BALANCING COMMUNITY AND COMMERCIAL INTERESTS IN SPECTRUM MANAGEMENT, THE AUSTRALIAN EXPERIENCE.

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Abstract – Regulators and telecommunications industry operatives in Australia have been developing, over the last several years, a method of spectrum management which has much wider application than Australia, the policy presents an innovative means for delivering to Pacific and Asian communities social policy objectives not formerly possible.

Why use the Australian system? - Because it sets out a series of operational, technical and policy rules prior to the auction, which in turn provides commercial certainty to operators, and because it permits the attachment of social policy and economically desirable license conditions to a radiocommunications license.

Where the operability, capacity and utility of spectrum is undefined, it becomes difficult to build a solid business case; where those parameters are defined, it is clear that a business case and network rollout plans can be defined prior to the auction. The climate of certainty would, where a social contract is applied, reduce operator anxiety about the social aspects through the provision of commercial certainty. Spectrum licensing allows for the attachment of license conditions to each license, this provides significant policy flexibility for national regulators for

example by requiring that, along with commercially attractive geographic areas, services be provided to less favoured areas. In effect this implies the attachment of social justice and equity objectives to a spectrum acquisition, these objectives could be communications focussed or directed to other policy areas such as health, education or training issues.

Spectrum licensing is but one of a number of spectrum management methodologies, however it has potential for wider policy application far beyond what has to date been achieved. This paper sets out why the Australian system of creating a public market in fully tradeable spectrum rights is capable of implementation within the Asia Pacific region and beyond:

- By giving a brief general description of the Australian system
- Explaining the Australian experience with industry and regulation
- Setting out areas where other polities could learn and benefit from the Australian experience
- Providing a series of policy options for regulators and industry which enable the benefits of spectrum management to be returned to the community, without sacrificing regulatory control or industry viability.

General Background to spectrum licensing

The Australian experience began in 1992 and took a number of years to come to fruition. The first spectrum auctions were not held until 1997 and this was very much a prototyping exercise,[3] with the first device registrations not occurring until mid December in 1998. One of the reasons for the delay in implementation was natural caution in wishing to learn from the mistakes of others. And in our view others did make mistakes and we did learn from them. The second was that the work is highly complex and required a significant selling job both within the bureaucracy and in industry.

Bureaucracies tend not to like change. The Australian bureaucracy was no exception. Industry, which has to pay for the change fantasies of Government, is in many ways more resistant to change unless there is a definite advantage in moving away from existing practice. But the system of spectrum licensing has now a significant level of acceptance in Australian industry and has bi-partisan support at the political level.

It is profitable. The cost of setting up the system was minimal in terms of the benefits derived by Government, and through Government the community. To date Australian spectrum auctions have raised $465m against a set up cost of less than one million.

Spectrum licensing was not set up without challenges both from within the bureaucracy and industry. It was essential to prove that it could be done. So the main challenge was to create market certainty in use of a product (spectrum space) that, in practice, is difficult to control.

The objective was to design a legally robust technical framework that would:

- provide a clear description of the product in terms of spectrum access rights in order to create certainty and encourage confidence in a spectrum auction by:
  a) protecting the purchaser (the licensee) who would know exactly to what use the product could be put;
  b) protecting the seller (the government) by having a clear boundary drawn between licensee and government responsibilities;
  c) protecting incumbent apparatus licensees for a short re-allocation period after spectrum sale so that they might either trade that right with spectrum licensees for the cost of re-location or use it while they found other suitable spectrum;
  d) protecting existing adjacent apparatus licensees which operated just outside both the geographic and frequency boundaries of a spectrum licence;
  e) maintaining the access rights for the full term of the licence in order to help a bidder establish the correct price for spectrum based on a proposed business plan including ensuring that new adjacent apparatus licensed services do not encroach on the spectrum and reduce the access rights; and
  f) select a licence term that provided certainty for licensees but allowed government to then re-auction the spectrum after a time when it's value may have changed dramatically thus providing recurrent revenue from the rent of a valuable natural resource.
- manage interference between devices operated under adjacent spectrum licences with minimum requirement for costly negotiation between licensees;
- maximise flexibility by allowing all types of equipment and systems to operate and not bias the framework by requiring relatively more space for certain types of services so that the real value of the spectrum space could be based on the most economically efficient use available; and

- provide for trading or sharing of all or part of the spectrum and at a fine level to allow efficient licence shapes and sizes to evolve over time to support the operation of anything from narrowband short-range to wideband long-range services.

The important underlying objectives were to provide flexibility and certainty. Maximising options facilitates change and maximising certainty creates a stable basis for that change.

