INQUIRY INTO INFRASTRUCTURE AND THE DEVELOPMENT OF AUSTRALIA'S REGIONAL AREAS

SUBMISSION
BY

AUSTRALIAN COMMUNICATIONS AUTHORITY

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INTRODUCTION

This submission specifically addresses the following terms of reference for the inquiry into infrastructure and the development of Australia's regional areas:

- factors that would enhance development in regional areas, including the provision of infrastructure such as ... telecommunications.

In so doing, the submission also touches on the following terms of reference:

- deficiencies in infrastructure which currently impede development in Australia's regional areas; and
- the role of different levels of government and the private sector in providing infrastructure in regional areas.

This submission sets out information related to the following matters:

- Federal Government regulation which facilitates the provision of telecommunications services in regional areas;
- the management of radiofrequency spectrum;
- the administration of consumer safeguards, the telecommunications numbering plan and other regulatory matters;
- the data capability of Telstra's access network;
- improving access to existing telecommunications infrastructure; and
- the expanding availability of satellite services.

REGULATION WHICH FACILITATES THE PROVISION OF TELECOMMUNCIATONS SERVICES

Licensing arrangements

The new telecommunications regulatory framework under the *Telecommunications Act 1997* (the Act) was designed to achieve full and open competition in the provision of telecommunications infrastructure and services. It removed the limit on the number of carriers permitted to enter the industry. Carriers are individually licensed by the ACA and subject to initial application and annual licence charges which are set so as to recover the costs of regulating the industry. A carrier licence permits the holder of the licence to supply telecommunications carriage services to the public over any type of telecommunications network infrastructure. The ACA has granted 28 carrier licences as at 16 April 1999.

The licensing process itself does not inhibit service provision, as the ACA's requirements for the granting of a carrier licence are not particularly onerous. The ACA's requirements are that the applicant must:

- be a constitutional corporation, an eligible partnership or a public body;
- have a current Industry Development Plan which has been approved by the Minister for Communications, Information Technology and the Arts; and
- pay an application fee of $10,000.

In addition to the current 28 carriers there are also over 600 carriage service providers (CSPs) registered with the Telecommunications Industry Ombudsman.

CSPs supply carriage services, such as telephone and internet services, to the public over telecommunications network infrastructure without being required to obtain any licence or approval from the ACA. Under Part XIC of the *Trade Practices Act 1974* all CSPs have access rights to the services supplied by carriers where those services are "declared". Access rights facilitate the provision of access to declared services by service providers in order that they may supply services themselves. There is no restriction on the types of services which may be supplied by service providers and it should be noted that carriers are CSPs where they supply services such as the standard telephone service.

The provision of telecommunications services are also facilitated by a number of particular provisions in Acts administered by the ACA (e.g. those relating to universal service) and through other Government policies (e.g. the RTIF). Various matters relating to those other provisions in the Acts administered by the ACA are discussed later in this submission.

MANAGEMENT OF RADIOFREQUENCY SPECTRUM

The potential for Australia's regional areas to benefit from satellite-delivered services has long been recognised. ACA radiocommunications licensing arrangements facilitate the development of satellite services by minimising bureaucratic processes and costs.
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The ACA has implemented equitable and efficient licensing arrangements to accommodate the use of the radiofrequency spectrum, including the introduction of new space-based services delivered via satellite.

Previous licensing arrangements had required individual licensing of earth terminals in all circumstances. If these arrangements had been applied to new space-based services an onerous regulatory burden could have been imposed on industry and the general public.

The new arrangements are based on the principle that all spectrum used by space-based services should be authorised by a licence. The configuration of the satellite or the satellite system, the nature of its use of Australian spectrum, and the commercial preferences of the satellite operator or the service provider are factors that need to be taken into account by prospective licensees. Those licensees now have the option of apparatus licensing either the space segment or the ground segment:

(a) space segment licensing involves the satellite operator or service provider taking out apparatus licences for space stations on satellites—earth terminals communicating with those space stations are then authorised by the Radiocommunications (Communication with Space Object) Class Licence 1998; and

(b) ground segment licensing involves the satellite operator or service provider taking out apparatus licences for each individual fixed or mobile earth terminal that is communicating with space stations that are not licensed.

