

National Roaming

Prepared for

Vodafone New Zealand

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Executive Summary

This report considers several issues arising from the Commerce Commission's recently released Draft Report on a Schedule 3 investigation into roaming and co-location under the Telecommunications Act 2001. We have focused on several aspects of the Commission's analytical approach, and on its use of a model Covec developed for Vodafone.

Our analysis supports the following conclusions:

- The Commission has used an incorrect market definition. This is most obvious in respect of the geographic dimensions of the market, which are clearly not nationwide. The Commission's conclusions on the product dimension are also questionable however.
- The relevant counterfactual is Vodafone's Undertaking, not earlier commercial offers it made. This is because the Undertaking is currently available and clearly better than those offers.
- Low roaming prices will deter investment in new facilities. In setting a regulated price for roaming, the Commission must choose between
 - Predicting exactly where the entrant will build and setting a roaming rate that is consistent with that prediction; and
 - Erring on the side of setting a high price, and leaving the extent of build decision to the entrant.
 - The latter strategy avoids the risk of deterring entrant investment
- Setting roaming prices at TSLRIC is very difficult, as has been recognised in other jurisdictions. Since this appears its preferred strategy, the Commission should start considering the main conceptual issues.
- The Commission has edited our model substantially, but we have no visibility of the cell site numbers it used, which were sourced from NZ Communications. Our analysis suggests that NZ Communications believes it can cover locations with only 12% of the number of sites Vodafone uses. We find that difficult to believe.
- The model predicts that Vodafone would not build under the assumptions the Commission uses for the entrant. Vodafone would prefer to seek regulated access to the entrant's network under these conditions.

1. Introduction

The Commerce Commission recently issued a Draft Report¹ on its Schedule 3 investigation into the merits of amending the treatment of roaming and co-location services in the Telecommunications Act 2001. The Commission concludes that regulating the price of national roaming would enhance the prospects of new entry. Among other things, it proposes that regulation should:

- Be priced at a common level nationwide using the TSLRIC concept;
- include 3G roaming; and
- allow Telecom regulated access to Vodafone's network.

Vodafone has sought advice from Covec on the Commission's report. In this report, we address the analytical approach used by the Commission (section 2) and then discuss the Commission's use of the model we built for Vodafone (section 3).

¹ Schedule 3 Investigation into Amending the Roaming and Co-location Services, Draft Report 3 August 2007.

2. Analytical Approach

The basic structure for analysing regulatory proposals is widely accepted, and reflected in all of the previous decisions of the Commission. One needs to establish some kind of market failure and identify a regulatory intervention that addresses it. One then compares two future scenarios: one in which no change is made to regulation (known as the counterfactual) and one with a change (the factual). If end-users are better off under the latter, then there is a prima facie case for regulation. If cases exist for several alternative forms of regulation, it is then necessary to assess which is likely to be best, once all of the relevant costs and benefits have been taken into account.

To implement this style of analysis, one needs to start with market definition, because that is relevant to identifying a market failure (and an appropriate regulatory solution). A comparison of the counterfactual and the factual come next. This sequence is followed below.

2.1. Market Definition

The Commission's analysis of the time, functional and customer dimensions of the relevant roaming markets are reasonable. However the other dimensions have not been treated correctly in the Draft Report.

2.1.1. Product Dimension

Regarding the product dimension, the Commission observes (paragraph 79) that a new entrant would make a technology decision before approaching a potential roaming provider. We agree. At this moment of choice, the entrant is weighing up all of the potential costs and benefits of its technology choice. In New Zealand, it currently has two options: GSM and CDMA. They are substitutes for the entrant, until it has picked one. So the default view must be that they are in the same market. As a matter of fact and common sense, the entrant makes an active choice between technologies.

To over-turn that view, one would look for evidence that small but significant changes in the relative price of roaming between technologies would not affect the entrant's choice. There is no real evidence of that type in the Commission's report.

2.1.2. Geographic Dimension

There seems to have been some confusion over geographic market definition. In our view, it would be useful to ignore co-location when thinking about the geographic dimension of roaming markets.²

There is clear evidence that the cost of building networks varies considerably across locations. This does not seem to be in dispute, and should be enough to settle the market definition issue. By investing in more network, an entrant saves itself some outflow of

² Co-location can still be factored into the analysis, when assessing the constraints acting on parties in the markets that have been defined.

revenue to its roaming service provider, but to enjoy that saving, capital investment is needed. The business case for building rather than renting access will therefore vary across locations.

If, as the Commission concludes (paragraph 101), roaming is provided in a single nationwide market, then small but significant changes in the roaming rate will not affect the entrant's demand for roaming. But there are very strong pieces of evidence against that proposition.

