

Broadband Interconnection

Statement by the Telecommunications Authority of Hong Kong

14 November 2000

0 Summary of Conclusions

0.1 Basic ground rules should be formulated for the regulation of broadband interconnection and the Telecommunications Authority (TA) should be prepared to determine the terms and conditions of broadband interconnection should commercial negotiations fail.

0.2 The lower limit for the applicability of the regulatory framework for broadband interconnection should be 144 kbps.

0.3 Further studies on the technical feasibility of and the standards and commercial products available for Type I interconnection between core networks are necessary before such an interconnection is to be mandated. The Telecommunications Standards Advisory Committee (TSAC) under the auspices of the Office of the Telecommunications Authority (OFTA) should undertake the studies and continue to monitor developments in international standards setting bodies, and formulate standards for adoption in Hong Kong where appropriate.

0.4 When making a final decision on mandating Type I interconnection, due consideration should be given to the availability and effectiveness of other forms of broadband interconnections, e.g. interconnection through Internet Protocol (IP) networks, to provide end-to-end broadband connections of the required capacity and efficiency to customers.

0.5 Type II interconnection should be mandated at any technically feasible points along the local loops of the local wireline-based fixed

networks.

0.6 Type II interconnection should be made available for all local loops of all local wireline-based fixed networks.

0.7 Type II interconnection to the wireless sections of the local wireless fixed networks are best left to commercial negotiations and agreements.

0.8 Type II interconnection should be available to enable access to in-building block-wiring systems and In-building Coaxial Cable Distribution systems (IBCCDS).

0.9 Both “full bandwidth option” and “partial bandwidth option” should be available for Type II interconnection to local loops.

0.10 OFTA should conduct a study together with the industry on the interference problems associated with Type II interconnection for broadband services, for both the “full bandwidth option” and the “partial bandwidth option”.

0.11 Type II interconnection should only be required on local loops based on the copper medium at this stage. As the coverage of fibre-to-the-building increases to a significant percentage, the TA may re-visit the issue of Type II interconnection to optical fibres in the customer access networks through another round of consultation.

0.12 Type II interconnection for broadband services should be made available for local loops of all local wireline-based fixed networks after end-February 2001. No distinction would be drawn between local loops existing in July 1997 (when the 1997 TA Statement on availability of Type II interconnection for broadband services was issued) and those installed after that time.

0.13 Service providers are in practice customers of network operators in the wholesale market and thus a pure “carrier-to-carrier” status would not be appropriate in broadband interconnection between network operators and service providers.

0.14 The TA will consider requests for determination of interconnection from service providers if the circumstances so justify.

0.15 “Open access” should apply to the hybrid fibre coaxial (HFC) network of Hong Kong Cable Television Limited (HKCTV) as this is a licence obligation accepted by HKCTV.

0.16 Interconnection to backbone and trunk networks is a form of interconnection covered under section 36A of the Telecommunications Ordinance. However, the TA would only invoke this power for determination of interconnection to backbone and trunk networks when such regulatory intervention is found to be necessary to facilitate fair competition or to protect consumer interest.

0.17 An appropriate charging model, which takes account of the capital and operating costs, plus a reasonable cost of capital commensurate with the risk of the network investment, should produce levels of interconnection charges that fairly compensate the network investors, provide incentives for new entrants in infrastructure investment and offer opportunities for the service providers to extend their services to the end-users.

0.18 The level of regulatory intervention should be minimized. The network operators and service providers should be allowed to negotiate and agree on a commercial basis. When these attempts have failed, the TA would mediate or make determinations based on the predetermined principles described in this Statement.

0.19 The Long Run Average Incremental Cost (LRAIC) pricing model based on the “total service” and “forward looking” approach would be adopted as the pricing model for the determination of interconnection charges as it best reflects pricing in a competitive market. It would also ensure fair competition and efficient allocation of resources, as well as maintain incentive on infrastructure investments.

0.20 The forward-looking or replacement cost standards should be adopted for broadband interconnection as they reflect the current costs in

investing in and operating network infrastructure.

0.21 The TA would take into consideration all the relevant risks incurred by the incumbent operators and new entrants in network investment and would conduct detailed studies on the level of the cost of capital commensurate with the risks.

0.22 More studies are required to establish whether the “peering” or “inter-offset” arrangements are appropriate for usage charges for interconnection.

0.23 No particular structure for interconnection charges needs to be mandated at this stage. However, an important principle is that the structure of charges should reflect the underlying cost behaviours.

0.24 Determinations on the terms and conditions of broadband interconnection should be extended to cover the provision of essential support elements where necessary.

I Introduction

1.1 On 3 November 1999, the TA issued an industry consultation paper entitled “Broadband Interconnection – an Industry Consultation Paper” (first consultation paper) which sought industry’s comments on the regulatory framework for interconnections between networks, and between networks and services in the broadband environment. The consultation paper covered various issues related to broadband interconnection, including the need for regulatory intervention, the definition of “broadband”, the types of interconnection available, the general principles for interconnection determination and the charging principles for the determination of interconnection charges.

1.2 A total of 21 submissions were received in response to the first consultation paper. Taking into consideration the comments from the submissions, as well as further information on the latest development in the market and regulation in overseas jurisdictions at that time, the TA had formed some preliminary views on the issues. On 14 June 2000, the TA

issued another consultation paper entitled “Broadband Interconnection – Analysis of Comments Received, Preliminary Conclusions and Further Industry Consultation” (second consultation paper). In the paper, the TA presented his preliminary views on the issues and sought further comments on these views before he finalizes the regulatory framework for broadband interconnection.

1.3 In response to the second consultation paper, the TA received a total of 12 submissions from the following companies and associations:

- (1) AOL Asia Limited (AOL)
- (2) Cable & Wireless HKT Limited (now renamed Pacific Century CyberWorks HKT or PCCW HKT)
- (3) City Telecom International (CTI)
- (4) Consumer Council
- (5) Galaxy Satellite Broadcasting Limited (GSBL)
- (6) Hong Kong Cable Television Limited (HKCTV)
- (7) Hutchison Global Crossing Limited (HGCL)
- (8) Level 3 Communications Limited (Level 3)
- (9) New T & T Hong Kong Limited (New T & T)
- (10) New World Telephone Limited (NWT)
- (11) SmarTone Broadband Services Limited (SmarTone Broadband)
- (12) SmarTone Mobile Communications Limited (SmarTone Mobile)

1.4 Taking into consideration the views received in the two rounds of consultation, the TA sets out the finalised regulatory framework for broadband interconnection in this Statement.

II Whether Regulation is Necessary for Broadband Interconnection

2.1 From the first consultation paper, the TA has recognised the need to strike a proper balance between the promotion of open access and effective competition, and the maintenance of commercial incentive for continued investment for the rollout of the broadband infrastructure.

2.2 In the response to the first consultation paper, PCCW HKT and HKCTV considered that regulation in broadband interconnection was not necessary and would distort market forces. They considered that sufficient competition and choice of access alternatives would soon be available. On the opposite side, the majority of views in the industry were inclined to agree that a certain degree of regulation in broadband interconnection would be necessary for creating a healthy and competitive environment for the operators to launch broadband services to the public in an efficient manner.

2.3 In paragraph 2.6.7 of the second consultation paper, the TA stated that, based on the considerations that the development of alternative access networks would be immature in the initial years and that bottleneck potentially exists in the in-building wiring systems, he took the preliminary views that basic ground rules should be formulated for the regulation of broadband interconnection and the TA should be prepared to determine the terms and conditions of broadband interconnection should commercial negotiations fail.

2.4 The submissions in response to the second consultation paper were generally supportive of the TA's preliminary views. PCCW HKT and HKCTV, however, maintained their positions.

2.5 PCCW HKT repeated its views that a cautious approach should be adopted to apply regulation to the broadband market. It submitted that considerable progress had been made in broadband coverage and penetration without regulatory intervention. It also submitted that interconnection charges set by regulation might not sustain investment incentives.

