Chief Technology Office | Briefing Note 14

Subject: Wireless Data Overview

Author: Ken Douglas, October 2002

Introduction

Most people in business roles would now find life difficult without their cell phones. Taking voice calls while traveling, catching up with voice mail off-site, following up meeting actions from airport lounges, are all taken for granted. Soon such ubiquitous access to *data* will be taken equally for granted, with potentially profound implications for the way we work.

The wireless/mobile hype of the last two years is giving way to solutions mature enough for large-scale business adoption. However, there are several distinct forms of wireless and mobile technology and each remains accompanied by marketing spin and counter-spin that confuses the marketplace and slows the rate of adoption. This briefing paper aims to cut through to the most important information, outlining both the main technologies and the role they have to play in BP. Separate briefing notes will highlight each of these wireless technologies in more detail.

Wireless Data Communications - the big picture

There are three main families of emerging wireless data communications technology *(a fourth – which includes two forms of satellite communications-is not covered in this paper).* These differ in the size of the physical area within which a wireless link can be established and the nature of that link.

1. The first is the **Wireless *Wide* Area Network** (WWAN), based on the "cellular" technology used by our mobile phones, which allows users to establish a data connection wherever there is cell-phone coverage. In Europe this is present in all but the most remote areas; elsewhere coverage is good though typically focused on towns and main road/rail links. This area is subject to the fastest pace of change and the most confusing acronyms!

2. The second is the **Wireless *Local* Area Network** (WLAN). This is a wireless variant of the LAN technology we have used in offices for many years and allows several users to connect without wires to an "access point" within a typical range of 120 yards/metres. Several Access Points can be deployed to cover entire buildings or industrial plants.

3. Third is a relatively new concept – that of the **Wireless "Personal Area Network"** (WPAN or just PAN). This can best be thought of as a replacement for signal cables (not power cables) with a connection range of not much more than 10 yards/metres. It can be used to link the plethora of devices increasingly surrounding individuals – and is dominated by the much talked about "Bluetooth" standard.

The table overleaf summarizes the main characteristics of these wireless technology families and introduces the most common examples of each.

Network	Examples	Range	Speed	Application notes
1. Wireless **Wide** Area Networks (WWAN)	**GPRS**	2-3 miles/km (to a base station)	Approx 56Kbps	For remote email access and light internet browsing over cellular networks. Deployed worldwide
	CDMA2000 1x		Approx 75Kbps	As above but deployed mainly in the USA
2. Wireless **Local** Area Networks (WLAN)	**802.11b** (Wi-Fi)	120 yards/metres (to a "access point")	11Mbps max	Wired LAN alternative for use inside the corporate firewall or in public spaces for "Hot Spot" access
	802.11a (Wi-Fi5)		54Mbps max	
3. Wireless **Personal** Area Networks (WPAN)	**Bluetooth**	10 yards/metres (device to device)	800K bps max	Cable replacement between nearby devices

Wireless *Wide* Area Networks

Technology Highlights

Cellular phone networks are undergoing rapid change to improve their ability to handle data. The current (so called "second generation" or 2G) networks will give way to third generation (3G) networks over the next 2-3 years and these will be fundamentally data oriented providing users fast connection speeds over wide areas

In the meantime, however, transitional technology – known generically as "2.5G" - will be the dominant standard for wide area data connectivity for several years to come. For BP the two most important 2.5G technologies are "GPRS" (our preferred approachstandard) which is available across most of the world, and "CDMA2000 1x" or just "1X" which is available mainly in the USA (and confusingly marketed as 3G).

Both GPRS and 1X allow users to establish a data connection to the Internet at speeds roughly equivalent to a good fixed dial-up line. This is fast enough for checking email, accessing the majority of inter/intranet applications etc. Typically after a connection is established it remains "always on" and users are charged either a flat connection charge or by the volume of data transferred rather than by the length of connection. In order to use GPRS or 1X users need either suitably enabled cell-phone or a plug in card (in the future many laptops will have this built in)

Application Notes

The main application areas for BP lie with providing near pervasive network connectivity for our commercial field personnel (sales and relationship management roles) and to other management or traveling roles in order to make more productive use of "out of office" time. Having access to and being able to act upon timely information and being able to enter data directly into back-office systems (rather than by later batch entry) offers many opportunities to substantially improve our business processes.

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Wireless *Local* Area Networks

Technology Highlights

WLANs provide much faster connectivity than wide area cellular technologies but over much shorter distances – limited to just over 100 yards/metres from a central receiver/transmitter called an "access point".

