

Numbering: Structure of Australia's telephone numbering plan

Consultation paper number one

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Executive summary

The Australian Communications and Media Authority (ACMA) is Australia's regulator with responsibility for telecommunications, broadcasting, radiocommunications and the internet. The ACMA is examining the numbering arrangements in response to:

- > issues raised by consumers and industry through the ACMA's Numbering Advisory Committee
- > pressures as a consequence of technical innovation, innovation in services and business models, and changes in consumer behaviour, many of which have been raised during consultations by the ACMA about numbering and related matters
- > difficulties in achieving compliance with current numbering obligations, or undesirable consequences of achieving compliance
- > the potentially unwarranted complexity of present numbering arrangements.

Numbering, naming and addressing are intrinsic to the design of communications networks because they provide the information that enables communications users to be connected. Since the last major restructure of the *Telecommunications Numbering Plan 1997* (the Numbering Plan) in the 1990s, there have been significant changes to communications networks and the services that are delivered over those networks, as well as changes in the number of service providers operating in the market and seeking allocations of telephone numbers. Another major technological and commercial development is envisaged as Australia moves from circuit switched networks towards a wider deployment of next generation networks (both in fixed and mobile networks) and in the adoption of internet protocol (IP) services.

This work program is not concerned with the use of numbering, naming and addressing in all IP communications networks and services, but with ensuring that the gulf between the current numbering arrangements and the future communications environment is bridged. Consequently, this work program examines the Numbering Plan and other numbering arrangements in a way that is intended to allow the future communications environment to evolve.

Regulators in other countries are also considering responses to address changes in the way communications services are used and provided. Some of the most important changes are:

- > increasing demand for mobile services
- > increasing demand for other services and applications which are not fixed to a permanent location
- > reduced costs of transporting calls, weakening the linkage between distance and call costs
- > the growth in machine-to-machine communications.

Responses to these changes, which are under consideration or have been adopted in other countries, include removing or reducing geographical significance in telephone numbers and rebalancing resources within numbering plans. The ACMA has also observed an increasing number of commercial disputes concerning the use of numbers and has found that the complexity of the Numbering Plan is proving challenging to enforce.

It is timely, therefore, that the ACMA commence a comprehensive assessment of the transition and evolution of the administrative and regulatory arrangements for telecommunications numbering which are outlined in the Numbering Plan.

The early part of this paper provides an introduction to the wider work program examining numbering arrangements. It outlines the scope and assumptions and introduces the set of principles that the ACMA is using in assessing numbering arrangements. The paper also provides background information about the evolution of the current framework and discusses the current pressures that technical and service innovation and convergence have placed on the existing regulatory framework.

The latter part of this paper is about the structure of the Numbering Plan and the more than 40 service types that it specifies, using criteria ranging from technical descriptions (for example, digital mobile services) to call charges (for example, local rate services).

This paper assesses the regulatory and administrative framework for numbering in terms of:

- > its efficiency in facilitating the continued supply of communications services in accordance with the public interest, even as preferences change and technologies develop over time, including:
 - > achieving the most effective use of numbers
 - > avoiding disparities in how different types of numbers are assigned
- > its flexibility to evolve over time and respond to the changing needs of the communications environment:
 - > without creating barriers to market entry and competition
 - > allowing addition of new service features
 - > accommodating alternate pathways for market evolution
- > its resilience in standing the test of time and providing certainty to carriage service providers and their customers, including achieving other policy objectives that are enduring
- > its simplicity and transparency in enabling consumers to make informed choices about their use of communications services, including whether they are able to know the cost of calls that they make.

This discussion will also consider how, in the medium term, call charges for services using different types of numbers may evolve as a consequence of developments such as:

- > falling and converging interconnect (wholesale) charges
- > changing user perceptions of the importance of distinctions between different call types as consequence of widespread use of capped plans
- > a decreased reliance on the location information embedded in geographic numbers.

Underlying this assessment is the following series of questions that the ACMA is asking about numbering:

- > How can the Numbering Plan provide a bridge between the current communications environment, and the emerging and future communications environments which may be predominantly reliant on internet-based services and next generation networks?
- > To what extent should numbers be used to achieve policy objectives or support the call routing, charging and other functions of carriage service providers?
- > Recognising the increasing role that IP addresses and internet domain names will play in the supply and use of communications services and that neither follows a

service-based structure, to what extent should distinctions between services in the Numbering Plan be removed or reduced to a minimum, for example, by merging some or all of today's service types into a 'general purpose' category?

The ACMA is seeking feedback from the public on this paper to allow it to assess the degree and speed of change that is needed to support changing industry and user requirements and expectations of telecommunications numbering.

Next steps

The ACMA is also examining the following aspects of telephone numbering arrangements, which are the subject of separate consultation papers to be released in the coming months.

1/ Administration of numbering and institutional arrangements, including the role of numbers in industry taxation and charging arrangements

Examination of whether the current administrative and institutional arrangements governing telecommunications numbering and associated repositories of numbering data are efficient in a converging communications market, including:

- > rights and responsibilities attached to numbers
- > customer transfer between providers
- > models of allocation of numbers
- > holdings of information about telephone numbers.

This paper will also examine the efficiency of arrangements for collection of revenue related to numbers, in the context of sector-wide taxes and charges, and the effectiveness of the current revenue arrangements in a converging communications market.

2/ Derivation of customer, location and service provider information from numbers

Examination of the uses of various attributes of numbers, especially by enforcement agencies and emergency services organisations, and how the objectives of these uses may be met in a converging communications market.

3/ Information in numbers utilised by end-users

Examination of how information associated with numbers is used by end-users in relation to assessing the cost of calls, identifying callers and working out the location of a called party.

At the conclusion of these consultations, the ACMA will publish a directions paper that examines the issues raised and identifies changes that may be needed to improve the efficiency and effectiveness of the Numbering Plan and related numbering arrangements.

The ACMA invites written submissions from the public and industry on the matters raised in this paper both in response to specific questions raised and as otherwise considered relevant.

The close of submissions to this paper is 5.00 pm on Friday 3 December 2010.

Members of the public and industry are encouraged to make submissions by email to:

numbering.project@acma.gov.au

or by mail to:

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The ACMA has recently published [Evidence-informed regulation: the ACMA approach](#), which describes how the ACMA informs its regulatory processes by high quality evidence from a wide range of sources. Evidence-informed regulation aims to improve the transparency of the ACMA's decision-making and assist stakeholder involvement in regulatory issues and decisions.

One way in which the ACMA puts the principles of evidence-informed regulation into practice is by enhancing the effectiveness of its stakeholder consultation processes, which is an important source of evidence for regulatory development activities. To assist stakeholders to formulate submissions to consultation processes, the ACMA has recently published [Effective consultation: A guide to making a submission](#). This guide provides information about the ACMA's public consultation processes and practical guidance on how to make a submission.

In general, the ACMA publishes all submissions it receives. The ACMA prefers to receive submissions which are not claimed as confidential. However, the ACMA accepts that a submitter may sometimes wish to provide particular information in confidence. In these circumstances, submitters are asked to:

- > identify specific paragraphs of submissions over which confidentiality is claimed
- > provide a written explanation for each part of a submission over which confidentiality is claimed.

The ACMA will consider each claim for confidentiality on a case by case basis. If the ACMA accepts a confidentiality claim, it will not publish the confidential information unless required to do so by law.

Submissions provided to the ACMA may be required to be released under the *Freedom of Information Act 1982*. The ACMA may also be required to release submissions for other reasons including for the purpose of parliamentary processes or where otherwise required by law (for example, a court subpoena). While the ACMA seeks to consult, and where required by law will consult, with submitters of confidential information before that information is provided to another body or agency, the ACMA cannot guarantee that confidential information will not be released through these or other legal means.

Under the *Australian Communications and Media Authority Act 2005* (the ACMA Act), the ACMA may disclose certain information to the Minister, the Department including authorised officials, Royal Commissions, the Telecommunications Industry Ombudsman, certain Commonwealth authorities such as the Australian Competition and Consumer Commission and Australian Securities and Investments Commission and the authority of a foreign country responsible for regulating matters relating to communications or media.

Introduction

Types of identifiers

Collectively, numbers, names and addresses are identifiers that enable communications to be carried across communications networks to a correct point of termination and to a correct end-user.

Telephone numbers

Telephone numbers can be regarded simply as a string of digits (sometimes combined with special symbols such as * and #), but they serve two distinct purposes in communications networks:

- > they identify a point of termination in a communications network—in this role, numbers are defined as an address
- > they identify an end-user who is the intended recipient of a communication—in this role, numbers are defined as a name.

To enable telephone calls to be made between two telephones anywhere in the world, the use and administration of telephone numbers is internationally harmonised via a standard maintained by the International Telecommunication Union (ITU). The standard is known as *The international public telecommunication numbering plan*, or more briefly, [Recommendation E.164](#).

All telephone numbers are used and administered in accordance with Recommendation E.164, which states that telephone numbers can be up to 15 digits in length (including the country code). Australian telephone numbers do not exceed 12 digits, or 10 digits excluding Australia's country code, 61. However, the ITU plays a relatively small part in the day to day administration of numbers. The administration of Australian telephone numbers is ultimately the responsibility of the Australian Government. In turn, parliament has, under the *Telecommunications Act 1997* (Telecommunications Act), assigned responsibility for the management of telephone numbers to the ACMA.

In 1997, the ACMA's predecessor, the Australian Communications Authority, created a set of rules for the use and administration of Australian telephone numbers known as the Numbering Plan or, formally, the [Telecommunications Numbering Plan 1997](#). It specifies different types of services, of which the most familiar are the following:

- > local services, associated with geographic numbers
- > mobile services
- > freephone and local rate services
- > premium rate services
- > directory and information services.

In turn, geographic numbers are further divided into approximately 2050 separate geographic areas, referred to as 'standard zone units' in the Numbering Plan.

Carriage service providers have established interconnect agreements with each other that reflect and enable the supply of services that are defined in the Numbering Plan. Location information embedded in geographic numbers has enabled the construction of billing systems which are able to calculate call distance for the purpose of charging and delivering untimed local calls.¹

¹ The first few digits of a telephone number—up to the seventh digit, including the area code—can currently be used to identify the standard zone unit in which a call to that number will terminate. For example, the first five digits of the main contact number for the ACMA's Canberra office, 02 6219 5555, identify that a call to that number will terminate in the Canberra standard zone unit.

Consumers, meanwhile, have used the information embedded in the numbers to ascertain potential call costs—for example, calls to premium rate numbers (recognisable by their 19 prefix) are likely to incur higher charges—and as a proxy for location in the case of geographic numbers.

Electronic addresses

Other types of addresses and names that are not telephone numbers are also in widespread use. On the internet, addresses take the form of IP (or internet protocol) addresses. The most common form of IP addresses is 32 bits in length; for example the ACMA uses IP addresses in the range 165.191.0.0 to 165.191.255.255.²

IP addresses are generally assigned in a hierarchical manner, with large ISPs typically obtaining large address spaces from a regional internet registry. The registry with responsibility for Australia is the Asia–Pacific Network Information Centre, based in Brisbane. Smaller ISPs typically obtain less address spaces than larger ISPs, and end-users obtain small IP address spaces or individual IP addresses from their ISP.

IP addresses are globally coordinated by the Internet Assigned Numbers Authority, itself operated by the Internet Corporation for Assigned Names and Numbers (ICANN), in accordance with guidelines made by the Internet Engineering Taskforce.³

The internet also features names, known as domain names. For example, the ACMA's domain name is `acma.gov.au`. Generally, end-users are more familiar with domain names than IP addresses as the former are easier to understand and remember. However, most internet communications involve translating a domain name to an IP address using the internet domain name system.

There are two types of domain names:

- > those which end in a generic top-level domain (gTLD)—the best known top-level domains are `.com`, `.net` and `.org`
- > those which end in a country code top-level domain (ccTLD)—the top-level domain corresponding to Australia is `.au`.

Domain names are assigned by a registrar and the details of the registration are recorded in a registry. ICANN manages the assignment of domain names through its own policies and through bilateral agreements between gTLD registries and with national managers of ccTLDs. For Australia, ICANN recognises the `.au` Domain Administration Limited (auDA) as the manager of most domain names corresponding to the ccTLD, `.au`, based on an endorsement of auDA by the Australian Government in 2001.

The registry for `.au` domain names is operated by AusRegistry, and these domain names are assigned in accordance with policies made by auDA.

Application specific identifiers

Other types of names are provided to end-users for use with specific online applications, such as internet banking and social networking, for example the ACMA's

² A bit (short for binary digit) is a measure of the smallest unit of computer data. A bit has a binary value of either 0 or 1. The type of IP address indicated here is represented as four decimal numbers separated by a period. Each of these four decimal numbers may have a value between 0 and 255. A computer can store and process a decimal value up to 255 in eight bits. Hence, four decimal values between 0 and 255 occupy 32 bits.

³ See [RFC 2050](#), *Internet Registry IP Allocation Guidelines*, first published in 1996; [RFC 2928](#), *Initial IPv6 Sub-TLA ID Assignments*, first published in September 2000; [RFC 3177](#), *IAB/IESG Recommendations on IPv6 Address Allocations to Sites*, first published in September 2001. RFC refers to 'request for comment', and is the title used for internet standards documents and other publications of the Internet Engineering Taskforce.

identity on Twitter is *acmadotgov*. Rules requiring or enabling international harmonisation of these names do not exist, although there is some collaboration among different commercial providers of these applications to enable certain types of names to be used across a number of service and application platforms.

The particular characteristics of these different types of identifiers are summarised in Table 1.

Table 1 Telephone numbers and other types of identifiers

	Assigned by	Allocated to	Structure	International rules and standards	Other rules and policies	Charge for assignment
Telephone numbers	ACMA (in Australia)	Carriage service providers	Compartmented into 40+ separate types of services; geographic numbers further compartmented into approximately 2050 separate geographic areas	Recommendation E.164	National: Numbering Plan	Yes
IP addresses	APNIC (in Asia–Pacific region)	Generally to large ISPs	Compartmented into regional blocks	RFC 2050, RFC 2928, RFC 3177	ICANN/IANA policies, in coordination with regional internet registries	Yes
.au domain names	Registrars accredited by auDA	Organisations and individuals	Compartmented into 18 second-level domains; e.g. <i>.com.au</i> , <i>.org.au</i>	N/A	National: auDA policies	Yes
Application-specific identifiers	Organisation responsible for application; e.g. bank, social networking operator	Individuals	Proprietary or internal	None	Application-specific rules	No

Communications policy objectives

As well as industry and consumer use, numbering has also been closely related to facilitating or achieving various communications policy objectives located in the Telecommunications Act, the *Telecommunications (Consumer Protection and Service Standards) Act 1999*, the *Telecommunication (Interception and Access) Act 1979* and a wide range of licence conditions, determinations, industry standards and codes.

Examples of objectives that have relevance for the structure of the Numbering Plan are provided below.

Consumer protection

Price transparency is a common feature of consumer protection policy. The structure of the Numbering Plan is intended to provide a degree of price transparency by enabling end-users to:

- > understand the level of call charge for calls to a number
- > understand which numbers can be used in connection with the supply of particular carriage services
- > apply this understanding to the management of call costs.

This is done by grouping services that are charged similarly together; for example, services that are charged at a local call rate are provided on the 13X range while services that may be charged at a premium rate independent of content or delivery mechanism are provided on six- or eight-digit numbers from the 19X range. Therefore, end-users are able to ascertain the level of call charge to an individual number by the first two digits of the number and are able to use that information to manage their calls.

Another feature of existing communications policy is the obligation on carriage service providers under [Part 4](#) of the *Telecommunications (Consumer Protection and Service Standards) Act 1999* to provide their customers with an option of untimed local calls; that is, the option of being charged a flat rate for a local call that is independent of the duration of the call. [Subsection 455\(10\)](#) of the Telecommunications Act requires that, in making the Numbering Plan, the ACMA has regard to this obligation.

Carriage service providers currently derive the geographic location of both the calling and the called parties from their respective geographic numbers to determine whether the call is a local call.