2.6 HKCTV commented that its network was still in the process of being constructed for the provision of telecommunications services. At the time of issuing the first consultation paper, the HFC network of HKCTV passed less than half of the homes in Hong Kong. HKCTV had commenced to upgrade its HFC network to carry broadband Internet traffic only from January 2000 when it was awarded a fixed telecommunications network services (FTNS) licence. HKCTV also pointed out that its

480,000 subscribers were analogue pay-TV subscribers and not broadband digital subscribers. It therefore had difficulty with the concept that its network still under construction would in some way be deemed to be “mature” and be a target of regulatory action because of its deemed “mature” status.

2.7 As regards the potential bottleneck problem for customer access, HKCTV considered any benefit that it might have because of its ownership of many of the 750 MHz bandwidth IBCCDS was negated when the TA limited the spectrum available for HKCTV’s use in his Statement of 15 July 1999 entitled “Frequency Layout Plan of IBCCDS”.

2.8 HGCL saw regulations for broadband interconnection on a general basis as premature and, to the extent that there were no common technical standards yet, almost impossible. However, it supported the view that regulation over bottleneck facilities, such as in-building wiring systems, is desirable in the interest of promoting competition in the market.

2.9 In response to the views expressed by PCCW HKT, the TA considers that although the coverage and penetration of broadband services have been expanded considerably in the past months, this was largely the result of marketing effort of PCCW HKT and HKCTV. The choice to consumers in the market remained to be limited. The coverage of the new local wireless fixed networks is insignificant and as given in paragraph 2.3 of the second consultation paper, the coverage of these new networks would remain to be limited as compared with that of the networks of PCCW HKT and HKCTV by the end of 2002. The concerns of PCCW HKT of interconnection charges set by regulation adversely affecting investment incentive is an issue more appropriately addressed in the establishment of charging principles for the determination of interconnection charges.

2.10 In response to the views of HKCTV that its network for telecommunications is not “mature”, the TA notes that its optical fibre network infrastructure had passed over one million homes by April 2000 and would pass 1.74 million homes by the end of 2002. The TA considers that the coverage of over 50% homes is much more significant than the other emerging networks. The principal barrier to reach customers is the

bottleneck of the customer access networks (sometimes referred to as the “last mile”) as the rollout of this part of the infrastructure takes time and may be restricted by physical constraints. Although the connections to the coaxial cable networks of HKCTV are still being progressively changed over from microwave to fibre, the coaxial cable systems are already in place and passing premises of potential customers. Hence, the “last mile” of HKCTV’s broadband infrastructure already exists and is readily available for the delivery of broadband services once the necessary cable modem equipment is attached to the transmission medium.

2.11 The responses to the second consultation paper have not changed the view of the TA that, compared with the networks of PCCW HKT and HKCTV, the alternative customer access networks are still being rolled out and the coverage in the initial years would be small. As many of the end-users would be accessible only through one of the two incumbents’ networks in the initial years, interconnection to these two networks would be the most effective means of bringing the benefits of competition to consumers at an early date.

2.12 As pointed out by many submissions, commercial negotiations without the guidance of a framework would take too long and the new entrants would be at a disadvantage because of asymmetry in bargaining power. Laying down some fundamental rules would ensure that commercial negotiations can be efficiently concluded for the interconnection so that effective competition in the broadband market and the associated consumer benefits would not be delayed. The TA would ensure that intervention will be kept to a minimum and he would only be prepared to determine the terms and conditions should commercial negotiations fail.

2.13 The TA notes that although PCCW HKT cautioned against regulatory intervention in broadband interconnection, it nevertheless supported mandating interconnection to in-building wiring systems which it accepted as bottlenecks. HKCTV recommended that the TA should implement broadband interconnection using a very cautious approach, by setting basic ground rules and not intervening unless that there was clear market failure or abuse, and taking minimum action if intervention was required. The TA notes that HKCTV’s position is quite similar to what the

TA has proposed.

2.14 In conclusion, having reviewed the submissions in response to the second consultation paper, the TA had identified no new arguments which would lead to the TA changing his preliminary view in the first consultation paper. The TA therefore re-affirms his views stated in paragraph 2.3.

III Regulatory Framework for Broadband Interconnection

3.1 Definition of “Broadband”

3.1.1 As explained in the second consultation paper, the definition for “broadband” was meant to establish a boundary between the regulatory frameworks for “narrowband” and “broadband” interconnection.

3.1.2 In paragraph 3.1.3 of the second consultation paper, the TA took the preliminary view that the interconnection of services of transmission rates up to 144 kbps, including public switched telephone network (PSTN) services, should be considered under the existing narrowband interconnection framework while interconnection of services of transmission rates above 144 kbps should be dealt with under the broadband interconnection framework to be developed.

3.1.3 New T & T and NWT considered that there was no need to draw a distinction between narrowband and broadband for the regulatory frameworks for Type II interconnection. New T & T was of the view that the removal of the distinction would allow quicker rollout of the services requiring higher bandwidth to meet market demand. NWT did not see any logic of adopting different cost models for the same access medium only to reflect it is being used to carry broadband services. AOL likewise suggested that broadband and narrowband networks should not be treated as distinct networks and the application of different regulatory principles would be likely to result in inconsistencies. CTI suggested that the present narrowband regulatory framework should be extended to cover transmission rates up to 1.544 Mbps. The other submissions responding to the issue were generally supportive of TA’s preliminary view.

3.1.4 The TA considers that drawing a distinction between the frameworks for narrowband and broadband interconnection would enable a proper consideration of the broadband investment and operating environment to be carried out without pre-empting the conclusion that the narrowband regulation would be automatically extended to the broadband market. The boundary between the two regulatory frameworks does not mean that the two frameworks necessarily have to be different, as some submissions have apparently suggested. It would enable the TA to consider if the existing rules for narrowband interconnection would be conducive to the development of competition and consumer choice in broadband services. It would also enable TA to consider if there is any substantial difference in risk for investment in a broadband network because of uncertainty in future demand.

3.1.5 As the regulatory framework for Type II interconnection up to basic ISDN rate i.e. 144 kbps has already been established, it is reasonable and logical to use the 144 kbps as the lower limit for the applicability of the regulatory framework for broadband interconnection. The TA re-affirms his view stated in paragraph 3.1.2.

3.2 Types of Interconnection Configurations to be Available

Network to Network Interconnection - Type I Interconnection

3.2.1 Type I interconnection is interconnection between the gateways of core networks. For the narrowband PSTN, Type I interconnection has been mandated so that customers connected to any network can communicate with customers, and access service providers, connected to any other networks (such capability being called the “any-to-any” connectivity).

3.2.2 In paragraphs 3.2.3 and 3.2.6 of the second consultation paper, the TA:

- ◆ proposed to mandate interconnection between networks with broadband capacity if such interconnection is necessary to achieve “any-to-any” connectivity;

- ◆ considered that further studies on the technical feasibility of, the standards and commercial products available for, Type I interconnection between core networks are necessary before such interconnection should be mandated. The Telecommunications Standards Advisory Committee (TSAC) under the auspices of OFTA should undertake this study and continue to monitor developments in international standards setting bodies, and formulate standards for adoption in Hong Kong where appropriate; and
- ◆ considered that the final decision on mandating Type I interconnection should depend on the availability and effectiveness of other forms of broadband interconnections, e.g. interconnection through Internet Protocol (IP) networks, to provide end-to-end broadband connections of the required capacity and efficiency to customers.

3.2.3 The majority of the submissions supported the TA's proposal and considerations. Although PCCW HKT re-iterated the success of "any-to-any" connectivity of the Internet achieved through market forces to support its position that mandating Type I interconnection was not necessary, both NWT and Level 3 did not consider it appropriate to draw analogy from the Internet environment. Both operators opined that while "any-to-any" connectivity had been achieved in the fully competitive Internet environment, the significant difference in market shares for the broadband core networks between the dominant and other operators would lead to imbalance in their bargaining positions in negotiations for interconnection. Without the necessary regulatory measures, the policy objective of "any-to-any" connectivity might not be achieved efficiently. SmarTone Broadband proposed that the TA should mandate Type I interconnection among all four wireline-based FTNS operators and HKCTV, and the emerging broadband mobile data networks.

