WINSTAR COMMUNICATIONS SINGAPORE PTE LTD

COMMENTS ON THE CONSULTATION DOCUMENT "PROPOSED APPROACH TO FIXED-WIRELESS BROADBAND NETWORK DEPLOYMENT AND SERVICE PROVISIONING IN SINGAPORE"

31 March 2000

Winstar Communications Singapore Pte Ltd ("**Winstar**") is pleased to submit its comments in reply to the invitation made by the Info-Communications Development Authority of Singapore ("**IDA**") on the issues documented in the consultation paper entitled "Proposed Approach to Fixed-Wireless Broadband Network Deployment and Service Provisioning in Singapore", dated 16 February 2000 (the "**Consultation Document**"). Winstar commends IDA for the timely release of the Consultation Document and encourages IDA to make available as soon as possible spectrum for the provision of interactive broadband multimedia ("**IBBMM**") services in Singapore.

The following response by Winstar corresponds to the order of the questions posed by IDA in the Consultation Document.

A. THE POTENTIAL OF AND BENEFITS ARISING FROM THE DEPLOYMENT OF FIXED-WIRELESS BROADBAND NETWORKS, THE LIKELY SERVICES/APPLICATIONS TO BE DEPLOYED, AND THE POTENTIAL DEMAND FROM BUSINESS AND CONSUMERS.

1. Deployment of fixed-wireless broadband networks is spurring competition in the telecommunications markets in the United States and throughout the world, and is providing consumers with the latest telecommunications services. While still relatively nascent, the fixed-wireless broadband industry is nevertheless robust and poised for growth. In the top markets in the United States, for example, there are often several licensees of fixed-wireless broadband spectrum holding licenses in the 24, 28, 31 and 38 GHz bands. Winstar and other service providers are using their fixed-wireless broadband spectrum to deploy wireless local loop or local exchange networks in direct competition with incumbent local telecommunications companies. It is to be expected that a similar demand for broadband communications services in Singapore will spur competition in the telecommunications industry and benefit consumers.

2. Companies such as Winstar are poised to offer consumers in Singapore a variety of broadband communications services over fixed-wireless networks, such as leased lines, Internet access and exchange services, Virtual Private Network and Managed Data Network Services, among others. At present, there is no competition for the provision of these services in Singapore, and an active, competitive broadband communications market for customers does not exist. Singapore is already one of the world's most densely concentrated markets in terms of both fixed and mobile telecommunications services. It is expected that Singapore will become a leading regional hub in Asia for broadband communications, information services and financial services, and that consumers in Singapore will increase their demand for broadband communications

services. As such, deployment of fixed-wireless broadband networks will be an essential element to foster the development of the telecommunications industry in Singapore, by promoting both facilities-based and resale competition.

3. Fixed-wireless broadband networks have the ability to duplicate the performance capabilities of fiber optic cable with wireless millimeter-wave, microwave transmissions.[1] High-speed communications links such as those deployed by Winstar around the world have broadband characteristics, allowing for digital voice, data and video transmissions.[2] In addition, fixed-wireless broadband networks are engineered to have an availability up to 99.999 percent, with actual design availability of the network based on market requirements. Although the fixed-wireless component differentiates fixed-wireless operators from their wireline competitors, fixed-wireless broadband networks are equal or superior to wireline fiber networks in terms of functionality and quality of service ("**QOS**"). Fixed-wireless broadband capabilities can be brought to customers much more rapidly than cable modem and fiber optic technologies, and at a substantially lower cost. Moreover, streets do not have to be excavated, so cities and their residents will not be inconvenienced by fixed-wireless broadband network buildout.

B. POSSIBLE USES FOR THE FIXED-WIRELESS BROADBAND TECHNOLOGY AND HOW THE COMPETING DEMANDS FOR THE SPECTRUM CAN BE MANAGED, INTERCONNECTION AND ACCESS ISSUES THAT MAY POSE PROBLEMS TO ACHIEVING IDA'S OBJECTIVE OF TRANSPARENT AND SEAMLESS INTERCONNECTION AND OPEN ACCESS.

4. Winstar believes that IDA should take steps to encourage fixed-wireless broadband network operators in Singapore to deploy, pursuant to their licenses, both point-to-point ("**P-P**") and point-to-multipoint ("**P-MP**") systems to provide a variety of broadband communications services, including telephony, high-speed data, Internet access and information services, among others. IDA should provide flexibility to fixed-wireless broadband providers to deploy either technology in all of the bands allocated for this service. Unlike P-P systems, P-MP technology allows for simultaneous transmissions between a single "hub" site antenna and multiple customer building antennas to which it has line-of-sight. A P-MP connection allows for the cost of the hub site antenna to be allocated over numerous customer building sites, rather than just one, and reduces the capital expenditures necessary to bring fixed-wireless broadband service to a particular customer building. In addition, the use of P-MP technology gives a fixed-wireless broadband provider the unique ability to allocate and share network capacity on an as-

---

[1] For purposes of this document, millimeter wave spectrum refers to spectrum in the 20.0 - 42.5 GHz band.