Management of Radiofrequency Spectrum - Spectrum Plan

The ACA's Spectrum Plan divides the radiofrequency spectrum at the highest level into frequency bands, and specifies the purposes for which the bands may be used. It is intended to:

- provide a basis for management of the radiofrequency spectrum in Australia;
- inform radiocommunication users about the services allocated to each frequency band, and of any conditions attached to those allocations;
- reflect Australia's treaty obligations as a member of the International Telecommunication Union (ITU); and
- provide details of international frequency allocations agreed by the ITU for the three world Regions.

The ACA's Spectrum Plan is updated following every World Radiocommunications Conference which is normally every two years. The last update was in January 1999 to incorporate the outcomes of the last Conference, which made provision in the Radio Regulations for a number of new services. From an infrastructure development view, the most significant changes arising from recent conferences were:

- provision for global LEO mobile satellite systems,
- additional allocations for non-geostationary orbit fixed satellite systems to accommodate high capacity services—these allocations related to regulatory provisions to accommodate proposals from Teledesic and Skybridge which are global satellite systems intending to provide high data rate services to businesses and homes; and
- new allocations for high density fixed services, including high altitude platform stations—these systems are supported by large balloons and

have the potential to compete with the satellite technologies in delivering high data rate services.

ADMINISTRATION OF CONSUMER SAFEGUARDS

The Universal Service Obligation

The Universal Service Obligation (USO) is the obligation to ensure that the standard telephone service (ie. a voice grade telephone service or another form of communication that is equivalent to voice telephony) and payphones are reasonably accessible to all people in Australia, on an equitable basis, wherever they reside or carry on business. The USO addresses the needs of people with a disability by requiring the supply of carriage services and customer equipment in order to comply with the *Disability Discrimination Act 1992.*

The fundamental purpose of the USO is to safeguard access to a minimum level of essential telecommunications services for all persons in Australia. Other significant policy intentions with respect to the USO, as stated in section 138 of the Act, are summarised below:

- the USO should be provided as efficiently and economically as practicable; and

- losses incurred in satisfying the USO must be shared on an equitable basis amongst all carriers unless they are granted an exemption.

The costs of the USO are determined on the basis of the universal service provider providing services on the most efficient, cost-effective basis available, while still ensuring that appropriate services levels and standards are maintained. Telstra is the national universal service provider, and has responsibility for meeting the USO.

The USO has a been a particularly successful policy in Australia, ensuring that where ever people reside or carry on business they have access to a telephone service. In 1998 approximately 97% of Australian households have a telephone, which is one of the highest levels of telephone penetration in the world. (For example, in 1997 the comparative figures for the United Kingdom were 93%, the United States of America 93.9% and Canada 98.7%.) This level of telephone penetration in Australia is a significant achievement when the inherent difficulties of providing services to a rural and remote population dispersed over a large area are considered.

The cost of providing the USO in 1997-98 is currently subject to assessment by the ACA. Telstra has lodged a claim for $1.8m for 1997-98 costs but adoption of the recommendations contained in consultant reports commissioned by the ACA as part of its assessment process would result in a cost considerably less than $1.8b. Telstra's claim, therefore, may not be a good indicator of the costs of providing

telecommunications service to regional Australia. The ACA's assessment will be completed by end June 1999.

Incorporation of Digital Data Services into the USO

As discussed below under the heading 'Policy response to availability of ISDN/64kbit/s capability', the Government has announced its intention to incorporate a digital data capability under the USO in the form of ISDN equivalent or comparable service.

Scope for tendering for USO services

The Act allows for some or all of USO services to be placed out to tender, and the Department of Communications, Information Technology and the Arts has recently issued a discussion paper on this issue.

