



Technology

- ◆ Bluetooth specification v1.1/1.2/2.0/2.1 + EDR
- ◆ Chipsets - CSR Bluecore series, Broadcom
- ◆ Stacks - Affix, Widcomm, lwBT, OpenBT, BlueZ
- ◆ Stack layers - HCI, L2CAP, SDP, RFCOMM, TCS, OBEX, AVDTP, AVCTP
- ◆ Profiles - SPP, DUN, FTP, HSP, HFP, CTP, A2DP, AVRCP, LAP, HID, BIP, SAP
- ◆ Modules - Samsung, USI
- ◆ Bluetooth device driver development, performance tuning and optimizations for
 - Echo cancellation and noise suppression
 - Latency reduction
 - Increase in data throughput
- ◆ Audio codec development and integration for SBC, MP3
- ◆ Conformance to standard practices from Bluetooth SIG for PTS, BQB qualification
- ◆ Bluetooth product testing and test automation

Overview

Ways of connecting with people and modes of communication are changing with an ever-increasing number of wireless products, which offer mobility and simplicity without cable clutter. Introduced in 1999 and still evolving, Bluetooth is a low power, short-range, radio technology that revolutionizes communications for a wide array of consumer electronic devices from mobile phones to computer peripherals. An open specification, Bluetooth offers convenience, enhanced immunity from interference, and security. Ensuring compatibility across wide variety of products from many manufacturers, Bluetooth technology is increasingly seen as a smart choice for local, private device networking.

Aftek Expertise

While going wireless offers many benefits, it also presents many challenges for developers such as increased software complexity, meticulous power management and added security risks. Wireless communication is one of the core competencies of Aftek. End to end solution providing capability and expertise in Bluetooth domain has enabled Aftek to deliver diverse Bluetooth applications. Along with product development for clients, Aftek's Bluetooth team is continually exploring latest updates and advancements in Bluetooth specifications. By building in-house prototypes and contributing to the open-source development community, Aftek has remained abreast with the latest changes in technology and processes.

Bluetooth Services

As an adopter Bluetooth SIG member, Aftek has been working on Bluetooth for the past decade and has set up a dedicated Bluetooth team. Aftek's Bluetooth expertise paired with comprehensive skill-set spanning from hardware to embedded, application software enable us to offer expert and cutting edge services in different flavors:

Design and Development Services

- Application specific hardware design and prototype development
- Driver development and porting
- Development and porting of stack layers
- Development and porting of profiles
- Applications and SDK development
- Feature enhancements
- Product maintenance

Customer Support Services

- Support not only our clients but also their customers
- Customizations and customer release management
- Handling of customer reported queries and issues
- Development of various manufacturing tools and user guides
- Development of automation tools to accelerate customer support activities
- Customer support for web based downloads
- Providing onsite customer support

Testing Services

- Bluetooth interoperability testing
- Bluetooth compliance testing (e.g. BQB)
- System testing
- Performance testing
- Scripting and automation for regression testing



Bluetooth Experience

Aftek has contributed in design and development of Bluetooth based hardware systems as well as development, enhancement, customizations and testing of Bluetooth firmware and application software to deliver various solutions



Tools Used

- Sniffers (FTS / Merlin)
- Jeeni JTAG debugger Anritsu BT tester
- Spectrum analyzer
- M-Audio for audio quality verification

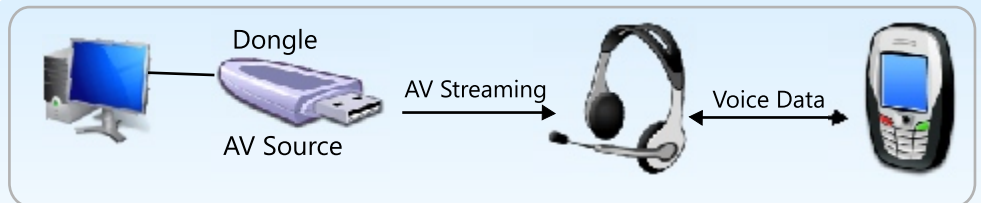


Sample statistics for a project with Broadcom Corporation

- Total 135 person years efforts over 3+years
- Worked on 6 different product variants based on 3 generation chipset variants
- 20 different customizations for 10 different customers
- Executed 5000+ test cases per cycle and interoperability testing with 40 mobile phones

