Public Wireless LAN

The first Step to the Mobile Internet

"Cellular operators plan multimedia services in your hand by 2020. With PWLAN you can get them in 2002."
                                                        Network Magazine, March 2002

One of the last and most disruptive technologies during the last year have been the emerging WLAN technologies enabled by the WiFi standard 802.11b. Especially the roll out of public WLAN hot spots providing high speed Internet connections over the air is one of the hot topics nowadays.

First of all, what is a PWLAN hot spot? The abbreviation stands for Public Wireless Local Area Network. It provides the end user with Internet connection at high speeds (100 times faster than traditional dial-up connections

FERRAN MORENO BLANCA
AND PATRICK DER HOVSEPIAN

with GSM) in public spaces such as airports, train stations, convention centers, hotel lobbies, etc. without using any cable. Instead, the standard WLAN is used as underlying technology and all the connections are done over the air. On the other hand, hot spots are zones in which Internet and Intranet access are offered through PWLAN. Different devices, from Laptops to PDAs, can easily access the Internet wherever PWLAN is present. It is planned for the end of 2002 that Swisscom Mobile will have in Switzerland around 100 hot spots. Coverage will be increased later depending on customer needs.
The benefits for the customers are clear: high speeds where the customer needs it, ease of use and reduced price compared to traditional mobile data services, e.g. GPRS. Because of the lack of wires subscribers can initiate service much faster.
If PWLAN hot spots are considered an integral part of a UMTS network, significant lower UMTS infrastructure investments are needed at the hot spot areas.

Benefit of PWLAN for the Customer
PWLANs will satisfy the increased need for mobility of people today. It is a fact that society is becoming more mobile; this is the case for the private as well as the public and professional domains. The rise of PWLAN-Technology – which has been broadly publicised in the US and the Northern countries over the last year and has recently also been increasingly visible in the European media – and the ever increasing mobility of people in general are parallel trends which support each other. PWLAN is the perfect solution for the growing need to stay connected. There is not just an increase in the amount of data exchanged, but also

a rise in the number of actual data exchange sessions.
Everybody who travels a lot knows how inconvenient it is to get online from your hotel room or an airport lounge, especially in foreign countries. Beginning with the numerous phone adapters you have to carry around, the complicated dial-up procedure and often ending with unsatisfactory connection quality, or even no connection at all, login-on while on the move is not usually a pleasant experience. WLAN will dramatically change this situation.
PWLANs offer the user a standardised, effective, customer friendly and convenient solution that avoids these problems. Simply start your web-browser and enter your username and password to authenticate yourself and, before you know it, you are surfing the web with a high speed connection. The speeds offered today at hot spots will be higher than ADSL lines and a few Mbps enabled by new WLAN standards, already emerging now, will come out in a couple of years.
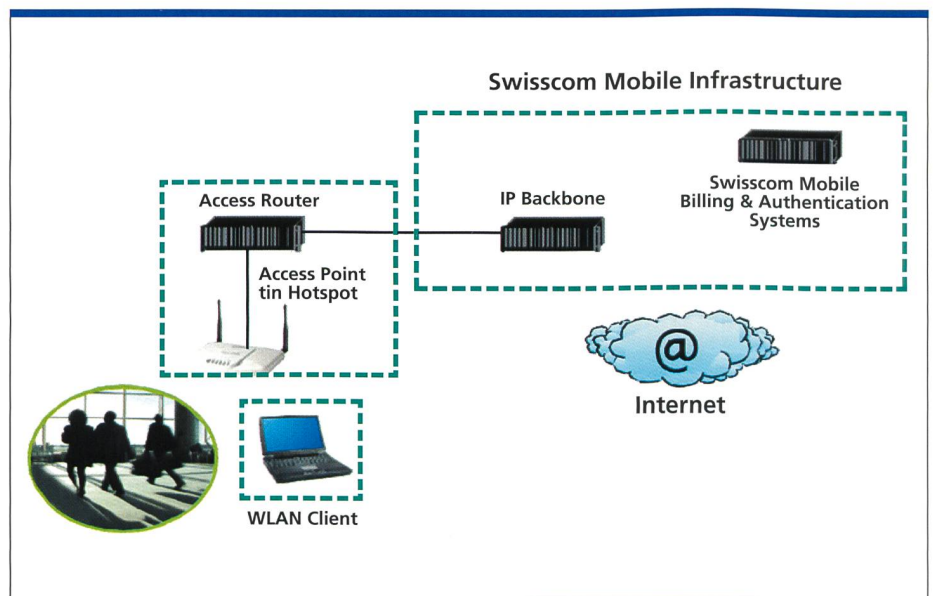

