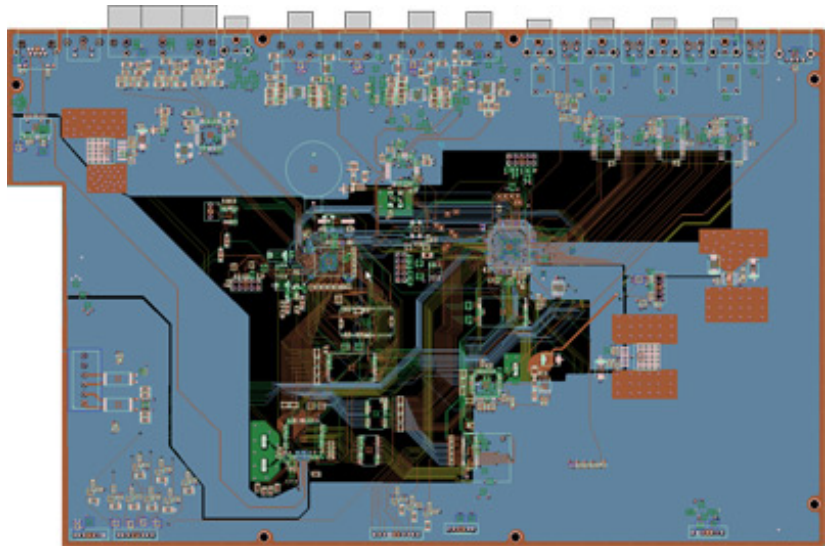


Promwad company has successfully prototyped the universal audio and video streaming player.

Hardware platform

Digital board of the device is based on Blackfin ADSP-BF533 processor of Analog Devices Inc.. The device contains 4Mb AT49BV322AT-70TU Flash memory, SDRAM Micron MT48LC32M16A2P (32M x 16bit in size). OEM WiFi 802.11b/g module on the basis of Marvell 88W8385 chip was used. USB Host interface on the ISP1362BD controller from NXP Semiconductors has been designed for connection of USB memory and other devices.



10/100Mbit Ethernet interface is realized on SMSC LAN91C111I-NE. DBGU Serial Port is applied for the purpose of device debugging.

Input stereo audio channel and 3 output stereo audio channels have been implemented on Analog Devices AD1836AASZ audio codec microchip. Communication between the processor and the audio codec is conducted by SPI interface.

S/PDIF input and 3 S/PDIF outputs have been implemented on CS8427-CS microchips. Coaxial and optical interfaces serve the purpose of S/PDIF transceiving. Optical S/PDIF channel is realized on fiber-optic Toshiba TOTX179P and TORX179P transfer and receiving modules.

Output video channel (RGB, composite and S-Video) has been implemented on Analog Devices ADV7171KSU video decoding device microchip.

FPGA XC3S250E-4FT256C microchip from Xilinx Inc. has been applied in the project. Audio interface converter, sample-rate converter as two CIC-filters and processor companion logic are realized on FPGA.



Nano- and micro- impulse noise protection on the basis of SEMTECH solutions has been realized on each external interface.

Software

The device operates under uCLinux operating system.

Software distribution package consists of:

- Linux 2.6.x core;
- BusyBox command shell;
- MPlayer intended for network audio streaming reproduction;
- ALSA-based utility package (arecord, aplay) for Line-in operation.

U-Boot initial-loading program and Linux core have been optimized underway to enable the cold start of the device less than in 4 seconds. Board Support Package (BSP) also comprises NAND Flash memory driver, Philips ISP1362 USB controller driver for the purpose of operation with USB mass-storage external memory, IEEE802.11g driver for Marvell 88W8385 (Libertas) chipset support and energy-saving mode control driver. Several drivers have been additionally adjusted to the Blackfin platform.

Possibility of Ethernet and Wi-Fi network operating has been realized. Wireless Wi-Fi networks are supported using managed and Ad-Hoc modes with the free access or protected access with 64/128-bit key. DHCP and ZeroConf technologies application enables the device to configure network interfaces independently and to identify the media-server.

Mode of information interchange with the media-server is conducted using RTSP. The protocol of overhead information interchange with the server has been developed and implemented.

User interface has been implemented by means of SDL library ported on Blackfin platform; True Type Fonts (TTF) output is supported.

Benefits and specifications

- Plenty of supported audio data input channels types: Ethernet, Wi-Fi, USB Mass Storage, Analog Stereo In, S/PDIF TOSLINK, S/PDIF Digital Coaxial
- 3 multipurpose output audio channels, each of them has Analog Stereo Out, S/PDIF TOSLINK, S/PDIF Digital Coaxial output types

Design facilities	GNU Toolchain (gcc, gdb), P-CAD, Quartus, Pro/ENGINEER, Photoshop, Corel Draw
Interfaces	USB 2.0 (Host, OTG, Slave), Wi-Fi, CFII+, Ethernet 10/100 BaseT, S/PDIF, RS-232
Programming languages	C, C++, VHDL
Project controlling tools	dotProject, MS Project, CVS
Efforts	380 man-days
Project lead time	8 months