It is likely that different labelling schemes will develop world wide to reflect different community and cultural values.

The PICS system gives Australia the opportunity to develop a labelling scheme for on-line content which incorporates Australian community values and standards. To this end the ABA has recommended that it convene an On-line Labelling Task Force, with all relevant parties, including the Office of Film and Literature Classification and the on-line industry to develop a labelling system which can be used by Australian content providers and consumers. The ABA also recommends that Australia participate in the PICS development process in the international arena, and collaborate with relevant expert bodies to maximise Australian labelling consistency with overseas ratings schemes.

Other Recommendations

The Report makes a number of recommendations which seek to promote the productive use of on-line services in Australia and encourage the development of Australian content on-line. The ABA has also recognised that community understanding of on-line services, codes of practice and the implementation of labelling schemes will be critical to their success and has recommended that a co-operative approach to community education by government, industry and consumer groups be adopted.

In view of the dynamic nature of on-line services the ABA has also noted the need to monitor developments to ensure that the proposed regulatory regime remains effective and appropriate and encourages the productive use of on-line services in Australia.

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Satellites - the Information Superskyway?

Chris Deacon argues that the role for satellites in the global information infrastructure should not be under-estimated.

It is well accepted now that satellites can play a unique role in a number of communications scenarios.

For example, satellites are often appropriate for rural or remote regions that are poorly served by existing terrestrial fixed wired or wireless technology, or mobile cellular. They are particularly well suited to point to multi-point (and vice versa) applications where many users are widely dispersed and for mobile and fixed users requiring reliable services without geographic or terrain restrictions.

Despite initial skepticism, satellites have now become a widely accepted vehicle to provide virtually "instant" networks for business and entertainment broadcasting applications, including direct to private homes. In many respects, Australia led the way with its outback Homestead and Community Broadcasting Satellite Service that began on the AUSSAT system a decade ago.

But satellites are often forgotten when it comes to debate about the so-called "information superhighway." The purpose of this article is to shed some light on recent developments that could lead to satellites providing broadband "information skyways" direct to homes and businesses spanning the globe. This may actually happen before much of the world's population gets within cooee of terrestrial fibre.

Although it would not seem immediately obvious in Australia now, a quiet revolution is taking place in the satellite communications industry worldwide. Apart from the range of new creative ventures and changing business support relationships that have emerged recently, there is an increasing awareness of satellite system solutions. More bandwidth is being made accessible by more people in more places than ever before.

Apart from the new generation of global mobile personal communication satellite systems (such as Iridium, Globalstar and Odyssey) which promise to support levels of mobility ranging from local to global, new satellites are presently being designed to be capable of the advanced features of fibre and wired networks, and more. These systems avoid the extensive terrestrial infrastructure associated with cables. They are capable of providing ubiquitous coverage the day they are brought on stream and will bring broadband services associated with high capacity optical fibre to users at a fraction of the cost and in far less time. Some are proposed to be in place by the end of this decade.

By contrast, attempts to bring interactive broadband services to the home via fibre are only just beginning. In many countries, access will not be available to many areas until well into the next century at estimated costs of hundreds of billions of dollars.

The Information Superhighway

The "Information Superhighway" concept erroneously suggests a concept that is purely land-based, such as fibre. Satellites, however, are already playing a major role in the global information infrastructure and are destined to play an even greater role in future. There are several reasons why I believe this will happen.

First, they will play an increasingly important, complementary role to terrestrial fibre and wireless delivery systems. Secondly, it seems likely that they will be able to fulfil universal access policies. Importantly, satellites are acting as a catalyst to reduce, if not eliminate, the historic barriers between the different segments of the communications supply industry and many of the traditional regulatory barriers that have restrained the development of competitive international telecommunications.

Finally, the satellite industry is experiencing unprecedented growth, particularly in the Asia-Pacific region. Some industry predictions suggest up to 300 new commercial geostationary satellites will be launched worldwide between now and the year 2000. This represents hundreds of billions of investment dollars, and that does not include the two hundred or so medium and low earth orbiting satellites that are also expected to be deployed by then. Hughes, the largest manufacturer of commercial satellites, believes it will be more like a 'wireless expressway'. Ninety-five satellites have been ordered or are expected to be ordered for Asia-Pacific region alone, representing some US$10B worth of business.

