Telstra Corporation Limited

Submission to the Infocomm Development Authority of Singapore on the Deployment of Wireless Broadband Technologies in Singapore

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1 Introduction

Telstra Corporation Limited ("**Telstra**") welcomes the consultation by the Infocomm Development Authority of Singapore ("**IDA**") on the *Deployment of Wireless Broadband Technologies in Singapore* and makes this submission in response to the consultation paper issued by the IDA on 2 April 2004.

Telstra Singapore Pte. Ltd., which is ultimately wholly-owned by Telstra, Australia's leading telecommunications and information services company, currently holds an individual services-based operator licence ("**SBO**") (Licence No 64387911).

2 Summary of Major Points

- As an existing telecommunications operator in the Asia-Pacific region (including as a SBO in Singapore), Telstra sees the IDA's proposal to allocate spectrum for wireless broadband as a possible way of Telstra growing its service-based operations and broadening its customer relationships in Singapore.

- Telstra believes wireless broadband access can provide a valuable, real and portable alternative to the existing customer access networks or "local loop" in Singapore, to drive broadband uptake in line with IDA policy objectives and to promote competition in Singapore's broadband market to the benefit of consumers.

- As there is still considerable uncertainty surrounding the technical standards, frequency band allocations and likely services/applications for wireless broadband, Telstra considers it imperative that the regulatory environment set by the IDA for wireless broadband technologies:

    - allows maximum flexibility so as to enable the future incorporation of standards and band allocations set by the International Telecommunications Union ("**ITU**"), which may require changes to any existing use of certain spectrum bands;

    - is consistent with international and regional developments and allocations of spectrum bands, so as to ensure global and regional interoperability and roaming, and commonality in the use of standards and equipment;

    - affords regulatory and investment certainty - for example, in terms of the tenure of the spectrum rights and a holders' right of renewal. Telstra believes that the proposed 7 year tenure, together with the existing uncertainty at the end of the tenure period creates considerable risk and uncertainty for operators considering entering the wireless broadband market - particularly those who are not currently facilities-based operators; and

- encourages efficient use of spectrum and fosters competition in the broadband market by encouraging new players into the market.

3 Specific comments

Telstra has the following specific comments in response to the questions posed by the IDA in the consultation paper.

3.1 ***Views and comments on the potential of and benefits arising from the deployment of wireless broadband technologies, the likely services/applications to be deployed and the potential demand from businesses and consumers***

Telstra is an existing SBO in Singapore. As such, Telstra is currently reliant on the infrastructure and networks of facilities-based operators ("**FBOs**") to provide services to its end users in Singapore. Because of the nature of the Singaporean telecommunications market and the incumbency of Singapore Telecommunications Limited ("**SingTel**"), Telstra is largely reliant on SingTel's customer access network in order to provide services to end users.[1]

Telstra sees the allocation of wireless broadband spectrum as a way of decreasing its reliance on SingTel's customer access network and of providing customised, more cost effective solutions to its existing and targeted customers.

Telstra believes wireless broadband has the following two key potential benefits:

- as an alternative technology by which new, targeted services and applications can be developed for particular market segments; and
- as a way of providing effective competition for existing customer access networks and alternative broadband services to consumers and business where alternatives do not currently exist.

Telstra is aware of the IDA's plan to take the infocomm industry to the next level of growth and to establish Singapore as one of the world's premier infocomm capitals. Telstra is also aware of the IDA's goal of ensuring that by 2006, 50% of households in Singapore have broadband - and of the importance that wireless infrastructure, networks and technologies play in the IDA's "*Connected Singapore*" vision launched in 2003. Telstra believes that, subject to Telstra's comments in the remainder of this paper, the IDA's proposed allocation of spectrum for wireless broadband technologies is an important step in achieving that vision.