[2] For example, Winstar provides seamless communications and technology to its customers worldwide, including a comprehensive set of high-quality, digital-age broadband communications services. The company can provide customers with up to an OC-3 (more than 2,000 voice grade equivalents) of transmission capacity over a single wireless link, which is 2,700 times faster than the fastest dial-up service currently in general use. The capacity of these wireless links has risen dramatically in recent years and Winstar expects that it will continue to expand as wireless technologies advance.

needed basis, and supply customers with bandwidth-on-demand to address their dynamic capacity needs.

5. As indicated above, fixed-wireless broadband networks are well-suited for a variety of communications services. An important element for service providers to be able to provide broadband services in Singapore is their ability to interconnect and obtain equitable open access to the networks of other telecommunications providers. Winstar believes that IDA should set clear interconnection policies and procedures. Obtaining interconnection in a timely, cost-effective and non-discriminatory manner is one of the most significant obstacles facing competitive telecommunications providers. Without obtaining interconnection, new entrants cannot compete effectively against incumbent operators. Therefore, Winstar urges IDA to implement an interconnection regime that makes clear to both incumbent operators and new entrants the "rules of the game." IDA should set clear guidelines and time frames for interconnection negotiations and provisioning of network elements and functions. In addition, IDA should implement a dispute resolution regime that permits IDA to arbitrate disputes and issue and enforce binding decisions on interconnection issues.

6. Specifically, Winstar recommends that IDA take the following steps:

   (1) To the extent not already required under the law, incumbent operators should be required to make publicly available a standard interconnection offer setting forth the interconnection services available to competitors and the terms and conditions under which those services will be provided. The standard offer should be available for execution by competitors "as is" if they so choose; however, it also should be made clear that incumbents are obligated to negotiate different terms and conditions based on the particular needs of a competitive provider.

   (2) Interconnection agreements and related IDA orders should be made publicly available to all licensed carriers, and should be made available at IDA's Web site. Allowing interconnection agreements to remain confidential gives disproportionate bargaining power to incumbent operators by allowing them full knowledge of what competitive providers are paying for interconnection services, while preventing competitors from determining market conditions. Requiring incumbent operators to make interconnection agreements publicly available will level the playing field and allow competitive providers to avail themselves of already existing terms.

   (3) Incumbent operators also should be required to commence interconnection negotiations within 10 days of a written request from a competitive provider. The parties should have a limited time -- no more than 60 days -- to negotiate interconnection. After the 60-day period, either party should be able to request the intervention of IDA. The parties should be able to request the intervention of IDA before the end of the 60-day period if they can show that the other party has failed to negotiate in good faith. In order to facilitate voluntary negotiations, Winstar recommends that IDA not be able to intervene in interconnection negotiations absent the request of a party.

(4) Where IDA's intervention is requested, clear procedures and time periods should govern its role. Winstar recommends that IDA be required to resolve the dispute and issue an appropriate decision within 60 days of the request for intervention. Providers also should be able to request action by IDA after an interconnection agreement is signed or an interconnection order is issued if the other party breaches the terms of the agreement or order.

(5) IDA should set clear time limits for provisioning network elements and functions, collocation space, and other services by incumbent operators. IDA should be empowered to sanction providers for failure to provide interconnection services in accordance with an interconnection agreement or IDA decision.

(6) Finally, incumbent operators should be required to provide and publish periodic reports of their compliance with IDA's policies and procedures for interconnection. These reports are a useful mechanism to verify that incumbent operators are providing the same treatment to competitors as they are to their affiliates. Reports should include information regarding requests for negotiations and interconnection negotiations, the ordering and provisioning of interconnection services, and maintenance and repair records. In addition, reports should be broken down by carrier type, services requested and customer type, and should be made publicly available.

C. THE AMOUNT OF SPECTRUM THAT SHOULD BE MADE AVAILABLE FOR TERRESTRIAL FIXED-WIRELESS BROADBAND VERSUS SATELLITE SERVICES.

7. Winstar is encouraged by the fact that IDA has reserved a total of 3.55 GHz of spectrum for the provision of terrestrial fixed-wireless broadband services, as follows:

(1) 25.25 – 27.0 GHz (1,750 MHz).

(2) 27.5 – 28.6 GHz (1,100 MHz).

(3) 29.10 – 29.5 GHz (400 MHz).

(4) 31.0 – 31.3 GHz (300 MHz).

8. Winstar believes that these bands are suitable for the provision of terrestrial fixed-wireless broadband services, and encourages IDA to make this spectrum available for these services.[3] In addition, Winstar supports IDA's proposal to allocate spectrum for satellite services in a different frequency band.[4] Winstar recognises that it is not

---

[3] Winstar notes, however, that the United States and other administrations have allocated the 28.35 –28. 6 GHz band to geostationary satellite orbit("**GSO**") fixed-satellite service ("**FSS**") networks.

