MOTOROLA

25th April, 2007

Communications and Technology Branch
Commercial, Industry and Technology Bureau
2/F, Murray Building
Garden Road
Hong Kong

Email: wwchong@citb.gov.hk

Dear sir/madam

Re: Public Consultation on Digital Broadcasting: Mobile Television and Related Issues

Motorola thanks the Government of the Hong Kong Special Administrative Region (the Government) for the opportunity to respond to the consultation and we are pleased to contribute our views and comments, taking into account the Government's desire to enhance Hong Kong's position as a regional communications hub and the desire to achieve the most economical and technically efficient use of radio frequency spectrum.

(a) Spectrum availability – whether the frequency spectrum available in Band III (174MHz – 230MHz) and L Band (1466MHz – 1480MHz), as well as the two single frequency network multiplexes in the UHF Band (470MHz – 806MHz) originally reserved under the current policy framework of DTT, should be made available for mobile TV services or other digital broadcasting services;

Comment: Recently Malaysia has identified the frequency bands 174 – 230 MHz and 470 – 798 MHz for digital terrestrial television, including digital terrestrial sound. Currently, in Singapore the band 174 – 230 MHz is planned for digital audio broadcast and 494-790 MHz, for digital video broadcast (DVB).

In allocating spectrum for digital broadcast use both countries have not prescribed the type of broadcast services permitted based on whether the services are intended for stationary, portable or mobile reception.

Although we strongly believe that DVB-H[1] will be the most widely adopted in Asia and Europe we would recommend that Hong Kong maintain its technology neutral stand by not prescribing specific technologies for specific frequency bands.

We believe that Hong Kong's position as a regional communications hub will be significantly enhanced if open global digital television standards are implemented in Hong Kong. So that global and regional visitors to Hong Kong are able to seamlessly receive Hong Kong television programmes with their handsets. We therefore strongly support the inclusion of mobile TV technologies based on open standards in spectrum allocated to digital broadcasting, including the two SFN multiplexes in the UHF Band.

[1] Refer to Annex 1 for more DVB-H information.

At the same time we would also recommend that Hong Kong take steps to benefit from the 'digital dividend' when the conversion from analogue to digital television broadcasting is completed; the unique opportunity of recovering spectrum for other services in the frequency range 742 MHz to 806 MHz.

For instance, Malaysia plans to re-allocated spectrum above 742 MHz to the mobile service after 2018. With the advent of technologies (such as IPTV) that enable the delivery of multimedia (video) content over fixed broadband networks Hong Kong, with one of the highest broadband penetration rate in Asia, should not forgo this opportunity to recover valuable radio spectrum.

The band 2500 – 2690 MHz has been identified as for broadband wireless access in a number of countries globally and we expect it to be one the frequency bands[2] to be harmonised for that purpose in the Asia Pacific. We recommend that Hong Kong support the harmonisation of this band for mobile broadband.

(b) Spectrum allocation – whether we should adopt a service-neutral approach by allowing spectrum users to decide on their own which digital broadcasting services should be launched, a conventional approach by allocating frequencies to specific uses of DTT, DAB and mobile TV respectively, or a pro-mobile TV approach by allocating frequencies primarily for mobile TV purpose but also allowing other services to run as ancillary services;

Comment: We believe that Hong Kong should take the service neutral approach and we recommend that the utilisation of spectrum in the bands 174-230 MHz and 470-806 MHz should not have any restriction on the type of services delivered by service providers and that service providers be allowed to determine and select the type of services to deliver according to the market.

(c) Spectrum assignment – whether we should adopt a market-led approach where the available frequencies should be assigned by auction with appropriate rollout obligations, and whether a spectrum utilization fee should be charged for such uses; and

Comment: We believe that ubiquitous and seamless access to multimedia content (information, news) anytime, anywhere with wireless technology can be an enormous opportunity for operators, consumers, content providers and manufacturers and that the assignment of scarce public resource such as radio spectrum should be managed for the benefit of the community. Irrespective of the method used in making the spectrum assignment the primary objective is to put spectrum in the possession of those who will put it to the best use and getting fair compensation for the use of a public resource.

[2] 2300 – 2400 MHz; 2500 – 2690 MHz; and 3400 – 3600 MHz

(d) Licensing arrangements - whether mobile TV programme services should be licensed and regulated under the Broadcasting Ordinance.

Comment: We make no comment on this question

Yours faithfully,

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Annex 1 – DVB-H

DVB-H is the leading global technology standard for the transmission of digital TV to handheld receivers such as mobile telephones and PDAs. Published as a formal standard by ETSI in November 2004, it is a physical layer specification designed to enable the efficient delivery of IP-encapsulated data over terrestrial networks. The creation of DVB-H, which is closely related to DVB-T, also entails modifications of some other DVB standards dealing with data broadcasting, Service Information, etc. It is designed to be used as a bearer in conjunction with the set of DVB-IPDC systems layer specifications. A non-proprietary open standard, DVB-H has broad support across the industry and has been the subject of more than thirty technical and commercial trials around the world.

DVB-H networks have been commercially launched in Italy, Finland, Vietnam and Albania. The first service to launch, in Italy in June 2006, already has hundreds of thousands of subscribers. More than thirty DVB-H technical and commercial trials have taken place all over the world and further commercial launches are expected in 2007 in Germany, Spain, Russia, the USA and elsewhere. It is a worldwide proven technology.