3.2.4 In response to the views expressed by PCCW HKT, NWT, Level 3 and SmarTone Broadband on the need for Type I interconnection between broadband core networks, the TA considers that although core networks could be interconnected through IP backbones and local Internet

exchanges, the efficiency and capacity of such interconnection must be observed to assess if it is equivalent to Type I interconnection between core networks. For example, without direct interconnections between the Asynchronous Transfer Mode (ATM) core networks, the users connected to one ATM network could only be connected to the Internet service providers (ISP) connected to the same network (through the “virtual circuits” established through the network). It would not be possible for the users to choose to be connected through ISP connected to other ATM networks. Although the users may access the services connected to other ATM core networks through the Internet backbone or local Internet exchange, such interconnection links might be bottlenecks.

3.2.5 The TA’s proposal to study with a view to adopting the interim and long-term standards before the TA would mandate Type I interconnection was generally supported. PCCW HKT cautioned that, in the absence of established gateway nodes in the architecture of the local ATM networks, the TA should not attempt to mandate interconnection standards which would pre-empt technological and market development. PCCW HKT also considered that any standards developed should comply with international standards. New T & T proposed to adopt Private Network-to-Network Interface (PNNI) as the interim standards for interconnection between broadband ATM networks, before Broadband Inter-Carrier Interface (B-ICI) products are available, in order to achieve timely implementation of Type I interconnection. NWT and SmarTone Broadband shared the views of early implementation of Type I interconnection and proposed that the TA should define a set of interim standards after consulting the industry.

3.2.6 Most submissions also urged the TA to form a special task force to commence the study on industry standards as soon as possible. CTI urged the study to be initiated and completed in three months. Most submissions considered that TSAC is the appropriate body to perform the study on the technical standards for Type I interconnection.

3.2.7 The TA acknowledges these comments and intends that a special working group be set up under the TSAC as soon as possible to study the technical standards for Type I interconnection in detail with a view to recommending an interim standard as soon as possible.

3.2.8 When mandating Type I interconnection, HKCTV requested the TA to ensure that broadband network operators should not over-rely on the regulator to provide preferential interconnecting charges thus undermining their incentives to build network infrastructure. The TA acknowledges HKCTV's concern, but considers that the issue is more related to the establishment of charging principles.

3.2.9 SmarTone Mobile proposed that, in view of the convergence of fixed/mobile services and the growing importance of mobile services to the public, mobile operators should be granted the same carrier status as FTNS operators in relation to Type I interconnection between fixed and mobile networks in both the setting of usage charges and the supply of interconnection facilities. In this respect, the issue raised by SmarTone Mobile has been separately addressed in the consultation exercise on the review of methodology for the calculation of interconnection charges between fixed networks and mobile networks (on which a TA Statement was issued on 25 October 2000).

Network to Network Interconnection - Type II Interconnection

3.2.10 Type II interconnection is the interconnection to customer access networks so that network operators without the customer access networks can also provide broadband services to customers through the customer access networks of other network operators.

3.2.11 In paragraphs 3.2.11 and 3.2.12 of second consultation paper, the TA took the following preliminary views on the availability of Type II interconnection:

- ◆ Type II interconnection should be available at any technically feasible points along the local loops of the local wireline-based fixed networks;
- ◆ Type II interconnection should be available on a reciprocal basis for all local loops of the local wireline-based fixed networks;
- ◆ Type II interconnection to the wireless sections of the local

wireless fixed networks should best be achieved through commercial negotiations and agreements; and

- ◆ Type II interconnection should be available to enable access to in-building block-wiring systems.

3.2.12 Most submissions supported the TA's view of mandating Type II interconnection to local loops for the provision of broadband services. AOL supported the availability of Type II interconnection at any technically feasible point. Though PCCW HKT reiterated that mandated interconnection was not necessary, it commented that, if the TA decided to mandate Type II interconnection, it would be important that the interconnection obligations should apply equally to all local wireline-based FTNS operators.

3.2.13 On the other hand, New T & T and HGCL considered that the TA should only mandate Type II interconnection to the local loops of PCCW HKT only, not to the local loops of the non-dominant local wireline-based fixed network operators. New T & T considered it logical that the TA should only mandate PCCW HKT to provide Type II interconnection at its local loops which cover 95% of homes and offices in Hong Kong. New T & T and HGCL also considered that TA's proposal would undermine their incentive to continue their network rollout. If TA decided to mandate Type II interconnection at their local loops, HGCL requested a three-year exemption period for all new local wireline-based and wireless fixed network operators.

3.2.14 The TA notes the arguments raised by HGCL and New T & T and would like to refer to the current regulatory framework of Type II interconnection for narrowband services as described in his Statement No. 6 in the series "Interconnection and Related Competition Issues" issued on 3 June 1995. The general principles laid down in the TA Statement No. 6 were that Type II interconnection should be available to the local loops of *all four wireline-based FTNS operators on a reciprocal basis*. The TA however notes that such extension of the principles is largely academic as the wireline-based local fixed networks of the non-dominant operators are mainly based on fibre-to-the-building configurations and there are hardly any local loops for other FTNS operators to interconnect to at the local

exchanges. Other FTNS operators would seek interconnection to the in-building blockwiring systems owned by the non-dominant operators. The TA therefore does not see how the symmetrical application of Type II interconnection for narrowband services to the local loops of PCCW HKT and the non-dominant local wireline-based fixed network operators would undermine the commercial incentives of the latter. The TA considers that the same set of considerations applies equally well to the broadband environment and hence different treatments should not be given to the PCCW HKT and the other local wireline-based FTNS operators in the availability of Type II interconnection to local loops. Accordingly, Type II interconnection should be made available for all local loops of all local wireline-based fixed networks.

Type II interconnection as Applied to Local Wireless FTNS Operators

3.2.15 PCCW HKT, HKCTV and New T & T did not agree to the TA's preliminary proposal in the second consultation paper that Type II interconnection to the wireless sections of wireless FTNS networks should be left to market forces. PCCW HKT, HKCTV and New T & T considered it unfair to impose asymmetric access obligations to different types of FTNS operators and opined that such obligations should be imposed on a reciprocal basis.

3.2.16 In response to the concerns expressed, the TA maintains the views that the local wireless networks had limited coverage during their initial rollout period and that alternatives of more extensive coverage exist. In order not to undermine the commercial incentives of investment in the wireless infrastructure, it is appropriate for the Type II interconnection to the wireless hubs to be left to commercial negotiations between the wireless FTNS operators and the party seeking such interconnection. Furthermore, Type II interconnection to the wireless hubs would only have limited impact on the level of competition because of the limited coverage of the wireless networks. The TA is also concerned about the relatively limited capacity of the wireless FTNS networks due to the limited width of radio spectrum allocated to each wireless FTNS operator. If wireless FTNS operators were obliged to provide Type II interconnection over the wireless sections to wireline-based FTNS operators, it might impose certain constraints to the dimensioning and future deployment of the

wireless FTNS networks.

3.2.17 The TA therefore considers it appropriate to leave the interconnection to the wireless sections of the wireless FTNS networks to market forces. The power of determination of interconnection to the wireless sections of the wireless FTNS network is available, but determination would only be made only if it can be established that without such interconnection, the level of competition would be significantly lessened, e.g. there are no other technical alternatives available for accessing the customers concerned.

3.2.18 It should be made clear that the above would apply only to interconnection to the wireless hubs of the wireless networks. Interconnection to the in-building wiring systems operated or used by the wireless FTNS operators is a separate issue and Type II interconnection to such in-building wiring systems would be mandated (see paragraph 3.2.23 below).

3.2.19 On the question of which operators should be entitled to the right of Type II interconnection, NWT considered that Type II interconnection to the local loops of wireline-based FTNS operators should not be available to wireless FTNS operators. PCCW HKT opined that asymmetric obligations might lead to the wireless FTNS operator “cherry picking” in the rollout of their local multipoint distribution system (LMDS) infrastructure, relying on infrastructure of wireline-based FTNS networks in high risk areas and undermine their incentive.

