Response to OFTA's Review of the Regulation Policy for Type ll Interconnection, Analysis and Preliminary Conclusions: 16 December 2003

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The Argument in Brief

1. The argument of this paper is simple and straightforward. ULL has fulfilled its initial purpose of bringing competition and therefore choice to Hong Kong consumers. In fact, the policy has been a considerable success. The danger now is that the policy will lose its initial purpose and instead be driven by what are really the commercial strategies of a subset of FTNS operators. This is market distorting and requires the policy to be rethought.

2. The key issue is sustainable consumer benefits derived from facilities-based competition, which itself is built on investment and innovation. On a highly conservative estimate, well over 60 per cent of consumers already have choice (the true figure is probably very much higher) and there is little reason to think those remaining could not be offered choice by direct or indirect means in the very near future. This is due to the existing level of directly connected buildings, the ability to directly connect additional buildings that are within close proximity of existing networks, the ability to provide voice over Internet Protocol services on Hybrid Fibre Coaxial networks and the substitutability of wireless services for fixed line services. But there is good reason to believe that not all will be offered alternative direct access in the foreseeable future due to commercial considerations or otherwise.

3. Choice of service by indirect access can be made available to all at commercially negotiated ULL leasing charges. The economic principles of ULL leasing charges should be revised in any event to reflect the contribution the local loops make towards the recovery of all network costs. This is the only long run basis upon which indirect access and network investment are compatible in economic logic. One method is outlined in the paper.

4. The timing of the phase out of the current ULL policy should reflect market realities. The reality seems to be that the second network operators (hereafter, '2Ns') more or

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less cover the entire community with their backbone networks and that strategic business reasons now dictate whether and when the 2Ns build out their customer access networks. The phase out of compulsory ULL should therefore start as soon as politically practical, not later than say 1st July 2005. There would seem to be absolutely no good economic reason to extend current ULL for another three years, especially if commercially-negotiated ULL charges are available. All ULL under current policy should end on the same date, leaving all FTNS on the same equal footing.

5. The argument for ULL for broadband (BB) is considerably weaker than for narrowband (NB) based upon consumer choice currently available. There would seem to be strong justification for getting rid of compulsory ULL if there is evidence that this is not needed to incentivise investment. In fact, this seems to be the case as the broadband market is facilities-based and highly competitive, earning Hong Kong high international praise for its substantial user benefits. The evidence suggests that BB is also another type of business with very different drivers involving content issues, web-hosting, etc., and that the 2Ns are in fact making strategic commercial investment decisions in light of the fact that these lines of business have completely different risk and uncertainty characteristics. In light of this, it is not surprising that the main competition in BB currently stems from PCCW (which took the financial risk as the 'first-mover' in the BB market), HGC (as a builder of a BB network), HKCTV whose core business has been content from the beginning and more recently, HKBN. The suggestion that NB and BB are essentially similar simply because they can be delivered down the same copper local loop holds no economic weight at all. When services such as pay TV, electronic commerce and home networking take off we can expect to see simultaneous infrastructure investment.

ULL Phases 1, 2 and 3

6. Interconnection of backbone networks (Type l) is essential for competition to be effective in telecommunications markets. From a customer perspective, it allows anyone on any network to communicate with anyone on any other network. Network economics arise from the fact that the maximum number of possible connections between subscribers is the square of the number of subscribers (n) on the network, or $n(n-1) = n^2-n$. Through Type l interconnection, small networks can achieve the same network economics as large networks and can thus compete effectively.

7. Unbundling of the local loop, know as Type ll interconnection in Hong Kong, is fundamentally different. Whilst it is classified as a form of interconnection, this is a misnomer as it is, in effect, forced leasing of the incumbent's network components. ULL is a means of achieving an alternative way to gain customers. Without it new entrants would have no effective means of establishing an early market share or a brand name in the early years before they have rolled out their backbone networks – what we shall call Phase 1. It is entirely possible that investment in the backbone network could go ahead without ULL, with the local loop of the new entrants being built later, but the business case might be much weaker. The importance of having ULL in the early years is the cash flow it can generate to defray the capital costs of

backbone investment. It also offers consumers a competitive alternative sooner rather than later. Of course, unbundled local loop is just the resale of another operator's loops.[2] It is not facilities-based competition and thus not desirable as a long term solution.

8. The logic of ULL is therefore to help new entrants establish a market presence and to support an investment model for backbone development. ULL should be provided for a longer period of time where the economics of density do not exist and for a shorter period of time where the economics of density do exist. In the EU and US models, no ULL would be provided where it is economic to build networks, although out of an abundance of caution, ULL could be (and has been) required for an initial period. However, ULL is an intrusive form of regulation and is a second best resale solution behind facilities-based competition. ULL, when not economically and technically required, would not be consistent with the EU "essential facilities" and US "necessary and impair" standards.

9. The price of ULL interconnection should therefore offer the new entrant an economic signal that neither penalizes 2Ns from leasing unbundled facilities from the incumbent, nor offers them an incentive to buy rather than to build whenever the latter becomes technically feasible. In other words, the price of Type ll interconnection during the first phase of competition should leave the 2Ns economically indifferent between build and buy. During this phase of competition, the decision to build or buy will be constrained by a series of complex technical factors, for example the need to design a new network, to research its physical routing across the territory, by the equipment procurement, delivery and installation process, and so forth. Only gradually will the backbone network take shape so the building of a local loop becomes technically viable.

