Comments on the Consultation Paper on Proposed Spectrum Policy Framework

Introduction

The Hong Kong Communications and Technology Branch of the Commerce, Industry and Technology Bureau have issued a Consultation Paper on a Proposed Spectrum Policy Framework. This document contains comments on the Consultation Paper.

Comments on Consultation Paper

Question 1

Do you agree that the above considerations, i.e. future shape of radiocommunication, international developments, encourage investment, strategic considerations and fair compensation for the community, should be factored in Hong Kong's spectrum policy framework and the supporting spectrum management arrangements? Are there any other factors or considerations that should be taken into account?

AsiaSat Comments:

AsiaSat is of the opinion that these factors are worthy of consideration but there are other factors that should be taken into consideration for satellite networks. These special considerations are reviewed in detail in the enclosed AsiaSat document entitled: "Why Satellite Networks Need Special Regulatory Consideration".

Question 2

Do you agree with the proposed spectrum policy objectives? Are there other spectrum policy objectives that the TA should take into account when making spectrum management decisions?

AsiaSat Comments:

Objectives a) and b) are very worthwhile in the context of terrestrial wireless services but may be too narrowly focused for application to satellite services. For satellite services, objectives c) and d) are more appropriate.

Paragraph 29 of the Consultation Paper states, in part: *"Specifically, the consultant considered that the absence of a stated spectrum strategy may create unnecessary misunderstanding or confusion, thereby increases the uncertainty faced by businesses investing in wireless services and so potentially reduces investment in the sector".*

The reference to only "wireless services" shows that this is the focus of the Consultant's Report. For satellite services special considerations are required as outlined in the AsiaSat document: "Why Satellite Services Require Special Regulatory Considerations".

To include satellite services in the objectives, AsiaSat proposes to substitute the phrase "and the world" by "communications hub for Asia" in objective d) so to read: "d) To strengthen Hong Kong's strategic position as a world city and the gateway between the Mainland of China and communications hub for Asia by facilitating the provision of key services in Hong Kong which are deployed, or will be deployed, globally or in the Mainland of China; and"

Question 3

Do you agree with the proposed guiding principle in spectrum management, especially that market-based approaches should be considered first for spectrum where there are competing commercial demands?

AsiaSat Comments:

In the case of the fixed-satellite service (FSS) and the mobile-satellite service (MSS) that typically have region-wide footprints, the market-based approach is not appropriate. See sections 6 and 8 of the AsiaSat document entitled: "Why Satellite Networks Need Special Regulatory Consideration".

Question 4

Do you agree with the proposal to prescribe the circumstances under which spectrum assignment may be varied or withdrawn before the assignment expires? Are there other circumstances for variation or withdrawal of spectrum assignment before expiry that should be taken into account? What are your suggestions on the appropriate minimum notice periods?

AsiaSat Comments:

AsiaSat agrees with the proposal to prescribe the circumstances under which spectrum assignment may be varied or withdrawn before the assignment expires. The time periods of 1 to 5 years or more mentioned in paragraph 40 of the Consultation Paper may be appropriate for terrestrial networks but in the case of frequencies for satellite communications the time should not be less than the typical lifetime of a satellite (including, design, construction launch and in service life) which is not less than 20 years. See section 2 of the AsiaSat document entitled: "Why Satellite Networks Need Special Regulatory Consideration".

Question 5

Do you agree with the proposal of status quo for spectrum right after the expiry of a spectrum assignment, i.e. no legitimate expectation for renewal? What is your suggestion of the minimum notice period for the intention to change or not to renew the spectrum assignment of a licence where substantial investment in the underlying infrastructure is required?

AsiaSat Comments:

AsiaSat is of the opinion that in the case of frequencies and orbital locations for satellite networks there should be automatic renewal unless the spectrum has been withdrawn under the proposal of Question 4 above. In the case of the FSS and broadcasting-satellite service (BSS), there will be thousands of earth station antennas pointed at the geostationary orbital locations used by the satellite operator. If the right to that orbital location and associated frequencies is terminated the satellite operator cannot easily move all customers to another orbital location. We must differentiate between spectrum that is consumed locally and spectrum that is internationally coordinated and is used internationally.

