

Economic Analysis of 700MHz Spectrum Allocation

PUBLIC VERSION

Prepared for

Two Degrees Mobile Limited

Authorship

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Executive summary

This report was commissioned by 2degrees but represents the independent views of the authors. It examines the potential acquisition of the 5MHz of spectrum in the 700MHz band by either Vodafone or Telecom, focusing on the way such an acquisition would affect competition in relevant markets. We assess these potential acquisitions against a counterfactual in which the spectrum is not allocated in the short term, and is later acquired by 2degrees.

Key findings

The Commerce Commission is being asked to grant clearance to Telecom and Vodafone to acquire spectrum rights in the 700MHz band. Our key findings on the competitive effects of either of the proposed acquisitions are that clearance would restrict competition in a number of relevant markets because:

- The incentive of 2degrees to compete aggressively for retail subscribers and wholesale customers (eg, MVNOs) will be reduced if it has relatively less spectrum than its rivals. This is because in the long-term 2degrees' variable costs will be higher than its rivals;
- The ability of 2degrees to effectively contest a number of retail and wholesale markets would be adversely affected because it will not be able to offer the same quality of service as rivals;
- Incentives for efficient spectrum-sharing would be reduced; and
- Incentives for national roaming providers to supply service on reasonable terms would be lessened.

Each of these is a serious issue in a market, and the group of affected markets is jointly important for mobile sector competition. Collectively, they seem likely to pose a material risk to the intensity of competition, especially since the sector is currently transitioning out of a duopoly structure but we do not yet have three similar-strength networks.

Management rights to the unallocated 5MHz of 700MHz spectrum will be significant to mobile network operators in the future provision of mobile broadband services. The spectrum management rights are for a period of 18 years, although the use of this spectrum is limited in the short term (due to lack of device and equipment availability and capacity demand). To properly evaluate the competitive impact of the acquisitions, the Commission must therefore anticipate the impact of the allocation of these spectrum management rights over a time period that is unusually long for its clearance application analysis.

Complex issues

The clearance applications at issue are also complex. Over this extended time period, several other complicating factors need to be considered, including the following:

- having access to additional spectrum rights reduces variable costs which confers a variable cost advantage over rivals;
- competition between firms is weakened where the smaller firm has higher variable costs of capacity expansion than its rivals do;
- the trend towards competition in bundles of services raises potential conglomerate issues; and
- vertical merger issues arise both because: (1) spectrum is an input into the production of a range of retail and wholesale mobile services; and (2) spectrum holdings impact on outcomes in the wholesale national roaming market which are important for existing and future competition.

Market definition

Against this background we have investigated several issues that are relevant to the acquisition of this spectrum in the context of the relevant markets as they exist now and as they are likely to evolve over the relevant timeframe. [C-I-C]

We have not sought to reach firm conclusions on market definition for the purposes of this report, but note that while overall market entry and exit decisions would typically be made at a broad national level, we consider that there are at least distinct segments within that market that warrant separate consideration of competitive effects. There is an important segmentation between pre-paid and on-account users and between customer types in the latter category. We also consider that while 4G could potentially lie in the same market as 3G at present, a separation is likely to occur as 4G services develop, because of the superior data transmission speeds provided by 4G technologies. This reinforces the need for a longer term view of the sector.

The spectrum at issue is for use in supplying 4G data services. It has both urban and rural uses. However it appears that Vodafone and Telecom intend to use it primarily in rural areas whereas 2degrees has urban applications in addition to rural rollout.

Incentives

The proposed acquisitions raise three sets of incentive issues:

- incentives on 2degrees to compete aggressively and expand into further markets (eg, the provision of MVNO services);
- incentives on any acquirer of the spectrum at issue to engage in efficient and pro-competitive spectrum sharing opportunities; and

- incentives on Vodafone to supply national roaming on efficient and pro-competitive terms.

Our analysis shows that 2degrees has weaker incentives for competing aggressively in retail and wholesale markets if it has *relatively* less spectrum resource than its rivals. This issue does not arise with symmetric spectrum holdings, but when one firm has a smaller holding than its rivals; growth pushes it down a *higher* cost curve than its rivals. This growth is unambiguously beneficial because it reduces average costs. However the fact that the whole cost curve is higher than rivals means that growth advances the date at which new capital is required, and this date arrives earlier than it does for rivals. This incentive effect arises from asymmetric spectrum holdings and is caused by the fact that more spectrum permits firms to spend less on network assets and to have lower variable costs. This effect will occur irrespective of the size of a network's customer base, but the lessening of competition is more severe as a consequence of 2degrees' relatively smaller size.

The pre-existing asymmetry of spectrum holdings reinforces the importance of this last 5MHz. Should either Telecom or Vodafone be permitted to acquire the remaining 5MHz of 700 MHz spectrum, then that party will have around 75% more sub-1GHz spectrum than 2degrees. That could seriously marginalise 2degrees, locking in a market structure in which the two larger firms face few material risks to their dominance, and thereby weakening the process of competition.

In addition to this impact on incentives, the ability of 2degrees to compete effectively in retail and wholesale markets will also be compromised. This is due to the lesser quality of service it will be able to provide as a result of having less spectrum than its rivals.

Spectrum sharing

The incentives for pro-competitive spectrum sharing will also be reduced if the spectrum at issue is allocated to either of the applicants. We note that either application would result in a gap of 10MHz between the 700MHz spectrum holdings of 2degrees and the acquirer. We need to compare this scenario with a situation in which 2degrees eventually acquires the remaining 5MHz so that 700MHz spectrum holdings are eventually symmetric. It is apparent that the latter scenario offers substantially stronger incentives for pro-competitive sharing because:

- bargaining power is more balanced between two parties who each have something to gain from an agreement;
- whereas in an asymmetric allocation
- any agreement would be unattractive to the spectrum acquirer because it would permit 2degrees to reduce its variable cost in urban (and potentially rural) locations without any additional cost advantage accruing to the spectrum holder.

Roaming

The incentives on Vodafone to negotiate an efficient and pro-competitive roaming agreement are also important because this firm is the only feasible roaming supplier to 2degrees and national coverage is an important factor in competing at the national level. There is consequently already an absence of competitive tension, with the status of national roaming as a specified service being a key incentive on Vodafone to negotiate current commercial national roaming arrangements. The relevant question is again over which of the two allocation scenarios outlined above would be most competitive. Again it is clear that an efficient and pro-competitive roaming agreement is substantially more likely if the 700MHz spectrum is allocated symmetrically. That is because:

- commercial negotiations are multi-dimensional and symmetric allocation would allow 2degrees to offer Vodafone an extra benefit in the form of spectrum sharing in rural areas;
- the ability to make this offer would confer on 2degrees a measure of countervailing bargaining power that is currently absent in roaming negotiations; and
- [C-I-C]

Relevant context

Since the launch of 2degrees, competition has intensified in the pre-pay market segment but this disruption has yet to be fully apparent in the on-account segments relevant to small and medium sized businesses and in respect of corporate and government customers. The analysis summarised above shows that asymmetric spectrum holdings in the 700MHz band would make that disruption less likely and undermine the sustainability of competition going forward.

Moreover, despite the more intense competition 2degrees has provided to date, there is still a risk of co-ordinated effects between Vodafone and Telecom. The recently announced international cable joint venture is one indicator of such effects but others also exist, including the practice of device/SIM locking and the emerging tendency to promote bundles of fixed and mobile services with content options.

Additionally, the antitrust regime in New Zealand does not currently offer effective redress against exclusionary conduct because of the way section 36 of the Commerce Act has been interpreted in case law. Without recourse to such a safety valve, the risks to competition are higher.

For these reasons we consider that competition would be substantially enhanced if clearance was declined for both of Vodafone and Telecom. The properly assessed (i.e. social) opportunity cost of leaving this spectrum un-allocated in the short term is very low, and there seem to be significant competitive benefits from that approach.

