

**Review of the Telecommunications Authority's  
Statements No. 4, 5, 6, 7 (Revised) and 8  
on Interconnection and Related Competition Issues**

**Statement of the Telecommunications Authority**

**18 March 2002**

**SUMMARY OF CONCLUSIONS**

S1. At the present stage of development of the fixed telephone line market, Long Run Average Incremental Cost (LRAIC), with a mark-up to recover the common and joint costs which are causally related to the “entire conveyance service” provided to directly-connected customers and interconnecting carriers, remains to be the appropriate cost standard for the calculation of interconnection charges. (Paragraph 13)

S2. In calculating the LRAIC for Type I interconnection charges, the TA will take the existing network configuration of the incumbent carrier as given, but will modify it to eliminate any network inefficiency. At the same time, the TA will use the current or replacement cost standard, but will consider applying a cap based on the historical cost standard on all or part of the cost components in the LRAIC, particularly those cost components related to land and buildings. (Paragraph 25)

S3. In calculating the LRAIC for Type II interconnection, the TA will apply the current or replacement cost standard to the copper-based local loop systems of the incumbent, particularly for local loops constructed or upgraded after the commencement of the local fixed network competition. However, for the local loops constructed (and probably fully depreciated) under the protection of the monopoly for local fixed telephone services, the TA will consider using the historical cost standard in determining the Type II interconnection charges. (Paragraph 26)

S4. The terminating charge arrangement (for any-to-any traffic) and originating charge arrangement (for access to services) in the TA Statement No. 7 (Revised) should not be replaced with the “bill and keep” arrangement. (Paragraph 31)

S5. The costs of network conditioning (if identifiable, causally related and attributable to the provision of the interconnection service) should be regarded as part of the incremental costs for the provision of the interconnection service and recovered through the usage charge of interconnection. (Paragraph 39)

S6. The TA considers it appropriate to maintain the existing principles set out in the TA Statement No.7 (Revised) concerning the responsibility for bearing the costs of interconnection links and network conditioning. Each interconnecting carrier should bear on its own account the costs of providing the physical links up to notional Point of Interconnection (POI), and conditioning its network, so as to be ready to interconnect with the other carrier. The costs of physical links and network conditioning, if identifiable, causally related and directly attributable to the provision of interconnection service, should be recovered through the usage charge of interconnection. (Paragraph 51)

S7. The TA considers that the specific length of the depreciation periods for network assets should be considered as part of any determination exercise during which the TA will call for detailed information from the parties. (Paragraph 56)

S8. The TA does not consider it necessary to change the charging arrangements for operator-assisted paging calls, volatile calls and calls to information/database services. (Paragraph 58, 60 and 63)

S9. The charging arrangements for ISDN calls will be modified. The charging arrangements will be based on traffic passing through the POI rather than the type of terminal devices of the originating or terminating operators. Traffic passing through the PSTN and ISDN POI should be subject to PSTN and ISDN interconnection charges respectively irrespective of the originating and terminating terminal device type. (Paragraph 61)

S10. The question of excessive forecast by requesting operators should be addressed by a model adopted in the Determination under section 36A of the Telecommunications Ordinance made in March 2001/November 2001 in respect of interconnection capacity between PCCW-HKT Telephone Limited (PCCW-HKTC) and Wharf New T&T Limited for achieving a fair sharing of

the risk in the investment in the network equipment for the provision of interconnection capacity which exceeds the capacity that could be agreed by both parties. This model may be extended to the interconnection between PCCW-HKTC and other operators. (Paragraph 65)

S11. The TA will request the dominant local FTNS operator to publish reference interconnection offers for all major interconnection services after receiving the approval of the TA. If the dominant local FTNS operator does not accede to this request, the TA will consider publishing under section 36A(5C) of the Telecommunications Ordinance the content of all interconnection agreements entered into by the dominant local FTNS operator filed with the TA under section 36A(5A). (Paragraph 71)

S12. The charging principles for interconnection between fixed and mobile networks should be subject to a separate consultation exercise. (Paragraph 82)

## **INTRODUCTION**

1. On 11 September 2001, the Office of the Telecommunications Authority (OFTA) issued a consultation paper entitled “Review of the Telecommunications Authority’s Statements No. 4, 5, 6, 7 (Revised) and 8 on Interconnection and Related Competition Issues”. This was in response to an earlier request from PCCW-HKT Telephone Limited (PCCW-HKTC) for a review of these TA Statements on the ground that they were made at the initial stage of the liberalisation of the fixed telecommunications network services (FTNS) market. As such, the consultation paper aimed to solicit views and comments from the industry and any interested parties as to whether and how the interconnection framework and the charging principles set out in the TA’s Statements should be revised to reflect the evolving competition environment in Hong Kong, and to address new and related interconnection issues that have arisen since the issue of FTNS licences in 1995.

2. By the closing of the consultation period (23 October 2001), the TA received a total of 11 submissions as follows:

- PCCW-HKT Telephone Limited (PCCW-HKTC)

- Wharf New T&T Limited (New T&T)
- New World Telephone Limited (NWT)
- Hutchison Global Crossing Limited (HGC)
- Sunday Communications Limited (Sunday)
- Hong Kong Cable Television Limited (HKCTV)
- Peoples Telephone Company Limited (Peoples)
- SmarTone Mobile Communications Limited (SmarTone)
- AT&T Asia/Pacific Group Limited (AT&T)
- Cable and Wireless plc (Cable & Wireless)
- Dr John Ure, Director of the Telecommunications Research Project, Centre of Asian Studies, University of Hong Kong (Dr Ure)

PCCW-HKTC subsequently made a second submission on 13 December 2001. The full submissions can be downloaded from OFTA's website at <http://www.ofta.gov.hk>. Having considered the submissions, the TA sets out in this Statement his final views on the interconnection framework and charging principles.

## **INTERCONNECTION CHARGING PRINCIPLES UNDER REVIEW**

### **The use of Long Run Average Incremental Cost (LRAIC) approach to measure the relevant costs for interconnection**

3. The existing cost standard for the calculation of the interconnection charges is the long run average incremental cost (LRAIC). LRAIC is defined as the difference in the carrier's total costs with and without the services or facilities supplied. Under the current charging principles, the LRAIC should be based on the incremental costs of the "entire conveyance service" (which includes the conveyance services provided to directly-connected customers and interconnecting carriers), including a reasonable cost of capital for the assets used for the provision of the service. The incremental costs will also include the shared costs common to all the service elements of the "entire conveyance service", but no other services. This would mean that costs common to the "entire conveyance service" and customer access (but not incremental to the "entire conveyance service") would not be included. In the consultation paper, the TA invited comments from the industry on the appropriateness of continuing the use of the LRAIC approach for calculating the interconnection

charges.

4. New T&T argued that the LRAIC approach should continue to be adopted for the purpose of calculating interconnection charges, as it will provide a sound economically efficient “build versus buy” pricing signal to the carrier acquiring the interconnection service. Submissions from NWT, AT&T and Cable & Wireless also supported the use of LRAIC as the standard for calculating the interconnection charges. Dr Ure argued for a shift of the basis for interconnection charges from LRAIC to a LRAIC plus mark-up, under which a certain proportion of indirect fixed cost should be included as a mark-up over LRAIC, and the proportion should be determined by the percentage of interconnect traffic in the total network traffic.

5. New T&T was concerned about the extent of the common costs being shared by the interconnection charges. It claimed that by including all the shared costs common to the conveyance services provided to interconnecting carriers and retail customers, the interconnection charges would effectively subsidise the dominant operator’s own retail customers.

6. In the existing charging principles, the LRAIC approach has been based on the incremental costs of the “entire conveyance service”, i.e. the conveyance service for the calls of the carrier’s own directly-connected customers (which include end-customers and directly-connected service providers) and the calls to and from customers (end-customers and service providers) of the other carriers interconnected with the carrier in question. Although the shared (common and joint) costs of the entire conveyance service are included in the incremental costs, the interconnection service bears only an equitable share of the shared costs, based on the proportion of the interconnect traffic in the total network traffic. There is no question of the interconnection traffic absorbing all the shared costs. The conveyance service for the carrier’s directly-connected customers will also bear an equitable share of the shared costs. The TA therefore does not see any subsidization of the carrier’s own retail customers as suggested by New T&T.

