

THE IMPLICATION OF ADVANCES IN WIRELESS DATA COMMUNICATIONS ON E-COMMERCE

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Abstract: The way we conduct our day to day business has undergone fundamental changes over the past ten years. With the emergence of Internet that links the world together, users have put a lot more emphasis on communicating through the electronics media such as email and fax. We now seldom write to each other through letters but rather we communicate more often through emails or even ICQ! With the imminent changes in the wireless data communications, the e-revolution that a lot of us are still trying hard to manage will extend from our desktop on to our hands. Internet connection will no longer be desk bound but will be extended to users who will be connected everywhere, all the time. This paper briefly examines the emerging technologies in the wireless data communications area and their effect on e-Commerce. Its implication to the training and skill development requirements for Hong Kong will also be examined.

FUNDAMENTAL CHANGES

Breaking out of the desktop

Together with Internet, e-Commerce has fundamentally changed the behaviour of many people and the way that many companies conducting their day to day business. The drivers for growth in the use of e-Commerce are:

1. the availability of better information infrastructure
2. the improvement in data security and integrity technology
3. innovative e-Commerce business concept
4. the exponential increase in network utilisation and its relationship to the degree of connectivity (MetCalfe's law)

With the increasing use of e-Commerce in B2C and B2B operations, the demand from the users, in terms of features, speed, ease of use, variety of products and logistic, on e-Commerce will only increase. Furthermore, with the advances in wired and wireless broad band data communications, the "shopping experience" in doing e-Commerce will only be improving continually.

Currently, e-Commerce experience is mainly desk bound. Users must access the Internet or Intranet through their desktop computers. With the significant advances in wireless data communications in the next few years, this will be changed. The availability of packet switched, continuously connected wireless communications regime, the circle of connectivity will be finally completed with users being able to be connected where-ever, whenever they require to.

Currently, connectivity to the Internet is mainly through wired lines. For most users, the connection will mainly be through desktop modems or local area networks. The technology trend (Figure 1) in the wired connection will mainly be towards higher bandwidth through the use of fibre optics. In terms of local area networks, gigabyte LAN or even 10-gigabyte LAN will help to ease the congestion in the ever increasing network traffic for large corporations.