[4] IDA's proposal contemplates an allocation in the 28.6 – 29.1 (Earth-to-space) for non-geostationary satellite orbit ("**NGSO**") FSS networks.

commercially feasible for fixed-wireless broadband services to share with satellite services. Consequently, IDA should make every effort to not mandate co-channel sharing with satellite systems by imposing operational restrictions on fixed-wireless broadband operators.

D. THE OPTIMAL AMOUNT OF SPECTRUM TO BE ALLOCATED TO EACH OPERATOR AND THE OPTIMAL NUMBER OF OPERATORS THAT CAN BE LICENSED.

9. Winstar has the following comments to offer concerning the frequency bands in the reserved list that should be given priority by IDA in the initial licensing process:

(1) The 27.5 –28.6 GHz and the 29.1 - 29.5 GHz bands should be given priority in the licensing process for the provision of fixed-wireless broadband services, and IDA should license these bands to a minimum of two licensees.

(2) Alternatively, IDA could consider the 25.25 - 27.0 GHz band -- or a significant portion of it -- for the initial licensing process of fixed-wireless broadband networks based on ETSI 26 GHz equipment that is already available in the market.

(3) The 31.0 – 31.3 GHz band should be held in reserve as an expansion band for future fixed-wireless broadband network growth.

10. In order to provide for fair and equitable competition with incumbent telecommunications providers, and to generally succeed in the global marketplace, IDA must assure new fixed-wireless broadband entrants the availability of adequate bandwidth. The fixed-wireless broadband services planned by Winstar and others must be able to compete with those that are provided by incumbent telecommunications operators, including wireline and wireless companies that operate in Singapore. To compete successfully against these established operators requires, among other things, business economies of scale, significant geographical coverage, a strategic marketing approach and sufficient bandwidth capacity. Perhaps the most important factor among these considerations, however, is the quantity of bandwidth that will be required by Winstar and other fixed-wireless broadband service providers, since spectrum will be the only transmission resource operated and offered by these company aside from certain land lines leased for network redundancy purposes. If IDA does not make available a sufficient minimum amount of commercial bandwidth for licensing to fixed-wireless broadband operators, the ability of these service providers to react quickly to changing market conditions through the rapid deployment of radio links will seriously hamper their ability to compete.

11. Winstar urges IDA to allocate the 27.5 - 28.6 GHz and the 29.1 – 29.5 GHz bands in a manner that enables fixed-wireless broadband operators in Singapore to make use of equipment that has already been developed for the United States, Canada, Latin America, and other markets. In the 27.5 – 28.6 GHz band, for example, the available equipment utilizes the 27.5 - 28.35 GHz band. This equipment can be reconfigured to cover the entire 27.5 – 28.6 GHz band. Such an allocation of spectrum by IDA would permit fixed-wireless broadband operators to use already available equipment for their networks,

thereby reducing the need to wait for new equipment and the cost associated with developing this equipment.

12. In the 27.5 – 28. 6 GHz band, the available equipment typically uses a transmit-receive band separation of 416 MHz, with 4 blocks of 208 MHz each. The additional 250 MHz of spectrum would need to be folded into the overall block-frequency plan without having to embark on costly and lengthy equipment redesign. Winstar recommends that IDA license two blocks of 208 MHz and one block of 125 MHz, each to two licensees. Given the equipment limitations in this band and the fact that there is no single specific band plan for this spectrum, Winstar believes that it would be difficult to license this spectrum to more than two fixed-wireless operators in this band. Alternatively, Winstar believes that IDA could allocate two blocks of 270 MHz with a transmit/receive separation of 540 MHz, each to two licensees in the 27.5 - 28.6 GHz band. Under this scenario, fixed-wireless broadband providers would need to absorb minor equipment configuration delays up front in order to fully utilize the spectrum.

13. Winstar also believes that the 29.1 - 29.5 GHz band should be allocated by IDA during the initial licensing process. This band should be allocated as a single block of spectrum in each market to be licensed for fixed-wireless broadband services, since equipment manufacturers can already provide a solution for this band. Therefore, Winstar urges IDA to make this spectrum available for the provision of fixed-wireless broadband services in the initial stage of its licensing process. Such an allocation of spectrum will serve to benefit consumers in Singapore, by encouraging competition in the provision of telecommunications services and by fostering the development of new and innovative wireless technologies.

14. Alternatively, Winstar urges IDA to consider the 25.25 - 27.0 GHz band -- or a significant portion of it -- for the initial licensing process of fixed-wireless broadband networks based on ETSI 26 GHz equipment that is already available in the market. However, IDA must keep in mind that equipment in this band may require some reconfiguration to cover the entire 25.25 - 27.0 GHz band, and the number of suppliers that provide equipment for the 25.25 - 27.0 GHz band may not be as numerous as those that provide equipment for other bands.

15. In addition, Winstar believes that IDA should reserve the allocation of the 31.0 – 31.3 GHz band for future expansion of fixed-wireless broadband networks. To Winstar's knowledge, available products in these bands are still in a developmental stage. It would be risky to consider this band in the first phase of the licensing process. Therefore, IDA should reserve this spectrum band for future assignment to fixed-wireless broadband operators.