Question 6

Do you agree that the TA should be required undertake impact appraisals before initiating spectrum refarming exercises? What other arrangements should be put in place for spectrum refarming exercises?

AsiaSat Comments:

AsiaSat agrees that the TA undertake impact appraisals before initiating spectrum refarming exercises. In the case of satellite services, a much longer lead time is required than is the case for terrestrial services. See section 2 of the AsiaSat document entitled: "Why Satellite Networks Need Special Regulatory Consideration".

Question 7

For non-licensees under the TO, do you have demand for spectrum rights? If so, what kind of spectrum rights would you seek? For licensees under the TO, what are your views on our proposal not to cover spectrum rights for non-licensees in the spectrum policy framework?

AsiaSat Comments:

The UK regulator, Ofcom, has proposed to create a right to interference protection called "recognised spectrum access" (RSA) with such rights tradable and subject to administered incentive pricing. In most cases an administration knows the location of receivers that are part of a licensed transmit/receive system and can protect the system from interference through its licensing regime. However, for some application where the signal originates outside the administration, the administration has no knowledge of the location and number of receive only terminals. It has been proposed that that RSA could apply in such cases. In this context, it has been proposed that RSA be applied to satellite receive only terminals.

AsiaSat is of the opinion that the RSA regime may be useful for such installations as radio telescopes and radiometers but not for satellite receive only terminals. Applying the RSA regime to satellite receive only terminals would be an unnecessary extra burden for satellite operators.

Many satellite bands share with point-to-point terrestrial networks. Such sharing has been in use since the birth of the satellite industry. (In fact, satellites were developed from point-to-point terrestrial microwave networks with a hop of 36,000 km to the geostationary orbit instead of about 40 km that is the length of a hop in a terrestrial point-to-point microwave network.) In this sharing situation, satellite receive only terminals can be deployed virtually anywhere except in the vicinity of a transmitter of the point-to-point terrestrial network.

Broadband wireless access (BWA) can be implemented as a terrestrial fixed service (FS) and as such has allocations in some of the bands that are also allocated to the fixed-satellite service (FSS). **However, BWA, in most of its applications, is point-to-multipoint and as such cannot share with the FSS. AsiaSat is of the opinion that administrations have an obligation to protect the satellite service from interference from point-to-multipoint BWA.**

Allocations to satellite services are generally on a worldwide basis and such allocations are adopted at World Radiocommunication Conferences (WRC's) where all administrations participate. In addition, satellite receivers by the very nature of the service are for all intents and purposes ubiquitous and therefore should be protected no matter where they are located. Therefore, as a matter of course, all administrations should prevent harmful interference to satellite services by not licensing other services in the satellite bands or in adjacent bands that could cause harmful interference into receivers in the satellite bands. This policy should be followed even if the uplink signal is from another administration.

Prior to WARC-ORB-88 the frequencies for the satellite uplink and satellite downlink were notified separately. However, WARC-ORB-88 adopted a network approach to the filing procedures (advance publication, coordination and notification) for satellite networks. In the TVRO installation the satellite receiver is the final link of the satellite network and harmful interference into the satellite receiver constitutes harmful interference into the service. It does not matter where in the chain the interference is injected. In addition, when coordinated and notified, both transmit and receive frequencies are in the Master International Frequency Register and as such can claim international recognition and protection. Administrations accept that they cannot cause interference into the receivers on the satellite. Why should this concept not also extend to the receivers located on the ground?

AsiaSat agrees that the TA need not cover this issue in the proposed spectrum policy framework at this juncture.

Question 8

Do you support the proposal to publish 3-year rolling spectrum release plans for spectrum to be released to the market through open, competitive bidding processes? What types of information would you propose to include in the plans?

