

**Second Consultation on  
Digital Terrestrial Broadcasting in Hong Kong**

**Communications and Technology Branch  
Commerce, Industry and Technology Bureau  
Hong Kong Special Administrative Region Government  
5 December 2003**

[www.info.gov.hk/citb/ctb](http://www.info.gov.hk/citb/ctb)

## FOREWORD

In December 2000, the Government published a consultation paper on digital terrestrial broadcasting in Hong Kong. We subsequently received 23 submissions. Both the consultation paper and the submissions can be found at the website of the Communications and Technology Branch at [www.info.gov.hk/citb/ctb](http://www.info.gov.hk/citb/ctb).

This document highlights the Government's thinking on the proposed way forward for introducing digital terrestrial broadcasting into Hong Kong. It is based on our analysis of the submissions responding to the earlier consultation in 2000, the outcome of our coordination with Mainland authorities regarding the frequency plan for digital terrestrial television broadcasting in Hong Kong, and our evaluation of overseas developments in digital broadcasting.

We now invite public comments on the proposals set out in this document. Such comments should be sent to the Communications and Technology Branch by 5 March 2004 by any of the following means:

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## **Introduction**

In December 2000, the Government published a consultation paper on digital terrestrial broadcasting in Hong Kong. The paper set out the Government's recommendations on the relevant issues relating to the implementation of digital terrestrial television (DTT) broadcasting and the way forward for introducing digital audio broadcasting into Hong Kong. In the submissions responding to this consultation (the first consultation), there was general support for the Government's initiative to introduce DTT broadcasting into Hong Kong as soon as practicable and to introduce digital audio broadcasting only when it is commercially viable.

2. One of the main concerns arising from the first consultation is the issue of technical standard for DTT broadcasting. Not long after the publication of the consultation paper, the Mainland announced that it would develop its own DTT technical standard. Some submissions, notably those from Asia Television Limited (ATV) and Television Broadcasts Limited (TVB), strongly suggested that the Government should defer the decision on the technical standard to be adopted in Hong Kong for DTT broadcasting until the Mainland had promulgated its own standard. The two broadcasters believed that if the Mainland and Hong Kong shared the same technical standard, multimedia applications developed in Hong Kong would have the potential to capture a larger market, thereby stimulating investment in this area. Besides, consumer products based on the Mainland standard was likely to be more affordable due to mass production.

## **Background to the present consultation**

3. In the light of this representation, the Government agreed to conduct a second round consultation at a later stage, taking into account the development on the Mainland. Three years have passed since then. To date, the timetable for the promulgation of technical standard on the Mainland remains uncertain. On the other hand, notwithstanding the initial lacklustre rollout of DTT broadcasting in other parts of the world, notably in Europe, the situation has improved with the availability of more affordable consumer products and digital content, particularly high-definition

television (HDTV)<sup>1</sup> programmes. This more positive outlook of DTT broadcasting<sup>2</sup> and the need to maintain Hong Kong's lead and competitiveness in the area of broadcasting have reinforced the case for paving a solid way for introducing DTT broadcasting into Hong Kong. The pertinent issues that are essential to providing DTT broadcasting would need to be addressed sooner, rather than later. Indeed, in response to the first consultation, there was support for the adoption of the European DVB-T technical standard for DTT broadcasting, as well as the concern that waiting until the situation on the development of the Mainland's technical standard was clear would delay the rollout of DTT broadcasting in Hong Kong.

4. This second consultation paper thus seeks to set out a total framework for the introduction of DTT broadcasting into Hong Kong. It represents our latest views and in this process we have taken into account the views that we received during the first consultation, the relevant market and technical developments in the last three years, and the experience of other economies.

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<sup>1</sup> Standard definition television (SDTV) and HDTV are the two categories of display formats for digital TV transmissions. SDTV provides a picture quality similar to digital versatile disk (DVD). HDTV provides a higher quality display, with a vertical resolution display from 720p to 1080i and higher and an aspect ratio (the width to height ratio of the screen) of 16:9, for a viewing experience similar to watching a movie. In comparison, SDTV has a range of lower resolutions and no defined aspect ratio. New television sets will be either HDTV-capable or SDTV-capable, with receivers that can convert the signal to their native display format. SDTV, in common with HDTV, uses the MPEG-2 compression method.