One is the Covec model. We are pleased that the Commission has taken the opportunity to experiment with this model, which was always intended to provide a basis for enlightenment. The Commission has found that, once the model is changed to better reflect its view of the world, "the entrant becomes more sensitive or exposed to variations in the roaming rate" (paragraph 44). This underlines the fact, which was also obvious from the version of the model we submitted originally, that the roaming rate does affect the extent of the entrant's build.

Even without the model however, it should be quite obvious that an entrant building a network will construct a smaller network the lower is the roaming rate. At the (geographic) margin, it will decide whether the additional traffic that would be covered by its new network will generate enough income to justify the investment. A small cut in the price of roaming will deter building, because it makes the substitute (roaming) relatively more attractive, and vice versa. As a result, we believe that it is simply untenable to claim that there are not distinct geographic markets for roaming.

Any given roaming price, whether set by negotiation or regulation, effectively divides the country into two markets: building is rational in one; roaming is rational in the other.

2.2. The Counterfactual

We have two concerns with the counterfactual used by the Commission. The first issue is that the counterfactual is confidential. It is bounded by roaming prices that NZ Communications and TelstraClear say were offered to them. This is a very unfortunate situation because it prevents it eliminates much of the transparency that is required to properly test the Commission's analysis and conclusions.

More importantly, there is a serious question over whether either of the Commission's confidential counterfactuals are valid. In analysis of this type, the counterfactual should be the most likely scenario in the event that the service is not regulated. In this matter, the most likely alternative to regulation is surely that Vodafone's Undertaking is accepted.

To understand why the Undertaking is the most likely alternative to regulation, one only has to absorb the Commission's reported views on what is required to secure a third network in New Zealand. Certainty over the level of the roaming rate is obviously important to an entrant's business case (see paragraphs 162, 255, and especially 257 of

the Draft Report). It is surely inconceivable that, having progressed this far through its Schedule 3 Investigation, the Commission would conclude it without having effected *some* change that would make life more certain for an entrant. Short of regulation, the Undertaking seems to be the best option.

The Commission reports that it is not satisfied that the Undertaking *best* gives effect to section 18 of the Act (paragraph 16, emphasis added), and it must be so satisfied before it can recommend that it be accepted as a suitable alternative to the proposed regulatory change (paragraph 15). To form these views, a comparison must have been made between the Undertaking and other likely scenarios including the proposed regulation. The statutory test seems to require such a comparison. Yet the analytical framework in the Draft Report appears to have been specifically designed to avoid making it, or at least reporting on it.

It hardly needs saying, but the adoption of an unrealistically negative counterfactual biases one's analysis in favour of regulation.

Finally, it seems that the Commission may, at some stage of its analysis, have intended to use (something like) the Undertaking as a counterfactual. Paragraph 187, which seems designed to support the Commission's preference for a single averaged roaming rate nationwide, states that

“...the counterfactual being considered here relates to offers by Vodafone of average roaming rates...”

2.3. Pricing Principles

There are several things that need to be said about the price of regulated roaming. These relate to:

- Regulatory objectives;
- Price levels;
- Price structure; and
- TSLRIC implementation.

2.3.1. Regulatory Objectives

There are clear indications that the Commission's objective is to ensure the construction of a third mobile network. It can also be deduced, from the absence of a roll-out requirement, that the Commission does not envisage this network being nationwide.

The rationale for promoting facilities based competition is reasonably well understood. The resulting competition is more durable because parties have a greater level of commitment. Additionally, marginal costs, which affect competitive pricing, are probably lower for infrastructure owners than renters. This is because even cost-based rental prices (such as those derived from the TSLRIC concept) have an element of averaging in them.

Taking the above as given, the question arises as to how roaming prices can stimulate investment in a new mobile network. The crucial insight, which unfortunately does not come through clearly in the Draft Report, is that *lower* roaming prices will *restrict* the extent of an *entrant's* build.

This situation is completely the *opposite* of the way the Commission needs to think about UCLL pricing, to take a topical example. For UCLL, lower access prices stimulate DSLAM and related investments by entrants and that investment stimulates competition. That is because UCLL is a *complement* to investment by entrants.

National roaming is only a complement to entrant investment in those parts of the country where an entrant will never build. If there were three additional mobile networks covering major population centres in New Zealand, there would be far greater demand for roaming services in sparsely populated rural areas.

Everywhere else, roaming is a *substitute* for investment in a new mobile network. In these locations, the lower is the roaming price, the more attractive it is to roam rather than build.

2.3.2. Price Levels

Assuming the Commission does regulate roaming prices, it therefore has a choice to make. One option is to set the roaming rate slightly high, and allow the entrant to determine how far to build out its network. The other is to set the rate slightly low, which will place an earlier halt on the entrant's roll-out.

It is tempting to argue that a third option – setting the price just right – should be allowed and preferred. But roaming costs vary with the extent of the entrant's build and their traffic profiles. So the "just right" price is actually a schedule of prices, one for each possible entrant network size and traffic profile.