Conversely, allocating the 5MHz to Vodafone or Telecom when 3-player competition is still developing poses a material risk to the process of competition. It will be market

forces that determine whether New Zealand can sustain three full-strength networks, but the Commission's decisions affect and help to shape the way those forces operate. It seems important to preserve the opportunity for robust and sustainable competition between three strong network operators.

1 Introduction

The government recently ran an auction to allocate rights to spectrum in the 700MHz band. A total of 45MHz of paired spectrum was available, and all but 5MHz was sold to mobile network operators. 2degrees purchased 10MHz and its two larger rivals Vodafone and Telecom purchased 15MHz each. Those larger rivals of 2degrees are both now seeking clearance from the Commerce Commission to acquire the remaining 5MHz. We focus on the competitive effects of allocating this 5MHz, effectively taking the recently concluded purchases as a given.

This report was commissioned by 2degrees but represents the independent views of the authors. It examines the potential acquisition of the remaining 5MHz by either Vodafone or Telecom, focusing on the way such an acquisition would affect competition in relevant markets. We assess these potential acquisitions against a counterfactual in which the spectrum is not allocated in the short term, and is later acquired by 2degrees. There are other counterfactuals that could be examined, but this one seems the most pro-competitive and therefore the most useful in exposing the likely impacts on competition.

The 5MHz of spectrum at issue is unlikely to be required for use in the short-term. Thus, in respect of that spectrum, network operators are being required to invest much further ahead of demand than is normal. This timing affects the competition analysis, lengthening the time horizon over which competitive effects need to be considered. We note that recent work by the Federal Trade Commission in the USA supports the need for a flexible approach to assessing the future in dynamic markets.¹

The auction timing also imposes financing costs on the mobile network operators, **[C-I-C]**.

This outcome is reflective of the delicate state of mobile sector competition in New Zealand. As we discuss in section 2 below, 2degrees has effectively disrupted the pre-pay segment of retail mobile markets since launching in 2009, but is yet to make a material impact on the more valuable post-pay consumer and business segments. It has not yet entered the corporate market segment in any material way.

Against this background, we examine the way spectrum affects the cost structure of mobile networks. The conceptual background is described in section 3, and then in section 4.1 we use data provided by 2degrees to illustrate the relative impact on mobile network costs of the 5MHz of spectrum at issue, and the resulting implications for incentives of mobile networks to compete. The balance of section 4 addresses the potential for co-ordinated effects to emerge, the role of countervailing buy-side power, and the relevance of anti-trust remedies to the Commission's decisions on the applications before it.

¹ The FTC imposed conditions on the Nielsen – Arbitron acquisition that were motivated by a desire to protect competition in a “future market” that does not currently exist but is expected to emerge <http://www.ftc.gov/os/caselist/1310058/index.shtm>

Drawing on these elements, we develop a framework for analysis that we hope will assist the Commission. Presented in section 5, this work emphasises the sustainable structure of the mobile sector and the way the proposed acquisitions could affect the transition to that structure via the impacts on mobile operators' incentives to compete and expand. We also explain how this framework leads us to infer that either of the proposed acquisitions do indeed pose a material risk to the process of competition.

2 Current situation in NZ mobile markets

This section discusses a number of issues in relation to market segments and realistic boundaries of competition among mobile. We do not attempt to provide a full market definition, but rather to focus on the following relevant issues:

- customer segmentation of the retail market(s);
- fixed-mobile product bundling;
- whether 3G services are a good substitute for 4G;
- which spectrum bands are included in the relevant market for the supply of spectrum management rights;
- the relevance of the wholesale market for the supply of MVNO services; and
- the relevance of the wholesale national roaming market.

A brief discussion of the current state of competition in each relevant market then follows in section 2.2.

2.1 Relevant markets

2.1.1 Retail markets

Customer market segments

The mobile market can be disaggregated into the following key customer segments which differ according to a number of demand- and supply-side characteristics:

1. prepay;
2. consumer postpay;
3. Small and Medium Enterprise (SME) postpay; and
4. Government and large enterprise postpay.

A relevant question in the context of the clearance application is whether these segments constitute separate markets or whether there are other reasons why the Commission should have regard to the effect of the proposed spectrum acquisitions on such individual market segments. We consider this by first examining the likely extent of demand and/or supply-side substitution between customer segments.

With regard to demand-side substitution, there is some potential for substitution between segments – for example, some consumer prepay customers may be content to switch to postpay services and some small business customers may be satisfied with postpay plans targeting consumer customers. However, other customers have specific requirements and preferences meaning that they would not be willing to switch to services targeted at different segments in response to a small but significant increase in price (SSNIP). For example, business customers would be unlikely to substitute away from postpay services towards prepay in response to a 5% increase in the postpay price above the competitive level because: (1) business customers have a greater need than consumer customers to keep track of expenditure and this is more easily done through the monthly invoicing associated with postpaid services than by collecting receipts for

prepaid top-ups; and (2) business customers would be very averse to having calls terminated if their top-up credit runs out. Even within business customers there are diverse requirements as between very small businesses and larger business customers which could curtail demand-side substitution. For example, large business customers may demand higher levels of customer service quality and network reliability delivered through service level agreements (SLAs), and some would also have more detailed requirements for Machine-to-Machine (M2M) services. Therefore, demand-side substitution may not occur between large and small business customers in response to a SSNIP.

On the supply-side, there are a number of distinct investments and capabilities required for the supply of each of the four identified segments in respect of sales, marketing, customer support, billing systems and network infrastructure that would inhibit supply-side substitution in the presence of a SSNIP for a hypothetical supplier of a different customer segment. For example:

- a supplier of prepay services would need to invest in a billing system to deliver postpay services; and
- a supplier of services to SME customers that attempts to supply-side substitute into the large business and government segment would need to: (1) ensure that its network integrity and quality of services met the specifications of large business and government customers; and (2) establish a team of specialised account managers that understand the sophisticated needs of business customers.

The above discussion indicates that at least some customer segments may form separate markets and have different outcomes with regard to the extent of competition.

Importantly though, as a matter of commercial reality the relatively small size of the New Zealand market dictates that an individual network needs to contest all customer segments in order to gain sufficient scale to be a viable competitor. In other words the overall decision to deploy a mobile network is not made at the level of individual customer segments but rather at the aggregate level of the retail mobile market as a whole. [C-I-C]

In conclusion, there are good reasons to suggest that competitive conditions could vary substantially between customer segments such that they constitute separate markets. However it could also be argued that overall market entry and exit decisions would typically be made at a broader level suggesting a market definition that encompasses all customer segments. Given these considerations, our view is that the competitive effects of the clearance be assessed at both an aggregate level across all customer segments and at the level of each customer segment.

3G and 4G services

The Commission states that it is interested in parties' views on "whether 4G mobile services are sufficiently distinctive to place them in a discrete market from second generation (2G) and/or third generation (3G) services."

Turning first to demand side substitution, while 3G services currently provide a degree of competitive constraint for 4G services, this is likely to reduce over time as customers become more attached to the higher speeds that 4G provides and as LTE-Advanced variants are progressively rolled out. Furthermore, business customers and high-end consumer customers that place a relatively higher value on advanced services are less likely to view 3G services as a reasonable substitute for 4G services. As a result, we conclude that over the long-term 4G services are likely to be seen as sufficiently distinct to 3G to result in them comprising a single market.

2G services would not be sufficiently substitutable for 4G to provide a competitive constraint due to the much lower speed data service they provide.

It also seems unlikely that either 2G or 3G services would fall into the same market as 4G services by way of supply-side substitution. This is because a supplier of either 2G or 3G services would need to make substantial investments in spectrum and additional sites in order to supply 4G services.

However, it does seem likely that in the short-run 3G and 4G services lie in a bundled market. Many customers that utilise 4G will do so using a smartphone – using 4G for data where a 4G network is available and 3G for voice (until such time as voice is delivered widely over IP). Given this nature of the use of mobile services it seems likely that both 3G and 4G services currently lie in the same bundled market but we expect these to separate as 4G develops.