Telstra considers that the successful deployment of wireless broadband services will provide a number of benefits to Singaporean consumers - it is a cost effective and, relatively quick way of providing competition to Singapore's existing customer access networks. Compared to fixed line, wireless technologies are much faster to provision. In many countries, including Australia, competitive operators are counting on wireless

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[1] Telstra understands from SingTel's *Management Discussion and Analysis of Unaudited Financial Condition and Results of Operations for the Third Quarter and Nine Months ended 31 December 2003* that 99.5% of all direct exchange lines in Singapore are provided by SingTel - http://home.singtel.com/investor_relations/financial_results/default.asp

broadband technology to gain rapid market access and save on deployment costs - while also avoiding becoming further dependent on the infrastructure and commercial terms of the local incumbent. Wireless broadband services are already being provided in Australia as a way of competing with Telstra's customer access network, meeting the needs of rural communities or offering enhanced mobile functionality for teleworkers.[2]

Wireless broadband has the additional benefit of providing portable broadband access, allowing greater flexibility for wireless broadband users.

3.2 ***Views and comments on the allocation of the 2.3GHz and 2.5GHz bands for wireless broadband technologies and the harmonization of spectrum at the border areas.***

What are the coexistence issues that need to be considered with regards to the deployment of systems (FDD & TDD) in the same geographical area in adjacent frequency blocks, and the deployment of systems across geographic boundaries in the same frequency blocks? What are the technical assessments and methodologies to be used for the deployment and coordination of systems, including separation distances, power spectral flux density limits, out-of-band-emission limits, frequency guard bands etc, to ensure coexistence of system operations? What are the mitigation techniques that could be employed in case of co-channel interference between systems operating in adjacent geographical areas? Does the 5 MHz or 6 MHz channelling plans for the 2.3GHz band and the 2.5GHz band meet industry requirements? What is the appropriate duplex separation (Transmit/Receive) for the FDD wireless broadband technologies in the 2.3GHz bands respectively? What is the minimum, as well as optimal amount of spectrum required by an operator for specific geographical deployment or nationwide deployment? Please provide supporting reasons for each comment and proposal made

Allocation of bands

Telstra supports any allocation of spectrum for wireless broadband that is consistent with regional and international developments.

Telstra strongly encourages a spectrum allocation system based on the allocation of spectrum bands consistent with allocations adopted at an international and regional level. Telstra believes that the development of standards based on international and regional frequency allocations contributes toward effective competition across global and regional markets, global interoperability and roaming and avoids the fragmentation of particular technologies.

Telstra is aware that while a wide range of bands are already allocated by the ITU to generic fixed wireless services and mobile services (within which it is possible to operate certain wireless broadband technologies - albeit with varying constraints), to date no explicit allocation specifically for wireless broadband services has been made by the ITU. However, Telstra is also aware that WRC-07 Agenda Items 1.4 (IMT-2000 and Systems Beyond) and 1.9 (Space vs Terrestrial Services in 2500-2690MHz) both encompass

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2 See, for example, Chapter 3 of the Report of the House of Representatives Standing Committee on Communications, Information Technology and the Arts *Connecting Australia! Wireless Broadband* November 2002 as to the rollout of wireless broadband technologies in Australia and overseas at that time: http://www.aph.gov.au/house/committee/cita/Wbt/report.htm.

proponents of wireless broadband technologies aimed at gaining implicit, if not explicit, spectrum allocations for wireless broadband. Accordingly, it is presently up to each individual country to determine spectrum band allocations, subject only to a requirement to ensure that any such allocation does not interfere with pre-existing spectrum allocations of neighbouring countries. In this respect, Telstra notes that IDA has made reference to the fact that South Korea and Malaysia have identified the 2.3GHz and 2.5GHz spectrum bands for the provision of wireless broadband services.

Telstra notes that while the 2.5 GHz band is currently earmarked by the ITU for 3G expansion, it is unlikely to be necessary for 3G expansion in either Singapore or Australia. Telstra also understands that significant commercial developments taking place in the region and in the US that would support use of the 2.5GHz band for wireless broadband. Telstra would support the allocation of the 2.5GHz band for wireless broadband in line with regional and international developments.