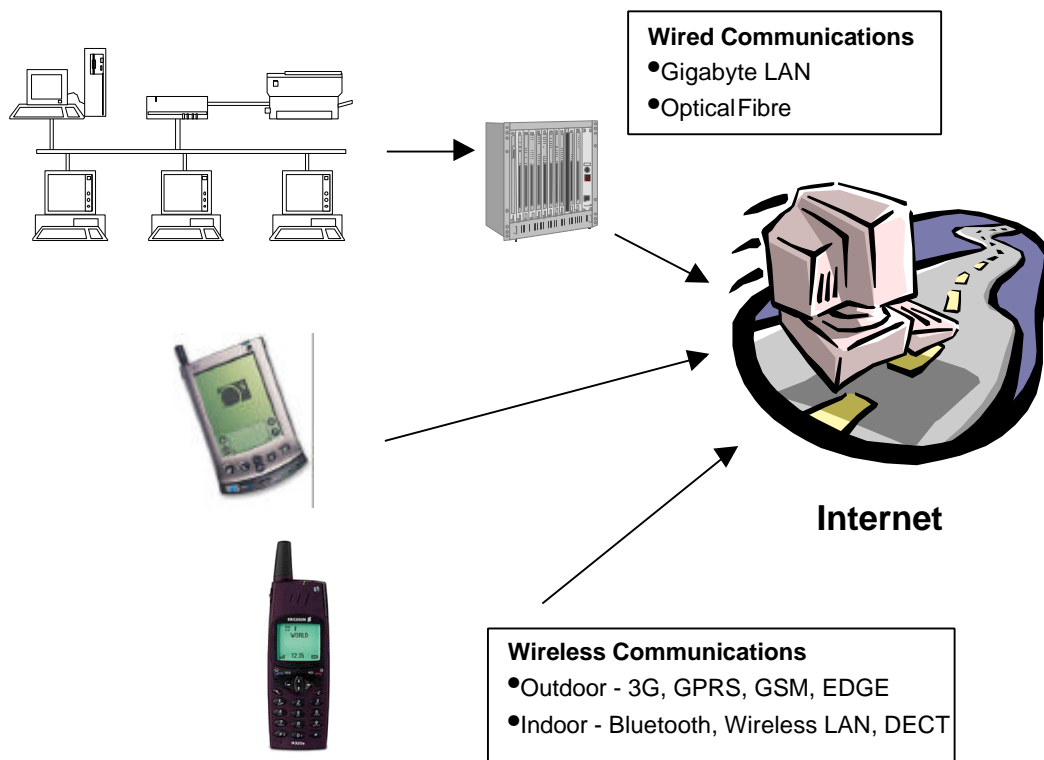


Figure 1: Advances in Connectivity to the Internet

GPRS, EDGE, 3G

For wireless data communications, the trends will be heading towards digital, packet switched broad band communications. For outdoor, circuit switched GSM based narrow band data communications will be superseded by GPRS (General Packet Radio Service) packet switched technology. Through the progress from EDGE (Enhanced Data rate for Global Evolution) and 3G, the bandwidth of wireless communications will increase significantly from the current 9.6 Kbps up to 2 Mbps in the next two to three years. For 3G, Third Generation Mobile Telecommunications, the first commercial system will be deployed in Japan and Europe in 2002. With 3G, users will be able to access all kinds of digital information such as music, photos, video, television, while they are on the move, anywhere. In the interim, GPRS (General Packet Radio Service) will provide “always connected” wireless data network access of up to 100 K bit/s while EDGE (Enhanced Data Rates for Global Evolution) will further boost the data speeds allowing video and mobile multimedia applications with data rates as high as 384 K bit/s. GPRS will be available in Hong Kong by the end of 2000 while EDGE will be available next year (Figure 2).

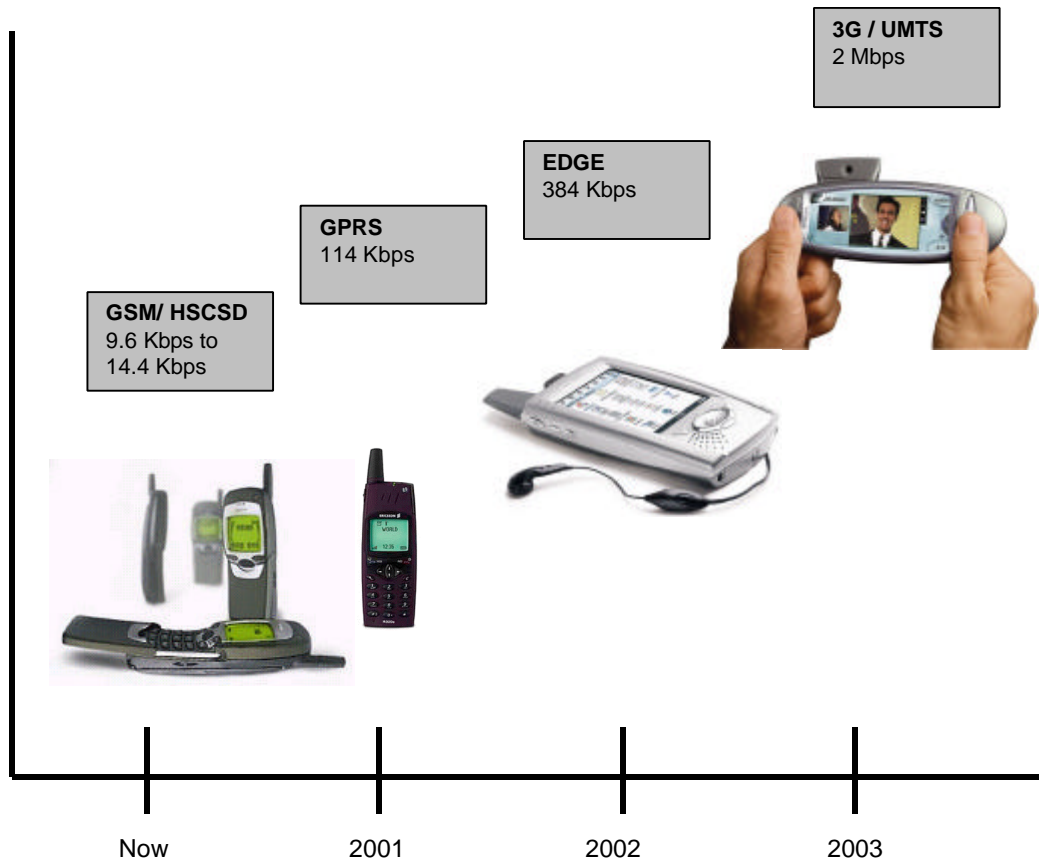


Figure 2: Wireless Data Communications Development

Circuit Switched and Packet Switched

The advantages of packet switched wireless network over the current circuit switched networks (Figure 3) are that firstly, it will be cheaper for data communications. As it is mainly developed for voice call functions, a circuit switched network is charging on a time basis, regardless of whether data is transmitted over the link for a data communication connection. So, for data connection purposes such as WEB browsing or even WAP browsing, the connection charge will be costly even for most of connection time, the link could be in an idle state. For a packet switched network, the charge involved should be much cheaper than a circuit switched network for such a network would be only charging for the bandwidth use rather than for the time used. Secondly, a packet switched network will have better control on data integrity. For a packet switched data transmission scheme, data are broken into many small packets and transmitted over the air. Data can be re-transmitted if they are found missing or lost over the transmission channel. Third, a packet switched data network will allow handheld or mobile devices to be continuously connected without the penalty of heavy connection charges. A packet switched network will not require the extra time to get a connection as in the case of the circuit switched network right now.

