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Briefing paper 2

PNETS

Response to OFTA's Consultation Paper

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PNETS – Pretty Nasty Economic Tariffing Scheme? Comments on the TA's Review of Statements No.4, 5, 6, 7 (Revised) and 8 on Interconnection and Related Competition Issues - Consultation Paper, 11 September 2001

PNETS Charging and Costing Principles - proposals for reform

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Preamble

> OFTA's preliminary view is that the TA Statements provide guidance to the FTNS operators regarding Type 1 interconnection between their FTNS networks. Any review of interconnection principles for the FTNS/Mobile and the FTNS/PNETS should be handled separately.' (para 28)

This is the second of two papers submitted in responses to the TA's Consultation Paper, 11 September 2001. The first paper deals directly with FTNS/FTNS interconnection issues. This paper deals with FTNS/PMRS interconnection and the basis for PNETS charging. It does so on two grounds:

(a) the principles involved in Type 1, Type 2 and PNETS charges are inextricably connected. For example, OFTA seems to agree that the 'build-buy' decision is an important consideration for Type 2 interconnect, but less so for Type 1. It is equally less so for PNETS. For example, OFTA seems to argue that at some stage FTNS interconnect traffic may be required to contribute to indirect network costs, but PNETS already does so, and perhaps should not.

(b) convergence of fixed and mobile, especially in the era f broadband, may well require bringing interconnect charging into harmony.

For both these reasons it seems reason and timely to raise the question of PNETS charging, and indeed to question it.

A: Introduction

1. The argument of this paper is that PNETS charges should not be based on FDC because this relieves the local loop tariff from covering the indirect fixed costs of the network. This is economically inefficient for reasons explained below.

2. PNETS charges based on FDC were introduced at a time when LRIC was unavailable and the flat rate monthly local loop tariff was subsidized by international revenues. Neither of these conditions applies today. Nor are mobile services any longer considered luxury purchases, nor services enjoying rates of return that mask the impact of interconnection charges.

3. In terms of numbers of customers, mobile networks now exceed FTNS networks and as such they directly contribute to the rising value of the FTNS, accounting for over 20 per cent of network traffic.

4. The most logical development for interconnection would seem to be a peering arrangement, possibly a sender-keeps-all arrangement in cases where the traffic is balanced. The intermediate step should be an immediate shift to LRIC, which removes indirect fixed network costs from the interconnection charge.

5. The immediate result of such a move would be to rebalance the tariffs of the local loop and mobile services. Raising local loop tariffs would reduce, but almost certainly not eliminate, the consumer surplus currently enjoyed by subscribers to the fixed networks. A shift of PNETS to LRIC would also offer the mobile network operators scope for price reductions, a move that would attract new subscribers, including some who decided to substitute a mobile for a fixed service.

6. An alternative or additional option for mobile operators would be to eliminate receiving party pays, and adopt calling party pays. While FDC is used there is no incentive for mobile operators to make this move, or for the incumbent to negotiate on this basis. A shift from RPP, or more accurately mobile party pays (MPP), to CPP would have the advantage of opening the doors for convergence between fixed and mobile and 3G and broadband services. This would result in simplified regulation for the industry, simplified billing for customers, and perhaps promoting the uptake of broadband communications in Hong Kong. It would also anticipate moves to CPP in the Greater China region.

B: FDC vs LRIC

1. Before examining the case for FDC vs LRIC for mobile-fixed interconnection, it helps to make some initial points regarding FDC vs LRIC for fixed-fixed. The key points are that the use of FDC for mobile-fixed arose at a time when LRIC was not available, and that the argument for the use of LRIC for mobile-fixed is actually stronger than its use for fixed-fixed.

2. Some form of FDC was widely used in interconnection regimes in the 1980s. It is a top-down approach and the cost data is easily obtained from company accounts, although it requires some level of breakdown into allowable and non-allowable costs. By contrast, a LRIC approach, which can be top-down or bottom-up, requires considerable accounting and engineering data which most incumbent operators simply did not collect because it is costly to do so, and as dominant or even monopoly

carriers they felt little or no need to have this information. In Hong Kong, not until the Accounts Manual was produced in the mid-1990s was sufficient data available for the introduction of the LRIC principle.