16. As indicated above, Winstar supports IDA's proposal to allocate spectrum for satellite services in a different frequency band. Winstar recognises that it is not commercially feasible for fixed-wireless broadband services to share with satellite services. Consequently, IDA should make every effort to not mandate co-channel sharing with satellite systems by imposing operational restrictions on fixed-wireless broadband services. Winstar also notes that P-P and P-MP technologies can be integrated into a single hybrid network in order to meet different customer demands. However, this integration process must be done with careful network engineering. Forcing P-MP fixed-

wireless broadband licensees to share spectrum with P-P licensees will only decrease the ability of multipoint licensees to compete in the marketplace, since each will be deploying a monolithic network.

17. Winstar also urges IDA to limit the ability of incumbent telephone operators to hold new millimeter wave band spectrum until future fixed-wireless broadband operators have had sufficient time and opportunity to compete in the local telecommunications market. In assessing the need to restrict the opportunity of a certain provider or class of providers to obtain and use spectrum to provide communications services, it is instructive to look at the FCC's initial allocation of Local Multipoint Distribution Systems ("**LMDS**") spectrum. Based on a review of the record in this proceeding, the FCC concluded that a policy favoring restricted eligibility for incumbent telephone and multichannel video providers would result in the greatest likelihood of increased competition in the local telephone and video markets. Winstar believes the same holds true in Singapore. Moreover, it is worth noting that the FCC made its decision in the LMDS proceeding notwithstanding the fact that other fixed-wireless broadband service providers were already licensed in the 38 GHz and 24 GHz bands. Simply put, the FCC concluded that it was appropriate to restrict incumbent providers from the new LMDS bands even though other fixed-wireless broadband spectrum bands were already available.

18. By temporarily restricting the ability of incumbent telecommunications providers to hold new millimeter wave band licenses, the IDA will ensure the entry of new competitors into the local telecommunications market. Whether or not that new competitor is Winstar, the IDA will guarantee that the fixed-wireless broadband spectrum is put in the hands of an entity that has a full incentive to promote competition and deploy state-of-the-art broadband technologies in Singapore. Incumbent telecommunications providers simply do not have that same incentive. The only way for the IDA to guarantee competition in the telecommunications marketplace is to temporarily restrict the ability of the incumbent telecommunications providers to hold future fixed-wireless broadband licenses.[5]

19. Winstar also supports IDA's technology neutral approach towards the licensing of facilities-based operators (including wireless facilities-based operators), and urges IDA not to adopt a specific channelization plan (channel bandwidth, channel spacing and channel pairing) for fixed-wireless broadband operators. In order to thrive, these service providers require flexibility in the deployment of technologies and equipment. A

---

[5] One need only look at the long-distance and mobile wireless markets in the United States to see the benefits of true competition from multiple (more than two) providers. During the past 15 years, competition in the long-distance market in the United States has driven down costs so far that most callers now enjoy domestic long-distance calling rates of US$0.05 a minute or less. Up until recently, mobile wireless services in the United States were controlled by a duopoly. With the FCC's auction and licensing of multiple Personal Communications Service ("**PCS**") providers, the benefits of competition really emerged. A number of companies are implementing new digital networks and flat rate calling plans in order to remain competitive. In some markets, there are now six mobile wireless providers. The ultimate beneficiary is the consumer. By promoting competition through multiple service providers in the fixed-wireless broadband and local telecommunications markets, the IDA can bring similar benefits to consumers in Singapore.

mandatory channelization plan would restrict the ability of fixed-wireless broadband operators to deploy equipment that may best suit their network and service needs. It may also constrain the innovation of fixed-wireless broadband technologies deployed in Singapore, to the detriment of telecommunications users in the country. As IDA is aware, the CITEL administrations are working to adopt certain guidelines that will promote block allocation. Under this plan, operators have the freedom to adopt optimum channelization plans, by coordinating the spectrum with other licensees on a block basis.

E. THE MOST APPROPRIATE LICENSING AND SPECTRUM ALLOCATION APPROACH.

20. Winstar supports IDA's objective of granting fixed-wireless broadband spectrum to operators who can optimise usage and provide a wide range of competitively priced and innovative broadband communications services. In Winstar's view, a beauty-contest tender approach will provide adequate opportunity for IDA to evaluate potential fixed-wireless broadband services providers and their commitment to deploying these services in Singapore. Winstar believes that auctions are not an appropriate means of assignment of fixed-wireless broadband frequencies. Auctions significantly increase costs for potential operators, and therefore constitute a barrier to entry. Moreover in light of IDA's aim to promote a competitive telecommunications environment in Singapore and welcome new and innovative players, an auction process for fixed-wireless broadband spectrum can in fact deter the entry of new competitors and deprive the country of competitive broadband service offerings.

