



**Telecom New Zealand Submission on Vodafone  
Mobile Co-location STP  
Executive Summary**

**Public Version**

**23 May 2008**

## 1. INTRODUCTION

1.1 Telecom welcomes the opportunity to comment on the Vodafone Mobile Co-location Standard Terms Proposal ("**STP**").

1.2 We acknowledge that improvements to mobile co-location services and processes are necessary to ensure co-location delivers meaningful benefits to parties that want to co-locate and to downstream end users of telecommunication services. To this end, we consider the STP provides a positive framework for facilitating mobile co-location, with sensible enhancements to existing processes, and we support most of the concepts and provisions included in it. Telecom notes that beyond the STP process Access Seekers and Access Providers will work together to develop commercial co-location solutions.

1.3 We have concentrated in our submission on exploring the most appropriate infrastructure sharing options where co-location space is not readily available on existing structures. We have also suggested enhancements to the STP where we think these improve the transparency and timeliness of the processes underlying the STP and are necessary to ensure the success of the Mobile Co-location Service. In particular, we have suggested:

- (a) the introduction of a multi-site application process;
- (b) the expansion of the mast replacement options for Access Seekers, and streamlining of the voluntary Greenfields site sharing process; and
- (c) streamlining the pre-approval stage of the mobile co-location process and the introduction of additional service levels and penalties, consistent with those contained in other STDs.

### **Infrastructure sharing to facilitate co-location**

#### *Greenfields site sharing*

1.4 Telecom supports the introduction of a voluntary Greenfields site sharing process facilitating commercial arrangements which enable mobile operators to lower the costs associated with deployment of a new cell site. Provided customer service levels are not impaired, or deployment materially delayed, as a result of the infrastructure sharing or co-location, such arrangements will make good commercial sense. In the past Greenfields site sharing has not been the norm, for a variety of reasons. We see strong commercial imperatives for this to change, and are committed to increasing the amount of Greenfield site sharing we participate in going forward.

- 1.5 We have suggested only minor amendments to the Greenfields process proposed in the STP, which are intended to streamline the process for all parties.

*Mast replacement*

- 1.6 We also support the inclusion of a mast replacement process. We have, however, suggested a number of enhancements to this process. These enhancements give Access Seekers greater powers to apply for mast replacement at any time. They also place further disciplines on Access Providers to ensure that Access Seekers are consulted on mast replacement options whenever an Access Provider considers upgrading masts which Access Seekers have included in forecasts for future co-location requirements.
- 1.7 Mast replacement provides an efficient and effective mechanism for facilitating co-location on existing cell sites where space might not otherwise be available - without degrading end-customer service experiences. Importantly, mast replacement also ensures that Access Providers' and Access Seekers' future forecast needs can be catered for in the design of the replacement mast.

*Antenna Minimisation*

- 1.8 Telecom does not, however, consider that it is appropriate to force antenna minimisation on Access Providers in a STD. Telecom's experience is that antenna minimisation almost inevitably negatively impacts the service quality and coverage of services offered by the Access Provider and any other Access Seekers already on the site, resulting in a lower quality of service for customers. These service-impacting outcomes are often difficult to forecast with any certainty, and can have a significant impact on the effective range of the cell site for particular service-types (in particular, the in-building coverage of the site).
- 1.9 In most cases where antenna minimisation might be requested, it will only be a short-term solution for what is likely to be a medium-term issue – a lack of space at a valuable cell site location. This is an issue that is better dealt with by mast replacement, which enables the future forecast requirements of all relevant parties to be catered for as well as the short-term requirements of the new Access Seeker. Antenna minimisation will typically only provide space sufficient for one additional co-locator, and it therefore simply pushes the costs of the medium-term issue onto the next prospective co-locator.
- 1.10 Telecom has been unable to identify any previous examples of antenna minimisation being mandated, despite most jurisdictions having regulated frameworks in place that would enable such a requirement to be imposed. Alcatel-Lucent has likewise been unable to identify any jurisdiction where such a requirement was imposed. If antenna

minimisation were to be mandated in the STD, we consider it likely that it would be a world first.

### **Multi-site application process**

- 1.11 Telecom's experience as a provider of mobile co-location services to date has been that a party deploying a new mobile network, or seeking to expand an existing one, is likely to want to submit a large number of applications within a short period of time. Where this occurs, it makes sense for both the Access Provider and the Access Seeker to look to achieve efficiencies in the processing of applications and delivery of the co-location services.
- 1.12 To this end, we have proposed a "multi site application" (or "Rapid Multi Access") process in the Operations Manual, which allows for batches of 10 or more applications to be submitted at one time, and dealt with on a "project" basis by the Access Provider. The objective of this process is to reduce the standard timeframes. Under our proposal, a multi site application could be made regardless of whether there are similarities between the sites. This will enable Access Seekers to apply for project management and streamlining of 10 or more applications in a region, regardless of the type of site.

### **Streamlining the Pre-Approval process**

- 1.13 There are two aspects to the mobile co-location process:
- (a) The "**pre-approval**" phase during which the Access Seeker and Access Provider work closely together to provide the Access Seeker with the necessary information to make a full site application; and
  - (b) The "**Access Seeker implementation phase**" which is the stage of the process where the Access Seeker has to take primary responsibility for ensuring it obtains the requisite Resource Management Act ("**RMA**") consents and landowner approval to enable it to place equipment on the site.
- 1.14 In the past the pre-approval phase has been viewed as a key bottleneck, and Telecom considers that there is still scope for improving the STP's treatment of this phase of the co-location process. We have sought to eliminate, or make optional, any aspects of the process that may result in unnecessary costs and delays for the parties. We have suggested a number of changes to streamline the process and have introduced additional service levels around key processes.

### **Common Format Site Database**

- 1.15 Telecom has already recognised that, in order to enable Access Seekers to make informed investment choices at an early stage in the process, they need easy access to site information. Telecom supports the creation of a Common Format Site database that was agreed to at the Telecommunications Carriers' Forum ("**TCF**"). As signalled in Telecom's letter to Access Seekers dated 26 March 2008, Telecom has already commenced work on its database and we hope that by the Determination Date it will already be complete in respect of many Relevant Locations. We have proposed that from that point Access Providers should focus first on adding information on Relevant Sites contained in Access Seeker forecasts.

### **The Act's *Limits on access principles***

- 1.16 The Act identifies six "limits" on the availability of the Mobile Co-location Service.<sup>1</sup> A number of these are additional limits that do not apply to any other designated or specified service. We support the clarification of these limits in the STP, and the provision of clear and certain guidelines to the industry. Members of the TCF working party were able to agree on a number of key elements necessary to provide clear and certain guidelines to the application of these limits, but were not able to reach consensus on how to apply the limits pertaining to an Access Provider's future forecast requirements, and interference management.
- 1.17 Telecom largely supports how Vodafone has applied these limits within its STP. In particular:
- (a) **Future forecast requirements** - Telecom agrees that the appropriate "future" period for which Access Providers should be able to set aside space should be five years. This is the time period used by the Government to apply a "use it or lose it" requirement to recent spectrum acquisitions, and will provide parties with sufficient certainty to enable them to manage the uncertainties that currently exist around the delivery of Wimax and LTE technologies; and
  - (b) **Interference Management** - Telecom agrees that the 0.5dB maximum performance degradation level set by Vodafone is the appropriate level in relation to mobile services, and appropriately reflects the level of sensitivity of high speed mobile data services to interference. However, Telecom considers a higher degradation level of 1dB could be set in relation to other services (ie

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<sup>1</sup> Telecommunications Act 2001, Schedule 1, Part 3, "Co-location on Cellular Mobile Transmission Sites", limits on access principles.

non mobile high speed data services), to reflect their lower sensitivity to interference.



**Telecom New Zealand Submission on Vodafone  
Mobile Co-location STP**

**Main Submission**

**Public Version**

**23 May 2008**

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## 1. INTRODUCTION

- 1.1 Telecom welcomes the opportunity to work with the Commission and other members of the telecommunications industry on the issue of mobile co-location. Telecom acknowledges that improvements to the Mobile Co-location Service will deliver benefits to parties that wish to co-locate and also to downstream end users of cellular mobile telecommunication services. Telecom considers that co-location offers parties the opportunity to share resources which will allow for a more efficient and timely roll out and expansion of mobile telecommunications networks. This in turn will likely result in greater speed to market and more options being made available to end users of mobile telecommunication services.
- 1.2 In preparing this submission Telecom has been mindful that, although it may be viewed primarily as an Access Provider, it will also be an Access Seeker. Accordingly, Telecom believes its comments are balanced and its suggestions will be fair for both Access Seekers and Access Providers.
- 1.3 Telecom also notes that, when regulating the mobile co-location service, the Commission is not required to focus on what is good for Access Seekers or Access Providers. Rather, the Act sets out that the Commission's role is to focus on what will be for the "long term benefit of end users of telecommunications services" which in this case will be end users in the downstream market for retail mobile services.<sup>12</sup>
- 1.4 Telecom's submission is made up of the following parts:
- (a) **An overarching submission** - this provides background to Telecom's submission as well as setting out the details of key improvements it considers could be made to Vodafone's STP.
  - (b) **A detailed submission on each document** - these detailed submissions go through the STP clause by clause identifying where Telecom agrees with Vodafone's approach and also where Telecom considers it is possible to improve the terms which Vodafone has proposed.

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<sup>1</sup> *The Telecommunications Act 2001* sets out the purpose of regulating the mobile co-location service "as to provide competition in telecommunications markets for the long term benefit of end-users of telecommunication services within New Zealand" (section 18 of the Telecommunications Act 2001).

<sup>2</sup> The Schedule 3 investigation into amending the co-location service on cellular mobile telephone transition sites noted that "down stream retail markets are the market in which any benefit to end-users will emerge." Paragraph 59, page 10 "Schedule 3 investigation into amending the co-location service on cellular mobile telephone transmission sites" and degradation to the quality of service to its end-users.

1.5 Thirdly, mark ups of the Vodafone documentation - Telecom has also provided a mark-up of each of the documents that make up the Vodafone STP showing proposed amendments.

1.6 The full list of the documentation that has been supplied is set out below:

- (a) **Executive Summary;**
- (b) **This Submission;**
- (c) **General Terms** - table of submissions and mark up of Vodafone General Terms;
- (d) **Service Description** - table of submissions and mark up of Vodafone Service Description;
- (e) **Access Terms** - table of submissions and mark up of Vodafone Access Terms;
- (f) **Service Level Terms** - table of submissions and mark up of Vodafone Service Level Terms;
- (g) **Operations Manual** - table of submissions and mark up of Vodafone Operations Manual;
- (h) **Interference Management and Design document** - table of submissions and mark up of Vodafone Interference Management and Design document; and
- (i) **Implementation Plan** - table of submissions and mark up of Vodafone Implementation Plan.

## 2. VODAFONE'S STP

2.1 Telecom considers that, on the whole, the Vodafone STP provides a positive framework for the facilitation of co-location. Telecom also notes that Vodafone has based a lot of its drafting on the Unbundled Cooper Local Loop ("**UCLL**") Co-location STP. Telecom supports this approach for the following reasons:

- (a) Of all the existing STDs, UCLL Co-location is the service that is most similar to the Mobile co-location Service;
- (b) It provides consistency for Access Providers and Access Seekers across the different STDs; and

- (c) It ensures that parties are able to leverage off the work that has been done to date.

2.2 Telecom would like to thank Vodafone for the work that went into producing this STP. Telecom has prepared STPs in the past and is aware of the vast amount of effort that is required to produce a document of this quality.

### 3. PROVIDING A BETTER MOBILE CO-LOCATION SERVICE

3.1 As an organisation, Telecom is focussed on striving to deliver better outcomes for its customers. Telecom recognises that a better Mobile co-location Service will provide benefits to end-users of mobile telecommunications services. Telecom has identified that to ensure the delivery of a better Mobile Co-Location Service, processes must be transparent, streamlined and timebound:

- (a) **Transparent** – through the provision of clear guidance to the parties as to **what** the service encompasses and its limits. This will enable them to make informed investment decisions;
- (b) **Streamlined** - by ensuring that the processes for delivering the Mobile Co-location Service are efficient, Telecom has attempted to eliminate all aspects of the process that will result in unnecessary costs and delays for the parties; and
- (c) **Time bound** – by ensuring that, where appropriate, the parties are subject to strict timeframes and also by providing parties with the correct incentives to progress quickly through the process.

3.2 We discuss these three key concepts and how they apply to the Vodafone STP below.

#### **Transparent Processes**

3.3 Telecom considers that the Vodafone documentation provides some good guidance on what the service includes and its limits while providing improved access to information. This provides a level of clarity which should enable Access Seekers to identify early in the process which sites are suitable for co-location and which sites are not. Telecom considers that this is one of the key aspects of the process. Below we discuss some of Vodafone's key proposals and suggest some enhancements to them.

#### *Service Description*

3.4 The service description is crucial to determining **what** the service is. Vodafone has relied on the service description that is set out in the Act and Telecom agrees with this

approach. Telecom considers that the service description provided by Vodafone provides the detail necessary to identify what the service is.

- 3.5 It is important to note that the purpose of the service description is not to identify **how** the service is to be delivered. How the service is to be delivered will be dealt with in other key documents like the Operations Manual and the Interference Management and Design document.

*Limits to the availability of the service*

- 3.6 In the Act the Government has identified what it considers to be key “limits” on the availability of the service.<sup>3</sup> A number of these are additional limits that do not apply to any other designated or specified service.<sup>4</sup>

- 3.7 In particular, the Government has noted that interference constraints faced by mobile operators and other users of spectrum require careful consideration as interference may have a negative impact on the quality of service existing end users receive. It may also impact on the quality of service that an Access Provider or other co-located party may be able to deliver to end users in the future. These interference constraints are simply the result of the nature of radio spectrum usage.

- 3.8 These limits mean that the Mobile Co-location Service will not be available in all circumstances. The co-location process should ensure that Access Seekers have timely access to the information necessary to make informed decisions about how best to use their resources. Given sufficient information, an Access Seeker might decide that co-location on a particular site might not be the best option. It is important to remember that Access Seekers do have other options and these include:

- (a) Identifying another existing cell site in the area suitable for co-location;
- (b) Discussing alternative options like mast replacement, revision or extension with the Access Provider;
- (c) Assessing whether they should build a new cell tower on their own; and
- (d) Assessing whether they should build a new cell tower with another party.

It is of key importance that the STD identifies the limits on mobile co-location in a manner that is consistent with the Act.

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<sup>3</sup> Telecommunications Act 2001, Schedule 1, Part 3, "Co-location on Cellular Mobile Transmission Sites", limits on access principles.

<sup>4</sup> For example the Unbundled Copper Local Loop Co-location Service has six limits, while the Mobile Co-location Service has 11.

3.9 The limits that have been identified by the Government in the Act fall into two broad categories:

- (a) Limits which are designed to mitigate the potential impacts that co-location may have on the Access Provider's, or Existing Co-locators', end users; and
- (b) An acknowledgement of existing legal requirements.

3.10 The limits in the first category need further definition and we discuss Vodafone's proposals below. The limits in the second category are out of the Access Provider's control but again, where possible, information should be provided to the Access Seeker. We discuss some of these limits below:

(a) **The management of existing or potential radio spectrum interference arising from use of the relevant facilities**

- (i) This limit recognises that in some cases unacceptable performance degradation inhibits co-location. Telecom considers that Access Seekers should be given guidance as to what level of performance degradation would be acceptable to Access Providers.
- (ii) Telecom considers that the 0.5dB maximum performance degradation level set by Vodafone is the appropriate level in relation to mobile service to reflect the level of sensitivity of high speed mobile data services to interference. However, Telecom would add that in relation to other services (ie non mobile high speed data services) the level could be set at 1dB to reflect their lower sensitivity to interference. Telecom considers that a performance degradation limit of 0.5dB is appropriate for high speed data capable mobile services because a co-location solution which created more than 0.5dB of interference would result in all existing end users of such services receiving a reduced service (not just those on the geographic boundary of a cell site's coverage).
- (iii) An example of the reduction of service will be a loss of "in building" coverage. This will mean that in certain areas where there had previously been coverage, users may find that coverage is no longer available. They may not be able to initiate calls and it could also result in them missing calls and text messages.
- (iv) Another example of the loss of service would be a reduction in the availability of high speed data services. This has the potential to

undermine the Government's policy objective of ensuring that mobile broadband is available. Regulation which undermined Access Providers' ability to deliver broadband services would have a direct impact on the Government's economic transformation agenda which seeks to progress New Zealand to a high income, knowledge-based market economy that is both innovative and creative and which is to provide a unique quality of life to all New Zealanders. Telecom notes that Vodafone noted similar concerns about loss of coverage in its submission and we will discuss the aspects of Vodafone's Interference Management and Design document that we support in the detailed submission on this issue.