Fixed-Mobile Product Bundles

In the product dimension, there is an increasing move towards competition in bundled mobile and fixed-line communications with broadcasting services also becoming a frequent addition to bundles. For example:

- Vodafone offers a substantial discount of \$30/month off naked broadband packages to customers with on-account mobile connections.²
- Telecom is offering bundled broadband deals that include discounts on calls to mobiles and subscriptions to broadcast services.³

2degrees has announced that it too will commence supply of fixed services in order to supply fixed-mobile product bundles.⁴ These initiatives are all part of a broader trend towards competition in bundles which has been noted by the Commission.⁵ As a result, a forward-looking analysis of competitive effects must also consider effects in a bundled fixed-mobile market and in particular, the effect on 2degrees' ability to enter and compete in these markets.

² <http://www.vodafone.co.nz/naked-broadband/>

³ <http://www.telecom.co.nz/packages/?nid=mp032#p85>

⁴ <http://www.stuff.co.nz/technology/digital-living/9323332/2degrees-likely-to-be-selling-UFB-by-2015>

⁵ For example, the trend towards service bundles was discussed by the Commission in the *Annual Telecommunications Monitoring Report 2011*, p. 34.

2.1.2 Markets for the supply of wireless spectrum management rights

In its Statement of Preliminary Issues, the Commission stated that it is interested in parties' views on whether particular spectrum frequencies constitute individual product markets or form part of a broader differentiated market for wireless spectrum management rights.

Within the set of spectrum designated and available for use by wireless services, the two spectrum types that are most likely to form separate markets are (a) low frequency spectrum – that is, less than 1 GHz; and (b) high frequency spectrum – 1GHz or above. While there may be some degree of demand-side substitutability between the two types of spectrum, it seems unlikely that sufficient substitution away from sub-1GHz spectrum towards high frequency spectrum would occur to defeat a SSNIP. In other words, if a hypothetical monopolist of low frequency spectrum increased price by 5-10%, it seems unlikely that customers (in this case, the mobile networks) would instead purchase high frequency spectrum management rights.

Use of high frequency spectrum outside of the main centres requires a much greater number of cell sites than low frequency spectrum. For example, see the model by Lundborg, Reichl and Ruhle which finds that more than twice as many sites are required to provide the same amount of coverage when using 1800MHz spectrum as compared with using 900MHz spectrum.⁶ In addition, low frequency spectrum is more effective than higher frequencies for providing indoor coverage.

As a result, it is more likely that mobile networks would simply pay the additional 5-10% of the SSNIP in order to achieve the efficiencies available from using low frequency spectrum, rather than switching to high frequency spectrum. Given this, we are of the view that low and high frequency wireless spectrum management rights lie in separate markets. The most relevant market for the purposes of the current analysis, therefore, is the low frequency wireless spectrum management rights market which contains spectrum in the 700MHz, 850 MHz and 900MHz bands.⁷

2.1.3 Wholesale market for the supply of MVNO services

Wireless spectrum is an essential input into the supply of mobile virtual network operator (MVNO) services. As a result, spectrum allocations have the potential to impact on the extent of competition in this market and those potential impacts must be considered in the Commission's analysis of the competitive effects of spectrum allocation.

⁶ Martin Lundborg, Wolfgang Reichl, Ernst-Olav Ruhle (2012), "Spectrum allocation and its relevance for competition" *Telecommunications Policy* 36, pp. 664-675.

⁷ We note that there may also be separate markets in sub-1GHz spectrum bands in the short term. This is due to international standardisation of bands and the relevant economies of scale associated with device availability.

The relevant market would include the full bundle of services sold to MVNOs – that is, voice, messaging and data.

2.1.4 Wholesale market for supply of national roaming services

The extent of competitive pressure exerted on suppliers of national roaming services is potentially affected by the allocation of the 700MHz wireless spectrum rights (see Section 4.2.2 for a description of how spectrum holdings affect this market).

Services supplied in this market include voice services, messaging services and data access. As all of these services are provided/demanded jointly they would fall into a single national roaming market.

Roaming is a particular form of infrastructure sharing. Other forms include co-location, the sharing of backhaul and the sharing of spectrum. Many informed observers consider that infrastructure sharing will become more important in mobile industries over the coming years, including ACCC Commissioner Ed Willet who made this point strongly at the Commission's recent Competition Matters conference.

2.2 Current state of competition

The current state of competition in the mobile sector is relevant to the analysis of competitive effects because it forms the baseline of information against which both factual and counterfactual scenarios can be constructed.

2.2.1 Retail market(s)

The state of competition in the mobile retail market(s) is a matter that has been examined by the Commission in various contexts. Given the analysis conducted to date, both in the form of the Commission's own analysis and material provided by the mobile network operators and other interested parties, we do not attempt in this section to conduct a full state of competition analysis in this section, but instead focus primarily on examining how the state of competition differs across the potential customer markets/segments as identified in section 2.1.1

There are currently three network-based players providing retail mobile services and a number of very small MVNOs. Aggregate subscriber shares of the three network-based suppliers have been converging over time with Vodafone holding a [C-I-C] share of subscribers, Telecom [C-I-C] and 2degrees [C-I-C] as at June 2013.⁸

Revenue market shares are substantially more disparate across the three networks. Vodafone is substantially larger in terms of retail revenue share than either of its rival networks. For 2011/12, Vodafone held a [C-I-C] revenue share, Telecom had a share of [C-I-C] and 2degrees' held [C-I-C] in 2011/12.⁹ In comparison 2degrees' average

⁸ Sources: Telecom Annual Report 2013, Vodafone Group Half Year Results Q2 13/14, 2degrees.

⁹ Sources: Commerce Commission 2012 Annual Telecommunications Report; Telecom NZ Annual Results 2012; and 2degrees response to Commerce Commission Industry Survey

subscriber share over the 2011/12 financial year was [C-I-C]. 2degrees much lower revenue share as compared with its subscriber share reflects its substantially lower share of high-value customers.

2degrees grew its subscriber share at a rapid rate following entry through its focus on prepay customers who are more readily contestable due to having relatively lower barriers to switching than postpay customers. [C-I-C]

Figure 1: 2degrees Prepay subscriber volumes as at month end

[C-I-C]

Growth in 2degrees' consumer and business postpay customers has been slower than for prepay. This is especially so for business customer acquisition. As at June 2012, 2degrees had a [C-I-C] share of consumer postpay subscribers and a [C-I-C] share of consumer postpay revenues. At the same time, 2degrees had acquired only around a [C-I-C] share of business subscribers¹⁰ and a [C-I-C] share of business revenues, which indicates that [C-I-C]. We estimate that by June 2013, 2degrees held around [C-I-C] of business subscribers.

The expansion of three-player competition into the consumer postpay and business market segments has occurred at a considerably slower pace than in the prepay market segment. As can be seen from Figure 2 [C-I-C]

This reflects different barriers to expansion across different customer market segments. Barriers to customer switching in the prepay customer market include network effects and SIM locking. Additional barriers faced in the consumer postpay and business customer market segments include:

- Term contracts and early termination charges (particularly when coupled with early roll overs of contracts);
- Asymmetric information regarding customers – for example, being the incumbent suppliers of postpay services Telecom and Vodafone have the ability to engage in retention strategies such as making offline (non-advertised) offers to customers who indicate that they are intending to switch to 2degrees (eg, by requesting early termination of their contract);
- High fixed costs of becoming a distributor of certain high end smartphone devices (iphones); and
- Customer inertia associated with perceptions around network reliability and coverage.

¹⁰ Business subscribers include SME customers and corporate & government customers. Data is not available to disaggregate market shares further into these customer groups.

Additional switching barriers for business customer markets include:

- Investments in building capability to serve large business customers through having individual account managers, and additional sales and customer support.