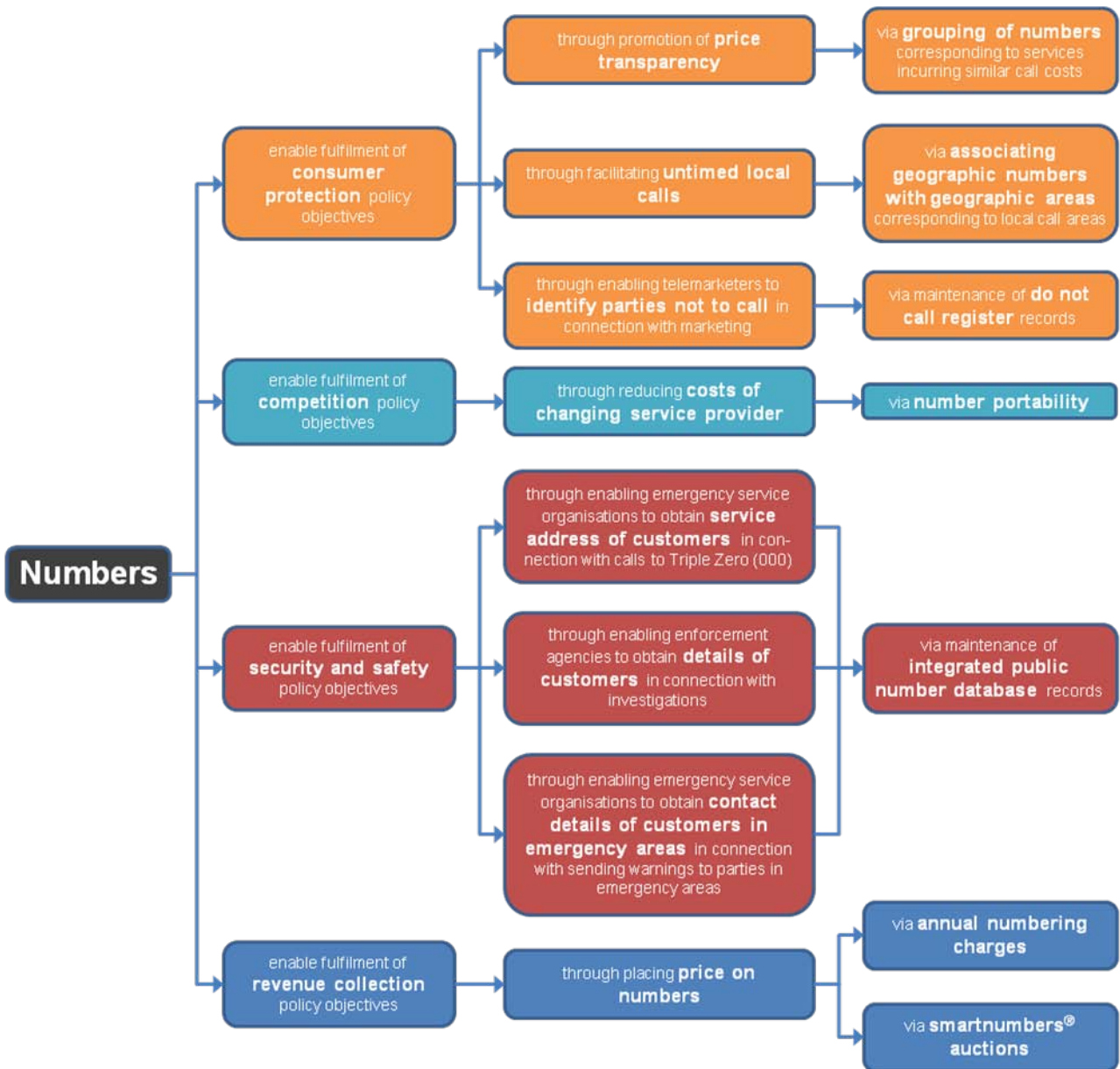
Competition

One of the barriers to consumers realising the benefits of communications market competition is the associated costs of having to change numbers when changing service providers. For example, for business, this typically involves letting customers and suppliers know the new number. Number portability attempts to remove this barrier by allowing consumers to take their number to a new provider, this means that many of the costs associated with changing providers are removed.

The Numbering Plan contains detailed rules about number portability, complemented by related industry codes and specifications.

The role of numbers in enabling the fulfilment of these policy objectives, together with others that will be examined in this work program, is summarised in Figure 1.

Figure 1 Role of numbers in enabling the fulfilment of policy objectives



Internet-based services

Numbers have, in the past, served as a convenient and sensible means of achieving the communications policy objectives mentioned above. However, the pressures on numbering described later in this paper are causing difficulties in continuing to achieve these objectives.

By contrast, the majority of the ways in which these policy objectives are fulfilled find no equivalent among internet-based services that use IP addresses and domain names. A notable but almost unique exception is the rules applying to spam or unsolicited electronic communications, which encompass both services that utilise telephone numbers and internet-based applications.

In considering whether changes to the current suite of services defined in the Numbering Plan are warranted, the relationship and impact on communications policy outcomes will be evaluated.

Consumer research

The ACMA has commissioned independent research into how end-users interact with and use numbers and their expectations and experience of numbers. The research provides an opportunity to confirm or dismiss assumptions and suppositions in this paper. The findings of this research will be published as a later paper in this work program, and will inform the ACMA's assessment of submissions made in response to all of the consultation papers forming part of this work program.

Evolution of the Numbering Plan

The Numbering Plan sets out the framework for the numbering of carriage services in Australia and the use of numbers in connection with the supply of these services.

Whilst intended to provide a stable regulatory framework for both industry and consumers, the Numbering Plan has always evolved to reflect changes in technology, consumer expectations and usage and to achieve key communication policy objectives.

There have been two major restructures of the numbering arrangements to accommodate shifts in technology and market structures. In the 1960s, the Community Telephone Plan was designed to assist the rollout of new technology, namely automatic exchanges, which allowed consumers to dial direct within their local area and reduced the need for multiple telephonists to complete long distance connections. The Community Telephone Plan also provided additional numbering capacity for the continued expansion of phone services.⁴ In contrast, the changes in the early 1990s were primarily to facilitate market liberalisation⁵; for example:

- > providing additional numbering resources in some of the major cities (including Sydney, Brisbane and Melbourne) to facilitate growth in services and in demand for number by new market entrants
- > simplifying the structure of the Numbering Plan—by extending the length of geographic numbers to 10 digits while reducing the number of area codes from 54 to 4—also allowed the regulator greater flexibility to move spare capacity into areas that needed it.

However, evolutionary changes to the Numbering Plan also occurred to accommodate smaller changes in technology, consumer expectation and usage. These have included the introduction of:

- > international calling (on 0011) in the 1970s
- > new number ranges for paging services and mobile services in the 1980s
- > new number ranges for freephone, local rate and premium rate services in the late 1980s.

Some evolutionary steps were short-lived. This includes the introduction of separate number ranges for:

- > calling card services, which were not attractive to the majority of providers of these services⁶

⁴ In 1959, the Postmaster-General reported that there were approximately two million telephones linking a population of 10 million Australians. However, the Postmaster-General projected that Australia's population at 2010 would be 33 million and the number of services would be 15.3 million (*Community Telephone Plan for Australia 1960*). Today, Australia's population is lower than projected at approximately 22.4 million, as is the number of fixed-line phone services, estimated as 10.67 million in June 2009, a fall of 0.33 million over the previous 12 months. By contrast, the number of mobile phone services (not envisaged in 1959) was estimated as 24.22 million in June 2009, an increase of 2.1 million over the previous 12 months. ACMA, *Communications Report 2008–09*, at www.acma.gov.au/webwr/_assets/main/lib311252/08-09_comms_report.pdf.

⁵ The Committee of Inquiry into Telecommunications Services in Australia recommended in 1982 that the regulatory and policy functions which had been given to Telecom be removed and an independent regulator be established. *Report of the Committee of Inquiry into Telecommunications Services in Australia*, 1982.

⁶ Five-digit numbers were specified for use by calling card services. These numbers are subject to a higher annual numbering charge than 10-digit freephone and local rate numbers, which have proved more popular with these services.

- > 'one number', services which were not commercially successful
- > facsimile services.⁷

Over this time, industry's use of numbers has also evolved through technical and service innovation, such as the development of:

- > calling number display technology
- > location dependent routing⁸
- > text-only premium services.⁹

In parallel with the evolution of the Numbering Plan, some significant policy initiatives have occurred with respect to numbering, or which have relied on numbers. These include:

- > establishment of the Integrated Public Number Database in 1998, to assist in the provision of directory and customer location and other details to directory publishers, emergency service organisations and enforcement agencies¹⁰
- > introduction of number portability for both mobile and fixed services in the 1990s, to reduce costs of changing service provider
- > establishment of the Do Not Call Register in 2007, to enable customers to register their phone numbers so they no longer received telemarketing calls.

The next big evolutionary step may be concerned with enhancing flexibility and promoting simplicity and transparency, in order to accommodate:

- > changes already occurring from the availability of internet-based services that provide equivalent to phone service
- > changes which are likely to occur (or to accelerate) as a consequence of the migration to next generation networks (both in fixed and mobile networks) and adoption of IP-based services.

⁷ For example, in 1993 numbers in the 197 range were allocated to various enhanced facsimile services which, however, have since ceased to be provided. The number range has subsequently been re-specified for use in connection with premium rate services.

⁸ Location dependent routing allows calls to a business to be automatically carried to the most appropriate store or branch location of the business, depending on the location of the caller. For example, a customer may call the number of a pizza delivery service or taxi service, and the call is automatically connected to the store or office closest to the customer's home.

⁹ Mobile premium services or premium SMS are accessed by sending a message from a mobile phone to a number starting with 191, 193–197 and 199. The services cost more than a standard SMS.

¹⁰ Telstra is required under conditions of its carrier licence to establish and operate the Integrated Public Number Database. Prior to establishment of the database, customer details were extracted from a distributed customer record system maintained by Telecom Australia which operated on an area by area basis.

Pressures for change

The current regulatory arrangements were, in the main, intended to be technology neutral. Inevitably, however, they reflected and applied best to those services and technologies that were in existence at the time the arrangements were conceived. Hence, these arrangements reflect the primacy of voice communications and in particular of landline phone services, and took lesser account of data communications and, in particular, internet-based communications such as VoIP.

Technical innovation

Today the regulatory framework is under pressure from technical innovation. The continuing trend towards cheaper and more sophisticated network technology—especially allowing centralisation of switch capacity in fewer locations than was possible in the past—has continued to reduce costs of carrying calls. This has been reflected in the disappearance of distance-based charging from all national mobile calls and, increasingly, from calls from landlines.

VoIP services—offering end-users the ability to make voice (and in some cases video) calls via the internet—are creating even greater pressures on the regulatory framework. The quality of VoIP calls has steadily increased since the early days of VoIP, and in some cases now exceeds that of standard telephone calls. At the same time, the cost of VoIP calls can be very low, even for international calls, and sometimes free. VoIP services can be supplied independently to a customer's internet or phone connection, and consequently can be supplied by providers based anywhere in the world, or even be self-supplied.

Some VoIP services do not use numbers, instead relying on application specific identifiers such as user names. For example, Skype and Google's Gmail voice and video chat service enable their users to contact other users, or call normal landline and mobile phones, without any need for the user to have a number. Where these services do use phone numbers, there is no inherent restriction on what kinds of numbers are used or where they are used. Thus, there is no technical obstacle to a number used in connection with a VoIP service being used in any place in Australia, challenging the traditional tying of geographic numbers to specific geographical areas. Indeed, some overseas-based VoIP providers go further and offer end-users the ability to select a number from a range of countries—for example, a United States or Swiss number—for use anywhere in the world.¹¹

The impact of these developments is likely to increase as existing network technologies are replaced by next generation network—or IP-based—technology in both fixed and mobile networks.

¹¹ Relevantly, the ACMA has published research in 2008, *The Australian VoIP Market* (see www.acma.gov.au/scripts/nc.dll?web/standard/1001/pc=pc_310901), and in 2009, *Changes in the Australian VoIP Market* (see www.acma.gov.au/webwvr/assets/main/lib310658/changes_in_australian_voip_market.pdf).

The ACMA announced a new approach to dealing with regulation of VoIP services in April 2008 (see www.acma.gov.au/web/standard/pc=pc_311111), and has also undertaken consultations on:

- > the provision to emergency service organisations of location information for persons calling Triple Zero from a VoIP service, in April to June 2008 (see www.acma.gov.au/web/standard/pc=pc_311121)
- > rules for managing numbers used by VoIP services, in December 2008 to February 2009 (see www.acma.gov.au/web/standard/pc=pc_311581)
- > improving flexibility in the Numbering Plan in recognition of the characteristics of services such as VoIP, in April to May 2010 (see www.acma.gov.au/web/standard/pc=pc_312086).

Service innovation and consumer behaviour

Technical innovation has enabled industry to a range of communications—voice calls, video calls, messaging, social networking, email, to name a few—allowing end-users to choose the form that best suits the way in which they wish to communicate. Some of these forms of communications rely on phone numbers—for example, voice and video calls and mobile-based messaging (SMS and MMS) may use numbers—but many do not.

However, the most notable change in user behaviour in relation to voice calls is the growth in mobile phone usage. At the end of June 2009, more than 24 million mobile phone services were in operation in Australia, more than twice the number of landline phone services.¹² For Australians aged 44 and under, the mobile phone is now their primary means for making voice calls.¹³ Many of the provisions in the Numbering Plan, such as those relating to costs of calls to particular numbers, are built around an assumption that landline phones would be the dominant form of communication. For example, the Numbering Plan specifies the maximum charge for calls to freephone and local rate numbers from normal landline phones, but specifies no maximum charge for the same calls from mobile phones. Today, this assumption no longer holds.

Of possibly even greater significance for the medium term, changes are occurring as a result of the growing intensity of Australians' online participation, shown by the shift to more frequent use of the internet.¹⁴ More intense internet use is leading to changes in consumer attitudes to traditional communications, in turn affecting the frequency of their use of offline communications. For example, during 2009–10, 21 per cent of internet users aged 14 years and over made international calls less often since they had begun using the internet, 20 per cent made long distance calls less often and 17 per cent made local calls less often.¹⁵

These new technical capabilities and increasing online participation are leading to new types of providers offering communications services to Australian end-users. For example, the majority of Australian ISPs, together with multinational companies with a major internet presence such as Google, are using their existing market presence to promote voice-based (and video-based) VoIP services to their users, both to retain market share and to diversify their services and sources of revenue.¹⁶ Consequently, VoIP services are gaining in popularity: 2.9 million Australians aged 14 years and over (or 16 per cent) had access to a VoIP service at home in June 2010.¹⁷ VoIP is the main form of voice communication for two per cent of Australians aged 18 years and over.¹⁸

As discussed further on page 30, the ability to use some VoIP services without being fixed to a permanent location also challenges assumptions in the Numbering Plan

¹² ACMA, *Communications Report 2008–09*, at www.acma.gov.au/webwr/_assets/main/lib311252/08-09_comms_report.pdf.

¹³ ACMA, *Convergence and Communications—Report 1: Australian household consumers' take-up and use of voice communications services*, March 2009, at

www.acma.gov.au/webwr/_assets/main/lib100068/convergence_comms_rep-1_household_consumers.pdf.

¹⁴ Over the period June 2005 to June 2010, the proportion of heavy internet users (online for more than 15 hours a week) in the Australian population doubled. Roy Morgan Single Source.

¹⁵ Roy Morgan Single Source, June 2010.

¹⁶ Australian Bureau of Statistics, 'Proportion of ISPs offering other services, for ISPs with more than 1,000 active subscribers', table, *Internet Activity, Australia*, June 2010, at

www.abs.gov.au/AUSSTATS/subscriber.nsf/log?openagent&81530do005_201006.xls&8153.0&DataCubes&A39CD31E1F7D9052CA2577A100154C20&0&Jun_2010&20.09.2010&Latest.

¹⁷ Roy Morgan Single Source.

¹⁸ Households with a landline. ACMA commissioned research, April 2010.

regarding the use of geographic numbers within specific geographic areas, and challenges the notion of distance-based charging for calls to a fixed location.¹⁹

Also taking advantage of new capabilities and end-user behaviour are a range of new business models. These business models are in many cases substantially different from the familiar forms of telephone services; for example, they may feature voice communications as simply one of several ways of communicating, they may use other form of identifiers than telephone numbers, or they may derive their revenue from advertising rather than charging end-users for use of communications.

The ACMA cannot predict exactly where these developments are leading, but it is clear that they are leading away from consistency with the current numbering arrangements.

International experience

Similar pressures are also being observed internationally by the ITU, the European Conference of Postal and Telecommunications Administrations' Electronic Communications Committee and the Organisation for Economic Co-operation and Development (OECD).²⁰ Regulators in some other countries are now moving to reduce the number and specificity of service types. For example, the distinction between numbers for landline services and mobile services has been made largely non-existent in Denmark and Estonia, and the removal of geographic significance from national numbering plans is under consideration by European regulators.²¹

¹⁹ A capability to use a service without being fixed to a permanent location is sometimes referred to as nomadicity; i.e. an end-user is able to move from one place to another and continue to have access to the same communications service. This capability is different from the capability of mobile services whereby an end-user is able to continuously access the same communications service while in motion.

²⁰ See Electronic Communications Committee, *The Future of E.164 numbering plans and allocation arrangements*, September 2006, at www.ero.docdb.dk/docs/doc98/official/pdf/eccrep087.pdf.

