

**VODAFONE NEW ZEALAND LIMITED
SUBMISSION TO THE COMMERCE
COMMISSION**



**MARKET DEFINITIONS FOR ROAMING &
COLOCATION**

SERVICES

9 February 2007

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I Summary

1. In areas where

- the cost of the entrant building is low relative to the expected traffic; and
- there are incremental costs to the roaming provider caused by the expected increase in traffic; and
- the entrant expects to gain significant market share from the hypothetical monopolist,

roaming and co-location are definitely substitutes and therefore in the same market. Each cell site area is a separate market, but areas with similar cost characteristics can be grouped together. This leads to geographically separated markets split according to whether network building is feasible in each area.

2. However, if

- cost savings for the entrant relative to the roaming provider are small; and
- the cost of the entrant building is high relative to the expected traffic;
- incremental costs for the roaming provider caused by expected increases in traffic are not significant, and
- the entrant does not expect to gain significant market share,

then roaming and co-location are not substitutes and roaming is in a market alone. In this case, areas with similar costs are in the same market.

3. This means that the market for roaming is not national, but geographically segmented according to the costs of building relative to the entrants' expectations of market share and how this affects the incremental costs of the roaming provider.

4. Starting with a hypothetical co-location monopolist, in areas where building is not viable, co-location is not viable either, so there is no competitive analysis to be done. In areas where building is a viable substitute for roaming, a competitive roaming market constrains a hypothetical co-location monopolist, and roaming and co-location are in the same market.

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III Introduction

5. This note applies the SSNIP test to roaming and co-location to determine the extent of these markets. SSNIP is a thought experiment involving a hypothetical monopolist for a service raising its price a small but significant amount and seeing if this is profitable and sustainable.
6. The paper takes the perspective of hypothetical monopolists and roaming. Starting with a single cell site radius as the smallest possible geographic area, the paper looks at the service, geography, time and customer dimensions of the roaming service.
7. SSNIP requires that the starting price is the efficient price. We use the cost that when charged as a price means that the access provider can recover all of its costs for that site indefinitely. This is an average cost which includes all factors including a contribution to fixed costs. This is a reasonable estimate of the long term competitive price. All costs are assumed to be efficiently incurred.
8. Then the paper explores the conditions where an entrant might be indifferent between roaming and building. At this point roaming and building are substitutes and in the same market.
9. Then the same analysis is applied to co-location.

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IV Wholesale roamed voice and co-location

Sites and traffic: some background

10. Across the network there some sites that have a lot of traffic and some that do not. Some low traffic sites will take a long time to earn back their cost. Other cell sites are located in places that will generate a lot of traffic and will earn back their cost quickly.
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Service

12. We start with a simple case when an entrant doesn't create extra cost for the roaming provider when it roams, and there is no co-location. We then relax these assumptions to get a more realistic picture.

No incremental cost to carrying entrant traffic and no co-location

13. As cell sites are large fixed costs, the average per minute cost for a stand-alone network carrying only the entrant traffic will always be greater than the roaming provider's network carrying its and the entrant's traffic. The entrant is indifferent between roaming and building only if the entrant gains 100% of the

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traffic in this area because only then would it have costs equal to the roaming provider. Therefore for all practical purposes, building and roaming are in separate markets. This conclusion is demonstrated below.

14. If C is the annualised cost of a cell site and associated capital, t_i is the incumbent traffic and t_e is the entrant traffic, we get the following equations. These equations assume that the entrant and the incumbent have the same cost: C . They show that if the average cost of the entrant entering by building a cell site is the same as the average cost of roaming (i.e. the entrant is indifferent between building and roaming) then the entrant must be expecting to get 100% of the market in that area.

$$\frac{C}{t_e} = \frac{C}{t_e + t_i}$$

$$\rightarrow 1 = \frac{t_e}{t_e + t_i}$$

15. Therefore at lower market shares the roaming provider should be able to raise the roaming rate in this area to the point where the entrant is indifferent between roaming and building a stand alone network *provided that entry is feasible at this price*. Because this price rise is sustainable, roaming is in a market by itself and building is not a substitute.
16. However, the entrant business case may constrain the hypothetical monopolist from raising its prices. If the entrant can't enter because the hypothetical monopolist raises the roaming price, then the price rise is neither profitable nor sustainable.
17. The Covec model for the 3G entrant predicts that the roaming rate affects the extent of the entrant build, but does not materially affect the business case. But it only takes \$1 of NPV to make a project unviable and prevent the entrant from entering. And the business case is challenging. So an increase in the roaming rate could constrain the hypothetical monopolist by tipping the business case into unviable territory even if the roaming rate is not particularly important to the business case.
18. Making a judgement on this is an empirical matter and requires a NPV analysis of the business case.