Fig. 1. Typical Public WLAN hot spot infrastructure.

Technology behind the Business

There are different components involved in a typical PWLAN solution, but basically they can be distinguished as depicted in figure 1:
– mobile client
– access points
– backend infrastructure

The mobile client is the wireless-enabled device used to connect the Internet, read mails, etc. Laptops with wireless cards and PDAs with WiFi compliant WLAN extension cards are the devices most used by the mobile users. Standard commercial devices are equipped more and more with integrated WLAN interface cards (PCMCIA, Compact Flash cards, Smartcards,…) and at no extra cost.

Secondly, access points are also needed for a PWLAN solution. They act as intermediaries between the customer and the backend infrastructure. They are small boxes with built-in antennas of a very reduced size and are responsible for communicating with the user over the air and sending the information to the Internet through a fixed broadband line. These fixed lines can be ADSL, leased lines or even fibre. The so-called backend infrastructure consists of access servers and routers inbetween the hot spot and the Internet.

Key Issues to offer PWLAN Services?

Wireless LANs offer tremendous benefits, as described above. However, there are different problems to be addressed when offering public services, which is the case with PWLAN hot spots:
– radio signal interference
– network security
– authentication of the customer when arriving at a public hot spot

Interferences

One single access point operating in the band of 2.4 GHz (current WLAN 802.11b standard) has 13 different channels to choose, in order to transmit the signal, but only three of them are non-overlapping. This means other nearby wireless networks can interfere, resulting in a decrease of the original throughput offered. When PWLAN hot spots are large scaled there will be a real need to manage the frequencies. Although nowadays PWLAN hot spots are not such huge places and they are not totally covered, frequency management is still an issue, since there can be more than one WLAN provider in a single hot spot.
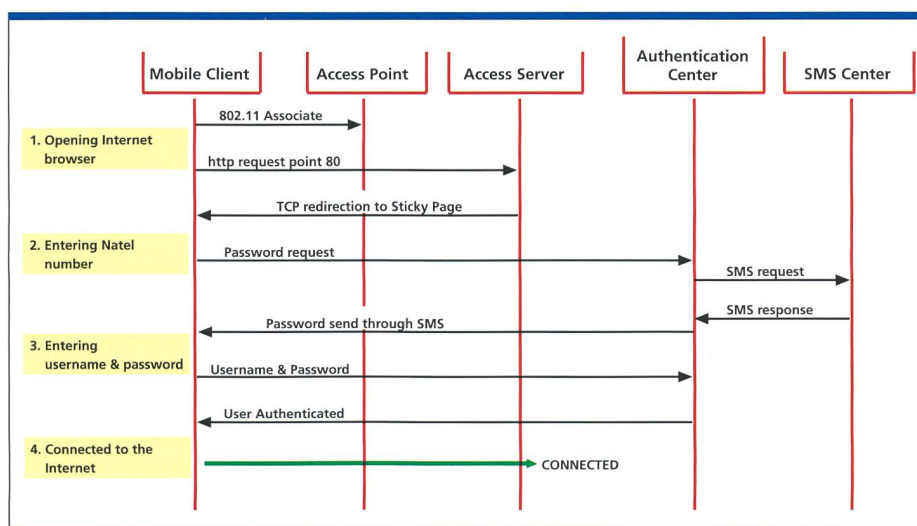