Whether all these systems make it to orbit, or successfully reach their market niche, remains to be seen, but I, for one, plan to be watching closely.

Internet - a key driver

What is causing this rush to orbit that some have compared to the great Oklahoma Land Rush of the 1800s? It is not surprising that many of the industry drivers for these new systems are similar to the Internet model, i.e. personal and direct communication with individuals, being made possible by similar advances in digital electronics that have made the exponential rise in affordable, personal computing possible. The exploding interest in Internet, and in particular the potential of the World Wide Web, indicate that people want to interact with data, still images, sound and full-speed video.

And now, introducing the Information Superskyway

If only a few of the current new satellite technology proposals succeed, there will be a significant increase in telecommunications capacity in space over Australia by early next century. This will support a wide range of services from low speed data to broadband to the desktop to millions of users, on demand, worldwide.

No doubt this will happen irrespective of whether Australian parties decide to become involved or not.

Although a couple of the original proposals for global mobile personal communications satellite (GMPCS) voice services are in financial difficulty, several have now developed beyond the concept stage and have attracted worldwide attention and substantial investments, despite initial industry doubts. Iridium has its satellites under construction now and will commence launching them later this year. Similarly, Globalstar and ICO-Global seem well advanced. Odyssey plans to announce its investors soon. They have been joined by several ambitious regional mobile geostationary satellite proposals such as APMT, ACeS, Afro-Asian and Satphone. Several of these systems have investors and industrial partners with impeccable credentials and will probably succeed. Two way global low-speed data messaging and tracking has already begun with systems such as Orbcomm and GE Starsys implementing large constellations of satellites over the next three years.

The new round of global and regional broadband systems has generated even more frantic attention in international regulatory circles, driven by the need for additional global spectrum to be assigned to these systems. These systems promise to extend the concept of any person, anytime, anywhere communications -- the goal of the GMPCS -- to broadband communications in the fixed satellite service.

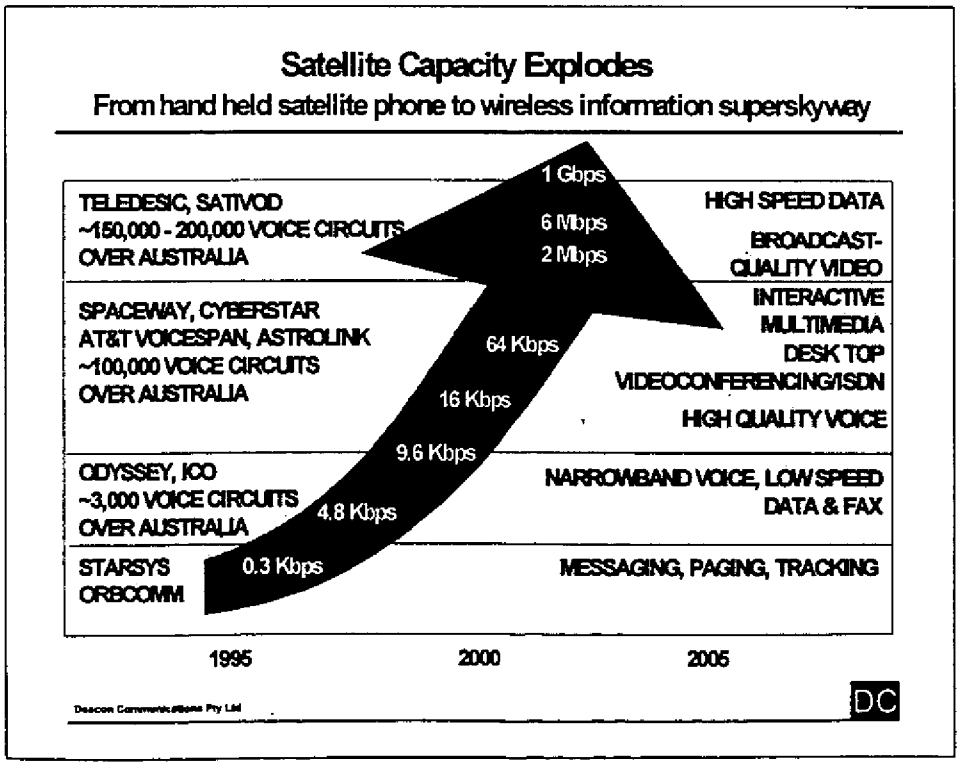
Ka-band has been identified as having the most suitable characteristics for providing interactive high speed data to small (66cm and larger), low cost terminals as it permits higher maximum data rates (of several Gbps) than C or Ku band. It is probably more sensible to describe these systems as multimedia satellite systems as service data rates typically from 16kBps to 8Mbps (and higher) are planned. Broadband satellites will allow symmetric and asymmetric data communications; depending on the customer application and antenna size, this will support a broad range of applications.