3. FDC is economically justified where there is a strong need to compensate the operator providing the interconnecting service. This may arise when the incumbent is

   (a) losing business to the interconnecting operator as a consequence of providing the interconnecting service, and

   (b) running a high commercial risk as a consequence of a shift towards a more competitive market environment. Both these points require some clarification.

4. In the case of (a) the new entrant can only compete effectively if the dominant network operator provides interconnection. However the resulting loss of market share by the dominant operator does not necessarily constitute a zero-sum game. For one thing, competition can drive the market, not just in terms of price [1] but also in service innovation, which in turn can generate revenues from a suite of intelligent and IP-based services. A second network can also generate greater calling opportunities, but as a close substitute for the incumbent network the possibility of a near zero-sum game is greater than for a mobile network.

5. In the case of (b) the shift towards a competitive market environment poses another issue. When this involves revoking an existing exclusive licence, the incumbent will normally look for compensation, as in the case of HKTI. When it involves opening the market after the incumbent's period of exclusivity has expired, no compensation is paid, as in the case of HKTC. Nevertheless, if the incumbent has a long history of relatively good service quality and has a large legacy network in consequence, it can reasonably expect to receive due consideration from the regulator for a period of transition during which its greatly increased commercial risk is taken into account. There are many ways in which this can be done, for example by adjusting the cost of capital in the interconnection charge, redistributing the cost of the universal service obligation, rebalancing the local tariff, and so forth.

6. There are limits to the transition period during which the incumbent has time to adjust its operational efficiencies. New entrants can expect symmetrical treatment. They can expect a period during which, for example, interconnection charges are kept low. In Hong Kong they were also offered an extended period during which a moratorium was placed on the issue of new FNTS licences, until 2003.

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[1] In Hong Kong the price elasticity of demand for telecommunications access and usage services is inelastic for local services, and seems to be inelastic for international. See John Ure (1995) 'Telecommunications' in Cheung Y.L. and M.H.Sze eds. *The Other Hong Kong Report 1995*. Hong Kong: The Chinese University Press (pp.380-401). See www.trp.hku.hk/pubications.html

7. On the respective merits of FDC and LRIC it is worth quoting from two sources. First from Ovum, a consultancy that specializes in interconnection studies, and then from OFTA.

> Which system creates the fairest environment in which competition can develop? We believe that this depends on the state of development that the industry has reached. Offering a new entrant interconnection on an incremental-cost basis will encourage a provider to enter the market with costs lower than the incumbent's. However, as its market share increases it seems fair that the entrant should pay a larger proportion of the interconnect provider's indirect costs. This proposal is both pragmatic and has a degree of theoretical justification. On practical grounds, it encourages the development of competition without due cost to the incumbent in the long run. Its theoretical basis is that the small amounts of traffic initially generated by the new entrants are marginal to the incumbent's business, but the large amounts handled once competition is established are not. (David Lewin and Malcolm Kitchen, 1994, *Interconnect: the key to effective competition*, Ovum, London, para. C1.6)

9. The position OFTA adopts in February 2000 seems close to Ovum's, suggesting the need for a shift from LRIC to FDC for FTNS interconnection:

> At present, interconnection charges among the FTNS operators are based on long run average incremental cost (LRAIC)…. However, as the market becomes more developed and the new entrants successfully increase their market share, it would be fair to require the new operators to take on the responsibility for a larger proportion of the interconnection service provider's indirect costs and thus a fully distributed cost (FDC) approach would seem to be justified. (*Review of Methodologies for Calculation of Interconnection Charges for VAS and PMRS and Local Access: Industry Consultation Paper*, 8 February 2000, para. 9)

10. By September 2001 OFTA's position had reverted in favour of LRIC.

> The current charging principles do include common and joint costs (collectively known as "shared costs") which are causally related to the conveyance service provided by the incumbent's network, of which the interconnection service is part…. The TA considers that LRAIC should continue to be used as the cost standard and the calculation of the interconnection charge should be based on the incremental costs of the entire conveyance service. Such incremental costs will include a reasonable cost of capital. The incremental costs will also include the shared costs common to all the service elements of the entire conveyance service, but no other services. On this basis, the indirect fixed costs at the corporate level, which are *not* causally related to the provision of the conveyance service, are *not* included in the LRAIC calculation. (*Review of the TA's Statements No.4,5,7 (Revised) and 8 on Interconnection and Related Competition Issues: Consultation Paper*, 11 September 2001, para.10, original emphasis.)