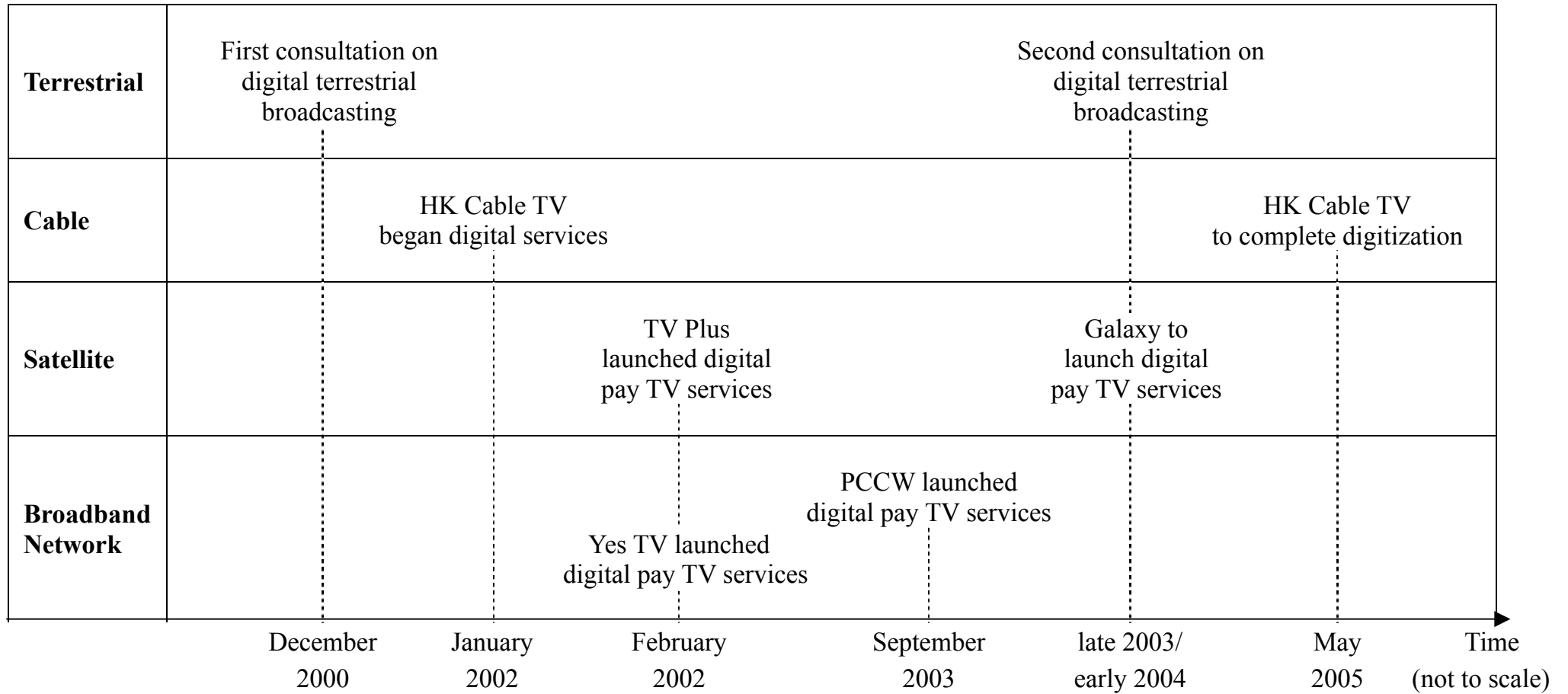
<sup>2</sup> A summary of the development of DTT broadcasting in other economies is at Annex.

## **Hong Kong's experience**

5. Digital television can be transmitted through different means, including terrestrial radio communications, satellite, broadband network and cable. Although we have yet to commence digital terrestrial television broadcasting, digital television broadcast is already available to viewers in Hong Kong via cable, satellite and broadband network (see Box). The Hong Kong Cable Television Limited commenced its migration to digital transmission in January 2002. The relevant licensing conditions require it to complete digitization by the end of May 2005. As of now, out of its 640,000 subscribers, about 50% are receiving digital services. Yes Television (Hong Kong) Limited and TV Plus (HK) Corp Limited launched digital pay television services via broadband network and satellite, respectively, in February 2002. PCCW VOD Limited launched digital broadband pay television service as recently as in September 2003. Galaxy Satellite Broadcasting Limited, another pay television operator, will launch its digital satellite pay television services soon.

6. The development of digital television broadcasting in Hong Kong is similar to that of other economies, including the Mainland, where the introduction of digital television has been driven to a large extent by pay services via cable or satellite.