Also the capacity of these systems may be reused many times and spectrum shared between several satellite systems providing multiple access for millions of users worldwide.

Broadband satellite systems will support dynamic allocation of satellite resources and bandwidth on demand. Fibre networks, by comparison, can have huge quantities of unused bandwidth lying fallow in the form of dark fibres routed past homes of consumers whose needs may be met by only a small fraction of the total potential bandwidth at their disposal.

The idea of an integrated terminal in every home, offering telephone, data, TV, interactive video, computer links, etc. is no longer regarded as fantasy.

With the capability of broadband satellites to provide bandwidth on demand, consumers will experience the reality of multimedia convergence at a



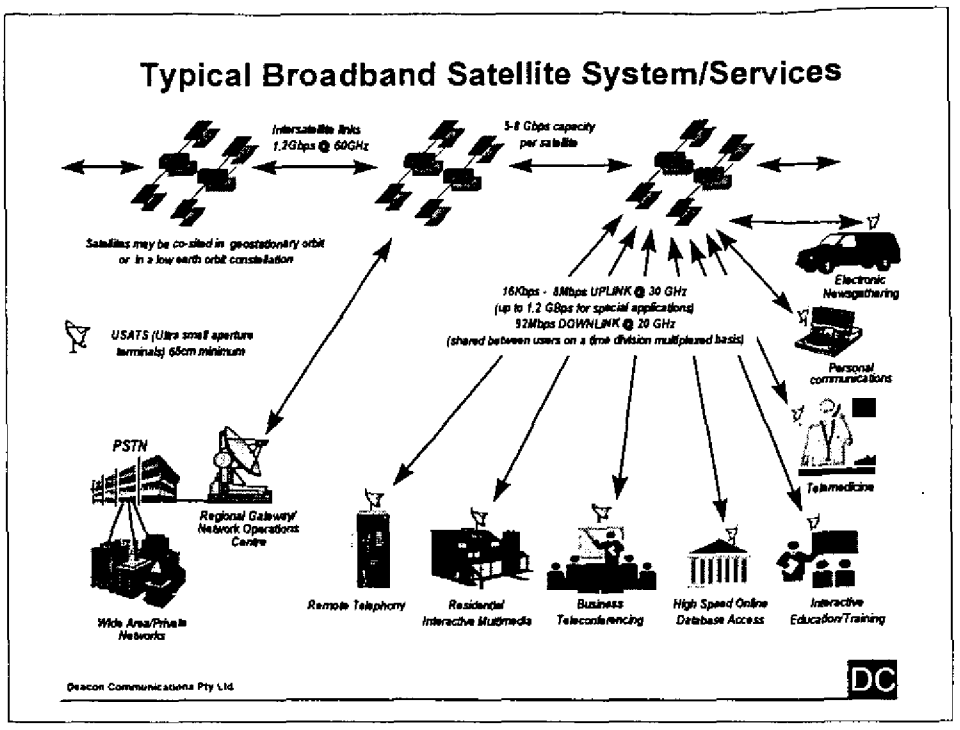
relatively low capital cost per location served. These systems will afford new efficiencies on a competitive, consumer oriented basis. Greater flexibility will be achieved by providing semi-fixed and fixed public and private access virtually anywhere on the earth.