²¹ See Electronic Communications Committee, *Evolution of Geographic Numbers* (draft), June 2010, at www.ero.dk/1829308F-0ABC-4450-988A-9199E395FB43?frames=no&.

Assumptions

In undertaking this work program on numbering, the ACMA has made a number of assumptions, set out below.

The ongoing need for telephone numbers

The ACMA has observed a change in the type of services offered by industry. Fixed services were down from 11 million in June 2008 to 10.67 million at June 2009 while mobile services continue to rise (24.22 million at June 2009, or more than one mobile service per person, up from 22.12 million in June 2008).²² Figure 2 shows the trend during the past 10 years.

There is likely to be a continuing role for telephone numbers for the foreseeable future (albeit potentially used in different ways), due to numbers being:

- > able to be used by a wide range of simple devices that are ubiquitous, even in parts of the world less developed than Australia
- > capable of being readily exchanged between different networks, given that they conform to international standards and are internationally unique.

For the past few years, consumers have increasingly been supplementing their traditional communications services (for example, their home or mobile phone) with new types of services, both:

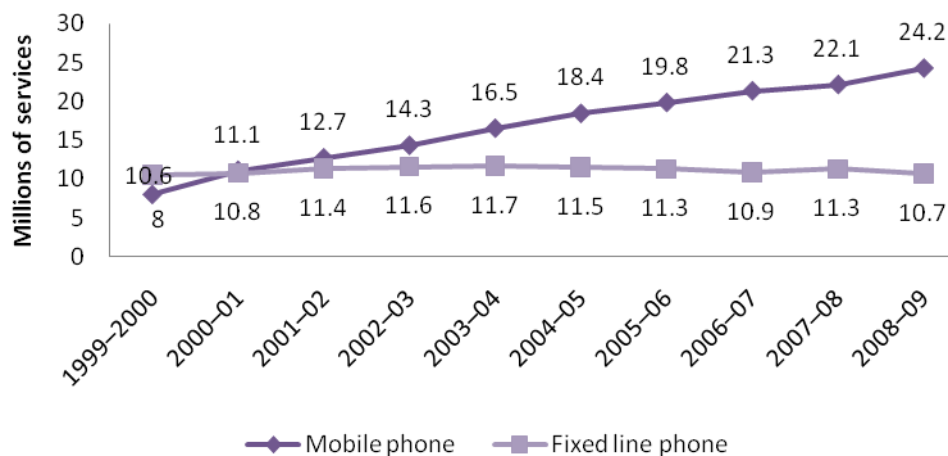
- > those relying on numbers, such as certain types of VoIP services
- > those that use application-specific identifiers, such as VoIP services, email, micro blogging services such as Twitter, and social networking services such as Facebook.

The ACMA is not able to predict whether this trend will continue along its current trajectory as technology and market changes occur and new usage patterns are established, or will take a different path.²³

²² ACMA, *Communications Report 2008–2009*, at www.acma.gov.au/webwr/_assets/main/lib311252/08-09_comms_report.pdf. While there is a lag between number allocations and the provision of service to end-users, the ACMA has observed a stabilisation in the level of allocations. The allocation of geographic numbers has returned to the levels seen in 2006/07 off from a high in 2007/09, while allocations of mobile numbers have also remained relatively stable down from a high in 2006/07.

²³ Most major carriage service providers are reporting a decline in voice traffic (for example, Telstra reported a 13 per cent drop in local calls between December 2008 and December 2009). Younger users particularly are shifting to text messaging, email and online chat and away from voice telephony.

Figure 2 Fixed-line and mobile services, by financial year



Source: ACMA, Communications reports 2005-06, 2007-08, 2008-09

No new digits

Changing numbering, naming and addressing systems can be expensive. Australia's transition to the current 10-digit numbering plan took almost five years to implement. Raising public awareness alone cost carriage service providers an estimated \$25 million. Therefore, efforts to conserve the existing number supply by increasing its flexibility may reduce potential cost to industry, taxpayers and government.

The ACMA does not plan to increase the supply of numbers by increasing the length of numbers at any time in the foreseeable future.

Internet names and addresses and application-specific identifiers

Worldwide, a transition by ISPs and internet users from internet protocol version four (IPv4) which uses 32-bit addresses, to internet protocol version six (IPv6) which uses 128-bit addresses, is underway. IPv4 addresses are predicted to be exhausted in the near term. IPv6 addresses offer a number of advantages over IPv4 addresses, including enhanced security. (See page 6 for further discussion about IP addresses.)

In the short to medium term, the ACMA believes that use of internet names and addresses and application-specific identifiers for a diverse array of communication services (including but not limited to voice) will grow, but remain complementary to telephone numbers in this period. However, in the medium to longer term (possibly 20 or more years), it is possible that internet names and addresses and application-specific identifiers may replace telephone numbers for most and perhaps all communication services. This work program does not address these medium to longer term developments.

Government communications policy

The government has indicated that it intends to consider its overall approach to communications regulation in 2011.²⁴ While the government may make significant changes to the structure of communication regulation in the future, it is assumed that broad communications policy goals of consumer protection, competition, and security and safety will not change during this work program. It is recognised, however that the

²⁴ Department of Broadband, Communications and the Digital Economy, *NBN Regulatory Reform for the 21st Century Broadband*, April 2009 at www.dbcde.gov.au/_data/assets/pdf_file/0006/110013/NBN_Regulatory_Reform_for_the_21st_Century_Broadband_low_res_web.pdf.

method of delivery of these policy goals may change with implications for numbering management. It is also recognised that any evolution of numbering arrangements must, of course, occur within the existing legislative framework.

Globalisation of communications

Markets for communications services are increasingly global, and the pace of technology change within these markets, especially internet-based markets, is rapid and to some degree unpredictable. There is little reason to expect these trends to slow or stop. In this environment, the role of international collaboration and coordination of numbering, naming and addressing schemes may become increasingly important in managing the limitations of national jurisdiction in achieving policy goals of security, safety, competition and consumer protection.

Emergency numbers

The Numbering Plan specifies Triple Zero (000) as the primary emergency number, together with secondary emergency numbers 106 and 112. 106 is used for the emergency call relay service, which enables people who are deaf or who have a speech or hearing impairment to make text-based emergency calls. 112 is specified as an emergency number accessible from mobile phones worldwide; calls to 112 in Australia are automatically delivered to the 000 emergency call operator. The ACMA is not considering changing any of these numbers and they are not the subject of further discussion in this paper.

Access codes and private numbers

The Numbering Plan sets aside certain numbers for use only as prefixes to other numbers. Access codes generally indicate that a particular kind of carriage service or function is applied to a call to the number following the access code. For example, 0011 is the access code for an international direct dial service. The existing access codes are likely to be necessary for the foreseeable future, and the ACMA is not considering any changes to these arrangements.

The Numbering Plan also defines private numbers which form part of a private numbering plan that is used in connection with a carriage service, such as a centrex service.²⁵ The ACMA is not considering changes to the current arrangements for these numbers set out in the Numbering Plan.

The role of regulators

The ACMA's role, as articulated in the ACMA Act, is to regulate telecommunications in accordance with the Telecommunications Act and the *Telecommunication (Consumer Protection and Service Standards) Act 1999*. In practice, this means that the ACMA has responsibility for the Numbering Plan and related determinations and instruments; for registering industry codes and guidelines; and for managing, monitoring and enforcing a range of protections for communications users. Accordingly, within the remit of its legislative functions, the ACMA seeks to meet the objectives of the Telecommunications Act in ensuring the long-term interest of end-users within the context of promoting an efficient and internationally competitive Australian telecommunications industry.

²⁵ A centrex service is a service offered by a carriage service provider that emulates the functions that would otherwise be performed by a PABX on a customer's site.

The ACMA does not have a role in application-specific identifiers that do not have an international harmonisation framework, or internet names and addresses, which do.²⁶

The ACMA is not the only regulatory body with an interest in numbering. The Australian Consumer Competition Commission (ACCC) has responsibility for regulating competition policy as it affects telecommunications, including number portability, access and pricing, anti-competitive and misleading conduct.

Question 1

Are the assumptions of the Numbering Work Program sound?

²⁶ [Division 3](#) of Part 22 of the *Telecommunications Act 1997* provides the ACMA with a reserve power to determine that a specified person is the declared manager of electronic addressing, and permits the ACMA and the ACCC to give directions to such a manager. This reserve power has never been exercised.

Principles

Numbering, naming and addressing arrangements are critical for communications around the world. International bodies such as the OECD—which has a responsibility to promote development in democratic and market-based economies—have identified the need for ongoing refinement of national regulatory frameworks governing numbering in light of the pressures arising from convergence and the move towards next generation networks. In this regard, the OECD has recommended that:

Policy makers and regulators ... monitor and reassess the effectiveness of legacy policy and regulatory frameworks to reap the benefits of next generation access networks and convergence while also minimising any costs which may arise from these new developments...

In particular, it identified a need to:

Review numbering plans to increase flexibility, facilitate new converged services, and improve the nomadicity of persons.²⁷

To properly assess the present regulatory framework governing numbering in Australia and its underlying assumptions, it is helpful to set out principles that establish an appropriate basis for future management of numbering resources and how these resources are used by providers and users of communications services.

Such principles must be consistent with the main [object](#) of the Telecommunications Act; providing a regulatory framework that promotes the long-term interests of end-users and the efficiency and international competitiveness of the Australian telecommunications industry. Promotion of the long-term interests of end-users is an object of both the Telecommunications Act and Part XIC of the *Trade Practices Act 1974*, and relates to:

- > the promotion of competition in markets for carriage services
- > achievement of any-to-any connectivity in relation to carriage services involving communication between end-users (meaning that end-users are able to communicate with each other using the same or similar carriage service, whether or not they are connected to the same network)
- > encouragement of economically efficient use of and investment in infrastructure required for supply of carriage services.²⁸

The objects of the Telecommunications Act do not directly deal with management of resources, such as numbers. However, the object of the *Radiocommunications Act 1992* provides an insight into principles that may guide the assessment of the regulatory framework for numbering, inasmuch as it is concerned with management of a resource that is vital to communications networks in Australia. The object encompasses:

- > maximising the overall public benefit derived from using the radiofrequency spectrum by ensuring its efficient allocation and use
- > providing a responsive and flexible approach to meeting the needs of users of the spectrum

²⁷ Organisation for Economic Co-operation and Development, *OECD Policy Guidance on Convergence and Next Generation Networks*, June 2008, at www.oecd.org/dataoecd/14/52/40869934.pdf.

²⁸ See [section 152AB](#) in Part XIC of the *Trade Practices Act 1974*.

- > encouraging the use of efficient radiocommunication technologies so that a wide range of services of an adequate quality can be provided
- > supporting the government's communications policy objectives.²⁹

Drawing on these sources, the ACMA refers to the following four principles in assessing the present, as well as any future and transitional, regulatory frameworks for numbering:

- > efficiency
- > flexibility
- > resilience
- > simplicity and transparency.

The **efficiency** principle is concerned with whether the regulatory and administrative framework for numbering leads to the continued supply of communications services in accordance with the public interest, at least cost, even as preferences change and technologies develop over time. In the context of managing resources such as numbers, names and addresses, this refers to the three forms of economic efficiency:

- > productive efficiency
- > allocative efficiency
- > dynamic efficiency.

Productive efficiency is concerned with whether regulatory and administrative arrangements encourage carriage service providers and their customers to choose inputs (whether numbers, names and addresses, or other types of inputs) that allow supply of their services at the lowest overall cost. This may include considerations of:

- > the extent to which the most effective or intense use is made of numbers, names and addresses, such that no artificial shortage occurs
- > costs of administering of numbering, naming and addressing
- > how numbers, names and addresses are priced in comparison with other inputs to communications services.

Allocative efficiency is concerned with whether regulatory and administrative arrangements achieve an assignment of numbers, names and addresses between carriage service providers and between their customers that facilitates the supply of services that are valued most highly. This may include considerations of:

- > the extent to which regulatory and administrative arrangements may produce disparities in how different types of numbers are assigned
- > the extent to which regulatory and administrative arrangements may produce disparities in how numbers are assigned in comparison with internet names and addresses
- > how numbers, names and addresses are priced if they are scarce.

Dynamic efficiency is concerned with whether regulatory and administrative arrangements enable services and technologies to change in response to shifts in preferences and developments in technologies while maintaining productive and allocative efficiency over time. Dynamic efficiency is closely related to the flexibility principle discussed below.

The **flexibility** principle is concerned with whether the regulatory and administrative framework for numbering is able to evolve over time and respond to the changing needs of the communications environment. This may include considerations of:

²⁹ See [section 3](#) of the *Radiocommunications Act 1992*.

- > barriers to entry and competition
- > allowing the addition of new service features over time
- > accommodation of alternate pathways for market evolution, notably as a consequence of the increasing ubiquity of internet-based communications services and implementation of next generation networks
- > reliance on specific communications technologies to achieve a given policy objective.

The **resilience** principle is concerned with whether the regulatory and administrative framework for numbering stands the test of time and provides certainty to carriage service providers and their customers so that they are able to plan their use of numbers over time (including for the business purposes of customers). This may include considerations of:

- > the extent to which numbering is used to achieve enduring policy objectives
- > any need for frequent adjustment of the regulatory and administrative framework for numbering.

The **simplicity and transparency** principle is concerned with whether the regulatory and administrative framework for numbering facilitates consumers making informed choices about their use of communications services. This may include considerations of:

- > whether the structure of numbering or the use of numbers assists consumers in understanding the nature of a service that they use, or knowing the cost of calls that they make
- > whether discrimination occurs in access to numbers between technologies, types of communications service, individual carriage service providers, or individual customers.

Fulfilment of the general principles described above in any future administrative and regulatory framework for numbering is likely to result in a structure that adheres to the following principles for 'design' of the Numbering Plan:

- > broad-based use of numbers
- > technical neutrality
- > price transparency
- > clarity.

The **broad-based use of numbers** design principle is related to the general *flexibility* principle, and is concerned with minimising the need to compartmentalise the Numbering Plan in response to technical or service innovation or changes to business models. This may include considerations of whether compartmenting within the Numbering Plan is retained or introduced only if it:

- > provides scope for flexibility and innovation by providers of communications services
- > can provide this scope without any need for frequent review or adjustment
- > minimises the need for new or revised agreements between access suppliers and access seekers when new services or business models are introduced or existing ones are changed.

The **technical neutrality** design principle is related to the general *flexibility* and *resilience* principles, and is concerned with avoiding the need to compartmentalise the Numbering Plan on the basis of the technical characteristics of communications services. This may include consideration of whether existing compartmenting within the Numbering Plan based on the technical characteristics of a service is retained, and

whether new compartmenting based on the technical characteristics of a service may be introduced.

The **price transparency** design principle is related to the general *simplicity and transparency* principle, and is concerned with ensuring that, if it is necessary to use numbering to facilitate end-users recognising the cost of calls, the structure of the Numbering Plan supports this. This may include considerations of whether:

- > compartmenting within the Numbering Plan enables end-users to obtain an indication of the general nature of the cost of a call from the prefix of a dialled number
- > the primary reason for retaining or introducing compartmenting within the Numbering Plan is to separate types of calls or services that incur substantially different charges such that they can be distinguished by end-users from the prefix of a dialled number.

The **clarity** design principle is also related to the general *simplicity and transparency* principle, and is concerned with ensuring that the structure of the Numbering Plan is simple and capable of being readily understood by carriage service providers, their customers and end-users. This may include considerations of whether:

- > the amount of compartmenting within the Numbering Plan is kept to the minimum necessary
- > compartmenting within the Numbering Plan is retained or introduced for reasons that are evident to carriage service providers, their customers and end-users.

Neither the general principles nor the design principles are intended to operate independently of law applying to the communications sector.

Question 2

Do the four general principles applied by the ACMA—*efficiency, flexibility, resilience, and simplicity and transparency*—encompass the most significant aspects of the use of numbers which the ACMA should assess?

Question 3

Do the design principles—*broad-based use of numbers, technical neutrality, price transparency and clarity*—encompass the most significant aspects of the design of a numbering plan which the ACMA should consider?

Structure of the Numbering Plan

Introduction

A core element of the Numbering Plan is its specification of particular series of numbers for use in connection with different services.

The degree of complexity associated with how telephone numbers in Australia are divided between specific types of service has generally increased over time as the number of services has increased. This reduces the flexibility, efficiency and transparency of the Numbering Plan. Such complexity may generate costs and confusion, both for carriage service providers supplying services via telephone numbers, and for businesses and citizens using the numbers.