This is clearly very demanding from an analytic perspective; much more so than, say, estimating the TSLRIC of interconnection. More importantly, however, the entrant will have no certainty³ over its regulated business case unless this schedule is produced *in advance*.

To summarise, certainty requires that roaming prices be known in advance. If those prices are cost reflective, they will be a schedule of prices that depends at least on the extent of an entrant's build. Otherwise, if a single price is set, the Commission needs to choose between actively restricting investment by erring on the low side, or actively promoting investment by erring on the high side.

2.3.3. Price Structure

The cost of providing a roaming service depends on which assets the roamer uses. If they are predominately rural sites that have low utilisation rates, the cost will be

³ Refer to paragraphs 162, 255, and especially 257, of the Draft Report on the desirability of this.

correspondingly high. Cost-based prices are therefore geographically de-averaged. This is the structure Vodafone proposed in its Undertaking.

The Commission complains that Vodafone's de-averaging is not pure enough (paragraph 381, 385), but also seems to accept (paragraph 386) that its proposal will "better reflect the cost of supplying roaming where and entrant expands its network over time, compared to a single fixed roaming rate that remains constant. However, the Commission then decides (paragraph 387) that the proposal "may still lead to some distortion in terms of the investment decision taken by the entrant". This is unfortunate for two reasons.

First, no comparison is made between the distortion the Commission perceives and those that would accompany its own preferred approach. This is all the more surprising given that the Commission's endorsement (just one paragraph earlier) of Vodafone's de-averaging on the grounds that it will "better reflect the cost of supply...".

Secondly, the perceived distortion is not actually there. Paragraph 387 has a logical error which is best demonstrated by the following thought experiment. Suppose there are N areas, an entrant has covered $N-1$ of them, and it is considering whether to cover area the last one. Under Vodafone's proposal, it will make its rent/buy choice by comparing the average cost of roaming in area N with the cost of building in area N . That is completely efficient. And by backward induction it follows that the same efficiency properties apply to all other decisions.

2.3.4. How will TSLRIC work?

The Commission appears at this stage to have not seriously contemplated how it would implement the proposed final pricing principle, which is TSLRIC. This will be a major and costly exercise, but at this point it is worth highlighting just a few of the questions that will arise, including:

- Which network will be modelled?
- What technology will be assumed?
- What historical development pattern will be adopted?

In places New Zealand looks to for guidance on such matters (particularly the UK) TSLRIC modelling of mobile networks has had regard to the historical development of networks. This is also true for fixed network TSLRIC models where it is reflected in a general preference for scorched node models. This suggests that the costs of the host network are what would need to be modelled.

The recent emergence of low-cost Chinese manufacturers raises an important question about the technology that is to be modelled. The issues here involve a trade-off between modelling the lowest-cost means of production, and not halting development expenditure on a host network that uses equipment from another supplier (see section 3.2.1 for more on this issue).

3. Model Experiments

There is widespread interest in understanding the business case for building a third mobile network in New Zealand. At this point, the only publicly available model of that business case is one that Covec built for Vodafone in 2006. It uses Vodafone data, because we had access to no other data. The model was provided to the Commerce Commission in July 2006, and a censored version⁴ was provided to NZ Communications in February 2007.

In its Draft Report, the Commission refers to the model extensively. It is said to have a number of limitations, both in terms of the underlying assumptions and in terms of what it was designed to do (paragraph 194). The Commission says it has identified several factors that serve to overstate the non-roaming costs of an entrant, and thereby understate the significance of roaming.

An important advantage of the model however is that it allows the Commission to test its own assumptions. These opportunities have been explored at some length. The Commission has made changes to:

- The mix of spectrum used;
- Subscriber numbers and the volume of minutes;
- Average revenues; and
- Other traffic-sensitive costs.

These changes were designed to reduce the non-roaming costs of an entrant and make roaming seem more important. The net impact can be seen by comparing Tables 1 and 3 from the Commission's report, which is done in Table 1.

Table 1 Impact of Alternative Assumptions at 14c Roaming Rate

ARPU Reduction	Break-Even Market Shares @ 14c Roaming	
	Covec Assumptions	ComCom Assumptions
0	12%	14%
5%	14%	16%
10%	16%	19%
15%	18%	24%
20%	21%	30%
25%	25%	38%

Under any given market conditions (represented by the post-entry ARPU reduction), the entrant needs a larger market share to break even under the Commission's assumptions.

One thing aspect of the model on which the Commission's report is silent is its predictions of the extent of build at different roaming rates. In our view, this is a

⁴ Vodafone's confidential information was deleted; this allowed NZ Communications to inspect the logic of the model and examine its predictions when their own data was added. The fact that NZ Communications subsequently made quite detailed submissions to the Commerce Commission on the model suggests that this process was a useful way to share information.

particularly useful feature of the model, because it addresses very directly the outcome that the Commission seeks: a third network.