Fig. 2. Sticky Portal concept.
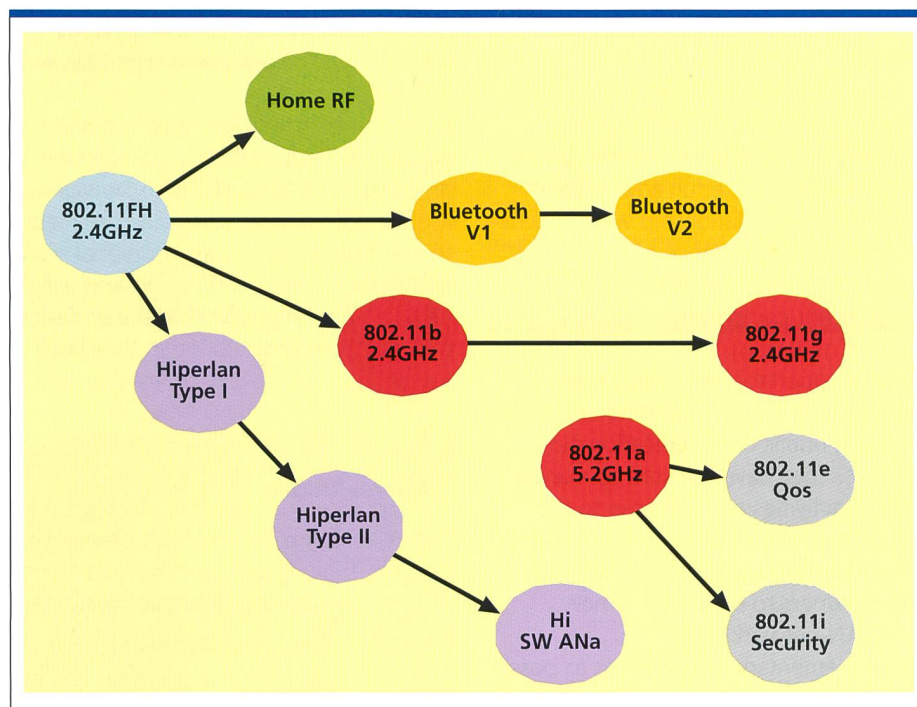
Fig. 3. Short-range wireless technologies spectrum.

Network Security

Data encryption used by current WLAN standards is not very strong, but this does not mean WLAN cannot be used to offer certain services. In the case of PWLAN hot spots the critical information (corporate information) will be accessed using preconfigured VPN clients, so this way the air link is fully protected and the encryption from WLAN is no longer required.

Authentication

Once the security is solved, another issue is the authentication. There are different solutions to authenticate the user in a hot spot and Swisscom Mobile has chosen the method shown in figure 2.

It is this easy: once the user arrives at the PWLAN area and opens the browser, he/she will be redirected to the official PWLAN welcome web page from Swisscom Mobile, the sticky page, where a username and password is required. In order to accomplish this in the most secure manner, this password is received by SMS after entering the phone number. Once the user has received the SMS (normally this process takes less than 5 sec-

onds) he/she is connected immediately to the Internet, to the corporate information, etc. All this at high speed, very easily and with much lower pricing than using conventional mobile connections (GSM).

There are obvious synergies in reusing the authentication mechanism from GPRS, i.e. SIM (Subscriber Identity Module), even within the Wireless LAN segment. This provides a common user identifier and authenticator for both networks, making them appear as one from a user and administration point of view.

Why Mobile Network Operators are well positioned to offer WLAN?