**Box Digital Television in Hong Kong**



## **Benefits of DTT broadcasting**

7. The benefits of DTT broadcasting are clear. Signals transmitted as discrete bits of information improve picture and sound quality and reduce problems such as ghosting and interference that affect viewers in a hilly environment or areas with high-rise buildings. In comparison with analogue broadcasting, digital broadcasting makes more efficient use of the available spectrum. The same bandwidth for transmitting one analogue programme channels can accommodate at least four digital standard definition television (SDTV)<sup>3</sup> programme channels. Furthermore, digital television broadcasting will bring benefits to viewers, including the possible increase in the number of television programme channels, introduction of HDTV programmes, television reception on the move and new interactive multimedia applications.

## **Framework for the introduction of DTT broadcasting**

8. The introduction of DTT broadcasting and the transition from analogue to digital broadcasting involve the following major regulatory considerations:

- (a) frequency planning and coordination;
- (b) adoption of technical standard;
- (c) simulcast and transition to DTT broadcasting;
- (d) allocation and licensing of multiplexes<sup>4</sup>; and
- (e) analogue switch-off.

9. A major issue in this context is the timetable to rollout DTT broadcasting in Hong Kong. Given the background set out in paragraph 3 above, *the Government's clear intention is to see the introduction of DTT broadcasting as soon as possible, and within 2006 at the latest*. We feel that in practical terms such a clear indication will be helpful to put the regulatory issues in perspective, particularly in relation to simulcast

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<sup>3</sup> See Footnote 1 above.

<sup>4</sup> A multiplex is a digital transmission channel which combines programme material and other data in a digital form for transmission via a frequency channel. The process of digital combination of the signals is called multiplexing.

arrangements, the timetable for the allocation and licensing of multiplexes and the planning and introduction of new services. In this context the Government has already included as a licensing condition the power to require ATV and TVB to start simulcast by giving an 18-month advance notice.

### **Frequency planning and coordination**

10. We estimated in the first consultation that there would be six multiplexes available for DTT broadcasting, three of which would be based on single frequency network (SFN) configuration and three on multiple frequency network (MFN)<sup>5</sup> configuration.

11. Since the publication of the last consultation paper, the Government has completed frequency coordination with the Mainland authorities regarding the frequency plan for DTT broadcasting in Hong Kong. Our objective is to enable operators to design a network with territory-wide coverage but without interference to the transmission of the existing and planned telecommunications and broadcasting services in Hong Kong and neighbouring areas. According to the agreed frequency plan, it is now confirmed that there are five multiplexes available for the implementation of DTT broadcasting in Hong Kong, four of which are SFN multiplexes and the remaining one MFN. A summary of the technical details of the frequency plan is available on the website of the Office of the Telecommunications Authority at [www.ofta.gov.hk](http://www.ofta.gov.hk).

### **Technical standard**

12. In the first consultation paper, we took into account five criteria in selecting the DTT technical standard for Hong Kong. Briefly these criteria are:

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<sup>5</sup> An SFN multiplex allows the transmission of the same television programme by different transmitters on the same frequency channel throughout the coverage area. Normally, a multiplex may carry at least four SDTV programmes or one HDTV programme in digital form. SFN and MFN multiplexes can provide basically the same system functionalities and capacity for the carriage of DTT services. Similar types of DTT services for fixed reception can be offered on both SFN and MFN multiplexes. However, an MFN multiplex uses different frequencies at different locations to provide service. Re-tuning of certain existing analogue TV channels will therefore be required. Furthermore, an MFN multiplex may not be able to support mobile reception because of the handover requirement between transmitters operating on different frequency channels.



- (a) the selected standard should facilitate the provision of sufficient channel transmission capacity (e.g. able to support SFN transmission) to meet new demand for broadcasting services during and after the simulcast period;
- (b) the selected standard should support mobile reception;
- (c) the channel bandwidth adopted by the selected standard should be compatible with the 8 MHz channel bandwidth that is currently used in Hong Kong for terrestrial television broadcasting;
- (d) the selected standard should preferably be widely adopted internationally. There should be a full range of consumer products such as set-top boxes<sup>6</sup> and integrated television sets<sup>7</sup> based on the selected standard in the market at competitive prices; and
- (e) it would be advantageous for the selected standard to be interoperable with other broadcasting services delivered by different transmission platforms such as satellite or cable. The commonality in the system design of the relevant broadcasting equipment and TV receivers may lead to cost savings in both network rollout and network operation.