Individual users, for example, will be able to use the systems for basic telephony and data communications. Low end terminals could be a desktop package similar to Hughes DirecPC or DirecTV consisting of a PC port and a video port typically supporting up to 10Mbps connections. Depending on the bandwidth selected and the size of antenna, the satellites can also provide multicasting of specialised news and financial information; personal communications such as e-mail, faxes, chatrooms and interactive services such as personal video-telephony and high speed PC access to Internet; pay per use video services, entertainment and information multimedia services to millions of end users.

Business users will be able to put these new capabilities to an equally wide range of applications including video-conferencing, training and educational services; medical and technical imaging, and data services such as those now carried on present generation VSAT networks. They will extend the present-day VSAT technology to businesses whose communications needs are not sufficiently large to justify access to a Ku-band VSAT network and to "desktop" USATs (ultra-small aperture satellite terminals) based on "Plug n Play" PC cards connecting individuals to information service providers. Business terminals may have the option of ATM up to say 40 or 50 Mbps (70cm or larger).

These services can potentially be provided to every person in the world, whether in urban or remote regions and can be used in lesser developed countries as a substitute for scarce basic telephone facilities.

Some of the services envisaged are already here! Only this month a new fast Internet computer networking service called Cyber City was announced in Israel for service via the Amos-1 satellite in Eastern Europe. The system is capable of providing data direct to users with an installed personal computer card and a 60cm dish antenna to receive data at 40 Mbps. The same dish will also enable customers to receive television services. Compressed digital movies that normally take over an hour to download over ISDN circuits are reported to take only two minutes on this system.



Brought to you live via Global Broadband Satellites

Several hundred satellites have been notified to the International Telecommunication Union for use of the Ka Band. The geostationary systems consist of an interconnected series of regional networks based on spacecraft clustered in several orbital slots with coverage selectively tailored to market requirements. Some systems, for example, plan to cover only the world's land masses. Others plan to cover particular regions they believe to be the most attractive from a market perspective and have decided to ignore Australia. Lets look briefly at some of the *global* proposals.

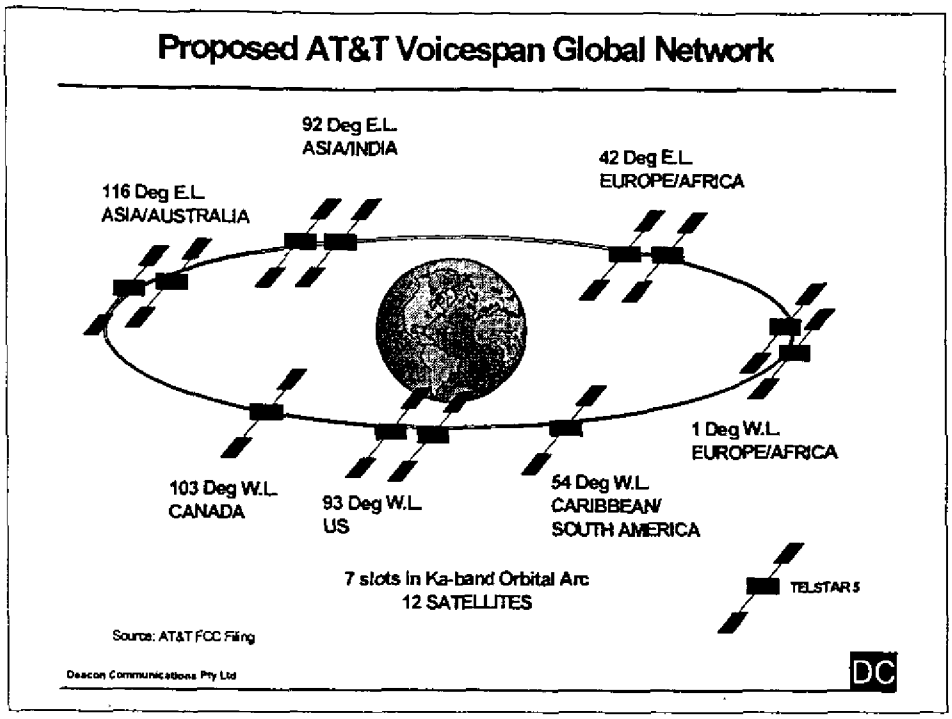
Voicespan has been proposed by AT&T as a global network of twelve geostationary satellites in seven different orbital positions, including two over Asia and Australia. AT&T plans to launch the first *Voicespan* satellite in 2000, with services at speeds ranging from 32 Kbps to 1.5 Mbps.

