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# Implementation of Bluetooth hotspots using IGAP

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***Abstract*— Bluetooth provides a way to connect and exchange information between devices like personal digital assistants (PDAs), mobile phones, laptops, PCs, printers, digital cameras and video game consoles via a secure, globally unlicensed short-range radio frequency for multiple users simultaneously. This technology is developed to free end users to allow people access digital information wirelessly. Main idea of this paper is to show implementation for providing internet connection in Bluetooth enabled mobile using IGAP. IGAP is the new Bluetooth profile that solves the problem of accessing (browsing) internet in Mobile phone from a Computer having internet connection. With the IGAP a mobile user can access internet without any GPRS or EDGE provided by the telecommunication companies. This implementation has two parts, a client application and a server application. The server application runs in a normal PC with Bluetooth dongle. This PC acts as the gateway to the internet for the mobile. The mobile will host the client application which will connect to the server application in a hotspot environment and provide the mobile with internet access.**

***Keywords*—IGAP, Bluetooth Hotspot, Bluetooth, Algorithm, Implementation of IGAP.**

## I. BLUETOOTH HOTSPOT

As the number of Bluetooth products increases each year, it is important to develop applications and services to take full advantage of their potential and capabilities. A broadband hotspot is one application where Bluetooth has a value in providing Internet access to mobile users. Consumers owning a Bluetooth enabled mobile phone can easily access a Bluetooth hotspot to Browse the internet without having to carry a PDA or a laptop. A higher proportion of PDA owners use the device to access the Internet through Wi-Fi which is more costly as compared to Bluetooth.

The penetration rate for using mobile phone is very high. In fact, it is becoming the internet access point for many people encountering the Internet for the first time. The size of the device is getting smaller, making it convenient for consumers to carry and the capabilities are becoming more powerful and sophisticated. Mobile phone creates more possibilities for social networking. The deployment of Bluetooth hotspots will widen access to broadband services using mobile phones not only to professionals and mobile workers but more importantly, to other segments of consumers who want to go on-line for non-business related and sociable purposes, and to consumers who do not own PCs.

In terms of social conception, Bluetooth hotspots have the ability to bridge the digital divide between people who do or do not have access to the technology. It is not necessary to purchase a PC**,** a laptop or a PDA which are often used for business and work related purposes, for occasionally checking email and browsing the Internet. There are some consumers who are not a frequent user of the Internet due to the nature of their work, lifestyle or income. This group of people can invest in a Bluetooth enabled mobile phone to access the Internet.

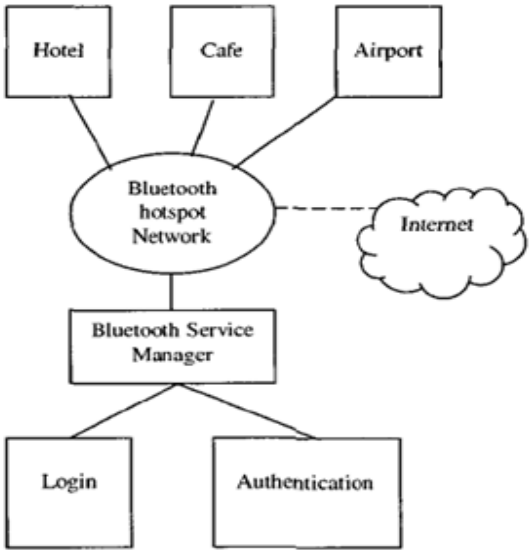


Fig 1 Bluetooth Hotspot[16]

They can receive instant messages and access the Internet using a mobile while having dinner in a restaurant or coffee in a cafe that offers Bluetooth hotspot. The establishment of Bluetooth hotspots in public places extends the broadband services to all sections of society especially in urban and rural areas as well as small local communities and cities. Power of internet can be transferred over mobile phones for low or no network coverage areas or mission critical situations.

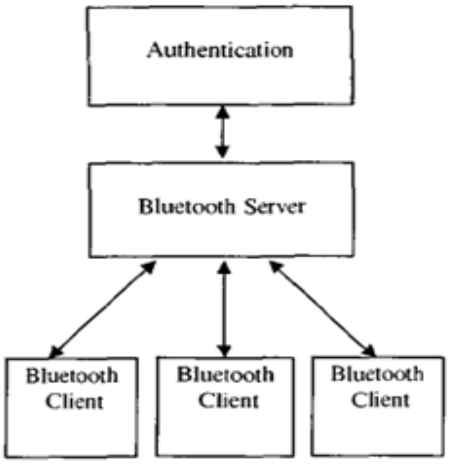


Fig 1.2 Bluetooth Architecture[16]

## II. RELATED WORK

*A. GNU Box*

GNU Box lets your pc share your internet connection with your phone over Bluetooth making you have free internet on your phone. This is complicated and time consuming process. All that the GNU Box does is modify the communications database settings. You need it because the user interface (Settings|Connection|Access points) doesn't allow you to specify the right settings. No software is needed to run in the background for this to work.