21. Winstar is of the view that granting fixed-wireless broadband spectrum by means of auction does not ensure that frequencies will be awarded to those operators who can guarantee that the frequencies will be efficiently used for the provision of fixed-wireless broadband services. On the contrary, this procedure favors operators with "deep pockets" -- such as incumbent telecommunications providers -- to the detriment of potential new entrants due to frequently exorbitant auction costs. Auctions do not take into consideration the ability of the operator to maximize network buildout and deployment, but rather give sole consideration to the ability to pay for the spectrum. Initial large down payments also deprive new fixed-wireless broadband operators of financial resources when it is most needed to begin their infrastructure deployment. The costs involved with an auction will therefore reduce the readiness to invest in fixed-wireless broadband networks and will lead to higher consumer prices. An award of fixed-wireless broadband licenses by competitive test, on the other hand, will provide IDA with an opportunity to protect the social and economic interest of guaranteeing the establishment of alternative, competitive broadband networks to the benefit of consumers.

22. Winstar recommends that new fixed-wireless broadband operators in Singapore be licensed on a geographic basis, preferably on a regional basis. At a minimum, fixed-wireless broadband licenses should provide coverage to areas originally defined by the applicant, thereby allowing the license holder to install and operate as many transmission links as can be engineered inside the licensed area without being burdened by a requirement to seek both spectrum coordination clearances and IDA regulatory approvals prior to installing specific links. Regional coverage will also avoid producing complex, additional regulatory enforcement burdens on IDA. The exclusive right to use a particular channel or channels within a broad geographic area gives the licensee much

greater control and flexibility over its network design. Exclusive, geographic area licenses will allow fixed-wireless operators to save costs, ensure interference-free operations and increase quality and reliability in designing efficient communications networks. If IDA forces broadband wireless operators to share spectrum, this flexibility will be lost. Fixed-wireless broadband providers must have the flexibility to deploy their systems based on the demands of the marketplace. Exclusive, geographic area licenses will allow these operators the needed flexibility to deploy, in a timely fashion, advanced services without the need to seek additional regulatory approval.

23. Winstar also believes that an allocation of spectrum on a per-link basis or on a needs basis will result in inefficient spectrum usage. As indicated above, Winstar believes that the license holder should be able to install and operate as many transmission links as can be engineered inside a licensed area without being burdened by a requirement to seek both spectrum coordination clearances and IDA regulatory approvals prior to installing specific links. Therefore, Winstar urges IDA to adopt a spectrum allocation mechanism that simplifies the provision of fixed-wireless broadband services by reducing unnecessary regulatory burden and oversight on operators.

24. In allocating spectrum for fixed-wireless broadband services, Winstar urges IDA to consider a decision by the Federal Communications Commission ("**FCC**") in the United States to "segment" the 36.0 - 51.4 GHz band in allocating licenses to terrestrial wireless and FSS licenses. In Winstar's opinion, decisions such as the one adopted by the FCC in this case provide terrestrial wireless licensees with a degree of certainty that will allow them to develop commercial services and exploit spectrum without technical constraints that arise from forced sharing of frequency bands on a co-primary basis.[6]

25. Winstar also believes that IDA should ensure that any fee component imposed on new fixed-wireless broadband providers does not hamper their ability to compete in the marketplace by imposing artificial barriers to competition. IDA should impose a license fee component on fixed-wireless broadband providers only if the license charge seeks to cover the administrative cost inherent to the licensing scheme. A license fee should not impose unnecessary costs or burdens on telecommunications providers, and should be a function of an administratively economical procedure that seeks to distribute the cost of the licensing scheme over those operators being licensed. A license fee should be proportionate to the work involved in processing the application, and should be limited to the cost of examining the application, granting the authorization, and verifying

---

[6] In a Report and Order adopted on December 17, 1998, the FCC addressed the uncertainty regarding the sharing of sub-bands between wireless and FSS operators by stating that "sharing the same spectrum between ubiquitous wireless and satellite systems is not currently feasible.... We conclude that designating separate spectrum for FSS and wireless services will provide the various proposed systems with the best opportunity to operate free of interference and will encourage commercial development of this band. Accordingly, we find that the public interest is best served by providing separate designations for FSS and wireless services…". Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz, and 48.2-50.2 GHz Frequency Bands, Report and Order, IB Docket No. 97-95,13 FCC Rcd 24649, at ¶18 (1998).

compliance with licensing conditions. In addition, Winstar believes that any spectrum fee imposed by IDA on fixed-wireless broadband providers should reflect the need to ensure the optimal use of this resource. Such fee should be non-discriminatory and take into account the need to foster the development of innovative services and competition that deployment of these new networks will bring to Singapore.

F. WHETHER THE PROPOSED SPECTRUM IDENTIFIED BY IDA FOR FIXED-WIRELESS BROADBAND SERVICES SHOULD BE RESERVED PRIMARILY FOR IBBMM SERVICES.

26. Winstar believes that the spectrum identified by IDA for fixed-wireless broadband services should be reserved primarily for IBBMM services. This spectrum is well-suited for these services and IDA should make an allocation accordingly. Forcing fixed-wireless broadband licensees to share spectrum with broadcasters may not be feasible, thereby reducing the ability of fixed-wireless licensees to compete in the marketplace.

