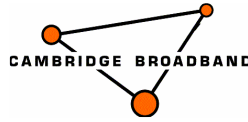


Cambridge Broadband

Response to OFTA's Consultation on BWA
March 2005



Licensing Framework for Deployment of Broadband Wireless Access Consultation from Hong Kong OFTA

Cambridge Broadband welcomes the opportunity to respond to TA's recent consultation on the above. Cambridge Broadband designs, develops, manufactures and markets the VectaStar product which is in use by broadband wireless operators worldwide. VectaStar is a flexible, extendable true multi-frequency, multi-service platform, delivering IP and voice services, E1/T1, ATM access and backhaul of cellular base stations such as GSM and UMTS.

We intend to respond to the consultation by answering each noted question individually.

Spectrum Issues

Spectrum for BWA in Hong Kong

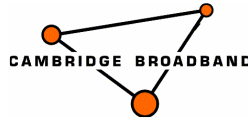
15. Having regard to the gradual withdrawal of mandatory Type II interconnection by 2008, the considerations above and the unavailability of spectrum in other candidate frequency bands for BWA, the TA is of the preliminary view that the 3.5GHz band is a possible and could be the most appropriate licensed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

Cambridge Broadband agrees with this preliminary view of using the 3.5GHz band in a licensed manner. It is a commonly used band for BWA around the world and could lead to greater economies of scale from a manufacturers' perspective, with cost-savings resulting in lower infrastructure prices being able to be passed on to network operators. There are of course other frequency bands that could be considered for BWA in the event of spectrum shortage, namely 10.5GHz.

Spectrum Sharing between FSS and BWA

19. 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.

Cambridge Broadband concurs with OFTA's preliminary view on allocating BWA on a primary basis within the 3.4 - 3.6GHz band. Further Cambridge Broadband believes that FSS could use a 600MHz band outside of the 3.4 - 3.6GHz band on a primary basis. Thought may be given to the effective and efficient use of the spectrum when statistics state that only 1.3% of the overall SMATV systems operate in the proposed BWA spectrum that FSS use. An economic assessment may prove useful in determining the value to the people of Hong Kong in using the spectrum for



two operators using FSS to deliver TV services or the value in seven BWA operators offering broadband – capable of delivering not only TV but internet services as well.

Spectrum Sharing between FDD and TDD

22. 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.

The band plan stated in the consultation document would prove very difficult to deploy unless Hong Kong is to be divided up geographically and that 'border' areas are clearly known. There are serious issues in deploying TDD contiguously. Although many FDD systems can be collocated, TDD not only causes interference with FDD systems (and vice versa) but also cannot be adjacent with another TDD frequency band as each will block out the other. Regulating FDD and TDD becomes very problematic even with the use of guard bands but TDD to TDD blocks will also require guard bands, eating into the spectrum allocated for BWA, and is still restricted in terms of adjacent / co-channel deployment, dependent on which spectral mask is used.

FDD also sits quite happily next to other FDD systems in terms of sharing mast space where TDD and FDD must be physically as well as spectrally separate.

TDD is regarded as a low-cost access system comparable with that of DSL, however it is difficult to offer any serious SLA guarantees with the service unless it is seen as only offering residential broadband.

Cambridge Broadband uses FDD duplex operation, allowing for greater ease of frequency planning.

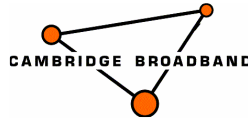
Cambridge Broadband's VectaStar transmission platform for BWA is among one of the most spectrally efficient in FDD mode. The following table highlights the raw data throughput for the system against the modulation system running (net data throughput is around 80% of that quoted).

| channel | QPSK | 16QAM | 64QAM |
|----------------|-------------|--------------|--------------|
| 14MHz | 20Mbps | 40Mbps | 60Mbps |
| 7MHz | 10Mbps | 20Mbps | 30Mbps |
| 3.5MHz | 5Mbps | 10Mbps | 15Mbps |
| 1.75MHz | 2.5Mbps | 5Mbps | 7.5Mbps |

Spectrum Allocation

24. 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.

25. 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.

The spectrum allocation for FDD at 14MHz is seen by Cambridge Broadband to be an appropriate amount in order to deliver services.

Cambridge Broadband is aware of a number of other countries that mix TDD and FDD within the band plan but believe that the amount apportioned for FDD is higher than that for TDD – this is the case for Canada, Ireland, Australia etc. Other countries to not assign any frequency to TDD to avoid the management of the spectrum due to interference issues arising between co-channels or adjacent channels – countries included in this list are Austria and most of South America.

Standards Issues

32. 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.

Cambridge Broadband welcomes new initiatives to speed up assignments in frequency spectrum and believe that allowing spectrum to be used in a less restrictive manner will lead to robust business propositions from operators. Allowing the operators to decide which technology to deploy will create diversity in service offering and competitiveness between operators. Only allowing certain technologies could lead to difficulties and an unfair market situation for vendors; as each believe in their own technology and the merits therein.

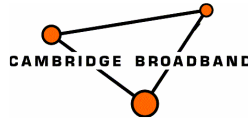
Licensing Issues

37. The TA is of the preliminary view that BWA in Hong Kong may initially be offered as a wireless extension of the conventional wireline 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. 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.

Cambridge Broadband welcomes the work around for other operators (namely mobile network operators (MNOs)) to allow them to bid for the spectrum. Cambridge Broadband see an opportunity for MNOs to complement their mobility service offering with hotspot data coverage such as WiFi and WiMAX and the potential for multi-mode phones such as VoWiFi. There is also a benefit to these MNOs in being able to deploy a BWA system to help out in backhaul for the many 3G base stations that will be required for coverage.



Assignment of Spectrum

Spectrum Assignment Method

43. Taking into accounts the pros and cons as set out above, the TA is of the preliminary view that the BWA spectrum may be assigned by auction.

Cambridge Broadband has no considered opinion on auctions or beauty contests but would like to see that the spectrum is not hoarded by a single operator, who subsequently takes an overly long period of time to roll out a network.

Payment Approach

49. Based on the consideration above, the TA is of the preliminary view that SUF for BWA spectrum may be charged annually on a per MHz basis.

Cambridge Broadband believes this preliminary view to be fair and reasonable. If the preliminary view of not allowing mobility is adopted, the price for the spectrum should reflect that of a comparable service i.e. DSL type commercial value rather than mobile spectrum pricing in order to maintain a fair business case to deploy broadband services.

Spectrum Usage Period

52. The TA is of the preliminary view that a usage period of ten years may be sufficient for successful bidders of BWA spectrum. The actual spectrum usage period will however be subject to the licence validity period as mentioned above.

Cambridge Broadband believes this to be a fair and reasonable amount of time in order to make a viable business.

Surrendering Spectrum

54. The TA is of the preliminary view that successful bidders of BWA spectrum may be given the option to return any unused BWA spectrum to the Government, thereby reducing the level of SUF payment, over the spectrum usage period except for the initial 5 years.

Cambridge Broadband would like to see spectrum returned within a shorter time space if the spectrum is not being used, say two years, especially if the spectrum is not generating either services for customers or revenue for the Hong Kong government.