The main strengths of a mobile network operator offering Public Wireless LAN are the following:

– Existing (billing) relationship to the customer:
  Increasingly it is an economic necessity to charge the customer for a high quality WLAN service. Mobile operators can therefore take full advantage of their existing relationship with the customer. The importance of this "asset" should not be underestimated.
– Significant competence in operating public networks:
  Mobile operators are highly experienced in building, operating and maintaining public communication networks. They have the staff to manage these activities and – thanks to the GSM business – they can profit from their existing relationships with location owners to build up the new PWLAN-network.
– Complementary technologies as possible fallback options outside the hot spot:
  As stated above, the use of PWLAN is limited to the relatively small area of the hot spot. The user needs a complementary technology such as GPRS or UMTS outside these covered zones to satisfy his need for connectivity
– Synergetic use of existing infrastructure and more effective utilisation of UMTS investments:
  Many components of the operators' infrastructure can be reused to supply PWLAN – e.g. the billing solution used to charge for next generation services (GPRS and UMTS) can be used to bill WLAN services as well, hence improving the efficiency of operations.
– High brand recognition in the market:
  Mobile operators already have a well

known and trusted brand; they can use this asset to significant advantage against new competitors in the WLAN market.
– Existing GSM roaming agreements with other mobile operators facilitate roaming agreements for other technologies:
  As managing GSM roaming agreements is daily business for most operators, they are well positioned to quickly set up roaming agreements in WLAN business as well. They have the know-how and the relationships/contacts with other players in the market and are able to set up the necessary agreements within reasonable time.

Swisscom Mobile's Business Model

Swisscom Mobile offers the user a standardised Internet access using WLAN-Technology. There are two separate offers for the end user:

Firstly there is the subscription model which – as long as there is no roaming on hand – is only available to Swisscom Mobile GSM subscribers. They can have the PWLAN service as an additional option in their GSM subscription and will be billed on the GSM bill at the end of the month. In order to log in they have

to type in their mobile number on the "sticky portal page" and the session password will be sent to them via SMS within seconds.

Then there is the prepaid offer for all non-Swisscom Mobile subscribers (e.g. visitors, travellers from foreign countries, etc). In this case the customer has to buy a scratch value card at the hot spot (i.e. the reception desk at the hotel or the kiosk at the airport) which has user ID and password printed on it. After having entered the requested information, the user has full access to the service.

PWLAN Evolution Path and Main Conclusions

At the end of summer 2002 Switzerland will have around 100 Swisscom Mobile PWLAN hot spots. Obviously this number is going to increase dramatically in the coming years due to the strong demand for mobile data services. As mentioned above during the first phases the hot spots will be connected to the core network through ADSL lines because they offer enough speed for the estimated incoming traffic generated by the first wave of wireless users. Next phase of PWLAN hot

Abbreviations

WLAN   Wireless Local Area Network. A computer network that allows the transfer of data and the ability to share resources, such as printers, without the need to physically connect each machine with wires.

SIM   Subscriber Identity Module. A card that contains subscriber identifying data about a user that can be used to gain access to a network.

IP   Internet Protocol. Standard which regulates computer connections on networks which are part of the Internet.

ADSL   Asymmetric Digital Subscriber Line. Technology that enables rapid transfer of digital information through regular telephone cables.

WiFi   This is abbreviated from the term wireless fidelity and is another name for IEEE802.llb. It refers to an over-the-air connection with a wireless client and a base station or between two wireless clients.

GPRS   General Packet Radio Service. An enhancement to the GSM mobile communication system that allows continuous flows of Internet data at rates from 56 up to 114 kbits/s.

UMTS   Universal Mobile Telecommunications System. A so-called "third generation" (3G), broadband, packet-based transmission, offering a consistent set of services to mobile computers and phone users no matter where they are located in the world.

VP: Virtual Private Network. Technology arrangement that allows certain users access to a fully operational corporate network via the Internet.

spots will be interconnected to the IP backbone through leased lines having higher bandwidth.

Current WLAN standards are evolving in such a way that next PWLAN generation hot spots will offer even faster connections than now (fig. 3); there will be two very clear alternatives: 802.11a (802.11h in Europe) or HiperLAN2. Both offer speeds of up to 54 Mbit/s and work in the frequency band of 5 GHz. Certainly such products are just appearing on the market now, so it is still unclear which is going to be the next WLAN standard used.

WLAN can be seen as the first enabler to the Mobile Internet. WLAN will offer real broadband connections to the Internet.

