# IMPLEMENTING WPAN INTO OUR HOME

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## ABSTRACT

The concept of Wireless Personal Area Network is in our life now a days, Bluetooth does this. With a Bluetooth product in our hands, we can do lot of things that we would dream couple of years ago. But now we can send, talk, dance, and more entertainment – all wirelessly. Bluetooth wireless technology has expanded rapidly. Where ever we go, where we are working, playing, or moving, Bluetooth technology or this device can make life easier for us. Our modern home is much different than homes of past Decades. We discuss about the various household Bluetooth products in this paper, how this products works, what are the possible problems that we might face to use Bluetooth devices and finally some simple solution for those problems. Using Bluetooth devices in our home is very popular and easy but there must be a clear definition about what kind of devices we are dealing with. A clear concept of using this sort of device may make us comfortable in using technology. With the growth of modern technology, we are bringing our office into our homes, making our lives easier and more enjoyable. Besides, we are now extending technology outside of the main office, into other areas of the home. With products using Bluetooth technology, we can eliminate the cable replacing technology in the home office. Keyboards, mouse, printers, laptops, and headphones and speakers can be used in the PC environment wirelessly, improving the area and allowing for more creativity and freedom in decorating our own office.

## KEY WORDS
Bluetooth, Connectivity, Pairing, Troubleshooting.

## 1 Introduction:
If we just look today's diversity of all Bluetooth devices we can say our near future is all about using this new technology. As I am discussing only those Bluetooth products those can be used inside our home it will become a short list consider to those all Bluetooth devices. Now the question is what are the devices that we can use in our home environment. In-home networks are becoming more common as people want to enhance their convenience, security and safety at home and use their personal devices in home environments (as well as elsewhere). Bluetooth technology can be especially useful in home networks because it does not require any wires to be installed in the home to allow devices to communicate. For instance, a mobile phone could be used as a cordless phone via a Bluetooth voice access point (base station) as described later in this paper. Portable computers could be used at home through wireless dial-up networking or a data access point, also described later. In these scenarios, Bluetooth technology offers a convenient way to use the same devices at home that are used at work, allowing people to easily access the same data and to do the same tasks in either place. By synchronizing contact and other information between mobile devices and the home PC, users will have up-to-date information accessible everywhere. Bluetooth enabled devices do not just make working from home easier, these also make home entertaining easier by allowing us to change the music selection without having to leave their table. From up to 30 feet away, we can wirelessly control audio files stored on a PC or iPod. Bluetooth technology is also utilized in adaptors that allow people to share photos with friends by sending images from a camera, mobile phone, or laptop to a television where everyone can view them.

In many devices in home (including devices such as audiovisual equipment, appliances, home security and automation systems) happen to have Bluetooth interfaces, and then a personal device such as a PDA or mobile phone might be used as a "Universal remote control" for all of these other devices. From a single device, using Bluetooth links, a person might be able to receive alerts that the refrigerator door was left open or the clothes dryer completed a cycle, arm the security system, control lighting in the house and control the stereo and television. Bluetooth technology can do for us a lot; among them I am describing some. Release our self from the wires of our

home office as follows using Bluetooth connections. Keep contacts and other information in synchronization on our computer, phone, and PDA. We can print files from a computer to a printer wirelessly. Make our desktop wire-free by connecting our computer to both a mouse and keyboard. Also we can keep conference calls hands-free with a speakerphone to mobile phone connection. We can relax using Bluetooth technologies and have fun by creating the following connections:

Printing pictures have never been easy by sending pictures from a camera phone to a printer. If we want to listen to music, we can use wireless stereo headphones streaming music from home stereo or similar audio devices. View digital pictures on your television by sending images from laptops or mobile phones over a Bluetooth connection to a media viewer. Fill our living room with music with a wireless stereo system in which the base station streams audio to the wireless speakers over a Bluetooth connection.

We can move freely about our home as Bluetooth technologies keep us connected.

Talk hands-free on your phone as you go about your daily activities using wireless headset connected to a mobile phone or to a landline phone. Keep your monthly wireless bill low by using a mobile phone that connects to your landline CTP phone while you are at home.

While the specific user interfaces implemented by manufacturers may differ from device to device, there are still some very basic steps to go through in connecting two devices for the first time. We should always conduct the pairing process in a secure environment. [2]



*Figure: The products shown here represent the diversity of* Bluetooth *products on the market.* [6]

Before I talk about different household Bluetooth devices I must take a look about how this devices work with each other with the help of collaborative network.

