On-Net/Off-net Price Discrimination and Digicel in PNG: Independent Opinion

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Abbreviations used

LRIC	Long Run Incremental Costs
LRIC+	Long Run Incremental Costs with a mark-up
MNO	Mobile Network Operator
NGN	Next Generation Network
NICTA	National Information and Communications Technology Authority
NRA	National Regulatory Authority
PNG	Papua New Guinea
UK	United Kingdom

Executive Summary

We have been asked by Digicel (PNG) Limited to provide independent opinion on On-Net/Off-net Price Discrimination and Digicel in the PNG mobile telecommunications market.

We note that the NICTA is considering applying a measure aimed at prohibiting price discrimination that is not justified with reference to objective cost differences.

NICTA justifies its view that the current on-net/off-net price differentials set by Digicel are anti-competitive by reference to economic models published in academic journals. However, we note that many of the papers that suggest price discrimination between on-net and off-net calling tariffs may be bad are predicated on assumptions that do not fit the prevailing characteristics of the PNG market. In particular, most of the papers referred to by NICTA assume implicitly or explicitly that all of the potential customers in the market are served.

If the assumption that all potential customers are served is relaxed, so that it leaves open the possibility of market expansion, the standard model generates results showing that price discrimination is necessary to attain the highest possible welfare level. Put differently, should the measure proposed by NICTA be applied it would be harmful for welfare as it would limit the pace of growth in mobile teledensity, and thereby limit beneficial club externality effects.

Further, we argue that the proposed measure by NICTA has not been considered in a way that meets with international best practice. The measure appears disproportionate as it would likely cause costs outweighing perceived benefits.

In our view the move to prohibit discrimination between on-net and off-net prices would slow down market expansion. Overall welfare would likely be lower and the contribution of mobile telecommunications to the economy more widely would be less pronounced.

1. Introduction

We have been asked by Digicel (PNG) Limited to consider academic work on off-net/on-net price discrimination relied upon by NICTA in its Second Discussion Paper “Public Inquiry into the need for a Retail Service Determination regarding certain mobile telephony services” issued 4 May 2012, and on the remedy proposed by NICTA to address perceived competition problems.

NICTA concludes pp. 1-2:

“(a) The relevant market is the national market for retail mobile services, which comprises mobile access and national mobile call origination, includes SMS and MMS, but excludes fixed telephony access and services and mobile data services;

(b) The retail mobile services market is susceptible to *ex ante* competition regulation;

(c) Digicel has a substantial degree of power in the retail mobile services market and, in the absence of *ex ante* regulation, that position is likely to endure over the forthcoming two years at least;

(d) Digicel’s substantial degree of power in the retail mobile services market gives it the incentive and the ability to price discriminate between on-net and off-net mobile calls in a manner that increases the barriers to entry and/or expansion, fosters customer lock-in and, in turn, risks leading to the foreclosure of the market to competition;

(e) It is appropriate for NICTA to consider making a retail service determination that establishes a pricing principle that prevents discrimination between on-net and off net prices except to the extent that any such differences are objectively justifiable based on differences in costs;”

We shall focus in particular on (d) and (e) above.

In addressing (d) we look at the academic literature on the matter and in part relied upon by NICTA. It is our view that the economic literature supporting NICTA’s opinion expressed in (d) is based upon assumptions that a market is mature in the sense that all potential consumers are actual customers who have made subscription decisions. Where there is room for market expansion, the academic literature indicates that price discrimination between on-net and off-net services can be welfare enhancing. We note that NICTA does not highlight this effect, which may be of greater relevance to Papua New Guinea (PNG). Notwithstanding the market expansion effect, models portraying markets as mature often given solutions that echo some of the concerns mentioned by NICTA. But these models very often presume competing firms are symmetric on the cost side or in respect of competencies, which appears to be far from the case in the market of PNG. Indeed, Digicel had the disadvantage of entering the market to compete against an established operator. Despite this handicap, Digicel brought competencies into the market which were clearly liked by consumers and resulted in it becoming very successful as measured by market share, but more significantly Digicel has materially expanded the number of consumers enjoying mobile telecommunication services.

