

**Frequency Requirements for
Telecommunications Services in the 5 GHz Band**

**Statement of
The Telecommunications Authority of Hong Kong
18 May 2001**

Introduction

The Telecommunications Authority (TA) has received requests from the operators of local Wireless Fixed Telecommunications Network Services (WFTNS) for the use of a new category of apparatus known as Unlicensed National Information Infrastructure (U-NII) devices in the 5GHz band. The proposal is given in the paper of the Radio Spectrum Advisory Committee (RSAC) No. 1/2001 entitled "Frequency Requirements of WFTNS Operators in the 5GHz Band". Copy of the RSAC paper could be downloaded from the OFTA web site at "<http://www.ofta.gov.hk/ad-comm/rsac/paper/rsac1-2001.pdf>". The matter was discussed at the 21st RSAC meeting held on 22 February 2001.

2. There are also requests from WFTNS operators for the TA to consider an additional allocation in the band 5850 – 6425MHz for point-to-multi-point (PTMP) Fixed Wireless Access (FWA). Following the discussions at the RSAC, the Office of the Telecommunications Authority (OFTA) further consulted the relevant licensees of the Fixed Telecommunications Network Services (FTNS), WFTNS, External Fixed Telecommunications Network Services (EFTNS) and satellite operators about the proposal to open an additional 100MHz common frequency block or the alternative proposal of assigning 50MHz per operator in the band 5850 – 6425MHz for use by the telecommunications licensees. A new condition is proposed for the use of this additional allocation of frequency to require the licensee that equipment should be designed, installed and operated in such a way as to cope with interference from other primary services such as fixed service (FS) and fixed satellite service (FSS) working in the same band. This statement gives the TA's considered view on the issues.

Decision concerning the Use of U-NII Devices in the Band 5725 – 5825MHz

3. There was general support from the RSAC members for allowing the use of U-NII devices in the band 5725 – 5825MHz. The TA has decided that such

devices could be used by private systems as well as systems for offering public telecommunications services. Technical characteristics of the equipment should comply with the requirements given in Annex 1. As regards private systems, the authorization will be effected by way of Class Licence for Wireless Telecommunications Apparatus (Private Use) to be created shortly. As for systems offering public telecommunications services, individual licensees should write to the OFTA and authorization will be considered on a case by case basis.

Additional Allocation in the band 5850 – 6425MHz for Offering Public Telecommunications Services

4. As regards the proposal of having additional frequency allocation in the band 5850 – 6425MHz for offering public telecommunications services, responses and comments submitted by FTNS, WFTNS, EFTNS and satellite operators are summarized below.

Frequency Sharing with Fixed Satellite Service (Earth-to-space)

5. In Hong Kong, the band 5850 – 5925 MHz is allocated to Fixed Satellite Service (Earth-to-space) (FSS(uplink)) and the band 5925 – 6425MHz for Fixed and FSS(uplink). There is also an allocation for Industrial, Scientific and Medical (ISM) equipment in the band 5725 – 5875MHz. There are large earth stations and Very Small Aperture Terminals (VSAT) working in the band 5850 – 6425MHz in Hong Kong. Most of them are working in the popular frequency band for FSS in 5925 – 6425MHz, also known as the C-band. At present, there are no VSAT operating from 5850 – 5925MHz. Because of the lower transmission power and antenna directions, FWA working in the band shared with FSS(uplink) will not cause interference to the satellite networks. But they may receive harmful interference from the satellite uplinks due to the high transmission power of the earth stations and VSAT. During the 21st RSAC meeting, EFTNS and satellite operators expressed concerns that they would have limitations on the selection of building rooftops for VSAT when the deployment of FWA in the shared frequency band becomes popular. It is because the building owners may object to the VSAT installations on the ground that VSAT may cause harmful interference to the FWA. EFTNS operators also quoted problems in other countries where fixed and FSS(uplink) are allowed to share a common frequency band.

