



The engagement:

- Relationship spanned over 3+ years with an average team size of 25 engineers
- Worked on 3 generations of Personal Wireless Gateway, Bluetooth PSTN Gateway in addition to 5+ variants and Supporting products
- Efforts included hardware, firmware, application design and development along with testing and certification support



Business impact:

- The client leveraged Aftek's expertise in plethora of technologies viz. Bluetooth, GSM/GPRS, WiFi, VoIP
- Since Aftek had taken complete ownership of the product, its highly dedicated and scalable teams leveraged greater co-ordination thereby increasing productivity and throughput
- Complete removal of overhead on recruitment and management of teams in India
- Higher ROI for the client due to lower cost of skilled engineers

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The Client

The client is an ODM house based in South-East Asia. They design and manufacture wired and wireless telecommunication products. With a strong focus on innovation in IP telephony, they have developed cost effective products to cater to a growing demand in enterprise as well as consumer market.

Business Situation

With the growing popularity of cellular phones, a need was felt to develop complimenting solution to offer better indoor experience and a cost effective option for roaming or long distance calls. Intelligent use of latest technologies would offer similar mobility and ease of use as with cellular networks and phones. The client conceptualized innovative product ideas and chose Aftek as their technology partner. Aftek having worked on their earlier product was the obvious choice for developing innovative products like **dual mode phone and Bluetooth PSTN Gateway in 2003-04 when no such devices were being offered in the market.**

The Challenges

Key products developed by Aftek were Personal Wireless Gateway and Bluetooth PSTN Gateway. Starting with raw product ideas Aftek formulated product requirements and mapped those to appropriate technology to develop full-fledged products.

In 2003 Aftek developed first-of-its-kind product, which provided combined solution having GSM/GPRS, VoIP/WiFi connectivity and Bluetooth interface. Handling Bluetooth-WiFi interference issue was a major challenge. Aftek overcame it by successfully designing and developing a hardware solution for Bluetooth-WiFi co-existence. For providing Bluetooth connectivity, open source Affix stack was deployed in Personal Wireless Gateway as well as Bluetooth PSTN Gateway. Affix stack was devoid of telephony control functionality. This vital feature was to be developed in a very aggressive time frame.

Providing dual SIM support and dynamic routing of real time voice data to/from Bluetooth headset, wired headset and local speaker/microphone were some other challenges.

The Personal Wireless Gateway being a handheld consumer device, Aftek had to meet stringent requirements of **weight (128gm)** and **slick form factor (100mm x 60mm x 22mm)**. Other challenge was to implement an effective power management scheme to meet steep battery life requirement of **72 hour standby.**



Quick technical overview:

- Embedded Linux porting
- JFFS2, CRAM-FS file systems
- Device drivers for WiFi-SPI, Bluetooth-HCI, Flash, USB, PMU, Keyboard, LCD
- Stack porting/modifications for Bluetooth, VoIP (SIP, RTP), TCP/IP, PPP
- Quad band GSM, GPRS- Mobile Station Class B
- Dual SIM support, SIM Application Toolkit Class1/2/3
- WiFi conformance to IEEE 802.11b with WPA, WEP security and EAP authentication
- VoIP application with SIP, RTP, SDP protocols
- Codecs- G.711a, G.711u, G.723.1, G726 and G.729ab
- Echo cancellation, Silence suppression, VAD, CNG
- Phone applications with intuitive user friendly, menu driven UI
- BQB, FCC and CE certification support

Bluetooth

- Bluetooth v1.1 (Class II) compliant
- Affix stack porting on Linux platform
- Development of TCS layer, CTP for Affix open source stack
- Development of data/voice communication, networking and control applications over Bluetooth profiles- SPP, DUN HSP, HFP, CTP
- Modifications in standard Bluetooth drivers to enhance user experience by
 - Noise suppression in voice data
 - Latency reduction
 - Increase in data throughput

The Contribution

Aftek took complete ownership for end to end delivery right from defining the feature set, designing and selecting hardware to top level UI applications. On the testing side, Aftek designed and developed test cases and test plans to ensure a high quality end product. We further extended support for product certification and product maintenance. Aftek's timely and high quality delivery enabled the client to demonstrate this innovative product at **CeBIT 2004 as the first dual mode phone in the world.**

PERSONAL WIRELESS GATEWAY

The Personal Wireless Gateway is dual mode phone that supports GSM as well as VoIP over WiFi. Bluetooth is used for communication between Pocket PC and the phone thus providing the Pocket PC with various features like internet browsing, call control, messaging etc.

Personal Wireless Gateway as dual mode mobile phone:

- Acts as a cellular phone providing quad band GSM with **dual SIM support**
- Acts as a **wireless IP phone** supporting **VoIP calling over WiFi**
- Can be used as **cordless phone in PSTN environment** with Bluetooth Cordless Telephony Profile Gateway
- Supports **Bluetooth hands-free devices**
- Supports USB interconnection for soft phone application

Personal Wireless Gateway as smart data device:

- Enables internet connectivity on PC/Laptop/Pocket PC over WiFi/GPRS
- Functions as a peripheral device with PC or PDA using its USB/Bluetooth interface

Bluetooth PSTN Gateway

This is a home network supporting Base Station for Bluetooth enabled cordless phones or Bluetooth headsets. It also acts as PSTN gateway for data connectivity. It allows Bluetooth enabled devices such as mobile phone or PDA to be used as cordless PSTN phone.