13. Three technical standards were then available at the time of the first consultation. They were the American ATSC-T standard, the European DVB-T standard and the Japanese ISDB-T standard. Based on the above criteria, the Government recommended DVB-T as the DTT standard for Hong Kong. DVB-T is also the most suitable for the Hong Kong environment based on the findings of technical field trials. It is a sophisticated technology that supports both SFN and MFN configurations,

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<sup>6</sup> A set-top box for digital television receives and decodes digital TV signals into a form suitable for display on analogue television sets or other display devices, e.g. computer monitors or projection screens. Analogue television sets currently in use cannot display digital transmissions on their screens without being connected to such a set-top box converter.

<sup>7</sup> An integrated television set is a television set with built-in digital capabilities to receive and display digital TV signals. Integrated digital television sets are generally distinguished by wide screens, high-level audio capability and high quality displays. They do not require a set-top box to receive digital TV services.

multimedia services, the Multimedia Home Platform<sup>8</sup> and robust mobile reception. Moreover, it is a proven technology already adopted by many other economies<sup>9</sup> with a wide range of compliant consumer products available in the market. Today these considerations remain valid.

14. However, we would not wish to rule out the possibility that any new standard that eventually emerges from the Mainland's own research and development may have better technical features than DVB-T. Also it is likely that consumer products based on this Mainland standard, manufactured on the Mainland, and targeted the huge Mainland consumer market could be more affordable than those based on DVB-T. Alignment with the Mainland DTT standard may also facilitate the access of Hong Kong programmes and services on a compatible technical platform to the Mainland market, as ATV and TVB argued. There are therefore merits to defer the decision on the technical standard to be adopted in Hong Kong. However, this will mean further delay in the launch of DTT broadcasting in Hong Kong.

15. We now propose a "market-led" approach as the way forward. Under this approach, there is no officially prescribed technical standard but DVB-T will remain the one recommended by the Government in the light of the technical and market information available so far. *A multiplex operator would have the option of adopting DVB-T or proposing another technical standard if it can be proven to the satisfaction of the Telecommunications Authority that it meets the five criteria set out in paragraph 12 above and that in the case of ATV and TVB, the adoption of the proposed standard would not cause delay in starting simulcast in 2006 and achieving territory-wide network coverage in 2008.* The same approach applies to the adoption of sound system.

16. Arguably the disadvantage of this approach is the possibility that different multiplex operators may adopt different, and possibly

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<sup>8</sup> Multimedia Home Platform (MHP) is a software architecture that defines a generic interface between interactive digital applications and the terminals, such as set-top boxes, integrated digital TV sets and personal computers, on which those applications execute. In other words, MHP is an enabling software in the user-end terminals that supports Internet browsing, television broadcast and interactive services such as on-line shopping.

<sup>9</sup> Economies where the DVB-T standard has been adopted or DVB-T based digital television services have been launched include the European Union, New Zealand, Australia, Poland, Israel, Baltic States, the Czech Republic, Singapore and Taiwan. About 17 manufacturers are producing DVB-T compliant set-top boxes and integrated digital television sets.

incompatible, DTT standards. This may in turn cause inconvenience to viewers, as they may have to buy different set-top boxes for receiving all DTT services. However, amidst the uncertainty over the technical standard to be adopted on the Mainland and the resulting lack of a policy decision in Hong Kong in the past three years over this key issue, the proposed “market-led” approach is an enabling move to minimize the uncertainty as far as the regulatory environment in Hong Kong is concerned. This approach, together with the timetable indicated in paragraph 9 above, encourages existing and prospective new broadcasters to focus on the planning of DTT broadcasting again, while allowing a reasonable period for the existing terrestrial broadcasters to wait for the Mainland standard. Practically it is not totally inconceivable that the existing and prospective new broadcasters would converge on this important matter of technical standard in the light of the market conditions then prevailing or being anticipated.

17. On the technical side, multiplex operators may have the incentive to make access to all digital terrestrial services hassle-free by enabling reception of all services by one single set-top box. As such, they may coordinate their network rollout based on the same standard or interoperable standards. As indicated in the first consultation, *the Government will consult the industry separately on the regulation of set-top boxes and integrated digital TV sets and on measures to ensure interoperability and accessibility on a non-discriminatory basis to safeguard consumer interests.*

### **Simulcast and transitional arrangements**

18. The transition from analogue to digital broadcast needs careful handling as it affects frequency allocation, simulcast arrangements, the licensing framework applicable to existing and new operators, and also the planning for the rollout of new digital services.

