



Source: Regulatory Working Group

Response from the WiMAX Forum™ to Hong Kong's Consultation entitled "Licensing Framework for Deployment of Broadband Wireless Access" dated 20 December, 2004

1. INTRODUCTION

The WiMAX Forum, representing over 200 broadband wireless equipment manufacturers, service providers, and companies, is pleased to respond to the OFTA consultation on Licensing Framework for Deployment of Broadband Wireless Access. We find the consultation clear and well written, with appropriate questions to address the issues. Commenting generally, we find that the TA is appropriate and forward thinking in adopting a "Technology Neutral" approach to allocations in this band and in general, as it is increasingly being recognized as a paramount approach to fostering new technologies and services to the benefits of the public. We are encouraged to see that OFTA is addressing both TDD as well as FDD deployments in this band, as well as addressing/allowing "limited mobility" or nomadic use as a first step in the band.

In general we agree with the position of the paper, which points out the overall importance of broadband wireless services, and we feel that OFDM based WiMAX technology is a very important broadband technology.

We have formatted the response in a form to address the specific questions raised; referencing the paragraph within the consultation being addressed, and any additional comments will be so identified.

5. – Q: Should BWA be licensed and if so what is the appropriate timing for inviting applications for such licensed.

Ans: Relative to the questions raised in section 5, namely the invitation for views on whether BWA should be licensed in Hong Kong, and what an appropriate timing would be for inviting applications for such licenses, we respond as follows. We feel that although BWA has a place for both licensed as well as unlicensed usage, for the 3.4 – 3.6 GHz band, to be consistent with the rest of the global allocations, this band should be licensed. However we would like to suggest that the licensing mechanism be designed to maximize the use of the spectrum, offered at reasonably low costs, with minimized stipulations on roll out conditions. A review process may be considered as an option to address spectrum speculators. Relative to the question of auction timing, WiMAX equipment will be available in the second half of 2005; therefor it would be recommended that any time within the next 6 months to year end would be optimum timing.

15. – Q: Having regard to the gradual withdrawal of mandatory Type II interconnection by 2008, the considerations above and the unavailability of spectrum in other candidate frequency bands for BWA, the TA is of the preliminary view that the 3.5 GHz band is a possible and could be the most appropriate licensed band for BWA deployment in Hong Kong.

Ans: There are substantial numbers of Broadband wireless equipment available for operation in the 3.5 GHz band, which creates good economies of scale to reduce costs and increase consumer affordability. Furthermore, as this band is globally harmonized, and one of the initial primary bands for WiMAX equipment, further greater economies of scale can be realized. Therefore we agree that the 3.5 GHz band is a good initial choice as a licensed broadband wireless band.

19. – Q: Having considered the international deployment of spectrum for BWA, the possible benefit that BWA may bring into Hong Kong, the gradual withdrawal of mandatory Type II interconnection in the run up to 2008, the equipment availability, the co-existence between BWA and FSS, the TA is of the preliminary view that the 3.4 - 3.6 GHz band may, depending on the actual requirement of BWA, gradually be allocated to BWA on a primary basis. FSS may still be used in this band on a secondary basis, or in a 600 MHz band outside the 3.4 – 3.6 GHz band on a primary basis. The TA invites views from the industry on this spectrum management issue.