Figure 2: 2degrees subscriber share by customer segment

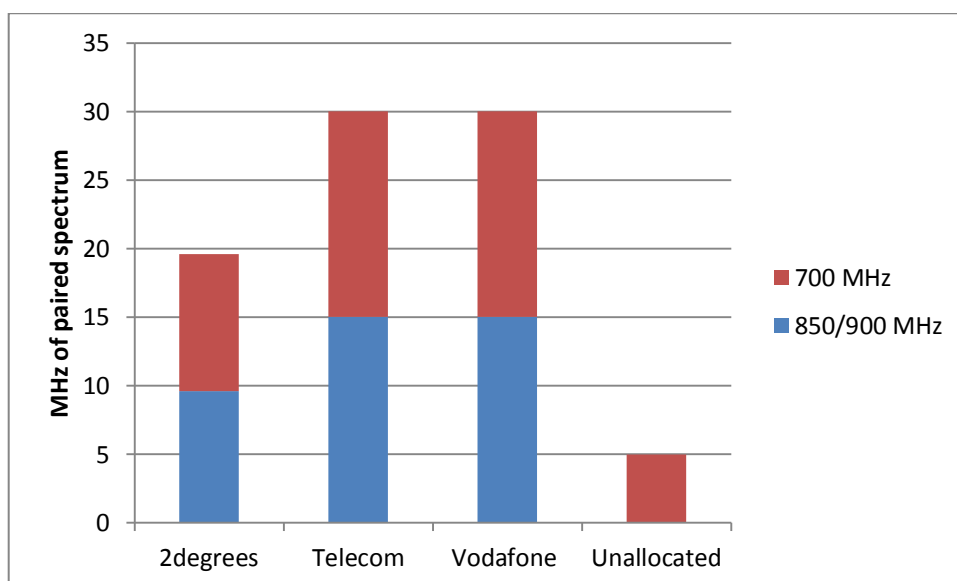
[C-I-C]

It is evident from the above chart that 2degrees' entry across customer market segments has been sequential. Contrary to statements made by Telecom, this does not appear to be a long-term strategy of targeting low-value customers, but merely a sequence of entry from more readily contestable low value customers to less contestable high value market segments.

2.2.2 Markets for low-frequency wireless spectrum management rights

Section 2.1.2 concluded that sub-1GHz spectrum management rights lie in a separate market from higher frequencies. Aside from the 5MHz of unallocated paired 700MHz spectrum at issue all other spectrum in this market is held by parties who are unlikely to be prepared to trade any of those holdings. As a result, the allocation of the remaining 5MHz of 700MHz spectrum will be determinative of final allocations in this market in the foreseeable future. As can be seen from Figure 3, current holdings of spectrum in the low-frequency market are such that 2degrees has around 10MHz less of paired spectrum than each of Telecom and Vodafone. If either Telecom or Vodafone acquires the remaining 5MHz of spectrum 700 MHz spectrum, then that party will have around 75% more sub-1GHz spectrum than 2degrees.

Figure 3: Holdings of sub-1GHz wireless spectrum management rights



2.2.3 Wholesale MVNO service market

Currently only Telecom and Vodafone supply wholesale MVNO services. Retailers that use wholesale MVNO services have made little headway in gaining retail market share. This could indicate that the terms available to wholesale MVNO customers do not allow them to compete aggressively in the downstream market, from which one could infer that competition in this market is weak.

2degrees is a potential entrant into the supply of wholesale MVNO services and its entry could result in significant disruption through applying significant competitive pressure to existing suppliers. As a growing network with traffic volumes that are lower than its rivals, 2degrees would have an incentive to acquire MVNO customers as a means for more quickly acquiring economies of scale. However its incentives to enter and compete actively in this market would be affected by capacity constraints. In particular, it seems much less likely that 2degrees would seek to enter the wholesale market aggressively if it was concerned about capacity constraints in serving its own retail base.¹¹ Spectrum allocations will have a direct impact on capacity and as a result could directly impact on the extent of competition in this market.

2.2.4 Wholesale market for national roaming

The national roaming service is a Specified Service under the Telecommunications Act. As a result, the price terms of the national roaming service are not regulated, however specification does form a regulatory mandate that the service be provided and allows for access seekers to request a Standard Terms Determination (STD) for the non-price terms. An STD is not currently in place, with access to roaming being provided on commercially negotiated terms.

There is currently only one customer of national roaming, being 2degrees. Vodafone is the only technically viable supplier of national roaming services to 2degrees. This is because:

- a) Telecom does not have a 2G network. Around [C-I-C] of 2degrees' total voice traffic is generated by 2G devices, and therefore 2G traffic is a significant proportion of 2degrees' overall national roaming requirements.
- b) Telecom's 3G network runs on 850MHz spectrum whereas both 2degrees and Vodafone use spectrum in the 900MHz band to supply 3G services. [C-I-C]

The implication of the above points is that Vodafone is essentially a monopolist in the market for national roaming services and will continue to be for the foreseeable future. As discussed above, at present 4G national roaming services will form part of the same market as 3G services due to the need for dual 3G/4G devices to roam on the same network for both 3G and 4G services. While in theory Telecom could provide an alternative for 4G-only data devices, this would only constitute one component of overall national roaming demand.

¹¹ See sections 3 and 4.1 below for analysis of the way 2degrees expansion incentives are affected by spectrum holdings.

Given this market structure and the absence of price regulation, countervailing buyer power is essentially the only means for pricing constraint on national roaming prices. In other words, 2degrees' ability to avoid facing monopoly pricing is contingent on Vodafone's perception of whether or not 2degrees would invest in its own network infrastructure, and on any other leverage 2degrees might be able to obtain.

Factors that influence the extent of 2degrees' countervailing buyer power driven by its "build" threat include Vodafone's perception of 2degrees' access to capital and 2degrees' access to sufficient spectrum. As to any other form of leverage, we note that Vodafone view the spectrum at issue as being primarily useful in its rural expansion, whereas 2degrees requires additional spectrum for urban footprint capacity also. That raises the prospect that the remaining 5MHz could be shared with a rural/urban split between Vodafone and 2degrees. The incentives for such an arrangement will be affected by the Commission's decisions on these clearance applications. We analyse this further in section 5 below.

3 Competitive effects of spectrum allocation

In this section we briefly discuss how spectrum allocation affects competition among mobile networks from a theoretical perspective, as a prelude to our analysis of the competitive effects of the allocation of 700 MHz spectrum in New Zealand.

3.1 Spectrum as an input

Spectrum is obviously a critical input for mobile networks – it allows networks to provide coverage and provides capacity to handle traffic within the coverage area. Taking the state of mobile network technology as given, the spectrum holdings of a mobile operator affects its capacity to handle traffic within its coverage area and its costs of handling additional traffic.

Now and in the future, data traffic is the primary driver of volumes on mobile networks (rather than voice calls or SMS). A mobile network's capacity will determine the data transmission speeds that it can provide to its customers. More capacity means that:

- higher transmission speeds can be provided to a given number of customers; and/or
- more customers and more traffic can be handled without average transmission speed falling below an acceptable level.

Over time, developments in mobile technology (eg 3G and LTE) have enabled more efficient use of spectrum, ie greater capacity to handle data traffic within a given amount of spectrum. This has led to faster mobile data transmission speeds for customers, spurring the development of new mobile applications (eg mobile video) and in turn has increased the demand for mobile data services.

Lower frequency spectrum can cover larger geographic areas. It also penetrates buildings better than higher frequency spectrum. Both of these effects enable a given area to be covered with fewer cell sites and therefore at lower cost. An efficient mobile network design involves using low frequency (below 1 GHz) spectrum to build a basic coverage network, and then augmenting this to provide additional capacity in specific areas as required.