10. Without a backbone network covering a particular geographical area there is no opportunity to construct links to connect buildings. However, what is the situation when major sections of the backbone network have been built? Phase 2 starts when the new entrant is faced with the choice of building the relatively short connections to link buildings to its backbone or instead relying on ULL.[3] Once again the new entrant's choice in Phase 2 is influenced by the fact that the entire set of building links cannot be built overnight for technical reasons. Applications for road works, ordering and taking delivery of the cable and line equipment, and so forth take time. ULL offers the new entrants continuous access to potential customers during this period. Also, in reality Phase 1 and Phase 2 overlap because local loops can be built out in some areas while the backbone network has yet to reach other major residential or business areas. Both backbone build-outs and links to buildings occur at the same time. But at this stage also a non-technical constraint becomes evident that is

[2] To call unbundling wholesale suggests that the incumbent purposely builds network capacity to sell at less than retail price to another service provider who then retails services to the end user. A wholesale market would also suggest a commercial arrangement voluntarily entered into by the incumbent.

[3] Phase 2 can be said to date from the end of Phase 1 to the final rebalancing of the local tariff in January 2001. Anticipation of the rebalancing actually permitted 2Ns begin earlier to expand their building links.

qualitatively different from the technical. This is the commercial strategy of the 2Ns which varies according to each 2N as they differentiate their product and geographical markets. Some 2Ns will never make an investment decision to directly serve certain end users in certain product markets and in certain geographical markets. The question then arises, is Type ll interconnection there to allow them to serve any of these consumers indirectly, and is this the Government's policy aim and objective of Type ll?

11. Clearly under these circumstances a different economic logic would be driving unbundling requirements. During Phase 1 the economic logic is to provide an alternative means of customer access at a time when the 2Ns are still building the backbone and the short connections to buildings. During Phase 2 we see the possibility of unbundling serving a different purpose, that is supporting strategic commercial decisions of the 2Ns. The question then arises whether the continuation of compulsory unbundling is justified either in light of, or in spite of, these changes and if so should the basis of Type ll interconnection be changed or not? Moreover, what should these changes be where the economics of density exist and no other bottleneck issues (such as road openings) arise? For example, it could be argued that from a consumer perspective ULL ensures access to a competitive alternative service despite the geographical location of the customer placing them beyond the commercial justification of facility-based services from a particular 2N.

12. An alternative perspective could hold that consumers choose to live where they do, and the scope of competitive facilities available should be reflected in the market valuations placed on their properties. We may call this latter view about property prices the strongly economic perspective, whereas for reasons of social equity or politics in the community policy makers may prefer to guarantee choice of service at any and all locations. But then the question arises at what cost? We shall return to this issue below and just note here that this issue is not the major issue during Phase 2. The major issue is the commitment of 2Ns to construct the building connections in areas where technical constraints have been overcome.

13. By Phase 3 the situation is different in principle. By Phase 3 the network planning and building process is now routine, the new entrants have established market share and brand recognition. The 2N backbone is substantial (unless the 2N has opted for commercial reasons not to make it substantial). The 2N links to almost all major and mid-size buildings have been completed (again, unless a specific 2N has opted, for commercial reasons, not to build these short links). It is during Phase 3 that competitive market forces come into their own, and the case for requiring ULL has fully disappeared.[4] The marketplace can determine ULL prices as the incumbent acts to optimize its NPV via offering other operators resale options to increase revenues and value. The economic argument hinges on the 'build-buy' equilibrium price. The

[4] I note that one submission to the Consultation Paper argues the 'latest FTNS entrants have shown no commitment or plan to rollout their fixed line services to retail customers (residential or business).' (Wharf T&T, p.6) This clearly would not apply to HKBN. Nor would it seem to apply to the intentions of Wharf's sister company Hong Kong Cable TV in the area of VoIP.

price ($42 per month for NB ULL) in theory reflects the cost and risk that the new entrant would incur if they built their own local loop, so they are no worse off building or buying.[5] The choice of this cost-based approach by OFTA in Phase 1 itself demonstrates that the logic involved is not to subsidize new entry but to offer an alternative when it is required. The logic should therefore also state that if the price represents the forward-looking costs of building the local loop, new entrants would not be worse off if ULL is withdrawn or if it were available only at a higher price, assuming there are no technical constraints to constructing the network or building links. It is likely that OFTA's most recent local loop costing analysis which sets the cost for BB loops at $95 is closer to the real cost than the $42 for NB which was reached under the threat of a determination.

14. The price is in fact an 'average' because local loops differ in terms of length and location, and therefore it is entirely possible that building a particular local loop may cost more or less than this price. If new entrants embark on regulatory arbitrage and are allowed to choose to build only where the costs are less or equal to the price of the ULL, and to use unbundling wherever the costs are greater than the market price this would seem to go beyond the purpose of Type ll and imply a subsidy. It would distort the market, for which there would appear to be no justification, especially since this privilege is not granted to more recently licensed FTNS. Yet there is a danger that precisely this situation is now arising.