AsiaSat Comments:

AsiaSat agrees that the TA should publish 3-year rolling spectrum release plans for spectrum to be released. However, as pointed out in Section 8 of the AsiaSat document entitled: "Why Satellite Networks Need Special Regulatory Consideration", in the case of satellite frequencies, such spectrum should not be subject to auctions.

Question 9

Do you agree that the introduction of secondary trading of spectrum in Hong Kong can improve the efficient use of spectrum? How should potential anti-competitive behavior in the spectrum market be addressed? How should gains in spectrum trading be treated? What are your views on other implementation issues identified by the consultant?

AsiaSat Comments:

AsiaSat is of the opinion that satellite spectrum not subject to competitive bids should not be traded by the licensee. If such spectrum can be traded then companies will apply for spectrum with a goal of only trading it and not developing a service. This adds to the cost of eventually providing the service.

Question 10

Do you agree that we should further monitor developments in other jurisdictions regarding spectrum liberalisation before considering whether we should introduce it to Hong Kong?

AsiaSat Comments:

In the case of satellite frequencies, AsiaSat is of the opinion that the status quo should be maintained.

Question 11

Do you agree that the command and control approach for spectrum management should continue to be applied to spectrum for government services?

AsiaSat Comments:

AsiaSat agrees with the TA that for the time being the current command and control approach should continue to be applied to spectrum for government services.

Question 12

Do you agree that SUF should be applicable to commercial use of spectrum irrespective of whether there is competing commercial demand? Do you agree that SUF for spectrum not released through auction should be set to reflect the opportunity costs of the spectrum?

AsiaSat Comments:

AsiaSat does not agree that the SUF be set to reflect the opportunity costs of the spectrum used for satellite services. AsiaSat is of the opinion that the license cost to satellite operators should be on a cost-recovery basis. This approach is used by many administrations for satellite frequencies. See Section 9 of the AsiaSat document entitled: "Why Satellite Networks Need Special Regulatory Consideration".

Why Satellite Networks Need Special Regulatory Consideration

1. Introduction

This document has been written in reply to the "Consultation Paper on Proposed Spectrum Policy Framework" issued by the Hong Kong Communications and Technology Branch of the Commerce, Industry and Technology Bureau. AsiaSat is of the opinion that frequencies allocated to satellite communications require special consideration. This opinion is based on the special characteristics of satellite networks as well as concepts embodied in the ITU Radio Regulations.

Question 1 of the Consultation Paper reads:

Question 1.

Do you agree that the above considerations, i.e. future shape of radio communications, international developments, encourage investment, strategic considerations and fair compensation for the community, should be factored in Hong Kong's spectrum policy framework and the supporting spectrum management arrangements? Are there any other factors or considerations that should be taken into account?

In general, AsiaSat agrees that the above-named considerations should be reflected in the spectrum policy of Hong Kong especially for frequencies for use in terrestrial applications. However, AsiaSat is of the opinion that special consideration as outlined in this document must be given with respect to frequencies that are used for satellite applications. This is due to the special characteristics of satellite networks.

2. Need for Special Considerations for Satellite Networks

Communications satellite networks have the following special characteristics:

1. In the case of communications satellites in the fixed-satellite service (FSS) there is typically a minimum lead time of about 3-5 years between the conception of a satellite network and the launch and commissioning of the satellite. In many cases this time can be much longer.

2. Communications satellites in FSS are typically designed for a lifetime of about 15 years, leading to an investment cycle of no less than twenty years

3. The construction and launch of a satellite is very capital intensive with a typical cost between US$200 – US$450 million. The construction cost for control and monitoring facilities for a fleet of satellites is in the order of US$ 10 million. Moreover, the cost of user terminals, hubs, gateway stations etc. for the satellite users can easily be in excess of the cost of the satellite itself.

4. New communications satellites are built and launched based on market predictions. Due to the long lead time and the difficulty of estimating demand, most communications satellites operate for many years at a low fill factor, often well below 50%. Successful satellite business plans are normally based on fill factors averaging 75% over life.