The DVB-H standard is fully specified and published. Some additional work is ongoing within the DVB Project for final elements of the DVB-IPDC systems layer specifications, but the main elements are now published by ETSI and ready for commercial deployment.

Benefits of DVB-H:

- **Fast business rollout:** DVB-H offers the industry the leading "time-to-market" schedule, and was ready to be launched commercially in 2006.
- **High quality:** The high bandwidth and advanced compression methods used in DVB-H allow it to deliver the richest possible audio-visual experience possible to a mobile device.
- **Battery life:** DVB-H uses a technology called time slicing to reduce the battery usage while receiving live broadcast transmission. It will allow the receiver to be switched off 90 % of the time leading to corresponding savings in power consumption.
- **Standardized and tested:** DVB-H has received an ETSI standard in November 2004 and has been commercially piloted and technically trialed all around the world.
- **Broad support:** DVB-H is supported by over 270 members via the DVB Project consortium. Moreover, there are lot of DVB-H receiver chipset players such as Dibcom, Philips, Samsung, Siano, ST, TI, Freescale, Microtune etc.

Deployment

DVB-H is a worldwide adopted technology and has been commercially deployed in many countries. With a multitude of players competing for business in each link of the mobile TV value-chain, exceptional economies of scale are likely to be achieved for operators and, eventually, the subscribers utilizing DVB-H.

Standardization

DVB-H standard has been existed since Oct 2004 and it has full specifications published for ESG, copy protection, service purchase, etc. The main elements are now published by ETSI such as EN 302 304, EN 301 192, EN 300 744, EN 300 468, TR 102 377, TS 101 191, TR 102 473, TR 102 469, TR 102 401, TS 102 471 and TS 102 470 etc. and ready for commercial deployment. Other mobile TV technologies either do not have proper standards for ESG, copy protection, purchase etc. or no standard body published Service Purchase and protection/content delivery protocols specifications.

Network Design

DVB-H allows a lot of flexibility on network design by providing different parameters to choose from when designing the network. It is composed of COFDM (2K, 4K and 8K modes), Guard Interval (1/2, 1/4., 1/8 and 1/16) with R/S and Convolutional Coding FEC, with the addition of time-slicing for power saving and MPE-FEC for optimised DVB-H performance. Available DVB-H parameters are listed below.

Parameter	DVB-H
Channel Bandwidths (MHz)	5, 6, 7, 8
FFT Sizes	8k, 4k, 2k
Guard Intervals (us)	224, 112, 56, 28, 14, 7
Inner Modulations	QPSK, 16QAM, 64QAM
Error Protection	Convolutional code + RS FEC + MPE-FEC
Convolutional code rates	½, 2/3, ¾, 5/6, 7/8
Time interleaving	Practically up to 1000ms depending on MPE-FEC selection, typically 200-500 ms
MPE-FEC code rate	Free selection (most likely ½ to 7/8)
Time Slicing	Time slicing (good power saving)
Protocol stack	IP Layer
Theoretical data rate range (Mbit / s)	2.49 – 31.67 (@8MHz channel)
Practical data rate	3.32 – 13.8 (@8MHz channel, ¼ GI QPSK ½CR MPE-FEC 2/3 – 1/8 GI 16QAM ¾CR MPE-FEC 5/6)

Out of Band Emission

DVB-H has detailed specification on the out of band emission and spectrum mask requirement relative to 0 dB total output power.

Table 19: Breakpoints for spectrum mask for critical cases

Breakpoints	
relative frequency (MHz)	relative level (dB)
-12	-120
-6	-95
-4,2	-83
-3,8	-32,8
+3,8	-32,8
+4,2	-83
+6	-95
+12	-120

DVB-H specification has stringent requirement which reduces the adjacent channel interference.

Channel Switching Time

By selecting the DVB-H time slicing parameters correctly, DVB-H physical layer delay is negligible i.e. 1-2 s. With these parameters the power consumption is still low enough. The major part of delay in channel switching is coming from the video player latency, which is identical for any system. This can be corrected by optimizing the video player design.

Co-existence of DVB-T

DVB-T and DVB-H may coexist within a single instance of a DVB-T multiplex. Trial done in Germany have shown that a DVB-H time-sliced multiplex processed by a DVB-T statistical multiplexer creates a unique "dual services" transport stream, usable without impacting the existing receivers in the market. DVB-T is a widely adopted DTT standard and there are lots of DVB-T device available in many countries such as Taiwan, Singapore, Europe etc. In fact, Hong Kong also has dual analog and DVB-T capable devices commonly available. This creates a network deployment flexibility to allow operator to offer both DVB-H and DVB-T services without building a new network. Operator not only can serve the mobile TV user but also the terrestrial user.

References

- www.dvb-h.org – the official website for information about trials and services launches, and useful technical documents
- www.etsi.org – all DVB standards are available for download directly from the ETSI website
- www.dvb.org – the main website of the DVB Project
- www.bmcoforum.org – an international organisation committed to fostering an open market for mobile TV
- www.mdtvalliance.org – an industry consortium promoting the use of DVB-H in North America