- (v) Telecom notes that the Interference Management and Design document sets out the mechanism for the parties to identify where a co-location would breach this limit.

(b) **The Access Provider's current and reasonable forecast requirements for capacity on the relevant facilities**

- (i) This limit recognises that co-location may have an impact on what services a site will be able to accommodate in the future. The Act enables the party who invested in a site to set aside capacity for their future use. This will provide an Access Provider with the certainty needed to plan for the provision of new and enhanced services in order for it to remain competitive in the rapidly changing telecommunications market.
- (ii) For example, the types of technology that some Access Providers are currently retaining space for are Wimax and LTE technology. These are technologies that will be used to deliver broadband and voice to end users. Telecom has invested in spectrum in the 2.5 GHz spectrum range to ensure that it has the ability to offer Wimax or LTE technologies when they become available. Technological developments will ultimately determine which is Telecom's preferred option. If Telecom was not able to reserve space to offer one of these services to end users it would undermine one of the Government's stated policy objectives in the 2.3/2.5 GHz spectrum auction.<sup>5</sup>

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<sup>5</sup> See Ministry of Economic Development, Radio Frequency Option 2.3 GHz and 2.5 GHz bands, August 2007, page 7

"The overall policy settings the Government is attempting to facilitate are expressed to be:

1. Efficient use of spectrum and maximum value to society;
2. Investment in infrastructure, particularly broadband services; and

Telecom considers that Access Provider's should be able to set aside space for five years. Telecom considers this would be appropriate because it is consistent with the Government's wider policy framework (including the MED's five year "use it or lose it" requirement applied to recent spectrum acquisitions).

- (iii) Through its policies, the Government has acknowledged that given the uncertainties that currently exist around the delivery of Wimax and LTE technologies, parties need time to correctly plan for their release. That is why the Government allowed parties a minimum of five years to use their spectrum allocation. If the Commission's STD resulted in parties having a lesser period of time in which to deliver these services (for example where parties could only forecast their requirement for the next three years) it would undermine these broader policy objectives.
- (iv) However, Telecom acknowledges that to enable Access Seekers to make decisions they should be given clarity as to when an Access Provider might be able to set aside space. Accordingly, Telecom supports the inclusion of the forecasting provisions that Vodafone has included in its Interference Management and Design document although Telecom considers that these sit more naturally in the Operations Manual. These provisions state that parties may forecast where it is evidenced by the following:
  - 9.5.1 the Access Provider must hold suitable spectrum management rights, or intend to acquire such rights, to deploy the relevant requirements; and
  - 9.5.2 if relevant, the new Telecommunications Service or technology must be standardised and must be one which is recognised by the ITU.
- (v) These provisions provide clear guidance as to when the Access Provider will be able to retain space for future use.<sup>6</sup>
- (vi) Telecom also supports the proposal that forecast future requirements be included in the Common Format Site Database. This will enable Access Seekers to identify sites with reserved space early in the co-location process.

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3. Competition between services providers."

<sup>6</sup> These state that the "Access Provider must have reasonable intent and ability to deploy the Access Provider Forecasts which will be evidenced by [paragraphs 9.5.1 and 9.5.2]".

(c) **The interests of third parties who use the relevant facilities**

- (i) Telecom considers that Vodafone STP does not deal with this issue adequately and accordingly it has suggested further provisions for the Interference Management and Design document to deal with this;
- (ii) Telecom's proposal requires that when assessing interference and performance degradation associated with an Access Seeker's proposal, the impact on others utilising the site for the provision of radio-communication based services (existing co-locators) be considered. In Telecom's view, the customers of existing co-locators should receive the same level of protection as that afforded to the Access Provider's customers;
- (iii) in addition, interference and performance degradation testing should be two-way so that the parties can assess the likely effect that existing services on the site will have on the service which the Access Seeker intends to deploy from the site.

(d) **Reasonable technical and operational practicability having regard to the access provider's network**

- (i) This is another key limit as there may not be physical space or "capacity" available on the site. Whether there is physical capacity is determined by 13 different factors which include:
  - (aa) Mast height;
  - (bb) Mast type;
  - (cc) Headframe type;
  - (dd) Antenna configuration;
  - (ee) Mast structural capacity (eg age, material etc);
  - (ff) Foundations
  - (gg) Wind loading;
  - (hh) Tenure;
  - (ii) Shelter;

- (jj) Power;
- (kk) Access Provider equipment;
- (ll) Other parties on site;
- (mm) The Access Provider's reasonable forecast requirements.

- (ii) It is important to note that **any one of these** factors, or any combination of them could mean that there is limited or no capacity for co-location.
- (iii) Again, Telecom agrees that this information should be provided to Access Seekers early in the process so they can assess the likelihood of space being available.

(e) **Existing legal requirements**

- (i) It is important to note that these factors are outside the Access Provider's control. The best an Access Provider can do is to provide all reasonable support and assistance to the Access Seeker to deal with these requirements. Telecom would be willing to commit to this as an Access Provider and would expect this as an Access Seeker.
- (ii) Telecom supports the position that, to the extent possible, this information should be made available to Access Seekers up front so they can carry out their own assessment as to whether the site will be able to support another operator.

(f) **All relevant requirements under the Resource Management Act 1991**

- (i) This limitation recognises that the RMA protections often result in space limitations on mobile cell sites and, most importantly, restrict the heights of masts. The RMA has different policy objectives to the Act. The RMA seeks to protect the environment and often limits mast height because of concerns arising from factors such as visual effects, shading and the location of the mast. Put simply, the smaller the mast, the less likely it is that the mast will be able to accommodate Mobile Co-location. This will be the case whether the service is regulated or not. Telecom notes that these RMA type limitations do not affect operators in many other jurisdictions. In **Appendix A** we provide examples of the types of restrictions found in local body plans.

(g) **All existing contractual obligations to third parties, including lessors of land on which the relevant facilities are located**

- (i) Again, the best thing that an Access Provider can do is to provide the Access Seeker with information to start identifying where this may be an issue. Whether a landowner will allow another party on the site is generally outside an Access Provider's control.

*Ensuring Access Seekers have access to necessary information*

3.11 Finally, Telecom notes that the provision of accurate information to Access Seekers is another key aspect of ensuring the process is transparent. Accordingly, Telecom supports the following aspects of the STP.

- (a) **Common Format Site Database** - Telecom acknowledges that a key way of ensuring that Access Seekers have the information they need to make informed investment decisions is through the common format site database that was agreed to in the TCF. To this end Telecom has started work on such a database.
- (b) **Templates** - Finally, Telecom notes that Vodafone has used templates throughout the Operations Manual. Telecom supports this approach as it reduces uncertainty for both Access Providers and Access Seekers. Telecom's only comment on the templates is that some of them should be made more generic so they can be used by all Access Providers and Access Seekers.

**Streamlined processes**

3.12 Telecom notes there are two parts to the co-location process set out in the Vodafone STP:

- (a) There is the "**pre-approval**" phase during which the Access Seeker and Access Provider work closely together to provide the Access Seeker with the necessary information to make a co-location (or "full site") application. The various aspects of this phase are documented in the top half of the process diagram on page 12.
- (b) The second part of the process is the "**Access Seeker implementation phase**". It is important to note that at this stage of the process it is up to the Access Seeker to take primary responsibility for ensuring that they move towards the "build phase". As an enabler, the Access Provider will provide the support and assistance necessary to ensure the Access Seeker can move

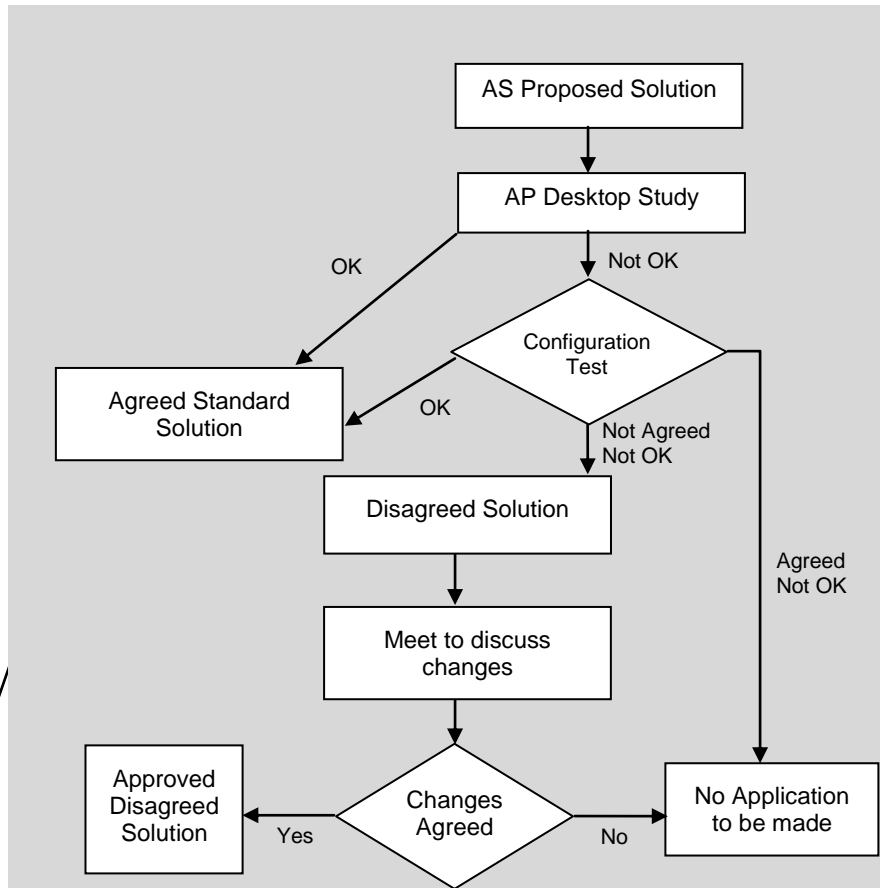
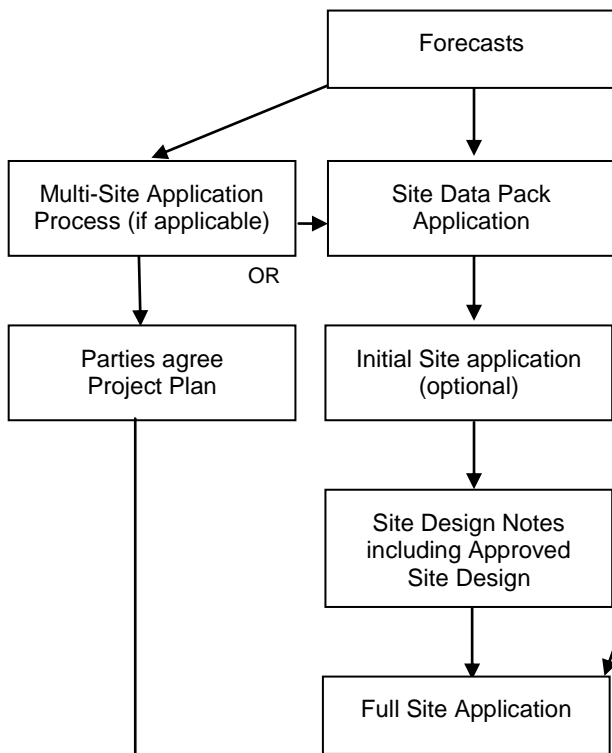
rapidly through this process.<sup>7</sup> However, this is all they are able to offer. The various aspects of the Access Seeker implementation phase are documented in the bottom half of the process diagram on page 12.

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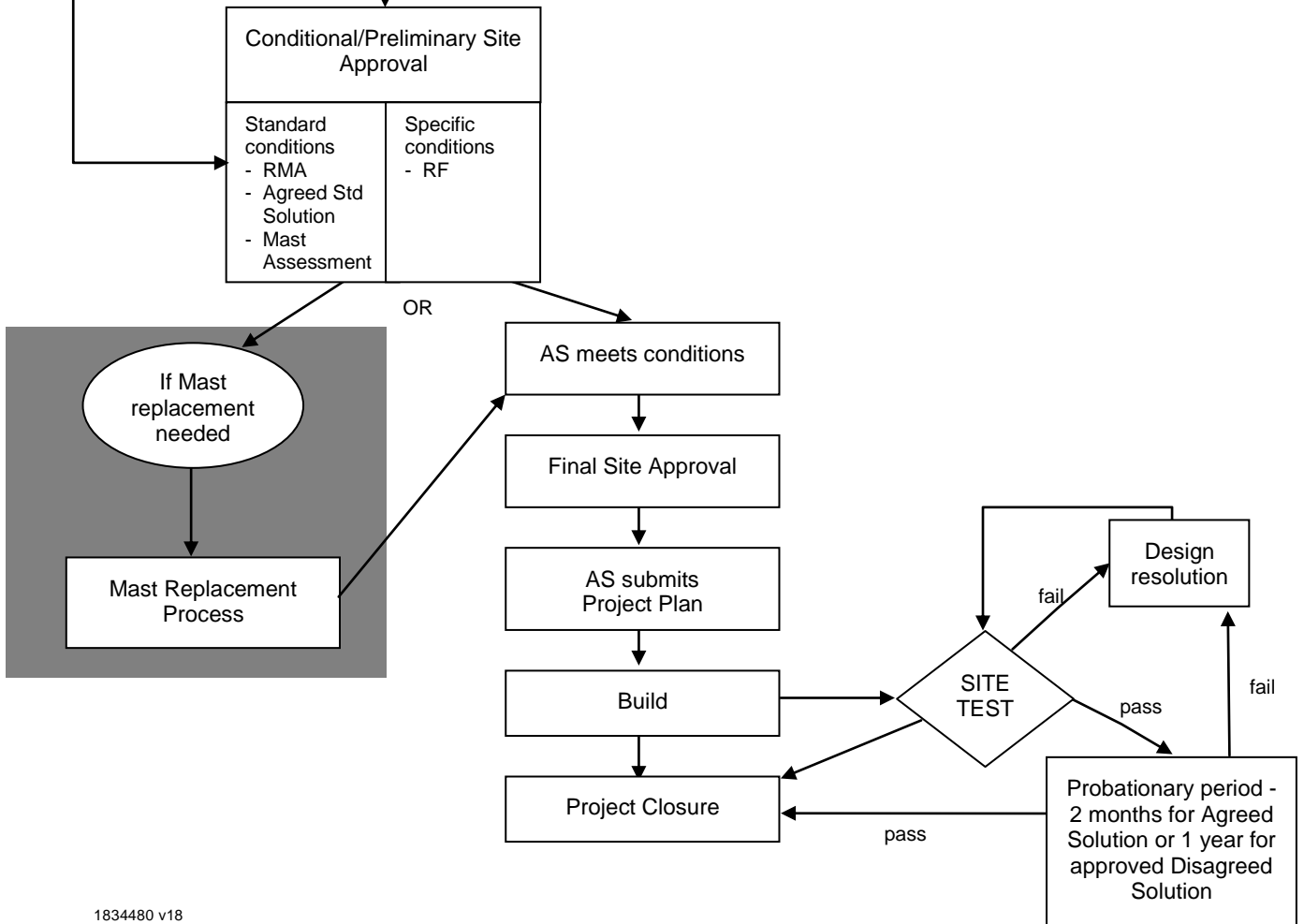
<sup>7</sup> At the TCF, a general principle was agreed that the Access Provider would be the enabler and the Access Seeker the implementer. TCF paper entitled "Preconditions for Final Agreement of the Mobile Co-location Working Party Meeting" on 28 March 2008, page 27.