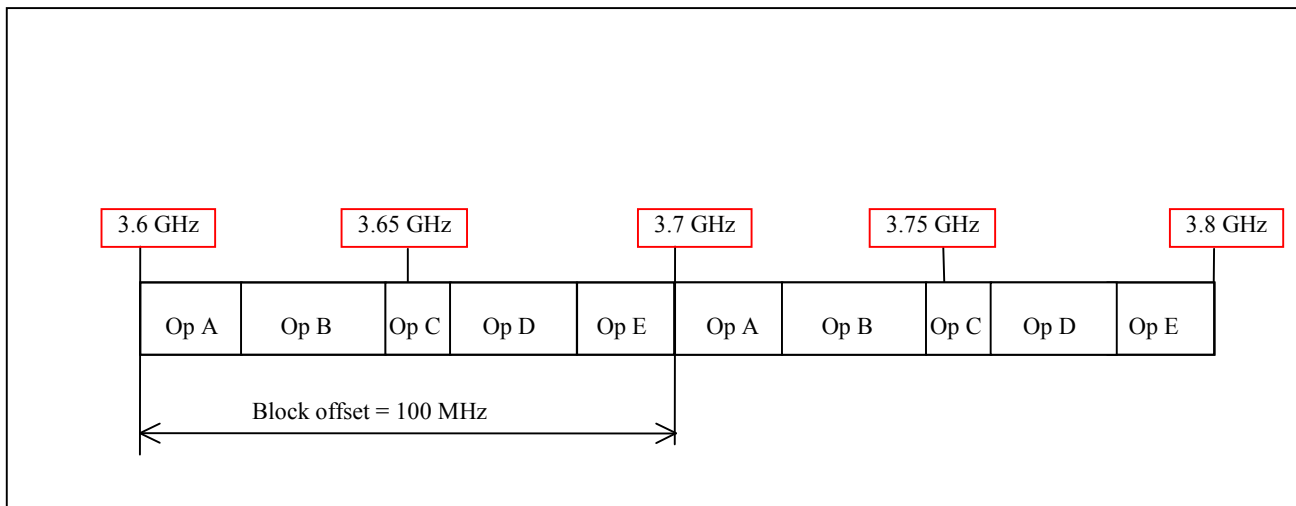
Ans: We agree with all of the points given, and the clear choice is to allocate the 3.4 – 3.6 GHz band as a primary allocation for BWA and as a secondary allocation for FSS, given the nearly pan global allocation for broadband services in this band.

22. – Q: For coexistence of TDD and FDD services within the 3.4 – 3.6 GHz band, proper band plan will be devised to address the interference issues. Proper geographical separation of TDD and FDD systems will also be arranged where possible. The TA invites views from the industry on any other measures that will help tackling the interference issue. The TA would also like to receive input from interested parties on their expected bandwidth requirement and modes of operation (TDD or FDD) for BWA.

Ans: The Forum equally supports technology that operates in either FDD or TDD mode in the 3.5GHz band. Therefore we commend the TA again for taking a technology neutral approach to spectrum management and for this allocation in particular; for example by citing that either TDD or FDD can be utilized. For the 3.5GHz band we do not support identification of specific TDD and FDD blocks but prefer greater flexibility for technology choice through non-specific allocations for both TDD as well as FDD deployments.

In the truly technology neutral approach, the regulator specifies blocks within a frequency band without assigning specific use of any technology to each block including TDD or FDD operation. The operators then have the flexibility of deploying their technology of choice in their assigned blocks irrespective of the duplex scheme in the adjacent block(s). Flexible use block assignments provide for the necessary conditions under which markets could decide on the technology and operators could, hopefully, find the right technology to address the customer needs in their markets.

Division of a spectrum band into blocks in the technology neutral approach needs to be done in a way that allows both TDD and FDD operation. Paired blocks separated by a duplex spacing (50 or 100MHz recommended for this band) remains the most neutral way to allocate the spectrum blocks. An example of this is shown in the Figure below; (reference from ECC draft recommendation (04)05)



Each operator is free to select TDD or FDD. No assumptions should be made on deployments in the adjacent block.

For flexible block assignments to work, however, certain requirements need to be met so that neither technology is unfairly burdened with excessive interference due to adjacent-operator coexistence. Another consideration is the position and width of the guard bands necessary to mitigate the interference problem.

Studies in various bodies, e.g., IEEE 802.16.2¹ and ITU-R to name a few, have shown that in many cases there is need for one or two carrier separation between FDD and TDD systems for safe operation. The exact amount of required guard band is technology-dependent and is a function of factors such as peak transmitter power, emission mask, receiver blocking, and deployment-specific factors such as antenna heights. Under certain conditions and utilizing certain mitigation techniques, it is also possible to deploy TDD and FDD systems in adjacent channels without guard bands.

