

WBT Inquiry
Submission No. 15

McMahon, Paul (REPS)

From: Doan Hoang [dhoang@it.uts.edu.au]
Sent: Thursday, 23 May 2002 2:27 PM
To: cita.reps@aph.gov.au
Cc: Doan Hoang
Subject: Submission to the Inquiry into Wireless Broadband



DH-Wireless-Submissio
n.pdf

Dear Sir/Madam,

It has come to my attention a call for submissions into the Inquiry into Wireless Broadband by The House of Representatives Communications Committee.

I am not sure where this submission fits in. However, I hope the submission is useful to the Committee.

Regards,

Doan Hoang

--

A/Prof (Networking) Doan B. Hoang
Department of Computer Systems
Faculty of Information Technology
University of Technology, Sydney

Phone: (+61 2) 9514 7943
Fax: (+61 2) 9514 1807
Email: dhoang@it.uts.edu.au

NSW 2007, AUSTRALIA
www-staff.it.uts.edu.au/~dhoang

URL: <http://www->

A view on Wireless Broadband Technologies

*Doan Hoang
Information Technology
University of Technology, Sydney*

Wireless broadband technologies promise to make all kinds of information available anywhere, anytime, at a low cost to a large portion of the population. Practical systems that deliver the promise, however, still some years in the future. At the moment we have a collection of services and products, each capable of performing some of the functions of a complete wireless communication system. What we really need is a deployment of new technologies that allow merging, bridging and integrating all these separate systems into an information delivery system of the twenty first century.

I am not quite sure where this submission fits in. But my view is that it is best to focus on the use and the development of wireless technologies where they are most appropriate in terms of economy, usage and technical feasibility.

To have a clearer picture of where wireless broadband technologies fit within an overall communication infrastructure, we first identify several inherent limitations of wireless communication systems.

1. Bandwidth limitation of a wireless communication channel: A bandwidth of a wireless channel (narrow or broadband) is always limited due to the limitation of available frequency spectrum. The portion of the allocated spectrum can hardly be increased or changed. With this limitation, the only way to accommodate more users is to devise techniques that enable more efficient use of the given spectrum. That is exactly the reason why the latest the third generation (3G) wireless systems adopt Code Division Multiple Access (CDMA) for channel sharing since it is more efficient than other sharing techniques. It should be emphasize that the limitation is a HARD limitation.
2. Power limitation of mobile devices: The main source of power of a mobile device is its battery. The most expensive portable battery lasts for about 6 hours of continuous active operation. It is absolutely important to minimize the use of the battery power. This makes the channel less tolerable to noise since techniques that require more signal power to combat noise cannot be deployed.
3. Size limitation of the device: Most wireless clients are handheld devices. They have very limited input as well as display capabilities. They cannot display information content (text and images) the way a normal computer screen can. As a consequence, many interesting applications that require full display or interaction may not be appropriate.

Given these fundamental limitations, there is little point in using wireless technologies in a competing fashion with wired communication (the wired Internet). The most beneficial direction is to develop and deploy wireless systems where they are unique: mobility and access over inaccessible areas.

1. Mobility – With wireless systems, mobile users can be contacted almost anywhere, anytime as long as they come under the coverage of a base station. This aspect of mobility CANNOT BE DONE with wired networks (the Internet's mobile IP). This is the area where wireless systems should be appropriately deployed.
2. Access over inaccessible area – This implies two scenarios:

- A wireless communications channel can be established to replace inconvenient cables from printer, keyboard to its computer, between neighboring computers, from a cellular phone to a computer or a storage device, etc.
- A wireless communication channel can be established over inaccessible terrain where laying cable is impossible or too expensive.

This suggests that wireless technologies are best to provide services to regional areas. Extension of the wireless devices to the reach of computers and storages devices should provide supplementary services that may not be possible with pure wireless technologies.

So what exactly are my points?

- Develop and deploy 3G systems that support Wireless Wide Area for voice, video and data (not focusing only on voice) at high speed (some Mbps). With the deployment of such systems, all types of desirable services can be provided to needed users: individuals, communities, and businesses, including those in regional areas.
- Support the development of low-power wireless local area networks such as Bluetooth systems, which support data, rates comparable to that of 3G systems. This allows the integration of mobile devices into the wired Internet (if a connection to the Internet is available in the vicinity), or allows an extension of wireless devices to computers and storage devices. This enhances the wireless services enormously.
- Developing intelligent gateways. These are network edge devices. They are positioned between two network domains (two different administrative domains, or between two disparate technologies (between wired technology and wireless technology) and can speak to the mismatches between them. These devices are essential to provide personalized content services and quality of service to applications.

In doing so, we complete the loop – Wired Internet – Cellular Multimedia Networks – Wireless Local Area networks – Wired Internet. The loop provides maximal flexibility in providing services to the community

In summary, I believe that we should focus on specific areas where we can make a strong impact (technologically feasible) and most profitable (serving the need of mobile and remote users)

- 1) 3G systems where the focus is not just for voice but also for multimedia traffic at comparable high bit rate of several Mbits/s.
- 2) Low power technology for bridging 3G and wired Internet. Technology such as Bluetooth should be further deployed. 802.11 technologies may be heavy on power.
- 3) Development of intelligent, programmable edge devices to bridge the impedance mismatches between systems and between technologies.