*B. Lykii*

Lykii is a user centered interactive pervasive wireless system allowing mobile users not only to visit services provided on remote Lykii servers over GPRS but also to enjoy local services through Bluetooth in Lykii hotspots for mobile phone users. Lykii, a system of three-layer architecture includes a backend Lykii servers, Lykii Bluetooth stations and Lykii mobile phone software clients. [16]

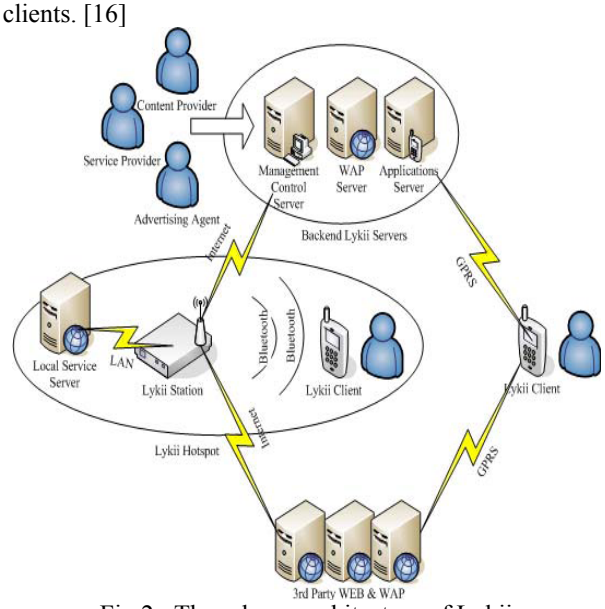


Fig 2 : Three layer architecture of Lykii

*C. Bluevibe*

Bluevibe is Bluetooth proximity marketing software which also supports Wi-Fi enabled phones such as iPhone blackberry. Bluevibe is a complete Bluetooth proximity marketing system that provides both one-way content-push services, for all your proximity marketing needs, but also provides a range of interactive mobile marketing services, via the Bluevibe Mobile.

## III. IGAP

*A. IGAP Scenarios Protocol Stacks [13]:*

As there are two scenarios of the IGAP so the protocol stack of both is different according to the each scenario. Both stacks are discussed in the following.

1) *Direct PC Access (DPA) [13]:*This defines that how a mobile directly access internet form a PC. The scenario stack is the following

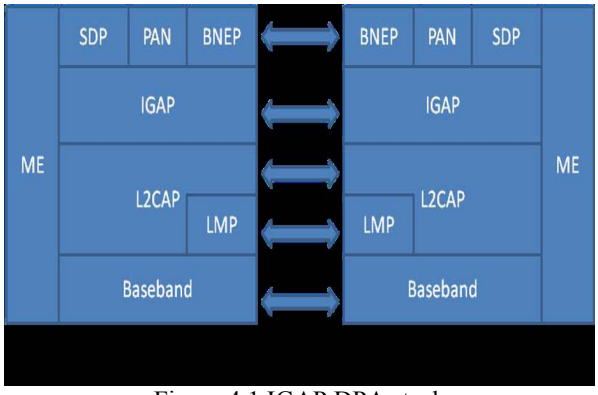


Figure 4.1 IGAP DPA stack

- IGAP User: This is the device that request to access the internet.
- Direct PC Access: This is the device that provides internet access to the IGAP user

2) *Network Access Point (NAP) [13] :* This defines that how a mobile can access internet from a LAN gateway through a Network Access Point. Its stack is

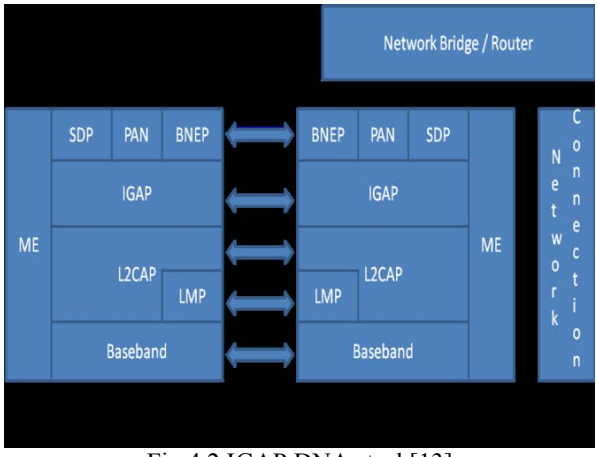


Fig 4.2 IGAP DNA stack[13]

- IGAP User: This is the device that request to access the internet.
- Network Access Point: This is the device that connected to the LAN and provides access to the internet through the LAN gateway.