PRE-APPROVAL PHASE

Operations Manual Process



ACCESS SEEKER IMPLEMENTATION PHASE



3.13 The extent of the pre-approval phase is one of the key differences between the Mobile Co-location STD and other STDs. To illustrate this point, we compare the Mobile Co-location Service with the UCLL Co-location Service. For the UCLL Co-location Service, the Act only recognises the five standard limits to access principles that apply to all regulated services and an additional limit to protect the interests of other service providers who are co-located in the Access Provider's facilities. The fact that there are only six "limits" for UCLL Co-location, as opposed to the 11 that apply for Mobile Co-location, make the process for obtaining the UCLL Co-location Service much simpler.<sup>8</sup> In particular, it is the combination of the capacity limits and the interference limits that result in a lot more work before the Access Seeker is able to "order" the service. The initial work that is conducted by the Access Provider is more akin to processing an application than the processing of an order.

3.14 Therefore, the real scope for streamlining the process is in the pre-approval phase. Telecom is mindful that in the past this has been viewed as a key bottleneck in the process. Telecom considers that Vodafone's STP provides a significant improvement on the situation previously faced by Access Seekers and Access Providers, but thinks the following changes would improve the process:

- (a) **Multi Site Applications** - Telecom does not think that dealing with applications on a site by site basis precludes efficiencies being driven into the process. Accordingly, it has sought to come up with a concept to achieve this;
- (b) **Access Seeker forecasting** - Telecom considers that accurate forecasting will result in the more timely delivery of the Mobile Co-location Service. Accordingly, it has suggested changes to this aspect of the STP to make it more robust;
- (c) **Queuing policy** - Telecom considers that an Access Seeker should only be placed in the queue when a final site application is made. In Telecom's view, this will create the correct incentives for Access Seekers to move quickly through the process;

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<sup>8</sup> The Standard Limits and Access Principles are set in the Telecommunications Act 2001, Schedule 1, subpart 2, section 6 which states:

- (1) principles 1 to 4 set out in clause 5 are limited by the following factors:
  - (a) reasonable, technical and operational practicability having regard to the access provider's network;
  - (b) network security and safety;
  - (c) existing legal duties on the access provider to provide a defined level of service to the users of the service;
  - (d) inability, or likely inability of the access seeker to comply with any reasonable conditions on which the service is supplied;
  - (e) any request for a lesser standard of service from access seekers ...

- (d) **Streamlining the initial site application process** - Telecom considers that the initial site application and detailed site design visit stage should be optional.
- (e) **Full site application** - Telecom considers that an agreed or an approved disagreed standard solution that does not create any interference issues should be submitted with the final site application. Ensuring desktop interference studies are undertaken prior to final site application will ensure the most effective and efficient allocation of resources by the parties, as well as ensuring that another operator is not unnecessarily blocked from the site.

### **Time bound processes**

3.15 Telecom supports Vodafone's use of strict time limits in its STP documentation. In addition to this, Telecom supports the use of service levels to ensure that parties live up to their obligations. However, Telecom does not consider that the service levels proposed by Vodafone provide the necessary incentives across the end to end process. Accordingly, Telecom has suggested additional service levels be included for:

- (a) Acknowledgment of receipt of applications;
- (b) Notification of rejection;
- (c) Acknowledgement of receipt of faults;
- (d) Notification of fault restoration;
- (e) Availability times for provisioning and fault management systems; and
- (f) An additional time step for site design.

3.16 Telecom also notes that certain key service levels need to be backed up with penalties. Currently the STP provides financial penalties for four service levels, all of which are in the application process. Telecom proposes that, consistent with other STDs, penalties be attached to three parts of the process that are key to the Access Seeker, namely:

- (a) Desktop Study (Site Design solution);
- (b) Issue of information on the site following a request; and
- (c) Decision on application.

#### 4. OPTIONS FOR MAKING SPACE AVAILABLE.

- 4.1 Telecom notes that if space is unavailable, the parties may choose to consider options for making more space available. We discuss three of these below.

##### **Mast Replacement/Antenna Minimisation**

- 4.2 The main proposals that have been discussed in the TCF process and which appear in Vodafone's STP are mast replacement or antenna minimisation. It is not clear to Telecom that either of these fit within the service description in the Act.

- 4.3 Telecom is also concerned that if a "preferred" solution is regulated, it may lead to unintended consequences and ultimately result in the inefficient use of resources. As set out previously, there are a number of options available where Mobile Co-location at an existing site on existing infrastructure is not possible. Economic rationalisation will drive the most appropriate solution in the circumstances.

- 4.4 However, if a solution is to be regulated, Telecom's view is that the preferred way to add capacity is through mast replacement, extension or revision ("**mast replacement**"). These processes provide an efficient and effective mechanism for facilitating Mobile Co-location in circumstances where space might not otherwise be available. Telecom considers that key advantages associated with mast replacement include:

- (a) It allows Access Seekers to agree on a solution that does not negatively impact the Access Provider's, or any existing co-locators', service and allows the Access Seeker the freedom to optimise its service performance;
- (b) It will provide the Access Seeker with greater flexibility as to where it places its equipment;
- (c) Where another party co-locates on the new mast, it will allow the Access Seeker to recoup part of their investment.

- 4.5 Telecom has noted that in the past the cost of mast replacement has been an issue, but Telecom believes this issue can be addressed if parties work together. Telecom proposes that where an Access Provider identifies it needs a mast replacement for its own requirements, it should be required to advise Access Seekers who have forecast future use of the relevant site and the parties should be required to negotiate in good faith to agree a joint build.

4.6 Telecom considers that the alternative approach for making space available, antenna minimisation, is not appropriate because:

- (a) It will, almost inevitably, negatively impact the service quality and coverage of the Access Provider and any existing co-locators already on the site, resulting in a lower quality of service for all their customers;
- (b) In the past the Commission has accepted that Access Providers' property rights, and the rights to operate their business should not be restricted. Telecom considers that the Commission should not change its approach here, particularly in light of the fact that mast replacement provides an appropriate mechanism for creating space and the variety of other options available to Access Seekers;
- (c) It would go beyond the approach the Commission has taken in other STDs (UCLL Co-location in particular);
- (d) Mandating antenna minimisation would be a "world-first" in that Telecom has not identified any jurisdiction in which it has been done despite most jurisdictions having regulatory frameworks in place that would enable such a requirement to be imposed;
- (e) Antenna minimisation would be a short term solution which would not resolve what is likely to be a long term issue. Regulation which allows a party to co-locate in this way will be at the expense of the next party that wants to co-locate. New Zealand already has a number of parties wanting to co-locate, mandating antenna minimisation would incentivise a solution that will discourage the building of the larger infrastructure that is seen in other countries and that is necessary to accommodate multiple Access Seekers. In the long run this would be a bad outcome for end users of downstream mobile telecommunications.

### **Greenfields**

4.7 Telecom does not consider Greenfields site sharing to be part of the mobile co-location service. However, as set out above this should be one of the options that parties should be able to consider commercially (again, it would seem inappropriate to mandate this as a regulated preferred option). Telecom would accept a voluntary Greenfields process in the Operations Manual if it was thought this would assist parties to reach commercial agreements to build shared infrastructure.

## 5. GENERAL TERMS

- 5.1 Telecom agrees with Vodafone's approach of adopting the UCLL Co-location General Terms as a basis for Mobile Co-location. Those terms were agreed in the TCF process as an appropriate basis, amended as necessary, for the provision of the Mobile Co-location Service.

### **Liability and insurance**

- 5.2 Telecom agrees broadly with Vodafone's proposed changes to the UCLL Co-location General Terms to adapt them to reflect the Mobile Co-location Service. In particular, Telecom supports the liability caps and insurance requirements. It was agreed in the TCF process that a higher cap should apply where Mobile Co-location occurs at an exchange than where it occurs at other sites. This reflects the greater damage to an Access Provider that could flow from actions of the Access Seeker at exchanges compared with at other sites. Exchanges are a component of an Access Provider's core network and issues caused by Access Seekers in such locations can have significant and far reaching effects on the Access Provider's network and its ability to provide services to its end users. The \$50,000,000 proposed by Vodafone is the same as the liability cap in the UCLL Co-location STD. That service also involves co-location at exchanges and is therefore comparable with Mobile Co-location at an exchange.
- 5.3 Telecom also considers that the General Terms should clearly state that an Access Provider is not liable in respect of interference to an Access Seeker that is caused by another Access Seeker or Service Provider.

### **Financial security**

- 5.4 The financial security requirements required of Access Seekers also mirror those in the UCLL Co-location General Terms and there is no basis for altering that position for the Mobile Co-location Service. Access Providers must be given the same level of confidence that Access Seekers will be in a position financially to meet relevant charges. Given the queuing process, it would be unfair to the Access Seekers if an Access Seeker which is ultimately likely to fail to meet its commitments prevents an Access Seeker which would have been able to comply from gaining access to a Relevant Location.

## 6. SERVICE DESCRIPTION

- 6.1 Telecom supports the Service Description that has been proposed by Vodafone. It accurately reflects the definition of the Mobile Co-location Service included in Part 3 of Schedule 1 of the Act and provides sufficient detail to give

certainty to the industry as to the scope of the service. It is also consistent with what was agreed in the TCF.

- 6.2 It is not appropriate to include process elements such as batch processing in the Service Description as they are procedural and belong in the Operations Manual in the same way that the application and implementation process is set out in that document and is not included in the Service Description itself. The placement of such procedural elements in the Operations Manual does not make them any less binding (and so Access Providers and Access Seekers suffer no detriment) but better reflects the scope and intention of each document.
- 6.3 Importantly, the purpose of the service description is to describe **what** the service is, not **how** it is delivered. The "how" question is the domain of the Operations Manual. This has been the approach that has been used in all the previous STDs and Telecom considers there are no reasons for the Commission to change its approach now.
- 6.4 Telecom does consider there could be a useful addition to the Service Description. Telecom suggests that three further illustrative diagrams of the Mobile Co-location Service could be added to provide Access Seekers with examples of different ways of delivering the service. The illustrative diagrams we would like to be included are **attached as Appendix B** to this submission.

## 7. SERVICE LEVEL TERMS

- 7.1 Telecom agrees with Vodafone's general approach to Service Level Terms ("**SLT**"). Vodafone's SLT document is well drafted and appropriately reflects the approach of other STDs.
- 7.2 Telecom has proposed a number of changes to strengthen the SLT (including by adding Service Levels) to provide greater certainty to Access Providers and to focus the service levels on key areas of the Mobile Co-location process.

### **Service level overview**

- 7.3 Service levels are the foundation on which customer satisfaction is built. Access Seekers who are seeking to co-locate on the Access Provider's site expect the Access Provider to assist with the Mobile Co-location process on a consistent and timely basis. This is important in order for Access Seekers and Access Providers to set their customers' expectations and allows certainty for business planning. It is essential for a successful relationship that Access Seekers and Access Providers have confidence in each other to address and resolve issues quickly when they arise.

- 7.4 In a normal commercial environment of a willing buyer and willing seller, the service levels, tolerances and lead-times are negotiated against the background of the balance to be struck with price and forecasting.
- 7.5 Under the regulated environment the Commission has the role of ensuring that the SLT regime is appropriately balanced to ensure a sustainable and efficient regime that will drive the right incentives. Telecom considers that the SLT regime should be based on the regimes found in previous STDs. This is because they have struck an appropriate balance for both Access Seekers and Access Providers.

#### **What makes a good service level?**

- 7.6 A good service level drives customer satisfaction by ensuring that the person delivering the service behaves in an expected way. A service level agreement is not a tool for punishing poor service delivery, rather, its focus should be on creating the environment for service delivery to be improved.

#### **Checklist**

- 7.7 We consider that it is important that the service level regime be principled. Forrester Research Inc. has developed a checklist for defining and implementing service levels (referred to here as metrics).<sup>9</sup> Their suggested checklist, which Telecom has adopted, is as follows:
- (a) **The metric is objectively measurable:** All service levels in Appendix 1 of the SLT will be measurable on day one. Where possible such measurements will be automated to ensure that the measurements are objective and free from human error. It is important to ensure that service levels are not contingent on the Access Seeker e.g they should not include a timeframe which includes the Access Seeker's response time.
  - (b) **The metric includes a clear statement of the end result expected:** Telecom proposes to utilise both best practice service levels as well as context specific tolerance levels to ensure the clearest possible statement of the result expected (tolerance levels are explained more fully below).
  - (c) **The metric supports customer requirements, including compliance issues:** In the case of the Mobile Co-location Service, the proposed service levels allow Access Seekers to manage their customers' expectations and provide the certainty required for business planning.

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<sup>9</sup> Roehria, Paul Ph.D; checklist for Defining and Implementing SLA's, Forrester Research, Inc., March 2007.

- (d) **The metric focuses on the effectiveness or efficiency of the process being measured:** service levels measure the end to end process from request phase to delivery phase. This allows for overall process efficiencies to be achieved.
- (e) **The metric allows for meaningful trend or statistical analysis:** Monthly reporting to Access Seekers, and where necessary to the Commission, will allow for analysis of the Access Seeker's provision of services on a consistent and timely basis.
- (f) **Assumptions and definitions of a satisfactory performance are specified:** The proposed SLTs regime describes the circumstances for performance of the various service levels and includes specific exclusions where relevant.
- (g) **The provider and the customer accept the metrics:** The proposed service levels are based on existing service levels, which have been industry standard for quite some time.

### Principles

7.8 In addition to the Forrester Research Inc checklist, in amending Vodafone service levels, Telecom has adopted the following principles:

- (a) **Service levels reflect the price of the service:** Higher service levels will be reflected in a higher price for the service;
- (b) **Penalties need to reflect value:** Penalties must be a balance of value to the customer and value to the Access Provider. In other words, penalties need to be set in a way which drives the right outcome for the customer and Telecom; and
- (c) **Penalties should impact profit only:** Penalties should not be so great from an Access Provider's perspective so as to cut into the cost of provisioning. On the other hand, the Access Provider should not be incentivised to pay the penalty rather than meet the service level.

### Specific nature of the Mobile Co-location Service

7.9 Telecom has taken into account the specific nature of the Mobile Co-location Service when amending the service levels. In particular, a service level has been created for each stage of the process so that there are incentives on the Access Provider to perform across the end to end process.

7.10 Telecom considered that the seven service attributes that have been included in the SLTs did not provide sufficient incentives for Access Providers to ensure the key processes are efficient. Telecom therefore proposes that further service levels be included for:

- (a) Acknowledgment of receipt of applications;
- (b) Acknowledgement of rejection;
- (c) Acknowledgement of receipt of faults;
- (d) Notification of fault restoration;
- (e) Availability times for provisioning and fault management systems; and
- (f) An additional time step for site design.

7.11 This proposal is consistent with previous STDs, in that it provides service levels for the three key areas of:

- (a) **Application processing** - acknowledging requests in a timely manner, providing acceptances or rejections where required in a timely manner;
- (b) **Faults** - meeting notification periods for planned and unplanned outages, acknowledging fault report receipt, notification of fault restoration times and restoration of the fault by the time specified
- (c) **Availability of key systems.**

#### **Tolerance levels**

7.12 Telecom supports the inclusion of Tolerance Levels. In an ideal world, the Access Providers would meet their service levels 100% of the time. However, a “perfect” level of service is rarely possible and would be expensive. Perfect delivery of a service may be hindered by a number of factors, many unpredictable and out of the Access Providers' direct control. There are also a lot of “unknowns” in the setting of service levels for new services. This is nothing out of the ordinary in normal competitive markets, despite best intentions and endeavours.

7.13 To deal with these unknowns, a “Tolerance Level” has been introduced for each service level. Tolerance Levels are common across the telecommunications industry – for example, the service levels contained in the Number Portability Determination only apply 95% of the time to account for unknown circumstances that may occur. The

principle of Tolerance Levels has also been recognised in the Commission's earlier STDs. Examples of unknown circumstances include:

- (a) inaccurate information provided in a request which does not result in a rejection, but makes provision of a Service impossible or may delay the provision of a Service;
- (b) contracting and sub-contracting difficulties, sickness, or injury which extends lead times; and
- (c) day to day variances in volumes and the geographical location of service requests and faults.

7.14 Some tolerance for late delivery must be factored into the regime as a result. The issue is the level at which a Tolerance Level is set.