This capacity augmentation can take two basic forms. One is to re-use spectrum within the same frequency band as the basic coverage network, but to 'split' cell sites into sectors and/or to add more cell sites that cover smaller geographic areas. Since each site then covers a smaller area, it will be 'seen' by a smaller number of users and the overall capacity of the network can be increased. However this approach to adding capacity is limited by the fact that smaller sectors or cell sites re-using the same frequency band need to be sufficiently far apart so that radio signals to/from any one site do not interfere with others nearby.

The other form of augmentation is to overlay the coverage network with cell sites that use higher frequency spectrum (ie 1800, 2100, and 2600 MHz) to provide additional capacity in specific areas as required.

In either case, increasing capacity requires capital expenditure to build new cell sites and backhaul links. The amount of this expenditure and the rate at which it increases with traffic volumes depends partly on the amount of spectrum that the network has, in the various frequency bands. In general, a network with less spectrum (particularly below 1 GHz) will face more capital expenditure, sooner, to maintain customer service levels as traffic volumes increase, compared to a network with more spectrum, everything else equal. We return to this point in section 4.1 below.

In practice, the relationship between cost and traffic implied by a given spectrum allocation will depend on complex interactions between a number of factors, including customer density, topography, and mobile technology. This means that analysis of the competitive effects of different spectrum allocations must be informed by detailed empirical analysis reflecting the realistic opportunities and trade-offs that mobile operators face when designing their networks.

It is also important to note that, in reality, the efficient design of a mobile network will be constrained by the need to support multiple mobile network technologies for some time. For example, during the transition from 2G to 3G technology, it is necessary to support both networks simultaneously, and the same is true during the transition from 3G to LTE. Each technology that an operator supports requires its own block of spectrum and these cannot overlap.

This affects the ability of operators to build a fully efficient network at any given point in time. An operator may have to use higher frequency spectrum than desired to support a new technology, due to the need to maintain capacity on lower frequencies that are already allocated to older technologies. For example, Vodafone and Telecom have deployed their 4G networks using 1800 and 2600 MHz spectrum in part because their existing allocations of 850 and 900 MHz spectrum are required to support legacy 2G (Vodafone) and 3G (Telecom and Vodafone) networks.¹² Similarly 2degrees is constrained in its deployment of LTE by the need to allocate spectrum to support its existing 2G and 3G customers.

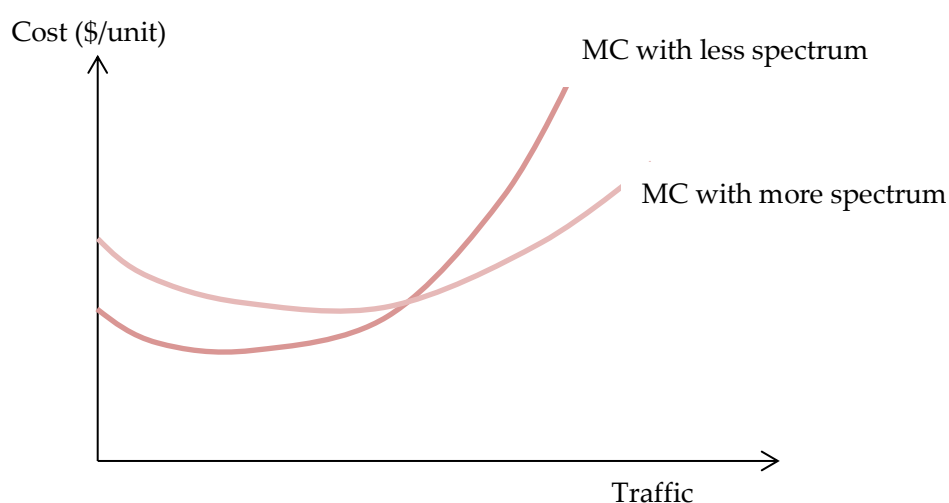
The next section translates these features of spectrum and the relationship between spectrum and radio network costs into competitive effects, in the case where the allocation of spectrum is asymmetric across mobile operators.

¹² Handset availability is an important factor driving the need to maintain support for different technologies. If 700MHz devices were already available, the optimal network configuration would be different.

3.2 Competitive effects of asymmetric spectrum allocation

For the reasons described above, a network's spectrum allocation affects the required capital costs to increase capacity as traffic on its network grows. The capital costs for upgrading capacity are somewhat 'lumpy', in that they relate to upgrading individual cell sites or building new sites, but in relation to the total volume of traffic on the network, it is reasonable to view these as variable costs.

A network with a smaller spectrum allocation thus has a lower fixed cost but a higher marginal cost of traffic than a network with a larger spectrum allocation, and will have a lower minimum efficient scale in terms of traffic volume. In other words, an asymmetric spectrum allocation translates into asymmetric cost structures and different incentives to compete for customers and traffic across networks, as shown in the diagram below.



It is well understood that firms, having decided to enter a market, compete on the basis of their marginal costs. In general, a network with less spectrum will have a weaker incentive to compete for customers and traffic, due to its higher long-run marginal cost of traffic and correspondingly lower marginal profit from attracting increased volumes. A small network with less spectrum will therefore have some incentive to remain small. Everything else equal, it will not have an incentive to go after an equal share of the market as a rival with more spectrum – it will prefer to remain smaller in order to avoid capital costs of increasing its capacity.

It follows that if spectrum allocations were to reflect *existing* market shares, there would be a risk that these shares will be locked in to some extent, due to these incentive effects. We return to this in section 5 below.

There is another channel by which the long-term strategic interaction between mobile networks can also be affected by their spectrum allocations. It can be shown that a pre-commitment to a high capacity level through a costly investment can act as a barrier to

entry or expansion in a market.¹³ This occurs because an investment in excess capacity gives a firm a credible threat that it can cut prices (ie increase output) significantly if faced with competition from a smaller rival.

A high capacity commitment (eg a large spectrum holding) can thus be a credible signal of a willingness to use an aggressive competitive strategy should a rival enter the market or seek to significantly expand. Anticipating this, the competitor may be deterred from entering or expanding in the first place, and the excess capacity simply acts as a barrier to entry or expansion, with little benefit for consumers. The investment in excess capacity can be profitable for the incumbent as this protects its market power.

In summary, there are sound reasons to be concerned about the effects of asymmetric allocation of spectrum across mobile operators on competition among them. This is particularly so given the 18 year duration of spectrum licenses, with allocations having the potential to fundamentally affect competition and structure in the retail mobile markets for a considerable length of time.

We note that this view is also consistent with the Commerce Commission's previous position on spectrum holdings that "a marked disparity in allocation is likely to harm competition".¹⁴

¹³ There are many academic papers on this topic. Useful references include Marvin B. Lieberman, Excess Capacity as a Barrier to Entry: An Empirical Appraisal, *The Journal of Industrial Economics* Vol. 35, No. 4, (Jun., 1987), pp. 607-627 and Richard J. Gilbert and David M. G. Newbery, Pre-emptive Patenting and the Persistence of Monopoly, *The American Economic Review* Vol. 72, No. 3 (Jun., 1982), pp. 514-526.

¹⁴ Letter from Commerce Commission to MBIE, Allocation of Digital Dividend Spectrum, 16 December 2011.

4 Implications of 700MHz allocation

The previous section explained how an asymmetric spectrum allocation can distort competition among mobile networks. The key point is that having less spectrum increases a mobile network's long run marginal cost of traffic, everything else equal, which weakens its incentive to compete for traffic. In this section we consider the implications of the allocation of 700MHz spectrum in New Zealand, given the market context outlined in section 2.

4.1 Cost and competition analysis

We have attempted to undertake some quantification of the effects of a change in a mobile operator's holding of 700MHz spectrum on its capital costs. Figure 4 shows information provided to us by 2degrees about the number of cell sites it expects to need to build each year with 2 x 15MHz and 2 x 10MHz of 700MHz, under conservatively low assumptions about growth in data traffic.