The process of setting up a spectrum auction

This is essentially a Government based process but with a great deal of industry consultation. The Australian Communications Authority examines spectrum availability and announces a range of spectrum which it is considering for release at auction. There is a requirement that the Minister designate the spectrum for auction, this means that the issue is never divorced from the political process and control. It also meant that in the development phase significant changes were required to Australian Radiocommunications legislation. The system is now widely accepted and has bi-partisan support within our Parliamentary processes.

Essentially spectrum licensing, while entirely commercial in its application, is, during the development phase a government based process with extensive industry consultation. The system is based on defining a market both in terms of spectrum utility and commercial attractiveness with a series of conditions attached to those licenses.

The system provides for considerable technical and operational freedom:

- No equipment standards
- No band planning
- No build-out requirements
- Capacity to use any technology which complies with the license conditions
- Flexibility to accommodate technical change over the period of the license

- Capacity for risk management at a commercial level
- Capacity for risk management at a technical level.

Spectrum is sold at by an auction process using a simultaneous multiple round ascending auction process which ensures maximum flexibility during the bidding process . The conditions which will be attached to a license are published prior to the auction and any bidder can develop a business case in the certainty that those rules will remain constant for the term of the license. This allows for considerable forward planning and means that, with experience of the system, licensees are able to conduct detailed network planning prior to the auction.

Technical Certainty

The Australian system of spectrum licensing provides for a certainty at a number of levels. The technical aspects of spectrum licensing have been previously covered in references [1] and [2].

The most obviously important is technical certainty, the licensee is thus fully aware of the scope and technical utility of the license. These provisions also mean that any type of equipment and any technical solution is acceptable provided always that it meets the license conditions. The scope for technical innovation is enormous and we have already seen positive industry response to these provisions.

Commercial Certainty

The auction bidder has available all the information prior to auction to build a business case, including negotiations on equipment and rollout. Finance is easier to obtain where a solid business case can be presented.

This also provides for commercial certainty, Australian spectrum licensees are able to develop a business plan against the background of a defined set of rules

which are the subject of legal determination. These conditions apply for the life of the license.

This means that backers, service and equipment providers are able, by adopting a strategic approach to planning, to effectively be ready to move on rollout shortly after the Australian Communications Authority issues the spectrum license.

This contrasts with a situation with other forms of spectrum licensing where licensees can spend considerable time defining the administrative and regulatory fine print where the rules are not defined prior to auction. Definition prior to auction is preferable always to litigation and commercial uncertainty after auction. We don't see the Australian system as excessively bureaucratic, and industry seems to be coping well with the requirements of self regulation.

Policy Considerations

The initial impetus in Australia was that, with increasing demands for both accountability in Government charging policy and the application of user pays principles to many areas of Government activity, there were no real bench-marks which set suitable and commercially realistic prices for spectrum. Previous policy in apparatus licensing had calculated an administrative cost for spectrum use, but this had no real correlation with the actual value, in market terms, of the spectrum.

Nor did such a system realise a reasonable return to the community for what was, after all, a significant national resource.

Another major problem was that, because the Government was liable for interference problems caused through incorrect frequency assignment, the technical approach was one of extreme caution. Very conservative engineering practices led to wasteful use of spectrum. With the price of spectrum being a significant factor in rollout, conservative engineering is no longer the name of the

game and the best Australian engineers are enjoying the creative challenge presented. It should also be said that some engineers are choosing not to become involved in spectrum licensing, this is a commercial decision and a market place phenomenon which the policy assumes will occur. In Australia the system of spectrum licensing is seen as an alternative to apparatus licensing and the two systems operate easily side by side, albeit with some specialisation of personnel.

For many years Australia had operated on the almost unspoken assumption that, given our geographic area and population, the notion of economic use of spectrum was not an issue. Enter the mobile phone and the Internet.

Australians are justifiably notorious for their willingness to take up new technology, our commercial and personal use of new communications equipment is, per head of population, prodigious. This means that in our cities we have levels of spectrum clutter which rival similar levels of usage in Europe, Asia or the US. The Australian community is also accustomed to high standards of service, so policy had to change to meet the community demand, but also the policy requirement for clarity and definition of the actual value of spectrum.

Australia also operated in a heavily regulated communications environment where the Government, through the regulator, made decisions on behalf of industry and often took responsibility for those decisions. Some times the Government employees actually did the work on behalf of industry. This applied at both the technical and policy level. With moves to smaller Government the former regulator, the Spectrum Management Agency, and its successor, the Australian Communications Authority, have moved to a position of light touch and self regulation where industry is obliged to accept increasing levels of responsibility for meeting regulatory requirements. Spectrum licensing is a good example of self-regulation functioning and functioning well.