Technical framework for wireless broadband

In setting the technical framework for wireless broadband in Singapore, Telstra recommends the IDA determine a technical framework that:

- provides for maximum flexibility; and
- minimises the costs to right holders, while facilitating the economic deployment of wireless broadband services in the initial rollout phases.

The setting of technical parameters for a spectrum band can be critical to the success or otherwise of commercial deployment of that band.

Telstra believes that great care needs to be taken by the IDA in setting the technical framework for wireless broadband in Singapore due to:

- the current uncertain and evolving nature of wireless broadband technologies and standards (including as between the competing 802.16 and 802.20 standards) and speculation as to the likely applications/services; and
- the absence of any ITU allocation of spectrum band for wireless broadband and the unknown sharing and co-ordination conditions for wireless broadband, which may need to be set by the ITU.

Telstra is aware of the correlation between maximum permitted emission levels, the spectrum loading efficiency in terms of possible number of users per Hertz and the capital costs of network rollout. That is, lower emission limits allow for shorter spectrum re-use distances, and thus a greater number of potential users per Hertz of allocated spectrum - but this is at the expense of increasing the required number of base stations to cover a designated service area, and thus driving up the capital cost of deployment. In order to best stimulate the entry of competitive service providers, initial capital costs need to be minimised to ensure earliest commercial viability, by permitting safe but reasonably high emission levels that minimise the number of required base stations.

Telstra submits that in considering the technical framework for the proposed wireless broadband spectrum allocations, the IDA should determine a framework that:

- allows maximum flexibility for potential spectrum rights holders in terms of the technologies and applications/services for wireless broadband able to be deployed in the band; and

- minimises initial deployment costs to spectrum holders by setting safe but reasonably high maximum permitted emission levels so as to minimise the number of base stations required to service a given area - minimising the initial capital outlay for new entrants, and thus encouraging earliest commercial viability to underpin healthy growth of the wireless broadband service sector.

3.3 ***Views and comments on the key features and service obligation to be applied for auctioning the spectrum for the deployment of wireless broadband technologies. If the key features are not appropriate, please provide supporting reasons why they are not***

Telstra supports the IDA's proposed market-based allocation approach for the allocation of wireless broadband spectrum rights.

Telstra also agrees with the IDA's proposal to set spectrum reserve price levels according to the cost of administering the spectrum and is encouraged to see this is payable over the term of the licence, rather than as a total upfront amount. Telstra is comfortable with the requirement for bidders in the spectrum auction to submit an initial offer and banker's guarantee.

However, Telstra is surprised and disappointed by the IDA's proposal for the tenure of wireless broadband spectrum rights. Tenure of spectrum rights influences the certainty with which rights holders can plan their investments - longer tenures provide more opportunity for the spectrum rights holder to recoup the cost of the investment (and, of course, encourage higher bids for the spectrum).

Telstra considers a tenure of only 7 years to be much too short for spectrum rights holders to recoup their commercial investment - particularly new facilities-based entrants who are likely to take significantly longer to achieve commercial viability. Telstra believes it is also inconsistent with Singaporean and international precedent. For example, Telstra notes:

- Singapore's 3G spectrum rights were issued for a period of 20 years. Telstra does not see any sensible rationale for there to be any difference between length of tenure of wireless broadband and 3G spectrum rights;

- in Australia, the equivalent spectrum licences are typically issued for periods of 15 years. In particular, Telstra notes that wireless broadband spectrum licences in the 3.4 GHz and 27 GHz bands were issued for maximum of 15 years; and

- in the UK, radiocommunications licences for wireless broadband in the 3.4 GHz and 28 GHz bands were issued for a maximum of 15 years.