Co-location available but still no incremental cost of traffic

19. Now imagine that co-location is available at the cost sharing rate that Vodafone offers now. Then the ability of the roaming provider to raise prices in a particular area is constrained by the cost of a site built using co-location—which makes the entrant build cheaper.

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20. In the following equations r which is the cost saving factor from co-location (which is between 0 and 1 in theory, but is between 60% and 70%).

$$\frac{rC}{t_e} = \frac{C}{t_e + t_i}$$
$$\rightarrow r = \frac{t_e}{t_e + t_i}$$

21. So the entrant's expected market share equals the savings from co-location when it is indifferent between roaming and co-location in a particular area. We know that r is between 60 and 70% which is an ambitious but not impossible target for a second entrant competing with the hypothetical monopolist.
22. So co-location and roaming are in the same market if the entrant forecasts a market share of between 60% and 70%.

r generalised

23. We define r as the cost savings from co-location. But r can be generalised to represent cost savings whatever the source. It could therefore represent an entrant's cost advantage derived from cheaper capital, an entrant strategy of only building in low cost areas such as urban areas, or a strategy to deploy less dense coverage.
24. All of these factors are realistic possibilities for a third entrant in New Zealand. Radio equipment is falling in price, and an entrant is unlikely to either build outside the cities or to deploy as much capacity as Vodafone.¹ And these conditions are not mutually exclusive and could all occur together. So r could well be much lower than 0.6.
25. What the actual value of r is for any particular entrant strategy and site is a difficult empirical question.

¹ The Commission has noted in the past that the costs of deploying a nationwide network now are significantly lower than they were when Vodafone and Telecom built their first networks. See decision 479, para 136.

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Incremental costs and co-location is available

26. Now imagine that the entrant expands the market to such an extent that its traffic imposes incremental costs of the roaming provider. Modifying the above to include I as the incremental cost factor caused by the entrant's traffic we get:

$$\frac{rC}{t_e} = \frac{IC}{t_e + t_i}$$

$$\rightarrow r = \frac{I t_e}{t_e + t_i}$$

$$\frac{r}{I} = \frac{t_e}{t_e + t_i}$$

27. We know that I must be greater than or equal to 1 as the entrant may add costs to the roaming provider, but certainly will not cause savings.
28. In reality, costs will vary with traffic in a discontinuous way as capacity thresholds are reached and more investment is needed. What we can say is that if $r = 0.6$ then I will need to be 1.2 to generate an entrant market share of 50%.
29. Note that we are not suggesting that a third entrant will gain this sort of market share, but that the SSNIP thought experiment indicates that with a I of 1.2, and a r of 0.6 the entrant will be indifferent between building and roaming if they expect to gain half the market.

Cohorts of cell site areas

30. We have used cost as a proxy for an efficient price. When grouping areas, adding areas with different starting prices does not make sense. Areas with different starting prices must already be separate markets as the prices are different.
31. So we only aggregate areas with the same price. This puts all areas with similar costs in the same market for those areas where building and roaming are not substitutes. But where building and roaming are substitutes, each cell site area is a separate market as no price rise is sustainable.

Time

32. The hypothetical monopolist could not raise prices at any particular time as a supplier of roaming in an alternative timeslot can easily enter into a monopolised time slot. So the market is 24/7.

Customer type

33. There is only one type of wholesale customer, and the analysis applies whether it is an MVNO or a roamer.

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Conclusion

Building and roaming are substitutes in all areas where building is economically viable – this means that building and roaming are in the same market in these areas.

These areas are more likely to be in places where the cost of building is low relative to the expected traffic. This could be for a variety of reasons, the availability of co-location, the declining cost of radio equipment or because the entrant requires a lower capacity network.

The Commission's issues paper implies as much by referring to the build or buy decision of the entrant. Clearly the Commission envisages the entrant substituting between building and roaming.

Building and roaming are not substitutes in areas where building is not economically viable – this means that building and roaming are in different markets in these areas, which are likely to be places with low traffic and high building costs.

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V Co-location

34. This section looks briefly at the same analysis from the perspective of a hypothetical co-location monopolist.
35. As with roaming, in areas where there is no significant cost change in response to expected changes in traffic, and the cost of building is high relative to the expected traffic, then co-location is simply not viable as building is not viable. So there is no competitive analysis to be done.
36. Imagine cell site radii where the expected increase in traffic caused by the entrant imposes costs on the roaming provider and there are cost savings for the entrant. In these cases building using co-location is viable. The hypothetical co-location monopolist cannot put its prices up because the roaming market will constrain it. In other words, any charge greater than cost for co-location must make the entrant switch to a roaming strategy in these areas.
37. Again this is a site by site analysis, so there are separate markets in each cell site radius for co-location.

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