These changes have not occurred without challenges, many industry operatives are accustomed to Government hand holding and have been slow to wean. But extensive consultation with industry prior to any spectrum auction, including development of the technical rules for any spectrum auction, through a Technical Liaison Group involving industry, have meant that there is significant industry ownership of the policy.

Nor does it mean that the Government, through the Australian Communications Authority, has no control over what happens within Australian spectrum. Government continues to make policy and to reflect community and international standards in its policy decisions. It also brings to bear issues such as competition policy pricing rules and access issues which regulate the communications industry in terms of its relationship to the law, other industry operatives and the community. But to a great extent the Government is getting out of hands-on telecommunications technical issues. It has even outsourced the drawing up of technical frameworks for spectrum licensing.

For the regulator the spectrum licensing policy can mean reduced regulatory costs and increased revenue. Though it is fair to state that the regulator under the Australian system does not retain the revenue generated from spectrum auctions. In Australia the dollars return to Consolidated Revenue and are used for general community benefit. Or, on a more cynical note, the revenue raised gives the appearance of improved budgetary performance by the Government.

It must be said that neither outcome is undesirable at the Government level.

Policy evolution continues in spectrum licensing with the Government considering further simplification of the Regulatory framework and licensing arrangements. With all the simplification and outsourcing, the Australian Regulator retains a significant role in policy formulation and in the management

and publication of data. Australia maintains a national database of radiocommunications devices and licenses.

The ACA accredits technicians to work within industry to register communications devices. The accreditation process is essentially credentialist in application. The persons accredited operate independently of the ACA and are not its agents. The ACA continues to retain a minor capacity for competing with the people it accredits but this is a diminishing role because of the prices the ACA is required to charge for its services in a user pays environment and because of another government policy relating to competitive neutrality which effectively prevents Government enterprises from competing with Australian businesses.

The national database is open to public scrutiny and is accessible to technicians accredited by the ACA to undertake frequency assignment work for private enterprise. It enables accredited persons, private contractors who undertake in the private sector work previously done by Government, to work in the clear knowledge of coordination requirements. This is particularly important when dealing with spectrum licensed space adjacent to apparatus licensed space.

The Government retains a role in the development of overarching policy but allows industry to work to its maximum potential. Market place competition means that companies engaging in inefficient market place practices will suffer the logical consequences of inefficiency.

The Regulatory Structure

The Australian system is designed for openness and clarity. Broad principles are defined in overarching legislation. The Radiocommunications Act 1992 sets out the rules for industry and Government. A subset of determinations is established for each band release, these form part of the license conditions of the spectrum license. Other matters are dealt with in Guidelines. The difference between Determinations and Guidelines, apart from the former being applicable law and

the latter constituting guidance to industry, albeit guidance which must be followed, is that with Determinations the technical framework provides a technical solution.

In dealing with Guidelines the Government prescribes an outcome, usually of the "thou shalt not cause interference …" variety, but does not provide a methodology for achieving the outcome required. This allows industry to operate creatively and with due attention to risk management principles and the need for commercial certainty and technical excellence.

Each spectrum auction is preceded by discussions and all bidders are provided with an Applicants Package which gives full details of license and auction requirements.

The Auction Process

The Australian spectrum auction system was designed and built by the Australian Communications Authority and based, as conventional wisdom about such designs goes, on games theory. It allows for a number of auction lots to be specified and for bidders to register for a specified level of bidder eligibility. The auction rules are spelled out very precisely with bidders needing to maintain specified levels of bidder eligibility but with the provision for waivers where a bidder wishes to sit out a particular round. Bidding can be conducted either by phone, fax or through the Internet. Very high levels of security apply to the bidding process. There are rules for the auction manager and these are also specified before the auction.

The ACA has indicated to us that its software is available on the market, but purpose built auction software is a fairly straightforward product to design and develop.

The joy of spectrum licensing is that while the basic physics remains untouched, almost everything else can be varied to suit national political and cultural processes. We have no wish to force an Australian design and administrative process on other nations, but it is a fact that, while the rules and regulations surrounding spectrum management can be infinitely variable, the rules of physics remain immutable.

Communications Policy and the Social Contract

Most Government communications polices contain some element of social policy delivery whether it is, as in Australia, a Universal Service Obligation, (USO) which requires a particular carrier or all carriers, to provide services at a specified, though not necessarily economically attractive, rate to isolated areas.

In the Australian context Telstra is required to look after the bush, and in Australia we have huge areas where few people live in isolated circumstances and where effective communications are often literally life and death matters.

The policy has been in place for a number of years and is being re-examined at the Government level, both as to the means and methodology of delivery. With satellite technology there is not longer a need for the overland telegraph concept, and the services are often delivered to quite wealthy corporate entities which could well afford their own satellite services.

