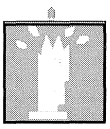


Bob Greeney, ABA Director Technology discusses new issues facing keepers of the spectrum.

Electronic business bandwidth requirements

What price spectrum?

Today, we hear about B2B, B2C and B2G, and most of wonder what on earth people are talking about. Of course they are talking about 'business to business', 'business to customer' and 'business to government'. The other terms we keep hearing relate more to broadcasting and on-line services such as video-on-demand, interactive television, e-banking, e-mail, e-shopping and audio and video streaming, etc. Lately, in e-commerce circles, one often hears that there is a need for ubiquitous bandwidth and that 'we' need more bandwidth to deliver these electronic services.

The common thread in all of this is the speed with which businesses can communicate with clients or each other, and with which service providers can down load content to their customers — this takes bandwidth. As we know, bandwidth is analogous to a pipeline delivering fluids, such as water or gas. The ultimate volume of content that can be delivered to each customer depends on the size of the pipe and the time allowed for delivery.

In e-commerce, the pipe is usually a cable, whether copper wire, coaxial cable or a fibre optic cable, or it may be a wireless connection, such as the evolving wireless application protocol (WAP) that brings the Internet to enabled mobile telephones. The capacity of the electronic pipe is called its data rate, which is measured in bits per second and which is dependent on bandwidth, or the diameter of the pipe.

Inevitably, the issue for those who use e-commerce and the Internet becomes one of portability and mobility and how best to provide access to the service provider's content. Portability is readily accommodated as long as one can get access to a network, normally through the telephone or other wired network.

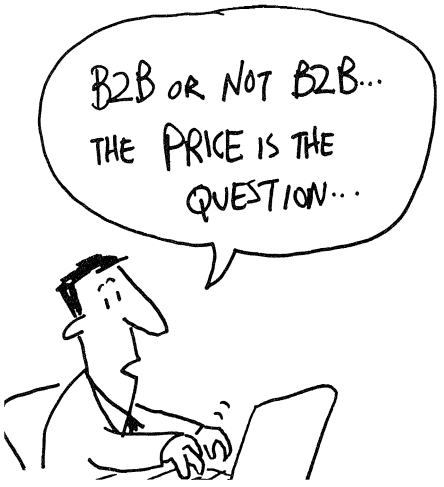
However, mobility is not so easy when operating email or other interactive electronic services while mobile on the basis of having access to the electronic media anywhere at any time to deliver anything, because users must rely on a wireless connection to the backbone, or network. It needs wireless bandwidth, which is already a scarce commodity.

For those who doubt the scarcity of spectrum for wireless applications, consider the recent Australian Communications Authority spectrum auctions for 60 MHz of the 1.8 GHz band for expansion of the GSM[1] mobile telephone networks in each capital city. Bidding for two blocks of 30 MHz reached more than $1.33 billion at the close of the auction process, far exceeding the bids for previous auctions of GSM spectrum. The value for this spectrum in Sydney and Melbourne exceeded $700 and $400 million respectively. In comparison, television broadcasting in Australia uses at least 70 MHz in each city (10 services), including provision for digital television services, plus the capacity required to operate translators where this is necessary.

The question arising for e-commerce is what spectrum is available and at what cost, to meet the demands of e-commerce for businesses and users? For the moment, mobile e-commerce is using spectrum already allocated for mobile purposes, such as that used for mobile telephones, wireless local area networks, or for

microwave distribution services. Use is being made of satellite capacity as well.

With the introduction of digital broadcasting we are seeing proposals for datacasting services that include wireless Internet and interactive services through digital radio and digital television channels. In these cases, the data or Internet-type services provide a high-speed download capability (up to about 20 Mbps). Interactivity is commonly provided through a return link typically using the existing fixed or mobile telephone networks at data rates varying between 9600 bps and 56 kbps. In a broadband network the return link may be at higher data rates—up to 400 kbps.



Of course, datacasting can also include limited Internet services such as cached data and data carousels, so that Internet access is facilitated by the data component of the television signal. But, the datacasting Internet service may be limited in the content available and the number of users who can access the service simultaneously. The digital television or datacasting service would then serve as a portal to the Internet.

A datacasting channel could also be used to deliver true Internet access on demand (with the aid of a return link), but the 19 Mbps data capacity of the channel would limit it to serving only a few thousand customers (maybe 25 000 terminals or television receivers) at most. In the wired environment, the subscriber limitation, which is not nearly so constraining as it is with wireless connections, is being addressed through the development of IP (Internet Protocol) Multicasting. This sends commonly sought content or data to mirror sites closer to the community of users. From there, relatively short 'tails', or connections, from the mirror site to nearby users are employed. This reduces the need for one-to-one connections from the Internet service provider's main site, or server, through the network to every customer and increases the capacity of the service provider to serve more customers.

The data capacity of a digital radio service using the Eureka-147 standard (the European digital audio broadcasting (DAB) standard) is around 1.8 Mbps; the data rate approaches 20 Mbps on a digital television channel with the DVB-T (Digital Video Broadcasting-terrestrial) standard in a 7 MHz television channel. These data rates are approximately 30 and 400 times faster, than can be achieved through wired telephone lines which are currently capably of delivering about 56 kbps of data. Even the prospect of using Asynchronous Digital Subscriber Lines (ADSL) over the telephone network only provides an increase in the data rate to about 1.5 Mbps. While this is considerably better than the present telephone system, it is still a long way short of the potential data capacity of a digital television channel.