Figure 4 700MHz cell sites required under 2degrees low data traffic growth assumptions.
[C-I-C]

[C-I-C] By 2022, under the low traffic growth assumptions, 2degrees expects to need [C-I-C] more cell sites with a 2 x 10MHz allocation of 700 MHz spectrum compared to a 2 x 15 MHz allocation. This translates to a difference in total capital cost of around [C-I-C], in order to compensate for the lack of capacity implied by a smaller spectrum allocation. Under a relatively high data growth scenario, the additional capital cost of having 2 x 10 MHz of 700 MHz spectrum relative to 2 x 15 MHz would be [C-I-C] by 2019 and [C-I-C] by 2022].

The results in Figure 4 assume a particular pattern of (relatively low) growth for 2degrees, and actual data traffic growth could be considerably higher than assumed in this scenario. To a large extent, this pattern is a function of the strategy and pricing that 2degrees chooses to adopt, which in turn depend on its cost structure. The capital cost differential shown in Figure 4 should therefore not be taken as given but should be thought of as reflecting one particular set of strategic choices. Other strategies may be considered by 2degrees, but the attractiveness of these depends partly on the cost implications.

In particular, as we concluded above, a network with less spectrum has a higher long run marginal capital cost associated with increasing traffic volumes. To estimate the potential size of this effect, we used the information provided in Figure 4 to understand how annualised capital costs change with annual traffic volumes.

Figure 5 shows the results of this analysis, where traffic volumes are varied relative to the level that 2degrees low growth scenario forecasts for 2015, and assuming a seven year life for cell site electronics, 25 years for towers and a 15% cost of capital. The figure shows the differential in total capex associated with having 2 x 10 MHz versus 2 x 15

MHz of 700 MHz spectrum, and the corresponding percentage difference in the contribution of these costs to the network's total long run marginal capital cost.

Figure 5 Implications of a 5 MHz differential in 700 MHz spectrum for long run marginal capital costs [C-I-C]

The results of this analysis suggest that the contribution of capex associated with 700 MHz spectrum of a mobile operator with 2 x 10 MHz of 700 MHz spectrum will be [C-I-C] greater than an operator with 2 x 15 MHz of 700 MHz spectrum. This will reduce the incentive to compete and expand traffic volumes and market shares.

Thus while 2degrees expects to grow, the real question is how their incentive to grow is affected by having a smaller spectrum allocation and correspondingly higher marginal costs. Our analysis suggests that, based on cost considerations alone, a 5 MHz differential in 700 MHz spectrum can make a significant difference to marginal capital costs and we expect this will blunt the incentive to compete for traffic.

This will have a particular impact on the incentive to compete in segments of the market where customers generate high volumes of data traffic (ie the high price / high value segments). Attracting such a customer generates a disproportionately high volume of incremental traffic on the network, with corresponding cost implications. A network that has a high marginal cost structure due to having a smaller spectrum allocation will have a weaker incentive to compete for such customers.

As noted in section 2.2 above, [C-I-C]

There is also some evidence that the relationship between capital costs and spectrum allocations is not linear. Figure 6 shows the results of some analysis provided to us by 2degrees to test the effect of different holdings of sub-1 GHz spectrum used to provide 3G services on capital costs, given 2degrees' expectations of 3G traffic growth on its network up to 2018.

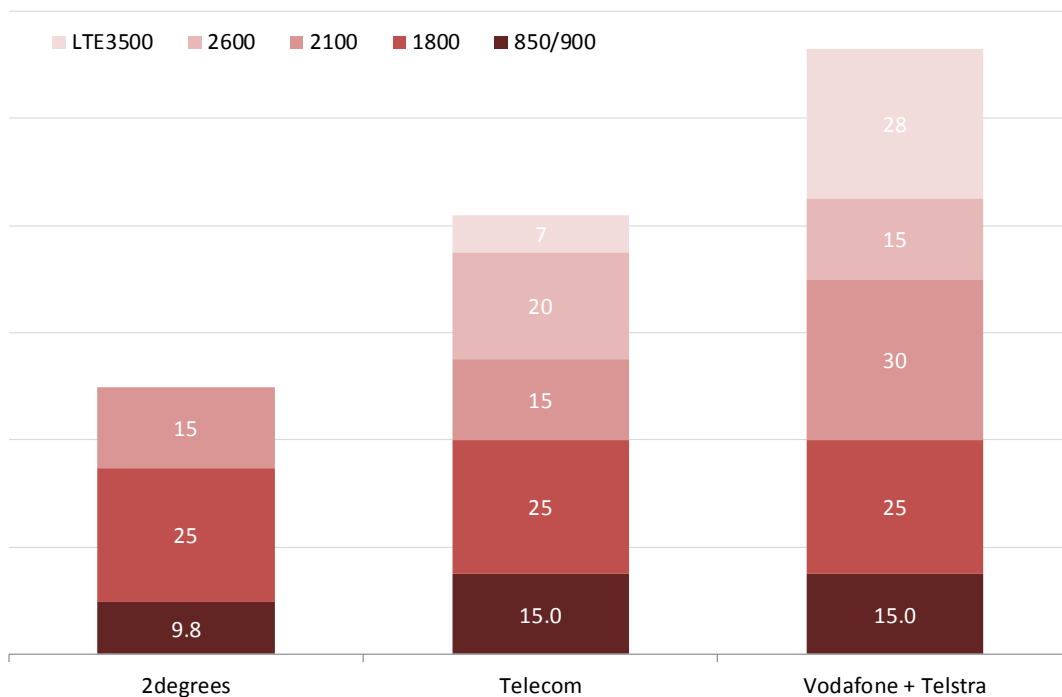
This shows that [C-I-C]. .

Figure 6 Additional capital cost required to maintain current service levels given 2degrees expected growth to 2018, for different allocations of sub-1 GHz spectrum.

[C-I-C]

This analysis suggests that spectrum asymmetries can have a disproportionate impact on network costs as the size of the asymmetry increases. In this light, it is noteworthy that existing spectrum allocations are already asymmetric across the three mobile networks, with 2degrees having significantly less spectrum in total and below 1 GHz than its competitors (Figure 7). An asymmetric allocation of 700 MHz spectrum would increase this imbalance, and as discussed above that may have a disproportionate effect on 2degrees' capital costs and a correspondingly large impact on its incentive to compete for data traffic.

Figure 7 Existing spectrum management rights allocations (paired spectrum only).



Source: Covoc. Vodafone also has additional unpaired spectrum that is not included in this chart.

Although Telecom and Vodafone currently have larger customer bases and higher total traffic volumes than 2degrees, this does not change the incentive effects discussed above, and arguably reflects those effects. It is important for an assessment of the competitive effects of the allocation of 700 MHz spectrum to be forward-looking and consider the incentives of all operators to compete for market segments, rather than to maintain their current competitive positions. In order to protect the process of competition, rather than any individual competitor, the Commission should consider the implications of spectrum allocation for the incentives to compete.

4.2 Other impacts on competition

Stepping back slightly from an examination of the costs and incentives that 2degrees faces, it is also relevant to consider several other ways in which competition could be lessened by one or other of the proposed acquisitions.

4.2.1 Co-ordinated effects

As the Commission’s merger guidelines note, the potential for an acquisition to increase the risk of co-ordination between rivals needs to be considered. In this matter, it seems fair to conclude that the relevant markets are “vulnerable to co-ordination”. That view is supported by examining the material difference in consumer outcomes since 2degrees launched in 2009. For example, data from the Commission’s latest market monitoring report shows:

- Significant increases in the volume of off-net mobile calls;¹⁵ and
- Material falls in the price of mobile services.

The monitoring report also notes that a number of other initiatives were led by 2degrees in the 2012 year, including the first launch of NFC technology and unlimited SMS offers.

Although 2degrees' development has so far targeted the most contestable segment of the potential customer base for mobile services, its activities have still noticeably disturbed the previous somewhat comfortable equilibrium between mobile network operators. It can therefore be classified as an "aggressive or destabilising competitor",¹⁶ without which co-ordinated behaviour would be more likely in the mobile sector.