6. In the subsequent consultation, Asia Satellite Telecommunications Company Limited (AsiaSat) objected to the proposal to allocate 100MHz block of bandwidth in the band 5850 – 6425MHz to PTMP fixed service. AsiaSat is of the view that sharing has been seen to be feasible between the FS and FSS because the current application of the FS is point-to-point networks, in general long haul relay systems. Such networks are characterized by a small number of stations at specially selected locations using high power levels and antennas with high directivity. However PTMP systems will be characterized by a large number of stations located on the user premises, using lower power levels and smaller antennas giving low directivity. These characteristics will increase the risk of receiving interference from the FSS terminals. They are concerned that there will be complaints that equipment will work in one area will not work in another. Even more seriously, when a new VSAT terminal is brought into use, a set of PTMP terminals that were previously working without interference may suddenly face interference difficulties. This could lead to coordination procedure that effectively would exclude VSAT applications from this 100MHz block of frequencies, meaning that about 20% of the transponders in the satellite cannot be used for VSAT applications. AsiaSat suggests that OFTA should wait for the outcome of the revision of the allocations in the 5GHz bands by World Radiocommunication Conference of the International Telecommunication Union in year 2003 (WRC2003) before any decisions are made.

7. APT Satellite Company Limited has the same view as AsiaSat.

8. Galaxy Satellite Broadcasting Limited is of the view that the uplink service providers should have the priority to use this frequency range. Galaxy also considers that it is more reasonable for the PMTP fixed users to adjust their frequency or configurations to resolve any interference.

9. At present there are some 50 valid VSAT licences in Hong Kong. There are also large earth stations which use wide bandwidth transmission working to more than one satellite network. They are usually established at locations away from the build-up areas. Most of the VSAT installed on roof-tops in the territory occupy a bandwidth of less than 1MHz with transmitter power of about 2 Watts.

10. The TA considers that co-existence of FWA and VSAT should be possible. This is because VSAT in the build-up areas, where FWA is likely to be deployed, is unlikely to operate at high transmitter power because of radiation hazards considerations. Although FWA may not be able to operate in areas around a large

earth station which operates at high transmitter power and wide bandwidth, there are chances that FWA could be used in many other parts of the territory.

11. The TA is of the view that the potential limitations on VSAT deployment may be exaggerated. FWA equipment use spread spectrum and/or other frequency agile technique to seek a free frequency channel before transmission. In addition, the TA also requires that FWA equipment operating in the additional allocation should be designed, installed and operated in such a way as to cope with interference from other primary services such as fixed service and fixed satellite service working in the same band. The TA considers that the above arrangements could allow FWA a fair chance to co-exist with other services.

12. The TA is aware that the coming WRC-2003 will discuss new allocations in the band 5150 – 5725 MHz for wireless access systems including radio local area networks and other services. However the TA considers that a small allocation of 100MHz common bandwidth in the 5850 – 5950 MHz range will facilitate the rollout of networks by the telecommunication licensees. The TA will review the situation after the WRC-2003 has made decisions on the 5GHz band allocations.

Frequency Sharing among Authorized Users in the 5GHz Band

13. Some WFTNS operators have expressed concerns whether they could actually make good use of the U-NII common frequencies for the provision of a public service as the band is shared by other public operators and the general public. They suggested that a coordination mechanism should be established to facilitate such use.

14. Eastar Technology Limited (Estar) is concerned about band sharing, interference control and compatibility with telecommunication equipment operating in the same band. Eastar is interested in whether WFTNS and/or other operators (e.g. ISPs) need separate authorization to use the common frequency block and whether licence fee is required to be paid.

15. Hong Kong Broadband Network Limited is of the view that it is preferable to allocate a dedicated bandwidth of at least 100MHz to each operator upon request in the band 5850 – 6425MHz.

16. Smartone Broadband Services Limited (Smartone) noted that the 100MHz common frequency block will be allocated on a shared and uncoordinated basis. They have concerns about the interference. Smartone considers it is unfair to pay

a licence fee based on the width of spectrum assigned for this common frequency block while no fee is payable for the use of spectrum within the band 5725 – 5825MHz.

17. The TA has given careful considerations and concluded that:

- (a) to limit the overlap of frequencies and hence possibilities of interference, it will be advisable to start with a common allocation of 100MHz instead of 100 or 50MHz for each operator. The allocation should be from 5850 – 5950MHz. The U-NII devices are designed to work in an uncoordinated manner. A pool of common channels should facilitate a FWA to seek an usable channel at a particular location. Such arrangement will also achieve higher spectrum efficiency;
- (b) the common allocation of 100 MHz is within the range of 5850 – 6425 MHz used by fixed satellite services as well. The actual amount of licence fee to be paid will depend on the possibility of re-use; and
- (c) the TA will take into account the proposed applications before authorization is given to a particular telecommunications licensee to use the shared band of 5850 – 5950MHz. Because of the spectrum constraints, consideration will be given to applications submitted by FTNS and WFTNS operators initially.