G. THE APPROPRIATE LICENSE DURATION FOR THE PROVISION OF FIXED-WIRELESS BROADBAND SERVICES.

27. Winstar urges IDA to award spectrum licenses for fixed-wireless broadband operators for at least a 10-year term. Such a license term will provide fixed-wireless broadband operators with the flexibility to develop the spectrum as the market demands. More importantly, a 10-year term will allow fixed-wireless broadband operators to employ innovative technologies that may not be available immediately upon licensing.

28. While a 10-year license term will provide fixed-wireless broadband operators with a certain amount of stability in building out their networks, IDA could go a long way to improving that stability -- and the fixed-wireless broadband industry in general -- by adopting a "renewal expectancy" for licensees of fixed-wireless broadband spectrum. In other words, IDA should adopt a major preference for existing licensees as a comparative factor for consideration by IDA in license renewal proceedings. The FCC has adopted such a renewal expectancy for a number of its fixed-wireless broadband operators including its LMDS and 38 GHz licensees.

29. In order for a fixed-wireless broadband operator to qualify for a renewal expectancy, the FCC must be satisfied that the licensee has furnished "substantial service" during its license term, and that the licensee has substantially complied with the FCC's rules and regulations for the service. The FCC has defined "substantial service" as service that is sound, favorable, and substantially above a level of mediocre service that just might minimally warrant renewal.

30. A renewal expectancy, coupled with a 10-year license term, will contribute toward the establishment of a stable regulatory environment that will serve to attract investment capital that will fuel the development and deployment of services utilizing fixed-wireless broadband spectrum. Without such stability, fixed-wireless broadband operators understandably will be deterred from fully deploying their network infrastructure. Consequently, consumers in Singapore will be disadvantaged as some markets and potential customers that could have been served by a full deployment will not be served.

In addition, without a renewal expectancy, fixed-wireless broadband operators will hire fewer personnel to keep costs down, which will result in less job creation for the economy of Singapore. Finally, fixed-wireless broadband operators likely will be forced to charge higher rates in order to recoup costs during the 10-year term and to earn a respectable return on investment because there is no terminal value to the license.

H. THE TIMEFRAME FOR AWARD OF LICENSE AS WELL AS TIME NEEDED BY THE OPERATORS TO ROLL-OUT THEIR NETWORKS AND OFFER COMMERCIAL SERVICES TO THE PUBLIC.

31. While IDA has taken the first step toward promoting fixed-wireless broadband services in Singapore by seeking views and comments of industry and members of the public, Winstar urges IDA to make this spectrum available for licensing as soon as possible. Competition in the fixed-wireless broadband industry -- and indeed the telecommunications industry as a whole -- will not be realized until multiple parties have been licensed in Singapore for fixed-wireless broadband spectrum. An allocation of spectrum for fixed-wireless broadband services above 20 GHz as soon as possible will stimulate competition in the telecommunications industry and will ensure that all fixed-wireless broadband operators will be able to compete on a level playing field. In addition, a quick allocation of fixed-wireless broadband spectrum by IDA will greatly benefit consumers in Singapore, by allowing greater competition in the provision of telecommunications services and by ensuring deployment of new technologies. The ability to rapidly deploy an extremely high quality, high-speed network would provide fixed-wireless broadband operators with the opportunity to offer customers in Singapore what they want and need: cost savings and excellent services and support.

32. Winstar believes that a 10-year license term, as discussed above, will provide ample time to rollout fixed-wireless networks and provide services to customers in Singapore. Service rollout plans should identify a number of target service areas and for each service area, the estimated number of hubs, served buildings, the number of customers and commercial operation dates. In accordance with the information provided by fixed-wireless broadband operators in their rollout plans, IDA should be able to accurately measure the progress made by this new technology.

I. HOW THE ISSUES OF RAIN ATTENUATION AND COMPLIANCE WITH QOS STANDARDS WOULD BE ADDRESSED.

33. Singapore falls in rain-zones N and P. Relevant data on the rain attenuation characteristics is contained in the ITU Recommendation **Rec. ITU-R PN-837.1** (see **Attachment A** to these comments). For 0.001% of time, the rainfall exceeds 180 mm/hour. For 0.01% of time, the rainfall rate exceeds 95 mm/hour. Therefore, Winstar believes that the cell sizes that will be deployed by fixed-wireless broadband operators in Singapore will be relatively small in size. In the 38 GHz band, in which Winstar operates fixed-wireless broadband networks in the United States and other countries, for a link length of about 0.75 Km (0.47 mile), the required rain-fade margin is about 25 dB, for 99.999% availability. Shorter links require less fade margin, as do links with relaxed availability requirements. For the 28 GHz band, a 5.0 Km (3 mile) link requires a fade

margin of 26 dB for 99.99% availability, and 56 dB for 99.999% availability. For a 0.75 Km link, and for 99.999% availability, the required fade margin is about 15 dB (see **Attachment B** to these comments). This information is provided to IDA to demonstrate that a high availability for fixed-wireless broadband networks can indeed be implemented in the frequency bands being considered for rain-zones N and P. However, network design and availability will be based on actual markets requirements.

