

# SPECTRUM MANAGEMENT IN HONG KONG

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## **Abstract**

This paper gives an overview of the spectrum policy framework being adopted in Hong Kong. It gives an account of the market-based approach that Hong Kong has adopted for the management of the radio spectrum. It then discusses some of the challenges lying ahead, including the digital switchover and the introduction of UWB technology.

## **1 Introduction**

Radio spectrum is a finite resource which has a negative “externality” property, in the sense that the use of this resource by one party may adversely affect another party. As a result, the use of spectrum cannot be left entirely unregulated. There is a need to regulate the use of radio spectrum in order to manage demand and to contain interference to acceptable levels for all spectrum users.

## **2 The Old Framework**

Under the law, the Telecommunications Authority (TA) is the spectrum manager in Hong Kong. Before 2007, the spectrum management arrangement in Hong Kong was essentially a “command and control” system, based on centralized planning and administration by the spectrum manager. In discharging his spectrum management responsibilities, the TA decided how much spectrum each broad use would have, allocated spectrum for those uses,

and released the available spectrum and assigned the spectrum to users accordingly.

## **3 Spectrum Policy Framework**

However, in the face of fast technological advancement and dynamic market development, the command and control approach was seen to be increasingly reactive, inefficient and unresponsive to the needs of the market. The Government therefore undertook a fundamental review of the spectrum policy, with a view to formulating a responsive and transparent policy that enables the community to reap maximum economic benefits from the deployment of radio spectrum.

The Government announced in April 2007 the policy framework<sup>1</sup> for the management of radio spectrum in Hong Kong, after taking into consideration the views collected during a public consultation exercise. The policy framework covers six areas, namely spectrum policy objectives; guiding principles in spectrum management; spectrum rights; spectrum supply (including spectrum trading and liberalization); spectrum for government services and spectrum pricing.

One of the spectrum policy objectives is to strengthen Hong Kong's strategic position as a world city and the gateway between the mainland of China and the world. This is considered particularly important in the light of increasing

economic integration between Hong Kong and the mainland of China.

The framework also sets out clearly the guiding principle in spectrum management that a market-based approach should be used for spectrum when there are likely to be competing demands from providers of non-government services. If there are overriding public policy reasons requiring a departure from this guiding principle, the relevant public policy reasons will be published for sake of transparency.

To provide certainty to spectrum users, the framework states that before a spectrum assignment expires, the TA will normally invoke his powers to vary or withdraw any spectrum assigned only in exceptional circumstances, including where the public interest or international obligations of the Government so require, there is a serious breach of spectrum assignment conditions or serious interference between legitimate spectrum users has to be resolved or minimized.

The spectrum policy framework affirms that there is no legitimate expectation for spectrum rights after the end of a spectrum assignment, but for licences where substantial investment in the underlying infrastructure is required, a sufficiently long notice period will be given before the expiry of the spectrum assignment.

To provide more information to the industry on the potential supply of spectrum to the market, the TA publishes spectrum release plans<sup>2</sup> showing the potential supply of spectrum through an open, competitive bidding or tendering process in the following three years. Such plans are updated every year on a rolling basis or as necessary.

The framework makes clear the policy intention that spectrum trading should be introduced in Hong Kong in the long term, subject to a feasibility study on the implementation issues.

Since spectrum is a scarce public resource, the framework establishes the principle that spectrum utilization fee (SUF) should be applicable to all non-government use of spectrum. Where spectrum is not released through market means, the SUF should be set to reflect the opportunity costs of the spectrum. However, if spectrum is assigned to support public interest purposes, the SUF may be adjusted accordingly.

#### **4 Auction of the BWA Spectrum**

Following the timetable published in the spectrum release plan, the TA conducted the auction of the broadband wireless access (BWA) frequency spectrum in the 2.3 GHz and the 2.5 GHz bands in January 2009. When we issued the information memorandum for the auction in October 2008, we were already in the midst of the worldwide financial crisis and there were considerable doubts as to whether or not we should proceed with the auction. In the face of the substantial uncertainty and lack of confidence in the market, we decided that we should adhere steadfastly to the market-based approach as given in the policy framework. That is, we will allow the market to decide whether there is after all any demand for the spectrum that we will put out to the market, and if there is market demand then we will allow the market to determine what the appropriate level of the SUF should be.

The auction duly took place between 12<sup>th</sup> and 22<sup>nd</sup> January 2009 and 90 MHz of spectrum in the 2.5 GHz band was auctioned at a price exceeding HK\$1.5 billion. The spectrum in the 2.3 GHz band was left unsold and we accept this is the market outcome.

#### **5 Spectrum Trading**

Following the policy framework, we are conducting a feasibility study to see how we may implement spectrum trading. The few salient issues that we need to consider are

the concept of spectrum right as a property right issue and the need for us to introduce a separate spectrum licence as a licensing vehicle as distinct from the existing network and service licence. We plan to issue a consultation paper later in the year seeking views and comments from the industry and the public on the way-forward.

## 6 Administered Incentive Pricing (AIP) Scheme

Ideally prices for spectrum would be set through market processes, such as auctions or trading. Sometimes, however, spectrum is not released through market means. This may for example be the need to renew the spectrum right of an existing licensee. In such case, one approach is to set charges with reference to the original auction price, a growth factor and where applicable other market benchmarks. In practice this may not always be possible because of the absence of suitable market benchmarks, in which case estimates of market prices will have to be estimated by the regulator.