C: Interconnection Methodology - Unbundled Network Elements (UNEs)

1. Interconnection costs in Hong Kong are arrived at through two processes. First, by establishing a set of principles, which are cost-based. Second, through a cost estimation procedure. The principles determine the range of costs to be included, and the basis of their measurement, for example whether to use historical (past) or current (market) or forward-looking (engineering) data. The cost estimation procedure does the actual cost measurement estimations, based upon data supplied by PCCW/HKT on a quarterly basis in accordance with the Accounts Manual, together with a sampling method to check the accuracy of the date, and supplemented by other information such as international benchmark comparisons. The accountancy firm Deloitte Touche was contracted by OFTA to draw up the Accounts Manual and undertake the audits.

   > Information obtained from HKTC has been verified against the source records on a sample basis or by comparison with other information available to the TA and international benchmarks…. (P.5, para 19). Where necessary, the data from the operator which is capable of performing the measurements can be audited by an independent impartial party. (p.10, para 35; OFTA, *Determination Under Section 36A for the Terms and Conditions of Interconnection Between Hong Kong Telephone Company Limited and New T & T Hong Kong Limited*, 21 August 1998)

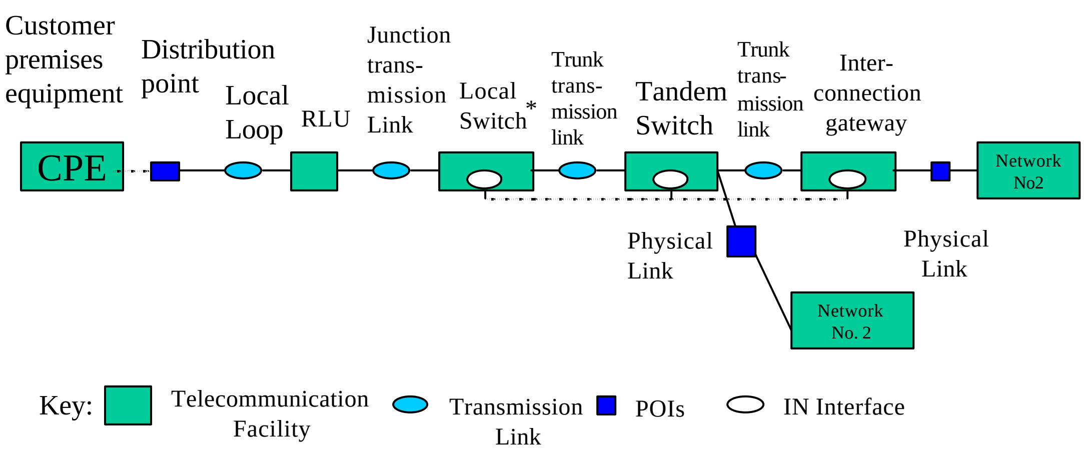
2. It follows that interconnecting parties of any licence type have an interest to review the appropriateness of the principles being applied at any particular time, and, if necessary to request an impartial review of the actual cost estimates to ensure that (a) only the correct network elements were being identified in the estimations, and (b) the data supplied was as accurate as is reasonably possible.

3. OFTA uses the Accounts Manual that is underpinned by a conceptualized unbundling of the different network elements used to convey interconnected traffic. Each network element is costed according to either current (replacement) or historical cost whichever is the lower to take into account inflation in Hong Kong's property market.