3.2.20 The TA agrees that Type II interconnection to the local loops should not be available to the wireless FTNS operators. The purpose of licensing the wireless fixed network operators was to encourage them to provide alternative customer access networks to bypass the local loops and this policy objective would be defeated by allowing them to develop their networks based on Type II interconnection to the local loops of the wireline-based FTNS operators. There is also the practical consideration of space limitation in the local exchanges of PCCW HKT and it would not be possible to accommodate the requirements of too many network operators seeking co-location for Type II interconnection.

Type II interconnection to In-Building Wiring Systems

3.2.21 Most of the submissions which commented on this issue recognised that the in-building wiring systems are bottlenecks in accessing the customers in the building and accepted that it would be necessary to mandate Type II interconnection to such systems.

3.2.22 Both SmarTone Broadband and PCCW HKT considered that the regulation of in-building wiring systems should be extended to include the IBCCDS. SmarTone identified in particular the Satellite Master Antenna Television (SMATV) systems to which the Type II interconnection framework should be extended. CTI considered that there was increasing demand for interconnection to IBCCDS for all types of services and asked the TA to further study the possible configuration for interconnection to such systems.

3.2.23 Recognizing that the lack of in-building blockwiring systems and IBCCDS are bottlenecks that hinder the choice of services, the TA considers that Type II interconnection should be mandated to enable access to these two types of in-building wiring systems. (SMATV systems are within the definition of IBCCDS.)

Configurations of Type II Interconnection

3.2.24 The first consultation paper identified three options for Type II interconnection, namely, the “full bandwidth” option, the “partial bandwidth” option and the “transmission service” option.

3.2.25 In paragraph 3.2.17 of the second consultation paper, the TA took the preliminary view that

- ◆ the “full bandwidth option” and the “partial bandwidth option” should be available; and
- ◆ in the event of adopting the “partial bandwidth option”, a lower bandwidth limit rather than an upper one might be specified so as to allow “line sharing” with the conventional narrowband telephone services and yet not to limit the capability to carry

higher bandwidth services.

3.2.26 PCCW HKT reiterated and emphasized the technical difficulties such as crosstalk and fault isolation associated with the Type II interconnection for local loops and opined that the “partial bandwidth option” should not be implemented. PCCW HKT also opined that, if the “full bandwidth option” is to be mandated, a maximum transmission rate should be set in order to avoid unmanageable interference problem.

3.2.27 On the other hand, most submissions supported the TA’s view that both the “full bandwidth option” and the “partial bandwidth option” should be available. Level 3 considered that only access to unconditioned copper pairs would enable full utilization of the transmission medium. As such, Level 3 considered that the “partial bandwidth option” should be regarded as a “temporary solution” for any non-availability of the “full bandwidth option”. Both New T & T and NWT considered the “partial bandwidth option” should be available provided that mutual interference between the basic and broadband services could be overcome. New T & T considered that “bundling” narrowband and broadband services in the same local loop would restrict choice to consumers. AOL pointed out that the “partial bandwidth option” would facilitate the customers in using both data and voice services on the same line, eliminating the need for customers to acquire a second line. AOL further considered that the “partial bandwidth option” would allow service providers to have direct access to their customers in the same way as the network operators thus promoting competition in the downstream market for both narrowband and broadband services.

3.2.28 SmarTone Broadband suggested that, in addition to copper local loops and hybrid fibre co-axial cables, the scope of Type II interconnection should include optical fibre cables. SmarTone Broadband was of the view that access to those buildings served by the “fibre-to-the-building” technology would be restricted if Type II interconnection covered only the copper transmission medium.

3.2.29 Taking into account the views from the industry, the TA considers that both “full bandwidth option” and “partial bandwidth option” should be available for Type II interconnection. For the latter option, a lower band

limit for the broadband channel rather than an upper one should be specified so as to allow the provisioning of both narrowband and broadband services on the same line.

3.2.30 The TA agrees that OFTA should conduct a study together with the industry on the interference problems associated with Type II interconnection for broadband services, for both the “full bandwidth option” and the “partial bandwidth option”. The work would involve the development of appropriate technical standards and coordination procedures among operators. The TA will set up a technical specialist group working on preventing or resolving the interference problems, including the concern raised by PCCW HKT on the maximum transmission rate of the “full bandwidth option”, arising from both types of Type II interconnection. The group will look into the technical details of offering basic services and broadband services by different operators on the same local loop.

3.2.31 Regarding the SmarTone Broadband proposal of extending the scope of Type II interconnection to include optical fibre, the TA considers that the proposal is outside the scope of this consultation. In the first consultation paper, both the full bandwidth and partial bandwidth options were defined with respect to the supply to Type II interconnection over copper medium. The TA therefore considers it appropriate to confine the considerations and decisions of this consultation exercise to Type II interconnection over copper medium only. In addition, the households in Hong Kong are mainly connected by copper local loops and hence the TA considers that the availability of Type II interconnection to the local loops based on the copper medium is sufficient to cater for the immediate need of the broadband market. As the coverage of fibre-to-the-building increases to a significant percentage, the TA may re-visit this issue through another round of consultation.

Date from which Type II Interconnection is Available

3.2.32 On 16 July 1997, the TA issued a Statement indicating that he would not consider mandating Type II interconnection to newly installed local loops for broadband services until three years after the launching of the broadband conveyance service of PCCW HKT. As the broadband

conveyance service of PCCW HKT (known as the Residential Cell Relay Service) was launched in March 1998, the three-year moratorium for Type II interconnection to the cables would terminate at the end of February 2001.

3.2.33 In the paragraph 3.2.18 of the second consultation paper, the TA considered that:

- ◆ Type II interconnection should be available immediately for cables existed on or before 16 July 1997; and
- ◆ beyond end-February 2001, the TA may consider making determinations on Type II interconnection on any copper loops for broadband services.

3.2.34 PCCW HKT requested an extension of the existing moratorium for a further three years after 2001 in order to allow them to recoup its investments. HGCL requested similar protection for the non-dominant wireline-based FTNS operators and considered that the TA should refrain from making determination on Type II interconnection to the new wireline-based and wireless FTNS operators for a period of three years after they have launched their broadband services.

3.2.35 On the other hand, NWT opined that Type II interconnection for broadband services should be available as soon as possible. NWT opined that PCCW HKT had received sufficient protection from the moratorium and that the moratorium had introduced undue delay in the rollout of broadband services of competitors. In view of the difficulty in identifying whether Type II interconnection would be available from the time this Statement is issued to end-February 2001, New T & T requested the TA to require PCCW HKT to provide information on those cables existed when the 1997 TA Statement was issued. This information was vital in enabling operators seeking interconnection to plan their business and marketing strategy in relation to provision of broadband services.

3.2.36 Having considered the comments received, the TA considers that there is no supporting ground for the early termination of the moratorium announced on 16 July 1997, nor is there any supporting reason to extend

the moratorium for another three years as requested by PCCW HKT. When the decision on the moratorium was made in 16 July 1997, due considerations had been given to the then market conditions and the potential risks of investment made by PCCW HKT in the broadband services market. The TA therefore rejects PCCW HKT's request for an extension to the present moratorium and maintains that any determination for Type II interconnection for broadband services will be available for local loops of all wireline-based local fixed networks after end-February 2001.

3.2.37 Regarding the view of HGCL that similar moratorium should be given to the new FTNS operators, the TA does not agree to this view. As explained in the above paragraph, the three-year moratorium was based on the market conditions and level of investment risks in 1997. For the time being, the TA does not consider that such a moratorium is needed to enhance the commercial incentive of investment in the broadband market. In any case, the TA notes that the new FTNS operators do not install local loops based on copper medium from local exchanges to buildings.

3.2.38 The TA notes the problem identified by New T & T about identification of which local loops were pre-existing in July 1997. The TA shares the concerns of New T & T that the operators do not have any information about PCCW HKT's local loops that are outside the scope of the moratorium. This information is useful in facilitating the operators in formulating their marketing plans. However, the TA is concerned about the significant workload associated with the provision of a full set of related information. As March 2001 is less than six months away, the TA considers that it is more straightforward for Type II interconnection to be available to all local loops as from 1 March 2001.