In respect of (e) we conclude that NICTA staff's conduct of the 'regulatory impact assessment' of the proposed measure ("a pricing principle that prevents discrimination between on-net and off net prices except to the extent that any such differences are objectively justifiable based on differences in costs") is subject to a number of objections. In particular,

- the alternative scenario is not completely specified;
- options are not fully assessed against one another, as the chosen option is compared against the status quo; and
- only one form of discrimination remedy – the most severe – is assessed.

Our short report is structured as follows. In section 2 we provide a brief overview of key market facts relevant to the context within which NICTA has undertaken its review. In section 3 we discuss the academic literature on on-net and off-net price discrimination as relied upon in part by NICTA. In section 4 we appraise the reasonableness of the measure proposed and make reference to international best practice.

2. Market context

We have been informed that the PNG mobile telecommunications market has the following characteristics:[1]

- Three MNOs – bemobile, Telikom, Digicel
- Market shares are about 10%, 10%, 80% in subscribers, 11%, 1%, 88% in revenues respectively
- Average Revenue per Minute has been stable over 2010/11
- bemobile former state owned, now 50% private, launched GSM 2004
- Digicel entered July 2007, launched 3G April 2011 (others have not launched 3G)
- Mobile teledensity is about 40%
- Digicel has most extensive network with considerably more geographic coverage
- Interconnection between Digicel and bemobile agreed June 2008
- About 99% of subscribers are prepaid.

[1] Some data obtained from Figure 2, p. 30 in the Discussion Paper.

3. NICTA position and academic literature on on-net/off-net price discrimination

In the second consultation paper ('discussion paper') published 4 May 2012, NICTA claims:[2]

"Digicel's substantial degree of power in the retail mobile services market gives it the incentive and the ability to price discriminate between on-net and off-net mobile calls in a manner that increases the barriers to entry and/or expansion, fosters customer lock-in and, in turn, risks leading to the foreclosure of the market to competition."

NICTA's position expressed above is drawn extensively from its assessment of academic work on tariff mediated network externalities:[3]

"Tariff mediated network externalities and their potentially [our emphasis] anti-competitive consequences have come under close examination in the present inquiry and are a topic mentioned and considered throughout this discussion paper."

The network externality refers to the fact that whenever a person subscribes to a mobile network he or she confers an external benefit to others as they are able to call and be called by that person. The externality is usually not considered by the person joining a network, as the focus is on the direct private benefits of joining a network.

NICTA note that where on-net/off-net tariff discrimination prevails, so that off-net calling is more expensive, customers will likely seek to subscribe to the network which is larger and/or has most similar types. This claim is substantiated by reference to empirical studies cited by NICTA: Kim and Kwon (2003), Fu (2004), Birke and Swann (2006), Grzybowski and Pereira (2007), Doganoglu and Grzybowski (2007), Corrocher and Zirulia (2008), Maicas, Polo and Sese (2009) and recently also by the national competition authority in Portugal.[4]

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[2] Discussion Paper, page 1.

[3] The term tariff mediated network externality was proposed by Laffont and Tirole (1998). See Discussion Paper, page 8.

[4] Kim, H.-S., Kwon, N. (2003), 'The advantage of network size in acquiring new subscribers: a conditional logit analysis of the Korean mobile telephone market.' *Information Economics and Policy* 15, 17-33; Fu, W. (2004), 'Termination-Discriminatory Pricing, Subscriber Bandwagons, and Network Traffic Patterns: The Taiwanese Mobile Phone Market' *Telecommunication Policy* 28, 5-22; Birke, D. and Swann, P. (2006), 'Network effects and the choice of mobile phone operator', *Journal of Evolutionary Economics*, 16, 65-84; Grzybowski

We do not dispute the empirical observations that subscribers take account of network size and of the type of subscribers on a network when making subscription decisions. We also accept that price discrimination between on-net and off-net calls can mediate externality effects.