19. The transitional arrangements proposed in the first consultation were based on the availability of three SFN and three MFN multiplexes for Hong Kong (see paragraph 10 above). Instead of granting each existing terrestrial television broadcaster a multiplex for simulcast, we proposed to reserve a “guaranteed slot” (50% of the capacity of a

multiplex) on two different MFN multiplexes for the simulcast of the existing free-to-air analogue television channels operated respectively by ATV and TVB. On the other hand, ATV and TVB would need to go through the application procedure to secure the whole multiplexes (the remaining 50% outside the “guaranteed slot”) for rolling out new digital services.

20. In response to the first consultation, ATV and TVB pointed out that as half of the capacity of the designated MFN multiplexes would be used for simulcast, the remaining capacity would not be sufficient for rolling out new services such as HDTV programmes, which require the capacity of an entire multiplex. There would thus be no incentive for any operators to run these multiplexes.

21. As can be seen from paragraph 11 above, there are four SFN and one MFN multiplexes available for Hong Kong according to the latest frequency plan. Given that our objective is to guarantee multiplex capacity for ATV and TVB to facilitate their transition to digital broadcasting and that the operation of an MFN multiplex requires close coordination between the existing terrestrial broadcasters on re-tuning some existing analogue frequency channels, *we propose that the only MFN multiplex available under the latest frequency plan be assigned to ATV and TVB for simulcasting the existing analogue programme channels in both analogue and digital forms. ATV and TVB will share the capacity of this multiplex equally and may use any spare capacity to roll out additional services.*

22. On this basis, we propose that the period of validity of this direct assignment of the MFN multiplex should tally with that of their existing carrier licences (from 1 December 2003 to 30 November 2018). The direct assignment should be subject to the following conditions:

- (a) ATV and TVB must start simulcast in 2006 and reach territory-wide digital coverage in 2008 in accordance with the specific dates to be appointed by the Secretary for Commerce, Industry and Technology;
- (b) ATV and TVB must share facilities, including equipment rooms and antenna mounting towers at hilltop sites, with new

network operator(s) if directed by the Telecommunications Authority; and

- (c) ATV and TVB must each or jointly submit a plan on the promotion of consumer take-up of DTT broadcasting. This may include regular publicity campaigns to raise public awareness until analogue switch-off.

23. The proposed dates of simulcast and full coverage would give ATV and TVB sufficient lead time to implement digital broadcasting. The detailed network rollout timetable will be incorporated into their multiplex licences which will be carrier licences as explained in the following paragraph.

### **Multiplex licensing framework**

24. In the first consultation paper, we recommended that multiplex operators, programme service providers and additional services providers<sup>10</sup> would be licensed separately. Multiplex licences and additional services licences would be carrier licences and Public Non-exclusive Telecommunications Service (PNETS), respectively, under the Telecommunications Ordinance (Cap. 106). A multiplex operator might reserve up to 25% of the capacity of a multiplex for additional services. There would be no mandatory requirements for HDTV programmes and mobile reception at the initial stage of implementation of DTT broadcasting. Programme service providers would continue to be licensed under the Broadcasting Ordinance (Cap. 562). *We intend to adopt these proposals given the clear support for them we received in the first consultation.*

25. As regards the allocation and licensing of multiplexes, we proposed in the first consultation that a multiplex operator should not operate more than two multiplexes and a television programme service provider should not occupy multiplex capacity of more than one multiplex (excluding the capacity for simulcast by the existing terrestrial television broadcasters). We also suggested that only domestic television programme

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<sup>10</sup> An additional services provider could be the multiplex operator or a third-party service operator renting the transmission service from the multiplex operator.

services<sup>11</sup> should be carried on the multiplexes.

26. There were diverse views on the proposed restrictions on the number of multiplexes that a multiplex operator might operate and on the multiplex capacity that a television programme service provider might occupy. Some supported such restrictions on grounds of promoting competition, while some considered such arbitrary restrictions unnecessary, as market forces would establish how many operators the market could accommodate. Some respondents considered it unnecessary to restrict television programme services carried on multiplexes to domestic television programme services only.