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Ferran Moreno Blanca is a Telecommunications Engineer from the Universitat Politécnica de Catalunya (UPC), Barcelona (Spain). After working in frequency planning through GIS applications he did his diploma thesis at Swisscom, Corporate Technology, in the domain of IP mobility. Since November 2001 he has been working for Swisscom as a Research Engineer. He is involved in projects dealing with future wireless technologies and his fields of interest mainly concern mobile computing and their impact on our society.

Patrick Der Hovsepian holds a master's degree in economics from the University of Berne (Switzerland). He worked as a consultant prior to his engagement with Swisscom Mobile in January 2001. After working as an innovation scout in the portal area he then joined the innovation management team of Swisscom Mobile Connectivity Services, where he is now involved in the market aspects of the Wireless LAN project.

Zusammenfassung

Public Wireless LAN: Der erste Schritt zum mobilen Internet

Kaum eine Technik hat im vergangenen Jahr so viel Aufsehen erregt wie die auf dem 802.11b-Standard – auch Wi-Fi-Standard genannt – gründende WLAN-Technik. Es ist vor allem die Einrichtung öffentlicher WLAN-Hot-Spots für den breitbandigen Internet-Zugriff über die Luftschnittstelle, die für Euphorie sorgt. Swisscom Mobile bietet dem Nutzer einen normierten Internet-Zugang auf der Basis der WLAN-Technik. Dem Enduser stehen zwei Angebote zur Verfügung. Eines ist das Abonnementsmodell, das, solange es kein Roaming gibt, den GSM-Kunden von Swisscom vorbehalten bleibt. Sie können den PWLAN-Dienst einfach zu den abonnierten GSM-Diensten hinzuwählen. Bezahlt wird Ende Monat mit der GSM-Rechnung. Um sich anzumelden, geben sie an der «Sticky Portal Page» ihre Mobiltelefonnummer ein und bekommen das Session-Passwort binnen Sekunden per SMS zugeschickt. Das zweite Angebot ist ein Prepaid-Angebot für Personen, die nicht Kunden von Swisscom Mobile sind, also ausländische Reisende, Feriengäste, Besucher usw. Sie besorgen sich am Hot Spot (Empfangstheke im Hotel, Kiosk am Flughafen usw.) eine Rubbelkarte mit der User-ID und dem Passwort. Haben sie die erforderlichen Daten eingegeben, können sie den Dienst uneingeschränkt nutzen. Gegen Ende des Sommers 2002 dürfte Swisscom Mobile in der Schweiz an die 100 PWLAN-Hot-Spots eingerichtet haben. Die starke Nachfrage nach mobilen Datendiensten wird ihre Zahl in den nächsten Jahren explodieren lassen. Zu Beginn werden die Hot Spots über ADSL-Leitungen ans Core Network angeschlossen, weil sie die Übertragungsgeschwindigkeiten bieten, die es zur Bewältigung des von der Nutzergemeinde der ersten Stunde generierten Verkehrs braucht. Der nächste Schritt wird dann die Anbindung der Hot Spots an den IP-Backbone mit Hilfe von Mietleitungen sein, die noch mehr Bandbreite haben. Wenn man sieht, wie an der Weiterentwicklung der WLAN-Standards gearbeitet wird, so kann man zuversichtlich sein, dass die Hot Spots der nächsten PWLAN-Generation noch schnellere Verbindungen gestatten werden. Es zeichnen sich ganz klar zwei Alternativen ab: 802.11a (802.11h in Europa) und HiperLAN2. Beide arbeiten im 5-GHz-Band und versprechen Bitraten von bis zu 54 Mbit/s. Zugegeben: Diese Produkte kommen eben erst auf den Markt, und darum ist alles andere als klar, welches der nächste WLAN-Standard sein wird. Sicher scheint immerhin, dass in den nächsten beiden Jahren Geschwindigkeiten von einigen Mbit/s möglich sein werden. WLAN wird echte Breitband-Anbindung ans Internet bieten und darf damit als erster Enabler des mobilen Internet gelten.