

Digital & Communications Technology

Mars, battlefield and BP

Mike Bean, CTO/Mobility 27/10/03

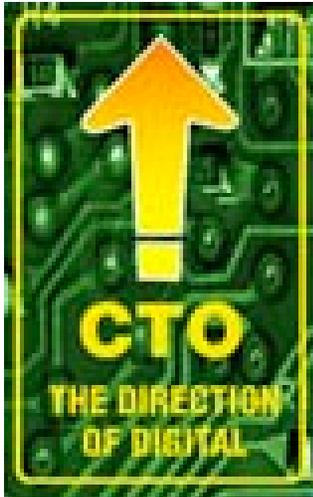


BP's position:

Question: Battery-Powered radio networks for industrial control is this a technologically viable path or just marketing hype?

Answer: A definite maybe.

chief technology office



The CTO fosters the rapid adoption and exploitation of emerging digital business technologies, advances the company's technology strategy and standards, and communicates the latest digital business ideas from industry and academia.

Four Roles

Technology Transfer □

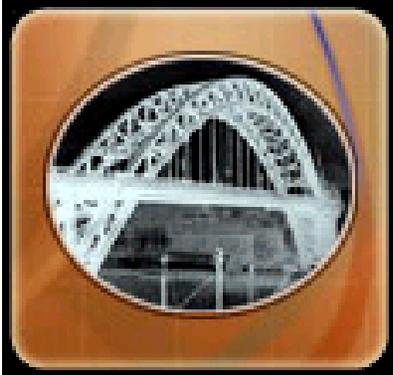
Technology Strategy and Standards

External Relations and Events

Business Innovation



technology transfer



The CTO provides a direct bridge to the latest in digital technology innovation. By working closely with Digital Business and business stream projects, the CTO helps BP rapidly identify and adopt business-building new technologies. The CTO pursues pilot projects of emerging technologies with early adopters in BP, then fosters the rapid adoption and exploitation of successful products. The CTO also facilitates connections between new digital technology suppliers and BP businesses and operational areas that could derive benefit.



technology direction



CTO is the process owner for technology direction, including guidelines, roadmaps, technology trials and product recommendations, ensuring that work is aligned with the overall DB strategy and goals. Development of consistent technology guidelines eliminates redundancy and inefficiency, ensures system compatibility, provides management with a global view, leverages the scale of BP with suppliers and enables the adoption of new digital technology.



technology networks



Telecommunications

Application & Integration

Security

Mobility

technology trial results



Bluetooth

Mobile Maintenance

Mobile Sales Force

Microsoft Sharepoint

Digital certificates

Secure email encryption - PGP tools

Consumer softphone

Wireless VOIP



CTO Publications

↑ **CTO**
THE QUESTIONS UP FRONT

Trial Results: Mobile Maintenance (Canada Gas)

Network: Mobility 8
Author: Ken Douglas
Date: July 2002

Goal of Trial:
 Take the first step toward productivity and communication in the field.

Description of Technology

Field personnel were equipped with Intrinsically Safe, Symbol handheld devices running WinCE/PocketPC 2002, with a "standard sized" 1/4 VGA screen, a soft keyboard, a numeric keypad and an optical barcode scanner. The device used a Symbol ethernet cradle and had integrated WLAN (although the WLAN was not used at this stage of the trial).

The trial encompassed the two main applications envisaged for BP's standard "industrial handheld" build:

1. PRIDE Web server v7.0, enabling field operators to define routes, collect readings and report and analyse field data.
2. SMART server for Maximo v3.4.1.1, enabling field maintenance personnel to access Maximo work orders, job plans and other key data in the field, as well as create Maximo work requests in the field.

↑ **CTO**
THE QUESTIONS UP FRONT

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.

external relations and events



The CTO cultivates relationships with the foremost innovators in digital technology. From major academic institutions like Stanford University to leading technology companies like Cisco to research and consulting resources like Gartner, the CTO searches across disciplines for knowledge and ways to apply it within BP.

business innovation



The CTO works closely with the business and streams to identify large scale opportunities to add significant value to BP's business employing digital technology innovation. These step-change initiatives are also referred to as 'game-changers.'



mobility and wireless



30+ areas across BP working with DB streams on how to use new wireless and mobile technology to deliver substantial business benefits. The challenge is to pool efforts and work together to trial the technologies and the new work methods they enable. For example:

On-vehicle systems

Tank monitoring (a radical change to our LPG processes)

'Always connected' technology to keep our traders constantly abreast of fast moving information and news.

Field maintenance operations by using rugged pocket PCs

Wireless payment mechanisms for our retail customers.

Sensory networks ...

sensory networks



“Network of Things”

Wired sensors

Occasionally connected devices (sync)

Motes/nodes etc

RFid (asset management)

Integrated with inspection and maintenance system.

Sensory networks



- State
- Position
- Control
- System integration
- Safety
- Security
- Maintenance
- Operability
- System life-cycle

[CTO - Sensory Networks](#)



BP conclusions ...

- Sensory networks allow us to do old stuff better and new stuff as we think about it.
- Mobile on-line or occasionally connected provides the basis of many process and safety systems.
- Asset location – people and things, especially combined with wireless systems will also be the basis of many process and safety systems.
- **Questions ...**



working group questions

- Questions posed in invitation
- Verbal feedback – many caveats
- Ensuing brainstorm notes – always happens!



Questions (1 of 2):

What are the characteristics of modern, current data communication and industrial control technologies used in refineries and along pipelines?

- What level of reliability is required and under what operating conditions?
- What are the minimum and maximum temperature conditions?
- What are the design parameters for electrical noise and lightning strikes?
- What are the constraints on operating electronic devices in corrosive and combustible environments?



Questions (2 of 2):

Which technologies (e.g. dedicated copper, fibre optic, data-over-power wiring, or radio) are successfully used for data communication in these environments?

- What are the approximate costs and limitations of existing methods?
- What are the regulatory requirements for electronic technology deployed in these environments?

□ If there were a dramatic cost reduction in providing safe, reliable data communication for petroleum industry environments, then how would it be deployed?

□ Would it simply replace existing methods in new construction or would there be new applications with significant economic value?

What are these potential new control and monitoring applications?



the 'sensory effect'

All Technology Transfer sparks some level of interest for most audiences but with field wireless devices, RFid and Motes – the elements of our definition of the Sensory Network – the reaction and outpouring of ideas is phenomenal !

If we didn't have the constraint of dangerous environments we would be well down many more roads of implementation.

Here are some from a meeting this week in Edinburgh

...



Application brainstorm (1 of 2)

- Crude interface detection thru refinery (virtual pig)
- Pump cavitation detection
- Coke levels on catalysts
- Additive injection
- Fouling/cleaning measurement while cleaning
- Profiles – density/temperature (e.g. thru catalyst bed)
- Acidity
- Distillation performance (e.g. tray loading)
- Flame detection beyond ‘on’ or ‘off’
- Personnel safety – track individual / H₂S



Application brainstorm (2 of 2)

- Alternative to laser survey
- Under lagging & general corrosion
- Tank leak detection
- Valve status – isolation (including manual valves)
- Cargo fraud detection
- Cargo degradation monitor (e.g. SG measurement)
- Frost detection
- Intelligent line tracing (prior to turnaround)
- Steam trap monitoring
- ‘Permit to work’