7. It should be noted that the current methodology does allow a mark-up to enable the operator providing the interconnecting service to recover the common and joint costs which are causally related to the conveyance service provided by that operator. However to increase the mark-up to cover the

indirect fixed cost (overhead cost) not causally related to the conveyance service would in effect turn the cost standard into the Fully Distributed Cost (FDC) standard. As discussed below, the current stage of development of the telecommunications market does not warrant the use of the FDC standard.

8. In the first submission, PCCW-HKTC argued that the interconnection charges based on LRAIC would be a disincentive for the new entrants to build their own networks due to the low level of interconnection charges. PCCW-HKTC claimed that the use of the FDC approach would allow the new entrants to bear a fair share of the costs common to the provision of conveyance and access services, and of the corporate overheads, thereby giving them the correct pricing signals in their “build versus buy” decision. The FDC approach was also supported by HKCTV and HGC. HGC stated that it benchmarked its own interconnection charges against PCCW-HKTC’s, therefore a higher level of PCCW-HKTC’s interconnection charges would prevent HGC from incurring loss when providing interconnecting services to other operators.

9. In its second submission, PCCW-HKTC however endorsed the LRAIC approach and only argued for the inclusion of a mark-up which enabled the recovery of common costs incurred by both the conveyance and access services.

10. The TA considers that the cost standard for the determination of interconnection charges should satisfy two principles. *First*, the interconnection charges should disseminate the correct pricing signals to the interconnecting carriers in their “build versus buy” decisions. New infrastructure should only be built where the economic cost of doing so is lower than that using the existing infrastructure. *Second*, the network operator providing the interconnecting services should be fairly and adequately compensated for the costs incurred in the provision of the services.

11. The TA considers that which particular cost standard, LRAIC or FDC, would satisfy the above principles depends on the state of development that the market has reached. The LRAIC standard is suitable for a market environment where the new market entrants are still establishing their foothold in the industry. The calculation of the interconnection charges on a LRAIC basis reflects the relatively low volume of interconnection traffic to/from the new entrants handled by the incumbent. There is no unfair or inadequate

compensation to the incumbent for it to recover all its indirect fixed costs from its other mainstream services. There is minimal impact on the pricing of the other services as the interconnection traffic to/from the new entrants has not increased the indirect fixed costs of the incumbent. The LRAIC-based interconnection charges would have fairly and adequately compensated the incumbent while providing an economically efficient “build versus buy” signal. Nevertheless, as the market becomes more developed and mature with the new entrants successfully establishing significant market share, it would be fair to require the new operators to contribute to the indirect fixed costs of the incumbent in providing the interconnection services - the incumbent would not be able to recover all its costs if all services were priced on the incremental cost basis. When the market development has reached that stage, increasing the mark-up from the LRAIC to include a reasonable contribution towards the incumbent’s indirect fixed costs would be justified.

12. For the above reasons, the TA does not subscribe to PCCW-HKTC’s view that there is no difference in the principles to be applied between the different forms of interconnection traffic and that the proportion of the interconnection traffic for the mobile and fixed services in PCCW-HKTC’s overall network traffic should justify the use of the FDC approach for both types of interconnection traffic. At present, the fixed and mobile network services are characterised by different stages of market development, thereby rendering the need for separate cost standards for interconnection charges for the interconnection traffic associated with these two types of services. The mobile market features a highly competitive landscape with the six operators successfully establishing themselves in the market. The total number of mobile customers has exceeded the total number of fixed telephone line customers. In addition, the interconnection traffic for mobile services constitutes a significant percentage of the total traffic handled by the network of PCCW-HKTC. As such, it would be fair to require the mobile operators to contribute to the indirect fixed costs of PCCW-HKTC’s network. The question of “build versus buy” is not relevant to the mobile-fixed network interconnection, as the mobile network operators have no right to build a fixed network. Thus a FDC approach, based on the fair compensation of the fixed network operator in providing the interconnection services and which includes contribution towards the indirect fixed costs of the operator, is justified. In contrast, the fixed telephone line market is still dominated by PCCW-HKTC. The networks of the new entrants are being developed. It is unlikely that the

indirect fixed costs of PCCW-HKTC have been increased in serving the relatively low volume of interconnection traffic originated from or terminated at the new entrants. In 2001, the total volume of interconnection traffic to and from other fixed networks constituted an average of around 10% of the total traffic carried over PCCW-HKTC's network. As such, the use of the LRAIC approach for pricing of the interconnection traffic for the fixed services should enable fair compensation to the interconnection service provider while sending the economically efficient "build versus buy" signals to the new entrants.

13. The TA is of the view that the choice between LRAIC and FDC has not been made to tilt the balance in favour of either the "buy" or "build" decision as suggested in some submissions. Further, the less than competitive fixed telephone line market environment justifies the continued use of LRAIC approach, which should induce efficient "build versus buy" decision while fairly compensate the incumbent for providing the interconnection services. Indeed, the TA notes that the use of LRAIC as the cost standard for the calculation of interconnection charges is the "best practice" among regulators around the world with similar market liberalization policies. The use of the FDC approach, or increasing the mark-up to LRAIC to cover indirect fixed costs, would arbitrarily allocate indirect fixed costs of the incumbent, which are not causally related to the interconnection services provided, to the interconnection services. Hence, such approaches should be considered only when the market has become more competitive and the interconnection traffic accounts for a more significant share of the total network traffic handled by the incumbent. Based on the above considerations, the TA concludes that, at the present stage of development of the fixed telephone line market, LRAIC, with a mark-up to recover the common and joint costs which are causally related to the "entire conveyance service" provided to directly-connected customers and interconnecting carriers, remains to the appropriate cost standard for the calculation of interconnection charges.

14. It is not appropriate to pre-determine any trigger point for the level of interconnect traffic that justifies the use of the FDC approach, since any method of doing so would be arbitrary and involve subjective judgement. However, the TA will continue to monitor the market development for the appropriateness of the LRAIC approach as a cost standard for calculating the interconnection charges. Should the interconnecting services take up a more significant share of the incumbent's total network traffic, the TA would

consider using the FDC approach, or increasing the mark-up to the LRAIC to cover indirect fixed costs, to allow the new entrants to bear a reasonable share of the incumbent network operator's indirect fixed costs.

15. As regards the mark-up required to recover the costs shared between the access service and the conveyance service, it is understood that PCCW-HKTC's main concern was the costs of the land, exchange buildings, ducts, trenches and manholes shared between access networks and trunk networks. The incremental cost model used in the PCCW-HKTC/New T&T determination in August 1998 had *included* the costs of optical fibres, ducts, trenches, manholes and transmission equipment for the calculation of transmission costs<sup>1</sup>, and the costs of switches, network management systems, power plants, land and buildings, etc. for the calculation of switching costs<sup>2</sup>. The TA does not take the view that since these facilities would have already been provided for the customer access networks and therefore they do not constitute part of the incremental costs for the "entire conveyance service". Although some ducts and fibres are shared with the customer access networks, the part for the provision of the "entire conveyance service" would be avoidable if the "entire conveyance service" were not provided. Thus the costs for these ducts and fibres are also included in the LRAIC of the "entire conveyance service". This should have addressed PCCW-HKTC's concern.

16. New T&T cautioned that PCCW-HKTC's deteriorating credit rating would cause a higher cost of capital for calculating the interconnection charges. The LRAIC-based interconnection charge includes a cost of capital for the assets used so as to ensure a fair return would be available for the investment in the local fixed network. In calculating the interconnection charges, the TA would apply a *reasonable* cost of capital which is commensurate with the risk of the network investment. In no circumstances would the cost of capital compensate for the higher financial risks associated with deteriorating credit rating of a network operator. This should address the concern of New T & T.

**The principle of determining interconnection charges based on the lower of current or historical costs**

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<sup>1</sup> Paragraph 22 in Appendix to Determination of 21 August 1998 for Interconnection between Hong Kong Telephone Company Limited and New T & T Hong Kong Limited.

<sup>2</sup> Paragraph 32, *ibid.*

17. The current interconnection charges for Type I interconnection are calculated on the basis of current or replacement costs of the existing configuration of the incumbent's network using the most efficient technology, with a cap based on the historical cost standard. In this approach, if the interconnection charge based on the current or replacement costs is higher than that based on historical costs, the TA will apply the charge based on historical costs. This approach aims to balance considerations from economic efficiency, promotion of competition and fair compensation. In the consultation paper, the TA sought the views from the industry whether to continue the approach of using the lower of current/replacement or historical costs for calculating the interconnection charges.