At present 90% of the WLAN market follows a standard called 802.11b (pronounced "eight-oh-two-eleven-be") and sometimes referred to as "Wi-Fi". This allows connection speeds of up to 11Mbps, but this speed drops with distance from the Access Point and also the capacity has to be divided among simultaneous users. Next year will likely see the adoption of a new standard (802.11a also known as Wi-Fi5) capable of operating five times faster – although, at present, its use is not permitted in some parts of Europe.

Concerns were raised in late 2001 about the security of WLAN connections. To overcome these concerns BP has adopted two secure and easy ways to deploy WLANs. The first is to use Cisco hardware and software and their proprietary security solution. This is the only solution approved, at present, for use inside our firewalls. The second is to deploy the WLAN outside our firewalls and access the BP network using iRAS.

Application Notes
WLANs excel in industrial environments (refineries, warehouses, depots etc.) and can act as an enabler of potentially significant process improvements by giving typical roles real time access to information, collaboration tools and so forth.

In an office environment WLANs are ideal where additional network capacity has to be added quickly or where traditional wiring would be expensive. The main advantage, however, is to allow users the flexibility to remain connected while they move from desk to meeting room. (In "office of the future" environments WLAN's are reported to improve productivity by 5-6%.)

A final use is the creation of "Hot Spots," which are WLANs deployed in public places such as Starbucks, Hotels and Airport Lounges allowing paying users to access the Internet. BP Retail Sites could become Hot Spots in the future. and deployed in our own offices, Hot Spots could provide connectivity for contractors, separating them from BP's network and reducing the associated costs.

Wireless *Personal* Area Networks

Technology Highlights

As electronic and smart devices proliferate the need for connecting cables becomes more complicated and restricting. Bluetooth is designed to replace connecting cables over short distances (excluding power cables) and is the dominant standard with over 90% of the market. Devices within a 10 yard/metre radius can connect to each other and exchange information in a Personal Area Network or PAN (also known as a Piconet in industrial environments).

One of the big benefits of Bluetooth's short range is that it uses very little energy. It is therefore ideally suited to battery-powered devices (phones, handheld computers, PDAs etc).

Application Notes
In an industrial environment Bluetooth can be used to connect handheld devices to data loggers (eliminating the problematic connection of signal cables in difficult environments) and can also be used to deploy networks of low-power temporary instrumentation.

Bluetooth will find most application in white-collar environments. It is already a standard feature on virtually all new business cell-phones, allowing the phone to connect to a wireless headset, printer etc. One of the most

common uses is to connect a phone to a PDA (or laptop) that, in turn, connects to the Internet. Digital cameras, video projectors and even GM's new automobiles are also now shipping with Bluetooth to enable connection with a variety of other devices.

Mobile and Wireless Data Access in Practice

All of the technologies described are simple to deploy in their basic form, but some care is required when thinking specifically about "applications" enabled by wireless technology. For example, it may not always be possible or cost effective to remain wirelessly connected constantly. (Being mobile does not equate to being wirelessly connected!) In these cases the support of un-connected/offline work needs to be addressed, typically by having mobile logic and storage - an approach that is counter to BP's classic web based emphasis of recent years.

Also improvements in wireless connectivity have coincided with a proliferation of new computing devices ranging from smart phones through various PDAs to sub-laptops. Many of these have a role to play in BP – and in the future the different screen sizes and operating characteristics of the devices will have to be taken into account during the development of applications.

Security is a topic that is seldom far from wireless discussions. BP's security policies are particularly well informed and this means that practices adopted by other organisations and suppliers might not be appropriate for our use (e.g. the direct, un-protected, access to email accounts from a phone or PDA). Fortunately we have already developed working solutions to all of the most common wireless security challenges.

A final note is that in order to ensure security, usability and supportability of solutions using wireless technology many applications need to use additional infrastructure components, rather grandly referred to as "mobile middleware". At present this "middleware" is being supported on a BU by BU basis – but the provision of this as part of global infrastructure is being actively considered.

What this means for BP

The opportunities for BP vary according to the technology – from using WLAN Hot Spots to reduce the cost of access by on-site contractors, to the efficiencies of allowing our people easy and instant access to email while traveling, to changing operations and maintenance processes in refineries by giving floor workers instant access to work orders, data capture and so forth.

The apparently simple enabler of allowing data access without wires has far reaching implications for the way we work and even the way we communicate with our customers. More examples of the business applications best suited to each wireless technology are set out in separate CTO Briefing notes highlighting each technology type in more detail.