This complexity is not universal: many countries' numbering plans are considerably simpler in structure than the Australian Numbering Plan. For example, the North American Numbering Plan, which serves Canada, the United States and 17 Caribbean countries, is facing the same or greater technical and social pressures on the use of telephone numbers but possesses a much smaller set of service types compared with the Australian Numbering Plan.

The definition of service types is used in the Numbering Plan to divide the numbering resource into ranges for use by different kinds of services or applications.³⁰ They may provide information to industry and consumers on the nature of a service to which a call is made and how calls to that service are to be charged. The Numbering Plan contains more than 40 service types and uses a variety of criteria to describe them. In some cases, technical descriptions are used (for example, digital mobile services), while others reference call charging arrangements (for example, local rate services).

By contrast, when the Community Telephone Plan was published in 1960, only two kinds of numbers were described:

- > 'national numbers', which consisted of an area code and a directory number
- > 'service codes', which were short numbers used for the provision of certain services including emergency, directory information, trunk line assistance, and recorded information; for example, time and weather. In 1960, there were 15 such services.

By 1991, AUSTEL reported that the number of recorded and service information services had increased. For example, 26 information services were offered to customers in Melbourne. At that time, AUSTEL recommended that service numbers be reorganised and streamlined into seven broad service categories: community, operator, information, special network, mobile, universal personal telecommunications and access codes.

Consistent with the general and design principles articulated earlier, this paper examines the way in which telephone numbers in Australia are divided between specific types of service, by asking the following questions:

- > How can the Numbering Plan provide a bridge between the current communications environment, and the emerging and future communications

³⁰ [Section 2.2](#) of the Numbering Plan sets out the numbers that are for use by the public. [Schedule 2](#) and [Schedule 3](#) provide information about geographic numbers, while [Schedule 4](#) provides information about special service numbers, including digital mobile services. The Numbering Plan [dictionary](#) provides definitions for some, but not all of the services including: local service, location independent communications service and digital mobile service.

environments which may be predominantly reliant on internet-based services and next generation networks?

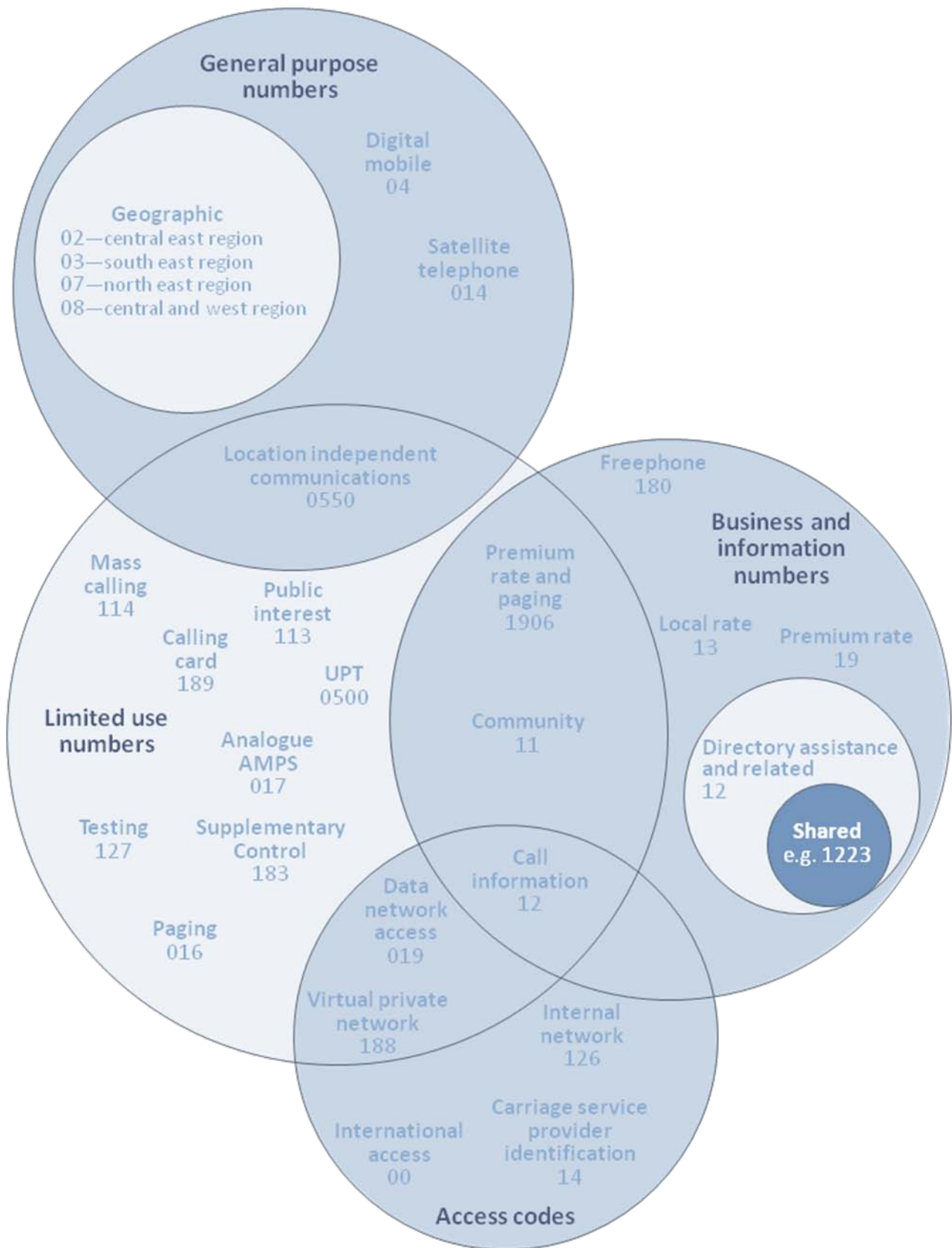
- > To what extent should numbers be used to achieve policy objectives or support the call routing, charging and other functions of carriage service providers?
- > Recognising the increasing role that IP addresses and internet domain names will play in the supply and use of communications services and that neither follows a service-based structure, to what extent should distinctions between services in the Numbering Plan be removed or reduced to a minimum, for example by merging some or all of today's service types into a 'general purpose' category?

Given the large number of service types in the Numbering Plan, they are divided into the following groups in this paper:

- > general purpose numbers
- > freephone, local rate and premium numbers
- > directory and information services on shared numbers
- > numbers with limited usage.

Figure 3 provides a visual guide to the structure of the Numbering Plan.

Figure 3 Structure of the Numbering Plan



General purpose numbers

The Numbering Plan describes several service types which are used to provide general purpose numbers for use by individual residential and business subscribers.

These include:

- > geographic numbers for use with local services
- > mobile numbers for use with digital mobile services
- > location independent communication numbers
- > satellite numbers.

Geographic numbers

Background

When the only telecommunications service used by most individuals, households and businesses was a fixed network voice telephony service, the only type of number available to subscribers was a geographic number. Since the time of the 1960 Community Telephone Plan—which set out the basic structure for the use of numbers in Australia, on which current arrangements have been built—geographic numbers have evolved so as to be used for a range of applications. Nevertheless, the predominant use of geographic numbers remains fixed network voice telephony.

Under the Community Telephone Plan, geographic numbers ranged in structure from a four-digit area code plus a five-digit local number (in a few select areas such as Kangaroo Island), to a three-digit area code plus a six-digit local number (in most areas), to a two-digit area code plus a seven-digit local number (in the major metropolitan areas). Today, geographic numbers uniformly take the form of a two-digit area code and an eight-digit local number. The 54 area codes that existed under the Community Telephone Plan have been simplified and amalgamated into just four area codes.

Geographic numbers have been used in the past—and to an extent continue to be used—by carriage service providers and end-users for the purposes listed in Table 2.³¹

Table 2 Uses of geographic numbers by carriage service providers and end-users

Carriage service providers	<ul style="list-style-type: none">> To identify the carriage service provider and exchange serving a called party, in order to correctly route a call.> To identify whether the calling and called parties are in the same local call area, in order to apply a local call charge to a call.> To identify the defined geographic areas in which exchanges serving the calling and called parties are located, in order to apply a long distance charge to a call.> To identify the location of the calling party, in order to carry a call to the particular store or branch location of a business that is most relevant for the caller's location.
End-users	<ul style="list-style-type: none">> To identify the charge for a call; in particular, to identify whether a call will be charged as a local call or a long distance call.> To identify the general location of a called party; for example, in order to determine whether a business is likely to provide a service in the end-user's area.

³¹ The use of geographic numbers to derive information about the name, location and provider of services to a customer by enforcement agencies and emergency service organisations, including the use of the Integrated Public Number Database, are discussed further in a separate and later module as part of this work program. The use of geographic numbers by end-users is also being examined in ACMA consumer research, the findings of which will be published as a later module of this work program.

Geographic numbers have had a long association with how calls are correctly carried from the calling party to the called party: blocks of contiguous geographic numbers were uniquely associated with individual telephone exchanges, and the numbers in these blocks assigned to customers within the area served by an exchange. Correctly carrying a call involved identifying the exchange serving the called party—since blocks of numbers associated with exchanges were identifiable from the first few digits of each number in a block, the exchange was identified simply by checking the first few digits of the called number.

Related to this, geographic numbers also have a long association with calls that are subject to distance-based charging. From 1991, carriers (and subsequently carriage service providers) have been subject to an obligation regarding provision of untimed local calls; that is, charging a flat rate for a local call regardless of the length of the call. This obligation remains in force today under Part 4 of the *Telecommunications (Consumer Protection and Service Standards) Act 1999*.

Under this obligation, carriage service providers must offer customers using a standard telephone service (other than a mobile or satellite service) the option of an untimed charge for any call between two points for which, prior to 1997, the call would have been charged at an untimed rate.

In order to meet this obligation, carriage service providers have needed to distinguish local calls from long distance calls. Carriage service providers have adopted a practice of determining the defined geographic areas related to local call areas—known as standard zone units (see page 5)—within which the calling party and the called party are respectively located.³² This task is assisted by the Numbering Plan, which associates standard zone units with blocks of contiguous geographic numbers. Consequently, carriage service providers have been able to efficiently and easily assess whether a particular call is local or long distance by referring to the first few digits of the numbers of the calling and called parties.

By way of example, take a call from the ACMA's Sydney office (number 02 9334 7700) to Parramatta City Council (number 02 9806 5000). To charge for the call in accordance with the obligation to provide an option of untimed local calls, a carriage service provider checks the first few digits of each number—in this case, '02 9334' and '02 9806' respectively—against a table associating these prefixes with standard zone units. In both cases, the prefixes are associated with a standard zone unit corresponding to part of the Sydney inner local call area. Because the call is carried entirely within this local call area, carriage service providers are able to determine that it is a local call and charge for it at an untimed rate.³³

Any changes to the legislative obligation to provide an option of untimed local calls are ultimately a matter for the government. Therefore, for the purposes of the ACMA's processes, it is assumed that such an obligation will continue to exist for the foreseeable future, and will be a relevant consideration for carriage service providers that calculate charges for local calls on an untimed basis and for long distance calls on a timed basis.

³² Local call areas are typically larger than the areas served by a telephone exchange. For example, Telstra operates over 100 exchanges in the Sydney metropolitan area, but the same area is covered by six local call areas.

³³ The determination of whether a call is local or long distance is in many cases more complex than this example would suggest. See www.acma.gov.au/webwr/assets/main/lib100283/implementing_the_untimed_local_call_obligation.pdf for more details.

While it is recognised that carriage service providers rely on the method described above for determining whether a call is local or long distance, this connection between geographic numbers and local call areas is coming under pressure as the use of numbers evolves. This is one reason why carriage service providers may find it beneficial to identify alternative means of distinguishing local calls from long distance calls.

Current practice

While geographic numbers continue to be most commonly used for fixed network voice calls, they are also used for non-traditional services that are an exact or close substitute for fixed network voice telephony, such as some VoIP services, as well as for non-voice calls such as fax calls. Less obviously to consumers, geographic numbers are also used for a range of functions internal to the networks of carriage service providers, such as voicemail and mobile roaming.

The association between geographic numbers and how calls are carried to the called party is no longer as close as it was. For example, the ability for customers to keep their geographic number when changing from one carriage service provider to another means that individual geographic numbers within a block of contiguous numbers may no longer be served by the telephone exchange with which the block was originally associated. Consequently, it is generally no longer possible for a carriage service provider to rely on identifying the exchange serving a called number simply by reference to the first few digits of the number.

The use of numbers as indicators of geographic location to assist with charging for calls is also less relevant than it was in the past. This is due to:

- > The increasing dominance of mobile phones, as calls from mobile phones to geographic numbers make no distinction between local and long distance call charges. As noted earlier, the number of Australians aged 44 and under who employ a mobile phone as their most common communications choice now exceeds the number who use a landline phone as their most common communications choice.
- > The take-up of capped plans for fixed network services, where the distinction between local and long distance calls is muted due to both types of calls frequently being included within call allowances.
- > The take-up of plans that feature charges for long distance calls within Australia that are not related to the distance or duration of the call.

Added to this, it is difficult for most end-users to refer to the called number in order to identify, at the boundary between a local and a long distance call, whether a call is one or the other. By way of example, take a call from Springwood State High School (number 07 3380 6111) in the outer southern suburbs of Brisbane, to Humpybong State School (number 07 3385 1666) in the outer northern suburbs of Brisbane. Although both numbers begin with the same five digits, this call crosses from one local call area to another and therefore may be charged as a long distance call. However, a call from either school to the Queensland Department of Education and Training in the centre of Brisbane (number 07 3237 0111) is in the same respective local call area for each school and is charged as a local call.³⁴

The ability for customers to forward incoming calls to their geographic number to any other number also means that, in effect, an end-user calling the original number cannot reliably predict the destination of the call.³⁵

³⁴ Local call areas may overlap each other.

³⁵ Call forwarding has no impact on charging: a caller pays the usual charge for a call to a called party, whereas the called party pays for the forwarded part of the call.

Consequently, the use of geographic numbers to convey information to assist with the following is becoming less relevant:

- > carrying a call to a called party
- > charging for a call
- > allowing a caller to assess the location of the called party
- > allowing a caller to assess the charge for a call.

This trend is consistent with the use of internet addresses by applications on the internet and IP-based networks. Such addresses convey no significant location information. Instead, applications and networks which require geographic location information related to a party at either end of a communication interact with servers containing relevant geographic information.³⁶

Question 4

What information conveyed by geographic numbers is of value to end-users?

Question 5

Does the list of uses of information conveyed by geographic numbers in Table 2 encompass all of the major uses of this information by carriage service providers and end-users?

Pressures

There is interest among some carriage service providers in having greater flexibility in their use—and their customers' use—of geographic numbers.³⁷ For example, some carriage service providers—typically those offering VoIP services—have the technical capability to enable their customers to make and receive calls using their assigned geographic numbers without being restricted to a fixed location within a standard zone unit. This capability enables their customers to:

- > move house or business from one standard zone unit to another without having to change their number
- > use the same number while temporarily in a location that is not their usual address.

These capabilities are typical of what is already possible and available with VoIP services today, and points to what is becoming possible as next generation network technology is implemented across all networks.

However, these capabilities are not unfamiliar: major carriage service providers have long offered 'out of area' or 'number redirection' services which enable customers to receive calls in a location which is outside the area normally served by the telephone exchange with which a customer's number is associated (and may even be outside the local call area corresponding to that number). VoIP places such capabilities in the hands of consumers instead of carriage service providers, and enables them to be used routinely rather than by exception.

³⁶ See, for example, the protocols defined by the GEOPRIV (Geographic Location/Privacy) Working Group of the Internet Engineering Taskforce (<http://datatracker.ietf.org/wg/geopriv>). These protocols are not reliant on network addresses.

³⁷ See, for example, submissions from Engin, Skype Communications and VON Europe in response to the ACMA's April 2010 discussion paper on proposed amendments to the Numbering Plan to increase flexibility in the use of geographic numbers, especially by VoIP services, at www.acma.gov.au/web/standard/pc=pc_312065.

Some carriage service providers also wish to be able to deploy a single block of contiguous geographic numbers across multiple standard zone units, for example, for use by companies who have multiple locations in one city.³⁸

It is not possible to foresee the further evolution of voice communications to provide enhanced capabilities such as those described above, nor the implications of this evolution for numbering. However, scope to allow these degrees of flexibility in the use of geographic numbers is constrained, while carriage service providers rely on an association between the first few digits of the numbers of calling and called parties and local call areas to deliver on the legislative obligation to provide an option of untime local calls.

Such flexibility is likely to deliver benefits to both residential and business customers. Indeed, Australian users of VoIP services, including services which are not based in Australia or services which provide for assignment of numbers to their customers from other countries' numbering plans, may already be benefitting from such flexibility. Given these factors, it is appropriate to consider options to achieve greater flexibility, both within the current broad structure of the Numbering Plan and outside that structure.