Lockheed Martin is seeking to establish a US$4b global system of nine interconnected Ka-band satellites located at five geostationary slots. The *Astrolink* system would be capable of providing users access to two-way digital services such as voice, data and video at transmission speeds ranging from 16Kbps to 8.448 Mbps and above. Lockheed Martin believes their system, when layered on top of a hybrid wired/wireless terrestrial infrastructure, can serve the needs of medium to high bandwidth users anytime, anyplace, for a fraction of the cost of existing or planned infrastructures. The company envisages applications such as digital communications services in the fields of training, telecommuting, distance learning, transaction processing, personal computer Internet access, smart building monitoring and telemedicine, at a quality which will equal or surpass fibre.

*GE*Star* is a US$4b worldwide Ka-band system that has been proposed by GE American Communications. It will consist of nine geostationary satellites at five orbital slots. Services proposed include high speed data trunking or home-use multimedia, interactive business data applications suitcase-sized portable digital satellite newsgathering and video/audio applications for entertainment.

Hughes Communications *Spaceway* has been proposed as a combined voice, data, and videotelephony platform with a fleet of 15 satellites offering coverage of most of the world's populated regions. Hughes estimates the cost of the system as between US$3 - 5 billion, depending on the configuration of the system.

Loral is proposing to establish a US$1.05 billion broadband satellite system using three interconnected Ka-band GEO satellites to deliver two-way entertainment and information



services to home and business customers in North America, Europe, the Middle East and Asia. Loral plans to commence services in 1999 by taking a three-satellite scalable approach. *Cyberstar* will target customers who have a high demand for broadband services but are unpassed by existing terrestrial based infrastructure, with an integrated package of interactive information services and entertainment.

Morning Star Satellite Co. proposes to use four orbital slots to locate four hybrid Ku/Ka band satellites at a total cost of US$820m.

In contrast to most other Ka-band plans, *Teledesic* plans to establish a global constellation of 840 low earth orbit satellites. They claim this will have the advantage of providing earth-satellite response delays as short as those experienced by use of fibre optic transmission systems. Seamless interaction with terrestrial networks is a key aspect of the US$9b *Teledesic* proposal, which has been backed by Bill Gates and Craig McCaw. The project plans to provide everything from Internet data transfers to multimedia and videoconferencing, with transmission speeds ranging from 16 Kbps to 2 Mbps. The system is scheduled to be launched from 2001-2003.

As this goes to press, *Teledesic* continues to look even more real. The company recently hired one of the developers of the Internet architecture and is reported to have appointed launch procurement staff from the Iridium project. Initial commercial partners (i.e.telecoms service providers) are expected to be announced in the next few months.

Building on their experience with development of the *Globalstar* spacecraft, Alcatel Espace has proposed *Sativod*, a 60 satellite LEO constellation, as a broadband solution that will directly compete with *Teledesic*.

A summary of the global broadband systems proposed is shown at Table 1.

Regulatory nightmare or regulatory challenge?

In some ways, the regulatory difficulties associated with the new breed of stationary coverage broadband satellites may not be as difficult to resolve as the present round of applicants for global mobile services. The reason for this is that the global mobile satellite systems will permit handheld terminals capable of roaming through countries worldwide as well as some fixed terminal access, whereas the global broadband systems are generally based purely on fixed terminal access, which administrations would find easier to license.

Moreover, because of their orbital characteristics, the GMPCS systems cannot prevent their satellites overflying countries that prohibit access. Some operators, however, plan to selectively switch off certain coverage beams in these circumstances. It will be interesting to see whether this actually takes place, in practice, as there will be a major business incentive to provide "incidental" coverage (as for regional satellite TV and Direct-to-home services) and to rely on individual countries to police access, if necessary, via terminal licensing.

GMPCS operators seeking to cooperate in pushing for an open market environment recently reached a rapprochement. They will seek the support of national regulatory agencies in not awarding exclusive licences and facilitating non-discriminatory, cost based, interconnection to terrestrial networks and roaming arrangements.

