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**Subject: Comments on Consultation Paper: Development of Wireless Broadband Technologies in Singapore**

Lucent Technologies welcomes the opportunity to respond to the IDA's consultation paper on the "Development of Wireless Broadband Technologies in Singapore". Attached is the Lucent's comments which are limited to issues relative to the use of technologies and spectrum allocations. Please feel free to contact me if further clarification is required.

Yours faithfully,

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## **Deployment of Wireless Broadband Technologies in Singapore**

Lucent Technologies Inc. (Lucent) welcomes the opportunity to respond to the IDA's consultation on the "Deployment of Wireless Broadband Technologies in Singapore." Lucent is a leader in the development, manufacture, and deployment of wireless spread spectrum systems. Lucent's comments are limited to issues relative to the IDA's constraints on the use of technologies, and to matters associated with spectrum allocation.

### **Potential of Wireless Broadband Technologies**

Lucent agrees that wireless technologies can support a cost effective and rapid rollout of high-speed, broadband services. Key among such services could be internet access for consumers or intranet access for enterprise users. Wireless access services would provide a competitive alternative to DSL or cable modem technologies and could offer the availability of state-of-the art capabilities where alternative wireline technologies are not available due to cost considerations. Importantly, wireless broadband access services can provide the element of portability or mobility, thus potentially increasing the value of such services to subscribers.

Lucent believes that operators should not be limited in the choice of technologies they might use to provide wireless broadband access (WBA) to their customers. Such decisions should be based upon the operators own business needs, including, or course, the operator's need to decide how to best serve their subscribers. Lucent, therefore, is disappointed that the IDA has apparently deviated from its stated technology neutral stance and has restricted the technologies to be used for WBA to those not included in the ITU's approved IMT-2000 approved family of standards. Included in those standards are systems such as CDMA2000 and UMTS, systems that have the capabilities to provide high-speed data services. Moreover, these technologies are available now and are being deployed, or will soon be deployed throughout the world in large volumes, potentially providing economies of scale and associated lower costs. Such systems could be adapted to the 2.3 GHz and 2.5 GHz bands, designated for WBA in Singapore, without difficulty. It should be noted that the 2.5 GHz band has been identified by the ITU as an extension band for IMT-2000, further supporting the promise that these technologies will be available at 2.5 GHz.

Finally, the IDA should recognize that the restriction imposed on the use of technologies in WBA spectrum is artificial and could be undermined by future standards activities. Specifically, it is possible that the 802.16 standard could be presented to the ITU as a technology consistent with 3G characteristics and accepted as a member of the IMT-2000 standards family.

### **2.3 GHz and 2.5 GHz Spectrum**

Lucent supports the IDA's choice of spectrum allocation for WBA in the 2.3 GHz and 2.5 GHz bands. As noted by the IDA, this spectrum has already been allocated for WBA and other advanced wireless services in many countries. This multi-nation commonality or harmonization of spectrum allocations will increase the potential for realization of economies of scale and lower equipment costs. Lucent also supports the IDA's flexibility in permitting the use of either FDD or TDD technologies in the WBA bands, and appreciates the IDA's recognition that the use of these two types of technologies in close spectral proximity requires that issues of coexistence be addressed.

Analysis of potential interference between adjacent FDD and TDD systems should be provided through minimum coupling loss studies or simulations that would estimate the probability of interference that exceeds a given limit. Given information including, for example, the transmit power of the interfering signal and the out-of-band energy requirements, such studies can be used to determine the guard band that will likely be necessary between blocks of spectrum in which TDD and FDD systems are used.<sup>1</sup>

Similarly, the probability of interference for different systems operating in the same frequency block across geographic boundaries can be estimated based on the same methodology. A zone near the boundary where frequency coordination between two system operators is required can then be determined. Appropriate action based upon a knowledge of this zone would mitigate the level of mutual interference at the boundary.

Lucent suggests that spectrum allocations for use with advanced wireless technologies be at least 2x5 MHz for FDD system and 5MHz for TDD systems. A larger allocation is, however, preferable as it will provide added operator flexibility and allow the operator to better meet the demands of its subscribers. Lucent believes that the realignment of the 2.5 GHz spectrum in the U.S. will provide operators with at least 2x10 MHz of spectrum.

### **Deployment of Wireless Broadband Technologies in 3G Spectrum Bands**

Lucent applauds the IDA's suggestion that 3G operators be allowed to deploy non-IMT-2000 WBA technologies in their 3G spectrum, and agrees that this will afford the operators greater flexibility in offering a broad range of services to meet customer needs. Indeed, as the IDA states, such flexibility is already in place in several countries where there are essentially no restrictions that limit the use of specific technologies in a given band. Although such flexibility should be available, service rules should assure that there will be no excessive interference introduced by the non-IMT-2000 WBA to the adjacent 3G (IMT-2000) frequency block.

Lucent is aware of the legal requirement that demands that the IDA restrict the use of IMT-2000 (3G) technologies to the IMT-2000 bands (1.9/2.1 GHz), but considers it unfortunate that the benefit the IDA believes will be derived from the flexibility of allowing a 3G operator to use non-IMT-2000 technologies in the 3G bands will not be available to the operator who wishes to use 3G technologies in the WBA bands.

### **Eligibility of Existing 3G and Broadband Infrastructure Providers**

Lucent believes that licenses for WBA should be available to several potential providers. A multi-operator, competitive environment will offer maximum benefit to customers in the form of quality services and reasonable pricing. Accordingly, Lucent supports the eligibility of existing 3G and broadband infrastructure providers for licenses in the WBA spectrum. Lucent assumes that the eligibility of these existing providers will not preclude qualified new operators from bidding and possibly winning the available WBA licenses.

### **Interconnection and Access**

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<sup>1</sup> . In the U.S., out of band emissions limits mandated by the FCC typically demand that the interfering signal be attenuated by  $43 + 10\log(P)$ , where P is the power of the interfering signal in watts.

Lucent suggests that quality of service (QOS) standards should not be established by regulatory mandate. Characteristics such as network availability and network latency are best supported by a competitive marketplace where customers demand and operators supply feature rich, quality services. The IDA can support competition through the allocation of appropriate spectrum blocks for use in a given geographic or market area (e.g., island wide) and the provision of the associated licenses that will create a multi-operator environment. Technical standards for WBA services are best established by standards development organizations. Implementation of such standards should be voluntary and implemented based upon each operator's competitive and business decisions.