Review of Telstra's Universal Service Plan

In May 1998 the Minister for Communications, Information Technology and the Arts ('the Minister') approved Telstra's first universal service plan. This plan sets out how Telstra proposes to address its obligations under the USO. On 1 December 1998 the Minister wrote to the ACA requesting that it conduct a review of Telstra's universal service plan, and that in doing so the ACA should give particular attention to:

- the supply of interim services by use of satellite phones;
- arrangements for people with disabilities under the plan;
- Telstra's commitments in relation to payphone services; and
- connection and fault repair times, in particular for remote communities, set out in the plan.

On 18 December 1998 the ACA issued a public discussion paper calling for submissions to the review. By the end of February 1999 seventeen submissions had been received. After consideration of these submissions and other material a report was compiled, taking account of Telstra's recent performance in the areas outlined by the Minister and also addressing other matters raised by submitters. The report contains 29 recommendations for changes to Telstra's procedures under its USP, in relation to the manner in which it addresses its Universal Service Obligations.

The ACA's report was submitted to the Minister on 31 March 1999.

Customer Service Guarantee

The Customer Service Guarantee (CSG) supports effective infrastructure development in regional areas through establishing standards of service for the provision of standard telephone services.

The CSG involves the ACA setting performance standards for carriage service providers and payment of specified damages to customers where those standards are not met. The objective of the CSG is to encourage improvements in service and to guard

against poor service by providing carriage service providers with an incentive to meet minimum standards.

The CSG has been in operation since 1 January 1998. Current CSG provisions apply to the standard telephone service terminating at a handset without switching functions, and certain enhanced call handling features (eg. call waiting). Thus it does not apply to mobile services, services that terminate at switching systems (PABXs) or customer equipment with switching capability. Standards of service covered by the CSG Standard include timeframes for the connection of service, the repair of faults and the attendance of appointments.

The impact that the CSG is having on the performance of the industry is being monitored by the ACA on a quarterly basis. The ACA's recent *Telecommunications Performance Monitoring Bulletin - Issue 7 December 1998 Quarter* (available through the ACA's website www.aca.gov.au) provides information about the connection and repair of services in rural areas within CSG timeframes by Telstra.

Provisioning of new services

Table 1 defines in simple terms what is meant by 'major rural' and 'minor rural' areas for the purpose of standards for connection of telephone services against the CSG.

Table 1 – Definition of rural areas for provisioning performance against the CSG

Location	***Definition of location***	***Connection time***	
		Available cabling (capacity) or other infrastructure that carrier can use	No available cabling (capacity) or other infrastructure that carrier can use
Major rural	Areas in Australia with a population between 2,500 and 10,000 people	Within 10 working days of customer request	Within 1 month of customer request
Minor rural	Areas in Australia with a population between 200 and 2,500 people	Within 40 working days of customer request	Within 6 months of customer request

Source: *Telecommunications Performance Monitoring Bulletin - Issue 7 December 1998 Quarter*

Table 2 presents data showing Telstra's national provisioning performance in rural areas against CSG timeframes. The data shows that Telstra has been considerably more successful in connecting new services within CSG timeframes in minor rural areas than in major rural areas. In addition, the data in the table indicates that in major rural areas Telstra's performance has consistently and markedly been lower where there is no available infrastructure at the site.

Table 2 – Provision of service by Telstra in rural areas

	National quarterly average		
	June 98	**Sept 98**	**Dec 98**
Provision of new services against CSG-major rural areas with infrastructure	88	90	91
Provision of new services against CSG-major rural areas without infrastructure	62	68	62
Provision of new services against CSG-minor rural areas with infrastructure	97	98	97
Provision of new services against CSG-minor rural areas without infrastructure	97	97	98

Source: *Telecommunications Performance Monitoring Bulletin - Issue 7 December 1998 Quarter*

Fault rectification in rural areas—Telstra

The national performance figure for faults cleared within rural areas (within two full working days after being notified of a fault) improved by three percentage points to 84 per cent during the December 1998 quarter. Telstra's performance in rural areas against the CSG timeframe in the June quarter and the March 1998 quarter was 82 per cent and 78 per cent respectively.

