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(54) Title: UNIVERSAL WIRELESS GATEWAY

(57) Abrégé/Abstract:

Wireless Networks Inc. has conceived of a unique, low-cost method and apparatus for co-locating Bluetooth and 802.11b in a single access point. The WNI proposed solution has the added benefit of considerable flexibility, modularity, and end-user focused ease of use. The solution does not depend on complex silicon level integration but rather on widely available, low cost modular adapters and a means of interconnecting devices. The most basic configuration based on the WNI universal access point is a base platform with a single USB peripheral expansion port. While a USB hub could be used to allow the attachment of multiple peripherals, the most basic configuration would be that of a single WiFi USB adapter attached to the base platform. The base platform is capable of supporting any radio technology internally, including 802.11b, but will initially be bought to market with Bluetooth as the built-in standard.

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Abstract

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Universal Wireless Gateway

Background

To facilitate development and ease of use in the wireless products market, many international government and regulatory bodies have set aside a portion of spectrum in the 2.4 GHz range as an unlicensed band for industrial, scientific, and medical (ISM) applications. The 2.4 GHz ISM band has grown in popularity and application to dominate a wide range of consumer and business products ranging from cordless phones to high speed wireless networking products. The proliferation of devices using the same spectrum has created a growing interference problem for co-located devices.

Of specific interest is IEEE 802.15.1 (Bluetooth) and IEEE 802.11b (WiFi) products in close proximity. Bluetooth has been envisioned as a wireless cable replacement and networking technology intended for two main targets: from a cable replacement perspective, offering a less cluttered alternative for connecting desktop devices like keyboards, mice, and speakers to a PC or a laptop. From a networking perspective, to provide network access for small devices with limited battery reserves such as PDA's and Cell Phones. WiFi or 802.11b is a more mature specification and has become the defacto standard for implementing in-building wireless LAN infrastructure – predominantly targeted to Laptops and desktops where physical LAN wiring is impractical or inconvenient.

Both standards share the ISM band and both are likely to require co-incident operation from a network infrastructure perspective. The issue of co-existence of Bluetooth and WiFi has been a topic of considerable discussion and research for the past 2 years and the detrimental effect of co-location is well known. Many proposals for long term resolution of this issue have been brought to the FCC and other regulators – chief of which is modification of the ISM band requirements to effectively allow federated “sharing” of the band, the implementation of which would be site specific. Unfortunately, it is extremely improbable that regulatory bodies will make the appropriate changes as quickly as the wireless industry is evolving.

In the interim, several private companies have developed various means of allowing co-existence from a chipset perspective. Co-existing radios and chipsets which share the same antenna are extremely interesting and are required for top performance in devices where both technologies are expected to exist together, such as Laptop computers. The two leading proposals for solving the co-location issue are one from Mobilian and a more recent solution which is the result of a partnership between Silicon Wave and Intersil. Both are in a

position to provide samples of their solutions and estimate they will achieve full production in the fall of 2002.

Description of the Drawings

FIG. 1 is a view of the WNI Universal Wireless Gateway in the simplest form with Bluetooth integrated into the base platform and a single 802.11b Adapter attached via Universal Serial Bus.

FIG. 2 is a view of the basic operation of the WNI Universal Wireless Gateway is to allow multiple devices using multiple radio standards to connect to the home or office network through a single, highly flexible gateway.

FIG. 3 is a view of the WNI Universal Wireless Gateway Architecture based on the Intel StrongARM processor and an embedded Linux OS, the WNI Universal Wireless Gateway architecture is specifically targeted for maximum flexibility in adding standards based peripherals.

Description of the Invention

Wireless Networks Inc. has conceived of a unique, low-cost method and apparatus for co-locating Bluetooth and 802.11b in a single access point. The WNI proposed solution has the added benefit of considerable flexibility, modularity, and end-user focused ease of use. The solution does not depend on complex silicon level integration but rather on widely available, low cost modular adapters and a means of interconnecting devices.

The most basic configuration based on the WNI universal access point is a base platform with a single USB peripheral expansion port. While a USB hub could be used to allow the attachment of multiple peripherals, the most basic configuration would be that of a single WiFi USB adapter attached to the base platform. The base platform is capable of supporting any radio technology internally, including 802.11b, but will initially be brought to market with Bluetooth as the built-in standard.

Close proximity coexistence of WiFi and Bluetooth, while likely to be the future preferred model, is simply not available at a reasonable cost today and does not allow for easy expansion to multiple radios within a single cell beyond the base configuration. In order to achieve the necessary separation of radios to minimize interference, a RS422 serial interface can be used. While completely functional, this approach requires a proprietary implementation of peripherals which would increase both time to market and overall cost.

USB peripherals are available from multiple sources and are typically one of the first interface technologies used for emerging wireless standards. While expansion and the addition of peripheral devices is completely managed by the WNI platform, the 'plug and play' attributes of USB have earned it a reputation for simplicity in the minds of the average end user.

The WNI Universal Access Point platform, which has multiple productized variants, is an embedded computing platform based on an Intel StrongARM processor and the MicroC distribution of embedded linux. Unique to the UAP as a network access point platform is the ability to be expanded much like a PC through the addition of peripherals. The UAP employs several different methods of peripheral expansion – CardBus, MiniPCI, and USB. Bluetooth is included in the access point and alternate wireless networking technologies are added to an available expansion port. To add 802.11b to the UAP, an end user attaches a WNI 802.11b USB adapter to an available USB port and locates the adapter up to 5m away from the UAP. This ability to separate the two conflicting radios is unique to WNI's implementation and is key to minimizing interference between the two technologies. When separated by 5m, the adverse effect of WiFi on Bluetooth has been shown to be minimal.

This separation of radios is not as convenient for client devices and the focus of Mobilian and Silicon Wave/Intersil is required to enable close proximity co-location. In fact the WNI UAP will be able to take advantage of mass market adapter availability to evolve rather than outright replacement of the entire AP when a new wireless technology arrives. WNI is currently sampling the Silicon Wave/Intersil Blue802 miniPCI prototype which could be incorporated into the flexible architecture of the UAP.

The ability to simultaneously network both Bluetooth and WiFi devices to a wire line network infrastructure can be achieved with current technology. A user wanting to achieve this result would be forced to purchase two separate wireless LAN access points – one to network Bluetooth devices and another separate unit to network WiFi devices. In addition to the added cost of duplicating network devices, the user is also forced to duplicate the cost of management and maintenance. The Wireless Networks Inc. solution centers on the development of a common technology platform from a network services and management perspective that allows external expansion with low cost wireless peripherals – each of the attached peripherals would represent an instance of a wireless networking radio.

Bluetooth technology will be incorporated natively into many product instances of the universal access point platform. In this case, the end user would choose, either initially or at

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