In Hong Kong, the next batch of mobile carrier licences due for renewal is the 3G licences and their common expiry date is 2016. While this appears to be somewhat remote, it should be noted that under the policy framework the regulator will have to give at least three year advance notice to carriers if he is minded not to renew the spectrum right. We will therefore have to start the conceptualization process soon in order that the AIP Scheme may be put in place by 2013.

## 7 Digital Dividend

In Hong Kong, the band of 470– 806 MHz (i.e. Channel 21 – Channel 62) is allocated for broadcasting services in accordance with the relevant ITU recommendations. In addition to analogue TV services, digital terrestrial television (DTT) services operating in multiple frequency networks

(MFN) and single frequency networks (SFN) are using the same band (figure 1). Currently, the two local terrestrial television broadcasters provide both the analogue and DTT services using most of the available 42 channels, on a shared basis with the mainland of China, for example, through the reuse of channels in different geographic areas. Due to the high power nature of broadcasting transmitters, coordinated use of channels with numerous cities of the Guangdong Province is necessary.

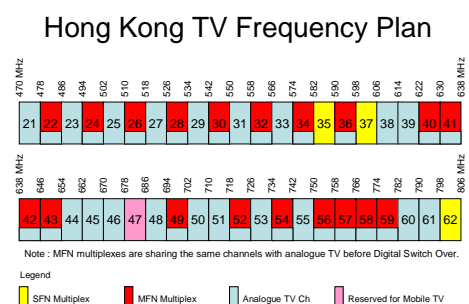


Figure 1 The Frequency Plan for TV Services

We have six main DTT stations in Temple Hill, Castle Peak, Golden Hill, Cloudy Hill, Lamma Island and Kowloon Peak, which occupy 6 channels for MFN and 2 channels for SFN. Another 13 channels will be used by 23 DTT fill-in stations. At this stage, the Government aims to switch off the analogue broadcasting service in 2012. After the digital switchover, the radio spectrum released by shutting down the analogue television transmitters can be redeployed for other broadcasting or telecommunications services. This is the so-called digital dividend.

Digital switchover is the process which involves the terrestrial TV broadcasters launching the DTT services and viewers equipping themselves at their own costs with the necessary receiving devices (such as set-top boxes and integrated TV sets). The community as a whole is set to derive enormous benefits from the digital switchover as:

- It will solve reception problems (e.g., snowing or ghosting);
- It will enhance programming choice and improve audio-visual quality for viewers;
- Broadcasters will be able to explore more business opportunities and test out new services on the digital platform;
- The consumer electronics industry will benefit from consumer demand for digital products; and
- The “digital dividend” will enable the provision more broadcasting and telecommunications services, not to mention the revenue that will be generated by auctioning the released spectrum.

The success of the digital switchover hinges on the cooperation of all stakeholders, including the consumers, the broadcasters and the consumer electronics industry. It also hinges on the successful frequency coordination with the authorities in the mainland of China. For example, in the ITU World Radiocommunication Conference 2007 China has formally indicated that while the 698 – 790 MHz band has been identified for international mobile telecommunications (IMT) services, the deployment of the band for such a service will not start until 2015<sup>3</sup>.

## 8 Ultra Wideband (UWB) Technology

One possible impact that the UWB technology may have on incumbent services concerns the rights of receivers. Current regulatory regimes largely define rights in terms of what a device is allowed to transmit and provide protection from harmful interference. While there are often implicit interference criteria used in making assignments it is not always the case and it will become increasingly important to define the receive rights of users more explicitly.

We have recently issued a consultation paper which proposes to create a class licence for the operation of the

UWB devices for radiocommunications purposes within the band 3.1 to 10.6 GHz.

The proposed band of UWB devices (i.e. 3.1-10 GHz) is currently being extensively used by various services such as fixed links, fixed satellite, radiolocation and radio LAN. In Hong Kong, the spectrum released so far through auctioned or listed in the spectrum release plan does not go beyond 2.6 GHz. The proposed introduction of UWB devices will not have any impact on the mobile carriers and conflict with the right owners in the bands below 3.1 GHz is a non-issue.

Fixed satellite receiving stations in HK commonly operate in the C-band (3.4-4.2 GHz), which overlaps with the proposed UWB frequency band. When the proposal was discussed in the local Radio Spectrum Advisory Committee, the satellite operators have raised concerns. We hope that positive feedbacks from equipment vendors and consumer interest groups may result in a more balanced view on the proposed introduction of the devices in HK.

## 9 Conclusion

Under the Spectrum Policy Framework, the industry has greater clarity and predictability of spectrum management decisions. The TA has also clear policy guidance in making regulatory decisions that are commensurate with the fast technological, market and societal developments both in Hong Kong and internationally.

## 10 References

- [1] Please see <http://www.cedb.gov.hk/ctb/eng/legco/pdf/spectrum.pdf>
- [2] Please see for example <http://www.ofta.gov.hk/en/freq-spec/plan2008.pdf>
- [3] Footnote 5.313A to the ITU Radio Regulation