Telstra strongly recommends that the IDA should extend the licence period for the proposed wireless broadband licences to 20 years in line with the existing Singaporean 3G licences, particularly if the IDA decides to permit existing 3G operators to deploy wireless broadband technologies using 3G spectrum.

In addition, Telstra submits that the IDA needs to provide greater clarity and certainty as to the renewal processes (if any) that are to apply at the end of the spectrum rights. For example, although Telstra has not yet seen any proposed draft spectrum rights, Telstra notes that the draft 3G spectrum right provided for spectrum rights to be extended or further renewed for such a period *as IDA the thinks fit* and *subject to such conditions as may be specified by the IDA in its absolute discretion.*

Assuming the IDA proposes to include similar renewal provisions for wireless broadband spectrum rights, holders of such wireless broadband spectrum rights would then be subject to the complete discretion of the IDA as to terms and conditions (including price) of any further renewal periods (if any at all).

Telstra submits that from an investment certainty perspective, this is wholly unsatisfactory. Potential investors in the wireless broadband market and, in particular, new entrants into the Singaporean market, need certainty in order to make the initial investment in spectrum rights. Investment uncertainty can undermine investment incentives and, given the already risky nature of investment in wireless broadband technologies, may deter investment in these often unproven technologies.

Telstra believes that ideally, from a rights holder perspective, a spectrum right would be granted in perpetuity (as supported in Australia by the Productivity Commission)[3] or, at least, would provide the incumbent rights holder with a first option to renew the spectrum rights. However, Telstra also appreciates the competing need to ensure that spectrum allocation is flexible enough to permit future changes of use and to provide scope for band clearance should it be necessary.

Providing spectrum rights holders with certainty of tenure also reduces the incentive to run down infrastructure as the expiry date approaches, contrary to public interest, and encourages investment in the latter part of the tenure period.

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[3] Productivity Commission - *Review of Radiocommunications Acts and of the Market Based Reforms and Activities Undertaken by the Australian Communications Authority* 2002, at pages 294-297.

To maximise investment certainty while retaining the regulatory flexibility necessary, Telstra submits that spectrum rights:

- should have a specified review period - so that the grant of rights would be reviewed a certain number of years prior to expiry. Telstra notes that a review period of 2 years prior to expiry of a spectrum licence is currently required under Australian legislation; and
- be renewable by the right holder subject to satisfaction of limited conditions - for example, a public benefits test and the payment of additional fees. A public benefit test requires an assessment of public interests and enables the regulator to have regard to the use made of the spectrum by the incumbent and any alternative use that may be possible under new or existing technologies or operators.

Further, to ensure regulatory certainty, the provisions relating to renewal of spectrum rights must be clarified prior to any spectrum auction.

3.4 Telstra does not support the IDA's proposed "use or lose" service obligation and notes that this is inconsistent with approaches taken in some overseas jurisdictions (for example, Australia). Telstra believes it should be left to the spectrum rights holder to determine as and when it makes commercial sense to rollout its network. The holder will do so taking into consideration the amount paid for the spectrum rights and the need to rollout services to recoup a return on that investment. The issue of hoarding of spectrum can be sufficiently addressed by setting caps on the amount of spectrum which can be acquired (see paragraph 3.4).

3.5 ***Views and comments on whether spectrum should be auctioned in generic lots or in blocks with specified frequencies; the appropriateness of the lot sizes; and the maximum amount of spectrum to be set***

Telstra supports the IDA's proposal to auction wireless broadband spectrum rights in generic lots.

However, Telstra's support is conditional on the assumption that IDA will allocate multiple lots:

- contiguously in order to maximise the efficient use of the spectrum and to minimise the need for guard space;
- taking into consideration the differing needs and interference requirements for TDD and FDD technologies; and
- so that all rights are equivalent in the context of overall utility - to ensure, for example, that allocation is not more advantageous to some rights holders over others in terms of interference from neighbouring bands.