27. We have reviewed the issue of allocation of the four SFN multiplexes under the agreed frequency plan. We agree that the restrictions proposed in the first consultation paper may affect adversely a multiplex operator's ability to achieve economies of scale by operating more multiplexes and limit a television programme service provider's flexibility in rolling out enhanced services. We therefore propose to remove the restrictions contemplated in the first consultation paper. Instead, the licences for operating these multiplexes will be awarded through an open, competitive process. ATV and TVB may apply for further multiplexes, in addition to the MFN multiplexes directly assigned to them for simulcast, to roll out new services such as multi-channel broadcasting or HDTV programmes.

28. This approach is consistent with what we put forward in the first consultation. It ensures smooth digital transition by guaranteeing the existing broadcasters adequate spectrum capacity to simulcast and at the same time allows both incumbents and new players the opportunity to operate the SFN multiplexes for new services based on the merits of their proposals in the competitive process. We are sensitive to the possible concerns from ATV and TVB about this arrangement. However, in our view, the alternative of allowing ATV and TVB to take up the SFN multiplexes on a priority basis, and allocating any remaining multiplexes

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<sup>11</sup> There are four kinds of television services under the Broadcasting Ordinance (Cap. 562), namely domestic free television programme service, domestic pay television programme service, non-domestic television programme service (these are essentially satellite television service uplinking from Hong Kong targeting the region) and other licensable television programme services (communal or hotel television services).

through an open process will be undesirable. It may deny prospective new players market entry, discourage competition, deprive the public of alternatives based on merits of services and programmes, and not represent the best use of limited spectrum resources. On balance, we maintain the open application method as proposed in the first consultation, but grant ATV and TVB the MFN multiplex for simulcast as the way forward.

29. At this stage, we envisage a two-stage process in selecting licensees for the SFN multiplexes. Subject to the outcome of this consultation, we would invite expression of interest in the second half of 2004 to gauge market interest and receive broad proposals based on the Government's requirements. In the light of the responses received the Government may ask short-listed parties to submit detailed proposals for assessment with a view to issuing licences to the deserving applicants within the limitations of spectrum availability.

30. Details of the relevant criteria and processes will be announced in due course. At this stage we envisage the importance of the following broad criteria, which were generally supported in submissions to the first consultation:

- (a) rollout timetable and geographical coverage of DTT broadcasting;
- (b) business plan for promoting early consumer take-up of DTT broadcasting;
- (c) service profile on multiplexes, including the mix of television programme services and additional services, the availability of HDTV and/mobile reception and the timing of their availability where applicable; and
- (d) the impact on competition and efficient use of multiplex capacity.

31. It is envisaged that the general conditions of a multiplex licence include the necessary requirements to provide carrier service to television programme service licensees and additional service licensees in

a non-discriminatory way, to comply with relevant technical standards and to fulfill the commitments on network coverage, investment and service obligations as contained in the application documents.

32. In order to enrich the choice of viewers, we will allow all television programme services licensed under the Broadcasting Ordinance to be carried on the multiplexes.

### **Analogue Switch-off**

33. The Government recommended in the first consultation that it would conduct a review within five years of the commencement of simulcast or when the penetration of DTT broadcast reaches 50% of all TV households, whichever is earlier, to decide whether, and if so, when analogue broadcast should be switched off. We intend to adopt this recommendation in the light of the public support received.

### **Conclusion on the way forward for DTT**

34. Our proposals above have set out a reasonable timetable for the rollout of DTT broadcasting. Through the proposals in the first and this second consultations, the Government has set out its views clearly on smooth digital transition. There would be opportunity for the existing terrestrial television broadcasters to provide enhanced services and for more competition. The transition from analogue broadcasting to DTT broadcasting would be a long process. The Government would coordinate among different parties during this process and plan a smooth analogue switch-off at a later stage. We look forward to close collaboration with the two existing terrestrial television broadcasters and new investors in the imminent future to bring DTT broadcasting and its enhanced services to the viewers of Hong Kong.

### **Digital audio (DA) broadcasting**

35. The Government has made available L-Band frequencies for DA Broadcasting service in Hong Kong. While the DA Broadcasting technology can deliver better sound quality and enhanced services (e.g. teletext, data, graphics and low quality video), it appears that commercially



viable models of DA broadcasting exploiting the full potential of the technology are not yet available. On the other hand, digital receivers are becoming more affordable. Low-end portable receivers costing about HK\$1,000 are available in the market. Variants of DA broadcasting technologies such as Digital Radio Mondiale or DRM<sup>12</sup> are also emerging.

36. We maintain our recommendation in the first consultation that the launch of DA broadcasting services should be market-led. The existing sound broadcasters should be allowed, under their respective licence conditions, to continue to make use of the AM/FM frequencies for analogue broadcast.