Review of CSG Standard

The ACA has recently reviewed the CSG Standard, in accordance with a request from the Minister to review the standard with a view to tightening standards where practicable. Some key findings and recommendations are:
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- the CSG Standard should be amended to better safeguard small business—the proposed definition includes residential and small business customers who have up to 5 lines and will be independent of the type of equipment used to connect to the line;
- standards for the connection of services should be simplified and tightened so that, for example, remote customers living in an area where a telecommunications network already operations should not wait more than 3 weeks for a connection.

Further to the ACA's review, the Government has accepted the ACA's recommendations, although implementation of some of the recommendations is expected to be delayed to allow industry to prepare for their introduction. The ACA is awaiting a new CSG direction from the Minister to enable the implementation of these recommendations.

Number portability

Number portability allows a customer to change his or her carriage service provider and retain his or her telephone number. This removes a barrier to competition that exists when customers must change their number in order to change their telephone operator. Number portability therefore increases competition by allowing customers to make decisions based on the price, available features or quality of service offered by competing operators without threatening the continuity of their business operations.

The ACA has set implementation dates for the introduction of number portability for local services (LNP). LNP has been a requirement since 1 May 1998 for simple services between Optus and Telstra. However, the ACA has granted a number of exemptions from the obligation to provide LNP for complex services and to carriage service providers (other than Telstra and Optus) until the network and operational codes and agreements that will allow LNP to operate more widely are finalised. Once these exemptions expire, on 30 November 1999, LNP will be available for most local services.

The ACA also intends, in the near future, to set a date for the introduction of local rate and freephone number portability (ie. for numbers beginning with the digits 13 and 18). The ACA has also prepared two papers investigating technical options for mobile number portability.

Pre-selection decisions

The ACA recently determined that pre-selection arrangements be extended to apply to calls originating on fixed networks and terminating on mobile networks by 30 June 1999. When making a call from a fixed phone to a mobile phone, consumers will now be able to choose which telecommunications carrier handles the fixed network component of that call. This provides consumers with increased choice in relation to these services. The decision gives new entrants and consumers the opportunity to benefit from competition in a greater range of services in the expanding mobile segment of the industry.

Self regulation and industry codes

One of the informing principles of the Act is light touch regulation. To achieve this the Act establishes a framework for self-regulatory activities through a scheme of industry codes. Codes combine the flexibility of industry initiated regulation with requirements for extensive consultation and appropriate regulatory standards, supported by a safety net of legislated powers to ensure compliance.

The Australian Communications Industry Forum (ACIF), a peak telecommunications industry body, was established by industry to manage communications self-regulation within Australia. Some twenty codes are currently under development by ACIF Working Committees convened of industry, consumer and regulatory representatives.

The first three industry codes have recently been registered by the ACA. These codes, summarised below, address issues relating to network standards and pre-selection. They will assist to ensure the provision of quality services and the availability of choice to consumers in their telecommunications services.

End-to-End Network Performance Code

The code sets criteria for telecommunications companies to demonstrate the compliance of their overall network performance in relation to levels of call connectivity performance and transmission quality. Its purpose is to provide consumers with the confidence that the quality of their telephone service will be maintained at reasonable levels and will not deteriorate. The code applies to local, long distance and mobile calls.

Call Charging and Billing Accuracy Code

This code will assist network operators to manage and control the accuracy of increasingly complex charging and billing systems by outlining specific performance criteria. It is intended to give consumers confidence that call charging and billing systems are accurate. The code applies to local, long distance and mobile calls.

Pre-selection Code

This code is intended to maximise customer choice by setting out competitively neutral processes for implementation of pre-selection. It covers the functional scope of preselection, the product, the operational arrangements and the timing aspects.