18. Both New T&T and NWT supported continued determination of interconnection charges based on the lower of current or historical costs. New T&T went further to argue that in applying the current cost standard, the calculation of the interconnection charges should be based on the lowest cost of all the FTNS operators. HKCTV's position was that the historical cost standard is more appropriate for both Type I and Type II interconnection pricing regime.

19. On the other hand, PCCW-HKTC believed that there was no economic justification for using the lower of historical or current/replacement costs. In its view, a hybrid costing standard would be "economically contradictory and introducing capital switching and reversing for reasons unrelated to the opportunity costs of alternative investment decisions". As stated in its first and second submissions, PCCW-HKTC recommended the TA to adopt forward-looking current cost approach for cost determination based on the Modern Equivalent Assets and apply it on a consistent basis across all assets and costs in the interconnection pricing regime. In particular, the current replacement costs of land, instead of historical costs, should be used to provide appropriate "build versus buy" signals. AT&T, Dr Ure and Cable & Wireless also supported the use of the current cost approach. However, in the view of AT&T and Cable & Wireless, interconnection charges should be adjusted for any "windfall" gain of PCCW-HKTC from the revaluation of land prices under the current cost approach.

20. As stated in paragraph 10 above, the cost standard for the determination of interconnection charges should be so selected as to send the

correct price signals to new entrants in their “build versus buy” decisions. At the same time, it should also fairly and adequately compensate the incumbent for the provision of the interconnection services. As such, the TA has to consider economic efficiency and fair compensation in parallel when determining interconnection charges.

21. The consideration between “build” and “buy” is relevant to Type I interconnection in that an economically efficient interconnection charge would send the correct pricing signals to the interconnecting carrier in deciding whether to build its infrastructure to capture directly-connected customers. For example, if the originating or terminating charges of the carrier with the customers now connected are higher than the economic costs of the interconnecting carrier acquiring the interconnection services, the interconnecting carrier would be induced to build its network and directly connect to more customers to capture those originating and terminating charges.

22. On the other hand, before the customers actually move over, the “build versus buy” may not be so relevant to Type I interconnection. As an end-user of a fixed network service typically connects to the network of only one FTNS operator, the network operator with the customer directly connected would have a “virtual monopoly” of providing originating and terminating services to that customer. That means that other carriers seeking to reach that customer would have no choice but to purchase the interconnection services from the network operator with the customer directly connected. In such a situation, a charging principle providing fair and adequate compensation to the provider of the interconnection services would be more relevant. If the current or replacement cost is higher than the historical cost, an interconnection charge based on the former would over-compensate the operator with the directly-connected customers. A cap on the interconnection charges based on the historical cost should be appropriate.

23. The current or replacement cost approach should nominally mirror the investment choice of operators today using the most efficient network design, technology choices and capacity planning. It is inappropriate to compensate any operator for inefficiency. However, in applying the current or replacement cost approach, it is inappropriate to totally ignore the historical legacy of the incumbent. The incumbent’s existing network has been built up

over time as the network was expanded to cope with the market demand in the past. The current network should thus be taken as the starting point for the incumbent to expand its network capacity to cope with the demand for interconnecting services. Hence, the current methodology for the calculation of interconnection charges basically takes the network configuration of the PCCW-HKTC as given and assumes that the network is constructed using the modern equivalent assets or the most efficient technology. This is often referred to as the “scorched node” approach.

24. However, many of the PCCW-HKTC’s exchange buildings were built on the land granted by the Government on concession terms some years ago. To revalue these exchanges to the current market value would result in an interconnection charge which gives a “windfall” gain to the incumbent. In addition, new entrants, in building their networks, would be expected to optimise their network configuration, so as to require in particular smaller and fewer exchange buildings when constructing their own networks. Therefore the significantly higher current land and building costs, when applied to the “scorched node” approach would result in an interconnection charge which does not represent the current or replacement cost of an operator using the most efficient technology and network configuration, and therefore fails to give the correct “build versus buy” signals that an interconnection charge based on current or replacement cost is intended to give. The use of historical cost for land and buildings used by the incumbent would be a closer approximation of the current or replacement cost for land and buildings used for the network of an efficient operator, as well as representing fair compensation to the incumbent operator.

25. Based on the considerations in paragraphs 23 and 24, in calculating the LRAIC for Type I interconnection charges, the TA will take the existing network configuration of the incumbent carrier as given, but will modify it to eliminate any network inefficiency. The TA will apply the current or replacement cost standard to such a network configuration, but will consider applying a cap based on the historical cost standard on all or part of the cost components in the LRAIC, particularly those cost components related to land and buildings.

26. Compared with Type I interconnection, the “build versus buy” decision is more relevant to the new entrants in a Type II interconnection.

The new entrants have to decide whether to roll out their own customer access networks or lease the facilities from the incumbent for the access to the customers. The interconnection charges should therefore convey the economically efficient pricing signals to the new entrants for their “build versus buy” decisions. As such, it is appropriate to apply the current or replacement cost standard to the copper-based local loop systems of the incumbent, particularly for local loops constructed or upgraded after the commencement of the local fixed network competition. The TA, however, considers that for the local loops constructed (and probably fully depreciated) under the protection of the monopoly for local fixed telephone services, and for any land and building costs that the local loop systems may share, an interconnection charge based on current or replacement cost would be over-compensatory to the incumbent. Furthermore, the incumbent may price its telephone line service to cover the depreciation cost based on book value of the local loops. A Type II interconnection charge based on the current or replacement cost of the local loops might be at a level which prevents competition to develop using Type II interconnection. In such a situation, the TA will consider using the historical cost standard in determining the Type II interconnection charges.

### **“Bill and keep” arrangement**

27. In the consultation paper, the “bill and keep” arrangement was discussed in response to an earlier submission by New T&T requesting for the consideration of such arrangement for the settlement of interconnection charges<sup>3</sup>. This arrangement is easy to manage and cost-effective due to its simplicity. However, this approach works best when traffic flows between the network operators are fairly balanced in both directions and the interconnecting network costs are similar.

28. PCCW-HKTC, NWT and AT&T agreed with the TA that the “bill and keep” arrangement should be considered only when there are symmetric traffic flows between the FTNS operators, otherwise a carrier will not be adequately compensated if it terminates more traffic from other carriers than it sends to the other carriers for termination. HKCTV argued that the problem of traffic

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<sup>3</sup> Under the “bill and keep” arrangement, there will be no charge payable among the interconnecting carriers for terminating each other’s traffic. Each carrier “bills” its own customers for outgoing traffic that it sends to other networks and “keeps” all the revenue that received.

imbalances could be settled by the commercial arrangement between the interconnecting carriers.

29. The TA agrees that the current market environment does not warrant the adoption of the “bill and keep” arrangement. The arrangement might not be fair to some interconnecting operators when used for the settlement of interconnection charges. For example, as discussed in paragraph 12 of the consultation paper, the “bill and keep” arrangement would not be fair when applied to the interconnection for customers of one network to access value-added services (e.g. Internet services) connected to the other networks because the traffic over the interconnection would not be balanced.

30. Further, under the “bill and keep” arrangement, the terminating services would be inappropriately valued as the originating operators incur zero costs when using the networks of other operators for call termination. Inappropriate valuing of terminating services would encourage abuse of the terminating networks’ resources, leading to inefficient utilisation of such resources as well as discouraging investments.

31. Taking into the comments received, the TA does not see any merits of replacing the terminating charge arrangement (for any-to-any traffic) and originating charge arrangement (for access to services) in the TA Statement No. 7 (Revised) with the “bill and keep” arrangement.

### **The cost recovery mechanisms for interconnection**

32. The structure of interconnection charges should reflect the behaviour of the underlying costs. To the maximum extent possible, fixed costs should be recovered through fixed charges while variable costs should be recovered through a per unit charge related to the underlying activity. On this basis, where the cost is one-off (i.e. non-recurrent), the costs should be recovered as one-off (lump sum) charges. Where the cost is recurrent, but traffic independent, the cost should be recovered by fixed recurrent rentals. Where the costs of network component are traffic sensitive, they are best recovered through usage charges. In the consultation paper, the TA sought the views from the industry on the appropriate cost recovery mechanisms for interconnection links, ports, switches and network conditioning charges.