It is expected that some guidelines for GMPCS systems will emerge from an ITU Policy Forum to be held in Geneva in October. While agreements there will be non-binding, they may provide some pointers for those who will need to establish suitable regulatory arrangements for the fixed broadband systems which will be launched around the same time as the global mobile satellite constellations.

Most countries have yet to determine how they will allocate scarce spectrum resources to multiple licensees (of mobile and fixed global systems) and some inconsistencies are already evident. Recent record prices have been paid for attractive domestic orbital slots in the US, while others have effectively gained free access to huge amounts of spectrum available worldwide. The global systems may benefit from the US FCC's view that spectrum auctions will likely not apply, although the Australian Government has yet to announce any formal policy. The geostationary broadband operators may not be as lucky.

As in the case of the global mobile satellites, I believe the international regulatory arrangements or "rules of the road" for global broadband satellites will probably cause the biggest policy debate. I do not think the technology or the "software" will be major hurdles.

Conclusion (or, "and now a word from our sponsor")

It is evident that many well-established telecommunications organisations (such as AT&T, GE, SES/ASTRA, Alcatel, Motorola, Orion, Hughes Communications, MCI, Singapore Telecom, Pacifik Satellit Nusantara and others) are presently crafting their international strategies to capitalise on new digital broadband

Table 1: Summary of Global Ka-band (broadband) satellite proposals

System	Company	No. of satellites	No. of orbital locations	User Data Rates	Capacity per satellite	Deployment Period	System Cost (US$B)
Astrolink	Lockheed Martin	9	5	16-8448 Kbps	7.7Gbps	2000 - 2003	$3.994
Spaceway	Hughes Comm. Galaxy	20	15	16-6000 Kbps	4.4Gbps	1999 - 2005	$5.171
VoiceSpan	AT&T	12+4 spare	7	32-1544 Kbps	5.9Gbps	2000 - 2002	?
GE*Star	GE Americom	9	5	384 kbps-40Mbps	1.8 Gbps	2000 - 2005	?
Morning Star	Morning Star	4	4	Fwd: 30 Mbps Rtn: 65 Kbps	625Mbps	2000 -	$0.823
CyberStar	Loral	3+1 spare	3	384 -3088 Kbps	4.9 Gbps	2000 - 2003	$1.050
Teledesic Network	Teledesic	840	LEO	16 - 2048 Kbps. Up to 1.244 Gbps	5 Gbps	2001 - 2002	$9.004
Sativod	Alcatel Espace	60	LEO	Broadband data & video	?	2001 - 2002	$3

information and entertainment satellite services. New ventures and partnerships are being announced every day.

As far as I can determine, Australia has yet to stake a strategic claim on these developments. Some proposals have coverage of Australia in their plans, while some potential operators have ignored the Australian market completely. Is it possibly because they perceive little interest on the part of carriers and other potential investors in Australia, or are they not convinced there is a sufficient market here for multimedia services? Given Australia's strong IT record, and the global market opportunities provided by these satellite developments, I would have thought interest would have been stronger, particularly from those organisations seeking to become global information service providers.

Whether Australia's carriers, policymakers, regulators and users will be positioned in sufficient time to take advantage of the inevitable availability of bandwidth and capacity that will emerge around 2000, has yet to be determined. What is clear is that strategic investment decisions for systems such as Teledesic, Astrolink and Spaceway will be well advanced (if not concluded) by the end of this year. Australia could end up being serviced by offshore interests, or even worse, ignored altogether.

Australia could significantly advance its commercial interests in the Asia-Pacific region, by doing more than simply playing a reactive role. This is particularly valid in the context of the global focus that the 2000 Olympics will provide. We are particularly well positioned, both geographically and with respect to the relative depth and sophistication of our telecommunications and supporting industries to be a gateway and service supplier, and to support regional marketing and distribution. We also have a sound understanding of the regulatory and political hurdles that would bar service providers from outside the region.

It seems that the USO problem in Australia will finally be addressed soon, almost certainly with space-based technology playing a major role; but the question remains - by whom? No doubt this will continue to be an issue of hot debate.

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