The AT&T Broadband Phone™

Developed for AT&T Laboratories Cambridge by OptionExist to be the phone for the 21st century, the Broadband Phone provides access to a range of multimedia services made possible by new broadband networks. With a touch screen and stylus, it presents a friendlier user interface than existing phones, providing users with a variety of benefits including the ability to draw explanatory diagrams and maps for each other, share photographs, or browse the same location on the web; all this while talking into a conventional handset or using the handsfree facility.

AT&T approached OptionExist with a proof of concept prototype consisting of a PC motherboard shoe-horned into a bulky telephone casing with whirring fans and network cabling sprouting from the rear and an LCD Screen stuck to the front. The project for OptionExist was to totally re-design and produce fully finished field trial units with the following features:

- Bright touch sensitive screen with 640x480 resolution and 65K colours
- Low power consumption
- Quiet operation (No fan)
- Linux operating system
- Ethernet networking
- CD quality 16bit 44.1 KHz stereo sound
- Audio in/out
- Handsfree features
- FCC Approval
- Custom designed slim case

Within a week of the initial meeting, OptionExist had prepared an outline specification for its proposed solution and, against stiff competition, won the contract. Dr Andy Harter, Assistant Director AT&T Laboratories Cambridge said "OptionExist beat the competition not just on price, but on the thing that really matters, which is listening to and understanding the needs of the client".

This project required a powerful processor with a high-speed memory bus which could operate in a slim case without fan cooling. No available chip fitted the bill, so OptionExist used its expertise to design a custom memory controller to allow a StrongARM 1100 processor to perform at the required specification.

To prevent the relatively slow, but high volume audio data delaying other processes, a separate buffer was implemented in an FPGA to receive audio data in high-speed bursts and output standard speed audio as required. This was effectively pseudo DMA for the audio chip.

AT&T specified the use of Linux, which had to be ported to the StrongARM processor. Linux assumes Direct Memory Access (DMA), which is not a feature of the SA1100, so the hardware drivers for the audio, networking, touch-screen and switch-hooks all had to be re-designed.

Under technical guidance from OptionExist, Dickinson Associates were commissioned for the case design. After initial sketches and solid models, a final design was agreed, and detailed CAD files were prepared.

As well as having to physically house all the hardware, the case needed to possess good acoustic qualities to avoid feedback or distortion in the microphone. It also needed to clamp the touch-screen securely without interfering with its operation. Prototype cases were created with Stereo Lithography to test the fit of the components before the CAD files were sent to the Far East for tool-making and manufacture.

OptionExist built the first complete prototypes and submitted them for CE and FCC testing. Functional and electrical tests were developed and the first ten prototypes were delivered to AT&T for evaluation. The tests were further refined before 100 units were delivered for internal field trials in real-world situations at AT&T offices. AT&T has since ordered a further 250 units which are destined for extended field trials at an external site.

This project demonstrates the depth of OptionExist's hardware and software knowledge and the grasp of and attention to detail in everything it does. As Dr Harter says "The result was a project tailored to our requirements which was delivered on time, on budget and to specification".

Brief Specifications:

Project	**Broadband Phone™**
Client	**AT&T**
Processor	StrongARM SA1100
Operating System	Linux
Screen	NEC NL6448BC20-08
Audio	Stereo16Bit 44.1KHz
Ethernet	10baseT
Compliance	FCC Approval

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