## 2 Collaborative Networks:

Perhaps one of the most exciting aspects of Bluetooth wireless technology is that it allows devices to communicate with each other and form a wireless personal area network (WPAN) that moves with a person wherever they goes. This allows personal devices to increase their utility, as they can be conveniently used in multiple environments. When two such networks of personal devices are joined, we call this a collaborative network

We assume a WPAN that consists of a PDA a mobile phone and a pager, each equipped with Bluetooth wireless technology. By itself, the WPAN might make use of version 1.x usage models such as file transfers, synchronization, dial-up networking and other.

At home, the WPAN devices could communicate with other Bluetooth devices in the home network, perhaps allowing the PDA's address book to be used to dial a wired Bluetooth telephone, receiving alerts or short messages from the home network on the pager and other scenarios such as those described in the introduction.

## 3 Bluetooth Home Usage Models:

**a) Cordless Computer**
Computers are a key device segment for Bluetooth technology. Mobile computers, especially, have a high affinity for Bluetooth wireless communication and are included in several of the version 1.x profiles. A number of major mobile computer manufacturers planned to incorporate Bluetooth technology I their products in 2000. Furthermore, through the use of PC cards large installed base of mobile PCs can be enabled with Bluetooth technology in the short term, in addition to integrated solutions that may be offered by computer manufacturers.

At its heart, Bluetooth wireless communication is all about replacing cables. One place where many cables exist, and where these cables are sometimes unwieldy, is not specifically addressed in version 1.0. Many of the cables associated with computer peripherals could be replaced by wireless links. Keyboard, mice, joysticks, speakers, printers, scanners and like might all employ Bluetooth wireless communications. Other computer-related wires such as PDA cradles, digital camera cables and network connection cables could also be replaced by wireless connections. [5]

**b) Ultimate Headset**
Support for voice in Bluetooth wireless communication fosters this usage model. Telephone headsets are increasingly common for use with both fixed and mobile telephones. In environments such as call centers and home headset might be used with standard telephones for person's hands free to use in other work.

One advantage of the ultimate headset is that supports mobility. The user of the headset is not physically toed to the audio device and thus is free to roam about the area while keeping the connection intact. [3]

**c) Three-in-one phone**
A key benefit of the three-in-one phone is that a single telephone could become the only one that a person needs. If multiple voice access points using Bluetooth wireless communication become available in environments such as the home, office and public areas, a single personal telephone that is usable almost anywhere becomes realistic. [3]

**d) File Transfer**
One of the most fundamental and useful applications for any type of data networking, including simple point-to-point links is to exchange files and other data objects. A primary benefit of wireless file transfer using Bluetooth is the convenience that it offers. Data could be exchanged easily between two or more devices without the use of cables and without the need to set up and configure a full blown network among devices. [5]

**e) Direct Network Access**
Direct Network Access via Bluetooth wireless communication is possible using data access points. A data access points allows devices to connect to it wirelessly; the data access point in turn connects to the LAN. It's not functionally different from the same sort of connection in a wired environment, such as a traditional Ethernet network where computers connect to network access points using cables. A data access point with Bluetooth wireless communication simply provides a "wireless plug" to connect to the network. [5]

**f) The speaking Laptop**
The speaking laptop usage model is an example of extending the functions of one device by allowing it to borrow the capabilities of some other device. Speakerphone capability becomes available, using the speaker and microphone of the notebook computer, even if the mobile phone does not have its own speakerphone capability. [5]

Use of HomeRF helps us to make things easy to communicate among Bluetooth devices. Our next approach is to talk a little bit about this HomeRF.

## 4 HomeRF and Bluetooth Wireless Communication:

The impetus for developing the HomeRF technology was to provide a solution for wireless in home networks.

HomeRF and Bluetooth technologies have many parallels. Both were developed at roughly the same time. As we know both operate in the unlicensed 2.4GHz ISM band for RF communications. [1]

## 5 How we solve problems in Bluetooth Devices:

As I discussed some house hold Bluetooth devices, I had to think how we can overcome the problem for an error free Bluetooth devices operation.

It is important for us to start by noting that Bluetooth wireless technology is a wireless standard and specification that product manufacturers build into their products. There are a few things we need to think about to get Bluetooth devices to work together. The most obvious being, of course, that we will need Bluetooth wireless functionality in all devices we want to connect. If we are not sure whether our devices contain Bluetooth technology, we will need to contact the manufacturers of the devices or check the products' manual.