There is of course no suggestion that 2degrees will exit. However as noted above, the acquisitions would constrain both the ability and incentives of 2degrees to continue disrupting this industry, particularly in higher value market segments that it has not yet heavily targeted.

In addition, the proposed acquisitions have the potential to marginalise 2degrees and in doing so they increase the risk of co-ordinated effects, at least in some segments of the market. Drawing on the Commission's list,¹⁷ we note several other factors that point towards such a risk, including:

- homogeneous products – beyond a basic quality threshold communications services are substantially homogeneous, which is why the networks try to differentiate themselves using coverage and also through pricing plans;
- a small number of competitors – until 2degrees makes significant progress in the on-account and business segments of the market, the competitive benefits of a 3-firm market will be largely restricted to pre-pay customers;
- firms repeatedly interacting – interconnection and interoperability requirements demand repeated interaction at multiple levels of the network operating firms;
- firms of similar size and cost structures – this is generally true of Vodafone and Telecom (although following the acquisition of TelstraClear Vodafone does have significantly larger spectrum holdings);
- firms that can readily observe each other's prices or volumes – this is clearly the case for the NZ mobile industry which has a number of information channels such as advertising, industry discussions and monitoring reports.

¹⁵ Regulation of termination rates has probably contributed to this effect, but it is also true that the support of 2degrees was instrumental in getting this regulation imposed.

¹⁶ NZCC Merger Guidelines paragraph 3.87.

¹⁷ NZCC Merger Guidelines paragraph 3.89.

Given the number of dimensions over which competition is expected to develop, it is difficult to predict how co-ordinated effects will emerge.

However the clear tendency to promote bundles of services carries with it a risk that Vodafone and Telecom could converge on using similar bundles, for example of broadband and mobile calling services with broadcasting. Apparently minor cost advantages in two or three separate elements of such a bundle could have the cumulative effect of precluding a similar offer by 2degrees. That could in turn lead to an entrenched equilibrium in which two firms effectively control the industry using tacitly co-ordinated strategies.

There are some other pointers towards a view that Telecom and Vodafone perceive a common interest in marginalising 2degrees. One is the announcement in February 2013 of a joint venture by these firms to build an undersea cable between Auckland and Sydney. Another is the TSM initiative,¹⁸ which excluded 2degrees from its initial stages of development. A third is the re-emergence of device/SIM locking by both Vodafone and Telecom, which will create switching barriers.

4.2.2 Countervailing buyer power

If Telecom was a feasible provider of roaming services, it could be argued that the risk of clearing an acquisition by Vodafone and/or Telecom would be lowered because 2degrees could buy roaming from either network. There are two reasons to heavily discount such an argument however. First, roaming is an inferior substitute for spectrum because 2degrees would use it to add capacity, reduce variable costs and improve service quality within its existing footprint. Second, as explained in section 2.2.4 Vodafone is a monopolist in this market which is therefore not workably competitive.

Nevertheless, competition in this market is still relevant to the proposed acquisitions. [C-I-C] Alternatively if the spectrum remains unallocated and is eventually acquired by 2degrees there is potential for an efficient and pro-competitive spectrum sharing arrangement to emerge, *and* for the terms of national roaming to be more efficient.

This is because incentives for asset sharing are directly analogous to incentives for compatibility between networks. Economists have long understood that when networks have asymmetric size, the smaller one wants to be compatible with the larger one, but the larger one prefers to press home its advantage by remaining incompatible.¹⁹ Exactly the same pattern of incentives applies to asset sharing.

In the matter at hand, there is a prospect that Vodafone and 2degrees could share 700MHz spectrum in rural areas. That is technologically feasible and there are indications in Vodafone's application that it would meet that firm's primary goals in

¹⁸ TSM stands for Trusted Services Manager. It is aimed at promoting the use of mobile networks to make electronic payments.

¹⁹ Michael L. Katz and Carl Shapiro, "Network Externalities, Competition, and Compatibility", *The American Economic Review*, Vol. 75, No. 3 (Jun., 1985), pp. 424-440.

acquiring the spectrum. However the incentives to make such an arrangement will be dramatically different depending on who secures the last 5MHz. Vodafone will prefer to press home its advantage if it secures the spectrum. If 2degrees ultimately obtains it (which means leaving it unallocated for an interim period) then it will have:

- a business rationale for sharing;
- a financial incentive to strike a deal; and
- an element of countervailing power in roaming negotiations.

To understand the final point, note that commercial negotiations are crucially affected by the outside opportunities available to each party. Although spectrum sharing and roaming are potentially the subject of distinct negotiations, in practice, if there is a prospect of a deal, they are very likely to be considered jointly.

We conclude that there is a substantial difference in the intensity of competition in the wholesale market for roaming services between these two scenarios.

4.2.3 Lack of competition remedies

It is sometimes argued that the anti-trust regime provided under Part 2 of the Commerce Act acts as a safety valve, so that structural decisions taken under Part 5 of the Act are less critical. In our view there are currently grounds to believe that the reverse is the case. Apparent weaknesses in New Zealand's anti-trust regime may in fact *increase* the hurdle for the Commission to be satisfied that acquisitions will not substantially lessen competition.

In this regard, we refer to the difficulties currently being experienced with section 36 of the Act, which is the primary anti-trust constraint on the exercise of unilateral market power. These difficulties were analysed in some detail at the Commission's recent inaugural conference, particularly by Professor Andrew Gavil. A critical weakness with the so-called "counterfactual test" that is embedded in section 36 case law is that it easily generates false negative results, meaning that conduct that does in fact lessen competition is (incorrectly) exonerated.

For the purpose of assessing these applications, the Commission could reasonably assume that section 36 is inoperative. Private prosecutions under section 36 are extremely rare and to our knowledge the Commission itself has commenced no new section 36 cases since Supreme Court's decision in the 0867 case.

The incentive effects of this are relevant. If the markets perceive the situation as described above, then powerful firms are more likely to act with impunity. While this might receive further policy consideration, there is no prospect of a solution on the horizon, even over the medium term.

How might this play out in the telecommunications markets? Clearly a firm like 2degrees is going to need roaming services for some time. These will be acquired from a powerful vertically integrated competitor that has both the ability and the commercial

incentive to implement a vertical price squeeze. Such a squeeze is much more likely to be attempted while section 36 is in limbo.

In summary, it would be reasonable for the Commission to perceive a greater risk of competition being lessened given the current and likely future difficulties with New Zealand's anti-trust regime.

4.3 Summary

This section has shown that the allocation of the 5MHz of spectrum at issue is likely to affect the incentives facing mobile network operators in several ways. We have contemplated a scenario in which the spectrum remains unallocated for an interim period after which it is acquired by 2degrees. Compared with that scenario, other allocations lessen competition through several channels.

First and most importantly, 2degrees would have weaker ability and incentives to grow rapidly especially in the postpay and business market segments that are yet to experience material disruption.

Second, the risks of co-ordinated behaviour between Vodafone and Telecom would intensify. There is already evidence of such behaviour.

Third, the wholesale market for national roaming would be less competitive, and the prospect of an efficient and pro-competitive spectrum sharing arrangement would disappear.

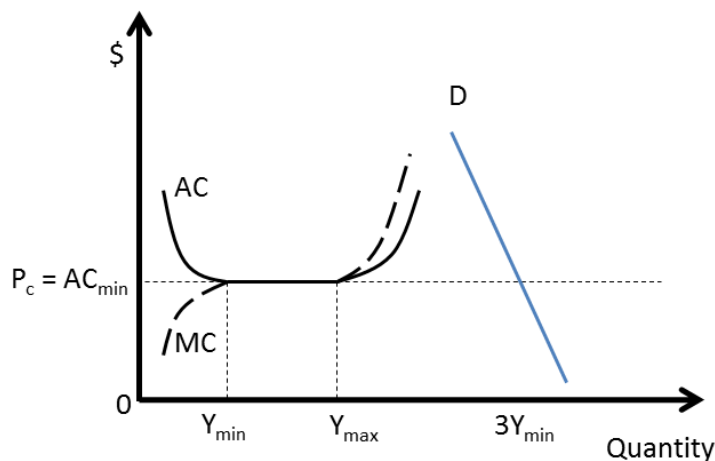
None of these effects is likely to be significantly mitigated through the use of the anti-trust provisions in the Commerce Act.

