Residential Gateway

Need

These days most of us look for a **safe and secured** place to live in. A secured home decorated with other amenities like **entertainment, automation, communication and consol** application makes a home more **"smarter"** in all aspects.

To achieve this we needed an integrated board specifically designed to accommodate all the above functionality, a networking device acting as a gateway. In short, this board would be the back bone of the entire system.

The residential gateway board can be used in various other applications like industrial automation, communication gateway, networking gateway etc.

Solution

Aftek has developed a gateway board called as **"Data and Voice Gateway"** **(DVG)** that supports interfaces for external world like WAN, GSM, ADSL, PSTN and internal home network like LAN, FXS, FXO, USB2.0 host and device, RS485 and external WiFi card.
Protocols implemented on DVG are **MODBUS, multi-master, UDP, TCP/IP, RTP, RTSP and SIP** either over **wired or wireless media.**

Highlights

- Supports power over ethernet (POE)
- Isolates external world from internal home network
- Throughput of 70 Mbps on LAN and WAN ports and 11 Mbps on WLAN
- Device has passed environmental testing conducted at government approved lab
- Detects AC power and battery supply going to power supply
- Debug messages on USB device

Tasks involved

- Schematic design and layout design
- Signal Integrity analysis, DC analysis, load analysis
- Device driver and Linux development for all interfaces
- Functional testing of all interfaces
- Environmental testing of the digital home solution as a whole unit
- Documentation Design document, BOM, testing guidelines, test report generation

Architectural Overview
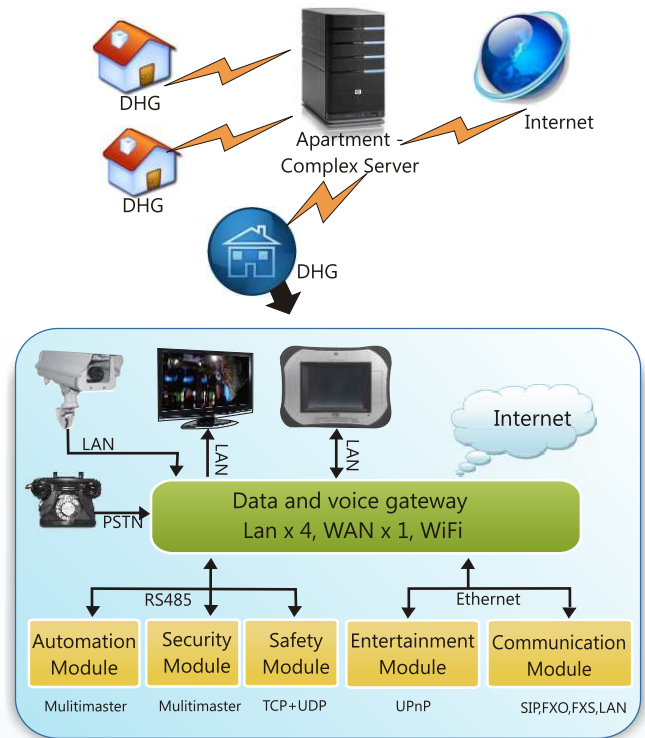
Data and voice gateway (DVG) board is the heart of the system and has:

Processor: Intel's Networking processor - IXP425, 533 MHz
Memory: 64 MB SDRAM, 32 MB NOR FLASH
Serial: Two ports of RS485, one debug port Rs232
Networking: LAN x 8 / 4, WAN x 1, external WiFi card based on Javelion chipset (802.11g)
USB2.0:   Host and device
Telephone: FXS, FXO, ADSL, PSTN
Storage: Compact FLASH and IDE Hard disk
Operating system: Linux 2.4RTC, EEPROM

Challenges

- High speed signal routing considering stringent space constraint form factor design
- Design consideration while layout design for switch and WAN port to achieve best possible throughput without having any cross talk
- Tuning of filter components to get best telephonic audio quality
- Complete design testing in short span for time to market