- We always have to make sure that the corresponding Bluetooth profile exists in both devices.
- Also make sure the devices have Bluetooth functionality switched on.
- Thirdly that the devices we want to communicate with are paired with each other.
- Always initiate a communication session.

1. For devices to work together it is important that each device that communicates share the same profile. Some examples:

- If we want to connect a headset to a mobile phone we will need the HFP in both devices.
- If we want to establish a dial-up session to reach the Internet from a PDA connected to a mobile phone, we would need the DUN Profile in both devices.
- If we want to print from a mobile phone to a printer, both devices typically will need the BPP.

These are just some examples, but when purchasing devices we need to keep this concept in mind to make sure that they will work together as expected. Usually we will find information about what profiles are supported in the user manual.
An example that is not likely to work together:

- A mouse, which typically supports the Human Interface Device (HID) Profile, and a camera are unlikely to work together since presently no cameras support the HID profile.

2. For devices to communicate using Bluetooth wireless technology we will need to make sure that both devices have the Bluetooth functionality turned on. Even though the basic design of Bluetooth provides for extremely low power consumption, the functionality can be switched off to save even more power, or to disable radio functionality in special situations such as during airplane take off. In most devices the Bluetooth functionality (radio) is switched on by software. This is typically done from a menu choice, "Turn Bluetooth radio on."

3. Normally, for security reasons, two Bluetooth devices always need to be initially paired before they can exchange data. The term, pairing (or bonding as it is sometimes referred to), normally means that two devices are exchanging protected passkeys. Once paired, all information sent over the Bluetooth link is encrypted and will only be able to reach devices that are authorized to do so by the pairing process. In certain instances it may not be necessary to conduct the pairing procedure. For example, when exchanging business cards between two mobile phones it may be too cumbersome to pair with a password. Usually there is a setting in the device, for such cases, in which you can set a lower level of security.

4. Typically a pairing is done in two ways, depending on the type of devices. For example, pairing a headset and a mobile phone necessitates setting one of the devices into pairing mode and activating the pairing from the other device.

- Headset is set into pairing mode, typically by specific sequence of button pushing.
- In the mobile phone, the pairing is initiated by activating this function from the appropriate menu.

5. With many devices, especially those that have built-in Bluetooth functionality, there is no need to perform additional operations to establish a connection once paired. Typically, a mobile phone will automatically connect to the headset when a call is initiated. If at any time a pairing or connection between two devices needs to be re-established, the pairing should be conducted in a private, secure location.

6. For each small personal network (piconet) of between two and seven devices, one device always acts as master and the other units are slaves. All devices, independent of capability, can take both master and slave roles. If we have many devices connected in a personal network (more than one slave to a master) it is called multipoint. A computer, for example, could simultaneously connect and transmit data to a PDA, a camera, and a mobile phone at the same time. However, some devices, like wireless headsets, cannot maintain more than one simultaneous connection.

7. In general, pairing between devices is not a problem; however, you will need to know how to initiate and facilitate the initial pairing, which is described briefly above and for greater detail see Connecting Devices.
Most common problems are:

8. Bluetooth is off or the other device is not in "discoverable mode". Make the unit you are trying to find and pair with visible/discoverable by either turning this on from the appropriate menu or by a sequence of keystrokes usually on devices with limited user interface. When you are done pairing, you can turn the device back to non-discoverable if you have security concerns.

9. The pair attempt between two devices failed. Usually this is the case when a wrong pass code or PIN is entered when trying to pair. If you are certain the pass code is correct, try powering down and then powering up both devices.

10. One of the most common causes for devices not to work together is the fact that two devices do not support the same profile. Unfortunately, support in both ends is a requirement. Usually the answer to this question is to look in the manual where information about profile support can be found. In many devices, like PCs etc., it is also possible to look in the Bluetooth application to find out what profiles (or services) are supported. Another common cause is, of course, that it is difficult to find the right commands or menus for making connections. This is more difficult to answer since it depends very much on the manufacturer implementation and the user interface of the device. The only recommendation we can provide is to look in the user documentation and/or to contact the device manufacturer's support department. [4]

## 6 Conclusions and Future Work

Innovation is the lifeblood of the computing and communications industries. The Bluetooth technology fosters innovation and presents many opportunities to many people. First and foremost is the value it can provide to end users in the form of convenience and new applications of the technology.

I believe that the Bluetooth wireless technology could bring about a major paradigm shift in personal computing and communications. This paradigm shift points to a time in the not too distant future when personal computing devices will simply connect and interact with each other and with their surroundings.

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