15. The economic argument that would hold sway under these circumstances during Phase 3 is for a commercially negotiated ULL price, perhaps a tariffed price, offered to all new entrants without exception. The price should create an incentive to entrants to construct their own building links at the earliest opportunity. It is clear that this price would need to be well above the current $42 (which does not include company overheads and other direct costs) because at that price new entrants have no incentive to build where local loop costs are above the average. In this way they would retain the opportunity to serve customers through ULL but at a price that makes this a short-term solution based upon purely commercial considerations. For example, a 2N may judge there is a potential for customers at a particular location but less risk is assumed paying for immediate indirect access. In Phase 3 the normal forward-planning process would expect to find all networks, including the incumbent, looking ahead several years taking into account changing patterns of land use and zoning, building permissions, plot ratios, and the start and completion dates of buildings. In a geographic area where the economics of density so clearly exist as in Hong Kong, all this would be even truer. Thus, if a 2N already has a backbone network with

[5] This requires some explanation. The price of NB ULL has been set according to LRAIC – and the price of BB ULL to include a risk-adjusted cost of capital – using forward-looking costs. OFTA uses the scorched-node approach which assumes the architecture of the incumbent network but the equipment costs of new technology. A scorched-earth policy would scrap the first assumption. In principle, therefore, the 2Ns have the choice of building at a cost reflected by LRAIC or buying at the same cost. However, commercial realities include other considerations, such as the operational and strategic marketing advantages of owning a network, and the advantages of maintaining high liquidity within the company to finance further expansion from internal resources.

significant coverage, its forward planning should enable it to reach all buildings within a relatively short timeframe.

The Commercial Realities of Phase 3

16. So far the analysis has focused on cost-based pricing. However the commercial decisions of new entrants who do not carry the universal service obligation are based on the expected revenue returns and profitability of providing access.[6] Each new entrant has its own business strategy to capture market share, and in each case that strategy will have a commercial justification. This is an important point because it demonstrates that the purely economic regulatory argument is only part of the issue. Each of the early new entrants, HGC, NWT and Wharf T&T, is faced with exactly the same price point ($42) yet each has a different strategy, relying heavily or very little on ULL. If the build-buy decision is based solely on the price point we would not see such diversity. The reasons for different strategies are fairly obvious, but underlying them is the fact that the Hong Kong market is too small for multiple carriers simply replicating each other. They have chosen to focus on slightly different market segments and to deploy slightly different technologies to provide differentiated services. They have also leveraged their individual advantages in business and residential markets, for example where office blocks, shopping malls or housing estates are owned or managed by associated companies. Finally, companies with deep pockets and substantial property interests support each of them, but some pockets may be deeper than others and the corporate cultures of these companies clearly vary, so their commitment to the scale and nature of investment also varies.

17. In Phase 3 business strategy of the new entrants becomes the main driver of the decision to build or buy. There is no longer the constraint of a lack of a backbone as there was in Phase 1, or the length of the planning and provisioning process for constructing the building links in Phase 1 and perhaps into Phase 2. This means that if OFTA continues with the current policy of Type ll, regulation will no longer be driven by the need to establish competition but by the business strategies and choices of the new entrants. This is clearly not the intention of the policy.

18. The Consultation Paper proposes a test of competition as being whether or not a building has at least two networks accessing it. This may seem a strong pro-consumer stance, but it is unnecessary and economically difficult to justify. So long as a commercially negotiated ULL remains available, no customer suffers loss of choice. By maintaining ULL for any period of time until a building is connected to at least two networks constructs a policy that is dictated by the strategic decisions of the new entrants without introducing an economic incentive for them to build rather than to buy. Indeed the Consultation Paper proposes to perpetuate ULL in cases where for strategic business reasons the new entrants choose not to build. By contrast the Consultation Paper proposes sun setting ULL where two or more networks serve a

[6] In this regard the USO is an advantage to the incumbent because PCCW-HKT is ubiquitous. Serving any customer anywhere requires PCCW-HKT to construct local loops in every neighbourhood and insofar as these costs are recoverable from a USO fund a future policy of tariffed ULLs in uneconomic areas needs to take this into consideration.

building and this could well act as a disincentive for the 2Ns to build to many buildings. For example, buildings where the cost to construct building links are above average and therefore the $42 price is an incentive to buy. Knowing that these buildings can always be served by ULL, why should 2Ns construct local loops?[7]

What is the Future Purpose of ULL?

19. According to the estimates in OFTA Consultation Paper, 16 December 2003, 45% of households in Hong Kong already have two or more networks providing facilities-based competition, excluding the network of HKCTV. In addition, and no doubt with some overlap, the 2Ns also offer indirect coverage to over 50% of households in Hong Kong. According to PCCW's data, over 90 % of households in Hong Kong are passed within 50 metres of a backbone network of one or another 2N.[8] Even allowing for delays due to physical and technical problems of building the access network, it seems clear that the key issue is now no longer time-to-market,[9] but the strategic commercial choice of the 2Ns. Of course, for the future the network of HKCTV must be counted when assessing network coverage, as this would generate immediate facilities-based choice to well over 90% of all households.

20. The danger is that while OFTA's 16 December 2003 paper fully recognizes the role of strategic commercial considerations by the 2Ns (see for example, paragraphs 105 – 116, pages 40-43) no special significance seems to be attached to these with regard to ULL regulation. For example, the OFTA paper acknowledges the role of commercial choice.

> In terms of marketing strategy, each company may have its own business plan in targeting certain groups of user or buildings/districts first… An operator may not choose to roll out to these buildings even if its backbone network is lying close. (para 77, p.30)

Here the emphasis should be on the word 'choose' in the second sentence. OFTA seems to be describing a situation where the 2N is prioritizing which customers to serve first. It is a purely commercial decision, but in Phase 3 not one taken under the constraint of Phase 2 when, despite most of the backbone having been built there remains keen competition within the 2N for resources to complete the backbone. In

[7] OFTA's paper (paras 143-144, pp.51-52) suggests they will compete to become the second network, but this is by no means certain if it is cheaper to buy than to build, especially if the phase-out period runs over six years. The decision is likely to be determined by economics of density, that is the estimated number of subscribers covered by the local loop. On the other hand, a higher leasing charge for ULL could tip the balance of the argument and produce greater consumer welfare.