Implementation of Type II Interconnection

3.2.39 The TA recognises that, in order to ensure that Type II interconnection will be implemented successfully, it is necessary to review the operational procedures in the existing industry code of practice entitled "Industry Code of Practice for the Interconnection of Local Access Links" issued by OFTA in consultation with the wireline-based local FTNS operators.

Network to Service Provider Interconnection

3.2.40 Service providers are at present interconnected with network operators on a tariff basis. This applies to the interconnection between narrowband networks and services, as well as the existing broadband conveyance service offered by PCCW HKT on a tariff basis to service providers.

3.2.41 In paragraph 3.2.20 of the second consultation paper, the TA took the preliminary views that:

- ◆ service providers are in practice customers of network operators in the wholesale market and thus a pure “carrier-to-carrier” status would not be appropriate regarding broadband interconnection; and
- ◆ he will consider requests for determination of interconnection from service providers if the circumstances so justify.

3.2.42 The submissions from the network operators and Consumer Council shared and agreed to TA’s views. However, there were contrary views from the service providers. AOL opined that there should be no distinction between the forms of interconnection made available, regardless of whether the one who seeks interconnection is a service provider or network operator. For example, AOL considered that service providers should not pay a higher interconnection charge based on tariff.

3.2.43 While New T & T agreed to TA’s views, it has reservation with respect to the TA’s power to determine the terms and conditions between service providers and network operators. The TA wishes to point out that sections 36A(1) and 36A(3D) of the Telecommunications Ordinance stipulate clearly the power of the TA to make determination for terms and conditions of interconnection to and between networks and services.

3.2.44 The TA has considered the views that service providers should be accorded the same treatment as network operators. The existing regulatory framework still draws a distinction between network operators and service

providers. The distinction recognises substantial differences in the level of investment between infrastructural rollout and service provision, and the substantial difference in the risk assumed by the two classes of operators. As the TA has to carefully balance between the need to promote open and effective competition and the maintenance of the investment incentives for network rollout, the TA considers at this stage, the distinction between network operation and service provision is still appropriate. The TA therefore re-affirms his views stated in paragraph 3.2.40.

3.2.45 Despite the TA's view that interconnection to networks for service providers would continue to be provided on a tariff basis, competition from service providers would be safeguarded by the TA's reserve power of determination of the terms and conditions of interconnection should competition be prejudiced by excessive interconnection charges levied by network operators. Before exercising his power to determine such charges, the TA would consider the impact of the charges which are excessive and such considerations would include the consideration of whether alternative equivalent access arrangements are available from other network operators.

Open Access to HKCTV's Network

3.2.46 In the second consultation paper, the TA re-affirmed the policy of "open access" which had actually been enshrined in the conditions under the licence held by HKCTV.

3.2.47 SmarTone Broadband, PCCW HKT and HGCL supported TA's policy. CTI requested the TA to further study the possible interconnection points for "open access" to HKCTV's network by other operators. Consumer Council welcomed TA's re-affirmation of the "open access" policy to networks of PCCW HKT and HKCTV.

3.2.48 HKCTV argued that its HFC network was still under construction as for other emerging networks. The response of the TA to this issue has been given in paragraph 2.10 above. "Open access" is a pre-condition which HKCTV had accepted as part of the conditions of its licence. The TA therefore re-affirms that "open access" should be available to the HFC network of HKCTV.

Other Types of Interconnection

3.2.49 In paragraph 3.2.26 of the second consultation paper, the TA stated that interconnection to backbone and trunk networks is a form of interconnection covered under section 36A. However, the TA would invoke this power for determination of interconnection to backbone and trunk networks when such regulatory intervention is found to be necessary to facilitate fair competition or to protect consumer interest. One major consideration is whether the backbone and trunk network which another operator seeks to interconnect with is a “bottleneck” meaning that there is no competing or alternative supplier. In such cases, the party requesting interconnection should bear the burden of proof to the TA that such facilities are “bottleneck”, which would justify TA’s intervention.

3.2.50 Level 3 strongly agreed with TA’s views. CTI opined that there are only a very limited number of suppliers of backbone and trunk fibre networks and interconnection to ensure sufficient availability of such capacity is necessary.

3.2.51 New T & T expressed the view that the provision of services based on backbone and trunk fibre networks is the “exclusive” right of wireline-based FTNS operators. Wireless FTNS and external FTNS operators should be treated as wholesale customers and strict “carrier-to-carrier” principles for interconnection are clearly not applicable.

3.2.52 In response to the views of New T & T, the TA considers that until the end of 2002, operators other than the wireline-based FTNS licensees would not be given the right to open up road to install backbone and trunk fibre networks for the purpose of operating local fixed networks. For this reason, it is necessary to check the market power of the four wireline-based local fixed network operators by the possibility of TA’s regulatory intervention should commercial negotiations fail or the interconnection charge prove unreasonably high.

3.2.53 In response to the views of CTI, the TA considers that wireless FTNS licensees and external FTNS operators, as network operators, are regarded as “carriers” in recognition of the substantial investment and

level of risks assumed and therefore they may seek interconnection with the backbone and trunk fibre networks on a “carrier-to-carrier” basis.

3.2.54 HGCL supported TA’s view on requiring a party requesting interconnection to bear the burden of proof to the TA that facilities in question are “bottleneck”. PCCW HKT expressed grave concerns if the access to backbone and trunk fibre networks including the access to dark fibres is determined by regulation as such decisions would fundamentally alter the way in which regulation has been applied in Hong Kong.

3.2.55 The TA re-iterates that interconnection to backbone and trunk networks is a form of interconnection. Section 36A under the amended Telecommunications Ordinance has clarified that the TA may determine the terms and conditions of interconnection at any technically feasible point and to any parts or elements of any network on an unbundled basis. When a request is made to interconnection to dark fibres, the TA would address the issues of whether dark fibres constitute telecommunications networks or elements of telecommunications networks. At this stage, the TA would not exclude the possibility of determining interconnection to dark fibres of a backbone or trunk network. The TA will use the power under section 36A for interconnection to backbone and trunk networks if such regulatory intervention is necessary to promote competition and protect consumer interest.

3.3 General Principles of Interconnection Determination

Balance between Investment Incentives and Promotion of Open Access and Competition

3.3.1 The preservation of investment incentive for network rollout and the promotion of access and competition might be conflicting objectives. The past consultation papers addressed the issues of how to achieve the appropriate balance between the two objectives.

3.3.2 In paragraph 3.3.2 of the second consultation paper, the TA stated that an appropriate charging model, which takes account of the capital and operating costs, plus a reasonable cost of capital commensurate with the risk of the network investment, should produce levels of interconnection

charges that fairly compensate the network investors, provide incentives for new entrants in infrastructure investment and offer opportunities for the service providers to extend their services to the end-users.

3.3.3 The Consumer Council and GSBL welcomed the TA's objective of striking a balance between investment incentives and promoting open access of infrastructure by other operators at reasonable costs. GSBL asked the TA to set a reasonable time schedule for the determination process as time is one of the crucial cost factors in the business world. Level 3 endorsed the TA's view that appropriate investment signals to the industry could be provided through the use of appropriate cost models. Given the conflicting nature of the TA's objectives, New T & T considered it important that the cost of capital should be set at the right level. On the other hand, HGCL considered that rapid technological development rendered it almost impossible for the TA to strike such a balance as regulations might not be able to catch up with the pace of technological development.

3.3.4 In conclusion, the TA maintains the view that the proper balance between the maintenance of investment incentives and promotion of open access and effective competition should be achieved through the choice of the appropriate pricing models. The TA acknowledges the views that the right level of cost of capital was important in determining the interconnection charges which should fairly compensate the network investors. In determining the interconnection charges, the TA will take into account factors including the capital and operating costs and a reasonable cost of capital commensurate with the risk of the network investment.

Preference for Settlement by Commercial Negotiations

3.3.5 The past consultation papers addressed the optimum level of regulatory intervention. There seemed to be no controversy in the responses to the first consultation paper that the level of regulatory intervention should be minimized.