34. In the United States and elsewhere, 38 GHz operators -- particularly Winstar -- have dealt with the rain fade problem by deploying shorter links with lower fade margins, and adjusting the link power to maintain the required availability of 99.999%. For broadband, multimedia networks that compete with fiber-based wireline networks, the availability level of 99.999% is essential. The benefit of deploying shorter links, with smaller cell sizes, is the ability to reuse frequency and enhance network capacity.

35. Given this background of 38 GHz deployment experience, Winstar can safely predict that it will be possible to deploy a robust broadband network in Singapore in the 27.5-28.6 GHz and 31.0-31.3 GHz bands, and maintain service availability of 99.999%. With further improvements in receiver and antenna technologies, other higher frequency bands may become equally attractive for fixed-wireless broadband networks in Singapore in the next few years.

36. Winstar also believes that fixed-wireless broadband networks such as those to be deployed in Singapore should be subject to RF engineering and planning requirements designed to ensure optimal deployment of resources. Through compliance with these RF engineering requirements, fixed-wireless broadband providers should strive to provide high-quality services over a high-availability wireless network in a resource-efficient and ubiquitous manner. In addition, Winstar believes that IDA should require fixed-wireless broadband providers to adhere to safety-related, mechanical and other standards (RF emissions, electrical code, environmental, etc.) to ensure a common contextual understanding with IDA.

J. HOW OPERATORS PLAN TO INSTALL THEIR OWN INTERNAL WIRING, THE POTENTIAL DIFFICULTIES FACED AND THE COST OF DOING SO, HOW THESE DIFFICULTIES CAN BE PRACTICALLY AND REALISTICALLY ADDRESSED BY POTENTIAL OPERATORS AND HOW IDA CAN FACILITATE THE INSTALLATION.

37. Winstar believes that IDA should adopt rules that permit fixed-wireless broadband network providers access to in-building wiring and related facilities. In densely-populated areas such as Singapore, competitive providers must have the ability to reach end users in multi-tenant environments ("**MTEs**") to compete for the provision of broadband services. Therefore, IDA should prevent operators of in-building wiring systems from acting as "gatekeepers" between end-users and service providers. This is especially significant where a single entity controls many buildings, because discriminatory policies can deny access to competitive services to thousands of individuals and small businesses.

38. In order for MTE end-users to take advantage of a choice of competitive offerings, fixed-wireless broadband operators require non-discriminatory access to a variety of building

facilities, including coaxial and CAT 5 cables, upgraded copper wiring, fiber optic facilities and other existing wiring, and riser cables. These facilities allow competitive carriers to provide their services directly to MTE end-users. Because it is not feasible for competitors to duplicate the incumbent's ubiquitous infrastructure, these elements constitute "bottleneck" facilities. Non-discriminatory access to all forms of broadband-capable in-building wiring thus is critical for the development of broadband service competition. In addition, IDA should establish standards for newly-installed inside wiring to ensure that any such wiring is capable of providing advanced broadband services.

39. Competitive providers also require unbundled access to the network interface device ("**NID**"), which connects carriers' networks to inside wiring and riser cables. If incumbent carriers have access to conduits, collocation space, air conditioning, and power to support their services to MTE end-users, competitive carriers should be given access to this infrastructure on the same terms and conditions. Additionally, space for infrastructure should be allotted between incumbent and competitive carriers on a fair, non-discriminatory basis.

40. Winstar supports the decision of IDA to leave the choice of technology used for in-building coverage to the commercial decision of fixed-wireless broadband operators. Not imposing a technology requirement for in-building coverage provides much needed flexibility in the deployment of fixed-wireless broadband networks. For example, Winstar applies in-building design to each customer building it serves based on the traffic demands of a particular customer building.[7] In-building design is intended to address the in-building wiring solution as well as the sizing of connected telecommunications equipment ("**CTE**") and customer premise equipment ("**CPE**") in terms of switching capabilities and network/service interfaces required to deliver in-building customers' traffic to the radio equipment located in the same building. In-building design provides details of each of the building blocks and connections described in the in-building architecture. The details include such elements as in-building devices, wiring types, configuration and the wiring and sizing of these components. Winstar believes that a good in-building design requires several factors to be taken into consideration, including the target services to be offered in the building, the choice of in-building devices to be deployed, and the physical wiring and network interfaces that are present in the building. These factors allow fixed-wireless broadband providers to calculate an optimal network configuration.

41. Winstar also wishes to stress to the IDA the importance of adopting regulatory principles that allow fixed-wireless broadband operators non-discriminatory access to roof space in customer buildings and to conduit space for the installation of trunking between rooftop radio facilities and inside wiring, since in many cases existing rooftop wiring is inadequate to support the necessary connections for broadband services.[8] Building access

---

[7] The type and configuration of P-MP and P-P radio equipment used in each building is also based on customer traffic demands of the particular building. In general P-P radio systems are used for high-bandwidth buildings and/or for buildings that cannot be served by P-MP systems.