In order to facilitate the greatest flexibility in band allocations a Block Edge Emission Mask concept could be used². In this approach, emission levels at block edge are specified at absolute values that would facilitate adjacent-block operation of TDD and FDD systems with no inter-block guard bands specifically identified. This, of course, may require implementation of more selective filters or site engineering techniques only in stations using block-edge channels. Therefore, the economics of the problem depends on how large a block is; i.e., the percentage of the stations that require costly solutions to meet the block-edge mask. For instance, if a block consists of two channels, then 100% of the stations will be required to meet the block-edge mask compared to 40% in a five-channel block assignment. It is recommended therefore to consider large contiguous block sizes that are greater than integer multiples of system channel bandwidths likely to be deployed in the band, thus providing some in-block guard frequency applied uniformly to all licensees and useful for dealing with coexistence challenges.

¹ Task Group 2 of IEEE 802.16 Working Group for Broadband Wireless Access Standards produced a "Recommended Practice" document which provides recommendations and guidelines for safe coexistence of 802.16 TDD and FDD systems.

² Under study within ECC/CEPT Draft new Recommendation (04)05.

As already mentioned, another way to facilitate coexistence is through block sizes that are greater than integer multiples of channel bandwidths of technologies likely to be deployed in the band, thus providing some in-block guard bands applied uniformly to all licensees. For instance, FCC allocation of the 2.5 GHz band in the United States divides the lower and upper segments of the band into contiguous 16.5 MHz blocks³ and specifies the more restrictive operator mask is measured 3 MHz and beyond the licensed block edge. Operators deploying 5 MHz channels, therefore, would have in-block guard bands of 750 KHz on each side, but in the event unsynchronized adjacent block operation, still be afforded 3.75 MHz to attenuate their out of band emissions to a more restrictive value permitting TDD/TDD or TDD/FDD coexistence .

Although separate, non-flexible allocations for FDD (paired) and TDD (unpaired) systems might create a more coexistence-friendly situation with respect to adjacent-channel interference, this advantage comes at the expense of true technology neutrality. In addition it is unnecessary given the numerous engineering solutions that can mitigate the situation.

A further improvement for a technology neutral deployment with no guard bands could be the introduction of a “**Light Notification**” regime, where Operators are requested to notify, on a data base provided by the Administration, parameters of Central Stations (e.g. geographical location, sector direction and size, frequency used, eirp) that may offer a process whereby worst cases can be addressed on a case by case basis that can be flexible enough to account for local conditions. It will allow interested operator to utilize efficiently open blocks in a controlled manner. In principle, we believe the “light notification” will improve available information on systems already deployed, facilitating a "self coordination" process for forthcoming operators going to use adjacent blocks or reusing the block in adjacent areas, so avoiding “worst-case” scenarios. However, “second comers” will have a reduced degree of freedom, unless the principle that all operators are liable to cooperate for solving such cases, is spelt out in the licensing rules (legacy license implication should also be considered).

However it should be carefully considered the practical bureaucratic implementation of such a procedure, which, if not properly addressed with very simple and user friendly interfaces, might adversely affect the necessary quick deployment requirements.

In summary, it is considered by the Forum that coexistence of TDD and FDD systems, in spectrally-adjacent situation can be worked out relatively easily if the parties involved realize the needs and are willing to work with each other. In a full flexible approach to spectrum allocation, spectrum could be licensed in paired blocks (free for TDD or FDD use and without imposing any specific channelization within) and permanent guard bands should be avoided as much as possible. Well thought-out block edge masks, and possibly a data base where deployment parameters of Master Stations are made available, would help operators to engineer guard bands when and where necessary without undue burden on their operation.

24. – Q: The TA is of the preliminary view that a paired band of 14 MHz x 2 for each block for IEEE 802.16 or ETSI HiperMAN service provision and an unpaired band of 20 MHz for each block for UMTS TDD service provision may serve the need of BWA in the 3.5 GHz band. The TA invites views from the industry on the proposed channel bandwidth and bandwidth for each block.