[8] According to PCCW's figures, the HGC network alone passes 95% of households and according to HGC all FTNS together, including HKCTV 'have an aggregate reach of more than 2 million households' [HGC, para2.10 (a), p.8].

[9] If time-to-market were the key issue, a commercially negotiated or a tariffed ULL leasing charge would suffice. In another context, it could be argued that networks such as HKBN were prepared to incur high costs of deployment using LMDS technology to achieve early market entry. Having captured market share and a source of revenue, HKBN has been able to migrate to a fixed line network using Ethernet technology under a full FTNS licence. There would seen to be no reason why older and more established 2Ns can not do likewise.

Phase 3 the competition for resources is between one access network for one set of target customers and another access network for another set of customers. Is ULL really designed to relieve the 2Ns of this type of normal commercial decision making? If ULL is to continue under these Phase 3 circumstances should it not involve new policy criteria? In particular, should the cost base of the network leasing charge not reflect at least some part of the company overheads and costs in maintaining and administering the network of which that local loop is an extension and without which it would not have been built in the first place? By removing that local loop from the network the incumbent is losing the financial contribution that local loop brought to the network, including the recovery of company overheads. And the reason for the loss of this contribution is the commercial choice of the 2N. The reason is not the choice of the customer who wishes to use the services of the 2N because the customer makes no choice as between being served directly or indirectly and therefore does not influence whether or not the incumbent receives leased circuit revenue.

21. Another example is where the OFTA sees risk as an issue.

> The use of Type II interconnection would avoid the risk of investing in its own customer access network when the market share of revenue from the customers is lower than forecast. Therefore, even if the interconnection charge is set at an economically efficient level, the existence of Type II interconnection may tilt the decision towards using Type II interconnection instead of building its own customer access network, if the operator does not wish to assume the risk and attach less importance to the strategic advantage of owning its customer access network. (para 109, p.41)

The comment here is quite worrying from an economic standpoint. Unlike the case above when the 2N was prioritizing risk, here the 2N is assumed to be avoiding a risk. The logical implication is that the risk-adjusted cost of capital would be higher in this case if the market, or if the ULL regulation, separately valued each and every local loop investment decision. Regulation averages the estimated efficient ULL charge with LRAIC. There is only one LRAIC for urban LALs and one for rural. From the economic standpoint the ideal answer is to charge a higher ULL charge so the build-buy decision is finely balanced and the 2N becomes indifferent. In fact what the OFTA paper appears to be acknowledging is that in these cases the ULL charge 'tilts' the decision towards buy. Unlike the previous case cited above, in this case it would seem the decision to buy would be a permanent one, or would last for as long as the risk factor remained too high. In other words, this paragraph seems to be suggesting ULL remains a permanent feature to relieve 2Ns of high-risk entry. The parallel aspect is that PCCW assumes these risks for the market but is not compensated for this. Again the economic conclusion would be that the cost of local loop leasing be revised under these circumstances.

22. The OFTA paper then relates ULL to the issue of investment incentives and uses an unusual two-step line of argument. Step number one is to argue that where 2Ns have

no intention of investing in a local loop because doing so holds no commercial attraction, the continuation of ULL logically cannot act as a disincentive to that investment. This first step argument needs slight modification in light of the point above, namely an increase in the ULL charge would affect the commercial decision at the margin, that is to say in cases where the commercial decision is based upon the difference in risk-adjusted capital costs. Otherwise, by definition ULL has no influence on the decision not to invest in uneconomic local loops, so the point is tautological, provides no new insight and so does nothing to advance the argument one way or the other.

23. The second step argument is that ULL promotes upstream investment by the 2N in collocation. This is true, but is it really what the ULL policy is all about? It echoes the point raised by Wharf T&T's submission to the OFTA Consultation Paper issued 23 May 2003.

> New entrants are still required to invest to get connection to the 'last mile'. Indeed Wharf T&T has invested very heavily in Type ll interconnection since 1996. (para 2.91, p.34)

Wharf T&T's strategic entry has clearly relied heavily on Type ll, which is Wharf's choice. It has the obvious commercial advantage of speed to market[10] and this in turn will generate cash flows earlier rather than later. The strategy clearly also has its drawbacks.

> We have in the past for capacity issue attempted to migrate some services served by Type ll interconnection to our own network. This has proven to be a mission impossible. Migration requires consent and cooperation from customers. As there would be service interruption, customers would not provide the required consent, let alone cooperation. (para 11.3, p.52)

The obvious response to this dilemma is that every 2N who has used ULL sooner or later has to face this problem if they are to invest in their own network. The real question is whether investment in upstream collocation is the long term policy aim of ULL, and if it is, is the long term aim confined to serving uneconomic areas and areas of genuine bottlenecks, or is it also designed to solve the commercial problems of the 2Ns such as avoiding the migration issue? The former requires a re-thought and cost-revised ULL, while the latter is an interventionist policy providing commercial relief for a select group of companies. Overall, collocation investment is not investment in new technology or innovation that will directly benefit users in the long term. It is just a cost that enables asset resale.