33. PCCW-HKTC believed that carriers providing the interconnection services should be entitled to fully recover the one-off costs from the carrier seeking the interconnection service in one lump sum, upon such costs being incurred by the providing carrier. As network conditioning costs are incurred by the providing operator as a fixed one-off expenditure, they are most appropriately recovered through a lump sum payment.

34. Cable & Wireless considered that the incumbent should bear a larger proportion of the risk associated with the recovery of fixed costs. Thus, usage-based charges should be used whenever it is difficult to distinguish between recurrent costs from non-recurrent costs, or traffic sensitive costs from non-traffic sensitive costs.

35. The TA notes that in principle, “network conditioning” is the initial investment made by an operator to provide interconnection services to the interconnecting operator. In the interconnection for “any-to-any” traffic, when both interconnecting operators can be the originating or terminating operator, the issue of recovering “network conditioning” costs from the other operator does not surface. Each operator would simply “condition” its network so as to be ready for interconnection at the notional Point of Interconnection (POI). Likewise, when traffic for directly-connected customers of one operator to access services directly connected to the other operator’s network is roughly balanced in both directions, both operators can have equal opportunity to be the “providing operator” and the “requesting operator” (with the “requesting operator” requesting the “providing operator” to provide originating interconnection service for access to the service providers). There is no need for the operators to compensate each other for the “network conditioning” costs. The intention of the interconnection regulatory framework is that because the network operators operate in a multi-network environment, each operator has the licence obligation to interconnect with other operators. To discharge this mutual responsibility of interconnection, each operator would simply “condition” its network so as to be ready for interconnection at the notional POI with other carriers. If upon each occasion of carrying out “network conditioning” work, an interconnecting operator were to ask the interconnecting operator(s) to make a lump-sum payment(s) for the recovery of “network conditioning” costs, this arrangement could be exceedingly complicated (as changes within one operator’s network could affect more than one interconnecting network), time-consuming (as

quotations have to be provided and agreed among the operators) and would give rise to more opportunities for disputes and delay. Therefore the network operators should basically absorb, on their own accounts, all costs up to the POI. Nevertheless, the inclusion of the relevant “network conditioning” costs in the LRAIC for the calculation of interconnection usage charges has provided for a mechanism for accounting for and settlement of the “net balance” of “network conditioning” costs in situations where one operator is predominantly the “providing operator” and the other as the “requesting operator”, e.g. where one network has more customers directly connected while the other has more service providers connected.

36. Although, in principle, where the cost is one-off (i.e. non-recurrent), the costs should be recovered as one-off (lump sum) charges, because of the considerations in the preceding paragraph, it is not inappropriate for “network conditioning” costs to be recovered through a recurrent usage charge. There is no economic or accounting principle to the effect that one-off capital expenditure should not be recovered through recurrent charges. The TA has quoted examples of one-off capital costs being annualized in the recovery arrangements (i.e. interconnection links and copper local loops) in paragraph 28 the consultation paper. He notes that some one-off costs related to the provision of additional switches and trunks have been recovered through recurrent payments, although an up-front payment is normally required for the purchase, installation and commissioning of the equipment. For example, the capital expenditure for switches and trunks are normally annualized in order to estimate the relevant costs for a particular year. In addition, the commercial viability of an investment is assessed over the expected net return during the project life. As such, it is also a common business practice to recover up-front capital expenditure through recurrent payments from customers during the lifetime of the investment.

37. In addition, the TA opines that some “network conditioning” costs are traffic sensitive and recurrent expenditure and should be recovered through usage-based recurrent interconnection charges. For example, an interconnection link or a switch port could be regarded as traffic sensitive as additional links or ports would be required to cater for additional amount of traffic passing between the networks. Another example is that an operator might have engineered its network so as to be capable of only handling the traffic load of its own customers. When new traffic comes onto its network

from an interconnecting carrier, the operator will require additional capacity and re-dimensioning of its network to accommodate the additional traffic.

38. Although the “network conditioning” costs are not recovered as one-off payment, they are recovered through usage charges under the current charging principles. In this regard, the TA considers that PCCW-HKTC’s argument that “network conditioning” costs have not been recovered through interconnection charges under the current charging principles is misleading. However, the TA takes note of the PCCW-HKTC’s concern that the reliance on usage charge to recover one-off or traffic independent cost would be subject to “abuse” in the forecast/provisioning process. However, this issue should be dealt with through improving the current forecasting and provisioning arrangement of interconnect capacity, or a commitment on minimum traffic volume over a defined period, rather than through any change to the charging principles stated in the TA Statement No.7 (Revised).

39. Therefore the TA sees no need to change the current principle that the costs of network conditioning (if identifiable, causally related and attributable to the provision of the interconnection service) should be regarded as part of the incremental costs for the provision of the interconnection service and recovered through the usage charge of interconnection<sup>4</sup>.

### **Physical link costs and network conditioning costs**

40. The consultation paper reviewed the existing principle under which the costs for establishing the physical links between the networks should be shared equally by the interconnecting carriers. It also discussed the principle requiring each carrier to bear on its own account all relevant network conditioning costs to prepare and maintain its network for interconnection. However, the costs of physical links and network conditioning (if identifiable, causally related and attributable to the provision of interconnection service) could be recovered through the usage charges paid by the operator acquiring the interconnection service to the operator supplying the service. The industry was consulted on the appropriateness of the existing cost recovery mechanism for the establishment of interconnect links and network conditioning.

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<sup>4</sup> Paragraph 13 of TA Statement No. 7(Revised) issued on 18 November 1997.

41. NWT suggested that the existing cost recovery mechanism for interconnect links and network conditioning should be maintained. However, New T&T argued that the costs of physical links and network conditioning should not be recovered through usage charges. Each operator is obliged under its licence obligations to provide the interconnecting services and they should absorb the costs of physical links and network conditioning alone. The incumbent would be subsidised for the fulfillment of its licence obligations if it could recoup the costs for physical links and network conditioning through the usage charges to other operators.

42. PCCW-HKTC held the view that there is an asymmetry of traffic between the incumbent and new entrants. The existing cost recovery mechanism for the establishment links cannot fairly compensate the incumbent. It also cannot meet the “cost causality” principle under which interconnecting carriers should bear a proportionate share of the interconnection link costs commensurate with the benefit they receive. PCCW-HKTC also argued that there is no rationale for “excluding” costs on the basis that they constitute “network conditioning” costs when the providing operator would be entitled to fair compensation in accordance with the principles set out in General Condition 13 of the FTNS licence. As network conditioning costs are causally related to the interconnection request, the providing operator should be compensated for these costs incurred. In addition, the network conditioning costs are fixed one-off charge and they are most appropriately recovered through a lump sum payment.

43. The TA Statement No. 7 (Revised) has already set out the responsibility of charges related to the costs of establishing the physical links and network conditioning. The TA considers that the argument presented in paragraph 42 of the consultation paper is valid in justifying that each interconnecting carrier should bear all the costs of its own network up to the notional POI at the mid-point of the links<sup>5</sup>. These costs include the physical link costs and network conditioning costs. While each carrier will bear its

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<sup>5</sup> Equal sharing of the physical link costs by the interconnection carriers is based on the arguments that each carrier is obliged to operate in network of networks and must therefore take whatever steps necessary to permit interconnection, that the provision of facilities is part of the investment to operate the business of providing an interconnecting service to other carriers, that the provision of interconnection is also to serve the access customers of the carrier providing the interconnecting service, and that by requiring the two interconnecting carriers to bear their own costs up to the notional POI, the two carriers will have the incentives to minimize the costs of the physical links which would bring ultimate benefits to the customers.

own network conditioning costs to make its network ready for interconnection, the costs for establishing the physical links should be shared on a 50:50 basis by the interconnecting carriers as each is responsible for the costs up to the notional POI only. Notwithstanding the responsibility for bearing the costs up to the notional POI, the operator supplying the interconnect service could still recover the physical link costs up to notional POI, and the network conditioning costs, through interconnection usage charges paid by the operator acquiring the interconnection service.