B. IGAP PROFILE STACK DESCRIPTION [13]

*1) Network Access Point (NAP) service*: A Bluetooth device that supports the NAP service is a Bluetooth device that provides some of the features of an Ethernet bridge to support network services. The device with the NAP service forwards Ethernet packets between each of the connected Bluetooth devices is simply referred to as a NAP [9]. The NAP and the PAN User exchange data using the Bluetooth Network Encapsulation Protocol (BNEP).

*2) Management Entity (ME):* The Management Entity co-ordinates procedures during initialization, configuration and connection management.

*3) Service Discovery Protocol (SDP):* Discovery services are crucial part of the Bluetooth framework. These services provide the basis for all the usage models. Using SDP, device information, services and the characteristics of the services can be queried and after that, a connection between two or more Bluetooth devices can be established [10].

*4) Logical Link Control and Adaption Protocol (L2CAP)*: The Bluetooth logical link control and adaptation protocol (L2CAP) adapts upper layer protocols over the baseband. It can be thought to work in parallel with LMP in difference that L2CAP provides services to the upper layer when the payload data is never sent at LMP messages. L2CAP provides connection-oriented and connectionless data services to the upper layer protocols with protocol multiplexing Capability, segmentation and reassembly operation, and group abstractions [4]. L2CAP permits higher level protocols and applications to transmit and receive L2CAP data packets up to 64 kilobytes in length.

*5) Link Manager Protocol (LMP):* The link manager protocol is responsible for link set-up between Bluetooth devices. This includes security aspects like authentication and encryption by generating, exchanging and checking of link and encryption keys and the control and negotiation of baseband packet sizes [11]. It also controls the power modes and duty cycles of the Bluetooth radio device.

*6) Baseband:* The Baseband and Link Control layer enables the physical RF link between Bluetooth units forming a piconet. It provides two different kind of physical links with their corresponding baseband packets, Synchronous Connection-Oriented (SCO) and Asynchronous Connectionless (ACL) which can be transmitted in a multiplexing manner on the same RF link. ACL packets are used for data only, while the SCO packet can contain audio only or a combination of audio and data [12].

## IV. PROPOSED SYSTEM:

When a mobile phone user wants to access internet through Bluetooth, the internet request is send to the IGAP and then the IGAP forward it to the PC or a Network Access Point to access internet. When the request is completed it is send to the Bluetooth device connected to the PC or NAP and send back to the mobile browser or other applications.

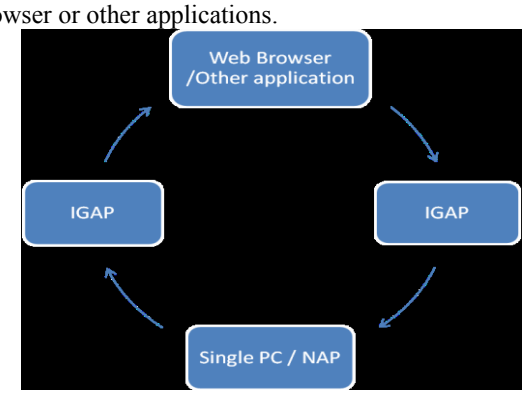


Figure 5.1 IGAP Working [13]

## V. PROSPSED ALGORITHM

*A. Algorithm Server- Application*

```
Start the server application
While (true)
{
Wait for the pairing request (Standby mode).
 If request encountered then
          {
          Reply for the passkey.
          Authenticate passkey.
           If passkey matched then
          break
         }
}
Enter into database.
While (true)
{
Wait for URL
If URL encountered then
break
}
Enter the URL into queue
 Do
{
          Select the URL in FIFO manner.
          Validate the URL.
          Send URL to web server using IGAP.
          Wait for the reply for <= 15sec.
          If received then
          send HTML Page to client
          Else Send error Message to client.
Update Database.
} until queue not empty
End
```

*B. Algorithm Client- Application*

Start Client application
While (true)
{
Input the URL
Send URL request to Server via Bluetooth using IGAP.
Display Retrieving Message on screen and wait for the file
If file received
{
Read the file and extract contents to display.
Display the Contents on the screen.
}
While (true)
{
Navigate
If (link requested)
Break
}
}

## VI. CONCLUSION

With this technology mobile phones need not have a GPRS connection or even a SIM card in it to access the internet. Currently many mobile subscribers are providing models with Wi-Fi, but still those models are costly. The technology is based on very small; low-cost, lightweight radios that easily form ad-hoc, secure links between various devices, allowing personal connectivity. The ability of Bluetooth to send and receive data can be beneficial in many areas; one of the areas is mobile communication through which any user can access internet in mobile from an office server or home PC. In the investigating parts of the research we have implemented Bluetooth hotspot using IGAP, proposed solutions and new thoughts about several problems with accessing internet over Bluetooth. We have implemented a completely new Bluetooth Profile where it could be desirable, in accessing internet in mobile over Bluetooth from a Computer or a gateway.

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