What matters is whether externality effects induced by price discrimination between on-net and off-net calls are necessarily detrimental from an economic welfare perspective. This is the focus of this section and we conclude by noting that price discrimination going beyond objective cost considerations, in other words reflecting demand side factors, can be welfare enhancing. Furthermore, this effect appears to be stronger the less diffuse mobile penetration.

3.1 Off-net/on-net price discrimination welfare implications

NICTA in the Discussion Paper draws on academic studies to determine whether on-net/off-net price discrimination is likely to have anti-competitive effects in the Papua New Guinea market. NICTA notes:[5]

"There is thus neither a *prima facie* case for or against on-net/off-net price discrimination as anti-competitive conduct and it must be examined on a case-by-case basis. Hence on-net/off-net price discrimination is commonly found in many mobile markets (in other countries) that are effectively competitive."

Notwithstanding NICTA asserts that the network effects in PNG are "very large":[6]

L. and Pereira, P. (2007) 'Subscription choices and switching costs in mobile telephony', available at https://editorialexpress.com/cgi-in/conference/download.cgi?db_name=IIOC2008&paper_id=248; Doganoglu, T. and Grzybowski, L. (2007) 'Estimating network effects in mobile telephony in Germany' *Information Economics and Policy*, 19(1), 65–79; Corrocher, N. and Zirulia, L. (2008). 'Me and You and Everyone We Know: An empirical analysis of local network effects in mobile communications', Working Paper Series 03-08, Rimini Centre for Economic Analysis, available at www.rcfea.org/RePEc/pdf/wp03_08.pdf; Maicas, J.P., Polo, Y. and Sese, F.J. (2009) 'The role of (personal) network effects and switching costs in determining mobile users' choice,' *Journal of Information Technology*, 24 (2), 160–170, available at www.palgravejournals.com/jit/journal/v24/n2/pdf/jit200835a.pdf; Autoridade da Concorrência (2010) *Consumer mobility in the electronic communications sector*, available (in Portuguese) at www.concorrencia.pt/SiteCollectionDocuments/Estudos_e_Publicacoes/Comunicacoes_Electronicas/01_Relatorio_mobilidade_comunicacoes_electronicas.pdf

[5] Page 13 *op cit*

[6] Page 35 *op cit*

“NICTA staff believe that the scale of Digicel’s price discrimination between on-net and off-net calls is fostering tariff mediated network effects (and a club effect) that enables it to attract many more subscribers much quicker than other MNOs, and which also deters churn away from Digicel. The strength of this particular network effect in PNG is currently unknown as NICTA has no empirical information specific to mobile subscribers in PNG with which to measure it, however, the disparity in network size and the extent of the price discrimination between on-net and off-net calls indicates that it is very large indeed.”

The academic literature addressing on-net and off-net tariffing started with seminal papers published by Armstrong (1998) and Laffont *et al.* (1998a,b).[7] These papers looked at situations where firms compete in a market to serve customers where network externalities are present. If on-net tariffs are lower than off-net tariffs, calling others on-net is cheaper and if calls are made to others with an equal probability, a larger network discriminating this way mediates an externality.

Laffont *et al.* (1998a) show that price discrimination may be beneficial in the case of linear tariffs. One of the reasons for this result is due to discrimination leading to an intensification of competition and leading to average prices in line with marginal cost.

Building on the foundations of Laffont *et al.*, Hoernig (2007) considered asymmetric equilibria and studied the setting of on-net and off-net prices under linear and non-linear pricing. In a model with full diffusion he shows that welfare may be adversely affected if price discrimination is applied. This would appear to support NICTA’s position and Hoernig’s paper was cited by NICTA: “That such on-net/off-net price discrimination serves as a strategic barrier to expansion (or entry) is widely accepted in the economic literature”.[8]

In relation to the effects of price discrimination of on-net and off-net calls tariffs on welfare, the papers Hoernig (2008) and Sauer (2011) are the most relevant.[9] We note that these papers are **not** cited in the NICTA Discussion Paper.