Efficiency improvements

Recognising the variance in views expressed in previous consultations by the ACMA in relation to the structure and use of geographic numbers, it is open to the ACMA to:

- > preserve the historical approach of restricting the use of customers' geographic numbers to their respective defined geographic areas
- > take steps to prevent any temporary or permanent use of customers' geographic numbers other than in the geographic areas defined in relation to the numbers.³⁹

However, preventing the further evolution of this historical approach may result in:

- > customers losing or being restricted in their ongoing use of their service if they are already using their numbers outside the historical approach
- > Australians missing the benefits from IP-based communications services, and Australia being confined to the rearguard of international communications developments.

In response to proposals made by some carriage service providers, the ACMA has recently put forward possible changes to the Numbering Plan that would facilitate some more flexible use of geographic numbers. These changes are especially targeted at the use of these numbers by VoIP services, which are inherently not limited to tying the use of the numbers by customers to a particular permanent location, and would allow the use of geographic numbers by services that permit:

- > outgoing calls only (that is, they cannot be used to receive calls)
- > end-users to make and receive calls in different locations, while requiring providers of such services to provide advice to their customers regarding the implications of such use.

The proposed changes were the subject of a discussion paper published by the ACMA in April 2010, and the changes are presently under consideration in the context of submissions received in response to that paper.⁴⁰

³⁸ Geographic numbers are allocated by the ACMA to carriage service providers in blocks of 1000 contiguous numbers.

³⁹ Rigorously enforcing the historical approach may involve modifications to existing arrangements to assist in assessing non-compliance.

⁴⁰ See discussion paper at

www.acma.gov.au/webwrr/assets/main/lib311403/geographic_numbering_amendments-discussion_paper.pdf, and submissions received by the ACMA in response to the discussion paper at www.acma.gov.au/web/standard/pc=pc_312065.

In the short- to medium-term, a further option open to the ACMA—also proposed by some carriage service providers—is to take down the partitions that exist *inside* geographic areas defined in the Numbering Plan within the major metropolitan areas. These partitions—referred to as ‘sectors’ in the Numbering Plan—correspond to patterns of assignment followed by Telecom Australia (the predecessor of Telstra) prior to the nationwide changes to geographic numbers that occurred in the 1990s. These patterns were preserved to permit callers to identify which part of a given metropolitan area they are calling.

For example, Adelaide numbers starting with 08 714, 08 724, 08 734, 08 744, 08 814, 08 824, 08 834 and 08 844—where the third digit of the local number is always ‘4’—identify a ‘north west sector’ that corresponds to Port Adelaide and surrounding suburbs.

These partitions do not serve any purpose related to distinguishing between local and long distance calls. Moreover, the original purpose of these partitions in assisting callers to identify the part of a metropolitan area they are calling is likely to be of reduced value today because:

- > the particular indicator of a sector within a number is not readily discernible as, even in those cases where it is most evident, it lies at the second or third digit of a local number
- > awareness of these numerical indicators is likely to have decreased over time
- > other information about the location of called parties is readily accessible (for example, online directories).

The use made by end-users of location information in geographic numbers is being tested in the ACMA’s consumer research.

Removing these partitions would enable more flexible use of geographic numbers across the most populous areas of the major metropolitan cities. Moreover, this step would involve no cost to end-users or carriage service providers. This is because, while it would remove *patterns* of association between numbers and sectors, it would leave unaltered the association between numbers and standard zone units. The association between numbers and standard zone units, rather than the *patterns* of association between numbers and sectors, is used for determining whether calls will be charged at an untimed local call rate.

Question 6

What advantages and disadvantages would be associated with the proposed efficiency improvement of removing sector partitions in major metropolitan areas?

Structural improvements

In the medium- to long-term, a further option may become open to the ACMA as the deployment of IP infrastructure in carriage service provider networks becomes more widespread.

IP-based communications networks utilise standardised protocols that enable the simple and rapid use of large databases to assist core functions within those networks.⁴¹ Therefore, a database that identified the standard zone unit within which each geographic number in service in Australia is used might, in a traditional telecommunications network, be prohibitively expensive to establish and to integrate with the real-time systems that determine call charges. This is not true of IP-based communications networks.

Consequently, standardised protocols available within IP networks may permit carriage service providers to continue to fulfil their obligation to offer an option of untime local calls by referring to a database of all geographic numbers in order to identify the standard zone units corresponding to the parties at each end of a call.

Such a capacity would provide freedom for any geographic number to be used in any location in Australia, because a carriage service provider needing to distinguish between local and long distance calls to or from that number could use a database to obtain the standard zone unit corresponding to that number. Indeed, this may be a first step towards a shift from geographic numbers that are tightly constrained in their use to more flexible and general purpose numbers. As discussed on page 38, such general purpose numbers could potentially encompass both fixed network and mobile network applications.

However, it is recognised there may be particular technical challenges to be overcome to enable such a database to indicate the standard zone unit corresponding to a temporary location of a customer.⁴²

Implementation of the capacity described above might require substantial investment by carriage service providers to establish databases, given that they would need to be capable of storing information about every geographic number in use, of responding rapidly to queries for each call to a geographic number, and of being updated quickly when new numbers are activated (or potentially when customers change their location).⁴³

Question 7

Given the technical and service innovations affecting the use of geographic numbers:

- > What are the circumstances in which geographic numbers should be converted to flexible and general purpose numbers?
- > What is the best strategy for undertaking such a conversion?

(See also Question 11)

⁴¹ An example is the use of the ENUM protocol, developed by the Internet Engineering Taskforce, in connection with large databases that may be used by IP-based communications networks to link telephone numbers to internet domain names for the purpose of routing calls within and between these networks.

⁴² The capture of location details of customers who are calling from a temporary location by emergency service organisations will be discussed in a separate and later module as part of this work program.

⁴³ The Integrated Public Number Database, operated by Telstra in accordance with a condition of its carrier licence as a source of information for directory assistance services and to emergency service organisations and law enforcement agencies, contains address information corresponding to every geographic number. This information is, however, of a different type—more specific—to that normally required for call charging purposes.

As noted earlier, the distinction between local and long distance calls has always been a challenging one for most end-users to discern. Nevertheless, although that distinction appears to be less relevant to end-users today than in the past, end-user knowledge of the cost of each call will remain important, especially for disadvantaged and low-income consumers. The move described above could increase the challenge of discerning whether a call is charged as local or long distance. Therefore, it is likely some new means of providing transparency of call costs may be needed.

Question 8

If geographic numbers move from the present tight constraints on their use to more flexible and general purpose numbers, what will be required to guarantee transparency of call costs to end-users?

Mobile numbers

Background

In 1981, an analog mobile telephone service was introduced by Telecom Australia to allow telephone calls to be made from vehicles and other mobile units operating within Melbourne and Sydney, with a nominal capacity of 4,000 subscribers in each location. By 1991, prior to the introduction of competing mobile networks, this had grown to 290,000 customers.

Today there are more than 24 million mobile services, approximately double the number of fixed services.⁴⁴ Indeed, consumers increasingly identify mobile phones as their primary communications service.

Mobile numbers are structured as 10 digits and uniformly commence with the prefix 04.⁴⁵ They are allocated administratively in blocks of 100,000 numbers by the ACMA, and approximately 47 per cent of all possible numbers are allocated to carriage service providers. Portability has been a key factor in underpinning competition in this sector since its introduction in 2001, with more than one million mobile customers porting their number to another provider in 2008–09.

Mobile handset and network technology have undergone significant changes since the first digital mobile service was introduced in 1993, including:

- > the introduction of mobile messaging services (SMS and MMS), which have grown to the extent that they may overtake voice as the primary means of communication on mobile phones⁴⁶
- > the provision of terrestrial mobile and satellite mobile services via a single handset, using the same SIM card and even using the same number (see page 42)
- > use of VoIP services on mobile phones
- > access to internet browsing from mobile phones, and availability of mobile adapters—where a mobile phone is effectively encapsulated in a dongle—which can be plugged into a laptop computer to provide wireless internet access
- > machine-to-machine communications, where devices communicate with each other via embedded mobile phone functionality.

Machine-to-machine communications

Machine-to-machine communications are used for automatic transfer of data between devices and applications. Examples of existing and potential machine-to-machine applications include:

- > EFTPOS terminals
- > vending machines and parking meters (to signal that a particular product is depleted or the machine requires service)
- > monitoring of smart meters by electricity, gas and water utilities
- > automatic notification by vehicles to emergency service organisations of serious road accidents⁴⁷

⁴⁴ The number of fixed-line telephone services in operation at June 2009 was estimated at 10.67 million, compared to an estimated 24.22 million mobile phone services. ACMA, *Communications Report 2008–09*, at www.acma.gov.au/webwr/_assets/main/lib311252/08-09_comms_report.pdf.

⁴⁵ Three analog AMPS mobile numbers remain allocated; see page 59.

⁴⁶ Telstra reported a 9.9 per cent rise in the number of SMS sent between December 2008 and December 2009 (up from 4,353 million to 4,783 million), compared with 2.7 per cent rise in voice minutes (up to 5,723 million from 5,570 million) over the same period. See Telstra, *Half-year report for the half-year ended 31 December 2009*, at www.telstra.com.au/abouttelstra/download/document/telstra-half-year-results-2010.pdf.

- > tracking of assets such as fleet vehicles, trucks, ships, trailers, containers and expensive medical equipment
- > security alarms
- > supervision and surveillance systems.

Mobile networks appear to be used for machine-to-machine communications because mobile network technology is mature, cheap, flexible and easily implemented. Estimates of the growth of machine-to-machine communications vary widely. One recent estimation of the requirement for numbers for machine-to-machine communications by 2020 ranged from 2.6 to 27.6 million for a hypothetical country of a population of 10 million.⁴⁸ Translating this estimation to Australia suggests a requirement for numbers for machine-to-machine communications of between 5.8 and 61.9 million by 2020.

In September 2010, Telstra estimated that machine-to-machine communications are worth \$300 million, and likely to exceed \$1 billion over the next four years.⁴⁹

In the longer term, it is likely that machine-to-machine communications will shift from current technologies reliant on mobile numbers to IP-based communications using IP addresses when next generation network technology is ubiquitous.

An increase in usage of mobile numbers for machine-to-machine communications on the scale predicted above may place pressure on the supply of mobile numbers. Should there be any likelihood of demand for mobile numbers towards the upper end of the predicted scale, it may be prudent to take steps to ensure sufficient numbers are available for these applications.

Question 9

Is significant demand for mobile numbers for machine-to-machine applications likely to occur in Australia? If so, how should an adequate supply of numbers for these applications be assured?

Charges

Since the introduction of digital mobile services, charges for calls both to and from mobile phones have fallen substantially. Nevertheless, calls from landlines to mobile phones are usually more expensive than calls from landlines to other landlines within Australia, and the call cost is almost always dependent on the duration of the call. Price transparency is the primary reason that mobile phone services use numbers distinct from landline phone services, to enable consumers to readily identify the higher cost of calls to mobiles.

In the United States, there is no distinction between the cost of calls to landlines and to mobiles, and it is noteworthy that mobile phone services in that country use the same numbers as landline phone services.⁵⁰

⁴⁷ See September 2009 European Commission announcement, 'European Commission urges EU countries to implement eCall voluntarily', at www.epractice.eu/en/news/293342.

⁴⁸ See Electronic Communications Committee, *Numbering and addressing in Machine-to-Machine (M2M) communications* (draft), June 2010, at www.ero.dk/273AB626-01A5-4DE5-8B98-5916A30ED6B2?frames=no&. Also Ericsson media release, 'Vestberg foresees industry shift', 15 February 2010, which predicted 50 billion connected devices by 2020 (www.ericsson.com/news/1384303).

⁴⁹ Miro Sandev, 'Telstra set to tap A\$1bn market with M2M charge' in *Communications Day*, issue 3844, 28 September 2010.

⁵⁰ Mobile phone customers in the United States may also pay to receive calls.

Today, two types of billing arrangements for calls from mobiles are commonplace:

- > cap plans, where customers pay a fixed monthly fee which includes an allowance of a given quantity of minutes of calls, together with text messages and data⁵¹
- > pre-paid plans, where customers pay for their mobile phone usage in advance and draw down from their pre-paid account when they make a call.

Within both of these types of billing arrangements, mobile carriage service providers frequently make a distinction in charges for calls to customers on the same mobile network (on-net calls) and calls to other to customers on other networks (off-net), with the former being cheaper.

Prior to the introduction of portability of mobile numbers in 2001, end-users were able to determine whether they were calling someone on the same mobile network as themselves by reference to the first few digits of the number they were calling. This was because each major mobile carriage service provider gave its customers numbers that were exclusively drawn from blocks of numbers with common prefixes; for example, the prefixes 0411, 0412 and 0413 identified the Optus mobile network in the early days of digital mobile services.

Mobile number portability has meant that the prefix of a number is no longer a reliable indicator of a mobile network. It is not evident to the ACMA whether the absence of a means of reliably determining whether a call is on-net or off-net has affected consumer behaviour. However, the ACMA has observed that at least one provider has recently offered a means of identifying whether a call to a contact is on-net or off-net.⁵²

In a number of countries, regulatory intervention in mobile markets has led to significant reductions in wholesale prices for termination of calls to mobile phones. In Australia, the ACCC has reduced the indicative price for the declared mobile terminating access service from 22.5 cents per minute in 2004 to 9 cents per minute. These reductions appear to have flowed through to retail charges.⁵³

The level of mobile terminating charge remains substantially higher than that for termination of calls to landline phones. In the European Union, consideration is now being given to switching to a new wholesale pricing model at the time that next generation network technologies are implemented in fixed and mobile networks. Under this model, differences in terminating charges for mobile phones and landline phones are likely to be eliminated.⁵⁴

⁵¹ Other types of post-paid plans are available which do not provide an allowance of a given quantity of calls, text messages or data.

⁵² In August 2010, VHA announced an iPhone application which identifies, within a customer's contact list, which number are for services on Vodafone or 3. This allows users to identify customers of the same network for the purpose of managing call costs. Other providers allow users to pre-identify family and friends for cheaper calls. See http://xseries.three.com.au/3/three/About_3/mediaRelease/VHA_Who2Call_Media_Release_030810_FINAL.pdf.

⁵³ See, for example, ACCC, *Changes in prices paid for telecommunications services in Australia, 2007–08 - Report to the Minister for Broadband, Communications and the Digital Economy*, April 2009 at www.accc.gov.au/content/item.phtml?itemId=877087&nodeId=685c33e98ae9b709d3b520de9378387b&fn=ACCC%20telecommunications%20reports%202007%E2%80%9308.pdf. Table 5.1 shows a fall in the retail price index for mobile services of 13 per cent in 2004–05—the first year in which the regulatory changes to mobile terminating access charges were in effect—and falls in subsequent years of between 2.5 and 6.5 per cent.

⁵⁴ See BEREC (Body of European Regulators for Electronic Communications), 'BEREC Common Statement on Next Generation Networks Future Charging Mechanisms / Long Term Termination issues', June 2010, at www.erg.eu.int/doc/berec/bor_10_24_nqn.pdf.

Given the ACMA's assumption that the distinction between mobile and geographic numbers is entirely due to differences in retail charges for calls to mobile and landline phones, it will be appropriate to assess whether this distinction should be retained should the level of mobile terminating charge begin to approach the charge for termination of calls to landline phones.

Question 10

What reasons are there for retaining a separate number range for mobile services, other than signaling the higher cost of calls to mobile phones compared with the cost of calls to landline phones?

Question 11

Given the ubiquity of mobile phones and the downward trend in charges for calls to mobile phones:

- > What are the circumstances in which mobile numbers should be converted to flexible and general purpose numbers?
- > What is the best strategy for undertaking such a conversion?

(See also Question 7)

Location independent communications numbers

Background

In 2005, the government considered the application of existing communications policies and regulation to VoIP services. A 2005 report by the Department of Communications, Information Technology and the Arts to the then minister recommended that a new series of numbers should be designated for services that depart from the expectations of a traditional telephone service, whether because they:

- > are intended for itinerant use
- > are intended for access from computers
- > otherwise differ significantly from services using existing types of numbers.⁵⁵

The report noted that services that are intended as a close substitute for traditional telephone services could be allowed to use geographic numbers; the pressures that this practice causes are discussed on page 30.

Mobile numbers were regarded as less suited to these services given that one of the essential characteristics of mobile services—the ability of customers to continuously access the same communications service while in motion—is not a feature of fixed network VoIP services.⁵⁶

In 2007, at the request of the government, the ACMA designated that 10-digit numbers beginning with the prefix 0550 would be available for services that are partially or totally nomadic; that is, able to be moved from place to place by a customer of the service. These numbers were labelled location independent communications numbers. It was intended that these numbers would enable:

- > consumers to identify that the service they were calling was distinctive, and might be subject to charges other than those typical of calls to geographic numbers
- > emergency service organisations to be advised, when they received address details for a caller to 000, that these details may be unreliable
- > enforcement agencies, when they similarly sought address details for a customer in connection with an investigation, that these details may be unreliable.