5 Towards sound clearance decisions

In this section we develop a framework for examining the proposed acquisitions. We then interpret the above analysis within that framework and draw some inferences about the likely competitive effect of clearing the proposed acquisitions.

5.1 Sustainable industry structure

Any clearance decision has an impact on the structure of the industry. Ideally, the sequence of such decisions over time would permit industries to converge on what is known as the “sustainable industry structure”. That is a state in which, given the total amount of demand, the industry is served by the largest number of firms that could operate at minimum efficient scale.



The diagram illustrates this concept under the assumption that the New Zealand market is large enough to support three mobile networks all operating at minimum efficient scale. It shows the average and marginal cost curves facing a mobile network operator. The minimum efficient scale is at output level Y_{\min} because at lower output levels each network has economies of scale. Once minimum efficient scale is reached, networks have constant returns to scale up to output level Y_{\max} and diseconomies of scale beyond that.

Market demand is the downward-sloping line marked D. At the competitive price of output P_c there is enough demand ($3 \times Y_{\min}$) to sustain three networks, all operating at minimum efficient scale.

We consider that there is a good chance that the New Zealand market could support three full scale mobile networks. If so, that outcome would be consistent with sustainable competition, and by comparison, anything short of that outcome would represent a lessening of competition.

We are not aware of any empirical work assessing the feasibility of this structure, and theory alone would clearly be insufficient. Market forces are likely to be the ultimate determinant, but they operate in a context that is influenced by the Commission through applications such as the ones at issue here. Thus, an important consideration for the Commission is over the extent to which these applications foreclose or restrict the opportunity for market forces to test and reveal the sustainable industry structure.

5.2 Forward-looking analysis

Clearly, the New Zealand mobile sector has not yet achieved a full three-player structure, but it is moving towards it.

It is therefore important to avoid basing decisions on the existing market structure. For example, it would be fallacious and error-inducing to argue that one of the applicants should be allocated the spectrum at issue because its “need” is greater due to its larger market share. Such reasoning carries a strong danger of entrenching existing market positions via spectrum constraints.

Instead, we recommend that in adopting a forward-looking approach to the analysis, the Commission bears in mind:

- The competitive benefits associated with an industry served by three full-scale mobile networks [C-I-C];
- The desirability of 2degrees disrupting the on-account markets (postpay and business), similar to what has been achieved in the pre-pay market; and
- The fact that unbalanced spectrum holdings cause unbalanced variable costs and therefore weaken competition.

These factors alone suggest that the proposed acquisitions pose a material threat to future competition. This is particularly the case given the 18 year period of the management rights in question. In addition, it may be helpful to consider the costs and benefits of different clearance decisions in an explicitly dynamic and forward looking framework for evaluating the Commission’s options.

There are several features of these applications that jointly imply the existence of a valuable option to defer allocating the spectrum in the short term. These features are

- Allocations are effectively irreversible;
- The value of allocating to either of the applicants is at least uncertain relative to the significant potential harm and potentially more competitive counterfactuals; and
- There is no immediate use for the 700MHz spectrum, particularly for the 5MHz at issue.

In what follows, we briefly comment on each of these features and then explain the relevance of the delay option.

Allocations are irreversible

The spectrum at issue comes in the form of an 18 year management right. Although the rights to use spectrum can be loaned, leased or traded between networks, these transactions are rare and it is reasonable to assume that the acquiring network will sink additional capital into equipment that uses the spectrum. This is a scarce resource and a strategic asset; we cannot envisage a scenario in which either of the applicants would willingly sell spectrum to a downstream competitor.

As discussed in section 3.1 above, the efficient development of a mobile network involves a complex interplay between investment in spectrum, cell sites and technology. Of relevance to this matter, cell site and electronics investment will be tailored to make use of the spectrum holdings of a network. As capital is sunk into those cell site and electronics investments, the spectrum allocation becomes economically irreversible in the sense that no network operator would willingly sell it.

The value of clearance is at least uncertain & more competitive counterfactuals exist

Rural users could benefit from having this spectrum used, even if competition for their patronage is weakened by asymmetric spectrum holdings. We have discussed above (section 4) the way allocating the spectrum to either Telecom or Vodafone can affect competition among mobile networks. That analysis tends to support the view that competition would be lessened, but we acknowledge that there are many uncertainties that bear on such a view. For example, there are uncertainties over:

- How quickly data traffic will grow over the forthcoming years;
- The capacity and throughput requirements of future data applications; and
- How great will be the impact on network traffic of over-the-top service providers such as Apple.

As time goes on, these uncertainties will be resolved and we will develop a much better understanding of the competitive impact of the proposed acquisitions.

No immediate use for 700MHz spectrum

The 700MHz spectrum is expected to be beneficial to mobile networks, in both urban and rural locations. However at this point it cannot be used because there are no handsets currently available. New Zealand is a technology taker for handsets, so the timing of mass-market availability will be dictated by international markets. High end handsets are expected to start becoming available in the second half of 2014.

Moreover, if we focus on just the 5MHz at issue, the relevant question is over the date at which a network with 15MHz would reach capacity in rural locations. The fact that government policy placed an initial cap at 15MHz strongly indicates that the capacity added by the extra 5MHz will not be needed in the foreseeable future.

Implications

The first two of the above features (irreversibility and uncertainty) are sufficient to infer that there could be value in deferring allocation of this spectrum. The economic literature for valuing these options is complex²⁰ but there are clear and readily understood implications. In particular, deferring investment decisions is profitable when the value of an irreversible investment is sufficiently uncertain. Intuitively, in this situation deferral provides an opportunity to learn more about the relevant (uncertain) features, which lessens the chance of regretting an irreversible commitment.

In this case, the relevant irreversible commitment is a Commission decision to clear either of the proposed acquisitions. By declining to clear the applications, the Commission retains the option to reconsider these issues later, after some of the uncertainties are resolved.

This approach does not need the third feature described above (no immediate use for this 5MHz of spectrum) to be justified. However that third feature does tend to increase the value of the option to defer a decision, making a refusal to clear more socially beneficial. The fact that there is no immediate use or requirement for that capacity (including in rural areas) reduces the opportunity cost of declining clearance.

5.3 Our conclusions

The above analysis suggests that clearing the applications does pose material risks to the competitive process. The primary risk is that the industry's evolution towards a sustainable and more competitive three-firm structure will stall. The mechanisms by which a stalling could occur stem from unbalanced 700MHz spectrum holdings which will tend to:

- lessen competition between Vodafone and Telecom in the market for wholesale roaming services;
- increase the incentive for a vertical price squeeze aimed at marginalising 2degrees, all the more so given the current weakness of section 36 remedies; and
- lessen competition in the retail market for mobile services by increasing the relativity between the marginal costs of 2degrees and its larger rivals and so weakening the incentive that 2degrees has to compete for a larger share of the market.

The retail market concern is most pronounced in the on-account market segments, which have not yet been fully disrupted, where data traffic is relatively more important, and where 700MHz spectrum is therefore of greater value.

²⁰ For a solid exposition of the concepts, see A.K. Dixit and R.S. Pindyck, *Investment Under Uncertainty*, Princeton University Press, 1994.

Declining clearance defers allocation of the spectrum to either of the applicants, but it does not extinguish that prospect. It therefore retains the option to clear an acquisition later when more information is available, at which point 2degrees may also be seeking clearance. The opportunity cost of such deferral is reduced by the fact that handsets are not yet available to use this spectrum.