[7] Armstrong, M. (1998). Network Interconnection in Telecommunications. *Economic Journal*, 108(448): 545-64; Laffont, J.-J., Rey, P., and Tirole, J. (1998a). Network Competition: I. Overview and Nondiscriminatory Pricing. RAND *Journal of Economics*, 29(1):1-37; Laffont, J.-J., Rey, P., and Tirole, J. (1998b). Network Competition: II. Price Discrimination. RAND *Journal of Economics*, 29(1):38-56.

[8] Page 37, op cit.

[9] Hoernig, S. (2008). Tariff-mediated network externalities: Is regulatory intervention any good? CEPR Discussion Papers 6866; Sauer, D. (2011) Welfare implications of on-net/o -net price discrimination, Toulouse School of Economics..

Using a standard modelling framework to examine the effects of price discrimination, Sauer (2011) shows when the market size is not fixed, so not all potential subscribers are currently served, price discrimination raises total welfare and consumer surplus. As Sauer notes in conclusion to his paper:

“Consumers benefit from price discrimination in all settings considered. High off-net prices resulting in an increased average calling price charged by networks in the presence of externalities seem to be bad for consumers at a first glance. However, price discrimination does not harm consumers since it is accompanied by lower on-net prices and fixed fees which overcompensate the rising average calling price. **Allowing firms to charge different on-net and off-net prices thus has a pro-competitive effect serving consumers**.”[10]

Much of the economic theory literature has suggested that price discrimination between on-net and off-net tariffs is detrimental for welfare. However, most models assume that all potential customers are served in the market. This assumption fails to capture the fact that in PNG many potential customers do not currently subscribe to a mobile network. In other words there is much potential for market expansion. The presence of market expansion possibilities has been shown in the economics literature to result in price discrimination as having a beneficial effect on welfare.

[10] Our emphasis.

4. Is prohibiting discrimination a proportionate remedy?

This section of the report assumes for the purposes of argument that Digicel's pricing practices are anti-competitive and that NICTA staff are accordingly justified in considering remedies.

4.1 Options considered

Four options are noted in Part 7 of the second discussion paper:

- reliance on competition law
- wholesale *ex ante* regulation
- direct regulation of Digicel's pricing, and
- reliance upon a non-discrimination pricing rule or policy.

Option 1 – competition law

Reliance on competition law is immediately rejected on the curious ground that 'reliance on *ex post* competition is only realistic where there is effective competition in the relevant market…' (p. 92). Since SMP is by NICTA's own construction equivalent to a situation in which the firm in question has a high level of market power or dominance, taken literally this statement means that competition law is not a realistic option in addressing such situations – which would certainly come as a surprise to competition authorities throughout the world, such as the ACCC, the US Department of Justice and Federal Trade Commission and the European Commission.

A more reasonable version of the proposition is that *ex post* competition law is *insufficient* to deal with the problem. A finding of this nature is a pre-condition for *ex ante* regulation under the European regulatory regime, which explains it as follows:[11]

> "Such circumstances would for example include situations where the regulatory obligation necessary to remedy a market failure could not be imposed under competition law (e.g. access obligations under certain circumstances or specific cost accounting requirements), where the compliance requirements of an intervention to redress a market failure are extensive (e.g. the need for detailed accounting for regulatory

[11] European Commission, *Commission Recommendation on Relevant Product and Service Markets within the electronic* communications sector susceptible to ex ante regulation, (Second edition) (C(2007) 5406), p. 8.

> purposes, assessment of costs, monitoring of terms and conditions including technical parameters and so on) or where frequent and/or timely intervention is indispensable, or where creating legal certainty is of paramount concern (e.g. multi-period price control obligations)."

It is not clear whether NICTA intends to rely upon any of these (non-exhaustive) grounds, none of which seems compelling in the light of the regulatory remedy finally preferred in the document, which sometimes features in competition law proceedings.