   > Costs of providing interconnection conveyance services are estimated on an unbundled basis using a 'bottom up' approach. The traffic sensitive network elements necessarily used for conveying a call are identified at a demarcated level. Costs of these unbundled network elements (UNE) are measured based on the LRAIC standard using current or replacement cost measurements as well as historical costs. In accordance with the principles set out in Statement No.7 (Revised), interconnection charges are based on the lower of current or replacement costs and historical costs. (p.2, para 4, Appendix to OFTA, *Determination Under Section 36A for the Terms and Conditions of Interconnection Between Hong Kong Telephone Company Limited and New T & T Hong Kong Limited*, 21 August 1998)

4. OFTA’s *Review of the Telecommunications Authority’s Statements No. 4,5,6,7 (Revised) and 8 on Interconnection and Related Competition Issues: Consultation Paper*, 11 September 2001, offers the following diagram that identifies the various unbundled network elements.

Relevant Unbundled Network Elements (UNEs) for Interconnection Services



* The line related costs of local switches are not included in relevant costs

Source: OFTA Determination, 21 August 1998

5. Type 1 interconnection for FTNS excludes the UNEs of the local loop, such as direct exchange lines and distribution points, and being based on LRAIC also exclude indirect fixed network costs. PNETS interconnection charges include the latter. Direct local line costs are accounted for in so-called Type 2 FTNS interconnection, or the costs associated with the unbundled local loop.

> The current costs of conveyance services are aggregated based on costs of UNEs and ‘routing factors’ which gives the number of UNEs used in conveying a typical call. The costs of UNEs are, in turn, built up from the costs of network components that are contained in a UNE, including associated operating costs and cost of capital for the assets used. (p.5, para.18)… The method of estimating the historical costs of conveyance services for interconnection is similar to that used to estimate current costs. However, the average costs, design capacity and actual traffic are calculated based on the network averages and not on typical sizes of

network components, as such information was limited. (para 20; Appendix *Final Analysis* to OFTA, *Determination Under Section 36A for the Terms and Conditions of Interconnection Between Hong Kong Telephone Company Limited and New T & T Hong Kong Limited*, 21 August 1998)

D: Mobile Interconnection & PNETS

1. When PNETS was introduced for the PMRS operators, cell phones were envisaged for marginal use in moving vehicles, 'mobile' rather than 'portable'. And as CSL was a subsidiary of HKTC it was in effect money out of one pocket and into another, despite separations accounting required to protect the Scheme of Control over local tariffs then in place. The premium prices that were charged for handsets and usage, and the profit margins involved diminished the importance of the interconnection charges and their cost basis.

2. How has OFTA justified the use of FDC for mobile-fixed interconnection since? In the 25 October 2000 Consultation Paper (para.12) on the subject, OFTA noted that PMRS traffic and VAS traffic represented 21% and 22% respectively of total PSTN network traffic, that is over 40% of PCCW/HKT's network traffic – another 10% comes from interconnecting FTNS operators, according to the 11 September 2001 Consultation Paper (para.11). On this basis, OFTA argues as follows:

   > The pricing of interconnection services based on an incremental cost approach for mature services like VAS and mobile services will not be able to fully compensate for all costs incurred in the delivery of the services through the incumbent FTNS operator's network because indirect fixed costs are omitted in the calculation of incremental costs. The FTNS operators would then be subsidising the mobile operators and the VAS providers in the provision of interconnection services. At the current state of development of the mobile services and VAS market, it would only be fair to require the mobile operators and VAS providers to take on the responsibility for bearing a reasonable proportion of the interconnection network operator's indirect fixed costs and thus a FDC approach would seem to be justified. (*Review of Methodologies for Calculation of Interconnection Charges for VAS and PMRS and LAC: Statement by the TA*, 25 October 2000, para.12)

3. The first point to note is that if FDC is justified on the grounds of a maturing market (the growing percentage of traffic coming from PMRS and VAS) then in logic Ovum's argument (see B.7 above) applies. On this basis, LRIC and not FDC would have been justified earlier in the history of PNETS.