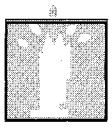
Of course, the broadcasting services bands are allocated to broadcasting, aren't they? A colleague once said to me that the day will come when the value of the spectrum currently being used for television broadcasting, and for radio to a degree, will become so great that the greatest value of the spectrum will be in using it ONLY for mobile purposes. The corollary is that any purpose that can be serviced by cable, that is where reception is at fixed locations, should move to the cable medium leaving the radiofrequency spectrum for those highly prized and very valuable mobile applications.

Clearly, listening to the radio is a mobile activity for much of the time—in cars, while commuting via public transport or while using a Walkman-type receiver when walking or running, or at the beach. Television viewing, however, has been mainly an activity for viewers at fixed locations. This raises questions about how we use the spectrum today, particularly in the broadcasting environment.

One might ask at this point, when do people watch television in a mobile environment? While mobile television viewing is not common in Australia at present, the DVB standards permit the use of a different modulation system from that used for fixed reception, to provide reliable mobile digital television services. This ability is one of the advantages of the DVB digital system over analog television standards.

Many readers will know that mobile television is considered important in some countries. In Japan, Singapore and in some European markets there are proposals for mobile television to be provided for commuters while they are captive audiences using mass transit services. However, let's assume for the sake of this discussion, rightly or wrongly, that there is not going to be great deal of mobile television viewing in Australia, and that no-one wants to do anything that facilitates it.

On looking at our hypothetical situation, maybe broadcasters will find that in a competitive market for spectrum access they can only afford to use the amount of spectrum necessary to deliver a mobile television service at the lowest ▷



Innovations

acceptable definition over the air. They therefore decide that they can provide their higher definition services more economically via cable, microwave or satellite.

The question is: When, and at what price, will the value of the spectrum used to broadcast television services to fixed or portable receivers become so great that broadcast television as we know it will have to move from the wireless to the wired medium?

Of course, today this is not the question. Rather, we are far more concerned with delivery of analog and digital free-to-air radio and television broadcasting services, regulation of broadcasting services and their program content, as well as regulation of the new datacasting and online services.

'When, and at what price, will the value of the spectrum used to broadcast television services to fixed or portable receivers become so great that broadcast television ... will have to move from the wireless to the wired medium?'

It might be interesting, though, to do an analysis of the potential value of the radiofrequency spectrum to the various users and to try to estimate the value of spectrum used for broadcasting compared with the value of that spectrum if it were to be used for mobile applications, ie. for those telecommunications services which cannot be delivered by wired communications links. The Productivity Commission's report of its Inquiry into Broadcasting raises this issue, suggesting that separation of content and carriage licences would free broadcasters to surrender spectrum to more profitable uses of that medium if alternative means of delivery of their services became preferable.

To see the final report, *Inquiry into Broadcasting* go to the Productivity Commission web site <www.pc.gov.au>

Of course, the reality is that the cost of a cabled infrastructure to handle the high volume of broadcasting services to be delivered to every home, to apartments, hotels and businesses is likely to be so great that the balance of the economic arguments would probably favour retention of the existing free-to-air systems and infrastructure for the foreseeable future.

Let's look at a few facts. In Australia, analog television services are delivered to more than 95 per cent of the population by free-to-air television transmissions from around 1500 transmitters using radiofrequency spectrum. The capital invested in this infrastructure is many billions of dollars and is set to increase by around $6 billion to introduce digital television services. In contrast, in the USA and Europe, more than 80 per cent of viewers receiver their television broadcasting services via cable or satellite; dependency on free-to-air services is therefore much less in the USA and Europe.

Today, cable television is available to something like one million or so Australians, but the total television viewing audience is now approaching 19 million people. Until the number of Australian homes passed by cable infrastructure approaches the same as in the USA and Europe, the practicality of transferring television broadcasting services from the spectrum to cable is likely to be problematic because the move could be considered to be prohibitively costly for consumers and broadcasters alike.

The value of the 60 MHz of mobile telephone spectrum recently auctioned for new GSM services in the 1.8 GHz band exceeded $1.33 billion nation-wide. This new GSM spectrum is valued at more than $700 million for Sydney alone and more than $400 million in Melbourne. Considering that television broadcasting services are set to use more than 70 MHz in each city, at least during the period that analog and digital television services are simulcast, what is the value of this television broadcasting spectrum?

In the longer term, is this spectrum of more value to other users than it is to broadcasters and their viewers? What are the costs of potential alternative delivery mechanisms for broadcasting to fixed locations? Where does the future lie for broadcast television?

Perhaps we are witnessing the dawn of new ways of broadcasting. These and other questions are likely to exercise our minds for the foreseeable future. No doubt the next few years are going to be immensely interesting for those who take an interest in these issues.

1 GSM means Global System for Mobile telephones and is one of the systems used for digital mobile telephones.