THE DATA CAPABILITY OF TELSTRA'S ACCESS NETWORK

Context of the Digital Data Inquiry (DDI)

On 30 April 1998 the Minister for Communications, the Information Economy and the Arts, Senator the Hon. Richard Alston, directed the ACA to hold a public inquiry to review whether a carriage service that provides a digital data capability broadly comparable to that provided by a data channel with a data transmission speed of 64 kilobits per second supplied to end-users as part of a designated basic rate Integrated Services Digital Network (ISDN) service should be specified in regulations as a prescribed service under the USO provisions of the Act.

The ACA consulted with carriers, carriage service providers, representatives of end-users, business customers, residential customers and rural customers in the conduct of the inquiry.

The ACA's report (which was tabled in Parliament in December 1998) encompassed a range of conclusions to assist the Government to address perceived inequalities in data service provision, access and price in rural and remote Australia. These are summarised below.

Increasing importance of Internet

The inquiry revealed that access to a data capability is becoming increasingly important in Australian society as evidenced by the increasing demand for Internet and e-mail applications, based on statistics from the Australian Bureau of Statistics (ABS) and other industry sources.

Disparity in data rates between rural and metropolitan areas

Despite the increasing usage of the Internet, there is a significant disparity between metropolitan and rural consumers in terms of their capability to access data services and in the charges they incur for this access. Given that the basic threshold for acceptable web browsing is a data rate of 14.4 kbit/s, the following table demonstrates that 55% of consumers in rural areas are unable to achieve this.

Transmission Rate	2.4 kbit/s	9.6kbit/s	14.4kbit/s	28.8kbit/s
Urban & provincial centres network coverage	99%	98%	85%	60%
Rural areas network coverage	99%	70%	45%	30%

The ACA's report noted that for most Australians, ISDN is not the choice for accessing the common data applications of facsimile, e-mail and web-browsing. For the vast majority of users it is significantly cheaper to access data using dial-up modems over the analogue PSTN, which *generally* incur untimed call charges, than to use ISDN services that incur timed call charges. However, a number of rural and remote consumers incur timed call charges when accessing data from their Internet Service Provider (ISP), as the call to the ISP is outside a local call area.

Costs of upgrading Telstra's access network

The cost of upgrading Telstra's customer access network (CAN) to support greater data capabilities was a focus of the ACA's inquiry. Telstra estimated the costs involved in upgrading the CAN to support a data capability of 28.8 kbit/s would be $3.9 billion. The cost of upgrading all lines to support a data capability of 14.4kbit/s is some $1.4 billion less than for 28.8kbit/s. CAN upgrading would be a major project which would run over a number of years, as in rural and remote areas it would require the upgrading or replacement of a substantial body of cable from the telephone exchange to the customer's premises.

Policy response to availability of ISDN/64kbit/s capability

In tabling the report, the Minister noted that the technical problems that prevent rural and remote customers from accessing higher data rates over the network also prevent them accessing high data rate ISDN services. By the end of 1998, Telstra was required—as a condition of its telecommunications licence—to provide 96% of the population with access, on demand, to an ISDN service. The 4% of the population who cannot access ISDN are those beyond 5 kilometres (in cable distance) from the

telephone exchange, with a significant proportion of this group located in rural and remote areas.

To address the disparity of access to higher data rates, the Federal Government announced three key initiatives:

(1) an upgrade to the universal service obligation (USO), which would effectively incorporate Telstra's licence condition to make ISDN available to 96% of the population into the USO arrangements in the *Telecommunications Act 1997*;

(2) a further upgrade to the USO, which would make available to the 4% of the population not able to access ISDN an asymmetric satellite service, delivering a satellite downlink service comparable to 64kbit/s—this service would be specifically targeted at providing Internet access and is based on the premise that most customers require access to data rather than the need to transmit data,

(3) in order to address the issue of affordability of the satellite service referenced in (2), customers in this category would be eligible for a reimbursement of up to 50% of the price of purchasing the necessary satellite receiving equipment.

Other policy initiatives are referenced below under the heading 'Improving Access to Infrastructure'.