3.3.6 In paragraph 3.3.6 of the second consultation paper, the TA reiterated that he would prefer to minimize the level of regulatory

intervention and allow network operators and service providers to negotiate and agree on a commercial basis wherever possible. When these attempts have failed, he would mediate or make determinations based on the predetermined principles established in this consultation exercise, or future exercises.

3.3.7 Almost all submissions in response to the second consultation paper agreed that regulatory intervention should be kept a minimum. New T & T and Level 3 were, however, concerned about the unequal bargaining power between PCCWHKT and other operators in commercial negotiations. Given its strong market power in the broadband market, PCCWHKT might not have the incentive to provide interconnection efficiently. To supplement the light-handed regulatory approach, New T & T requested the TA to take pro-active actions in closely monitoring any abuse of market dominance. Level 3 further requested the TA to impose detailed accounting separation and record keeping requirements at the level of individual network elements as soon as possible, with a view to ensuring effective monitoring by March 2001. CTI considered that the operators should inform the TA of the status of negotiations regularly so as to enable TA's timely intervention where necessary.

3.3.8 On the other hand, PCCW HKT cautioned the potential adverse effect of regulatory intervention. If the operators seeking interconnection suspected that intervention by TA would result in improved terms, in the view of PCCW HKT, these operators would not have the incentive to negotiate in good faith but would rely on TA's determination. HKCTV considered that the TA should not intervene unless there was market abuse, especially when alternatives or substitutes were available.

3.3.9 In response to New T & T, CTI and Level 3's concerns that detailed monitoring measures should be established for the purpose of monitoring the industry behaviour in broadband interconnection, the TA accepts that he needs to play an active role in the monitoring process and issue the relevant industry guidelines and codes of practice in consultation with the industry from time to time if necessary. Regarding PCCW HKT and HKCTV's remarks on the potential adverse effect of regulatory intervention, the TA would give due consideration to all the relevant factors when deciding on the necessity of regulatory intervention on a

case-by-case basis.

3.3.10 In conclusion, the TA considers that the comments of the industry have reinforced his view that the level of regulatory intervention should be minimized. The network operators and service providers should be allowed to negotiate and agree the terms and conditions of broadband interconnection on a commercial basis wherever possible. When these attempts have failed after a reasonable period of time, the TA would mediate or make a determination based on the predetermined principles set out in this Statement or established in future consultation exercises.

3.4 Charging Principles

Pricing Models

3.4.1 The first consultation paper identified four pricing models for the determination of interconnection charges, namely Long Run Average Incremental Cost (LRAIC), Fully Distributed Cost (FDC), retail minus and incremental cost plus lost opportunity cost (or the so-called “efficient component pricing rules (ECPR)).

3.4.2 In paragraphs 3.4.5, 3.4.7 and 3.4.8 of the second consultation paper, the TA stated his preliminary views that:

- ◆ the “incremental cost” approach should be based on the incremental cost of the entire service in the long run, e.g. the costs of setting up and maintaining the entire local loop system. The cost elements that should be covered should include all costs that could be avoided if the interconnection services were not provided in the long run. The costs of the cables, the ducts and the supporting facilities in the local exchanges should therefore be included as all these costs may be avoided in the long run if the interconnection services were not provided. Provided that such economic principles are applied to the determination of incremental costs, LRAIC would provide fair compensation to the network operator and preserve their investment incentive. LRAIC would therefore be the most appropriate pricing model in the determination of charges for broadband interconnection;

- ◆ all users should pay a fair compensation for the resources used, either in the narrowband or broadband environment, and the TA would closely monitor and ensure that the investors in network infrastructure and the interconnecting parties would share the appropriate business costs and risks. This is the most effective mean to maintain the incentive for investment in the telecommunications industry; and
- ◆ instead of adopting a FDC approach for the new entrants or new investment, the TA, through the adjustment of the cost of capital in the calculation of the LRAIC, will have taken into consideration the risk associated with different technologies or different stages of investment.

3.4.3 The submissions generally supported the adoption of the LRAIC model as the pricing model for the determination of the interconnection charge for the broadband networks. However, there were some contrary views from the incumbent network operators. HGCL found it premature at this stage to comment on the charging principles. PCCW HKT argued that regulated pricing would not be necessary as commercial negotiations driven by market forces would provide the appropriate pricing flexibility and avoid market distortions. In addition, PCCW HKT claimed that alternative access networks for broadband services would soon emerge in the market. It foresaw the likely scenario that new entrants would rely on interconnection to the local loops only in the initial years while they would build their own alternative access networks. As such, the LRAIC model would not allow PCCW HKT to recover all its avoidable costs in providing the broadband services especially as such network investments are speculative and involve significant shared costs and non-recoverable sunk costs. Against such concerns, PCCW HKT suggested that if a pricing model is to be enforced by the TA, the FDC model would be more appropriate as it would encourage network rollout and prevent the new entrants from over-reliance on the incumbents' networks. PCCW HKT however commented that LRAIC would be more suitable for interconnection to the IBCCDS because in its view the costs of providing interconnection to in-building wiring systems are more incremental in nature.

3.4.4 In response to the concerns from PCCW HKT about the inadequacy of LRAIC to cover the shared and sunk costs and the resultant disincentives for an incumbent's investment in its infrastructure, the TA believes that the LRAIC pricing model combined with the "total service" and "forward-looking" principles would reduce such disincentives. By adopting the "total service" incremental cost rather than the marginal cost approach, the LRAIC would include a reasonable share of the relevant costs which are common to a specific group of services considered as a whole (e.g. duct costs which are common to broadband and narrowband conveyance services over the local loops). The only cost elements not covered by LRAIC are the indirect fixed costs of the network operator which are not causally related to the interconnection services. At the initial stage of development in the market, the indirect fixed costs of the network operator should have already been recovered through the core business of the operator and would not have been increased (or reduced) due to the provision of the interconnection services. Should the broadband interconnection market further develop and competition become effective, the TA is prepared to re-evaluate the pricing model for the broadband interconnection arrangements.

3.4.5 While in economic theory sunk costs, once incurred, should play no role in pricing decisions under an effective and competitive market environment, these initial capital costs would, however, be taken into account when the new entrants consider the "build or buy" decision. The TA considers by adopting the "long run" incremental cost approach, the LRAIC pricing model would adequately cover all avoidable costs in providing the interconnection services. Because in the long run, the initial capital costs associated with the provision of the interconnection service are also avoidable. Thus the LRAIC pricing model would cover the sunk costs. The pricing for interconnection service should deliver the correct "build or buy" signals in the market for efficient allocation of resources and infrastructure investments. The inclusion of the initial capital costs in a LRAIC pricing model would appear to be the most suitable approach to accomplish such a policy objective, regardless of the technology and maturity of the companies and products.

3.4.6 On the contrary, the adoption of the FDC approach would suffer

strong weaknesses such as the arbitrary allocation of the indirect fixed costs and the adoption of historical costs instead of forward-looking costs associated with a LRAIC approach. The resultant interconnection charge would not provide the correct “build or buy” pricing signals as would the market price in an effective and competitive market environment. The excessive level of interconnection charges based on an FDC approach might act as a barrier to entry, reducing the effectiveness of a competitive market and thus the drive for efficiency in operation and resource allocation. Moreover, interconnection charges in excess of the LRAIC may also create distorted investment signals that would induce the new entrants to over-invest in their own facilities, leading to unproductive duplication and wastage of resources. As for the incumbent, such development would lead to increasing idle capacity of its existing networks and thus extra financial burden.

3.4.7 HKCTV opined that due to the lack of long run cost data on broadband infrastructures, LRAIC would not provide fair compensation to the network operators. Instead, they preferred the retail minus model to give an expedient interconnection price and avoid complex cost analysis. If the retail minus approach would not be adopted by the TA, HKCTV suggested that FDC would be more appropriate because it would allow full cost recovery. As discussed in the preceding paragraph, the FDC approach suffers many weaknesses. The second consultation paper has also commented that the retail minus approach could be unstable and thus would either under or over-compensate the network operators before the retail market sufficiently matures or a critical mass has been reached. Therefore, the LRAIC model would still be more appropriate than the other pricing models to simulate a competitive pricing mechanism. However, the TA agrees with HKCTV that a single pricing model might not be appropriate for every situation and he is prepared to consider other pricing models for the types of interconnections not covered in this consultation exercise.