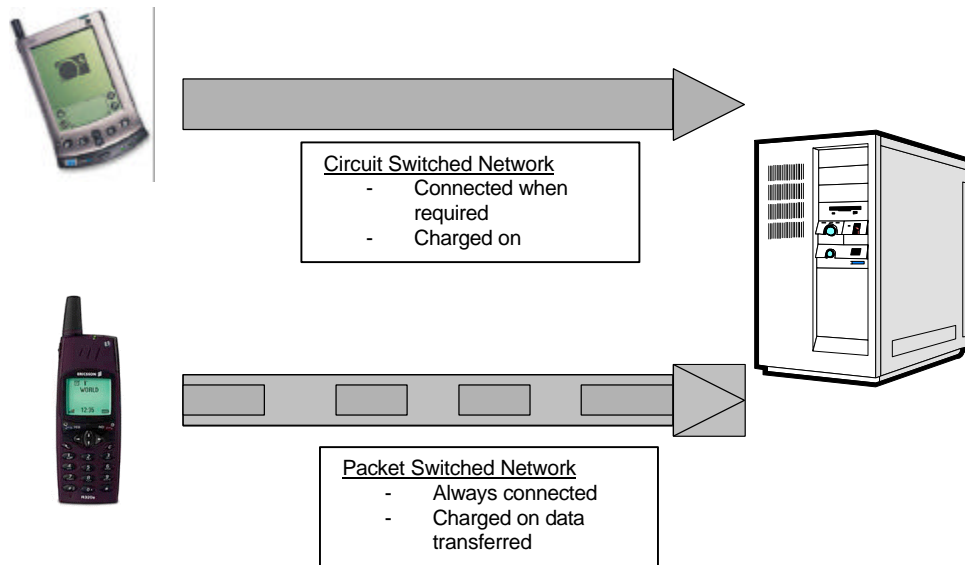


Figure 3: Switched Wireless Data Network

Bluetooth

For indoor, Bluetooth will become the prevailing trend for both wireless short range data and voice communications in the next few years. Bluetooth is the result of development effort of both the telecommunications and computer industries for the past few years and it aims to provide an effortless service for both home, mobile and business users with a low-cost and low-power radio based cable replacement technology. It operates in a unified frequency ISM band of 2.4 GHz. The initial cost for a Bluetooth module will be around US\$20 but the increase in volume will eventually see the cost of such modules to drop to US\$5. It has a gross data rate up to 1 Mbps with second generation devices going up to 2 Mbps. The integrated voice and data service will not only be the emerging standard for wireless LAN but the low cost of Bluetooth components will drive the increasing use of Bluetooth enabled devices at home as well. The low-power Bluetooth radio module is designed to be built into mobile phones, mobile computers, home appliances, wireless LAN modules, computer peripherals, and network gateways.

The performance of Bluetooth devices is very flexible and robust because the Bluetooth protocol features a range of flexible packet types. Further, using a frequency hop scheme allows Bluetooth devices to communicate in high data rate even in the presence of severe interference. The operating range is set at 10 metres which is optimised for power consumption and indoors short range usage.

THE IMPLICATION OF THESE ADVANCES

With these imminent advances in wireless data communications technology, the entire concept of the e-Commerce system will be migrating to a mobile commerce or *m-Commerce* system. It will be a system that allows users to perform business transactions, purchases, accesses to their data on the home server and even video conferencing, anywhere, any time. In the same way that cellular phones have fundamentally changed the way we communicate both in our personal life and in business, m-Commerce will take this one step further. Such development will provide strong

opportunities for both the fields of Information Technology and Electronics and it further demonstrates the growing convergence of the two important fields in terms of opportunities, technology and market.

Wireless data communications will be the main focus for technology and product development in the next few years. The implication for Hong Kong in terms of training and development is that there will be significantly more demands on skills such as RF engineers particularly for those having the skills and experience in the high frequency area (above 2 GHz). As there are a lot more opportunities in new, small wireless devices utilising wireless technology such as Bluetooth, testing equipment and compliance technology will also need to be upgraded to cope with the increase demands.

Further, with the increase demands on m-Commerce and wireless devices, it can be foreseen that the demands on software engineers with specialities on both application software development as well as embedded software development will be significantly increased. In terms of embedded software development, software engineers will be contented no longer with only MCU assembly type programming but in a more structured real time system type programming.

In conclusion, the imminent revolution in wireless data communications development and m-Commerce will present a lot of opportunities for Hong Kong. Being in the forefront in the application and usage of telecommunications products in the world, Hong Kong is in a strong position to ride on this next wave of IT revolution. Suitable engineers, both in RF, hardware and software, need to be trained in order to cope with the significant increase in their demand, or else, the opportunities will be heading elsewhere.