44. In a balanced traffic situation for “any-to-any” traffic, each interconnecting carrier would have the same opportunity to be the originating carrier or terminating carrier. There would be no or little net interconnection payment between the carriers. This would mean that each carrier is absorbing all the costs up to the notional POI. However, this is not invalidating the basic principle that the network conditioning costs and physical link costs up to the notional POI for the supply of interconnection service to the interconnecting carrier should be recovered through the interconnection charges from the interconnecting carrier receiving the interconnection services. Where the traffic situation is not balanced (for example, where over a particular interconnection link, one carrier acts predominantly as the network connecting to service providers), there may be a net payment of interconnection charges through which the network conditioning costs and physical link costs will be recovered.

45. It is therefore misleading for PCCW-HKTC to say that under the charging principles set out in Statement No. 7 (Revised), costs are being “excluded” and costs which are caused to be incurred by the requesting carrier are not be recovered by the interconnecting carrier providing the interconnection service. In fact, no cost causally related and attributable to the provision of the interconnection service would be “excluded”. In this regard, the TA does not agree with New T & T that the costs of physical links and network conditioning should not be recovered through interconnection charges. It would be quite arbitrary for interconnection costs to include only usage related costs. The licence obligation of effecting interconnection with the other carriers does not mean that the reasonable costs for the provision of interconnection services should not be recovered in the interconnection charges. Depending on the extent of the balance of traffic over the interconnection links, the interconnecting carriers will bear a proportionate share of the physical link

and network conditioning costs commensurate with the benefit they receive. The real issue raised by PCCW-HKTC was therefore not whether costs are being excluded, but rather whether the interconnection charges to cover the costs of physical links and network conditioning should be more appropriately one-off charges, recurrent flat charges or recurrent usage-based charges.

46. Under the existing charging principles, the costs for the establishment of the physical links are to be shared among the interconnecting carriers. Both interconnecting carriers are supposed to be responsible for providing the links up to the notional POI. Where one carrier provides the entire length of the links because perhaps the other carrier does not have the network coverage to provide the links to the notional POI, the normal arrangement is for the former carrier to charge a monthly flat rental for the links provided (nominally from the latter carrier's network to the notional POI). This monthly rental would then be the cost to the latter carrier in establishing the links up to the notional POI.

47. In both scenarios of paragraph 46 above, the costs of the establishment of the physical links are to be recovered through interconnection charges. The question is whether it is more appropriate for the establishment costs to be recovered through a one-off charge, as the establishment was a one-off exercise, or a recurrent flat charge as in the normal practice of one carrier charging the other carrier for the supply of dedicated circuits, or a recurrent usage charge as is currently adopted in the calculation of interconnection charges. It is not unreasonable to regard the costs for the initial establishment of the physical links as traffic dependent (and thus to recover the costs through recurrent usage charges) as each link can only handle a given volume of interconnection traffic. Increase in the volume of interconnection traffic would require expansion of the physical links. Thus the treatment of the physical links needs not be different from that of switches which are normally regarded as traffic dependent and therefore their costs are recovered through recurrent usage charges.

48. Switch port costs are presently also regarded as "network conditioning" cost to be recovered through usage charges. As each switch port is associated with a particular link of the interconnection, the switched port might be considered as an extension or termination of the link. The same cost recovery principle should be applied to both the switch ports and links.

49. The arguments presented in paragraphs 42 of the consultation paper apply as much to the physical links as to the conditioning of the network for interconnection, at least for the part of the network conditioning which is associated with the setting up of interconnection links. Such network conditioning cost would be required to cope with increases in traffic volume. Such network conditioning work would also be required on a routine basis to cope with daily changes to volume and distribution of network traffic. This is part of the myriad of work to maintain and operate the network. For such network conditioning work, it seems sound to adhere to the principle that each carrier should bear the relevant network conditioning costs on its own account. Such network conditioning costs are regarded as a form of investment for the provision of interconnection service, the cost of which is to be recovered through subsequent usage charges.

50. The TA does recognise that there are situations where it is justified for network conditioning costs to be recovered as one-off charges. This is where one carrier is requested to condition its network beyond its licence obligations as stated in paragraph 15 of the Statement No. 7 (Revised) issued on 18 November 1997.

51. Having reviewed the comments received, the TA considers it appropriate to maintain the existing principles set out in the TA Statement No.7 (Revised) concerning the responsibility for bearing the costs of interconnection links and network conditioning. Each interconnecting carrier should bear on its own account the costs of providing the physical links up to notional POI, and conditioning its network, so as to be ready to interconnect with the other carrier. The costs of physical links and network conditioning, if identifiable, causally related and directly attributable to the provision of interconnection service, should be recovered through the usage charge of interconnection.

### **The depreciation schedules for switching and trunk transmission/termination equipment**

52. The economic lives of the network assets adopted in the LRAIC-based cost model was first set out in the Determination entitled “Determination under Section 36A for the Terms and Conditions of Interconnection between the Hong Kong Telephone Company Limited and New T&T Hong Kong

Limited” issued by the TA dated 21 August 1998. According to PCCW-HKTC, the depreciation life for switching and trunk termination equipment was no longer appropriate amid rapid technology development. The consultation paper addressed PCCW-HKTC’s concern with a discussion of any need to revise the depreciation schedules for switching and trunk transmission/termination equipment. PCCW-HKTC was invited to supply to the TA the information on the ages of their existing exchanges and the ages of the equipment being replaced in the past replacement exercises.

53. In its first submission, PCCW-HKTC was of the view that the asset life for newly acquired switching and trunk termination equipment, particularly for narrowband Internet traffic, should be shortened from 15 years to no more than three years. The shorter asset lives are to reflect the anticipated rapid migration of narrowband Internet traffic to the broadband networks, saturation in the voice telephony market, the development of Voice over IP (VoIP) services and the increasing substitution of mobile for fixed line services. PCCW-HKTC did not assert in its second submission that all dial-up Internet traffic will have migrated in three years, but it still called for a shortening of the useful economic lives of certain interconnect links. HKCTV also agreed on a shortening of economic lives for trunk termination/transmission equipment and physical links from 15 years to five years.

54. New T&T and New World did not subscribe to the view of a rapid and full-scale migration of Internet traffic to broadband. Nor did they believe that a migration from the traditional voice telephony to IP telephony would materialise in the foreseeable future. Also Cable & Wireless did not expect such a migration within the medium term. AT&T opined that the TA should obtain and examine information on the ages of PCCW-HKTC’s existing exchanges and the ages of equipment being replaced in past replacement exercises before determining whether a change to the depreciation schedule was warranted.

55. The TA notes that the narrowband public (circuit) switched telephone network (PSTN) might be replaced by broadband or IP network in the coming years as the means of access to the Internet by ordinary users. However, there is insufficient evidence that a substantial amount of non-Internet traffic transmitted over the circuit-switched networks would also migrate to IP networks in the foreseeable future. Thus the existing circuit-switched

networks are expected to be maintained for many years. Some of PCCW-HKTC's new switches might become under-utilised as a result of migration of Internet traffic to broadband networks. However, PCCW-HKTC has built up an extensive network and it could re-deploy the switches originally catering for Internet traffic to handling other types of traffic. Alternatively it could re-deploy these switches to replace obsolescent switches in the PSTN that would otherwise need to be replaced.

56. Furthermore, PCCW-HKTC has not entertained the TA's invitation to provide the information on the ages of their existing exchanges and the ages of the equipment replaced in the past replacement exercises. The lack of such information makes it difficult to validate PCCW-HKTC's claim for any technology obsolescence of its newly acquired network assets and hence the need for shorter depreciation lives. The TA therefore considers that the specific length of the depreciation periods should be considered as part of any determination exercise during which the TA will call for detailed information from the parties, including the information which PCCW-HKTC has failed to supply in response to the consultation of September 2001.

## **SPECIAL CALL TYPES**

57. In the consultation paper, the TA discussed the interconnection charging principles in relation to specific call types which overlay the interconnection charging principles.

### **Paging calls**

58. PCCW-HKTC argued in its submission that calls to operator-assisted paging services should be classified as Value-Added Service (VAS). However, New T&T and NWT proposed to maintain the current charging principle under which calls to operator-assisted paging services are regarded as calls to ordinary users. The TA notes that an FTNS operator might take advantage of the current terminating charging arrangement, under which it could aggressively attract paging operators to connect to its network and profit from the terminating charges received from handling the incoming calls to these paging operators. Such an arrangement might result in inefficient call routing (calls traversing more than one network) and hence a wastage of resources.

