

COMMENTS ON IDA'S CONSULTATION PAPER: DEPLOYMENT OF WIRELESS BROADBAND TECHNOLOGIES IN SINGAPORE

IDA would like to seek the views and comments from the industry and members of the public on the issues and proposals raised in this consultation. My personal comments as a specialist in wireless systems are given after the relevant questions posed by IDA below:

(a) View 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.

This proposal is welcomed as it could provide a (hopefully) cheaper alternative broadband multi-media service direct to landed residential properties and business users.

(b) Views and comments on the allocation of the 2.3 GHz and 2.5 GHz 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 assessment and methodology 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?

The advantage of the 2.3 and 2.5 GHz compared to LMDS system operating in the higher microwave bands is that it is not directly affected by rain attenuation due to the high rainfall rate encountered in Singapore.

The system is able to operate in the non-line-of-sight mode (NLOS) due to obstructions by surrounding buildings and foliage. However the threshold limit of the NLOS has not been quantified (not all NLOS links can operate with the minimum QoS); this would be dependent on the antenna used at the base station, at the subscriber unit and on the surrounding environment. There are reports suggesting that significant fading occurs if there are trees in the way and there are winds.

The subscriber antenna should be located as close to the customer as possible so that transmission is direct to the customer and there is no need for an indoor distribution system, unlike LMDS systems.

Dynamic power control and diversity are two possible mitigation techniques that could be employed to reduce the transmitter power thus minimizing interference.

(c) 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.

See comments below on Quality of Service.

(g) 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.

For this service, two QoS Indicators in Annex 1 must be more clearly defined or re-defined:

- *Network Availability > 99%:*
Does this percentage refer to 99% of the time?

Since the service covers an area, the percentage area coverage has to be defined. Whether there should be a QoS for area coverage like in cellular systems is dependent on:

- (i) The number of operators for the service i.e. whether the customers would have choice of wireless broadband operators.
- (ii) Would the operators be allowed to share base station site? If so, QoS for coverage should be specified.
- (iii) Would non-wireless broadband operators be allowed to offer such wireless broadband services?
- (iv) Would this make broadband wireless access more affordable?

It is not clear what type of service would be provided – fixed, portable and or mobile and whether external or indoor antennas would be employed? Some commentators have speculated on the provision of WiMax chips together with WiLAN chips in notebooks.

- *Bandwidth Utilisation (for connections within the local network):*
This QoS indicator must be more clearly defined.

(h) Views and comments on the Market Trial Licence framework and the specific features set out in Annex 2. Is the market trial licence framework conducive 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.

Some of the previous trials e.g. LMDS trials conducted in Singapore and Hong Kong were essentially carried out to show that the systems operated well when the systems were monitored (only for a limited period during the trials). The high microwave band LMDS systems are severely affected by rain yet no serious efforts were made to measure the rainfall rates during the period of the trial.

I would like to suggest that trials carried out should also be technical in nature rather than just *Market Trials*.

Many questions must be answered before the roll-out of the new system such as:

- Fading characteristics on different NLOS paths in different Singapore environments (especially fading due to trees and other foliage when winds and rain are present).
- Threshold limit of the non-line-of-sight (NLOS) mode of transmission in the different Singapore environments. How much LOS obstruction is allowable before the QoS target is not met? The location of the antenna whether indoor or outdoor is important.
- Cross-polarisation discrimination for planning for possible frequency re-use
- Area Coverage with indoor antennas and external antennas

It is important that the technical issues are understood, otherwise teething problems will give the system a bad name and the network would not be commercially viable because of problems in implementation.

9.2 Respondents are also invited to comment on any other issues not covered in this consultation document but which are considered to be relevant in the deployment of wireless broadband technologies.

See (g) above.

Submitted by:
Dr. Ong Jin Teong
c/o School of EEE (S2)
Nanyang Technological University
Singapore 639798
Email: jtong@ntu.edu.sg
Tel. No. (65) 6790-5372

Ojt/IDABWA/29-4-04