7.15 Arbitrarily setting a low Tolerance Level could undermine the purpose of a service level. On the one hand, if Tolerance Levels are set too high, the Access Providers will continually fail to meet the service levels. If Access Providers are continually paying penalties for under performance, there is little incentive to improve the process, because there is little incentive for Access Providers to try to reach the unattainable. On the other hand, setting the bar too low will establish complacency and will not drive the requisite process improvement and standard of service generally that customers will justifiably be looking for.

7.16 In order to set reasonable Tolerance Levels for the Mobile Co-location Service, Telecom proposes that, where possible, they should be based on the Access Providers' service levels for existing services and their existing operating process.

7.17 Where this approach is not possible, for example the setting of the expected delivery dates, Telecom has set a target Tolerance Level.

7.18 Telecom submits that, in the New Zealand environment, high Tolerance Levels are inappropriate. Tolerance Levels should be set at levels realistic for the small number of instances of the service that Telecom expects in relation to individual Access Seekers. For example, a 95% Tolerance Level for a deliverable in relation to an Access Seeker that may only occur 15 times in a year, would have the perverse consequence that a de facto 100% Tolerance Level would apply in many instances.

### **Consequences of not meeting service levels**

- 7.19 When determining the appropriate consequences or penalties for failing to meet service levels Telecom considers that the guiding principle must be that penalties or incentives associated with service levels must drive the right behaviour. Financial penalties, for example, can drive the wrong behaviour in that the payment of money to an Access Seeker can be the “easy way out” - it may be better financially to pay the penalty than to improve performance. Also, non-financial penalties such as “naming and shaming” or reporting obligations can be a greater incentive to a larger corporate and can be more real to staff.
- 7.20 Currently the STP provides financial penalties for four service levels, all of which are in the application process. Telecom submits that penalties should be applied to three key service levels. This is consistent with other STDs. The penalties are attached to parts of the process that are key to the Access Seeker, namely:
- (a) Desktop Study (Site Design solution);
  - (b) Issue of information on the site following a request; and
  - (c) Decision on application.

## **8. OPERATIONS MANUAL**

- 8.1 Telecom is mindful that in the past some of the processes set out in the Operations Manual have been viewed as key bottlenecks in the process. Telecom is broadly supportive of the process that has been suggested by Vodafone but has made changes which it considers would further improve it. We discuss key changes to the following:
- (a) Common format site database;
  - (b) Standard Site types;
  - (c) Multi Site Applications;
  - (d) Access Seeker forecasting;
  - (e) Queuing policy and Telecom extension applications;
  - (f) Access Provider forecasting;
  - (g) Streamlining the initial site application process; and

(h) Full site application.

8.2 Telecom discusses these matters in detail below.

### Common Format Site Database

8.3 Telecom agrees that a Common Format Site Database is crucial to providing transparency. Telecom considers the database will assist Access Seekers to make informed investment decisions. Telecom generally agrees with the level of detail provided in the database proposed by Vodafone in its STP, but submits that it should also include the relevant local authority.

### Standard Site Types

8.4 Telecom considers the list set out below identifies the key standard characteristics of any given site.

Standard Characteristics:	
1. Mast height	Structural capacity (capacity for additional equipment before mast becomes unsafe), RF Interference (separation distances to prevent interference), Space on the mast (room for additional equipment), RF planning (amount of coverage available).
2. Mast type	Structural capacity (capacity for additional equipment before mast becomes unsafe), RF Interference (separation distances to prevent interference), Space on the mast (room for additional equipment), RF planning (amount of coverage available).
3. Headframe type	Structural capacity (capacity for additional equipment before mast becomes unsafe), RF Interference (separation distances to prevent interference), Equipment capacity and space (number of antenna spaces available).
4. Antenna configuration	Antenna type, RF planning (amount of coverage available), RF Interference (separation distances to prevent interference), RF coupling between antennas.
5. Mast structural capability (eg age, material etc)	Structural capacity (capacity for additional equipment before mast becomes unsafe), Equipment types (mast design parameters may effect equipment operation i.e. deflection angles and DMRs).
6. Foundations	Mast capacity, stability and safety, bolt structural capacity - Ground water, soil type and stability of slope all considerations.
7. Windloading	Mast capacity, stability and safety – affected by Geographical location, volume of equipment, mast type and size and foundations etc), deflection angles and suitability for DMR.

Standard Characteristics:	
8. Tenure	Freehold, Leasehold or Licence – may preclude co-location or allow subject to conditions.
9. Shelter	Space (room for additional equipment), Capacity (is there sufficient air-conditioning, battery back-up, noise limits etc).
10. Power	Capacity (spare capacity),
11. Access Seeker equipment	Relevant to determining all the parameters above.
12. Other parties on site	Relevant to determining all the parameters 1-10.
13. Access Provider reasonable forecast requirements	Relevant to determining all the parameters 1-10.

- 8.5 For efficiency and cost reasons Telecom would ideally like to be able to treat multiple applications in the same way. This could only occur if there was a degree of commonality which meant that applications did not have to be dealt with on a site by site basis.
- 8.6 However, given the large number of variables identified above, Telecom considers the likelihood of identifying a large number of sites with exactly the same characteristics to be relatively low. By way of example, although the height of a mast and site type might be the same, the foundations might be quite different because of the different soil types the sites were built on. These differences could prevent the applications being rolled together. See Appendix 2 for examples of different sites types.
- 8.7 Telecom's experience from its WCDMA project planning has confirmed that this conclusion is inevitable. Unfortunately a one size fits all approach cannot be applied to mobile co-location applications.

### **Multi Site Applications**

- 8.8 However, just because an Access Provider would have to go through each individual application does not prevent it trying to drive efficiencies into the site approval process. Accordingly, Telecom has come up with the concept that will enable parties to make "multi site applications" which will be dealt with on a "project" basis. A multi site application could be made regardless of whether there are similarities between the sites (although some commonality would be useful). The only pre-requisite from a multi-site application is that 10 applications, or more, are made at one time.

8.9 If this party makes a "multi site application" they will essentially step outside the usual process and into a separate process within the Operations Manual. That party will work through the process to reach an outcome directly with the Access Provider as to how the multi site application will proceed. Telecom considers that if an application is dealt with in this way it will be able to be project managed and the standard time frames will be reduced. If after the initial project discussion the Access Provider and Access Seeker do not think adequate efficiencies can be achieved, the Access Seeker always have the option of opting for the usual individual site application process and the regulated time frames set out in the STD. The process for a multi site application would be as follows:

- (a) The Access Seeker will use the Common Format Site Database to research the site types, the region, or other reason for batching such as a contiguous route down SH1;
- (b) Where the Access Seeker has identified a group of 10 or more sites that it wishes to apply for at once, it will bundle them together either:
  - (i) for a region (not necessarily by territorial authority, but for example Tauranga); or
  - (ii) for a type of site as identified by the Access Provider in the Common Format Site Database; or
  - (iii) for a specific group identified by the Access Seeker (for example Auckland Airport);
- (c) The Access Seeker will forecasts the number of Multi-Site Applications, including the number of sites in each Multi-Site Application;
- (d) The Access Seeker will then submit a Multi-Site Application aligned with its forecast in a form agreed by the parties, containing the site address and pre-approved solutions;
- (e) The Access Provider will acknowledge receipt of the Multi-Site Application;
- (f) The Access Provider will process the Multi-Site Application within either:
  - (i) 5 Working Days for 10 sites;
  - (ii) 10 Working Days for 20 sites; or

- (iii) The parties will agree a timeframe for any Multi-Site Application containing over 20 sites.
- (g) Once the Access Provider has processed the Multi-Site Application it will arrange a meeting with the Access Seeker;
- (h) The Access Provider will bring to the meeting the Multi-Site Application project proposal which should contain:
  - (i) The name and contact details of the relevant project manager of the Access Provider,
  - (ii) The proposed timeframes for the Access Seeker's submission of full application documents for the sites; and
  - (iii) The proposed service levels which will apply.
- (i) The parties will discuss relevant charges during the meeting.
- (j) Following the meeting, the parties will have 10 working days to agree the project plan, including service levels and charges for the Multi-Site Application Project.
- (k) Where the parties fail to reach agreement:
  - (i) Either party can initiate the dispute resolution procedures; or
  - (ii) The Access Seeker can re-submit the applications under the standard process set out in the STD.

8.10 The purpose of the rapid multi-site access process is to allow Access Seekers to obtain approval for multiple sites in a rapid timeframe. Telecom considers that the process set out above would achieve this effectively.

#### **Access Seeker forecasting**

8.11 Telecom considers that enhancements can be made to the forecasting provisions in the Operations Manual.

8.12 Telecom considers that Access Seeker forecasting is an important part of the process for determining whether capacity and space for Mobile Co-location is available for multiple Access Seekers. Telecom believes accurate forecasting will result in a more timely delivery of the Mobile Co-location Service. In addition it will enable Access Providers to anticipate expected requirements and allocate the appropriate level of

resources in advance. Telecom considers that the following changes should be made to the Access Seeker forecasting regime set out in the STP:

- (a) There should not only be a forecast for site data packs but also for initial and full site applications; and
- (b) All forecasting should be by region. This will enable Access Providers to allocate resources appropriately and in particular in relation to the development of the site database where data collection can be focused first in areas of interest to Access Seekers. The most appropriate way of defining regions in this instance would appear to be territorial authority.

8.13 The major advantages of using the territorial authority as the basis for defining regions are:

- (a) Accessible predefined boundaries;
- (b) Increased transparency through greater granularity of information being made available in the Common Format Site Database; and
- (c) Telecom's experience is that it is likely that those who are planning network roll out or expansions will be basing their plans on these geographic areas in any event.

8.14 Telecom also considers that there should be consequences where an Access Seeker submits an inaccurate forecast. Under-forecasting should result in a suspension of the Access Provider's service level requirements. Where there is over forecasting by the Access Seeker, the Access Provider should be able to recover costs incurred because of the over forecasting. These costs should be based on the extra resources that the Access Provider allocated to deal with the Access Seekers forecast. Telecom notes that this approach is consistent with that previously taken by the Commission in earlier STDs.

8.15 Telecom's view is that an enhanced forecasting regime would do away with the need for the capacity limits which Vodafone has built into its STP. Accurate forecasting would mean that Access Providers would deploy the resources necessary to ensure that they could deal the expected volume of Access Seeker applications. Telecom would prefer forecasting provisions that provide the correct incentives for Access Seekers to give careful consideration to their forecasts. Telecom considers that accurate forecasting will speed up the co-location process.

- 8.16 These forecasting processes are primarily set out in the Operations Manual. Therefore we have provided further commentary in our detailed submissions on that document.
- 8.17 Telecom acknowledges that there are times where an Access Provider may face resource constraints which may limit its ability to deal with high volumes of access applications. But rather than preventing Access Seekers making the applications it would be better to provide some flexibility in the SLTs. Telecom proposes that the following cap and time frames will be appropriate for the SLTs (based on current processing capacity): 40 applications per Access Seeker over 20 working days or, where there is a lesser number of applications, 10 applications per Access Seeker processed over five working days.

### **Queuing Policy and Extension Applications**

- 8.18 Telecom also considers that the process for identifying space can be improved through making changes to the queuing policy proposed by Vodafone. An Access Seeker should only be placed in a queue once it has made a full site application. Telecom does not consider that it is appropriate that a party that is not committed to complete a mobile co-location should be able to stand in the way of another Access Seeker who may be ready, willing and able to co-locate.
- 8.19 The principle behind the queuing policy is to responsibly manage limited resources. Telecom does not think this principle will be achieved if the Access Seeker were placed in the queue at the time the initial site application is received. Telecom also notes that it was agreed in the TCF Recommendations Paper that:

when the Access Seeker makes a full site application, that Access Seeker will be placed in the queue.<sup>10</sup>

- 8.20 Telecom supported this approach agreed at the TCF because the Access Seeker does not commit to the Mobile Co-location process prior to the full site application being made. Telecom considers that starting the queue at the full site application phase would provide the appropriate incentive for an Access Seeker to move quickly through the process so that it can make an application. If a queue formed at the preliminary co-location site application stage these incentives would not exist.
- 8.21 The STP also allows the Access Provider to grant extension applications where there have been reasonable delays. Telecom considers the extension applications

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<sup>10</sup> The Telecommunications Carriers Forum Recommendations Paper, section 2.2.

Telecom considers that an Access Seeker should not be placed in a queue until an Access Provider knows that the Access Seeker is ready to go on to a site. The approach taken in the STP would encourage Access Seeker's to make applications at a time when they may not be fully committed to co-locate on a particular site. This has the potential to waste an Access Provider's time and resources. It also has the potential to unnecessarily block other Access Seekers from sites.

provisions provide another reason why an Access Seeker should not be placed in the queue until a full site application is made. If a queue has formed an Access Provider will be tasked with making a subjective decision which will materially disadvantage one Access Seeker compared to another. While an Access Provider will always make extension decisions in what it considered to be the fairest way, Telecom considers that this will be less of an issue if a place in the queue were not at stake.

### **Access Provider's forecasting requirements**

- 8.22 Telecom considers that the Access Provider forecasting regime set out in clause 9 of Interference Management and Design document provides the appropriate level guidance for both Access Providers and Access Seekers as to when Access Providers can set aside space. However, Telecom considers that the relevant provisions set out in section 9 of the interference management which relate to the Access Providers forecasting requirements sit more naturally in the Operations Manual.
- 8.23 Telecom considers that it is important to end users that Access Providers should be able to set aside space for their reasonable forecast requirements. The Government also recognises this because one of the limits to the standard access principles in the Act allows for reasonable forecast requirements. Access Providers should be able to plan with certainty for the delivery of new services.
- 8.24 Telecom considers Access Providers should be able to set aside space for five years. The Government has also acknowledged (in the 5 year "use it or lose it" provisions of spectrum management rights) that Access Providers should have 5 years to deploy Wimax or LTE Technologies. The Government has given parties this flexibility because mobile broadband is key to New Zealand's economic growth. The Government has stated that it believes that information and communication technologies plays a fundamental role in providing capacity for New Zealand to transform its economy through sustainable economic growth. Telecom considers that the Commission must give adequate consideration to the risk that regulation might undermine the deployment of future technology necessary to transform New Zealand's economy.
- 8.25 However, Telecom considers that to reserve space by way of reasonable future forecast, Access Providers must have made their forecast prior to a full site application being made in respect of the Relevant Location. After the queue is formed Access Providers should not be able to leap frog an Access Seeker who has been through the pre-approval phase by forecasting a need for space at that Relevant Location.

### **Site desktop assessment - Stage 1 - Initial Site Application**

- 8.26 Telecom considers that some aspects of this process for identifying space can be streamlined. In particular Telecom considers that the initial site application, process and detailed site design visit should be optional. There may be situations where both parties are satisfied with the situation in the site design notes and will be prepared to proceed to the full site application on the basis of those notes.

### **Full site application - Detailed Site Design**

- 8.27 Telecom considers that an Access Seeker should file an agreed standard solution or an approved disagreed standard solution with its full site application. Accordingly, it considers the agreed/approved disagreed standard solution process contained in the Interference Management and Design document should be referred to in the Operations Manual. If an Access Seeker did not provide an agreed/approved disagreed solution the full site application should be rejected. To take another approach would be inefficient and costly for both the Access Seeker and Access Provider. An Access Seeker should not still be trying to identify where space is available after the time when a full site application is submitted. An Access Seeker should have certainty as to whether the Access Provider considers there is space available prior to committing the significant resources that will be required through the conditional site approval phase and on into the "build" phase.

### **Templates**

- 8.28 Finally, Telecom notes that Vodafone has used templates throughout the pre-approval stage and Access Seeker Implementation phases of the Operations Manual. Telecom supports this approach as it reduces uncertainty for both Access Providers and Access Seekers. Telecom's comment on the templates is that some of them need to be made more generic so they can be used by all Access Providers and Access Seekers.