24. The OFTA paper recognizes that the 2Ns have adopted very different strategies which reinforce the point that the ULL price point is not the key issue in deciding whether to build or buy for the industry-as-a-whole. The Hutchison Global Communications

[10] 'Direct access building by building can never provide that speed, even if there is no technical or physical constraint within similar timeframe.' (Wharf T&T, para. 2.40, p.18)

(HGC) submission to the OFTA Consultation Paper issued 23 May 2003 makes the case for build over buy.

> Since commencement of local competition in 1995, FTNS operators have built up substantial network coverage by self-built facilities. The rollout was partly to meet the performance commitment pledged with the Government but the more important impetus was to capture revenue opportunity arising from serving new customers' (para 3.4.a, p.14)

Here the revenue opportunity for 2Ns is seen to lie in control over the network technology and the services it can offer, and having direct access to the customer. No doubt the allure of captive markets is in there somewhere, but the important point is that commercial strategy is now dictating the way ahead for the 2Ns. This is Phase 3 rather than Phase 1 or 2. The logical implication is that the price point needs to be re-examined if and where ULL is to be continued.

25. The New World Telecommunications (NWT) submission to the OFTA Consultation Paper issued 23 May 2003 seems to sit halfway between the Wharf T&T and the HGC submissions on the question of strategic choice. Using own data (tables 2 and 3 withheld as confidential) NWT demonstrates that

> there are clear cost advantages in pursuing self built network. On the other hand, Type ll network remains a lesser, though still important, supply alternative until our local access networks can reach all our customers. (para 2.6, p.9)

This correctly identifies ULL as providing an alternative form of access until the local loop can be built which is the purpose that prevails in Phases 1 and 2.

26. But from here NWT goes on to argue a different case.

> Type ll interconnection does not hinder development but provides a useful way for carriers to gauge the time when the development of alternative infrastructure of the existing local loop would be warranted economically. (para 2.9, p.10)

This introduces a very different criterion. Here ULL is no longer just a means of providing alternative access pending the building of the local loop in the early years of competition. Here ULL is a means of testing the market for a critical mass of local customers that will guarantee a rate of return on investment in an access network, or at least reduce the degree of risk associated with that investment to an acceptable level. With this logic ULL in Phase 3 serves the aims of a commercial and business strategy. Naturally 2Ns will take advantage of this if it is available. NWT cites a 1999 Ovum report:

> Once a new entrant has achieved a critical mass of customers in a local area, it is likely to opt for its own competitive facilities instead… ULL will lower the major

> barrier to market entry and will lead to an increase in the amount of investment in alternative access networks. (para 2.10, p.10)

The use of this quote is somewhat disingenuous. In this context, the second part of the quote that refers to increased investment in alternative access networks makes sense only when low-risk entry opens the door to new major market opportunities, otherwise low risk entry simply stops short at ULL. NWT argues the same logic with broadband ULL.

> Broadband Type ll interconnection is needed to ensure that new entrants have access to a critical mass of customers and to enable fully-fledged investments by a number of carriers in high-speed networks. (para 3.1, p.11)

27. The message is clear, ULL bolsters a business case for low risk entry which, if it reveals a market of critical mass justifies building an alternative access network. To establish this point unambiguously, NWT also cites an EC Report (2000):

> Thus when priced at a level that does not distort the 'make or buy' decision of an entrant, local loop unbundling can encourage long term infrastructure competition by *allowing entrants to test out the market before building their own infrastructure*….' [emphasis added – JU] (para 3.4, p.12)

28. Using ULL to test the market and exploiting regulatory arbitrage makes commercial sense for a 2N,[11] and in light of this we can understand better the different degrees of reliance by the 2Ns upon ULL according to the scale of business, commercial and residential property ownership of their related companies in their respective holding company groups. Property holdings by related companies offer very low risk entry to what are virtually protected or captured markets,[12] even lower risk than ULL.[13] But none of this rests easily with the initial regulatory purpose of Type ll interconnection. By Phase 2, and certainly by Phase 3, ULL should have achieved its objective,[14] of giving the 2Ns the time needed to establish themselves in the market with backbone networks, brand names and a range of competitively priced services, and to have done this by allowing them to access customers and earn revenues while still developing their networks. ULL that serves a separate purpose, namely to reduce the risk of entry for 2Ns, would seem to require a completely separate policy justification. What this

[11] Because only some FTNS have access to regulated ULL charges, regulatory arbitrage is also market distorting.

[12] It has become common practice for the major FTNS operators to interconnection with each other at the level of major property developments rather than to insist upon separate and alternative entry.

[13] It is worth reminding ourselves here that risk refers to the probability placed upon signing up a customer. For example, in a residential property development of, say, five high-rise buildings with around 100 dwellings per building, the probability of signing up five customers per building may be considered high but a total of 25 such customers may not be breakeven for extending the local loop. However if the property development belongs to a related company the probability of signing up over 90 customers per building would be high and easily sufficient to justify a local access network.

[14] 'The rationale that drove the original Type ll interconnection has now become out-dated and no longer holds true.' (HGC, para 2.5, p.6) is how the HGC submission puts it.

approach does is simply shift all economic risk to the incumbent at prices which existed at Phase 1.This is not appropriate.

29. The danger therefore in Phase 3 is that ULL regulation becomes driven by the commercial and strategic business interests of some, but not all, FTNS rather than by the policy considerations that held good under Phases 1 and 2. Of course, the FTNS beneficiaries will argue that their customers are joint beneficiaries. This is true, but in the sense that they benefit from the cost advantages these particular FTNS enjoy over all their competitors. Benefits are unevenly spread across FTNS service providers and therefore unevenly across consumers. This is a far cry from a policy that seeks to bring choice to all consumers on an equal footing.