Market outcomes and state and territory initiatives

The ACA found encouraging signs that the market will deliver outcomes to address the increasing demand for the provision of data services. The report referred to a number of significant technological developments in service delivery mechanisms that could improve the overall availability of data services, reduce costs or enhance the data transmission rates available for data services. They fall into three distinct categories: fixed wire services, terrestrial wireless services and satellite based services.

Some Australian carriers are already planning to introduce some of these new technologies, and Telstra has commenced replacing its Digital Radio Concentrator Systems (DRCS) with High Capacity Radio Concentrator Systems (HCRCS). These systems operate in rural and remote areas and provide services to two-thirds of Australia's land mass, or some 19,000 subscribers. HCRCS currently supports 19.2 kbit/s symmetrical data, and with developments in this technology Telstra expects it to support a rate of 28.8 kbit/s within approximately one year.

Additionally, satellite based data delivery systems, currently being trialed by Telstra, provide 64 kbit/s (or broadly equivalent) data rate capacity. As discussed in more detail later in this submission, further developments in the provision of satellite technologies—such as low earth orbiting (LEO) and medium earth orbiting (MEO)

systems planned for introduction between 2001 to 2003—will provide a capability throughout Australia for high rate data services.

The ACA's report noted the contribution of state and territory government initiatives in commissioning infrastructure. Appendix 4 to the report presents a detailed summary of strategies employed by each of the State and Territory governments, particularly in the areas of health and education. The inquiry found significant evidence that State and Territory governments, aware of the increasing importance of in the provision of services, had initiated commercially negotiated arrangements to address data service provision on a state-wide basis. For example, the Queensland Government had launched its *Connect.Ed* program, part of a multi million dollar contract with Telstra to roll out ISDN services to 13000 schools across the state; whilst the Victorian Government has entered an agreement with AAPT to implement its *Directions for Education* initiative.

IMPROVING ACCESS TO EXISTING TELECOMMUNICATIONS INFRASTRUCTURE

Support for intervention

In the course of its inquiry into digital data capability the ACA found that people in rural and remote areas would benefit most from an improved data capability, as it is these people who experience most strongly the concept of 'tyranny of distance' in many facets of their life (ie. in areas such as health, education and government service provision.) Additionally, the ACA found that rural and remote users were at the greatest disadvantage in understanding and utilising data capabilities for common applications.

To this end, the ACA suggested a number of approaches targeted at stimulating demand for data services in rural and remote areas. Such approaches (for example, improving the affordability of services, aggregating demand and providing incentives for local entrepreneurs) could be designed to assist the provision of infrastructure and services by carriers. The report noted that the challenge is to address these impediments in ways that do not provide a disincentive to emerging market and carrier initiatives, nor bestow competitive advantage upon any party.

The Federal Government in its policy response to the report supported this approach. The Government identified two key components to the infrastructure upgrades, funded from the next 16% sale of Telstra: the allocation of an additional $36 million to the RTIF to increase ISP points of presence in rural and remote areas; and the allocation of up to $70 million over the next 5 years to install Rural Transaction Centres into smaller rural towns.

Timed call charges

The ACA also found that the disparity in access over the network is increased by the higher prices paid by rural customers for data services, particularly for using the Internet. A lack of ISP points of presence in rural areas, which requires rural customers to pay STD rates to connect to their ISP. This is compounded by low data rates of 9.6 kbit/s or lower, which mean that regional customers must stay connected to the Internet for longer periods of time to access the same information as their city counterparts. As an indication of comparative ISP costs, Big Pond Rural Access service costs approximately $7 per hour, compared with the average metropolitan service provider charging $1.49 per hour for Internet access.

Information strategies

Regional customers in particular are at a disadvantage in understanding and utilising data capabilities for common applications. Increasing the amount of information, which focuses on educating customers, especially those at a disadvantage, would also assist in growing the demand side of the market. This in turn would lead to benefits which would accrue to both individuals and the community, by enabling a greater range of customers to access the social benefits of effective and efficient provision of government service; particularly in the areas of education, health and primary industry.