### **Making space available**

- 8.29 Telecom considers that mast replacement extension or revision "mast replacement" provide Access Seekers and Access Providers with a means of enabling Mobile Co-location which might otherwise be unavailable. Telecom notes those solutions are established processes and are commonly used in overseas jurisdictions. For example mast replacement is regulated under the ACCC Code of Access to Telecommunications Transmission Towers, Sites of Towers and Underground Facilities as well as the EC Regulations for Sharing of Infrastructure.
- 8.30 Telecom considers that mast replacement, extension and replacement should be utilised where necessary to make space available because:

- (a) The process gives Access Seekers considerable control in regard to the design and implementation of mast replacement;
  - (b) It not result in degradation to the quality of service provided by Access Providers or existing co-locators to their customers; and
  - (c) It will enable an Access Provider and Access Seeker to work together to ensure that they both achieved an optimal outcome.
- 8.31 To help facilitate infrastructure sharing, Telecom has proposed that where an Access Provider identifies a mast that needs to be upgraded it will contact Access Seekers who have forecast an intention to co-locate on the mast and work with them to agree a solution and means of apportioning the cost of the replacement mast.
- 8.32 Telecom agrees with the approach taken by Vodafone that where a mast is replaced rental charges that are paid by any subsequent Access Seekers should be split between the parties who upgraded the mast. Telecom considers the simplest way of doing this would be to provide the Access Seeker who helped pay for the mast with a rent abatement.
- 8.33 Telecom also considers that an Access Seeker should be able to apply for mast replacement at any time.
- 8.34 In Telecom's view the process drafted by Vodafone omits several preliminary steps which should be included in clause 21 to establish when a mast replacement is necessary and the circumstances under which an Access Seeker can request mast replacement. In particular:
- (a) Once the Access Provider receives the Access Seeker's full site application, if there is no room for co-location the Access Provider is to undertake an assessment on whether the mast can be strengthened, extended or replaced;
  - (b) The Access Provider is to provide approval or rejection of the Access Seeker's application including all reasons for the decision; and
  - (c) The Access Seeker can take the decision to dispute resolution.
- 8.35 Upon these steps being completed the processes drafted by Vodafone begin. Telecom also considers that the mast replacement provisions from the Access Terms should sit in this section of the Operations Manual.

## Greenfields

- 8.36 Telecom agrees with the inclusion of a voluntary Greenfields process in the Operations Manual. Telecom notes it should be voluntary because Telecom does not consider Greenfields' site sharing to be part of the Mobile Co-location Service. However, Telecom considers that commercial infrastructure sharing should be encouraged and therefore is happy for a process to be included in the Operations Manual. To reflect the commercial nature of the arrangements Telecom would suggest the following changes to the Greenfields process:
- (a) A general opt out clause should be inserted in the Greenfields process allowing either party to opt out of the process at any stage where it considers that the process will have significant time and/or cost implications for that party; and
  - (b) The reduction of the time for rejection or acceptance of a Greenfields proposal from twenty to ten working days. Telecom would not like to see a Greenfield's process held up for one month. Any time savings that can be made will ultimately benefit end users.

## 9. IMPLEMENTATION PLAN

- 9.1 Telecom agrees with Vodafone's approach of an Implementation Period comprising an initial implementation phase of 40 working days followed by a soft launch of 70 working days. Telecom's confidence in its ability to meet those timeframes is based on the requirements set out in Vodafone's Implementation Plan. If the final Implementation Plan approved by the Commission contains different or additional requirements, Telecom's ability to meet those timeframes may be compromised.
- 9.2 Telecom also notes that the 70 working day soft launch period is unlikely to be sufficient to allow an application to proceed fully through the process given the likely timeframes that will be required to obtain all necessary consents. However, in Telecom's view the key potential bottleneck in the process is likely to be the pre-approval phase and 70 working days will be sufficient to test that part of the process or at least up to acceptance or rejection of the first of the full site applications.
- 9.3 Telecom has proposed a number of changes to Vodafone's Implementation Plan:
- (a) Telecom considers it appropriate for the Implementation Period to begin from the Date of Determination in respect of its own processes. This reflects the fact that Telecom is already providing Mobile Co-location and is developing its processes and a common format site database;

- (b) Telecom has proposed a separate timeframe for development of the Common Site Data Base to reflect that by the Determination Date it will already be complete in respect of many Relevant Locations and that completion from that point should focus first on Relevant Sites contained in Access Seeker forecasts. In that way Access Providers will make available the most relevant detail first and not absorb their limited resources in collecting data for Relevant Locations that are not of immediate interest to Access Seekers. It is important to note that the timeframes proposed by Telecom reflect the Common Site Database requirements contained in the STP and which were agreed in the TCF process.
  - (c) Because Telecom has suggested removing the general capacity limit concept from the Operations Manual, it is necessary to introduce a "Bow Wave" or increasing capacity limit to run alongside the Implementation Period to provide a sensible period for new systems to be optimised. Telecom's assessment is that such a Bow Wave concept should apply for the first 5 months from the Determination Date. This goes slightly beyond the end of the Implementation Period but Telecom proposes that service levels would apply after the Implementation Period within the capacity limits of the Bow Wave. After five months no capacity limits would apply.
- 9.4 Telecom notes that Access Seekers will have to provide accurate and complete information in a timely manner in order for the Implementation Plan to operate as intended. Access Providers will require Access Seekers' cooperation to meet these implementation targets.
- 9.5 Telecom notes that Vodafone has included remedial actions where an Access Provider does not meet a KPI. Telecom agrees with the remedies that Vodafone has included and that these have provided sufficient incentive for Telecom to meet its service levels in other STDs.
- 9.6 Finally, Telecom notes that it is proactively working towards the implementation phase to date and has initiated:
- (a) An internal project to develop systems and processes that were necessary to support the regulated mobile co-location process;
  - (b) Work on a Common Format Site Database so that Access Seekers will be able to obtain up to date information on Telecom's sites; and

- (c) Workshops with Access Seekers to work through common problems through experience in the mobile co-location process.

## 10. INTERFERENCE MANAGEMENT AND DESIGN DOCUMENT

- 10.1 Telecom broadly supports Vodafone's approach to interference management and in particular the mechanisms for implementation of Agreed Solutions and approved Disagreed Solutions which were broadly agreed by the TCF.
- 10.2 Much of the detail in relation to design principles in Vodafone's Interference Management and Design document is broadly correct. However, in Telecom's view, it is essential to reflect that site design is often a compromise between a wide range of factors and making any single component of site design mandatory (eg antenna separation) may in some circumstances result in unintended and unwanted consequences. Mandating a particular approach may preclude more flexible approaches.
- 10.3 All design components should be considered on a site by site basis taking into account all other design constraints and the ultimate goals of minimising any Performance Degradation and avoiding any Unacceptable Performance Degradation.
- 10.4 Telecom's comments on the Interference Management and Design document are directed at the following four issues (discussed in detail below):
  - (a) Interference management must involve an assessment of performance degradation of the services of others co-located at the site, not just the Access Provider.
  - (b) A maximum level of performance degradation is appropriate and should be 0.5dB for Mobile Services but may be 1dB for other services (such as land mobile services) which are less sensitive to interference (ie non-mobile speed data services).
  - (c) Antenna minimisation is not necessary or appropriate for inclusion in the STD.
  - (d) Telecom proposes additional clarity in relation to a standard solution test to provide certainty to Access Providers and Access Seekers.

### **Performance Degradation**

- 10.5 A key component when considering interference management in the development of site solutions and ongoing operation of co-located equipment is the extent of any interference with:
- (a) The Access Provider's services and/or its customers' and end users;
  - (b) Other Access Seeker's services and/or their customers' and end users services; and
  - (c) Where other third parties are co-sited at the location, their services and/or their customers' and end users services.
- 10.6 However, Vodafone's Interference Management and Design document focuses solely on interference with the Access Provider's services and its customers and end users:
- (a) The definition of "Performance Degradation" (paragraph 6.1.1) relates to Telecommunications Services provided by the Access Provider;
  - (b) The definition of "Unacceptable Performance Degradation" considers only the effect on the distance between the Access Seeker's and the Access Provider's equipment and loss from the Access Provider's Link Budget.
- 10.7 Vodafone's Interference Management and Design document contains a definition of "Existing Co-locator". However, as drafted, no provision is made for considering the effect of an Access Seeker's proposed solution on existing co-locators' end users.
- 10.8 Telecom considers that the Interference Management process should include consideration of the effect of an Access Seeker's proposed solution on existing co-locators' end users as well as those of the Access Provider. In Vodafone's documentation the protection for other parties who are not Access Seekers (eg emergency services, New Zealand Police and Airways Corporation), is under clause 14.4.2(b) of the Operations Manual (whereby the Access Provider may make Conditional Site Approval condition on such third party consents). However, such a consent requirement could be a significant barrier to Mobile Co-location. Such third parties will have no obligation under the STD to be reasonable in granting or refusing their consent and could delay or prevent the Access Seeker obtaining the Mobile Co-location Service.
- 10.9 While such consent may on occasion be required due to the contractual arrangements in place between the Access Provider and the third party, it would be preferable to

include such third party's services in the interference assessment and provide that an Access Provider may only make such third party consent a condition of a Conditional Site Approval where, notwithstanding there will be no Unacceptable Performance Degradation to the third party's service, consent from the third party is required.

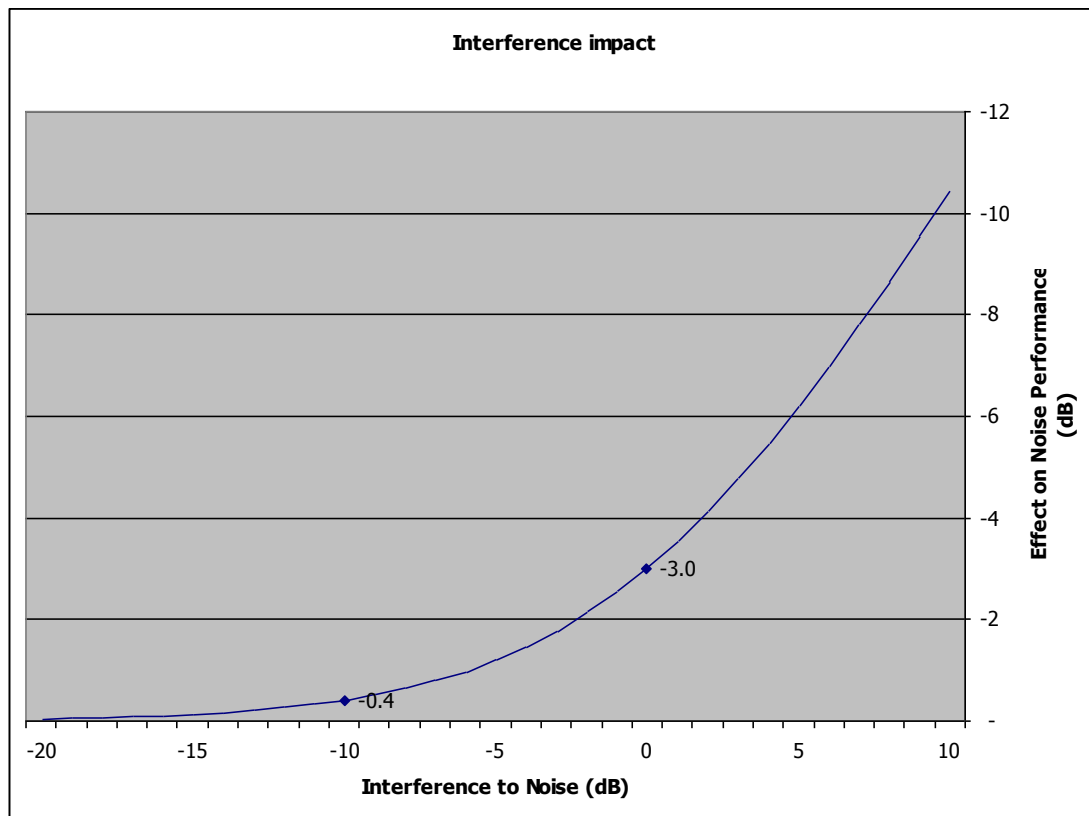
- 10.10 Assessment of Performance Degradation and Unacceptable Performance Degradation must also take into account the Access Provider's forecasting, currently provided for in section 9 of Vodafone's Interference Management and Design document. As currently drafted there is no clear scope for assessing future interference with forecasted Access Provider services. This needs to be clarified and Telecom has proposed drafting to achieve this.
- 10.11 Finally, the use of "Telecommunications Service" as a component of assessing Performance Degradation excludes consideration of interference effects on non-Telecommunications Services (such as broadcasting services) of co-locations. These services too should be protected from Unacceptable Performance Degradation. Telecom considers that reference to the broader concept of "Radiocommunications Service" would more accurately reflect the extent of interests that must be considered when assessing the potential interference associated with a co-location request.

#### **Unacceptable Performance Degradation**

- 10.12 Telecom considers that a degree of performance degradation due to interference effects is unavoidable at Mobile Co-location sites and that a maximum acceptable interference threshold should be set at a level that has a minimum impact end users of to existing services.
- 10.13 PIB 38 Radio Licence Certification Rules (Dec-05) published by the Radio Spectrum Management Group of the MED (section 4.2) recommends that:
- There is no single criterion for acceptable interference levels because this will depend on the nature of the victim service. However, commonly the total cochannel interference power calculated as above should cause no more than 1 dB degradation to the receiver noise floor at locations near the edge of coverage.
- 10.14 Telecom agrees that in relation to non-mobile and low speed services, 1dB is an appropriate limit. However, 1dB is not an appropriate limit in relation to mobile high speed data services.
- 10.15 Because Mobile radio communications have in the past generally only provided voice services and/or low speed data services. The impact of an increased noise floor or interference levels (at a base station site) on these services has therefore generally been to reduce the effective service area from the site and so only end-users located

at the edge of the coverage area are affected when they drop outside the reduced coverage or service area.

- 10.16 However, modern mobile cellular systems now also provide high speed mobile broadband data services capable of delivering data speeds of several Mbit/second to the end-user. The mobile networks' ability to deliver these high data speeds to each end-user is dependent on the overall signal quality available. If this signal quality is reduced due to interference at the base station then this will directly impact the uplink and downlink data rates delivered to all end-users, not only those end-users operating at the cell edge.
- 10.17 Since all end-users will be impacted by the increased interference at the base station, and not only those end-users operating at the cell edge, then Telecom considers it is appropriate to apply a maximum Acceptable Interference threshold which is lower than 1.0dB for Cellular Mobile Telephone Networks that are designed to support high speed data services such as CDMA-EVDO, UMTS-HSPA and GSM-EDGE etc.
- 10.18 Telecom supports the principles outlined in Vodafone STP submission at paragraph 152 and also notes that the trend shown in Figure 13.4 will continue for higher data rates up to 14.4Mbps HSPA, where the maximum data rates are only achieved at an even smaller relative distance of the cell edge. In addition to this, the reduction in end-user data rates will also lead to a reduced carrier data throughput and an overall reduction in site capacity, which then leads to the requirement to deploy more infrastructure (at increased cost) to support the equivalent level of traffic.
- 10.19 Telecom supports the value proposed in the STP and considers that the maximum acceptable performance degradation due to co-location interference effects from Access Seekers (including impacts of interference mitigating RF Filters) should be set at a level that does not exceed 0.5dB (which relates to 9dB below the noise floor - see the graph below, which is plotted using the formula provided in PIB38).



10.20 Telecom considers that there may be situations where either the Access Provider, the Access Seeker or an Existing Co-locator is prepared to accept a higher level of Performance Degradation than the maximum Unacceptable Performance Degradation. In such circumstances that higher level of Performance Degradation must be the baseline going forward for assessing whether the relevant party is suffering Unacceptable Performance Degradation. Also in relation to interference that occurs after the relevant probationary period for a site solution, Telecom proposes that where agreement between the Access Provider and those co-locating at the site cannot be reached the following principles apply to the determination under the disputes process:

- (a) Causer pays except where the causer is the Access Provider and the Access Provider is operating within its reasonable future forecast that was in place at the time of Full Application by the relevant affected party;
- (b) Where the Access Provider is operating within such forecasts it will not be required to modify its operations or use.
- (c) In this way, the Access Provider's reasonable forecast use of the site will be protected consistent with the Act.

**Co-location issues (Antenna Minimisation)**

- 10.21 Telecom would have significant concerns were any co-location site solutions (including antenna minimisation solutions) proposed by the Access Seeker which modify any existing RF equipment and configurations to be imposed on an Access Provider. These concerns are summarised below and set out in more detail in Appendix 3.