Should ULL Continue?

30. How then, in Phase 3, should ULL policy be modified to keep to the spirit and intention of the policy in Phases 1 and 2?

31. There will remain many households in Hong Kong that will most likely never be served directly by a second network unless future new technologies or bundling of services offer some solution. These households dwell in buildings that are uneconomic today in the sense that they will never generate sufficient revenue to cover the costs of service provision. Service to these households is part of the universal service obligation.

32. There is a second category, the marginal category of buildings that will remain commercially unattractive to new entrants, not necessarily because the revenues they generate can never cover the costs of service provision, but because the likelihood of them doing so is not certain, the risk factor is too high. In each of these cases the costs of service provision include the normal rate of return on capital investment.[15] Over time, the bundling of voice, internet access, content and/ or mobile services may turn these buildings into attractive building link opportunities.

33. A third category of buildings are those that are commercially viable but cannot be reached directly for reasons of bottleneck. Nevertheless, the submissions by HKBN and others indicate that (at least for a determined operator) there are few insurmountable bottlenecks. In Hong Kong, very few lines fall into this category.

34. A fourth category of buildings is where the rate of return can be expected to reach normal profit but nothing more than normal. The 2Ns may be unlikely to target such buildings with direct access in the foreseeable future, if only because their strategic priorities are likely to lie elsewhere, for example in developing a portfolio of broadband services to above average rate of return customers. For as long as the

[15] 'This is where the building is located in an area for which it is not commercially viable for the new FTNS operators to serve even through Type ll interconnection (e.g. either the new FTNS operators are reluctant to collocate in the particular exchange or the distance of the building from the co-located exchange is such that the higher rural interconnection charge is applicable.)'[OFTA paper 16 December 2003, para 104, p.40)]

telecommunications sector is exploring the new technologies and services associated with broadband and IP, the risk-adjusted rate of return hurdle is likely to leave many marginal dwellings in Hong Kong without alternative network choices. As with the second category, technologies and service bundles may make these buildings attractive.

35. Policy considerations would therefore seem to involve the following choices.

    (i) promoting choice to consumers in uneconomic areas
    (ii) promoting choice to consumers in areas of marginal commercial interest
    (iii) facilitating choice to consumers where there are access bottlenecks
    (iv) facilitating choice to consumers living in non-priority commercial areas

    In other words, anything close to achieving 100 per cent facilities-based competition is most unlikely so the question arises how should choice be offered to residents of such dwellings?

36. Precisely how many households may fall into categories (i) – (iv) above is not clear, and it is useful to place the problem in perspective by considering the data currently available. According to data in OFTA's paper 16 December 2003, there are 2,295,000 households in Hong Kong served by 3,811,699 direct exchange lines, which implies 1.6 lines per household. 45% of all households, that is 1,050,000 households, have access to alternative networks. Also, according to OFTA,[16] 58% of all households are within exchange areas that offer indirect access using collocation. We are not told how far these two sets of households overlap. If they overlap completely, then the *currently* contested market in terms of households with direct and indirect access is 58% of the total, or 1,331,100 households. The current contested market for direct access is 45% of 3,811,699 lines = 1,715,265 lines. (This assumes households uniformly have the average 1.6 lines.) This gives the 2Ns 31% of the currently contested market for direct access lines (538k as a percentage of 1.715m lines that serve households who have a choice of alternative networks).[17] Quite an achievement!

37. Collocation covers 58% households and according to OFTA 16 December 2003, 2Ns supply 407,422 indirect lines, approximately 11% of all lines. This means the 2Ns have captured 19% (=11/58 x 100) of the current contested indirect access market.[18]

38. We note that these figures are conservative[19] and in addition the geographical overlap between these two categories of households (those with alternative access networks

[16] 'By the end of 2002, 58 per cent of all residential customers have at least one alternative choice other than the incumbent through Type II interconnection.' M.H.Au, Director General, OFTA speaking at the Opening Session of the TIF conference *Putting Service into Broadband*, 14 October 2003.
[17] If the 45% figure also applied in May 2003, this represents an increase from 19% according to data in OFTA's Consultation Paper, 23 May 2003, pp.5-6. If the May 2003 figure was less, say only 40% then the increase is from 25%, and so on.
[18] This represents only a fractional increase compared with direct access, up from 17% according to data in OFTA's Consultation Paper, 23 May 2003, pp.5-6.

and those in collocation areas) is unlikely to be 100%.[20] This means that substantially more than 60% of households have a choice today (how many more depends upon the extent of the overlap). It also implies that the 2Ns could have captured anywhere between 31% and 50% (31% + 19%) of the contested markets, depending upon the geographical overlap. This is a significant success story, and does not yet take into account the network of HKCTV which has 90% coverage. Clearly the HKCTV network will become very relevant as soon as VoIP become available.

39. Households in uneconomic areas are currently covered by the universal service obligation. Should this be extended to include choice of services? If so the regulator will need to consider a subsidized ULL lease charge to be funded from the USO fund.

40. Bottleneck facilities are contentious only in the sense that there is sometimes disagreement as to whether access is technically or physically impossible. One way to avoid lengthy regulatory determinations is to give the incumbent network the opportunity to build (or to outsource) and sell a second access network and a requirement on the 2N to buy the second access network in cases of dispute. If both the 2N and the incumbent are unwilling to build then the 2N can lease at the commercial rate.