Telstra believes that a lot size of 5 MHz would be the most efficient considering the likely technologies to be deployed.

Telstra submits that the IDA must ensure any cap on the amount of spectrum allowed to be purchased at auction must be sufficient to ensure a viable commercial opportunity for the successful bidders. Telstra also submits that should existing 3G operators be entitled

to participate in the proposed wireless broadband auctions, any existing spectrum held by those operators should be taken into account in calculating compliance with the cap.

Telstra notes that the use of bidding limits on all auction participants as proposed by the IDA is commonly used by regulators around the world to regulate the conduct at the auction as a way of preventing unnecessary hoarding and/or to regulate the number of players in the markets (ensuring entry of maximum number). For example:

- in Australia:
  - in the 3.4GHz spectrum auction, a 67.5MHz limit was placed on each bidder (other than Telstra who was subject to more stringent limits (see paragraph 3.6 below));
  - in the 3G spectrum auction, no bidder could acquire more than 25% of the available spectrum in any metropolitan area or more than 50% in any regional area; and
  - in the PCS auction in the 800MHz/1800MHz bands, no bidder could bid for more than 15MHz in the 1.8GHz band in one region. Telstra, Optus and Vodafone were further limited (see paragraph 3.6 below);
- in the UK:
  - in the 28GHz spectrum auction, licence conditions for broadband fixed wireless access ("**BFWA**") services in that band were set so as to ensure a minimum of three licences in each region to allow effective competition between BFWA operators and with operators of competing broadband technologies;
  - in the 3G spectrum auction, bidders were limited to bidding for one of five licences, with the spectrum limit set in advance.
- in New Zealand, a cap of 15MHz was placed on bidders participating in the 3G auction; and
- in Hong Kong, bidders in the 3G auction were limited to bidding for one of four licences, with the spectrum limits set in advance.

3.6 ***Views and comments on the deployment of wireless broadband technologies in the 3G spectrum bands. Are there any technical considerations that IDA should consider? Please provide detailed supporting reasons for each comment and proposal made***

Telstra believes that any proposal to allow existing 3G spectrum rights holders to deploy wireless broadband technologies in the 3G spectrum bands must ensure the regulatory regime that applies (including in terms of technical framework and licence tenure) is the same for wireless broadband in both 3G and other spectrum bands - resulting in a level playing field.

Leaving aside the issue as to whether any appropriate product would be developed for the exploitation of wireless broadband technologies in the 3G spectrum, Telstra considers that the deployment of wireless broadband technologies in the 3G spectrum bands would only be feasible and should only be permitted if there is consistency in technical frameworks (e.g. emission limits, TDD/FDD segregation):

- between wireless broadband and 3G within the existing 3G spectrum band - otherwise significant interference issues will arise; and
- between wireless broadband in the 3G spectrum band and wireless broadband in other spectrum bands - so as to maintain a level playing field in respect of 3G operators.

In addition, Telstra believes that the technical framework for wireless broadband in 3G spectrum should be no more advantageous than the existing 3G technical framework, which suggests that a technical framework for wireless broadband would need to be established similar to that currently existing for 3G services in the 3G spectrum band. See our comments in paragraph 3.2 above as to the need for care in setting a technical framework for wireless broadband.

3.7 ***Views and comments on the eligibility of existing 3G and broadband infrastructure providers for the 2.3GHz and 2.5GHz spectrum, and the limit on the spectrum amount for which they could bid.***

Telstra notes that the use of competition limits on incumbent operators in spectrum auctions is consistent with international precedent.

Telstra notes that international precedent for the use of competition limits on incumbent operators or spectrum holders in spectrum auctions is consistent with international precedent. For example, in Australia, competition limits applying to incumbent operators have been applied in the following spectrum auctions[4]:

- 800/1800MHz - where Telstra, Optus and Vodafone were excluded from bidding in the first two frequency ranges of the 800MHz band;
- 3.4GHz - where a zero limit was imposed on Telstra for major population areas and a 22MHz limit in each of the 3442.5-3475MHz band and the 3542.5-

[4] In Australia, competition limits can only be imposed by Ministerial direction. The Minister acts on advice from the Department of Communications, Information Technology and the Arts, and the Australian Competition and Consumer Commission.