³ R&O FCC-04-135A1

Ans: we have provided recommendations related to the proposed banding in the previous response. We would like to again stress the importance of allowing flexibility in the banding to allow for the most efficient use of the spectrum, and discourage the identification of specific parts of the band for specific technologies when they can be accommodated in a neutral way. It should also be noted that larger contiguous blocks of spectrum minimize the number of instances adjacent block unsynchronized operations can occur.

As we have previously stated, we agree this band should be allocated in a flexible technology neutral manner, without the designation of a particular technology such as UMTS. Furthermore we agree that initially the 3.5 GHz band should be allocated for fixed services, allowing nomadic use in the band, and the concept of mobility in the band should be addressed sometime in the future.

25. – Q: Subject to the industry demand, the TA may ultimately allocate roughly three 14 MHz x 2 paired frequency blocks and four 20 MHz unpaired frequency blocks. The frequency spectrum allocated for BWA in the initial phase may however be limited, and the TA will decide the spectrum pool to be offered based on the industry's immediate need. The TA invites views from the industry on the total bandwidth allocated for BWA in the initial phase

Ans: The Forum promotes the potential for WiMAX technology to provide a truly broadband experience for users. This requires sufficient capacity in the spectrum awarded to any specific operator. Therefore the Forum promotes the possibility of wider blocks than may have been considered in the past (e.g for WLL telephony applications) and suggests that assignments per operator around 2x21MHz is a good starting point with the possibility to grow assignments up to 2x28MHz as capacity and demand grows. In addition, in support of the technology neutral approach, we encourage consideration of assignments built upon relatively narrow frequency "slots" contiguously aggregated into blocks to accommodate the assignments suggested above without specifically suggesting system channelization. This approach would support a wide range of equipment models. (A slot size of 0.25MHz has been used in other regions).

32. – Q: Consistent with the technology neutrality principle, the TA does not intend to mandate which technology or technologies should be used in the delivery of BWA services in Hong Kong. The TA invites views from the industry on this proposal. In addition, he would like to invite views as to whether the concerned equipment market being dominated by one or just a handful of manufacturers should be a valid regulatory concern from a competition perspective.

Ans: We agree with this approach of not mandating a particular technology for use within this band, which is as you mention consistent with a technology neutral approach. We also do not believe it should be a regulatory concern relative to one or a few equipment manufacturers dominating the market, as consistent with technology neutrality, market forces should drive the distribution, as opposed to specific restrictions placed within the regulations.

37. The TA is of the preliminary view that BWA in Hong Kong may initially be offered as a wireless extension of the conventional wire line based fixed network service. Under this proposal, BWA spectrum should be reserved for carriers with an intention to establish fixed networks in Hong Kong. Interested parties who are not already fixed

carrier licensees should apply for a fixed carrier licence before they are eligible to bid for the BWA spectrum.

38. To differentiate BWA services from a full mobile service, the TA proposes that the service offered by a fixed carrier licence through BWA would only be allowed to have 'limited mobility'. 'Limited mobility' here shall be interpreted as no cell handoff capability allowed.

39. – Q: The TA would like to invite views from the industry on this proposed licensing arrangement for BWA in Hong Kong as given in paragraphs 37 and 38.

Ans: We agree reserving the spectrum for carriers that intend to establish only fixed services would limit the applications for the wireless technologies to be used, and hinder the technology choices. We support the TA's forward insight regarding the current and future prospects of convergence relative to fixed and mobile services. In that context, we also agree in the current initial approach for now to define the band to allow for "limited mobility", also known as nomadic use, is appropriate.

About WiMAX Forum™

The WiMAX Forum is an industry-led, non-profit corporation formed to promote and certify the compatibility and interoperability of broadband wireless products using the IEEE 802.16 and ETSI HiperMAN wireless MAN specifications. The forum's goal is to accelerate the introduction of these devices into the marketplace. WiMAX Forum Certified™ products will be fully interoperable and support Metropolitan Broadband Fixed and Portable Applications. For more information about the WiMAX Forum and its activities, please visit www.WiMAXForum.org.