For each of the five locations in the model, a list of possible roaming rates is tested to determine whether it makes commercial sense for an entrant to build there. The output is shown in a graph on the “coverage optimisation” tab in the model. The graph is titled “Minimum Roaming Rate to Cover” because, in any given location, unless the rate is sufficiently high, and entrant will prefer to roam rather than build.

In the balance of this note, we attempt to replicate the Commission’s adjustments to the model, and investigate the model’s build predictions under the proposed (factual) roaming rate of 14c.

3.1. Entrant Sites

Most of the changes the Commission made to the model are very transparent. They are discussed in some detail in the report, and are clearly flagged within the model.⁵ However, in addition to these changes, the Commission removed Vodafone’s site numbers and distribution and replaced those data with confidential information supplied by NZ Communications.

To replicate the Commission’s analysis, we were therefore obliged to guess at what those site numbers are, and their distribution. Our objective was to find site numbers that would replicate the Commission’s column in Table 1.

We started with the model we received back from the Commission, and retained all of their transparent modifications. We then added a scale factor that reduced the number sites within each category by the same percentage, and rounded the resulting number of sites to the nearest whole number. Finally, we experimented with this scale factor, re-running the model each time.

The scale factor that most closely reproduced the Commission’s data in Table 1 was 88%; equivalently, if NZ Communications had 12% of the sites that Vodafone has, the Commission’s data can be approximately reproduced. Some differences remain, as Table 2 shows, but this is as close as we could get.⁶

A likely explanation for part of the differences between our results and the Commission’s is that there is not actually a common scale factor difference across all

⁵ For example, the Commission has set the starting market size at 4.18 million mobile subscribers, assumed the annual minutes per entrant to be 1160 with a growth rate of 5% per annum, and assumed an average level of ARPU of \$500 per year and a mobile to mobile interconnection rate of 20 cents per minute.

⁶ The Commission only reports results for three cities: Auckland Wellington and Christchurch. Not knowing exactly how this was achieved, we performed our analysis twice: once with all sites; and once excluding all sites except the ones in those cities. The estimated scale factor did not change (to 1dp), and the break even market shares were also identical (to 1dp) except for the one corresponding to a zero ARPU reduction which was 14% with all sites and 13% for just the three cities of interest.

categories of cell site between Vodafone’s actual sites and the plans of NZ Communications.

Table 2 Impact of Alternative Assumptions at 14c Roaming Rate

ARPU Reduction	Break-Even Market Shares @ 14c Roaming	
	Covec Replication of ComCom	ComCom Report
0	13%	14%
5%	16%	16%
10%	20%	19%
15%	24%	24%
20%	31%	30%
25%	38%	38%

We are very surprised at this result. It is not difficult to imagine that an entrant will find cheaper ways to build than the costs of an incumbent network. And it does seem possible to economise on cell site numbers through the use of 900Mhz spectrum. But for an entrant to be able to serve the same locations with less than 1 site to every 8 of the incumbent seems remarkable to us.

3.2. Entrant Costs

As the Commission notes (paragraph 202), to the extent that an entrant incurs different costs to those of Vodafone, the model will not accurately represent the business case for entry.

It is our understanding that NZ Communications plans to use Huawei as its equipment vendor. Huawei is regarded as offering considerable cost savings compared to the more traditional vendors. One might therefore imagine that the Vodafone cost data we used in the model would over-state the equipment costs that NZ Communications would incur.

The Commission seems not to have used alternative assumptions about the cost of equipment at cell sites or in the core network of an entrant. The Draft Report is silent on this matter, which would presumably have been mentioned if such a change had been made. A direct inquiry of one of the Commission’s staff also suggested that equipment costs were not changed.

We did test the implications of retaining the same (Vodafone) number of sites but reducing their cost by 50% however. If that was the situation, and all of the Commission’s transparent adjustments still applied, the entrant would not build in Wellington at the proposed regulated rate of 14c.

3.2.1. Incentives for Vodafone

Finally, we investigated the case for entry in the event that all of the Commissions assumptions hold, but the entrant had Vodafone’s pattern of sites and costs. In other words, we asked the question: where would Vodafone build, under these assumptions? The answer is nowhere, or at least not in any of the regions we have modelled. If the entrant had Vodafone’s costs, but all other assumptions were as the Commission

prefers, a 14c roaming rate would be too low to induce a build in any of the five main population centres.

It is worth noting that mobile networks are in a constant state of evolution. Capital expenditure is not something that occurs once only, prior to launching a service. These results imply that NZ Communications has a very significant cost advantage over Vodafone. It follows that a reasonable strategy for Vodafone may be to seek regulated access to NZ Communications network than continue developing its own.