3575MHz band for each auction lot area outside major population areas. The Australian government's reason for excluding Telstra was stated as follows:

> "The competition limits are designed to ensure that no one player dominates the provision to telecommunications services in the 3.4GHz band, especially in the provision of wireless local loop services. Telstra has a number of existing and proposed technologies capable of delivering high speed internet and traditional voice services to consumers and therefore Telstra has been excluded from bidding for 3.4GHz spectrum in major populations centres."[5]

- 28/31GHz - where carrier licence conditions were imposed on Telstra and Optus to:

> "prevent them bidding at auction and to ensure new entrants in the market have a better chance of purchasing the spectrum leading to the furthering of competition in an emerging area"[6]

In the context of a recent review of the Australian radio communications regulatory regime the Australian government stated:

> "The Government has decided to retain existing pro-competitive legislative provisions enabling a Ministerial direction to be issued to limit the amount of spectrum any bidder can acquire in a spectrum auction. These provisions can also be used to encourage a new market entrant by limiting or excluding the participation of a dominant incumbent in such an auction."[7]

In the 3G auction in the UK, incumbent operators were excluded from bidding for the largest licence, which was reserved for a new entrant, and in The Netherlands, the incumbent was excluded from the auction of wireless local loop licences in the 2.6GHz and 3.5GHz bands.[8]

3.8 ***Views and comments on whether there are issues that may pose problems to achieving transparent and seamless interconnection and open access. IDA further seeks comments on the type and level of QoS standards that will be appropriate and whether the existing set of QoS standards for broadband service providers are applicable for service delivery using wireless broadband networks. Please provide supporting reasons for each comment and proposal made***

Telstra understands that the various standards (either current or proposed) for wireless broadband technologies will generally enable transparent and seamless interconnection with standard interconnect protocols.

However, Telstra considers that any QoS standards for services based on wireless broadband technologies will need to recognise limitations imposed by the radio link. The quality of this link can vary due to a number of factors including variable interference levels, varying distances from the base transmitter, internal placement of transmitter/receiver in a premise and the local propagation environment. It would not be practical to require service levels for wireless broadband to be the same as fixed

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5 http://www.dcita.gov.au/Article/0,,0_1-2_1-4_15120,00.html.
6 http://www.dcita.gov.au/Article/0,,0_1-2_1-4_13206,00.html.
7 http://www.treasurer.gov.au/tsr/content/pressreleases/2002/076.asp.
8 http://www.muniwireless.com/archives/000106.html.

broadband. Some flexibility should be allowed for individual operators to choose their QoS standards according to their judgement on the requirements of the target market.

3.9 ***Views and comments on the Market Trial Licence framework and the specific features set out in Annex 2. Is the market trial licence framework conductive in helping market participants test the commercial viability of innovative service. Are there additional issues that IDA should consider? Please provide detailed supporting reasons for each comment and proposal made***

Telstra supports the concept of a market trial licence, particularly for new and uncertain technologies such as wireless broadband.

Telstra submits that the IDA needs to provide further information as to how the market trial licences are intended to fit with the IDA's proposed timeframe for the auction of wireless broadband spectrum rights. For example, what will be the timing (if any) between the IDA issuing the first market trial licence and the first proposed wireless broadband spectrum auction? Telstra notes that the IDA is aiming to announce the spectrum allocation framework and its policy decision on the use of 3G spectrum for wireless broadband technologies by the third quarter of 2004.

Telstra is happy to meet with the IDA to discuss or clarify any of the issues raised in this submission.

Telstra Corporation Limited
30 April 2004