Equity issues also need ongoing re-examination.

But in other countries in the region there may well be applications for an approach which attaches social policy objectives to licensing arrangements.

I am aware of one regional telecommunications policy, which lists " a telephone in every village" as one of its policy desiderata.

Many other Governments will have similar objectives. Spectrum licensing offers a means of achieving such objectives. This is to say that the technical application of communications policy need not operate in isolation from other policy areas. The linkage of communications policy with social issues also has a multiplier effect in terms of benefit from, for example, social justice or aid programs.

The Present Situation

Historically emerging nations have sought to achieve communications systems by acquiring technology at the most economic rates possible. This has meant that many of the technical rules, the equipment etc, were provided by outside agencies, international bodies and by private corporations, most, perhaps all of them very well intentioned, but not necessarily providing rules, equipment and regulations which meshed with the national interests of the country concerned.

Spectrum, or at least access to it, has been generally provided free, in return for services.

Commercial operations, of their nature, operate in areas where population and business presence justify commercial activity. Spectrum licensing with social policy conditions attached, by requiring perhaps a small sacrifice in terms of commercial short term viability, allows for the potential expansion of communications or other services to areas which would not attract commercial activity. The flow on of this is that, with improved communications education and commercial activity can also improve in areas identified as having development potential. The accretion process allows for the ongoing rollout of services with consequent benefit to the population.

There is also no reason why the material benefits of spectrum licensing cannot be directed to areas of Government policy outside the communications area; government concerns such a health and education or training could also benefit .

With the development of expertise in spectrum licensing Asia/Pacific region countries could also develop exportable skills in communications.

None of this is to suggest that there has been any sense of or intention to provide less than optimum service in the past, it is simply that with the development of spectrum licensing as a new and different means of managing spectrum, the application by regional governments of these new management principles could have the dual benefit of providing commercial certainty to business, a proper return to local communities and the retention of an appropriate level of national sovereignty in national communications policy.

Spectrum licensing cannot be imposed by a service deliverer. It requires a considered decision by Government and possibly legislative amendment. It is not a process which imposes any particular type or grade of service, a properly designed system of spectrum licensing provides maximum policy flexibility and technical neutrality. It is not written to a particular technology or equipment standard and allows for the imposition of specific local criteria which ensures that the policy is relevant to the needs of local communities and the Governments which serve them.

The system is capable of operating across very small spectrum lots and by use of frequency boundaries. Very close national borders can be managed. Equally, if polities wished to cooperate to create a viable market, this also is manageable. The necessary establishment of national databases also means that proper spectrum planning and management, including auditing is possible. The system provides for clarity in public policy relating to a means of delivering services which are central to the modernisation of both business and educational life. In Australia, for example, communications systems are also being used to deliver high tech medical services and long distance diagnostic services in the health field. These services all add significantly to the quality of life of our citizens.

The system is not based on Pollyanna principles.

A properly designed spectrum licensing regime will also have penalty clauses for non compliance by licensees with license conditions, though these have to be considered in the context of both the market implications and the cost of enforcement. But non-compliance with license conditions can result in resumption of the spectrum license by the regulator. This means that national governments retain control over spectrum and manage it as a national resource.

The Future

Spectrum licensing has the potential to create enormous community and Government benefit for Asian and Pacific nations. The concept that radio spectrum is a national resource which should be marketed as carefully as minerals or agricultural products, is not such a novel concept. Pacific region countries also have the advantage of benefiting from the long developmental lead time which has gone into the development of other systems both in Australia and elsewhere.

We are cognisant of the benefit we in Australia had in following on from other systems, observing the policy and technical outcomes and reaching our own conclusions about the need for a different approach. Our system is simple, based on straightforward policy and technical considerations. We also accept that other governments may have their own objectives, our mission is not to impose an Australian solution anywhere, but we are offering it as the best currently available system. It is also fully operational with management and design services and software available and on the market, including auction software.

Our experience in Australia is that industry, perhaps because of their continued involvement in the development of the process, are finding the system of

spectrum licensing not only acceptable but providing a measure of creativity for designers and engineers not always associated with spectrum engineering.

Australia is keen to export this knowledge and that enthusiasm applies at both the Government and commercial levels. FuturePace Solutions has come to this conference with the view of exposing both the technical and policy considerations which might lead governments to want to consider change.

But we also wanted to provide reasons why industry should not be alarmed at that change. I hope that our presentation has served to interest you in what is happening, and what can happen with spectrum licensing applied under appropriate conditions of regulatory and commercial certainty.

It's an Australian and world first in this particular approach to spectrum management and we are keen to see its benefits applied outside Australia.

References

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