The interconnection charging arrangement should nominally be used to discourage inefficient routing. However, as paging services have become an insignificant part of the mobile services market, and the number of such operator-assisted paging centres has been on the decline, the TA does not consider it necessary to introduce changes to the charging arrangement at this stage.

### **Volatile calls**

59. PCCW-HKTC pointed out that it has incurred considerable expense in setting up a Special Access Network (SAN) for handling the volatile calls. PCCW-HKTC considered it unfair to subsidise the terminating customers generating the volatile call pattern. It would be inclined to route the traffic directly to the terminating network unless it is not required to pay terminating charges to the other FTNS operators. In contrast, New T&T and New World suggested that the volatile calls should continue to be regarded as ordinary calls.

60. According to the TA Statement No.7 (Revised), volatile calls are classified as normal calls, unless the calls are made to a VAS. The TA does not see any need to change such a classification. The fact that PCCW-HKTC has to make special arrangement to handle these calls does not alter the nature of the calls. The originating carrier has the operational need to make special network arrangement to provide the required quality of service to its customers originating the traffic and protect the other services from degradation. The costs so incurred should be no different from other network costs and they should be borne by the originating carrier itself. The TA concludes that no change needs to be made to the current charging principles for this type of calls.

### **ISDN**

61. PCCW-HKTC, New T&T and NWT all agreed with the amendment proposed by the ISDN Technical Working Group (“Working Group”) in 2000 to amend the ISDN interconnection charging principles in a way that is technically feasible for implementation. The main theme of the amendment is to base the charging arrangements on traffic passing through the POI rather than the type of terminal devices of the originating or terminating operators.

Traffic passing through the PSTN and ISDN POI should be subject to PSTN and ISDN interconnection charges respectively irrespective of the originating and terminating terminal device type. Further details of this proposal are given in the Annex.

### **VAS calls**

62. PCCW-HKTC argued that the provision of information or database services by a service provider should fall within the definition of VAS. The service provider should pay PNETS charge to the Transiting Operator to which it is directly connected, and the Transiting Operator would in turn pay originating charges to the Originating Operator. New T&T and NWT opined that information or database services should not be classified as VAS.

63. Currently the operation of information or database services is not regarded as a public telecommunications service, and the operators concerned are not required to pay interconnection charges to the operator of the network connected to the services. This is because the providers of information or database services are not providing public telecommunications services, but rather using the telecommunications networks to disseminate their own information or data to the users. Without receiving interconnection charges from the information or database service providers, it would be unfair for the network operator with these services connected to pay the originating network operator an originating charge. The TA therefore does not accept the reclassification proposed by PCCW-HKTC.

## **OTHER COMPETITION ISSUES**

### **Forecasting and ordering**

64. PCCW-HKTC stated in its submission that the current cost recovery rules and interconnection principles fail to take into account the practice of consistent capacity over-forecasts by interconnecting carriers. As there is no requirement for any commercial commitments by the requesting carrier, the financial risk is borne solely and unfairly by the providing carrier. PCCW-HKTC requested that interconnecting carriers should be required to enter into certain minimum commitments related to their orders.

65. The TA would like to point out that the Determination made in March 2001/November 2001 in respect of interconnection capacity between PCCW-HKTC and Wharf New T&T Limited has already provided a model for achieving a fair sharing of the risk in the investment of the network equipment for the provision of interconnection capacity which exceeds the capacity that could be agreed by both parties. In particular, the model institutes some form of discipline on the operator which requests interconnection capacity so that it would bear the cost consequence of making excessive forecast. The objective is to ensure that the requesting operator could have all the capacity that it needs for its development but at the same time the model provides a safeguard to the providing operator in the event that it is proved that the order of the requesting operator is not justified in terms of demand for service. This model may be extended to the interconnection between PCCW-HKTC and other operators, thereby reducing providing operators' exposure to the risk of capacity over-forecasts by the requesting operators.

### **Economic and technical efficiency**

66. In its submission, New T&T referred to General Condition 13 of the FTNS licence which obliges the licensee to provide interconnection promptly and efficiently. New T&T argued that efficient interconnection implies the provision of interconnection services by the providing carrier in a technically and economically efficient manner.

67. The TA is of the view that it would be unfair to the incumbent operator if the calculation of interconnection charges totally ignores the legacy of its network and works on the assumption that its entire network could have been redeveloped at once using the best available technology (the "greenfield" approach). The interconnection charging regime is therefore based on the modified "scorched node" approach discussed in paragraph 23, which takes the existing network configuration of the incumbent carrier as given and then modify it to eliminate any network inefficiency.

### **Transparency of interconnection charges and justifications**

68. New T&T argued that TA must publish or direct the publication of all interconnection agreements entered into by the dominant operator. New T&T also submitted that TA should direct the publication of all tariffs by PCCW-

HKTC for all retail and wholesale services in accordance with its licence conditions and the Telecommunications Ordinance. NWT also supported the transparency of interconnection charges. PCCW-HKTC claimed that it did not comprehend the request for greater transparency with respect to interconnection charges as all material interconnection rates have been determined by the TA. In addition, PCCW-HKTC said it has recently undertaken the publication of interconnection terms and conditions in the form of a tariff, as evidenced by the published tariff for its carrier-to-carrier Broadband Copper Local Loop service.

69. The TA is of the view that the interconnection charges should be transparent so that the requesting operators know the applicable charges without the need to be engaged in a time-consuming enquiry and negotiation exercise. Transparency of interconnection charges is one of the elements in the Reference Paper incorporated into the commitments of the parties to the Basic Telecommunications Agreement under the auspices of the World Trade Organisation (WTO). Hong Kong is a signatory to the Basic Telecommunications Agreement under the auspices of the WTO. Therefore it has therefore the obligation of adhering to the principles in the Reference Paper. Under the conditions of their existing licences, FTNS operators have the obligation to perform and observe the requirements of international agreements. The dominant local FTNS operator is a “major operator” within the meaning of the Reference Paper. To meet international obligations imposed on Hong Kong, the dominant local FTNS operator should make publicly available either its interconnection agreements or a reference interconnection offer.

70. Although “interconnection” in the WTO Reference Paper may have a narrower scope than “interconnection” defined in section 36A of the Telecommunications Ordinance in Hong Kong, and Type II interconnection, which is within the scope of “interconnection” under section 36A, may not be “interconnection” under the WTO Reference Paper, the TA considers that the need for transparency applies equally to Type I and Type II interconnection.

71. The TA will therefore request the dominant local FTNS operator to publish reference interconnection offers for all major interconnection services (including Type I and Type II interconnection) after receiving the approval of the TA. If the dominant local FTNS operator does not accede to this request, the TA will consider publishing under section 36A(5C) of the

Telecommunications Ordinance the content of all interconnection agreements entered into by the dominant local FTNS operator filed with the TA under section 36A(5A).

### **Annual review of charges**

72. In the consultation paper, the TA considered that there is no need to conduct annual review of interconnection charges. PCCW-HKTC agreed with the TA on the grounds that there are already mechanisms embedded in the Telecommunications Ordinance and the standard FTNS licence for the TA's review of pricing matters and its power to determine such prices. However, New T&T and NWT argued otherwise and the interconnection charges should be reviewed annually in order to closely and effectively monitor the cost of interconnection. NWT recommended the TA to consider a bi-annual review should he consider annual review to be imposing too much administrative burden.

73. The TA concurs with PCCW-HKTC that the Telecommunications Ordinance has already provided for the TA's authority to review and determine the interconnection charges. It is more appropriate for the interconnecting operators to negotiate on the specifics of the interconnection charges, including the mechanism for annual adjustment of the charges where appropriate, based on the general principles set out by the TA. Hence, there is no need to conduct annual review of interconnection charges. However, the TA will continue to closely monitor market development and keep the charging principles in concert with the evolution of the industry and the establishment of competition.

### **Relationship between retail and wholesale charges**

74. The interconnection charge, being a form of wholesale charges, is based on LRAIC. This contrasts with the calculation of the retail charge based on the historical FDC approach. Hence, it might not be possible to maintain a correlation between the two sets of charges based on different cost standards. In the consultation paper, the TA sought views from the industry on the relationship between retail and wholesale charges.