THE EXPANDING AVAILABLITY OF SATELLITE AND OTHER RADIOCOMMUNICATIONS-BASED SERVICES

Opportunities to provide a variety of new services in Australia's regional areas have been facilitated by the timely allocation of spectrum by the ACA and the Spectrum Management Agency. These include auctions of spectrum suitable for the provision of MDS services, LMDS services and mobile telephone services. The ACA has recently released its program of future spectrum auctions, which is available at www.aca.gov.au. An auction of spectrum suitable for the provision of wireless local loop (WLL) services is expected to be held shortly.

The remaining parts of this submission provide brief comments in relation to satellite service WLL and mobile CDMA developments.

Mobile Satellite Services

The growth in terrestrial cellular mobile telephony over the past few years has been rapid. However, commercial pressures combined with technical limitations have concentrated coverage on areas of population, with the primary focus along Australia's coastal strip. In some regional areas there may be insufficient demand to justify the cost of installing terrestrial base stations.

One means of providing coverage to remote areas is via satellite. Many such systems, using geostationary (GSO) satellites, are in operation at this time. A problem exists

however with delivering telephony via geostationary satellites orbiting at approximately 36,000 kilometres above the earth. This is a particular problem for mobile applications that are becoming increasingly important for effective commercial operations in regional areas. Time delay, resulting from 'satellite hopping' causes confusion in speech conversation and presents problems in data and fax transfer. Further, at GSO distances, propagation losses are high and thus relatively large antenna systems are required to achieve the necessary performance, and these are not conducive to personal mobile use.

Three mobile satellite telecommunications systems exist in Australia at present, Optus' Mobilesat, the Inmarsat-based systems marketed in Australia by Telstra and Iridium.

As referenced previously in relation to the provision of data services throughout Australia, a number of new global satellite systems are planned at this time, using non-GSO orbits including LEO, MEO and highly elliptical orbit (HEO) systems. Small capacity systems suitable for low data rate applications, have been developed and have been dubbed 'little LEO' systems. Higher capacity systems suitable for voice are known as 'big LEOs'. LEOs, at around 700 - 1400 kilometres, practically eradicate the delay experienced by GSO users and the lower propagation losses permit small antennas. They are thus better suited to mobile consumer telephony and data transfer. These systems offer benefits to countries such as Australia where a significant part of the landmass has only a small percentage of the total population.

A number of 'little LEO' systems, designed to handle, store and forward data, positioning, tracking and messaging services, are currently in development. Probably the most well known proposal for this type of system is from the US based Orbcomm, which is expected to offer services in Australia.

In 1991 Motorola proposed the Iridium LEO satellite system. This system utilises a constellation of satellites to provide 'cellular in the sky' communications and commenced operation late in 1998. Since then a number of other proposals have been made and these are now in varying stages of development. There is a number of other 'big LEO' systems planned to come on line around the turn of the century, including GLOBALSTAR and ICO-P. Both these systems are expected to operate in Australia. They are planned to deliver some or all of voice, data, fax, paging, message services, video and position location.

These 'little LEO' systems are being marketed in two major ways. Firstly, to complement existing terrestrial coverage, 'dual mode' handsets will be available capable of operating on the terrestrial cellular network where there is coverage, and switching to the LEOs when there is not. Secondly, coverage can be provided where it is not economical to set up terrestrial networks, such as in remote regions, where the cost of cable or WLL networks is prohibitive.

As mentioned earlier, with the impending deployment of the LEO mobile satellite services and similar systems, appropriate licensing arrangements have been developed to accommodate these new systems.

Fixed Satellite Services

Fixed satellites provide high capacity national and international telecommunications services via GSO satellites and earth stations linked to the public telecommunications networks or to private networks. In Australia, they are also used to provide domestic telecommunications to remote areas and for broadcasting links.

In 1964 the International Telecommunications Satellite Organisation (INTELSAT) was formed. It is today the largest global satellite system in operation, and is jointly owned by over 100 member nations, including Australia. INTELSAT operations began with the launch of INTELSAT I in 1965. Since that time there has been significant increases in the capacity and coverage of the fixed satellite service, and the number of satellite operators, including Australia's Aussat (now Optus) systems.