*Reduced performance*

- 10.22 Access Providers and existing co-locators should be able to maintain existing services to Customers currently benefiting from those services. Designs that might be used to increase space on the mast by changing existing configurations of RF equipment will result in a reduction in performance including a reduction in the uplink budget and downlink budget. A reduction in the downlink budget or uplink budget will result in a loss of coverage and a reduction of service to all end users of high speed data services.
- 10.23 The size of the performance reduction depends on factors that impact the correlation/decorrelation between the two diversity uplink signal paths, such as the propagation environment and the degree of multipath propagations due to reflections and non-line of sight propagation effects. Mobile phones will also have a shorter battery life as they transmit at increased power to offset a lower uplink budget. These effects will negatively impact Access Providers' mobile customers in a manner inconsistent with the purpose of the Act.

*Reduced coverage*

- 10.24 Further, the designs that may be used to increase space on the mast may require the sub-optimisation Access Provider's RF equipment for different frequencies to point in the same direction. This reduces the coverage available from a site and may result in the Access Provider (and/or an existing co-locator) building more facilities to recoup the coverage loss. The limitation on an Access Provider's and Existing Co-locators' ability to alter their network design will increase inefficiencies in their network. The Commission has not required Telecom to modify the deployment of its technology to the detriment of its end users and the efficiency of its network in other STDs and should not do so for the Mobile Co-location Service.

*Available alternatives*

- 10.25 As discussed earlier, there are other options available to Access Seekers which avoid the problems identified above. Mast replacement, revision and extension are realistic alternatives that do not have negative effects on existing customers and the Access Provider's and existing co-locators' investment choices. Access Seekers should not be

able to reduce the existing services provided to customers and the efficiency of Access Providers' and existing co-locators' networks in order solely to reduce their deployment costs at a proposed co-location site.

- 10.26 In any event, antenna minimisation is only a short term solution that will also prejudice later Access Seekers wanting to co-locate at the site. Thus, if an Access seeker proposes antenna minimisation solutions to reduce structural load on the co-location mast in order to avoid or defer the requirement for a mast replacement, not only are services to existing customers degraded but the issue is only delayed until the next Access Seeker requests access at the site.

#### *Other jurisdictions*

- 10.27 An approach that does not require the Access Providers to modify its existing RF equipment or its configuration is consistent with other jurisdictions. Telecom (and also our technology partner Alcatel-Lucent) has researched cellular co-location regulations introduced by regulatory authorities in several jurisdictions (Australia, USA, EU, UK, Germany, France, and Scandinavia) and have not found any regulations that require Access Providers to minimise existing antenna infrastructure in order to reduce an Access Seeker's deployment costs. All these jurisdictions have in place frameworks within which antenna minimisation could be imposed. It is telling that none have, and, as far as Telecom can assess, New Zealand would be the first in the world to take such a significant step in interfering with an operators technology and network optimisation choices.
- 10.28 Technology and network optimisation and investment choices by operators should not be interfered with by requiring antenna minimisation. Therefore, Telecom does not support clause 7.5 of the Interference Management and Design document.

#### **Measurement and Testing**

- 10.29 Telecom generally agrees with the measurement and testing regime reflected in section 8 of Vodafone's Interference Management and Design document.
- 10.30 However, Telecom considers that testing should also include:
- (a) Test for sensitivity losses including noise rise, receiver blocking and desensitisation due to any effect of collocation including without limitation emissions (wanted or unwanted) and intermodulation distortion occurring when the Access Seeker's facility is installed or operated.

- (b) Limits under the Access Seeker's application shall be maximally tested, including without limitation power transmitted, proximity, interaction and transmitted power of any linking antennas. All options shall be tested such that all configurations are measured, including without limitation antenna azimuth and down tilt directions.
  - (c) System performance measurements for weak wanted received signals including without limitation Speech Quality Index (SQI), Bit Error Rate (BER), noise rise as appropriate to the technology to ensure Unacceptable Performance Degradation criteria is met and not exceeded. Tests shall be performed by transmitting across the full range of transmit frequencies and checking for effects across the full range of receive frequencies.
- 10.31 Testing should be designed and performed on each of the Relevant Facilities to ensure that no Unacceptable Performance Degradation occurs with fully configured facilities (within the limits sought by the Access Seeker at the Relevant Facility). Unacceptable Performance Degradation criteria must be met to ensure that the future use provisions are meaningful.
- 10.32 Telecom also submits that the scope of the measurement and testing should include all of the following cases and not just the first case:
- (a) Access Seeker transmitter equipment into the Access Provider receiver equipment;
  - (b) Access Seeker transmitter equipment into all other radio services receiver equipment operating from the relevant facility;
  - (c) Access Provider transmitter equipment into the Access Seeker receiver equipment; and
  - (d) All other radio services transmitter equipment operating from the relevant facility into the Access Seeker receiver equipment.
- 10.33 The interference caused to the Access Seeker by Telecom's Equipment and other radio services transmitter equipment will not be known without these tests. This could lead to dispute later if Telecom or an existing co-locator alters the design of their antenna as the Access Seeker may claim that it is suffering increased interference as a result of that change.

### **Access Provider Forecasting**

- 10.34 Telecom supports the need for forecasting by the Access Provider and for such forecasts to be used in determining both available capacity at the relevant location and in assessing interference issues.
- 10.35 Telecom considers that the process around Access Provider forecasting sits more appropriately in the Operations Manual than in the Interference Management and Design document and recommends that section 9 of Vodafone's Interference Management and Design document be deleted and put into the Operations Manual.
- 10.36 Whatever document provisions associated with Access Provider forecasting are included in, Telecom supports the approach adopted by Vodafone in section 9 of its Interference Management and Design document. In particular, a forecasting period of five years is consistent with the Ministry of Economic Development's five year "use it or lose it" requirements in reflection to spectrum management rights and reflects the time frame required to plan and deploy new services which often require the acquisition of new sites and the commercial production in suitable numbers of the equipment required to provide such services.

## **11. ACCESS TERMS**

- 11.1 Telecom broadly supports Vodafone's proposed access terms. They are based on the UCLL Co-location Access Terms and are appropriate for use in respect of the Mobile Co-location Service. Telecom has made a number of changes to the Access Terms. Most importantly, Telecom is concerned to make clear that Access Providers are not obliged to gift facilities to Access Seekers if the Access Provider wishes to decommission a Relevant Facility. In such cases Access Seekers should have the opportunity to purchase the Relevant Facility but if agreement cannot be reached the Access Provider should have the right to terminate all co-location arrangements. This would, for example, enable the Access Provider to re-allocate the Relevant Facilities to another area off its network and would prevent Access Providers from the risk of becoming long term subsidisers of Access Seekers' businesses.

## **12. SUNDRY CHARGES**

- 12.1 Telecom agrees with Vodafone's approach that Access Providers should be entitled to set charges to Access Seekers where costs are incurred in providing services to Access Seekers. The level of such charges will be a matter for negotiation between Access Providers and Access Seekers.

## APPENDIX 1

### **Auckland City Isthmus Plan Rule 4A.4.6:**

Permitted Activities clause (9v) - Telecommunication antennas, pole structures and masts are permitted in all business zones and mixed use zone provided they meet the height and diameter standards.

Restricted Controlled Activities - Telecommunication aerials and antennas are restricted controlled activities in the residential zones provided they meet certain height and diameter standards.

### ***Auckland City Isthmus Plan Rule 4A.4.6:***

Permitted Activities

...

(iv) The following are permitted activities in all business zones and Mixed Use zone, (in addition to those activities specified in subclause (iii) above) subject to compliance with the development control rules for the particular zone except where these specifically conflict with the rules below.

- Telephone exchanges.
- Telephone booths and cabinets.
- Telecommunication and radio-communication antennas (excluding microwave and satellite dish aerials), pole support structures and masts; provided that
  - (a) the antennas shall be capable of being contained within a horizontal circle centred on the pole support structure and with a diameter of 6.25 metres.
  - (b) the height of the pole support structure and antennas or mast above ground level may exceed the height limit specified for the zone by not more than 6 metres.
- Microwave and satellite dish aerials not exceeding 1.2 metres in diameter.
- Substations, provided that where a site abuts land zoned residential or open space, a front yard of 4m minimum width is required. In addition, 1 6m minimum side or rear yard requirement (as the case may be) shall apply to that portion of the site which abuts the residential or open space zoned land;

provided however that where a substation transforms voltages of 11,000 volts or less to 400 volts or less, no front yard is required and the side and rear yards, as the case may be, shall be of 4m minimum width.

- Meteorological installations, provided that any mast shall not exceed the height limit for the zone by more than 6m.
- Pumping stations for water or sewage, also gas regulator stations and ancillary above ground equipment, together with associated earthworks; provided that:
  - (a) they do not exceed 25m<sup>2</sup> in area or 3.0 metres in height above ground level, or are provided within an existing building; and
  - (b) they are not located on sites containing scheduled heritage features, or on sites in Conservation Areas.

## Christchurch City Plan:

Rule 4.4.3 lists specific telecommunication activities that are discretionary activities. If an activity does not fall within one of these categories, then the activity is permitted.

### 4.4.3 Telecommunication and radio communication facilities

Any utility, except lines and support structures for lines, is a discretionary activity where it involves any of the following:

- (a) Erecting any telecommunication or radio communication facility above ground level (including any mast, antenna, tower, or support structure) which is:
  - (i) within any conservation zone, Open Space 1 Zone, Rural Hills Zone, Special Purpose (Pedestrian Precincts) Zone, or Cultural 1 Zone, where any of the development or community standards for that zone are not complied with, or in any case (except the Rural Hills Zone) where the height exceeds 3.5m or the area exceeds 15m<sup>2</sup>; except that in any conservation zone, the Open Space 1 Zone and Rural Hills Zone, this rule shall not apply to any structure 1.8m or less in height, or 1.5m<sup>2</sup> or less in area and such structures shall be a permitted activity;
  - (ii) located on any site containing a protected building, place or object, listed in Part 10 of these rules, except that for Group 3 and 4 buildings the utility will be a controlled activity;
  - (iii) located in a living zone and is:
    - (A) over 12m in height and located within 20metres of a residential unit sited within any living zone. This rule shall not apply if (1) or (2) below apply;
    - (B) located within 20 metres of a residential unit sited within any living zone and has a support structure with a diameter greater than 0.4m. This rule shall not apply if (1) or (2) below apply;
      - (1) it complies with all the development and community standards for the zone in which it is located, in which case it shall only be a discretionary activity if

it exceeds a height of 18m or a diameter greater than 0.8m; or

- (2) it is a mast and/or antennae not exceeding 17m in height and provided that:
- The centre of the structure is located at least 6m from all boundaries; and
  - No part of the structure extends beyond the site boundary; and
  - The mast or antenna is unguyed above 10m; and
  - Where the antenna is other than simple wire dipole the distance from the centre of the mast to the furthest elements tip shall not exceed 7.5m; and
  - The mast which supports the antenna has a cross section diagonal measurement not greater than 226mm for a distance of 6m from ground level and 142mm between a height of 6m and the maximum permitted height; and
  - Any temporary extendable structure is nested at all times when not in use; and
  - There is only one such structure on any one site; and
  - Any antennae at a height exceeding 6m has a horizontal dimension of less than 55mm.
- (iv) located in any zone other than a Living Zone and is situated within 20m of a residential unit in any living zone and has a support structure that either:
- (A) exceeds any of the dimensions in the table below:

<b>Mast Structure</b>	<b>Maximum Diameter</b>
Top 20:	700mm
Middle 60%	220mm
Bottom 20% (above ground level)	500mm with an average diameter no greater than 400mm

- (B) is setback from living zone boundaries by less than 3m.
- (v) over 20m in height in any other zone (any "other" zone being any zone not referred to in rule 4.4.3(a)(i) except that where the facility is attached to a building in the Central City Zone, any business zone, or the Special Purpose (Airport) Zone, the facility is a permitted activity in terms of rule 4.4.3(a)(v) provided that the zone rules relating to building height and sunlight applicable to the building are not exceeded by:
- (a) 1.5m in height and 5m in any other dimension in the Central City Zone;
  - (b) 1.5m in height and 3m in any other dimension in the Business 1, Business 2, and Business 2P zones.
  - (c) 2.2m in height and 3m in any other dimension in the Business 3, 4, 5 and 6 zone, and the Special Purpose (Airport) zone, except that where an existing building in these zones exceeds the zone rules for height, an attached facility may exceed the existing height of the building by no more than 2.2m in height and 3m in any other dimension as a permitted activity.

- (b) Erecting any telecommunication or radio communication facility in a living zone which includes any dish antenna, which is more than 1.5m in diameter and

does not comply with the zone rules, and which exceeds the limit for permitted activities as set out in Clause 4.4.3(a)(iii).

- (b) Erecting any telecommunication or radio communication facility which includes any dish antenna, more than 3m in diameter in any other zone where it does not comply with one or more of the zone rules and which exceeds the limits for permitted activities as set out in Clause 4.4.3(a)(v).

### **Palmerston North District Plan:**

Rule 23.7.1 provides that aerials, antennas and antenna dishes attached to land, masts, buildings or other structures are permitted activities provided that they meet the performance conditions listed in the plan.

#### **R 23.7.1 Permitted Activities**

The construction, maintenance and upgrading to any of the following Permitted Activities throughout the City provided these comply with the performance conditions listed herein provided that, in the case of existing facilities listed, these performance conditions do not apply unless the nature of any proposed works on these existing facilities does not meet the existing use provisions of Section 10 of the Resource Management Act 1991.

- (i) Transformers and lines for conveying electricity at a voltage up to and including 110 KV with a design capacity up to and including 100 MVA.
- (ii) Water and irrigation schemes and all related drains, channels, pipes and necessary incidental equipment.
- (iii) Telecommunications lines, links, works, and facilities.
- (iv) Aerials, antennas, and antenna dishes attached to land, masts, buildings or other structures.
- (v) Pipes for the distribution (but not transmission) of natural or manufactured gas a gauge pressure not exceeding 2000 kilopascals and necessary incidental equipment, including household connections and compressor stations.
- (vi) Telecommunication and radiocommunication facilities which existed and were operational as at 31 May 1995.
- (vii) Underground pumping stations and pipe networks for the conveyance or drainage of water or sewage,, and necessary incidental equipment.
- (viii) Water supply wells and pumping stations including ancillary equipment provided such facilities were in existence and operational as at 31 May 1995.
- (ix) Navigational aids, and beacons.
- (x) Traffic management and control structures, street lighting, street furniture, and telephone cabinets.

- (xi) Meteorological structures and activities.

### Performance Conditions

- (a) Height

(i) All above ground structures except lines, masts, aerials, antennas and their brackets or attachments must comply with the maximum height control and any height recession planes for any zone in which they are located. The height recession plane shall not apply to the boundary of a road, road reserve, or service lane.

(ii) In the case of aerials and antennas these may exceed that part of the height recession plane or maximum height control, whichever is applicable, by no more than 5 metres. Aerials and antennas attached to masts may exceed the height for masts as set out in sub-clause (iii), below, by no more than 5 metres. The height recession plane shall not apply to the boundary of a road, road reserve, or a service lane.

(iii) In the case of masts, these must comply with:

- (a) a setback of not less than 5 metres from any boundary common with a Residential Zone or Recreation Zone site; **and**

a setback of not less than 8 metres from a boundary fronting an Arterial or Principal Road as listed in Appendix 20A of the Transportation Section; **and**

a setback of not less than 3 metres from a boundary fronting any road **other than** an Arterial or Principal Road as listed in Appendix 20A of the Transportation Section; **and**

- (b) a maximum height limit for:

Inner Business Zone	20 metres
Outer Business Zone	15 metres
Local Business Zone	10 metres
Industrial Zones	20 metres
Airport Zone	20 metres
Institutional Zone	18 metres
Rural Zone	15 metres
Conservation and Amenity Zone	5 metres
All other zones and places	10 metres

- (c) The setback conditions specified in clause (iii)(a) herein do not apply within any road, road reserve, or service lane.

**(b) Noise**

Activities shall comply with the noise standards for the Zone in which they are situated or adjoining Zone if located on any road, road reserve or service lane.

**(c) Lighting**

Any artificial lighting system shall ensure that its use does not result in an added illuminance, over and above the measured ambient level, in excess of 8 lux measured in the vertical plane at the windows of any residential building on any residentially zoned site.