4. The second point to note is that the argument OFTA has used to justify FDC for mobile-fixed on 25 October 2000 exactly mirrors the reason offered on 8 February 2000 (see B.9 above) by OFTA for moving fixed-fixed from LRIC to FDC. This is FTNS (just substitute PMRS and VAS) should 'take on the responsibility for bearing a reasonable proportion of the interconnection network operator's indirect fixed

costs.' But on 20 September 2001 OFTA rejects this argument for fixed-fixed, arguing for the exclusion of 'the indirect fixed costs at the corporate level, which are *not* causally related to the provision of the conveyance service.'

5. There seem to be two possible ways to reconcile these apparent contradictions.

   (a) The first is to argue that LRIC would have been appropriate for PNETS but LRIC was not available until recently, and since PMRS + VAS is 43% of network traffic it would be time to move to FDC anyway. Following this logic, since FTNS interconnect traffic is 10%, the question arises what is the trigger point for shifting from LRIC to FDC? Indeed, since interconnection traffic is over 50% in total, why not FDC for all? In reality OFTA's position seems to be that LRIC is always the ideal for FTNS. If this is so, then why not for PMRS?

   (b) The alternative reconciliation is the one OFTA seems to use. It is that in the absence of local loop call charging, and in the presence the use of MPP, mobile operators are in a special situation by picking up the revenues that should be used to cover the cost of interconnection conveyance services. This argument only makes sense if OFTA is assuming that network indirect fixed costs would normally be included in the local loop tariff but in fact are absent. In other words, if LRIC rather than FDC was used in mobile-fixed interconnect, then local loop tariffs would need to be rebalanced further than they have been.

6. Point (b) raises the key argument. A subscriber to the network of a fixed line operator paying a flat rate monthly charge would normally be expected to be charged a tariff through which the network operator recovered costs, including indirect fixed costs. To the subscriber the value of access to the network is derived from being able make and receive calls to anyone on any network, including mobile networks. The tariffing policy of any network in a competitive environment will be influenced by the tariffing policies of other networks, but what we have in Hong Kong with PNETS is a market distortion, and therefore a market inefficiency, because the PNETS charging principle is not based on LRIC, which apes the market price, but on FDC which removes from PCCW/HKT's local loop tariffing its indirect network costs. In other words, PNETS based upon FDC represents a hidden subsidy to the local loop. (This is contrary to OFTA's suggestion in 25 October 2000 Consultation Paper that LRIC would result in a cross subsidy from fixed to mobile.)

7. To argue that a rebalanced local loop tariff would leave the PMRS in an advantageous position because of mobile party pays (MPP) - in effect cross-subsidization from the local loop to PMRS - misses the point. In a competitive market with LRIC dynamic pricing would soon pass on the reduced PNETS charges to mobile customers. This could result in an all round reduction in charges, or it could lead to the abolition of charges on incoming calls – that is, calling party pays (CPP). The latter possibility is highly likely. An operator offering no charges for incoming calls would attract a lot

of new subscribers. From the mobile operators' viewpoint, the loss of incoming call revenue would be partly or wholly offset by the reduction in PNETS charges, and the price reduction would attract new subscribers, and some of them substituting a mobile for a fixed line phone. This is consistent with a rebalanced local loop tariff. That is how markets work.

8. The result would be reduced consumer surplus for PSTN subscribers. The question is, how far would consumer surplus be reduced? Monthly rental schemes for mobile currently seem to be as low as $140 for basic voice service plus some 'extras', which shows a gap of $30 per month over PSTN. (It should be noted that under resent market conditions this cannot be a cost-based tariff, so $30 substantially under-estimates consumer surplus, but here we are dealing with the underlying economic principles that can be expected to prevail sooner or later.) Would the shift from FDC to LRIC (assuming no shift the other way for FTNS) raise local loop tariffs by $30 per month? If the answer is no, then PCCW/HKT would be unlikely to lose revenues, unless of course they were constrained by competition from other FTNS, but this is irrelevant to the argument for an economically efficient PNETS charge.[2]

9. There is a further issue that needs to be addressed, and it arises from the issue raised by OFTA in the 25 October 2000 Consultation Paper quoted above. OFTA argues that PNETS traffic is now high volume, and therefore 'it would only be fair to require the mobile operators and VAS providers to take on the responsibility for bearing a reasonable proportion of the interconnection network operator's indirect fixed costs and thus a FDC approach would seem to be justified.' What OFTA ignores in this statement is that mobile networks are therefore responsible for adding more and more value to the PSTN in terms of calling opportunities. This is different from the interconnection of FTNS insofar as mobile is only partially a substitute for FTNS and more often than not a compliment, creating rather than detracting from network subscriber revenues.