5. Communications satellites provide a service of last resort in areas where it is not economical to deploy terrestrial communications. Communications satellites are an essential part of disaster response as has been illustrated in the Tsunami Disaster of 2004, the Pakistan Earthquake of 2005 and the multiple simultaneous sub-sea cable disruptions of 2006. Communications satellites are the medium of choice for broadcast Television and Broadcast data services. Communications satellites are very efficient for point-to-multipoint distribution of information and some mobile applications.

3. Accommodating Special Considerations for Satellite Networks

Paragraph 24 of the Consultation Paper states, in part:

"The spectrum policy framework should retain the discretion for the spectrum manager to depart from the technology neutral principle or full market-based approaches if there is sufficient justification."

Therefore, in principle, the Hong Kong spectrum policy should allow special considerations for frequencies used for satellite applications.

4. Examples of how the ITU Radio Regulations Recognize Special Consideration for Satellite Communication Networks

The ITU Radio Regulations recognize the fact that deployment of communications satellites requires a much longer lead time than the deployment of terrestrial communications networks. For example, Article 11 deals with the notification of frequencies for both satellite and terrestrial networks. Nos 11.24 and 11.25 read:

11.24 Notices relating to assignments to stations of terrestrial services, except for those referred to in Nos. **11.25**, **11.26** or **11.26A**, shall reach the Bureau not earlier than three months before the assignments are brought into use. (WRC-03)

11.25 Notices relating to assignments to stations in space services, and to terrestrial stations involved in coordination with a satellite network, shall reach the Bureau not earlier than three years before the assignments are brought into use.

It is noted that for terrestrial networks notification of frequencies cannot be earlier than three months before they are brought into use whereas with satellite networks this period may not be earlier than three years before they are brought into use. The ITU clearly recognizes that the lead time for satellite networks should be twelve times longer than for terrestrial networks. AsiaSat is of the opinion that this same principle should be retained in any regulation that may apply in Hong Kong.

This same difference in lead time is reflected in Article 9 which deals with coordination. For example, see the last sentence of No. 9.52:

9.52 If an administration, following its action under No. **9.50**, does not agree to the request for coordination, it shall, within four months of the date of publication of the BR IFIC under No. **9.38**, or of the date of dispatch of the coordination data under No. **9.29**, inform the requesting administration of its disagreement and shall provide information concerning its own assignments upon which that disagreement is based. It shall also make such suggestions as it is able to offer with a view to satisfactory resolution of the matter. A copy of that information shall be sent to the Bureau. Where the information relates to terrestrial stations or earth stations operating in the opposite direction of transmission within the coordination area of an earth station, only that information relating to existing radiocommunication stations or to those to be brought into use within the next three months for terrestrial stations, or three years for earth stations, shall be treated as notifications under Nos. **11.2** or **11.9**.

5. "Overlay" Networks

Point 26 of the Consultation Paper says, in part:

"On the other hand, spectrum lying idle and not put to valuable use would not generate any economic benefits for the community and could thus be considered as public resource wasted."

The above statement implies that "overlay" networks can be used for all frequencies that are not presently in use. Due to the long lead time and heavy capital expenditure required for the deployment of a communications satellite, satellite operators need certainty of access to the frequencies for which the satellite has been built. If "overlay" networks have been deployed, then, by the time that the satellite operator is ready to use the frequencies there may be a large number of users. In theory, such users are using the frequencies on a "*secondary*" basis in the ITU sense of the word. However, in practice, it may not be easy to move a large number of users. Even the ITU when examining the impact of a new *primary* frequency allocation will examine the impact on any *secondary* users in the band even when such *secondary* users have no formal rights vis-à-vis *primary* users. This is a tacit admission that even the *secondary* users have acquired some rights to the spectrum that they are occupying. Therefore, "overlay" networks should not be deployed in frequencies used by communications satellites.