Decision concerning an Additional Allocation in the band 5850 – 5950MHz Offering Public Telecommunications Services

18. Having considered the above, the TA has decided to allocate a common block of 100 MHz in 5850 – 5950MHz to telecommunications licensees on a shared and uncoordinated basis. Individual licensees should write to the OFTA and authorization will be considered on a case by case basis.

19. According to the Telecommunications Regulations Schedule 1, Part II (Annex 2), no fee is payable for the use of spectrum within 5725 – 5875 MHz. However the band of 5875 – 5950 MHz within the common allocation of 5850 – 5950 MHz is not exempt from the calculation of the fee. It should be noted that a reduction factor will be used to determine the actual fees payable. The reduction factor will be based on the total number of users authorized or reserved by the TA to use the band 5875 – 5950 MHz.

Other Consideration

20. The allocation for fixed service in the band 5850 – 5925MHz conforms to the ITU Region 3 Plan. The Hong Kong Table of Frequency Allocations will be updated accordingly.

Office of the Telecommunications Authority
18 May 2001

**Technical Characteristics of Equipment
Working in 5725 – 5825MHz and 5850 – 5950MHz**

(a) Transmitter power

Peak transmitter power shall not exceed 1W or $17\text{dBm} + 10\log_{10}B$, whichever power is less. B is the 26dB emission bandwidth in MHz. Power spectral density shall not exceed 17dBm in any 1MHz band. The maximum EIRP shall not exceed 4W. All emissions within the frequency range from the band edge to 10MHz above or below the band edge shall not exceed an EIRP of -17dBm/MHz . For frequencies 10MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27dBm/MHz .

(b) Additional Conditions

- (i) If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmitter power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
- (ii) Digital modulation shall be used.

**FIXED TELECOMMUNICATIONS NETWORK
SERVICES LICENCE**

1. A fee of \$1000000 shall be payable on the grant of a fixed telecommunications network services licence and, in each year while the licence remains in force, on the anniversary of the grant of the licence.

2. A fee of \$700 shall be payable on each anniversary of the grant or the renewal of the licence for each 100 customer connections, made by telecommunications line or radiocommunications means, to the Network established and maintained under Schedule 2 to the licence provided by the licensee.

3. Save as provided in paragraph 4, a fee for use of radio spectrum assigned to the licensee shall be payable on the grant and on each anniversary of the grant of the licence and calculated in accordance with the formula set out below-

- (a) where the radio spectrum is assigned exclusively to the licensee-
 - (i) \$50 for every 1 kHz or part thereof of spectrum then assigned below 1 GHz;
 - (ii) $(50-4F)$ for every 1 kHz or part thereof of spectrum then assigned within 1 GHz to 10.999 GHz, where F is the frequency rounded down to the nearest GHz in the band then assigned;
 - (iii) $(20-F)$ for every 1 kHz or part thereof of spectrum then assigned within 11 GHz to 18.999 GHz, where F is the frequency rounded down to the nearest GHz in the band then assigned;
 - (iv) \$1 for every 1 kHz or part thereof of spectrum assigned at or above 19 GHz;
- (b) where any part of the radio spectrum is assigned to the licensee on a non-exclusive or shared basis, the fee calculated in accordance with the formula set out in subparagraph (a) shall be proportionally reduced by a reduction factor equal to the number of users authorized or reserved by the Authority to use that particular part of the radio spectrum. For the avoidance of doubt, the reduction factor is to be determined on the grant and on each anniversary of the grant of the licence.

4. No fee is payable for the use of spectrum within any of the following frequency bands-

6.765 - 6.795 MHz
13.553 - 13.567 MHz
26.957 - 27.283 MHz
40.66 - 40.7 MHz
2400 - 2500 MHz
5.725 - 5.875 GHz
24.0 - 24.25 GHz
61 - 61.5 GHz
122 - 123 GHz
244 - 246 GHz

(Telecommunications Regulations (Chapter 106A) Schedule 1, Part II)