41. Households in marginal areas could be defined in terms of above average costs of building the local loop such that anticipated revenues would barely recover costs. (It seems that monthly revenue of around $80 is about breakeven for normal returns.[21]) One possible solution is for the regulator to adjust the commercial ULL charge where local loop lengths are above the average 830 metres in urban areas, and 1,500 metres in rural areas, and where cable pair densities are below 129 in urban and below 20 in rural areas.[22] A lower ULL charge for these areas would require a compensation mechanism for the incumbent as in the case of the USO. USO funding could simply be extended to these marginal areas. Alternatively, access charges in all other areas could carry a surcharge.

42. Households in non-priority areas should be covered by a commercially agreed ULL charge, as should households in priority areas the 2Ns wish to serve but have not yet got round to building the access network.

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[19] 'On the positive assumption that the number of buildings with direct access can only grow, rather than decrease, the results we obtain may probably even be regarded as conservative.' OFTA paper 16 December 2002, para 80, pp.31-32.

[20] OFTA's figure of 58% of households with indirect is the equivalent of 1,331,100 households. As this is larger than the 1,245,000 households without direct access (2,295,000 minus 1,050,000 according to OFTA December 2003, para 81, p.32) it implies some overlap between areas of direct and indirect line coverage. The greater the overlap the smaller the current contested indirect market, and the larger the indirect access market share of the 2Ns.

[21] This figure is based upon industry opinions as far as I can gather. It also happens to be about the average retail price of the 2Ns. PCCW-HKTC's request (rejected by OFTA in 2003) to offer 'five months for four' telephone rental service was the equivalent of $88 per month.

[22] See OFTA 'Determination … Criteria for Classifying the Local Access Links (LALs) within an exchange of PCCW-HKT Telephone Ltd as Urban or Rural LALs.' 30 June 2003.

One Model for ULL Charges: Ramsey Pricing

43. It has been long established in economic theory that in industries displaying strong economies of scale, that is where average or unit costs of production fall as output increases,[23] a pricing point based upon the efficiency principle of marginal cost equals marginal revenue (the 'First Best' solution) may not guarantee the recovery of fixed costs. Industries which have high fixed costs and relatively low variable costs, such as telecommunications, frequently fall into this category. In these cases, whether the companies are publicly owned utilities or privately owned limited liability companies prices will include a mark-up (the 'Second Best' solution) over marginal or incremental cost.[24] The question is then how to determine the mark-up?

44. Again it has been long established in economic theory the most efficient method of mark-up would be what is known as Ramsey pricing, [25] which states that the mark-up should be inversely related to the elasticity of demand of different consumers or groups of consumers. For practical reasons and reasons of social equity this principle has been difficult to apply by regulators of public utilities, but there are some cases in which it could be practical and remain socially equitable. The ULL leasing price is a case in point.

45. The case has been made by economists in respect of the pricing of inputs sold to competitors, and is called the 'efficient component pricing rule'.[26] If C_a is the LRAIC of local access, and C_n is the LRAIC of switching and transmission across the backbone network, then the MC (marginal cost) is given as

$$MC = C_a + C_n$$

If η is the elasticity of demand[27] and Ramsey pricing (P_{ram}) requires a mark-up (λ) equivalent to the inverse of the elasticity of demand, then

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[23] An associated phenomenon is economy of scope where average or unit costs fall across a range of outputs simultaneously. For reasons of simplicity of exposition we ignore this.

[24] Because investments and outputs usually come in chunks rather than in very small discrete units, costs and revenues are usually measured incrementally than marginally. Where increments are very small they become marginal.

[25] Ramsey, F (1927) 'A Contribution to the Theory of Taxation' *Economic Journal*, v.47.

[26] Willig, R.D. (1979) 'The Theory of Network Access Pricing' in H.M.Trebing (ed) *Issues in Public Utility Regulation*, East Lansing, MI: Michigan State University Public Utility Papers; Baumol, W.J. and J.G.Sidak (1994) 'The Pricing of Inputs Sold to Competitors' *Yale Journal on Regulation*, v.11, 171-202.

[27] The 2Ns have been offering a range of monthly rentals for the basic telephone service, from $90 down to $70 compared with PCCW's $110 for residential customers. Taking $80 as an average, this represents a discount of 27%. An admittedly crude estimate of the price elasticity of demand suggests 31/27 = 1.1 (using data from May 2003 suggests a range from 0.7 to 0.9). Taken at face value these figures suggest that consumers are very price sensitive and vigorous competition and advertising are making them more so. These estimates only include direct access. If consumer demand for service is measured, elasticity estimates can shoot up to 40/27 = 1.5. These crude estimates are point elasticity. As the 2Ns win larger market share the elasticity estimates may well fall as less price-sensitive customers look to other attributions of the service. If the incumbent can bundle a range of services this will also reduce churn based on price alone.

$$P_r = MC[\eta/(\eta - \lambda)] > (C_a + C_n)$$

Which says the incumbent's efficient price with mark-up is greater than the LRAIC of switching, transmission and providing local access. If the new entrant prices at LRAIC, $P_{lraic} \leq C_a + C_n$ this can be seen as a form of cream skimming insofar as the new entrant is attacking markets where the costs of entry are less than the incumbent's costs including an element of fixed or overhead costs. The 'efficient component pricing rule' would set the ULL leasing price, P_{ull}, as equal to the difference between the incumbent's Ramsey price, P_{ram}, and the long run average incremental cost of the downstream service (backbone network switching and transmission), C_n,

$$P_{ull} = P_{ram} - C_n$$

The beauty of this arrangement is that it provides a ULL price that is attractive to the incumbent and yet offers the new entrant a chance to compete if the new entrant's network switching and transmission costs are competitive. [28]

46. The problem with this solution as it stands is that the ULL rate, if determined by the regulator, becomes inefficient over time as costs change. The answer is to introduce a 'market-determined' efficient component pricing rule (MECPR) that allows the mark-up to decline as retail competition erodes downstream prices.[29] In other words, P_{ram} needs downwards adjustment as retail price competition becomes stronger. This also ensures the incumbent also tries to ratchet down network costs to maintain the level of the leasing charge.