The last two matters will be discussed further in a separate and later consultation paper in this work program.

Current practice

Location independent communications numbers are administratively allocated in blocks of 1,000 by the ACMA.

In practice, location independent communications numbers have very limited usage, for reasons including:

- > the absence of agreement between access providers and any carriage service providers holding location independent communications numbers regarding a wholesale price for origination of calls to these services
- > the absence of any notification of a dispute about the provision of originating access to location independent communications services to the ACCC
- > the absence of any declaration by the ACCC regarding originating access to location independent communications services under [section 152AL](#) of the *Trade Practices Act 1974*

⁵⁵ Department of Communications, Information Technology and the Arts, *Examination of policy and regulation relating to voice over internet protocol (VoIP) services*; report to the minister, November 2005, at www.dbcde.gov.au/_data/assets/pdf_file/0003/34194/VOIP_Report_November_2005.pdf.

⁵⁶ Many VoIP services permit customers to move from one place to another and continue to have access to the same communications service, but are not able to achieve connectivity for customers in motion.

- > the ACMA's adoption of a forbearance approach to the use of geographic numbers outside the standard zone unit with which the number is associated, until such time that agreements are reached between access providers and carriage service providers holding location independent communications numbers on interconnection of calls to the numbers⁵⁷
- > the absence of any sign that consumers dislike the use of geographic numbers for VoIP services.

In the absence of an agreement between access providers and carriage service providers holding location independent communications numbers:

- > consumers are unable to make a call to a location independent communications number
- > carriage service providers holding location independent communications numbers are unable to interconnect in order to receive calls.

Some 68,000 location independent communications numbers were allocated in the first two years after the numbers became available. In the absence of any agreements on originating access to these numbers, most carriage service providers have surrendered their numbers to the ACMA. Today only 7,000, or 0.7 per cent of the total available, remain allocated.

Several different approaches have been followed in other countries regarding provision of numbers for VoIP services, as shown in Table 3.

Table 3 Numbering for VoIP services in other countries

	Numbering arrangements	Originating access arrangements
United States	Use of geographic numbers for VoIP services is permitted (where it does not conflict with technical or other regulatory arrangements).	Originating access charges are as per other calls to geographic numbers.
Singapore, South Korea, Japan	The national regulatory authority designated a separate series of numbers for VoIP services.	The national regulatory authority determined charges for originating access to the services at the same time that numbers were designated. ⁵⁸
Malaysia, Ireland		The national regulatory authority initially did not determine charges for originating access to the services, but decided to set charges after finding that numbers were not utilised. ⁵⁹
France		The national regulatory authority did not determine charges for originating access to the services: the incumbent offered originating access to access seekers because it wished to use the numbers itself.

⁵⁷ See ACMA, *Discussion paper: Geographic numbering arrangements*, March 2010, at www.acma.gov.au/webwr/_assets/main/lib311403/geographic_numbering_amendments-discussion_paper.pdf, and the discussion about the use of geographic numbers by VoIP services at page 32 of this paper.

⁵⁸ VoIP services are also permitted on geographic numbers in Japan. In 2008, 19.5 million people were using VoIP; see www.ictregulationtoolkit.org/en/Section.2096.html, and www.soumu.go.jp/main_sosiki/joho_tsusin/eng/Statistics/pdf/090216_1.pdf.

⁵⁹ The Malaysian Communications and Multimedia Commission implemented a number range for VoIP services in July 2005, but it was not used until an originating access charge was set in June 2007. Numbers from this range are in use today. The Irish Commission for Communications Regulation implemented a number range for VoIP services in 2004. The national regulatory authority intervened in 2005 to set originating access charges.

Alternative arrangements

While there has been increasing interest and consumer take-up of VoIP services⁶⁰ in Australia, today the vast majority of fixed services are still offered via traditional telephone networks and do not depart from the expectations of a traditional telephone service. With the rollout of next generation networks, there is expected to be additional flexibility in these networks for providers and customers (including itinerant use) that is not available within traditional telephone networks.

If evidence is provided for either of the following, the ACMA will consider the case for requesting the ACCC to undertake an inquiry into declaring originating access to location independent communications services under [section 152AM](#) of the *Trade Practices Act 1974*:

- > that a separate number range is necessary to accommodate services that offer nomadicity and a greater level of flexibility than is available with traditional fixed network services
- > of likely substantial demand for these numbers.

Alternatively if one of the following occurs, the ACMA will consider removing this service type from the Numbering Plan:

- > there is insufficient evidence demonstrating the need for retention of a separate number range for itinerant VoIP services
- > there is insufficient evidence indicating substantial use of these numbers is likely
- > evidence is available to the ACMA that VoIP services can use geographic numbers without causing the difficulties originally anticipated (or these difficulties can be addressed by other means, including by changing the scope of the services defined as eligible to use geographic numbers).

Question 12

What are the reasons for the limited usage of location independent communications numbers?

Question 13

To what extent is it relevant to retain a distinction in the Numbering Plan related to the nomadic nature of a service? What level of demand is likely for such numbers?

Question 14

If location independent communications numbers are retained, to what extent will the ACMA need to address the reasons for their limited usage?

⁶⁰ 2.9 million Australians aged 14 years and over (or 16 per cent) had access to a VoIP service at home in June 2010. Of these, 2.4 million used a computer to access their VoIP service, with most of the remainder accessing the service via an internet phone or voice box/adaptor. Roy Morgan Single Source, June 2010.

Satellite numbers

As early as 1959, the Postmaster-General noted that Australia, with its vast area and sparsely scattered population, presented a number of unique problems in communications, and that these same conditions, which render communications difficult and costly, make rapid and reliable service desirable if not essential.

By 1985, the first satellite service was established to supplement the existing provision of communications to remote areas via a high frequency radio telephone service. The service was criticised for unreliability, absence of privacy, and limited accessibility.

In 2002, in response to the recommendations of the Telecommunications Service Inquiry regarding accessibility and affordability of telecommunication services in remote areas, the Government announced a satellite phone subsidy scheme. The importance of service accessibility for the health safety and economic participation of regional Australia was confirmed in the Glasson review in 2009 and further enhancements to access to satellite communications were announced in August 2009.

Satellite services represent a relatively small portion of the communications market: an estimated 16,000 services are in operation in Australia today.⁶¹ A number of companies resell international satellite services from the Iridium, Globalstar, and Thuraya satellite networks. Indeed Optus—which owns and operates a network of four satellites (used for data and broadcast services) and used to provide its own satellite service—resells satellite services from Thuraya.

Handset and network technology has evolved significantly since the 1980s: today, dual terrestrial mobile and satellite mobile handsets are available, allowing customers to make calls via a terrestrial mobile network when it is available or via the satellite network when a terrestrial mobile network is unavailable. Although usage of satellite services is limited at this time, as with mobile services, satellite services may find an application in machine-to-machine communications; for example, for use in controlling remote infrastructure such as mining equipment.

The technological evolution of satellite services has had an impact on the kinds of numbers that they use, which now include numbers from:

- > the 014 range under the Australian Numbering Plan⁶²
- > the 04 range under the Australian Numbering Plan⁶³
- > the +881 global mobile satellite range under the International Numbering Plan (for example, Iridium)⁶⁴
- > the +882 international networks range under the International Numbering Plan (for example, Thuraya)⁶⁴.

Numbers from the 014 range are allocated administratively by the ACMA to carriage service providers in blocks of 10,000 numbers. Six per cent of these numbers are currently allocated. Numbers from the +881 and +882 ranges are allocated by the ITU; the ACMA plays no part in availability or allocation of these numbers.

⁶¹ Paul Budde Communication, *Australia—Mobile Satellite Service*, June 2010.

⁶² Satellite telephone services may use 10-digit numbers from the following ranges: 0141, 0142, 0143, 0145 and 0147.

⁶³ Digital mobile services may use 10-digit numbers from the 04 range.

⁶⁴ These numbers must be dialled in international format; i.e. '0011' precedes the number on calls made from Australia.

There are implications flowing from the particular number that is used for a satellite service. In cases where a number from the 04 range is used in connection with a satellite service, customers are able to port a number from a mobile service to their satellite service. By contrast, where a number from the 014 range or an international number is used in connection with a satellite service, customers have no option to port their number.

A further implication is related to price transparency, which may be confusing for callers to satellite services that use 04 numbers, as indicated in the examples in Table 4 below.⁶⁵

Table 4 Charges for calls to satellite services

Charge for calls to satellite services: 014 numbers (most Telstra and Optus fixed and mobile plans)	Charge for calls to mobile services (same Telstra and Optus fixed and mobile plans)
\$1.20–\$3.96 per minute plus \$0.40 flagfall or \$0.11–\$0.44 per minute airtime surcharge.	\$0.22–\$0.80 per minute.
Charge for calls to satellite services: 04 numbers (Optus mobile plans)	Charge for calls to mobile services (same Optus mobile plans)
\$2.20 per minute plus \$0.22 per minute airtime surcharge.	\$0.22–\$0.792 per minute.

Charges may also apply to receiving calls under a minority of satellite plans.⁶⁶

Given the following, the ACMA considers it appropriate to question whether a case for retention of a separate number range for satellite services exists:

- > only small quantities of 014 numbers are allocated
- > carriage service providers are able to and are using mobile numbers for satellite services
- > it is open to carriage service providers to use numbers from the International Numbering Plan.

To the extent that there may be a need to apply higher charges for calls to satellite services than apply to calls to mobile services, a case for retention of the 014 number range may exist. In the event that evidence is provided that such higher charges are appropriate or necessary, it may be appropriate to consider whether an upper limit should be placed on charges for calls to satellite numbers using 04 numbers.

Question 15

To what extent is a separate number range required for satellite services?

⁶⁵ Details of charges were obtained from the standard forms of agreement of the companies mentioned in August 2010.

⁶⁶ For example:

- > Optus charges \$1.30 per minute for calls dialled using a 04 number that are received on a dual mode mobile/satellite phone while in satellite mode. Optus Thurarya Service Consumer Terms, May 2010
- > for some of Pivotal's call plans, the customer receiving a call pays for all incoming Globalstar calls at applicable Globalstar rates. Pivotal Satellite standard agreement for the supply of integrated satellite and cellular mobile services, 13 September 2010.

Freephone, local rate and premium rate numbers

Although not envisaged in the 1960 Community Telephone Plan, in the early 1980s Telecom Australia introduced a new service allowing end-users to make long distance calls to businesses or government agencies for which the recipient paid some or all of the call cost that would normally be incurred by the caller. Businesses were able to specify that calls would be accepted Australia wide or only from one or more states and territories.

Around the same time, Telecom Australia introduced a service that allowed third party providers to offer recorded or interactive information services to customers, with the third party service charged through a customer's phone bill.

The use of these numbers was not linked to the physical location of the recipient and, in some cases, the recipient could specify that calls were to be delivered to one of several locations. For example, to an office closest to the caller or to a call centre which had free capacity to receive calls.

By the early 1990s, these services fell into three distinct categories:

- > those which allowed a business to receive calls for which the caller incurred no charge and the business paid the entire cost of the call
- > those which allowed a business to receive calls for which the caller was charged the same as for a local call and the business also paid for part of the cost of the call
- > those which allowed a business to receive calls for which the caller paid a premium charge, receiving some information or other service in return.

Today these services are called freephone, local rate, and premium rate services. The numbering plans of most countries similarly feature one or more number ranges for use by businesses and other organisations to receive calls for which the charge is wholly or partially paid for by the called party.⁶⁷

Freephone and local rate numbers

The Numbering Plan specifies distinct numbers to be used for freephone and local rate services:

- > numbers beginning 180 are used for services for which calls from normal landline phones are specified as incurring no charge (freephone services)
- > numbers beginning 13 are used for services for which calls from normal landline phones are specified as incurring no more than the charge for a local call (local rate services).

Today, freephone and local rate numbers are portable and are allocated individually via two methods:

- > administratively, by Industry Number Management Service (INMS) to a service provider who then issues the number to a customer
- > by auction to a customer via the ACMA's **smartnumber**[®] process.

The methods of allocation of these numbers will be discussed further in a separate and later consultation paper in this work program.

⁶⁷ For example, the United Kingdom and Ireland each specify six different ranges of numbers to which call cost restrictions apply, while Malaysia has three and Belgium has two.

Charges for calls to freephone and local rate numbers

The use of distinct number ranges meant that the prefixes (180 and 13) associated with freephone and local rate services operated as powerful indicators of the cost of calls. In turn, this recognition assisted businesses and other organisations using these numbers to attract calls, on the basis that they were more affordable than alternative means of contact, particularly for rural or regional callers or for interstate callers who might otherwise have needed to make a long distance call. The decline in distance-based charging for calls from landline phones and its irrelevance for calls from mobile phones may mean that this attractiveness is less relevant today than it was in the past.

However, there are some important caveats to this recognition value associated with the prefixes used for freephone and local rate services:

- > calls to freephone services are typically free only when made from a standard telephone service that is not a mobile service (most landline phone services)
- > calls to local rate services from a standard telephone service that is not a mobile service incur a charge that is similar to, but generally higher than, the charge that would be incurred for a local call
- > calls to both freephone and local rate services from mobile phones usually incur a timed charge.

Examples of call charges are set out in Table 5 (freephone) and Table 6 (local rate).⁶⁸

Table 5 Charges for calls to freephone numbers

Provider	Call from	Cost of Call to Freephone Number
Telstra	Landline phone—post-paid plan	free
	Landline phone—pre-paid plan	free
	Public payphone	free
	Mobile phone—post-paid plan	\$0.22 per minute
	Mobile phone—pre-paid plan	\$0.22 per minute
Optus	Landline phone	free
	Mobile phone—post-paid plan	\$0.22–\$0.44 per minute
	Mobile phone—pre-paid plan	\$0.20–\$1.78 per minute (most plans \$0.74 per minute)
Skype	VoIP application	free

⁶⁸ Details of charges were obtained from the standard forms of agreement and websites of the companies mentioned in August 2010.

Table 6 Charges for calls to local rate numbers

Provider	Call from	Cost of call to local rate number	Cost of local call (or call to equivalent location)
Telstra ⁶⁹	Landline phone—post-paid plan	\$0.30	\$0.00–\$0.30
	Landline phone—pre-paid plan	\$0.25	\$0.20
	Public payphone	\$0.50	\$0.50
	Mobile phone—post-paid plan	same charge as for normal call to landline phone	\$0.70 per minute, or \$0.27–\$0.37 flagfall plus \$0.36–\$1.00 per minute
	Mobile phone—pre-paid plan	\$0.30 flagfall plus \$0.78 per minute	\$0.30 flagfall plus \$0.78 per minute
Optus ⁷⁰	Landline phone	\$0.275–\$0.30	\$0.00–\$0.30
	Mobile phone—post-paid plan	\$0.22–\$1.144 per minute	\$0.25–\$0.35 flagfall plus \$0.34–\$1.04 per minute
	Mobile phone—pre-paid plan	\$0.20–\$1.10 per minute (most plans \$0.74 per minute)	\$0.10–\$0.39 flagfall plus \$0.20–\$0.89 per minute
Skype	VoIP application	to 6-digit number: \$0.068 flagfall plus \$0.094 per minute to 10-digit number: \$0.068 flagfall plus \$0.371 per minute	\$0.068 flagfall plus \$0.031 per minute

The balance in the total number of calls between those originating on landline phones and those originating on mobile phones is shifting towards the latter.⁷¹ It is likely that an increasing number of calls to freephone numbers, and perhaps a majority, are now made from mobile phones, and are consequently not free. This represents a substantial shift from when freephone services were introduced, when almost all calls to freephone numbers were free.

The charges that are incurred for calls to freephone numbers from mobile phones may detract from the recognition value that would otherwise be attributed to the freephone prefix, because callers:

- > assume that calls to these numbers are free, when they are not
- > are confused about the cost of calls to these numbers because the charges vary.

Similarly, the shift to mobile-originated calls means that a significant proportion of calls to local rate numbers are charged on a timed basis. Moreover, it appears to the ACMA that only a minority of calls to local rate numbers from landline phones are today charged the same amount that the customer making the call would be charged for a local call. Again, this represents a substantial shift from the period when local rate services were introduced, when the charge incurred by a customer making a call to a local rate number was the same as the charge incurred for a local call.

⁶⁹ Calls to Telstra customer services using local rate numbers are free to Telstra customers.

⁷⁰ Calls to Optus customer services using local rate numbers are charged \$0.265 (untimed) to Optus mobile customers.