NICTA's own analysis at page 92 of the paper refers to the high current market share of Digicel, which may, of course, be due to its level of competence in meeting customers' needs relative to that of its competitors, rather than any other factor. According to NICTA's own analysis, concerns, mirroring those of Professor Cabral, about the market tipping and the persistence of dominance, seem either a case of shutting the stable door after the horse has bolted, or a further illustration of the fact that NICTA relies not on a finding of harm, but 'on the risk of either the identified harm or the identified incentive being acted upon.'

This leaves as an explanation the delays inherent in the *ex post* application of competition law's delays, mentioned in the source cited in footnote 214.[12] Any such claim should be specific to the circumstances of the jurisdiction in question. No such evidence is provided.

It is notable that in subsequent analysis of the 'regulator does nothing' option, no- body else in the field of economic regulation does anything either. In other words, the competition law option seems to have been neutered.

Option 2 – wholesale regulation

The second option is to rely on a wholesale remedy. The adoption of an approach operating on a different level poses questions which go beyond the scope of these comments.

Option 3 – direct retail regulation

The document's third option concerns the direct regulation of retail prices, under which it might 'specify prices by reference to various factors such as costs, international benchmarks, or particular rates of return.' (page 95).

NICTA's concern here seems to revolve around the possibility that an intervention of this kind might dampen competition. However, competition may be dampened by the presence in the market place of a combination of

[12] For the avoidance of doubt, all quotations from this source (Cave, M *et al.* (2006)) in the NICTA document are from a section of the report authored by Professor Valletti.

barriers to entry and relatively inefficient competitors.[13] It is not clear from the document what should be done in these circumstances, which cannot be ruled out in any jurisdiction, including Papua New Guinea.

The document notes (page 96):

> "NICTA staff believe that a competitive market is much better at setting prices than regulation….However, in the absence of effective competition in a market, it may be necessary for the regulator to intervene to mimic the pricing outcomes that would be expected in a competitive market until competitive market forces strengthen. Nevertheless, NICTA staff believe that it is important to adopt minimalist approaches to ex ante pricing regulation that leave maximum room for competition to develop and minimises the distortive effects…"

Option 4 – a non-discrimination pricing principle/policy

The fourth option is the one finally adopted. It limits the difference in prices which Digicel can charge for on-net and off-net calls to what can be objectively justified by difference in associated costs. In our view, this is *de facto* another form of direct retail regulation, in which the prices are not linked to, say, an international benchmark, but to each other. Its deployment should therefore be subject to the same requirement which NICTA has set out in relation to option 3 – a minimalist approach which leaves maximum room for competition and minimises distortive effects.

Making a proper assessment of the chosen option

The statutory basis for the recommendation to the Minister is in Section 158 of the Act, which enumerates four cumulative criteria for subjecting a retail service to a retail service determination, as follows:

" (a) that making a retail service determination for the retail service in respect of an operator licensee for a particular period will further the achievement of the objective set out in Section 124, but disregarding Section 124(2); and

(b) specifically, in relation to the competition objective, that –

> (i) that operator licensee has a substantial degree of power in the market within which the retail service is supplied; and
> (ii) in the absence of the retail service determination for that period, that substantial degree of power is likely to –

(A) persist in the market over that period; and
(B) expose retail customers to a material risk of higher prices and/or reduced service where they acquire the retail service from that

[13] To put it in another way, it takes two to compete.

operator licensee during that period; and

(c) specifically, in relation to the efficiency objective, that the operator licensee will not be prevented from achieving a return on assets during that period sufficient to sustain investment necessary to supply the retail service; and

(d) the aggregate likely benefits of making that retail service determination outweigh any aggregate likely detriments."