37. Nevertheless, we consider that there should be no regulatory obstacles to the deployment of new technologies and entrepreneurial ventures to launch innovative services including digital transmission of specialised info-data to specified user groups (e.g. transmission of information to buses). We propose that parties interested in launching digital radio services may apply for the Telecommunications Authority's approval to roll out trial services. Also, since broadcasters in some overseas countries (e.g. the UK) use Band III frequencies for DA broadcasting, the Telecommunications Authority will consider, subject to spectrum availability, applications for using Band III frequencies for DA broadcasting.

38. In the first consultation, we took the opportunity to consult the public on the proposal to rationalize the regulatory regime for radio services by bringing it under the Broadcasting Ordinance. We received favourable responses in the submissions. Proposals in this respect will be included in the consultation paper on the review of the broadcasting regulatory regime to be published in 2004.

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<sup>12</sup> DRM is a system that implements digital radio in today's AM frequency bands.

## Summary of Development of Digital Terrestrial Television Broadcasting in Other Economies

### A. Europe

Economies	Standard	Progress
UK	DVB-T	<ul style="list-style-type: none"> <li>• DTT launched in November 1998. Target to achieve analogue switch-off in 2006-2010.</li> <li>• The pay DTT service provider ITV Digital collapsed in early 2002. ITV Digital's multiplexes were awarded to a consortium of BBC, Crown Castle and BskyB, which launched free DTT services "Freeview" in October 2002. Coupled with the availability of low cost set-top boxes, consumer take-up is gaining momentum.</li> <li>• Currently, 6 national multiplexes cover about 70-80% of population. There are now over 2 million DTT households (8% penetration), including those possessing the set-top boxes sold before the closure of ITV Digital and after the launch of Freeview.</li> </ul>
Sweden	DVB-T	<ul style="list-style-type: none"> <li>• DTT launched in September 1999. Target to achieve analogue switch-off in 2008.</li> <li>• Pay TV model.</li> <li>• 4 multiplexes currently covering 90% of population with about 175,000 DTT households (3-4 % penetration). Sales of set-top boxes started growing during the summer of 2003.</li> </ul>
Finland	DVB-T	<ul style="list-style-type: none"> <li>• DTT launched in August 2001. Switch-off date has not been finalized. A working group has to report to the government in December 2003 with suggestions.</li> <li>• Free services (one pay service started in Autumn 2003).</li> <li>• About 140,000 DTT households (5-6% penetration) currently.</li> </ul>
Spain	DVB-T	<ul style="list-style-type: none"> <li>• DTT launched in May 2000. Analogue switch-off targeted in 2012. There are 5 national and 1 regional multiplexes.</li> <li>• About 200,000 DTT households before Quiero lost its national multiplex due to breach of licence conditions in 2002. Quiero then sold its assets to Retevisión, whose channels are now free to air. Net TV and VEO TV launched DTT in 2002. The main problem today is the lack of set-top boxes. The government will grant over 700 local licences as there are a lot of local television channels in Spain, which has 17 autonomous regions.</li> <li>• Government is considering measures to boost DTT take-up and will adopt a new free-to-air DTT platform modeled on the UK's successful Freeview service.</li> </ul>

<b>Economies</b>	<b>Standard</b>	<b>Progress</b>
Germany	DVB-T	<ul style="list-style-type: none"> <li>• DTT first launched in Berlin area in November 2002.</li> <li>• Free TV model. Between 160,000 and 200,000 boxes have been sold since launch. There are 160,000 terrestrial-only households in the area, so presumably all of them are now receiving DTT.</li> <li>• DTT transmissions will commence in other German metropolitan regions in 2004. Target to have analogue switch-off in 2006-2010.</li> <li>• Berlin and the surrounding Brandenburg area achieved analogue switch-off in August 2003, the first in the world, largely due to heavy reliance on cable and satellite for TV reception.</li> </ul>
Netherlands	DVB-T	<ul style="list-style-type: none"> <li>• DTT launched in April 2003 by single commercial operator Digitenne, which was allocated with 4 national multiplexes. DTT can be received by small indoor aerial (most houses do not have aerials on the roof as the country is very cabled).</li> <li>• Pay TV model (only one free-to-view channel).</li> <li>• A fifth multiplex will be allocated for national and regional public TV service.</li> <li>• Coverage at launch was 20% of the population and aimed at areas that have bad cable services. By end 2004, 50% of the country should be covered.</li> <li>• Target to have analogue switch-off starting from 2004.</li> </ul>
France	DVB-T	<ul style="list-style-type: none"> <li>• The regulator, CSA, formally issued DTT licences in June 2003. DTT services are expected to be launched in 2004.</li> </ul>
Italy	DVB-T	<ul style="list-style-type: none"> <li>• Pilot trial of DTT in progress.</li> <li>• Grant of 2 multiplexes expected in January 2004, one national and one regional. Initial coverage for 50% of the population in the 20 regional capitals. Extension of coverage in 2005 to 70% of the population in all provincial capitals.</li> <li>• Free-to-air service with government subsidizing set-top boxes with MHP.</li> <li>• Target to have analogue switch-off in January 2007.</li> </ul>