**(d) Undergrounding of Lines and Pipes**

(i) Lines shall not be located above ground except in the following:

- (a) where lines traverse any Rural Zone, or roads within this Zone.
- (b) the maintenance, repair, replacement and upgrading of existing overhead lines. Upgrading in this context meaning an improvement, increase in capacity or improved security provided that only existing support structures are utilised.
- (c) where lines are to provide temporary links, connections or services, they may be above ground for up to three consecutive months.

(ii) All pipes for network reticulation shall not be located above ground.

**(e) Building Size**

Any building located above ground level shall not exceed 10 m<sup>2</sup> in gross floor area.

**(f) Aerials, Antennas, and Antenna Dishes**

Aerials, antennas, and antenna dishes shall not exceed 5 m in diameter, in all Zones, with the exception that any antenna dish erected on a roof in the Residential Zone shall not exceed 2.5 m in diameter.

**NOTE TO PLAN USERS:**

This Rule is to be read in conjunction with Rule 23.7.1(a)(ii) which refers to the height of aerials and antennas.

**(g) Reinstatement**

Where the construction or maintenance of a network utility involves disturbance to the ground, at the completion of the work the ground shall be reinstated to the condition existing prior to commencement of the work.

**(h) Cultural and Heritage Sites**

Construction work shall not disturb any cultural or heritage site identified in Section 17 of the District Plan, nor any archaeological site.

**(i) Radiofrequency Field Exposure**

Activities emitting radiofrequency fields shall comply with the New Zealand Standard NZS 2772: Part 1: 1999 *Radio Frequency Fields Part 1 - Maximum Exposure Levels - 3 KHz to 300 GHz*.

**Explanation**

*The various requirements for Permitted Activities are intended to ensure that any of the potential effects of the activities permitted, are dealt with at the time the activity is established. Further, the conditions also ensure that the network utilities blend with the environment in which they are established and cause no adverse effects on the activities or amenity values of the Zone in which they are established. For reasons of clarity, Rule 23.7.1(g) refers only to land and does not include vegetation.*

*The New Zealand Standard NZS 2772: Part 1: 1999 is based on guidelines produced by the International Commission on Non-Ionising Radiation Protection. The guidelines and subsequent New Zealand Standard have established levels of exposure to radiofrequency fields below which adverse effects are thought to be non-existent or negligible. Operation of equipment that complies with the New Zealand Standard is therefore deemed to have no significant environmental effects in respect of health, safety or wellbeing of the community.*

**APPENDIX 2**  
**Site Type Examples**



Standard Characteristics: APKK, Pukekohe Exchange	11/10/2007
1. mast height: 15m	
2. mast type: 1L non climbable	
3. headframe type: circular	
4. antenna configuration: 10 x 1200mm Deltec MTPA8904EF antennas; 3 sectors (3+4+3)	
5. mast structural capability (eg age, material etc): 100% of design capacity	
6. foundations: 3m x 3m concrete pad	
7. windloading: low wind (A7)	
8. tenure: Freehold	
9. shelter: 6m container, space 85% utilised	
10. power: underground, 3 phase, 3 x 63A	
11. AS equipment:	
12. other parties on site: TML	
13. Access Provider reasonable forecast requirements: 6 x 1350mm RFS APXV860906513 antennas	



Standard Characteristics: AHBS, Harbour Bridge South	09/10/2007
1. mast height: 20m	
2. mast type: 1L non climbable	
3. headframe type: circular	
4. antenna configuration: 8 x 1200mm MTPA8904EF antennas, 1 x 1050mm Argus CPX304DR antenna; 3 antennas per sector	
5. mast structural capability (eg age, material etc) 100 % of design capacity	
6. foundations: 4m x 4m concrete pad on 4 x (10m) steel piles, stability compromised by soil type and groundwater	
7. windloading: low wind (A7) but subject to gusts from open water ( from East and West sides)	
8. tenure: No co-siting as of right. Additional Equipment will require the consent of the Owner which can't unreasonably be withheld. Agreement contains a relocation clause.	
9. shelter: 6m container, fully utilised	
10. power: 3 phase supply, 24A per phase	
11. AS equipment:	
12. other parties on site: nil	
13. Access Provider reasonable forecast requirements: 3 x 1302mm Kathrien 80010314 antennas, 6 x 1350mm RFS APXV860906513 antennas.	



Standard Characteristics: AWSY, Wesley	05/09/2007
1. mast height: 20m	
2. mast type: 1L non climbable	
3. headframe type: circular	
4. antenna configuration: 9 x 1200mm Deltec MTPA8904RF antennas; 3 sectors, 3 antennas per sector	
5. mast structural capability (eg age, material etc) : 63% of design capacity	
6. foundations: 4m x 4m concrete pad	
7. windloading: low wind (A7)	
8. tenure: Licence - No right to co-site without the consent of the Owner which may be granted at their absolute discretion. If consent is granted a number of conditions apply.	
9. shelter: 6m container, 90% utilised	
10. power: 3 phase, max 69 KVA, 1 meter, underground supply through base	
11. AS equipment:	
12. other parties on site: nil	
13. Access Provider reasonable forecast requirements: 3 x 1942mm Kathrein 742213 antennas, 6 x 1350mm RFS APXV860906515 antennas.	



Standard Characteristics: ADFT, Dairy Flat	21/09/2007
1. mast height: 15m	
2. mast type: 1L non climbable	
3. headframe type: circular	
4. antenna configuration: 8 x 1200mm Deltec panel antennas, 2 sectors with 4 antennas per sector	
5. mast structural capability (eg age, material etc): 100% of design capacity	
6. foundations: 3m x 3m concrete pad, 1m depth	
7. windloading: low wind (A7)	
8. tenure: Easement in Gross – allows invitees.	
9. shelter: 6m container, 90% utilised	
10. power: 3 phase, max 41.4 KVA, 2 x 24hr meters,	
11. AS equipment:	
12. other parties on site: nil	
13. Access Provider reasonable forecast requirements: 6 x 1942mm Kathrien 742213 antennas, 4 x 1350mm RFS APXV860906515 antennas	



Standard Characteristics: AHBN, Harbour Bridge North	21/09/2007
1. mast height: 20m	
2. mast type: 1L non climbable	
3. headframe type: circular	
4. antenna configuration: 3 x 1283mm Yagi antennas, 3 x 1200mm MTPA8904EF antennas, 2 sectors with 3 antennas per sector	
5. mast structural capability (eg age, material etc): 58% of design capacity	
6. foundations: 1.5m <sup>2</sup> concrete pile, 4m depth	
7. windloading: low wind (A6) but subject to gusts from open water (from East and West sides)	
8. tenure: No co-siting as of right. Additional Equipment will require the consent of the Owner which can't unreasonably be withheld. Agreement contains a (6 months) termination clause and a relocation clause.	
9. shelter: 6m container, 90% utilised	
10. power: 3 phase, 41.4 KVA, 2 x 24hr meters,	
11. AS equipment:	
12. other parties on site: nil	
13. Access Provider reasonable forecast requirements: 2 x 1283mm 850MHz Yagi antennas, 2 x 1300mm wideband Yagi antennas, 1 x 1350mm RFS APXV860906513 antenna, 1 x 1316mm Kathrein 742264 antenna.	

### APPENDIX 3 Antennae Minimisation Impact

#### Impacts to Existing End-users from Antenna Minimisation

1. Telecom considers that any co-location site solutions (including antenna minimisation solutions) proposed by the Access Seeker which modify any existing RF equipment and configurations must not be forced on the Access Provider and that the acceptance of a proposed co-location site solution must be at the sole the discretion of the Access Provider.

#### Antenna Minimisation Solutions

2. Two types of antenna minimisation solutions are available at sectorised mobile base station sites:

*Minimising 2 vertical polarisation antennas into a single cross polarisation antenna*

3. The downlink performance impact to an existing service link budget of replacing a vertical polarisation transmitter antenna with 45 degree slant polarisation antenna is approximately 0.5 dB.
4. The impact of antenna minimisation to an existing service depends on radio environment for the site. The effect on uplink performance of
  - (a) replacing two vertical polarisation antennas (with approximately 4 metre horizontal spatial diversity)
  - (b) with +/- 45 degree cross polarisation
 depends on factors that impact the correlation/decorrelation between the two diversity received uplink signal paths:
  - (c) the propagation environment, and
  - (d) the degree of multipath propagations due to reflections and non-line-of-sight propagation effects
5. The following table provides a summary of typical performance impacts in various propagation environments.

Environment	Relative Performance impact (dB)
Dense Urban	0 to -0.5
Urban/Commercial	0 to -1.0
Suburban	-1.0 to -2.0
Rural	-2.0 to -4.0

Table 1: Impact to Uplink Budget comparing cross polarisation diversity to horizontal space diversity

*Minimising 2 cross polarisation antennas into a single multiband double cross polarisation antenna*

6. Dual band cross-polarisation antennas (ie 850MHz cross-polarisation and 2100MHz cross-polarisation constructed in the same antenna shroud) are also available and can be used where masts have no headframe (eg slimline masts with cluster antennas). This forces both 850MHz and 2100MHz systems to have same antenna direction. In some instances, minimising the number of antennas is a compromise that must be made (to minimise the visual impact of the site) in order to gain initial RMA approval and get the site in at all. This decision is always carefully weighed and not taken lightly.
7. 2100MHz mobile systems require additional infill sites compared to 850MHz mobile systems due to reduced propagation range at higher frequencies. Where these 2100MHz infill sites are introduced to fill coverage holes, then they need to be correctly fitted into the network. The directions of the antennas at the surrounding 2100MHz sites need to be realigned to provide consistent 2100MHz coverage over the whole area. The new site adds coverage and capacity to its immediate area where service levels were clearly unsatisfactory. However, without this realignment work, coverage and capacity reductions start to occur in the surrounding network, detrimentally affecting customer service in other areas. Without network realignment in-fill sites tend to push the service problems into other areas where they did not exist before. If all sites were forced to use multiband 850/2100MHz antennas, then the coverage from one or both mobile systems would be compromised in some areas due to the inability to individually optimise the antenna direction to maximise coverage for each system.
8. These effects are illustrated in the following series of diagrams. For simplification, these diagrams use hexagons to represent the coverage area provided from each sector of a 3-sector site configured in a regular network grid. In reality, actual cellular networks are far more complex, having to cope with uneven distribution of subscriber and traffic, irregularities in terrain features and the availability of suitable site locations with the required antenna heights etc. Even so, the principles and issues outlined in these simplified generic diagrams still apply to actual cellular networks, since where possible, these networks are generally designed to conform to a regular grid topology to provide a consistent quality of coverage and use standard antenna azimuths to minimise interference. The antenna direction and down-tilts for each sector will then be optimised to manage network-wide coverage and interference issues.
9. Figure 1 shows the nominal coverage for a regular 850MHz cellplan and Figure 2 shows the 2100MHz coverage that would be achieved from these existing sites adopting the same antenna directions used in the 850MHz plan, and indicates the general shortfall in coverage due to the reduced propagation range at 2100MHz compared to 850MHz.

10. Figure 3 shows how these 2100MHz coverage holes can be reduced by introducing additional 2100MHz infill sites, but that significant holes still exist if the same antenna alignments are maintained across both 850MHz and 2100MHz networks. This configuration also results in some areas having excessive overlapping coverage from 2 or 3 neighbouring sites which increases secondary traffic levels and reduces the effective capacity provided from CDMA and UMTS mobile systems.
11. Figure 4 shows how the extent of this coverage overlap and the coverage holes can be reduced somewhat by modifying the alignment of the antennas at the 2100MHz infill sites, since these sites are not required to be aligned with the 850MHz system. Even though the problem is reduced, the coverage holes and excessively overlapping coverage areas still exist in Figure 4. This causes reduced capacity and reduced coverage performance compared to an optimised 2100MHz network, shown in Figure 5, which has rotated all 2100MHz antennas by 30 degrees compared to the standard 850MHz antenna alignments.

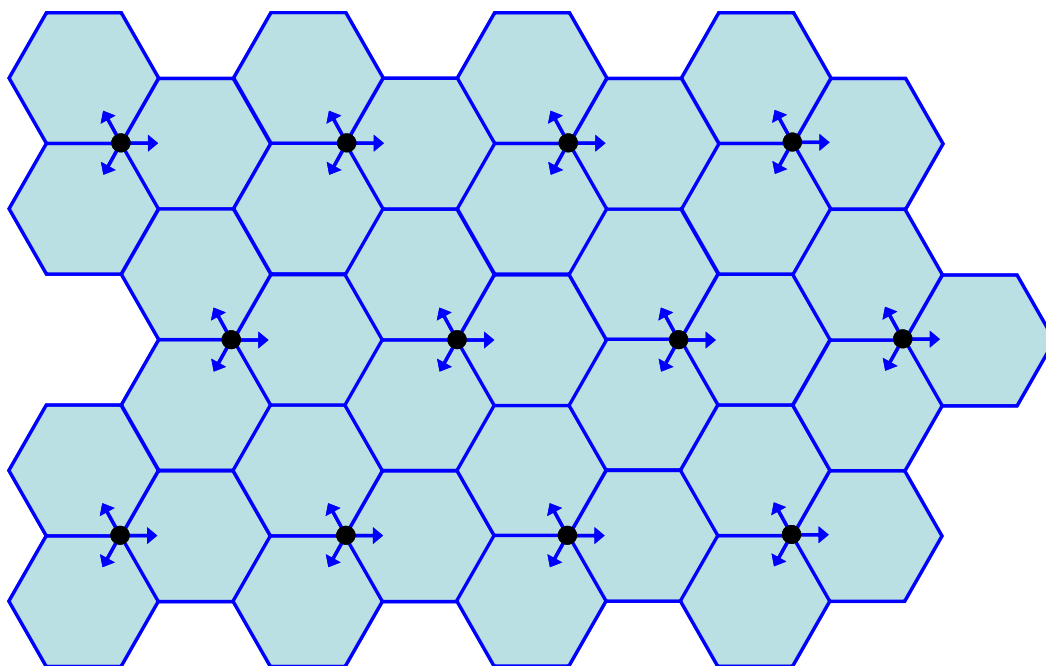


Figure 1: Nominal coverage from 850MHz network of 3 sector cellsites located in a regular grid and using consistent antenna directions

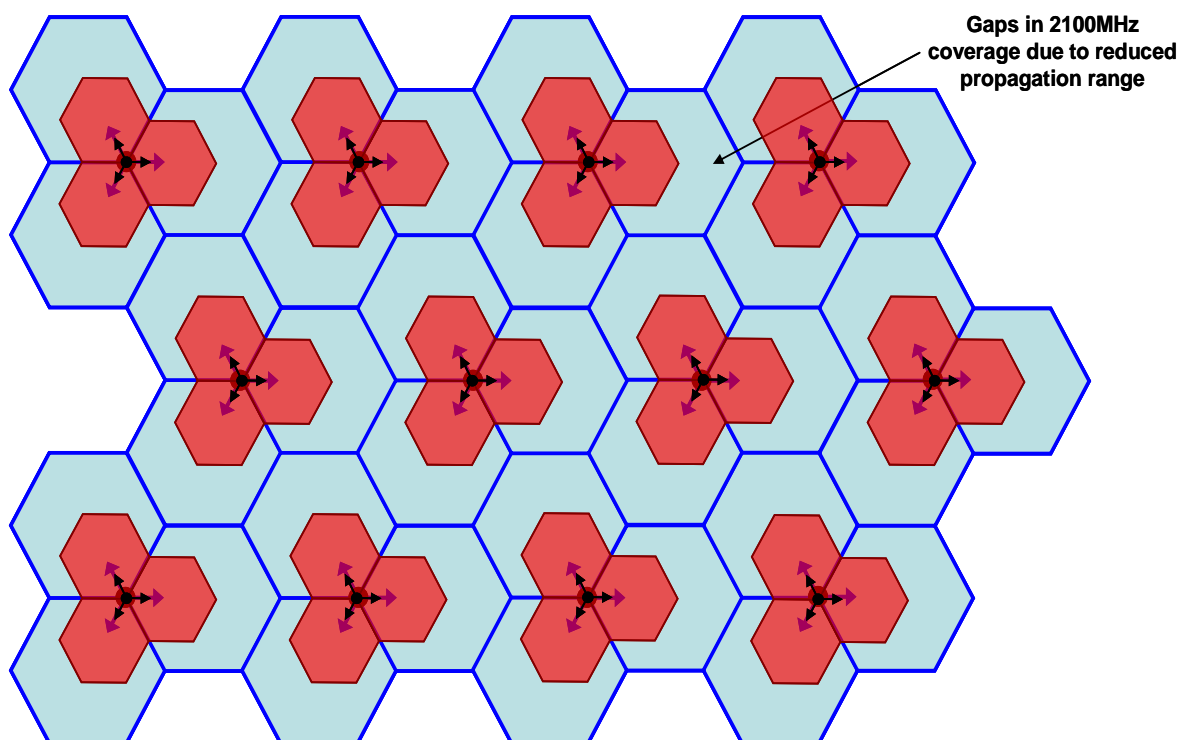


Figure 2: Nominal coverage from 850MHz network also overlaid with 2100MHz 3 sector cellsites – with both systems using same antenna directions