We are concerned regarding the comment on "wasted spectrum". For example; there are currently no less than five teleports in Hong Kong accessing no less than fifteen different satellites. All of these teleports share the same frequency bands and there is no limit to the number of teleports that could be established to satellites, provided the satellites have achieved international frequency coordination in accordance with ITU procedures".

6. Importance of C-band to Asia

On page 41 of the Consultants Report it states:

The lower part of the C-band downlink has been identified as an FWA candidate. It can be shown that sharing in a dense urban environment is not possible so decisions would have to be made as to which service should be designated as the primary user of the band. It can be noted that focus on this band has been growing internationally and it is anticipated that the situation will be raised at the next World Radio Conference (WRC-07) in the context of systems beyond IMT-2000.

In addition, Pages 122, 123 of Consultant's Report states:

In the longer term there are already discussions being held worldwide regarding the requirement for spectrum for systems beyond IMT-2000. These discussions will lead to decisions being made (or deferred) at WRC-07. Should decisions be made at WRC-07 regarding the designation of parts of the spectrum between 3.4 GHz and 4.99 GHz for 4G systems, it may become necessary to start a refarming process in order to make the spectrum available at a later date. While this situation cannot be regarded as an immediate release of spectrum, the planning for its future release has to be made in a timely fashion and it has therefore been included in the plan below.

3.4 – 4.2 GHz 4.4 – 4.99 GHz	Potential refarming required	Review in the light of WRC-07 outcome

In the opinion of AsiaSat, the present allocations to the Fixed-Satellite Service in the Table of Frequency Allocations of the ITU Radio Regulations should be supported with no terrestrial BWA in either the extended C-band (3.4 – 3.7 GHz) or standard C-band (3.7 – 4.2 GHz).

There is extensive deployment of FSS satellites transmitting in the band 3 625-4 200 MHz worldwide and the use of the band 3 400-3 625 MHz is rapidly increasing and is already in use by several satellites serving Hong Kong. There are currently more than 160 geostationary satellites operating in the band 3400 - 4200 MHz and nearly two out of three of commercial satellites under manufacturing (2006) will have transponders in this band. .

These bands are important for FSS because atmospheric absorption is lower in these frequency bands and particularly in areas with high rainfall intensity, this is the only band where satellite services realistically can be deployed with a high availability. Satellites in this band are offering a multitude of services, including VSAT networks, internet services, point-to-multipoint links, satellite news gathering, TV and data broadcasting to SMATV and DTH receivers. Satellites operating in this band, because of their wide coverage, have also been used extensively for disaster relief operations. Since this band has been used by the FSS for over 40 years, the technology is mature and can offer equipment at low cost. This, together with the wide coverage, has led to

satellites in this band being an important part of the telecommunications infrastructure in many developing countries.

In most cases, different services can operate in adjacent bands without causing interference. This is not the case with terrestrial BWA in the extended C-band and satellite operation in the standard C-band. Experience as well as field tests have clearly shown that such operation may overload the front end of the satellite receiver causing loss of the signals from all the transponders in the full standard C-band. The interference is one-way i.e. from BWA into the satellite operations. There is no interference into the terrestrial BWA from satellite operation in the band 3.7 – 4.2 GHz since it is receive only. In this case, the frequency separation between terrestrial BWA in the extended C-band and satellite operation in the standard C-band is not sufficient to prevent harmful interference into the satellite operation.

7. Expected Increased Use of Ku-band in Asia

In the US and Europe, the Ku-band is congested. One of the main applications (about 50% overall) of this band is DTH TV. Another big driver in the increased demand for Ku-band frequencies in the US and Europe is the advent of high-definition (HD) television with its greater bandwidth requirements. In Asia, the DTH TV market and the HD market is not as developed as in the US and Europe but it is predicted that these services will also grow in Asia. Therefore, in the anticipation of the increased use of the Ku-band, especially for the delivery of DTH TV both SD and HD, the Ku-band frequencies should not be shared with terrestrial operations. This is especially true for the delivery of DTH TV since a receive-only installation may be deployed virtually at any location. The presence of terrestrial transmitters using the same frequencies may prevent such ubiquitous deployment.