75. NWT, PCCW-HKTC and NT&T pointed out that the employment of

different cost standards has caused in the rates of interconnection services provided to service providers being lower than the corresponding wholesale (carrier-to-carrier) rates. PCCW-HKTC proposed to solve the inconsistency of retail prices and interconnection charges by imposing a price floor for both retail services and interconnection charges. NWT recommended using the same type of charging methodology for the setting of the wholesale and retail rates. As an alternative, the TA may stipulate a minimum price difference between the wholesale and retail charges.

76. The TA considers that the proposal suggested by PCCW-HKTC to solve the inconsistency between these two sets of charges seems to be arbitrary. As to NWT's suggestion on maintaining a minimum price difference between the wholesale and retail charges, it is in effect the same as a retail-minus interconnect-charging regime. This regime will require the carrier-to-carrier interconnection charge to be set based on downward margin from the incumbent's PNETS interconnection charge. For example, the carrier-to-carrier interconnection charge is determined by subtracting from the PNETS charge all of the incumbent's estimated average costs for such activities as marketing, customer-service and billing for serving the service providers. The retail-minus approach should guarantee sufficient margin for the new entrants to compete with the incumbent operator. However, the approach might result in interconnection charges that are not based on the true underlying costs, thereby deviating from the principle of cost orientation in setting the interconnection charges.

77. In paragraph 25 of this Statement, the TA has said he would consider applying a cap based on historical costs on cost components of Type I interconnection charges. This should have ameliorated the problem of the interconnection charges on a wholesale basis being higher than the retail (PNETS) charges.

### **Competition first and foremost**

78. New T&T believed that interconnection should be provided first despite whether the parties can come to an agreement or not during the commercial negotiation. PCCW-HKTC pointed out that the industry has sufficiently matured to a level where interconnection arrangements can be dealt with through class tariffs, instead of regulatory intervention. Further, the

PCCW-HKTC considered it appropriate for the TA to outline the factors which he will take into account when deciding whether it is in public interest to make a determination where there is already a commercially agreed interconnection agreement.

79. Normally commercial principles require the conclusion of contract before supply of services. However, where public interest so justifies, the TA has directed the provision of interconnection services before the interconnection agreements are concluded by commercial negotiations or determination under section 36A of the Telecommunications Ordinance. Such practices will be continued in the future.

80. The TA would only act on public interest ground to determine the terms and conditions where there is already a commercially concluded interconnection agreement. The TA would take into account factors, such as whether consumer benefits or effective competition would be *severely* compromised by the existence of the commercial agreements, when deciding on whether the commercially agreed agreements work against the public interest. However, the TA will not lightly interfere with commercial agreements and would do so only on *overwhelming* public interest grounds.

## **NON-FTNS/FTNS INTERCONNECTION PRINCIPLES**

### **Charging principles for interconnection between FTNS and mobile networks**

81. In its submission, HGC agreed with the TA that the review of the TA Statements should only cover the FTNS/FTNS interconnection principles. Any review of interconnection principles for the FTNS/Mobile and FTNS/PNETS interconnections should be reviewed separately. However, Peoples, SmarTone and Sunday argued against the exclusion of the existing interconnection charging principles for FTNS/Mobile and FTNS/PNETS interconnection in the review. Dr Ure also submitted a paper focused on FTNS/mobile interconnection.

82. The TA has already stated in the consultation paper that the review of the TA Statements will only include FTNS/FTNS interconnection principles. It would be unfair to other operators if the TA only considers the submissions

received from the mobile network operators in this exercise and decides the charging principles for FTNS/Mobile and FTNS/PNETS interconnection because other members of the industry, particularly the fixed network operators, would not have been given a fair opportunity to express their views.

83. Indeed, there is no plan at present for the TA to fundamentally alter the current arrangement whereby the mobile network operators paying originating and terminating charges to fixed network operators in view of the flat charges arrangement for fixed telephone lines. Any change of such a charging principle to one based on the “calling-party-pays” or “sender-keeps-all” as proposed by Peoples, Sunday and Dr John Ure is a longer term issue. It would involve a thorough consultation in the industry and the community, and would necessarily not be a change that can be brought about in the near term.

#### **“Heavy-handed” regulation vs “light-handed” regulation**

84. New T&T considered that the TA must be ready to intervene and to proceed with a determination upon request. The acceptance to proceed must not be limited to request submitted before the conclusion of a commercially agreed interconnection arrangement. NWT also suggested the TA taking a more heavy-handed approach. PCCW-HKTC argued that a “heavy-handed” regulatory approach would encourage the new FTNS operators to rely upon regulatory intervention, instead of good faith commercial negotiation, for the settlement of interconnection pricing issues.

85. “Light-handed” regulation is a Government policy which is implemented by the TA. This means that the TA would not intervene unnecessarily into matters which ought to be resolved through commercial negotiations, and the TA would not intervene until genuine effort had been made to try and resolve the interconnection terms. However, the TA would monitor that this preference for commercial settlement of interconnection disputes would not be exploited so as to hinder the development of competition. It has also been the past practice of the TA to consider intervening on an informal basis, such as through mediation, before considering initiating the formal determination process under section 36A of the Telecommunications Ordinance.

86. Once the TA has decided to intervene under section 36A, a due process is required in order to ensure that the natural justice requirements are met. The TA is mindful of the length of time required to make determinations. The TA issued a Statement entitled “Revision of Procedures for Making Determinations on the Terms and Conditions of Interconnection Agreement” on 27 September 2001. The Statement specifies the time required for each step required in the processing of determination request. This provides sufficient transparency and certainty to the industry of the time required for the determination proceedings.

87. The TA would also accept the request for determination on commercially negotiated interconnection agreement if it is in the public interest to do so. However, the TA will regard the re-opening of a commercial agreement as a serious decision and the hurdle for passing the “public interest” test would be much higher.

## **APPLICATION OF THE CHARGING PRINCIPLES**

88. A licensee may request a determination by the TA pursuant to section 36A of the Telecommunications Ordinance or the TA may initiate a determination in the public interest. The TA would take into account the charging principles set out in this Statement in the determination of charges for Type I interconnection between circuit-switched narrowband fixed networks<sup>6</sup> and Type II interconnection to copper-based local loops for narrowband and broadband services because it was with these types of interconnection in mind that the principles in this Statement were considered. The TA has in other statements or documents set out the charging principles for other types of interconnection and associated services, e.g. “Local Access Charges”, charging principles for implementing operator number portability and mobile number portability, “open network access” to third-generation mobile networks, etc. Charging principles for other types of interconnection (e.g. Type I interconnection between broadband networks) will be developed where necessary.

89. Based on the conclusions in this Statement, the TA has revised and re-issued Statements No. 4, 5, 6, 7 and 8 in the series on “Interconnection and

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<sup>6</sup> Public switched telephone network (PSTN) and integrated services digital network (ISDN)

Related Competition Issues”. The changes to carrier-to-carrier charging principles are incorporated into Statement No. 7 (Second Revision). The changes to Statements No. 4, 5, 6 and 8 are updating only.

**Office of the Telecommunications Authority**  
18 March 2002

**“Carrier-to-Carrier Charging Principles” for  
Interconnection of ISDN Calls**

**Introduction**

A1. Statement No. 7 (Revised) sets out the charging principles applicable to various interconnection scenarios, including the interconnection of integrated services digital networks (ISDN). Unlike other fixed network operators, PCCW-HKT Telephone Limited (PCCW-HKTC) treats an ISDN call as a separate call type and subjects it to a tariff structure different from that for a public switched telephone network (PSTN) call. Therefore ISDN calls are subject to separate interconnection charging principles.

A2. In February 2000, Wharf New T&T Limited (then New T & T Hong Kong Limited, New T&T), one of the fixed telecommunications network services (FTNS) operators, proposed to revise the charging principles for ISDN interconnection, as there were views within the industry that the principles in Statement No. 7 (Revised) were complicated and technically difficult to be implemented. In response to the request, the Office of the Telecommunications Authority (OFTA) formed an ISDN Technical Working Group comprising representatives from PCCW-HKTC, New T&T, Hutchison Global Crossing Limited (HGC) and New World Telephone Limited (NWT) (the Working Group) to study the matter. After a series of meetings the Working Group has come up with a proposal to amend the part of the Statement No. 7 (Revised) relating to ISDN interconnection.