In Australia, Optus Communications A and B series satellites provide national fixed satellite services. In addition to Optus and INTELSAT, a number of other systems are capable of providing fixed services to Australia following deregulation; these include PALAPA (Indonesia), PanAmSat (USA) Asiasat (UK) and JcSat (Japan).

Parallelling the LEO satellite developments for mobile voice, there are proposals for similar systems for high data applications. Major development efforts are being made by Teledesic (USA based) and Skybridge (Europe). These are global systems and are expected to be offering services in Australia in about 2-4 years, as discussed previously under the heading 'Market outcomes and state and territory initiatives'.

Stratospheric Stations for High Density Fixed Services

Sky Station Australia Pty Ltd is seeking to provide High Density Fixed Services (HDFS) in Australia using stratospheric platforms stationed at about 21 kilometres above the earth (also referred to as High Altitude Relay Platforms).

HDFS utilise low, medium and high capacity fixed service systems with a primary focus currently on urban, business and industrial areas. Configurations include conventional terrestrial point-to-point and point-to-multipoint or a combination of both.

Wireless Local Loop

The term 'local loop' has traditionally been used in telecommunications in reference to the final connection between a customer and the lowest order telecommunication network node of the service provider (eg. the copper cable from the customers premises back to the local telephone exchange). In recent years, the term wireless local loop (WLL) has emerged, signifying that the local loop connection is provided by radio (wireless) means.

The use of fixed (point-to-multipoint) radio in the local loop is not a recent innovation and this type of local loop is now often referred to as a Fixed Radio Access (FRA) WLL. A good example of a mature FRA WLL technology is the Telstra DRCS, which has been used to provide basic (low traffic density) telephony services in rural and

remote areas of Australia since the early 1980's. The technology is ideal for regions, such as those in developing countries, where current telephony provision is either poor or non-existent. However, due to its inherent limitations in traffic capacity and spectrum efficiency, this type of WLL is not suitable for use in urban areas.

Demand is emerging (in Australia and overseas) for FRA systems, to connect telephone subscribers in a fast and cost-effective way to new digital networks, whether to serve completely new areas, or to add capacity to over-stretched wireline networks.

Telecommunication service providers—particularly new and prospective providers—view FRA WLL loop technology as an attractive option for a number of reasons:

- the ability to have a fast roll-out for new networks, with a relatively short period between network construction and offering services;
- the expense of copper or fibre based wireline access for residential use—with WLL there is no need to dig up streets or to put up unsightly aerial cabling; and
- the flexibility of this technology—which provides options for limited customer mobility (cordless handset) up to full roaming through the use of multimode handsets.

A number of licences for WLL have been issued in Australia. As indicated above, the ACA is intending to auction some further spectrum in the 3.4 GHz band, which would be suitable for WLL.

Code Division Multiple Access (CDMA)

Telstra has announced that it will be upgrading its entire analogue mobile telephone network to the new digital technology CDMA. It has just announced the results of trials conducted at Swan Hill in Victoria that indicate that CDMA will provide coverage as good as the analogue system, while providing the additional service features possible with digital technology. Hutchison is also planning to roll out a CDMA network.

Australia will have both the American (CDMA) and European digital mobile telephone technology (GSM) platforms operating here, and will be very well placed to adopt further technology enhancements in the CDMA and GSM standards.

CONCLUSION

As indicated throughout the submission the rapid development and application of new telecommunications technology is being facilitated in Australia by the regulatory environment which aims to provide adequate levels of regulation to ensure the long-term interests of end-users are safeguarded while supporting the increasing competitiveness of the industry. Licensing arrangements, the management of the radiofrequency spectrum and the provision of consumer safeguards all facilitate the long-term development of telecommunications in regional areas. The ACA considers

that the current regulatory does not place an undue burden on industry and is not a deterrent to the development of telecommunications services in regional Australia.