8. Auctions are not appropriate for Satellite Frequencies in the FSS

Frequencies in the FSS and MSS should not be auctioned. This is the policy of almost all administrations. There are a few exceptions. For example, Brazil did auction frequencies in the FSS at an orbital slot that it had coordinated. Also, Tonga has made attempts to coordinate and sell spectrum rights to satellite operators.

One reason that auctions are not appropriate is due to the fact that a satellite service area normally covers many countries. Suppose that Hong Kong auctioned the rights to the frequencies of a satellite filing which had a service area that included over 40 countries (like the C-band coverage of some of the AsiaSat satellites.) The service may not originate in Hong Kong nor be intended for use in Hong Kong. (E.g. a TV offering from Europe intended for consumers in Australia) The spectrum thus consumed is still available for use in Hong Kong on other satellites. While satellite filings give rights to particular orbital locations, the spectrum can be reused in Hong Kong on any other satellite. Auctions imply exclusivity that is simply not appropriate for satellite services.

What would then prevent the various countries in the service area from now auctioning the landing rights? These additional costs would add to the already high

costs of providing satellite communications and would disadvantage a Hong Kong operator vis-à-vis other operators not saddled with this additional cost.

The only time that a case can be made for auctioning the rights to frequencies used by satellites would be in the case of the national allotments/assignments in the planned bands (both FSS and BSS). In this case the planned assignments (in the case of the BSS Plan) or planned allotments (in the case of the FSS Allotment Plan) this can be seen as a national asset and the service areas associated with the Plans correspondingly provide for national service only. In addition, all administrations have been assigned/allotted capacity. In this case, the US is one of the few administrations that have resorted to auctioning of frequencies for BSS (TV) in the planned bands and BSS (sound) in the unplanned S-band. Even the FCC considered auctioning as a last resort and proceeded only because there were mutually exclusive operators vying for the same capacity.
In the case of Hong Kong the planned BSS frequencies were the subject of a competitive allocation process administered by the Telecommunications Authority.

9. License Fees for Satellite Operators

Because of the heavy cost of establishing a satellite networks and the long lead times involved, the license fee charged by an administration to the satellite operator should reflect only the cost to the TA of administering the license i.e. it should be based on cost-recovery.

SUMMARY

- Communications satellite networks should generally not be subject to market considerations only but need special consideration. Paragraph 24 of the Consultation Paper potentially allows for this since it states, in part:
    - *"The spectrum policy framework should retain the discretion for the spectrum manager to depart from the technology neutral principle or full market-based approaches if there is sufficient justification."*
- Communications satellite networks require a long lead time to design and launch, the lifetime of a communications satellite is typically 15 to 20 years and large capital investments are required to build and launch a satellite communications network. Therefore, satellite operators must have à priori certainty of the availability of frequencies.
- Due to the heavy rain rates in Asia, the C-band, with virtually no rain attenuation, is very valuable for communications needs in Asia. Therefore, the satellite C-bands should be protected. This is not true in Europe or North America where much of the "push" for BWA in the satellite bands originates. As shown above, this means that BWA should not be assigned in the 3.4- 3.7 MHz band also because its impact on FSS reception in the 3.7-4.2 GHz band.
- In addition to a broad array of broadcast and data services; communications satellites provide a last resort communications link in emergencies, particularly when telecommunications infrastructure is destroyed.
- Frequency bands used by communications satellites should not be used by "overlay" networks. It is difficult if not impossible to ensure compatibility with Overlay networks and the nature of satellite operation is such that communications satellites operate for many years at a low fill factor, sometimes below 50%.
- Satellite frequencies in the FSS should not be auctioned.
- In the anticipation of the increased use of the Ku-band especially for the delivery of DTH TV, the Ku-band frequencies should not be shared with terrestrial operations. This is especially true for the delivery of DTH TV since a receive installation may be deployed at virtually any location. The presence of terrestrial transmitters using the same frequencies may prevent such ubiquitous deployment.