A3. The TA considers that the proposed amendments accord with the broad interconnection charging principles and have sufficiently taken into account technical issues for implementation. The TA will amend Statement No 7 (Revised) along the proposed line.

**The Current ISDN Interconnection Charging Arrangements**

A4. An ISDN call can theoretically be a call involving any of the call types for PSTN. However, for PCCW-HKTC, whilst there are no usage

charges for local PSTN calls originated from directly-connected (access) customers, there are usage charges for ISDN calls. Thus for an ISDN to ISDN call over the PCCW-HKTC network, the originating party pays for the conveyance of the call from the point of origination to point of termination, irrespective of whether the called party is an end-user or a value-added service provider. Therefore, for ISDN to ISDN interconnection, the originating carrier pays the terminating carrier a termination charge, irrespective of whether the call is made to an end-user or a service provider. Unlike PSTN to PSTN interconnection, even when an ISDN access customer calls a value-added service provider connected to another ISDN, the terminating charge applies and no originating charge has to be paid, as the originating carrier has already received a local usage tariff from its access customer. However, for an ISDN to PSTN call, or vice versa, the situation is somewhat more complicated, as there are usage charges at the ISDN end, but not at the PSTN end.

A5. As regards the quantum of the termination charges, for New T&T, HGC and NWT, the costs of conveying normal PSTN calls do not differ from the costs associated with conveying ISDN calls. However, for PCCW-HKTC, the ISDN calls are handled by an overlay network which has a different cost structure compared with the PSTN.

A6. Based on the above considerations, under the existing Statement No. 7 (Revised), the following charging principles apply to ISDN calls:

<i>Calling Party</i>	<i>Called Party</i>	<i>Applicable Interconnection Charge</i>	<i>Comments</i>
ISDN end user	ISDN end user	Termination charge	Calling party has paid for full cost of conveyance
ISDN end user	ISDN service provider	Termination charge	Calling party has paid for full cost of conveyance
ISDN service provider	ISDN end user	Termination charge	Calling party has paid for full cost of conveyance
ISDN end	PSTN end	Termination	Calling party has

<i>Calling Party</i>	<i>Called Party</i>	<i>Applicable Interconnection Charge</i>	<i>Comments</i>
user	user	charge paid to PSTN network	paid for full cost of conveyance
ISDN end user	PSTN service provider	No origination or termination charge	The ISDN end user and the PSTN service provider each have paid for the conveyance over the networks to which they are connected
PSTN end user	ISDN end user	Termination charge paid to ISDN network	The calling party has nominally paid for the full cost of conveyance
PSTN end user	ISDN service provider	Originating charge paid to PSTN network	Called party has paid for the full cost of conveyance

### **Problems with Implementation**

A7. In order to implement the ISDN interconnection charging principles set out above, fixed telecommunications network services operators are required to identify the service type (ISDN or PSTN service) and user type (end user or service provider) of the calling and called parties, as well as the call direction of ISDN calls. New T&T submitted that these principles, devised on the basis of PCCW-HKTC's retail tariff for ISDN services and its special network architecture, are difficult for all FTNS operators to implement for the following reasons:

- (a) the charging principles depend on the calling party and called party service types instead of network resource requirement. Operators may have various tariff structures and service options for the same physical line. There may be ambiguity for defining the service type, i.e. 'ISDN' or 'PSTN', of a particular line;

- (b) PCCW-HKTC requires separate incoming routes for ISDN and non-ISDN originating calls depending on the service type of the calling party;
- (c) to cater for (a) and (b), the other FTNS operators require a tailor-made and complicated routing logic for the originating calls. Equipment vendors are very unwilling to support proprietary features and the development can be very costly;
- (d) it is inefficient for the other FTNS operators to route originating calls via different outgoing points of interconnection (POI) routes to PCCW-HKTC by service type. POI configuration will be complicated and route dimensioning will be more difficult;
- (e) dedicated number ranges for ISDN and non-ISDN subscribers are not practical. Customers wish to keep their numbers for upgrading their services to ISDN. Mixing number ranges for ISDN and non-ISDN customers is already practised by the operators. There is no means to distinguish called party service type reliably.

A8. Pursuant to the request of New T&T, the Working Group was formed to study the matter. Members of the Working Group agreed that there was no practical and cost justified solution available to implement the ISDN interconnection charging principles set out in the Statement No 7 (Revised). Effort was therefore concentrated on finding an alternative charging approach which would be technically feasible to implement.

### **Revised Charging Principles**

A9. After six rounds of meetings, the Working Group has come up with a proposal to amend the part of the Statement No. 7 (Revised) that relates to the charging principles for ISDN interconnection (i.e. paragraphs 51 - 54). The main theme of the amendment is that the charging arrangements should be based on traffic passing through the POI rather than the type of terminal device of the originating or terminating operators. Traffic passing through the PSTN and ISDN POI should be subject to PSTN and ISDN interconnection charges

respectively irrespective of the originating and terminating terminal device type. By these means, the charging principles are not only simplified but are also technically feasible to implement. The detailed proposal adopted by the working group in the form of replacement paragraphs for paragraphs 51 - 54 of the Revised Statement No. 7 is set out in the paragraphs below.

A10. An ISDN call is not a separate call type, because an ISDN call can theoretically be a call involving any of the call types for PSTN. However, for PCCW-HKTC, there is currently a fundamental difference between the tariff structure in PSTN and that in ISDN. There is no usage charge for local PSTN calls between end users, whereas there are usage charges for ISDN calls. Since PCCW-HKTC had adopted an ISDN overlay network to provide ISDN service, it is necessary to establish two types of interconnect trunk groups between operators, the “ISDN trunk group” for which the terminating operator will support the ISDN capability and the “PSTN trunk group” for which the terminating operator will provide either Telephone User Part (TUP) or Integrated Service User Part (ISUP) signalling for succeeding circuit path. For an ISDN originating data call, the originating operator will route the call to the terminating operator via the ISDN trunk group. For an ISDN originating non-data call, the originating operator will route the call to the terminating operator via the ISDN trunk group or the PSTN trunk group. For a PSTN originating call, the originating operator will route the call to the terminating operator via the PSTN trunk group.

A11. As regards the quantum of the charges, the three FTNS namely, HGC, New T&T and NWT, have submitted that their costs for conveying normal PSTN calls do not differ from the costs associated with conveying ISDN calls. However, PCCW-HKTC claimed that the ISDN calls are handled by an overlay network which has a different cost structure compared with the PSTN. In the determination of the charges, the TA will examine the cost of PCCW-HKTC’s ISDN overlay and set a level justified by the relevant costs.

A12. Based on the above considerations, the following charging rules should apply:

<i>ISDN / PSTN POI Type<sup>7</sup></i>	<i>Called Party<sup>8</sup></i>	<i>Charging Rule</i>
ISDN	Normal telephone user	ISDN terminating access charge (TAC)
	Value-added service (VAS) provider	ISDN TAC
	Personal number	ISDN TAC
	Non-automatic paging number	ISDN TAC
PSTN	All	Refer to the relevant charging principles for PSTN calls

For ISDN transit calls (via ISDN POI type),

<i>End-to-End Charging Rule</i>	<i>Transit Charging Rule</i>
Originating access charge (OAC)	Terminating Operator Pays
TAC	Originating Operator Pays

A13. The TA has considered the proposal and is satisfied that the revised arrangement is simple and generally in line with the charging principles for PSTN calls. He notes that under the proposed charging arrangements, where a call is placed from an ISDN to a value added service (VAS) provider connected to a PSTN, the PSTN operator may, in addition to receiving terminating charge from the ISDN operator, also receive interconnection charge from the VAS provider. This is what the charging principles under the existing Statement No. 7 attempted to avoid. Nonetheless, given that the operators and the industry in general have no strong view against this respect, and that the rule proposed by the Working Group would not favour any particular operator, the TA has accepted the proposal given the simplicity and feasibility of the new approach.

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<sup>7</sup> ISDN / PSTN POI type is distinguished by the POI trunk group selected by the call originating party for conveying the call.

<sup>8</sup> This table only shows types of local calls between FTNS operators.