3.4.8 In addition to the above reservations about LRAIC from the incumbents, there were also supporters of the LRAIC model who raised other comments to enhance the mechanism. The Consumer Council, while supporting the LRAIC approach, raised its concerns over the different possible degrees of cost sharing that would affect the interconnection

charges and suggested the TA to formulate clear and practical guidelines. New T & T also made such suggestion especially on the provision of guidance from the TA in determining the elements of the incremental costs. It also queried how the TA would ensure that all network operators and the interconnecting parties would share the appropriate business costs and risks.

3.4.9 In response to the Consumer Council's view, the TA agrees that more detailed costing guidelines might be required in the future, but sees this Statement as the first step in establishing the basic pricing model. The TA considers that it is important to maintain flexibility for commercial negotiations to facilitate a market-driven pricing mechanism. Therefore he intends to establish first a set of high-level principles to facilitate and expedite commercial negotiations at this stage. He would continue to monitor market developments and, if detailed guidelines are found necessary, he would be prepared to formulate such guidelines.

3.4.10 Taking into consideration his previous analysis and all the industry comments, the TA concludes that the LRAIC pricing model based on the "total service" and "forward-looking" approach would best reflect the pricing in a competitive market. It would also ensure fair competition and efficient allocation of resources and maintain incentives for infrastructure investments. The "best practice" approach, through the cross-checking of costing levels based on the costs of different network operators, would be followed to ensure that no inefficiency and historical legacy could distort the calculation of a competitive interconnection charge for broadband access. This mechanism is generally supported by the industry and the TA is prepared to gather the necessary financial information from the operators to evaluate the actual cost levels when necessary.

Costing Standards

3.4.11 In paragraphs 3.4.12 and 3.4.13 of the second consultation paper, the TA stated that

- ◆ Forward-looking or replacement cost standards are better for broadband interconnection as such standards reflect the current

costs in investing in and operating network infrastructure. These costing standards would produce the correct market signals for network investors and service providers on their “buy or build” decisions.

- ◆ The TA recognizes that under the dynamic market and rapid technological advancement in the broadband environment, it could be difficult to assess the latest market costs of all elements in the provision of broadband access and interconnection. Whenever deemed necessary, he may choose to use the costs reported by the network operators, which could include some historical costs, as the basis of estimation. From these initial data, adjustments could be made to cater for the latest inflation or price escalation in the market.

3.4.12 All submissions which have expressed an opinion on this issue supported the initial views of the TA. PCCW HKT made the additional comments that different costing standards may be appropriate in different circumstances and that ultimately these issues should be left to the market. Besides, PCCW HKT considered that the current or replacement costs should be based on the incumbent’s network using the most efficient technology as the costs of the new entrants are not yet stable and do not reflect the optimal economies of scale. On the other hand, NWT commented that the forward-looking cost model would involve the estimation of the economic useful life of assets that is highly subjective, and thus reasonable assumptions based on the accounting manuals of FTNS operators would be a proper reference. New T & T also raised concerns over the uncertainty in adopting the forward-looking cost versus the consideration of historical costs as benchmark.

3.4.13 In view of the general support from the industry, the TA will adopt the forward-looking or replacement cost standards in the determination of interconnection charges. The comments from the industry focused on how the forward-looking or replacement costs should be determined. The TA is prepared to refine the reporting procedures under the accounting manuals of the FTNS operators, seek comments and contributions from the industry and external consultants where necessary, to provide him with data on the most efficient current costs for the determination of interconnection

charges. He would also base his evaluation on the “best practice” approach and compare the costing among various network operators, including all FTNS and other alternative access networks, to determine the fair and optimal costing. Nonetheless, although the TA would adopt the current cost principles in a determination, there could be practical difficulties in assessing the real forward-looking or replacement costs under some circumstances and in making a determination he could not rule out the use of historical costs or reported costs from the incumbents as a base case. However, he would ensure that the necessary adjustments would be incorporated to cater for the latest market, industry, and technological developments so as to simulate the forward-looking or replacement costs.

Cost of Capital

3.4.14 In paragraphs 3.4.15 and 3.4.16 of the second consultation paper, the TA stated that:

- ◆ he accepts that investment under the dynamic broadband environment bear a higher risk of obsolescence and thus may justify a higher risk premium and cost of capital. However, he does not agree that the adoption, or otherwise, of the FDC standard is relevant to the question of compensating risk. He considers it more logical to properly identify such risk for new networks built or new equipment installed and incorporate the associated cost of capital into a LRAIC-based interconnection charge such that it is fairly compensatory; and
- ◆ it might be difficult to identify the components in the existing infrastructure that are upgraded to cater for broadband applications and to separately assess the appropriate risk factor and cost of capital associated with these components. However, the TA considers that the costs for these components should not be disregarded since it is essential to fairly compensate the network operators (incumbents or new entrants) for the incremental costs incurred in the provision of broadband access and interconnection services to the other parties, plus a return commensurate with risk. By requiring users to pay for all, not just part, of the resources used, the correct market signals are maintained for investors.

3.4.15 New T & T believed that setting the right level of cost of capital is important and there should be further consultation in the determination of the appropriate level. SmarTone Broadband did not agree that a higher cost of capital should be included in calculating the interconnection charges as the investments of PCCW HKT and HKCTV in broadband networks should have been well protected through the moratorium granted and they have already enjoyed a good period of monopoly. Besides, since some network elements are common to both the narrowband and broadband networks, higher cost of capital, if justifiable, should only be applied to the newly added network elements dedicated for the broadband networks. The Consumer Council, while agreeing in principle to higher risk premium for investment in technologies with higher risk of obsolescence, queried how the risk premium could be realistically estimated so that network operators are not over-compensated.

3.4.16 On the other hand, PCCW HKT argued that the risk and thus the cost of capital are actually higher for the incumbent network operators since they have to bear the obligation to provide the facilities and face the risk of idle network capacity, surplus infrastructure and shorter service life for equipment stemming from new entrants switching between “buying” and “building” network access whenever there is a cost advantage. Moreover, if the cost of capital is calculated in favour of the new entrants, the market will always skew to “buy” decisions and thus hinder PCCW HKT’s investment in other access technologies because of the residual obligations to provide interconnection services over copper cables. PCCW HKT opined that investment of the new entrants is actually less risky as they are able to adopt new and cost efficient technologies while incumbents have to bear the burden of their historical investments.

3.4.17 The TA notes that there is basically no controversy with the inclusion of the appropriate cost of capital commensurate with risk in the calculation of interconnection charges. The comments from the industry have focused on the appropriate level of cost of capital for the incumbents and the new entrants, and for the existing networks and the newly added components for broadband conveyance.

3.4.18 The TA notes the different factors suggested in the submissions

which could affect the cost of capital of the incumbents and the new entrants. The TA considers that the appropriate time to address these factors would be when the TA conducts a study on the cost of capital for investments in broadband networks. The TA would take into consideration all the relevant risks incurred by the incumbent operators and new entrants and will consider engaging financial consultants, when necessary, to conduct detailed studies before deciding on the level of cost of capital commensurate with the risks.

3.4.19 The TA notes the concerns that the appropriate cost of capital should be applied to investments in existing network elements and newly added components for broadband conveyance only. The TA intends to separately evaluate, whenever possible, the cost of capital for the existing network elements shared between narrowband and broadband services and newly added network elements dedicated for the broadband conveyance so that the appropriate cost of capital is applied to the two categories of investments.