⁷¹ In the second half of 2009, Telstra carried 2,176 million local calls on its network, and 3,333 million minutes of domestic and international long distance calls from landline phones. In the same period, it carried 5,723 million minutes of calls from mobile phones. See Telstra, *Half-year report for the half-year ended 31 December 2009*, at www.telstra.com.au/abouttelstra/download/document/telstra-half-year-results-2010.pdf.

As with freephone call charges, the call charges incurred for calls both from landline phones and mobile phones to local rate numbers may detract from the recognition value that would otherwise be attributed to the local rate prefix, because callers:

- > assume that calls incur a charge equivalent to the charge for a local call, when they typically incur a higher charge
- > assume that calls are included within their cap, when they typically are not
- > are confused about the cost of calls to these numbers because the charges vary.

Under any of these cases, any weakening of the recognition value of the freephone or local rate prefix may diminish both:

- > the attractiveness of the numbers to the businesses that use them
- > price transparency.

On 10 September 2010, the Australian Communications Consumer Action Network, the Australian Financial Counselling and Credit Reform Association and the Australian Council of Social Service jointly submitted an issue to the ACMA regarding the costs of calls to freephone and local rate numbers from mobile phones.⁷² The submission stated that, for calls from mobile phones to important and, in some cases, essential government and other services that are only accessible via freephone or local rate numbers, timed charges reduce the affordability of the calls.

Examples provided of important services that are accessible via freephone and local rate numbers included:

- > Centrelink
- > Department of Veterans' Affairs
- > Medicare
- > Australian Taxation Office
- > Financial Ombudsman Service
- > Credit Ombudsman Service
- > Telecommunications Industry Ombudsman
- > state and territory consumer protection agencies
- > major energy providers and water utilities
- > public transport information lines.

The submission asserted that the reduced affordability of calls to these numbers especially affects low income and other vulnerable consumers, among whom levels of mobile phone ownership are high and mobile phones are frequently the sole communication device. This reduced affordability may lead to some consumers:

- > being discouraged from calling the services
- > being unable to call the services due to exhaustion of credit on a mobile pre-paid account
- > experiencing financial difficulties—especially accruing debt on post-paid mobile accounts—as a consequence of the costs of unavoidable calls.

⁷² "The Cost of a Free Call: Accessing 1800 and 13/1300 services from mobile phones", at

www.accan.org.au/uploads/Super-complaint%20re%201800%20and%2013%20numbers%20FINAL.pdf.

The same issue is raised in a submission of 15 September 2010 by the Brotherhood of St Laurence to the ACMA's 'Reconnecting the Customer' inquiry, at

www.bsl.org.au/pdfs/BSL_subm_ACMA_Reconnecting_customer_consultation_2010.pdf.

The submission also referred to advice received by the three organisations from financial counsellors, that variations in charges for calls to freephone and local rate numbers, depending on whether they are made from a landline phone or a mobile phone, causes confusion and frustration to consumers.

The submission suggested a number of solutions to address these problems, being one or a combination of the options listed in Table 7.

Table 7 Proposals regarding charges for freephone and local rate calls from mobile phones

'Regulatory reform'	The ACMA to change the existing obligation in the Numbering Plan, under which charges for calls to freephone and local rate numbers from most landline phones are limited, to apply it also to calls from mobile phones
'Industry-led'	Carriage service providers supplying mobile services to voluntarily reduce their charges for calls to freephone and local rate numbers to the same level as calls from landline phones, consistent with current practice by several providers for calls to their customer support services
'Technological'	The ACMA to create new freephone and local rate number ranges, for which charges for calls from mobile phones would be required to be at the same level as calls from landline phones

The three organisations acknowledged in their submission that a limitation of the 'technological' solution may be that it would require organisations that receive calls on freephone or local rate numbers to change their number and any promotional or informational materials that referred to it. In turn, this might generate costs for these organisations, and lead to further confusion among consumers.

To the extent there may be a need to address the affordability of calls to freephone and local rate numbers from mobile phones, solutions may be available that do not rely on the way in which numbers are used or calls to particular numbers are charged. However, the delivery of such solutions may be outside of the capacity of the ACMA.

The ACMA has no understanding of the extent to which the level of charges for callers ringing freephone and local rate numbers from mobile phones may be driven by:

- > underlying charges for interconnection of calls to freephone and local rate numbers;
- > the charges that may be incurred by organisations that receive calls to freephone and local rate numbers; or
- > payments that may be made to organisations that receive calls made to local rate numbers, as a share of the revenue received by carriage service providers for calls to local rate services.

Question 16

What purpose is now served by:

- > A distinction between freephone and local rate numbers?
- > The continuation of freephone numbers?
- > The continuation of local rate numbers?

Question 17

To what extent is there a problem with affordability and clarity of charges for calls to freephone and local rate numbers from mobile phones? In what ways is the problem manifested, and how extensive is it?

Question 18

To the extent there is a need to address the affordability of calls to freephone and local rate numbers from mobile phones, how should this be done? To what extent is each of the proposals in Table 7 feasible?

Length of freephone and local rate numbers

The Numbering Plan sets out a variety of different number lengths for use with freephone numbers (seven and 10 digits) and local rate numbers (six, eight and 10 digits).

These numbers are frequently marketed in one or more of the following ways:

- > on the basis of their short length (in the case of six- and seven-digit numbers), for example 13 2287
- > on the basis of patterns in the digits that are easy to remember, for example 1800 222 222
- > as a phone word (when using a telephone keypad with numbers), for example 13 CATS (corresponding to 13 2287).

Table 8 indicates the levels of local rate and freephone numbers allocated by the ACMA.

Table 8 Allocations of freephone and local rate numbers, June 2010

Number range	Length	Quantity allocated
Freephone	7 digits	27
	10 digits	114,913
Local rate	6 digits	2,093
	8 digits	2,414
	10 digits	172,156

Although shorter numbers may be regarded as easier to remember, large quantities of longer (10-digit) numbers have been allocated. This may be because the level of annual numbering charge on numbers is inversely related to the number of digits; that is, in 2010 a single 10-digit local rate number incurred an annual numbering charge of \$0.78, while a six-digit number incurred an annual numbering charge of \$7,850.54. An alternative explanation is that it may be easier to associate an attractive phoneword with a 10-digit number.⁷³

Eight-digit local rate numbers are specified for use only for monitoring of security alarms. These numbers were introduced in 1993, at the time that the program of nationwide changes to eight-digit numbers commenced. The adoption of these numbers by security alarm monitoring companies allowed them to spread the work of reprogramming alarm systems to call new numbers for monitoring centres over a longer period than would otherwise have been possible under the number change arrangements. Approximately 25 per cent of these numbers are allocated.

Question 19

To what extent should certain freephone or local rate numbers be specified for narrow purposes not directly related to the supply of carriage services?

⁷³ A discussion of the impact of taxes and charging arrangements on the use of numbers is included in a separate and later module as part of this work program.

Premium rate numbers

Premium rate services allow customers to pay for information, entertainment and other services using their phone bill. The market for provision of such content via premium rate services appears to have matured and may now be in decline.⁷⁴ However, premium rate services are used in some countries for a wider range of purposes, including electronic micropayments for roadside parking, vending machines and public transport. It is understood that mobile carriage service providers are considering a shift from mobile-based premium rate services to a more sophisticated mobile payment model, based on secure WAP pages rather than voice calls or transmission of text messages.

Premium rate services are billed to customers by a carriage service provider but are delivered by content service providers (which are usually separate companies to the carriage service provider).

Premium rate services are requested or delivered via voice, fax, video and data calls, as well as via SMS and MMS messages. Premium rate services based on voice, fax, video or data are delivered via a platform which is currently operated by Telstra. Premium rate services based on SMS or MMS are delivered via platforms operated by each of the mobile carriers. More than one SMS- or MMS-based premium rate service may use the one premium rate number—SMS- or MMS-based services are frequently initiated by texting a keyword to a premium rate number, and it is possible for more than one keyword to be used in connection with the same premium rate number.

The distinction between premium rate services based on voice, fax, video or data on the one hand, and SMS or MMS on the other, is reflected in the numbers used for premium rate services, as shown in Table 9.

Table 9 Allocations of premium rate numbers, June 2010

Number range	Used for	Length	Quantity allocated
1900, 1901, 1902	Voice, fax, video and data calls	10 digits	540,000
1906			100,000
191, 193, 194, 195	SMS and MMS messages	6 digits	122
196, 197, 199		8 digits	2,061

This distinction between the numbers used for premium rate services depending on the manner in which they are accessed appears inconsistent with the technical-neutrality design principle described on page 22.

Numbers for premium rate services based on voice, fax, video or data are allocated administratively by the ACMA to carriage service providers. In practice, these numbers have only been allocated to Telstra since 2000. Telstra issues individual numbers to content service providers. Numbers for premium rate services based on SMS and MMS are allocated administratively by INMS to carriage service providers (which may include carriage service providers whose main function is aggregation of content services). Fifteen per cent of all available premium rate numbers are allocated. Premium rate numbers are not portable.⁷⁵

⁷⁴ Paul Budde Communication, *Australia—Premium Rate Voice Services*, 2008, and Paul Budde Communication, *Australia—Mobile Media—PSMS Portals and Apps*, 18 February 2010.

⁷⁵ For the reasons not to require that premium rate numbers may be ported, see ACCC, *Review of the 2003 Direction on Premium Rate Number Portability*, October 2009, at www.accc.gov.au/content/item.phtml?itemId=904178&nodeId=de66eb7d0ad85fa9f33d0e196aec7dd9&fn=R

Premium rate services have at various times been the subject of high levels of consumer complaints, most commonly about the receipt of unsolicited services and unexpected high charges. The services are subject to specific regulatory measures under:

- > the Code of Practice developed and administered by the Telephone Information Services Standards Council, which sets our requirements for advertising and message content of services based on voice, fax, video and data
- > the Mobile Premium Services Code, developed by Communications Alliance and registered by the ACMA under [Part 6](#) of the Telecommunications Act, which sets out requirements for advertising, provision of consent, charging, delivery and cancellation of services based on SMS and MMS
- > Schedule 7 to the *Broadcasting Services Act 1992*, which sets out requirements for delivery of services that are or would be classified MA15+ and above.

To facilitate fulfilling the last obligation, the Numbering Plan makes a distinction between premium rate numbers that are available for general use, and numbers which are predominantly or wholly intended for use by age-restricted services that are or would be classified MA15+ or R18+. Numbers available for age-restricted services comprise:

- > the 1901 range, for services based on voice, fax, video or data
- > the 195 and 196 ranges, for services based on SMS or MMS.

This distinction may simplify the actions required by carriage service providers to enable or disable access to age-restricted services:

- > In practice, a PIN is required in order to access premium rate services using 1901 numbers. A PIN is issued to an individual by Telstra after verification that the person is 18 years or over;
- > In practice, all premium rate services using 195 and 196 numbers are barred, except to those customers who request access and provide evidence of being 18 years or over.

The continuing incidence of complaints about unexpected high charges for services based on SMS and MMS may suggest problems with transparency of charges for calls to premium rate numbers. For that reason, it is likely to remain important that premium rate numbers continue to use a distinctive prefix which signals to callers that that are likely to incur a higher charge than would be normal for a voice, fax, video or data call or for an SMS or MMS message.

In connection with the review of the Mobile Premium Services Code, the ACMA has indicated to Communications Alliance the desirability of enhancing the price transparency of premium rate services based on SMS and MMS, particularly for so-called subscription services.

Question 20

Is a need for premium rate numbers likely to continue into the future? If so, for how long?

Question 21

To what extent is it relevant to retain a distinction in the Numbering Plan related to the means by which premium rate services are accessed (that is, by voice, fax, video and data, or by SMS and MMS)?

Question 22

What are the limits to facilitating price transparency via the Numbering Plan? What means of achieving price transparency of premium rate services and other communications services, other than numbers, are possible?

Directory assistance and information services on shared numbers

Background

Prior to the introduction of automatic switching in the 1920s, all calls needed the assistance of an operator to be completed and directories were primarily kept by the Postmaster-General's Department for this purpose. By the 1960s the introduction of automatic exchanges meant that telephonists were being used mostly to provide information and assistance services. Numbers for these services were standardised across the country and were intentionally kept short to enable subscribers to remember them more easily.

By the early 1990s there were at least 22 different services:

1100	Underground cable location or damage
1194	Time
1196	Weather
11444	Police emergency
11642	AIDS information
0101	Operator connected international calls from private payphones, reverse charge calls and international conference calls
0102	Overseas charge enquiries
0103	International directory assistance
0104	International telegram enquiries
0107	Operator connected reverse charge international calls
0108	Calls to ships at sea
0109	International directory assistance
011	National directory assistance
012	Domestic call charge enquiries
013	Local directory assistance
014	Operator pricing
0170	Interstate directory assistance
0171	Local directory assistance
0173	Wake up and reminder calls
0174	National telegram enquiries
0175	Country and interstate directory assistance
0176	Operator connected calls from payphones.

The Telecommunications Act recognised the continued importance of these services by requiring all providers of standard telephone services to supply certain operator services namely: faults and service difficulties, and directory assistance services.⁷⁶ Further, anticipating the impact that the introduction of competition would have, several important measures were put in place to minimise both consumer confusion in accessing these services and practical advantages the incumbent might acquire over new entrants. These were:

- > firstly, to set aside short memorable numbers for use with key services such as directory assistance
- > secondly, rather than allocating numbers for key services to one provider, to share the numbers so that each provider would supply the same type of service to their customers on the same numbers as other providers
- > thirdly, to provide clarity regarding the call charges for these numbers by setting limits on charges for calls to certain of the numbers.

⁷⁶ These requirements are found respectively in [Part 2](#) and [Part 3](#) to Schedule 2 of the Telecommunications Act.

The objectives of these arrangements were to reduce the need for end-users to learn new numbers (which might be a barrier to changing provider) and to achieve transparency of call charges for these services.

The function, use and value of directory assistance has evolved significantly since that time and has grown into a large revenue source for some industry players.⁷⁷

In 2009, the ACMA commenced a review of the use of shared numbers to test whether the current arrangements met the objectives of the Numbering Plan. The review commenced after consumers and industry expressed concern about:

- > end-user confusion about the divergent service offerings on the same numbers
- > costs to carriage service providers in dealing with this confusion
- > the lack of transparency regarding call charges.

An ACMA discussion paper sought feedback on whether the ACMA should adopt an ex-ante or ex-post approach to regulating shared numbers. Five organisations—Telstra, Optus, Vodafone, Consumers Telecommunication Network and The Number—and one private citizen submitted papers to the review.⁷⁸

The respondents to the review generally agreed that the original objectives of the measures established in respect of these numbers—to enable consumers to easily access directory assistance and other operator services, and to provide competitive neutrality between the incumbent carrier and subsequent market entrants—were still relevant. The responses to the review also assisted the ACMA in gaining a deeper understanding of the problems faced by industry and consumers under the current arrangements, particularly in relation to risks that the current numbering arrangements may:

- > constrain innovation and place limits on competition in the provision of directory assistance, operator connected call and like services
- > frustrate consumers in identifying the pricing for these services.

However, some responses were not persuasive in their linking of current numbering arrangements with difficulties experienced in:

- > entering the directory assistance market
- > competing with other providers' models for delivery of directory assistance and related services.

Nevertheless, it is evident to the ACMA that, although the arrangements for supply of directory assistance and information services on shared numbers have served the communications market well in the past, they require fresh attention.

Current practices

Today, providers by and large offer faults and service difficulties, call cost and billing information services—provision of the first of these being a legislative obligation—on freephone or local rate numbers where the majority of other information services offered by carriage service providers are now located. For example, Telstra, Optus and Vodafone supply service difficulties and faults and billing information services on local rate and freephone numbers, as shown in Table 10.

⁷⁷ Total Sensis advertising and directories revenue for the voice portion of the business was \$65 million for the six months ending December 2009. See Telstra, *Half-year report for the half-year ended 31 December 2009*, at www.telstra.com.au/abouttelstra/download/document/telstra-half-year-results-2010.pdf.

⁷⁸ The discussion paper is available at www.acma.gov.au/webwr/_assets/main/lib310868/ifc11-09_shared_numbers_discussion_paper.pdf, and non confidential submissions to the paper may be found at www.acma.gov.au/scripts/nc.dll?web/standard/1001/pc=pc_311703.

Table 10 Service difficulties and faults and billing information services

Service difficulties and faults service	Optus	131 344
	Telstra	13 2203
	Vodafone	1800 638 638
Billing information service	Vodafone	1300 650 410
	Telstra	13 2000 (business customers)
		13 2200 (residential customers)
	Optus	133 937

Those services remaining on shared numbers are predominately related to the provision of directory assistance, operator connected call and like services.⁷⁹

While many consumers are now choosing to go online to search for numbers, rather than use the hard copy White Pages[®] or call a directory assistance service, providers are nevertheless offering a diverse range of services related to directory assistance on shared and non-shared numbers. It is the ACMA's expectation that the provision of some form of directory assistance and difficulties and faults services remains valued by consumers and therefore will remain a regulatory obligation for the foreseeable future.