10. As there are now more mobile subscribers than there are fixed line subscribers the relationship between the networks is effectively one of peers. This would strongly support an argument for a peering arrangement, and if the balance of traffic between the PMRS and PSTN networks justifies it, a sender-keeps-all interconnection regime. PCCW/HTC has no incentive to negotiate on this basis while PNETS is FDC based. This again underscores the economic inefficiency of the present PNETS regime. A shift away from FDC leading to a rebalancing of both local loop and mobile tariffs would clear the way for moves in this direction.

11. It should also be noted on traffic volumes that the higher the percentage of network traffic from PNETS operators the greater the proportion of associated conveyance service costs borne by PNETS operators, and the less borne by FTNS operators, including the incumbent. This is all win for the FTN operators, and a lose-win for the

[2] Such competition should be welcomed by OFTA as evidence that competition in the local loop is working at last.

PMRS insofar as the higher proportion of network costs are spread across a greater traffic volume.

12. A final word on economic inefficiency. In the fixed-fixed world, the “build-buy” decision underpins the choice of charging principles. In fact there are two alternative approaches open to a regulator.

    (a) The first is to be indifferent to facilities vs service competition. LRAIC is the appropriate charging principle in this case as it mimics the market. And worldwide the market has spoken, up to now saying that investment in the local loop is not easily justified.

    (b) The second is to determine as a matter of policy that facilities competition is required. In this case a shift to FDC seems justified, maybe after a period of transition as suggested in the Ovum report.

13. OFTA has tended to fall between these two stools. The FTNS licences included Performance Bonds based upon network build-out targets, and then extended the period of their exclusivity with additional investment pledges. OFTA also seems to have adopted contradictory positions in the 8 February 2000 and the 25 October 2000 Consultation Papers, proposing a shift to FDC in the first, rejecting it in the second. The real point is that for mobile networks the “build-buy” decision is irrelevant. There is no facilities objective in FDC for mobile. They have built. There is no service objective in LRIC for mobile. They provide competitive services.

14. LRIC does, however, eliminate the cross-subsidy towards indirect fixed costs that FDC maintains. It would also set in train market dynamic pricing mechanisms that would pave the way for market led – and technology enabled – structural changes in the whole telecommunications industry, including possibly fixed-mobile convergence.

15. Before examining those possibilities, we may note the Independent Regulators Group (IRG) who have responsibility for the National Regulatory Authorities (NRAs) of the European Union support a European-wide use of Forward Looking Long Run Incremental Costs (FL-LRIC) for wireless-to-fixed and fixed-to-wireless interconnection as well as fixed-to-fixed.

    > IRG presumes the principles of implementation and best practice on FL-LRIC principles to be valid for electronic communications networks in general (mobile as well as fixed networks, access networks as well as conveyance networks) – *Principles of interconnection and best practice regarding FL-LRIC cost modelling*, 24 November 2000, IRG, p.2, para. (h)

It should be noted that across the EU the CPP systems is used.

E: Convergence[3]

1. Convergence operates at two distinction levels, one technological and one commercial. Technologically, most telecommunications services applications and content services can be run down the same set of pipes. All that is really required is sufficient bandwidth. Multiplexing different services and end-user access requires investment and appropriate access devices, but the driving force behind convergence is the business case. Technology is the enabler, while regulation installs or removes barriers to the process.

2. The market determines the business case for convergence, but also required is that enterprises involved in different parts of the business work together. For example, if fixed and mobile network operators run different billing systems according to different billing principles, CPP and RPP, then clearly a unified billing system is difficult to achieve. Even more difficult to achieve is a unified service that allows users to make requests and download services on any type of device.