Responsibility for Bearing Costs

3.4.20 In paragraphs 3.4.17, 3.4.18 and 3.4.19 of the second consultation paper, the TA stated that:

- ◆ operators must pay for the relevant costs that they cause other operators to incur as a result of interconnection. The TA draws a distinction between establishment costs and usage costs;
- ◆ the establishment costs should be considered as part of the investment in the network and thus should initially be funded by individual operators of the networks. However, it does not mean that interconnecting network operators or service providers would have a “free ride” over such investment. The interconnecting operators/service providers would be required to pay for the resources used. The TA finds it reasonable to have the party requesting interconnection to pay for all the incremental costs for establishment of the interconnection, plus an appropriate cost of capital of the interconnecting operator, in proportion to the usage or capacity shared; and

- ◆ he is aware that the technologies, consumer behaviour and traffic pattern would be substantially different under a likely “always on” broadband environment and thus a traditional volume-based or time-based interconnection charge in a narrowband or voice-dominated market environment would not be totally appropriate. The TA will continue to study the most appropriate charging arrangement between operators, including the “peering arrangement” and believes that it would also take time for the industry to discuss and develop such arrangements. The TA welcomes further contributions on this aspect from the industry.

3.4.21 There was general support on the separation of the establishment and usage costs, and the principles that the interconnecting parties should be responsible for the relevant costs that they cause as a result of interconnection. However, CTI claimed that the payment for the resources used in interconnection would hinder the development of the new wireless FTNS operators, create barriers and hamper effective competition. It further commented that there is no measure to prevent the operators providing interconnection services from passing their normal costs or risks for serving their own customers to other operators seeking interconnection.

3.4.22 On the handling of establishment cost, NWT suggested a guideline that operators are required to maintain their networks up to the point of interconnection (POI). Establishment cost up to the POI shall be regarded as investment in the network and the related cost should be funded by the network operators itself. Wherever a network operator chooses to use the facilities of another operator to complete its own network, such cost shall then form part of the establishment cost of the former operator. Subsequently, the cost incurred in passing calls to and from the relevant POI shall be recovered by usage cost.

3.4.23 HKCTV raised its concerns over usage costs in relation to a HFC network. It mentioned that in a HFC network, users share capacity and certain applications could swamp network capacity to the detriment of other users. Without an effective technology to enable network monitoring and control, the measurement and evaluation of usage costs could be complicated and create distortions. As such, HKCTV proposed to engage

external consultants to study the subject.

3.4.24 Both SmarTone Broadband and NWT supported the use of “inter-offset” or “peering” arrangement in the settlement of the usage costs, pointing out that in an “always-on” environment, there are equal chances of sending and receiving messages and the proposed arrangement could allow the operators to develop their own tariff structure and save the administrative effort of billing and traffic measurement. New T&T proposed more time for the industry to study and attempt to come to commercial agreements on this issue.

3.4.25 The TA notes that there is no major controversy regarding the principles of making the parties requesting the interconnection to be responsible for the relevant costs that they cause the other interconnecting parties to incur as a result of the requested interconnection. This is in line with the cost causality principles that ensure efficient allocation of resources.

3.4.26 The TA affirms the preliminary conclusion in the second consultation paper that the establishment costs up to the point of interconnection to effect efficient interconnection should initially be funded by the individual network operators as network investment costs. The interconnecting parties will be required to pay, through usage charges, for the resources used in the other networks, including the relevant incremental costs for establishment of the interconnection, plus an appropriate cost of capital. The TA notes that the NWT’s proposal is consistent with the TA’s proposal on the responsibilities for bearing establishment and usage costs. CTI’s concerns about passing on irrelevant costs and risks to the interconnecting operators should be addressed by including only the relevant components of the establishment costs in the calculation of the LRAIC-based usage charges.

3.4.27 With regard to the responsibility for the payment of usage costs, no conclusion needs to be drawn at this stage on the suitability of the “inter-offset” or “peering” arrangements. Whether such arrangements would be acceptable depend on complex combination of factors such as the volume of traffic flowing in each direction over an interconnection, the costs of handling such traffic and the value to the operators in originating,

terminating or routing the traffic. The industry needs time to explore the arrangements mutually acceptable to the interconnecting parties. The TA notices that there are similar discussions in international fora (e.g. the International Telecommunication Union) on the settlement rates over Internet connections and it has become more generally accepted that market forces would be the best driver for the proper settlement methods to cater for various technological and market environments. In this respect, the TA would leave the flexibility of usage measurement and settlement procedures to commercial negotiations in the industry. The TA would observe the development of these negotiations and is prepared to make further detailed studies and guidelines, if necessary, to establish the settlement procedure for the usage costs.

Structure of Charges

3.4.28 In paragraph 3.4.21 of the second consultation paper, the TA stated that different technologies may involve different cost characteristics and behaviours. Under a cost-based charging model, different structures of charges, i.e. fixed or volume-sensitive charges, symmetric or asymmetric charges, single or multiple-tiered charges, etc. could be acceptable if the different structures account for actual differences in cost behaviours. The TA therefore took the preliminary view that it would not be necessary to specify a particular cost structure to be applied generally before detailed examination of particular cases other than re-iterating the underlying principle that the structure should reflect the cost behaviours.

3.4.29 All submissions supported the TA's preliminary conclusion that no particular charging structure should be mandated, as long as they reflect the underlying costs. Several submissions further emphasized that it is the best option to leave charging structure to commercial negotiations.

3.4.30 As the TA received no disagreements on his preliminary conclusions on the charging structure, the TA re-affirms that no particular charging structure needs to be mandated at this stage. However, an important principle is that the structure should reflect the underlying cost behaviours.

Essential Support Elements

3.4.31 In paragraph 3.4.22 of the second consultation paper, the TA considered that the determination of the terms and conditions of interconnection should be extended to cover the provision of essential support elements. He maintained his views in the first consultation paper that the costs of establishing and maintaining such elements should be shared among the interconnecting operators on the basis of the relative proportion of the capacity being requested and that the cost of modification to the elements, if necessary, to provide interconnection services should be borne by the operators seeking the interconnection.

3.4.32 There was general support of TA's preliminary conclusions of extending the determination of the terms and conditions of interconnections to cover the essential support elements. Only HKCTV argued that in the presence of more than one set of such elements for a particular location, the concept of "essential facility" bottlenecks does not apply and regulatory intervention would not be justified. It further suggested that the TA should engage an external consultant to study the issue. New T & T mentioned that assistance to interconnect with the essential support elements should not be confined to the rollout of the new local wireless FTNS or broadband networks.

3.4.33 In response to HKCTV's concerns, the TA agreed that the existence of substitution in the essential supporting elements would be a relevant factor in determining the terms and conditions relating to the sharing of those elements. With regard to New T & T's comments, the TA has been dealing with sharing of essential support elements for other types of interconnection (e.g. narrowband interconnection) outside the context of this consultation exercise.

3.4.34 In view of the general support on extending the determination of terms and conditions for interconnection to the essential support elements, the TA re-affirms his preliminary views that such elements, such as equipment rooms, cable entry points, risers, ducts and conduits, access to which is essential in order to effect interconnection, would be treated similar to the essential support facilities for interconnection of the existing narrowband networks. Nonetheless, in the case where two or more

alternative sets of elements are available, the TA would investigate on a case-by-case basis whether they are genuine and effective substitutes, and thus if regulatory intervention and mandatory interconnection would be necessary.

IV Way Forward

4.1 In this Statement, the TA sets out the regulatory framework for broadband interconnection. The TA encourages the network operators to negotiate with each other and agree on a commercial basis the terms and conditions for broadband interconnection. If necessary, they may refer to the principles stated in this Statement in order to facilitate the conclusion of their commercial agreements. Where commercial agreements cannot be reached within a reasonable time, the TA is prepared to mediate or consider determination of the relevant terms and conditions under section 36A of the Telecommunications Ordinance based on the principles set out in this Statement or established in further consultation exercises where necessary. The TA will formulate in due course more detailed guidelines or codes of practices on various aspects of broadband interconnection, including guidelines on the application of the LRAIC methodologies and the appropriate levels of cost of capital in the determination of charges for broadband interconnection.

4.2 A number of technical tasks will need to be initiated - the discussions in the TSAC on the technical standards for Type I interconnection (paragraph 3.2.7), setting up a specialist group on the prevention and resolution of interference problems that may arise from Type II interconnection (paragraph 3.2.30), and a review of the operational procedures in the existing industry code of practice for interconnection to local loops (paragraph 3.2.39).

Office of the Telecommunications Authority

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