[8] Winstar calls to the attention of the IDA guidelines to promote building access prepared

is a critical element to provide the benefits of facilities-based competition to consumers. In Winstar's opinion, absent a requirement of non-discriminatory access to buildings, competition in the telecommunications market will be severely impeded. In fact, without non-discriminatory building access requirements, facilities-based service provision will be limited to certain favored providers and the rollout of fixed-wireless broadband networks will be slowed down, thereby affecting telecommunications liberalization and the pace of competition. Adequate regulatory principles that allow non-discriminatory access to buildings are necessary to promote competition, and to prevent new fixed-wireless broadband competitors from being limited to provide access to customer buildings solely through resale or unbundled elements. Securing building access rights to install antennas on the roof, plus access to risers and conduits, electricity, telephone closets and pre-existing inside wire, are critical steps in the construction and expansion of fixed-wireless broadband networks.

42. The basic design of a fixed-wireless broadband network requires such non-discriminatory access to buildings. A typical fixed-wireless broadband network consists of a switch centrally located in a metropolitan area, connected by an intra-city fiber and/or microwave network to a series of "hub" buildings where traffic is aggregated from a series of customer buildings. Hub sites are located to maximize the number of potential customer buildings from which such sites can receive and distribute broadband communications. Usually, customer buildings are located within one to one-and-a-half miles from a hub site and have line-of-sight to the hub site building. Hub site buildings have antennas on the roof that have line-of-sight to several customer buildings. Each customer building, in turn, has its own roof-mounted antenna with line-of-sight back to the hub site building. Fixed-wireless broadband operators target end users in customer buildings. Communications are brought to the roof through in-building facilities (for example, inside wiring) and transmitted from the roof-mounted antenna to the hub site building. At the hub site, the traffic from several customer buildings is aggregated and passes back over wireline or wireless backhaul facilities to a switch site. The traffic received at the switch typically is routed out at broadband speeds over the least expensive channel to its intended destination. As described above, without non-discriminatory access to buildings, competition is impeded and the rollout of fixed-wireless broadband networks delayed or even hampered.

SUMMARY OF RECOMMENDATIONS

43. In summary Winstar's recommendations on the issues raised in the Consultation Document are as follows:

---

by other administrations, including Industry Canada and Hong Kong's Office of the Telecommunications Authority. See, "Code of Conduct" for Building Access, Implementing Local Telephone Competition (Industry Canada, 1999); Guidelines for Property Owners, Developers and Managers for the Provision of Facilities within Property Developments for Access to Public Telecommunications and Broadcasting Services (OFTA, 1995).

(1) IDA should take steps to encourage fixed-wireless broadband networks to deploy in Singapore, pursuant to their licenses, both P-P and P-MP systems to provide a variety of broadband communications services, including telephony, high-speed data, Internet access and information services, among others.

(2) IDA should set clear interconnection policies and procedures to allow fixed-wireless broadband network operators to obtain interconnection in a timely, cost-effective and non-discriminatory manner, and IDA should implement a dispute resolution regime that permits IDA to arbitrate disputes and issue and enforce binding decisions on interconnection issues.

(3) IDA should make available to terrestrial fixed-wireless broadband services the entire 3.55 GHz of spectrum identified in the Consultation Document, and should allocate spectrum for satellite services in a different frequency band.

(4) As part of the initial licensing process, IDA should give priority to the 27.5 –28.6 GHz and the 29.1 - 29.5 GHz bands for the provision of fixed-wireless broadband services, by licensing this spectrum to a minimum of two licensees. Alternatively, IDA could consider the 25.25 - 27.0 GHz band -- or a significant portion of it -- for the initial licensing process of fixed-wireless broadband networks based on equipment that is already available in the market for this band. Finally, IDA should reserve the 31.0 – 31.3 GHz band as an expansion band for future fixed-wireless broadband network growth.

(5) IDA should limit the ability of incumbent telephone operators to hold new fixed-wireless broadband spectrum until future operators have had sufficient time and opportunity to compete in the local telecommunications market.

(6) IDA should not adopt a specific channelization plan (channel bandwidth, channel spacing and channel pairing) for fixed-wireless broadband operators.

(7) IDA should adopt a beauty-contest tender approach to evaluate potential fixed-wireless broadband services providers in Singapore.

(8) IDA should ensure that any fee component imposed on new fixed-wireless broadband providers does not hamper their ability to compete in the marketplace by imposing artificial barriers to competition.

(9) IDA should license new fixed-wireless broadband operators on a geographic basis, and should award spectrum licenses for at least a 10- year term with a "renewal expectancy".

(10) IDA should make this spectrum available for licensing as soon as possible.

(11) IDA should require that fixed-wireless broadband networks to be deployed in Singapore be subject to RF engineering and planning requirements designed to ensure optimal deployment of resources.

(12) IDA should not impose a technology requirement for in-building coverage, and should adopt regulatory principles that allow fixed-wireless broadband operators non-discriminatory access to in-building wiring and related facilities and roof space in customer buildings.

ATTACHMENT A

Rec. ITU-R PN.837.1

ATTACHMENT B

"Propagation at LMDS Frequencies"
Presentation by Charles W. Bostian
Professor, Virginia Tech. University
Blacksburg, Virginia, USA