## B. North and South America

Economies	Standard	Progress
USA	ATSC	<ul style="list-style-type: none"> <li>• DTT implementation according to the following timetable set by Federal Communications Commission (FCC) in good progress : <ul style="list-style-type: none"> <li>1 May 1999 Coverage of 10 largest markets</li> <li>1 November 1999 Coverage of top 30 markets</li> <li>1 May 2002 All other commercial stations on air</li> <li>1 May 2003 All non-commercial stations</li> <li>2006 Switch-off of analogue service</li> </ul> </li> <li>• In August 2002, the FCC adopted a plan that requires all new TV sets to incorporate off-air digital TV tuners by 2007.</li> </ul>
Canada	ATSC	<ul style="list-style-type: none"> <li>• Test transmissions being carried out. The first commercial DTT station went on the air in Toronto in early 2003.</li> </ul>
Brazil		<ul style="list-style-type: none"> <li>• Decision on the DTT standard yet to be made.</li> </ul>
Argentina	ATSC	<ul style="list-style-type: none"> <li>• Formally adopted ATSC in end 1998.</li> </ul>

## C. Asia & Oceania

Economies	Standard	Progress
Mainland China		<ul style="list-style-type: none"> <li>• Launch of digital television will begin with cable and satellite systems and followed by terrestrial systems.</li> <li>• 5 proposed DTT standards were tested in 2002 and evaluation activities for adoption of a national DTT standard are still on-going. At present, the DMB-T system of Tsinghua University and ATDB-T system of Jiaotong University are reported to be the most promising candidates for consideration as the national standard.</li> <li>• Trial networks using DVB-T are being built in major cities like Shanghai for mobile reception. The concerned broadcast operators are required to change the modulator back to the national standard once the latter is decided.</li> <li>• Latest DTT Implementation Timetable <ul style="list-style-type: none"> <li>- Before 2005: Adopt national DTT standard</li> <li>- 2005: Formal launch of DTT</li> <li>- 2015: Analogue switch-off</li> </ul> </li> </ul>
Australia	DVB-T	<ul style="list-style-type: none"> <li>• DTT launched in January 2001 in five largest cities.</li> <li>• Current coverage exceeds 65% of population with reported 130,000 DTT households.</li> </ul>

<b>Economies</b>	<b>Standard</b>	<b>Progress</b>
Singapore	DVB-T	<ul style="list-style-type: none"> <li>• Launch of DTT in February 2001 by government-owned MediaCorp for mobile reception in public buses under the brand of TV Mobile.</li> <li>• Pilot trial of DTT for fixed reception in operation. Full scale service subject to commercial decision.</li> </ul>
Japan	ISDB-T	<ul style="list-style-type: none"> <li>• DTT broadcast will begin with three major urban areas (Tokyo, Osaka and Nagoya) in December 2003. Other regions to launch by 2006.</li> <li>• Aim to switch off analogue TV by 2011.</li> </ul>
South Korea	ATSC	<ul style="list-style-type: none"> <li>• One of the first nations outside America adopting the ATSC standard for digital terrestrial broadcasting in 1997. DTT was launched in October 2001 and is expected to provide coverage to 70% of population by end 2003.</li> </ul>
Taiwan	DVB-T	<ul style="list-style-type: none"> <li>• Government originally favoured the ATSC standard as a natural evolution from its analogue NTSC system. However, the broadcasters prefer the DVB-T standard. In June 2001, the government agreed to follow a technology neutral approach and adopted the DVB-T standard recommended by the Television Academy of Arts &amp; Sciences representing the 5 TV broadcasters.</li> <li>• DTT was launched in April 2003. Full implementation aimed by 2006.</li> </ul>