Should ULL Apply to Broadband?

47. The principal reason[30] OFTA's paper 16 December 2003 gives for agreeing 'with the majority of the respondents' that broadband (BB) should be treated the same as narrowband (NB) '*for the purpose of deciding whether the policy should continue or be changed*' (original emphasis) is

[28] 'building its own network infrastructure will ensure better network quality to serve its directly connected customers, and will be more cost efficient due to better technology and optimal network configuration.' (Wharf T&T, para. 12.5, p.54)

[29] See Sidak, J.G. and D. Spulber (1997) 'The Tragedy of the Telecommons: Government Pricing of Unbundled Network Elements Under the Telecommunications Act of 1996', *Columbia Law Review*, v.97.4, 1081-1161; also Sidak, J.G. and D. Spulber (1996) 'Deregulatory Takings and Breach of Regulatory Contract', *New York University Law Review*, v.71.4, 851-999 (especially pp 971-976).

[30] Secondary reasons are that any differences in costs should only affect the price of interconnection, not its principle, and that regulators in other jurisdictions 'generally do not distinguish between unbundling copper local loops used for narrowband and broadband.' (para 34, p.13). It is true that the issue of cost is irrelevant to the principle. It is also true that the FCC has proposed excluding broadband from unbundling.

> After all, the interconnection is implemented by the same physical copper local loop. No distinction is justified on the basis that that piece of local loop is used for narrowband or broadband services. (para 34, p.13)

From an engineering viewpoint this statement may or may not be acceptable but from an economic viewpoint it is seriously flawed. The issue of unbundling is an issue of selling inputs into a final product market. This is a crucial point because consumers choose and pay for products and services, not technologies or network components. The NB and BB product markets are completely different, the drivers are completely different and the business case and associated risk for each are completely different.

48. The NB market is essentially about voice telephony with additional value added services. Universal service obligations recognize the social benefits of bringing voice telephony to every citizen on demand. The BB market is not about telephony and is not generally part of the universal service obligation. Arguably it is about the following, among other possible products and services.

    - Fast Internet, Web browsing, file downloading, etc.
    - Fast data services and file transfers, mostly for the business market.
    - Video-conferencing, mostly for the business market.
    - Pay TV, video-on-demand and other entertainment services such as gaming.
    - Home networking functions, such as remote monitoring and control.
    - E-commerce functions tailored to business and consumer markets.

49. Many, if not all services can be delivered over NB, but the always-on high bandwidth quality of service offered by BB makes it a substitute product for almost everything other than voice.[31] BB is a business that differs in almost every aspect from NB. BB is first about revenue streams generated from the carriage of content and second about revenue streams from the sale of content itself, such as pay TV.

50. Broadband can be provided by several different technologies, copper included. Unbundling for copper at higher bandwidths introduces opportunities for regulatory arbitrage where 2Ns may choose to install copper in preference to fibre or coaxial or wireless on the grounds that regulation reduces the cost of indirect access by copper. This is market distorting.

51. The analysis of ULL in the OFTA paper 16 December 2003 relies upon an assessment of the number of households and buildings served by direct and indirect access. The analysis excludes the network of HKCTV (para 78, p.30 onwards) on the grounds that the HKCTV network cannot yet offer voice telephony, [32] but if the argument is to carry ULL over into the BB space the exclusion of HKCTV's network becomes arbitrary. Any conclusions regarding direct access by households to BB

[31] Emails are a close substitute for facsimile services and BB offers superior email services. Sooner or later VoIP and Internet Telephony (computerphone-to-computerphone) will substitute for NB voice services at which point NB may disappear altogether.

[32] There seems to be genuine confusion among all the papers as to the status of VoIP trials by HKCTV.

cannot be derived from an analysis that excludes the HKCTV network. 2Ns enjoy between them 45.6% market share in BB and HKCTV (para 73a, p.27) alone accounts for over 30%, having passed 90% of homes.[33]

52. The OFTA paper 16 December 2003 also makes the point (para 73e, p.28) that less than 10% of the market share of the BB has been captured by ISPs non-affiliated to FTNS. The number of active ISPs, their respective market shares and margins are relevant to the structure of the wholesale market but not directly relevant to the issue of household coverage or consumer choice. Just about every household in Hong Kong with a telephone line can choose from a number of competing ISPs for broadband services. Hong Kong already has the world's highest penetration rate of broadband services after South Korea, and unlike South Korea in Hong Kong it has been entirely market driven. Arguably therefore Hong Kong has the world's most vigorous broadband market in terms of consumer choice, take-up, connection speeds and commercial viability.

53. In conclusion, and on the basis of the data, there would seem to be nothing on economic grounds to justify extending current ULL policy to broadband.

[33] Given that 98% households dwell in 38% of Hong Kong's buildings (para 82, p.33) almost complete household coverage by HKCTV and other FTNS should not be long in coming.