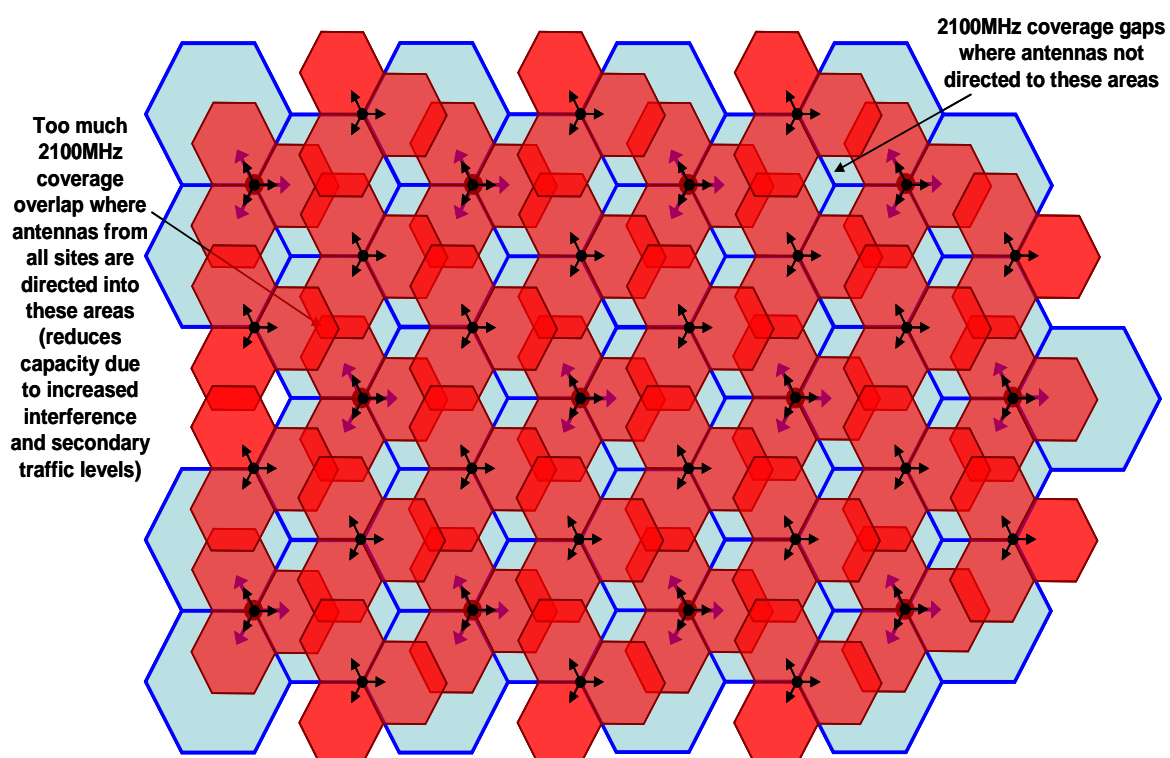


Figure 3: Nominal coverage from 850MHz network overlaid with 2100MHz 3-sector cellsites and additional infill 2100MHz sites – with all 2100MHz sites using same antenna directions as 850MHz sites

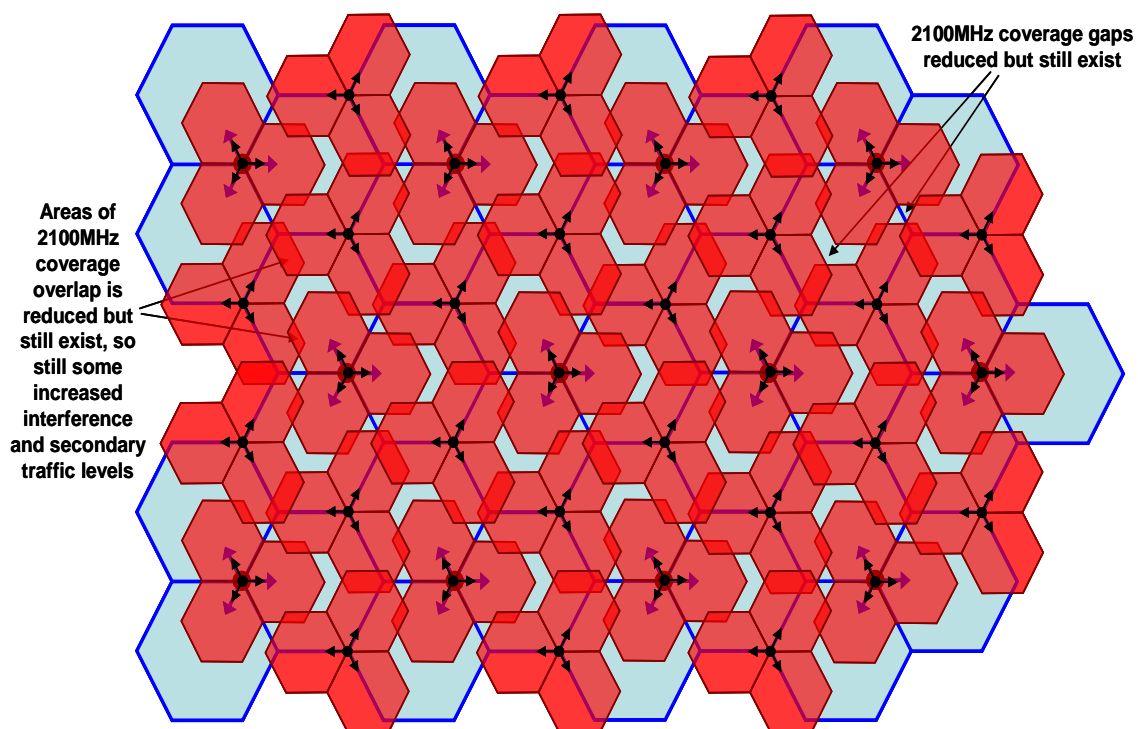


Figure 4: Nominal coverage from 850MHz network overlaid with 2100MHz 3-sector cellsites and additional infill 2100MHz sites – with 2100MHz overlay sites still maintaining 850MHz antenna direction but 2100MHz infill site antennas optimised to reduce coverage holes

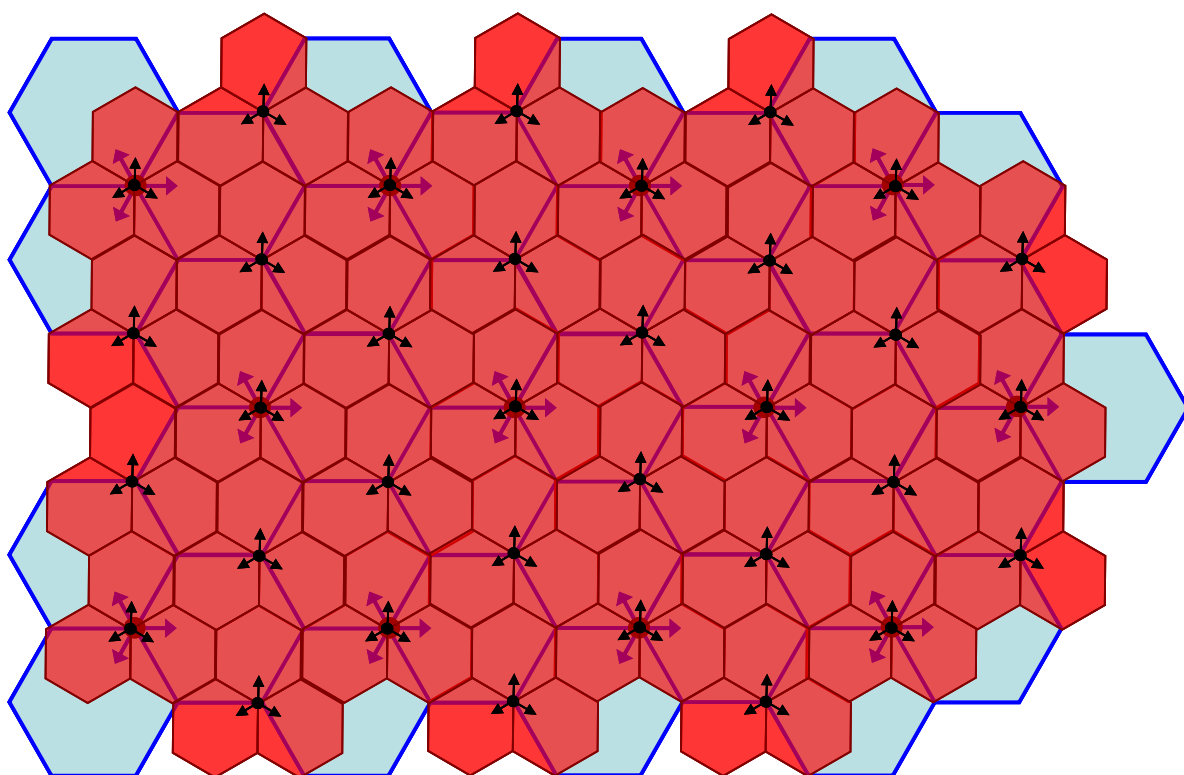
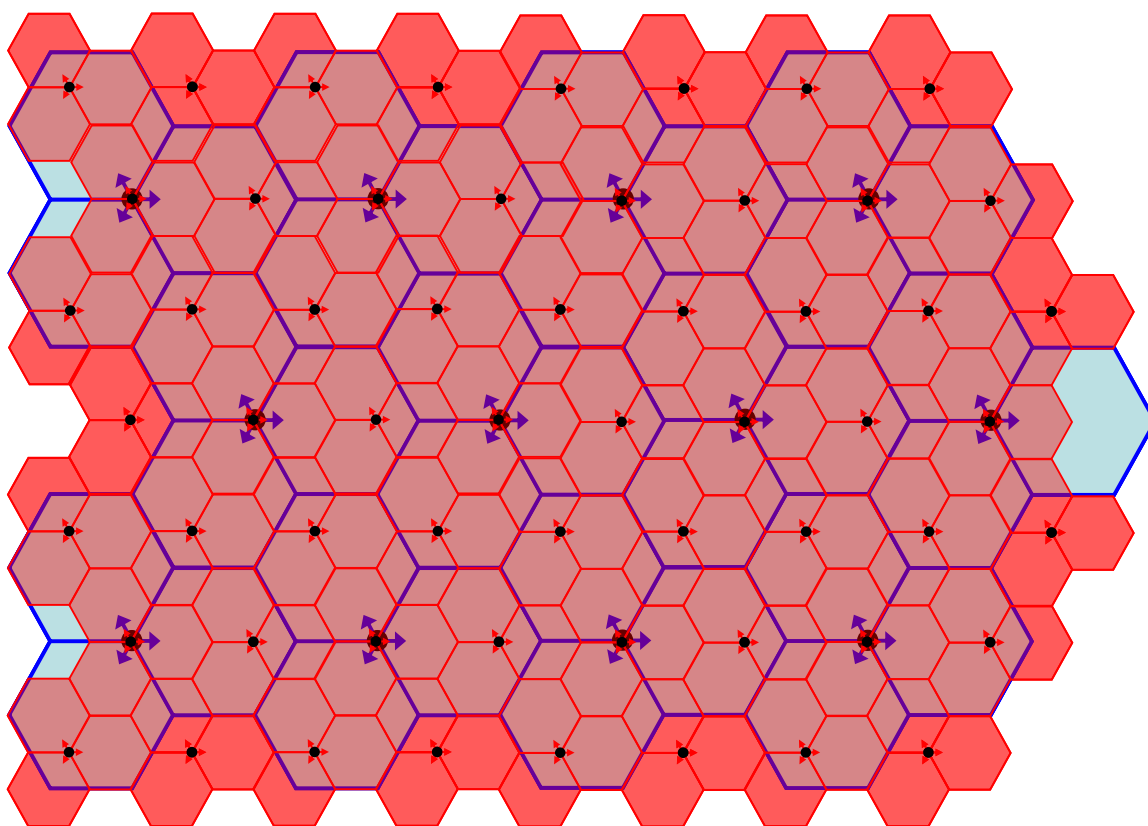


Figure 5: Nominal coverage from 850MHz network overlaid with 2100MHz 3-sector cellsites and additional infill 2100MHz sites – with all 2100MHz antennas optimised to eliminate coverage holes with 30 degree change in alignment from 850MHz antennas

12. This coverage management issue can be overcome if both 850MHz and 2100MHz equipment is installed at all sites, but then each infill site is more expensive and has increased visual impact (and RMA risk) compared to only deploying 2100MHz equipment at the infill site.
13. Alternatively even more additional 2100MHz infill sites could be deployed to allow for suboptimal 2100MHz antenna alignment and reduced coverage from the combined 850/2100MHz sites. Figure 6 below illustrates how a 2100MHz cellplan can share same antenna alignment as the 850MHz cellplan, but this plan requires 3 times the additional infill sites to provide complete network coverage instead of only 2 times as shown in Figure 5 above.



14. Both of these solutions result in increased costs for an Access Provider trying to maintain the quality of coverage provided to their end-user customers.

15. If the Access Provider does not deploy additional equipment at other sites to compensate for lost coverage, then the following table shows the reduced coverage that results from antennas not aligned in an optimal direction.

off axis (deg)	loss (dB)
0	0
5	-0.1
10	-0.3
15	-0.8
20	-1.4
25	-2.1
30	-2.9
35	-3.5
40	-4.4
45	-5.4
50	-6.3
55	-7.3
60	-8.4
65	-9.6
70	-10.6
75	-11.5
80	-12.2
85	-13.2
90	-14.4

Table 1: Link Budget impact associated with sub-optimal antenna alignment

### **Impacts of Antenna Minimisation Solutions on Customer Service**

16. As previously stated, Telecom NZ does not support the principle of Access Seekers being able to impose antenna minimisation solutions on Access Providers' existing services due to the negative impact that these antenna minimisation solutions will have on existing services and the customers using those services.
17. In particular, existing customers will unnecessarily lose in-building coverage provided from the Access Provider's existing services due to the degrading effects and impacts of antenna minimisation and other colocation solutions. Customers operating at the limit of

the available coverage link budget deep inside buildings would suddenly experience no service available to initiate calls, missed receipt of calls and delayed text messaging.

18. The availability of High Speed data rates (eg from EVDO, HSPA, HSPA+, WiMAX and LTE) will also be reduced for all existing data users operating from the collocation site due to the reduced link budget coverage levels and reduced C/I performance caused by the effects of reduced noise performance and of interference.
19. By contrast, when an Access Seeker deploys a collocation site solution, which may include some site design constraints, then the Access Seeker's customers will experience new coverage and does not suffer reduced service compared to what they were previously provided; ie no service has actually been lost or taken away from the Access Seeker's customers due to any collocation constraints.
20. Some proponents of wide scale mobile collocation may argue that NZ lacks a significant amount of radio collocation, speculating that existing operators are simply protecting their market. Telecom has shared its sites for many years with a number of operators of radio systems (commercial, competitive and emergency services) not just mobile operators, and realise the care that needs to be taken in many aspects of design and operation to avoid impacts on customer service. Collocation makes both site design and operation significantly more complex and makes service level maintenance more difficult. Perhaps this is the real reason that collocation is not so prolific. It would be counterproductive to introduce new mobile networks in precisely the same locations as existing mobile services and as a direct result degrade service especially to peripheral customer locations.