The ACMA conducted an audit between 15 and 19 July 2010 of numbers in use by the major carriage service providers that offer directory assistance, operator connected call and like services. Table 11 provides a summary of the findings of this audit (charges listed are for calls from landlines unless otherwise specified).

⁷⁹ The only exception to this is 1221, which is used to provide an international faults and difficulties service.

Table 11 Directory assistance and operator connected call services

Number	How specified in numbering plan	How actually supplied	
1222 (shared)	Call costs and enquiries service <i>Limited to low charge</i>	Optus	Service as specified in Numbering Plan, combined with an operator connected call service <i>Charges: \$2.20 plus \$1.49 and standard call charge to proceed with call to requested number</i>
1223 (shared)	Directory assistance service <i>Limited to low charge</i> or National and international operator connected call service <i>Not charge-limited</i>	Telstra	Service as specified in Numbering Plan. <i>Charges: \$0 from landlines or \$0.50 from mobiles plus \$0.99 and standard call charge to proceed with call to requested number</i>
		Optus	Service as specified in Numbering Plan <i>Charge: \$0.50</i>
		Vodafone	Service as specified in Numbering Plan <i>Charges: \$2.60 plus standard call charge to proceed with call to requested number</i>
1225 (shared)	International directory assistance service <i>Limited to low charge</i>	Telstra	Service as specified in Numbering Plan <i>Charges: \$0 from landlines or \$1.65 from mobiles</i>
		Optus	Service as specified in Numbering Plan <i>Charges: \$2.20</i>
		Vodafone	Service as specified in Numbering Plan <i>Charges: \$1.65 plus standard call charge to proceed with call to requested number</i>
123	Not specified in Numbering Plan	Vodafone	Concierge Service <i>Charges: \$1.30–\$3.50 flagfall plus \$0.78–\$3.50 per minute</i>
1234 (shared)	National and international operator connected call service <i>Not charge-limited</i>	Telstra	Service as specified in Numbering Plan, combined with a directory assistance service and a concierge service <i>Charges: \$1.40 plus standard mobile call fee from mobiles plus \$0.99 and standard call charge to proceed with call to requested number</i>
		Optus	Service as specified in Numbering Plan, combined with a call costs and enquiries service <i>Charge: \$2.20 plus \$1.49 and standard call charge to proceed with call to requested number</i>
1236 (shared)	Directory assistance service <i>Not charge-limited</i>	Not used by any provider	
12455	Operator service <i>Not charge-limited</i>	Telstra	Operator connected call service <i>Charges: \$1.40 plus standard mobile call fee from mobiles plus \$0.99 and standard call charge to proceed with call to requested number</i>
12456		Telstra	Operator connected call service <i>Charges: \$1.40 plus standard mobile call fee from mobiles plus \$0.99 and standard call charge to proceed with call to requested number</i>
124937		Optus	Directory assistance service, combined with an operator connected call service <i>Charge: \$1.10</i>
013	Not specified in Numbering Plan	Vodafone	Concierge service <i>Charges: \$1.30–\$3.50 flagfall plus \$0.78–\$3.50 per minute</i>

While responses to the ACMA's review of the use of shared numbers provided limited evidence of problems being experienced in relation to their use for a variety of directory assistance and operator services, the audit revealed that the supply of services using shared numbers features more divergence than commonality. In particular:

- > the use of a wide variety of numbers for similar types of services
- > non-use of one of the designated shared numbers
- > widely differing services supplied by different providers on the same numbers
- > widely varying charges for services that appear to be the same or similar.

This divergence is likely to be confusing to consumers, and highlights a need for further evidence about attitudes and understanding of these services and associated numbers by users.

Question 23

Are the details of services and charges for directory assistance and operator-connected call services listed in Table 11 complete and accurate?

Assessment of current practices

Current practices regarding use of numbers for directory and information services appear to provide demonstration that innovation and expansion of choices available to users is occurring. Notably:

- > a range of directory assistance and operator connected call services now exist, some of which appear to be popular with end-users;
- > directory and information services do not appear to have been constrained to use of shared numbers only, but have adopted non-shared numbers in the '12' range as well as freephone and local rate numbers.

This innovation and expansion of end-user choice may be occurring *despite* the Numbering Plan, rather than being facilitated by the Numbering Plan. However, it is also apparent that some uses of both shared and non-shared numbers do not align well, or in some cases at all, with the way in which the services associated with these numbers are specified in the Numbering Plan.

The complexity and inconsistent patterns of service offerings and call charges may cause confusion among consumers, and in turn lead to unexpected high charges being incurred for use of the services.

The legislative obligation to provide some form of directory assistance and difficulties and faults services to users may continue to exist for the foreseeable future. Given that it appears that the current industry practices may not be fully consistent with the Numbering Plan, nor are simple or transparent to consumers, some changes may be needed, in particular to improve price transparency.

Therefore, while any narrowing or constraining of services to respond to the potential problems observed above is unlikely to be in the long-term interests of end-users, one or both of the following approaches appear open to the ACMA to:

- > Address the apparent deficiencies in the lack of simplicity in the current practices, while retaining or enhancing flexibility, by discontinuing the shared use of numbers for directory assistance, operator connected call and related information services. Indeed, a number of these services are already being offered on non-shared numbers.

- > Address the apparent deficiencies in the lack of transparency in the current practices, by requiring the use of a separate number or number ranges for services which may be high cost, to those which are free or low cost.

Question 24

What are the implications of addressing deficiencies in relation to simplicity and transparency of practices in the use of shared numbers, by:

- > Discontinuing the shared use of numbers for directory assistance and operator connected call services?
- > Requiring the use of a separate number or number ranges for services which may be high cost?

Some options for implementing these approaches might include:

- > preserving the '12' range for directory assistance, operator connected call and related information services, but providing for all numbers to be individually allocated to carriage service providers
- > migration over time of directory assistance, operator connected call and related information services, away from the '12' range to existing number ranges which are appropriate to the level of charges associated with the services (that is, freephone, local rate or premium rate number ranges).

Question 25

What are the implications, in terms of the design principles of broad-based use of numbers, technical neutrality, price transparency and clarity, of:

- > Shifting to individual allocation of numbers in the '12' range to carriage service providers?
- > Migration over time of services away from the '12' range, to other existing number ranges, as appropriate to the level of charges associated with the services?

Limited use numbers

Some types of numbers have limited visibility to most consumers, but may be used by carriage service providers for:

- > supply of services with narrow application (for example, data network numbers)
- > in support of other services (for example, internal network numbers).

Certain other numbers are simply no longer used (for example, universal personal telecommunications numbers) or subject to very limited use (for example, calling card numbers).

Table 12 lists types of numbers with such narrow applications or with no or insignificant allocations of numbers.

Table 12 Service types with narrow applications or no or insignificant number allocations, June 2010

	Quantity allocated	Primary holders of numbers
Analogue AMPS service	3	Telstra
Call information service	0	–
Calling card service	5	Telstra, Global Card Services
Community service	3	Telstra
Data network access service	8,501	AAPT, Chime, Optus, Primus, Soul, Telstra
Data network service	301,000,000	Telstra, Department of Defence
Internal network service	102,003	Telstra, Optus, Powertel
International service	5	Optus, Primus, Telstra
Location independent communications service*	7,000	Agile, FaktorTel, GoTalk, ISPhone, Ivox, Mibroadband
Mass calling service	0	–
Paging service	1,000	Quantum Multimedia
Premium rate and paging service*	100,000	Telstra
Public interest service	0	–
Supplementary control service	0	–
Testing service	90,101	Telstra, Optus
Universal personal telecommunications service	0	–
Universal personal telecommunications profile access service	0	–
Virtual private network service	7	Optus, Primus, Telstra, Vodafone

* These numbers are discussed elsewhere in this paper.

The ACMA has little visibility of the use made of most of the types of numbers listed in Table 12 which are allocated. In order to properly assess the case for retention of each of these types of numbers in the Numbering Plan—including options of migrating numbers to a single, uniform pool of numbers, or to other, more broadly based number ranges (that is, geographic, freephone, local rate, or premium rate number ranges)—the ACMA would welcome receiving details of the current usage of these numbers.

Question 26

Are there any reasons not to migrate numbers in each of the number ranges listed in Table 12 to a single pool, uniform pool of numbers, or to other, more broadly based number ranges?

Questions

The ACMA invites comments and feedback on the current and future role of service types within the regulatory framework for numbers. Please use the following questions as a guide. Comments on other matters raised in this paper are also welcome.

Question 1

Are the assumptions of the Numbering Work Program sound?

Question 2

Do the four general principles applied by the ACMA—*efficiency, flexibility, resilience, and simplicity and transparency*—encompass the most significant aspects of the use of numbers which the ACMA should assess?

Question 3

Do the design principles—*broad-based use of numbers, technical neutrality, price transparency and clarity*—encompass the most significant aspects of the design of a numbering plan which the ACMA should consider?

Geographic numbers

Question 4

What information conveyed by geographic numbers is of value to end-users?

Question 5

Does the list of uses of information conveyed by geographic numbers in Table 2 encompass all of the major uses of this information by carriage service providers and end-users?

Question 6

What advantages and disadvantages would be associated with the proposed efficiency improvement of removing sector partitions in major metropolitan areas?

Question 7

Given the technical and service innovations affecting the use of geographic numbers:

- > What are the circumstances in which geographic numbers should be converted to flexible and general purpose numbers?
- > What is the best strategy for undertaking such a conversion?

(See also Question 11)

Question 8

If geographic numbers move from the present tight constraints on their use to more flexible and general purpose numbers, what will be required to guarantee transparency of call costs to end-users?

Mobile numbers

Question 9

Is significant demand for mobile numbers for machine-to-machine applications likely to occur in Australia? If so, how should an adequate supply of numbers for these applications be assured?

Question 10

What reasons are there for retaining a separate number range for mobile services, other than signaling the higher cost of calls to mobile phones compared with the cost of calls to landline phones?

Question 11

Given the ubiquity of mobile phones and the downward trend in charges for calls to mobile phones:

- > What are the circumstances in which mobile numbers should be converted to flexible and general purpose numbers?
- > What is the best strategy for undertaking such a conversion?

(See also Question 7)

Location independent communications numbers**Question 12**

What are the reasons for the limited usage of location independent communications numbers?

Question 13

To what extent is it relevant to retain a distinction in the Numbering Plan related to the nomadic nature of a service? What level of demand is likely for such numbers?

Question 14

If location independent communications numbers are retained, to what extent will the ACMA need to address the reasons for their limited usage?

Satellite services**Question 15**

To what extent is a separate number range required for satellite services?

Freephone, local rate and premium numbers**Question 16**

What purpose is now served by:

- > A distinction between freephone and local rate numbers?
- > The continuation of freephone numbers?
- > The continuation of local rate numbers?

Question 17

To what extent is there a problem with affordability and clarity of charges for calls to freephone and local rate numbers from mobile phones? In what ways is the problem manifested, and how extensive is it?

Question 18

To the extent there is a need to address the affordability of calls to freephone and local rate numbers from mobile phones, how should this be done? To what extent is each of the proposals in Table 7 feasible?

Question 19

To what extent should certain freephone or local rate numbers be specified for narrow purposes not directly related to the supply of carriage services?

Question 20

Is a need for premium rate numbers likely to continue into the future? If so, for how long?

Question 21

To what extent is it relevant to retain a distinction in the Numbering Plan related to the means by which premium rate services are accessed (that is, by voice, fax, video and data, or by SMS and MMS)?

Question 22

What are the limits to facilitating price transparency via the Numbering Plan? What means of achieving price transparency of premium rate services and other communications services, other than numbers, are possible?

Directory and information services on shared numbers**Question 23**

Are the details of services and charges for directory assistance and operator-connected call services listed in Table 11 complete and accurate?

Question 24

What are the implications of addressing deficiencies in relation to simplicity and transparency of practices in the use of shared numbers, by:

- > Discontinuing the shared use of numbers for directory assistance and operator connected call services?
- > Requiring the use of a separate number or number ranges for services which may be high cost?

Question 25

What are the implications, in terms of the design principles of broad-based use of numbers, technical neutrality, price transparency and clarity, of:

- > Shifting to individual allocation of numbers in the '12' range to carriage service providers?
- > Migration over time of services away from the '12' range, to other existing number ranges, as appropriate to the level of charges associated with the services?

Limited use numbers**Question 26**

Are there any reasons not to migrate numbers in each of the number ranges listed in Table 12 to a single pool, uniform pool of numbers, or to other, more broadly based number ranges?

Next steps

This is the first consultation paper in the ACMA's numbering work program. The ACMA will publish four consultation papers focused on specific issues, including the role of numbering, naming and addressing in:

- > personal information, identity and attribute management
- > numbering administration and institutional arrangements
- > industry taxing and charging arrangements
- > providing information to consumers, in the management of unsolicited communications and other related matters.

Following stakeholder feedback on each of the consultation papers, the ACMA will publish a directions paper responding to issues raised during the course of the work program, identifying possible amendments needed to the Numbering Plan and identifying transitional issues that may require medium and longer term consideration by policy makers.

Appendix—key terms

Key term or concept	Description or definition
carriage service provider	Carriage service provider is defined by section 87 of the <i>Telecommunications Act 1997</i> , as a person who supplies a listed carriage service to the public using a network unit owned by a carrier or for which a nominated carrier declaration is in force. Carriage service providers are subject to a range of obligations under the Act. They are not subject to any licensing requirements.
electronic address	A collective term for numbers, names and addresses that are used as identifiers for persons, organisations, applications, or points of termination of a communication, including telephone numbers and internet domain names and IP addresses, whether they are within the purview of the <i>Telecommunications Act 1997</i> or not.
ENUM	A mapping of telephone numbers to internet domain names using architecture based on the internet domain name system, in order to help facilitate use of telephone numbers in conjunction with internet-based communications, such as VoIP.
geographic number	Geographic numbers are specified in Schedule 2 of the Numbering Plan, and Part 1 of Chapter 3 of the Numbering Plan stipulates how they may be used. A geographic number has a two digit area code followed by an eight-digit number; for example, (XX) YYYY YYYY. Geographic numbers are allocated for use in a standard zone unit or in an area of broad geographic significance. They are for use with services that a primarily fixed or nomadic only on an occasional basis.
international number	The International Telecommunication Union allocates country codes to countries—for example, Australia is allocated 61—and to global services—for example, the Global Mobile Satellite System is allocated 881. The definition for international numbers in Numbering Plan does not recognise country codes that are assigned to global services; consideration will be given to including such a recognition at the conclusion of this work program.
number and numbering	International Telecommunication Union Recommendation E.164 provides the framework for the use of telephone numbers globally. The Numbering Plan which outlines the framework in Australia specifies that Australian telephone numbers have up to 10 digits. References to numbers or numbering are to E.164 telephone numbers as specified in the Numbering Plan.
shared number	A subset of special service numbers, which are specified in Schedule 4 of the Numbering Plan. They are used by several or by all carriage service providers rather than being allocated to a single carriage service provider. Each carriage service provider is responsible for supplying services to its customer on a particular shared number. This means that the service received by a customer will depend on the carriage service providers which supply them with the relevant telephone service.
standard telephone service	Defined in section 6 of the <i>Telecommunications (Consumer Protection and Service Standards) Act 1999</i> . Its focus is on voice services that are two-way services (i.e. allow calls to be both made and received) and enable connections to other services (that is, any-to-any connectivity).
standard zone unit, charging zone and charging precinct	These terms relate to geographic areas which are used in charging for local and long distance calls. Charging zones and precincts are identified by a charging point with a specified latitude and longitude that lies within the geographic area of the zone or precinct. Geographic numbers are allocated for use within standard zone units which are a charging zone or precinct as specified in Schedule 2 of the Numbering Plan, excluding the area of any charging precinct that lies within a charging zone.
voice over IP	An application or service enabling an end-user to make voice (and in some cases video) calls via the internet.

Abbreviations

ACCC	Australian Consumer and Competition Commission
ACMA	Australian Communications and Media Authority
APNIC	Asia Pacific Network Information Centre
auDA	.au Domain Administration
ICANN	Internet Corporation for Assigned Names and Numbers
INMS	Industry Number Management Service
IP	internet protocol
IPv4	internet protocol version four
IPv6	internet protocol version six
ISP	internet service provider
ITU	International Telecommunication Union
MMS	multimedia message service
OECD	Organisation for Economic Cooperation and Development
SMS	short message service
VoIP	Voice over IP