3. The clear global trend in mobile services is towards applications, content and data services using higher speeds and bandwidths. Although the nature of the business models to run commercially successful 2.5G and 3G network services is subject to debate, it is clear that the components of those models will include at the customer end, (a) access charges for making calls and service requests, (b) charges based upon some suitable metric – such as bit rate, bandwidth, download time, service type – for the sending of data and the download of applications, content, information services, etc. Both are consistent with CPP billing. Voice CPP involves *symmetrically* a calling party receiving a called party's voice response. Data CPP may involve a single outgoing transmission. Download CPP involves *asymmetrically* a calling party receiving downloaded applications, content, information, etc. Seen in this light, in each case CPP billing is possible.

4. In a broadband Internet era the methods of accessing the Internet and Web-based services will be many and varied. Similarly, a demand is likely to arise for requests being made through one device, for example a mobile phone, and the downloads being received by another, for example a PC connected to the PSTN, or possibly by several other devices. A regulatory regime that provides incentives, or removes barriers to this process is desirable in Hong Kong. This provides a developmental perspective in favour of reform the current PNETS arrangements.

5. The issue of fixed-mobile convergence was raised by OFTA in the mid-1990s, and more recently has been the subject of debate within the ITU, the USA and the EU. The award of four 3G licences in Hong Kong heralds the beginnings of a new era in mobile network services, and future decisions about how to licence existing 2G

[3] Convergence may not always be desirable if it results in industry consolidation that reduces consumer choice of service providers, but the assumption is that convergence also offers potential service benefits that consumers will be willing to pay for, and this will stimulate business among local applications and content providers.

spectrum after 2005, raise the serious possibility of convergence in networking, services and licensing between fixed and mobile operators beyond 2005. It therefore makes good sense for OFTA to review the PNETS charging principles in light of both (a) the changed circumstances since PNETS were introduced, and (b) the future possibilities and desirability of convergence, especially in light of the development of broadband and IP-based telecommunications access services and usage services.

Appendix 1

PSTN Interconnection Charges (LRAIC) and PNETS (FDC) Compared

Date of PSTN charge	**Originating/Terminating**			**Transit Traffic**			**PNETS**
1.7.95 – 30.6.96	Actual	Current	Historic	Actual	Current	Historic	
Per occupancy minute		4.1¢	2.8¢		2.5¢	1.8¢	
Per call attempt charge		5.4¢	3.4¢		1.2¢	0.5¢	
Aggregate	***4.9¢***	7.6¢	4.9¢	2.1¢	3.0¢	2.1¢	***9.0¢***
1.7.96 – 30.6.97							
Per occupancy minute		3.3¢	2.3¢		2.4¢	1.9¢	
Per call attempt charge		5.7¢	3.9¢		1.3¢	0.8¢	
Aggregate	***4.1¢***	5.9¢	4.1¢	2.8¢	3.8¢	2.7¢	***6.7¢***
1.7.97 – 30.6.98							
Per occupancy minute		2.9¢	2.0¢		2.3¢	1.9¢	
Per call attempt charge		4.8¢	3.3¢		1.3¢	0.8¢	
Aggregate	***3.4¢***	4.9¢	3.4¢	2.7¢	3.6¢	2.7¢	***6.7¢***
1.7.98- 30.6.99							
Per occupancy minute	***2.2¢***	3.0¢	2.2¢	1.9¢	2.3¢	1.9¢	
Per call attempt charge	***3.3¢***	4.8¢	3.3¢	0.8¢	1.2¢	0.8¢	
Aggregate		5.0¢	3.5¢		3.6¢	2.7¢	***6.4¢***
ISDN							
1.7.98- 30.6.99							
Per occupancy minute	***2.2¢***			1.5¢			
Per call attempt charge	***6.5¢***			0.7¢			
Aggregate							

From 1998 FTNS interconnection charges were broken down between 'per occupancy minute' and 'per call attempt' for voice traffic and ISDN traffic. Because PNETS charges include indirect fixed costs in addition to an apportionment of UNE costs used in the routing of PMRS traffic, PNETS charges are consistently higher than Type 1 FTNS interconnection charges, even if current rather than historical costs were used.