NICTA has also set out its own self-imposed criteria, the fourth of which is the "that the aggregate likely benefits of making the retail service determination outweigh any aggregate likely detriments."[14] The implementation of this approach can be found in Figure 26 on page 108 of the staff document. However, this procedure lacks any detailed evidential support. For example, item 5 of Figure 26 raises the spectre, absent the determination, of a 'connectivity breakdown' which apparently merits a relatively high level of detriment, but for which no supporting explanation is offered. The maintained but unargued hypothesis seems to be that no other potential regulator takes any action.

More broadly, this approach is, at best, incomplete. In some circumstances, many different interventions may improve the situation. The question is: which one to choose? NICTA's enumeration of the options noted above may seen to have taken this point on board, by identifying generic options and choosing one of them. But the approach is undermined because, while the chosen procedure is assessed against the alternative option of doing nothing in a detailed and systematic (if exclusively qualitative) way, no other option is subject to an equivalent comparison.[15] The procedure is also undermined by a failure to discuss alternative implementations of a non-discrimination pricing principle or policy. We discuss these two points in turn.

Over the past two decades, principles have been developed for undertaking regulatory impact analysis by, for example, the OECD, the European Commission, and the Governments of Australia, Canada, the UK, the USA and other countries.

For example, through its Office of Best Practice Regulation, the Australian Government's regulatory impact analysis requirements are intended to

[14] pp. 105-108

[15] This is done on p. 108, where scores are given for the proposed remedy (but for no other remedy), and the *status quo*.

achieve sound analysis, informed decision making and transparency. These analytical steps include:[16]

identifying the problem or issue that give rise to the need for action;

explaining the desired objectives;

providing a range of options (regulatory and non-regulatory, as applicable);

assessing the impact of the options;

consulting key stakeholders; and

concluding and recommending the preferred option with an implementation and review strategy.

The five principles of good regulation developed in the United Kingdom are:[17]

(a) proportionality;

(b) accountability;

(c) consistency;

(d) transparency;

(e) targeting, which means finding the minimally intrusive way of solving the problem.

As noted above, the NICTA staff have examined a range of options, but they have not subjected them all to the analysis to which they have subjected the chosen one, to show that it satisfies the statutory test.

Secondly, the staff have jumped straight from concluding that 'the retail service determination to be considered would establish some form of non-discrimination pricing or policy' (page 98), to the elaboration of a particular, and a particularly restrictive, version of non-discrimination.

This last point is of significance because the literature on on-net off-net price discrimination does not come out in favour of an automatic (*per se*) prohibition of it. It shows instead, in the conditions of a fully diffused mobile market

[16] Australian Government, Best Practice Regulation Handbook, 2010 p 16-18 (http://www.finance.gov.au/obpr/proposal/handbook/docs/Best-Practice-Regulation-Handbook.pdf).

[17] UK Better Regulation Executive, The Five Principles of Good Regulation (http://www.bis.gov.uk/policies/better-regulation).

(which conditions, as noted above in fact do not apply to Papua New Guinea), some degree of discrimination benefits customers and the general welfare, but an 'excessive' amount of discrimination may bring detriments.

Accepting for the purposes of argument that Digicel satisfies the conditions for the latter outcome, NICTA's task is then to craft a remedy which gives customers and the economy the benefit of 'legitimate' discrimination, but deprives them of the detriment of 'illegitimate' discrimination. Instead, NICTA proposes an absolute prohibition.

How might NICTA decide how to calibrate its principle or rule? The natural place to start would be to examine the structure of prices in effectively competitive markets. On this basis, NICTA could make an expert judgement, of the kind which regulators are constantly called upon to make.[18] The judgement would not be precise, but it is better to be approximately right (as in this approach) than exactly wrong (as the modelling work appears to suggest is the case with with an absolute prohibition).

4.2 Summary

We thus conclude that NICTA staff's conduct of the 'regulatory impact assessment' of the proposed measure is subject to a number of objections. In particular,

- **options are not properly assessed against one another, in the manner in which the chosen option is assessed against the status quo;**
- **only one form of discrimination remedy – the most severe – is assessed.**

[18] See R Baldwin and M Cave, Understanding Regulation, Oxford University Press, 2011, pp. 29-30.