Audio Streaming Applications

Stereo headset: Bluetooth application for stereo headset which enables user to listen and control streaming music wirelessly. At the same time, it also supports mono headset functionality allowing enhanced control of cellular calls.



- Based on Broadcom chipset.
- Ported and enhanced Bluetooth profiles A2DP, AVRCP, HSP, HFP.
- Implementation of Bluetooth white papers.
- Implemented dual AV support, with remote control features.
- Enhancement and integration of noise and latency reduction algorithms.
- Development and integration of SBC and MP3 audio codecs.
- Interoperability with a wide variety of phones.

Music source Music source Bluetooth enabled USB dongle capable of streaming music to two headsets simultaneously. This enables sharing a single music source between two users with freedom of wireless connectivity. It supports A2DP, AVRCP profiles and provides remote control functionality for each headset individually. AVRCP profiles and provides remote control functionality for each headset individually.

Personal Wireless Gateway

It is a pocket size device for wireless data and voice communication. It enables PDA and laptop users to browse internet (over WiFi or GPRS), do messaging, call-control and remote configuration over Bluetooth connection with the gateway. It also supports Bluetooth hands-free devices (e.g. headset) for voice communication.

- Aftek designed the hardware and developed form-factor prototypes using USI Bluetooth module with CSR Bluecore chipset.
- Aftek ported and enhanced open source Affix stack on Embedded Linux 2.6 based on PXA270 platform. Aftek's enhancements in Affix stack were merged in Affix source.
- Ported and customized profiles like HSP, HFP, SPP and DUN.
- Implemented embedded call-control application based on these profiles.
- Developed Bluetooth client applications on PDAs based on Windows CE, Palm OS and on Windows desktop.
- Also, supported BQB qualification of the product.

About Aftek

Aftek Limited is a full spectrum technology services company from India. Over last 20 years Aftek has gained significant exposure to variety of technologies. Rich technological capabilities, focused investments in Research & Development and industry exposure enables us to reach beyond the basic IT services to design and deliver projects, products and implement end-to-end solutions to customers in variety of industries. Our service spectrum covers key services as Application Development, Application Maintenance, Hardware Development, Firmware Development, Embedded Systems and Testing Services.

Bluetooth PSTN Gateway

Bluetooth PSTN gateway is a base station for Bluetooth cordless phone. It enables user to use Bluetooth enabled devices such as mobile phone, PDA or laptop to access the traditional PSTN line exploiting its cost effectiveness. Additionally, it also supports wireless headset connectivity and acts as a PSTN modem for data connectivity.

- Aftek designed the hardware and developed form-factor prototypes using USI Bluetooth module with CSR Bluecore chipset.
- Modified high-speed UART Bluetooth driver and modem driver for noise free voice and data communication with minimum latency.
- Aftek ported Affix stack for μ Clinux based on ARM7TDMI platform.
- Implemented TCS stack layer and CTP profile over Affix.
- Ported and customized HSP, DUN profiles.
- Implemented CTP based call scenarios like make, accept, reject, hold, un-hold, conferencing and 3-way calling.
- Supported BQB qualification of the product.

Bluetooth Access Point

It is a LAN access point developed using Widcomm Bluetooth stack. It enables multiple clients to access LAN services using Bluetooth technology and can be connected to up to 7 clients.

- Modified the existing USB Bluetooth driver for Widcomm Bluetooth stack to achieve higher throughput.
- Developed LAP, SPP, FTP profiles.
- Implemented support for LAP gateway functionality.
- Supported file transfer for single as well as multi client environment.

