



**Consultation on Vodafone's Standard Terms Proposal
for Mobile Co-location**

Submission by
Kordia Group Limited

26 May 2008

1. Introduction

1.1 Kordia Group Limited (*Kordia*) thanks the Commerce Commission (*Commission*) for the opportunity to make this submission.

1.2 Kordia's contact person for the purpose of this submission is:

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2. Background

2.1 Kordia's submissions are directed at responding to issues raised by the Standard Terms Proposal (*STP*) received by the Commission from Vodafone New Zealand Limited (*Vodafone*) for the specified service described as *Co-location on Cellular Mobile Transmission Sites* in Part 3 of Schedule 1 of the Telecommunications Act 2001 (*Mobile Co-location Service*).

2.2 The STP includes the following related documents and appendices:

2.2.1 Order made by the Commerce Commission under Section 100 of the Commerce Act 1986, applied by Section 15(i) of the Telecommunications Act 2001;

2.2.2 Appendix 1 Telecommunications Carriers' Forum recommendations for final agreement at the mobile co-location working party meeting on 28 March 2008 (*TCF Recommendations*);

2.2.3 Co-location on Cellular Mobile Transmission Sites General Terms (*General Terms*);

- 2.2.4 Schedule 1 Co-location on Cellular Mobile Transmission Sites Service Description (*Schedule 1*);
- 2.2.5 Schedule 2 Co-location on Cellular Mobile Transmission Sites Service Level Terms;
- 2.2.6 Schedule 3 Co-location on Cellular Mobile Transmission Sites Operations Manual (*Schedule 3*);
- 2.2.7 Schedule 4 Co-location on Cellular Mobile Transmission Sites Access Terms;
- 2.2.8 Schedule 5 Co-location on Cellular Mobile Transmission Sites Interference Management and Design (*Schedule 5*); and
- 2.2.9 The Co-location and Cellular Transition Sites Implementation Plan (*Implementation Plan*).

3. References

- 3.1 All references to *co-location* relate to Mobile Co-location unless otherwise stated.
- 3.2 All references to capitalised terms relate to the terms defined in the STP and the Commission's report *The Telecommunications Act 2001: Schedule 3 Investigation into Amending the Co-location Service on Cellular Mobile Telephone Transmission Sites* dated 14 December 2007 (*Final Report*).

4. Summary

- 4.1 Kordia's principal concerns with the STP are the terms relating to interference management in Schedule 5.

4.2 Kordia considers that Vodafone's concept of "Unacceptable Performance Degradation" does not properly take into account the relevant requirements of the Radiocommunications Act 1989 (RA '89) and the Radiocommunications Regulations, in particular by:

4.2.1 Setting too low parameters (e.g. affecting service in more than a minor way); and

4.2.2 Inappropriately and unnecessarily duplicating mechanisms for interference management already available under the RA '89.

5. *STD Process*

5.1 The STP is part of the Standard Terms Determination (*STD*) process pursuant to the decision and recommendations to further co-location in New Zealand by the Commission in its Final Report.

5.2 In the Final Report, the Commission noted that in comparison to other OECD countries, New Zealand was under-performing and featured anticompetitive aspects of a highly concentrated market structure, significant barriers to entry and high pricing.

5.3 The Commission concluded that non-price and implementation issues may deter entry and these need to be addressed in order to facilitate more effective co-location on cellular mobile telephone transmission sites for the long-term benefit of end users.

5.4 The Commission did not accept Vodafone's proposed undertaking dated 19 January 2007, or either of the further two revised undertakings dated 2 November 2007. It instead opted to regulate further.

6. Degradation Concepts Require Clarification

6.1 Kordia expresses great concern over Vodafone's proposed definition of *Unacceptable Performance Degradation* (UPD) in para 143 of the STP and set out in Schedule 5 at clause 6.2.2.

6.2 Vodafone's proposed UPD definition is any one or more of the following:

- (a) isolation of less than 30dB between the antenna port of the Access Provider's receiving equipment and the Antenna port of the Access Seekers' transmitting equipment;
- (b) a total level of loss from the Access Provider's Link budget of more than 0.5 dB in either the uplink budget or the downlink budget;
- (c) performance degradation which affects the quality of service *in more than a minor way* (emphasis added).

6.3 Affecting services in *more than a minor way* is more restrictive than seriously *degrading radiocommunication* (see definition of *harmful interference* in the Radiocommunications Act 1989 discussed below). For example, some interference could arise that is more than minor but does not seriously degrade, obstruct or repeatedly interrupt radiocommunications.

6.4 At its worst, Vodafone's definition of UPD and its low parameters may ultimately act as a form of barrier to entry.

7. More than minor

7.1 It appears that Vodafone does not have committed to any service levels in any specific form to their standard pre-pay or on-account customers. In fact, Vodafone has specifically noted in its mobile connection terms and conditions to these customers that provision of a fault-free service is impossible:

"Coverage and Services

- (a) *While we will do our best to provide quality Services, because of the nature of mobile telecommunications, **it is impossible to provide a fault-free service** and the quality and coverage of the Services depends partly on your Mobile Device, partly on our network and partly on other providers and telecommunications networks to which our network is connected or connects. (emphasis added).*
- (b) *Coverage and Services can be adversely affected by radio interference, atmospheric conditions, geographic factors, network congestion, maintenance, outages on other networks and provider sites, the configuration or limitations of your, or your intended recipients, Mobile Device or other operational or technical difficulties which means that you may not receive some or all of the Services in certain areas or at certain times.*
- (c) *Coverage and Services can also change with network expansion or reconfiguration." (emphasis added)*

7.2 At clause 7.5.2(d) of Schedule 5 of the STP, Vodafone refers to:

The Access Provider not being able to meet its existing legal duties to provide a defined level of service to customers or end user

7.3 Assuming Vodafone based its UPD definition on the premise that minimum customer service levels must be retained; Kordia questions how an Access Seeker can be asked to co-locate in a manner that enables Vodafone to retain its agreed service levels to customers, when that standard has not been established.

7.4 Kordia suggests that there is a lack a symmetry resulting if Vodafone may impose a stricter requirement on Access Seekers when determining whether to allow co-location, than the standard established by Vodafone to its own customers, which Vodafone itself has not articulated or guaranteed.

- 7.5 Accordingly, Kordia proposes the deletion of Schedule 5, 7.5.2(d).
- 7.6 As all co-location will likely involve some degree of degradation the issue is not to have zero tolerance (or something minimal), but to take the forward looking approach and only discriminate against degradation that is unreasonable.
- 7.7 Kordia queries who would decide the criteria for what is "more than minor". This issue is relevant as the decider would greatly shape the outcomes and success of co-location.
- 7.8 Kordia considers the correct approach is to agree to levels of degradation consistently with the requirements of the RA '89.

8. Cellular Degradation Fluid

- 8.1 Kordia is concerned that by setting the UPD as low as it has in the STP, Vodafone is asking the Commission to ignore the fact that mobile services are in a state of constant change.
- 8.2 Kordia considers degradation in the context of cellular mobile telecommunications to be a matter that can be fluid over the short term. Coverage from cellular sites undergoes constant change (both increasing and decreasing), and is due to both external factors and the underlying cellular technology itself. For instance, where there is saturation of users of any mobile service in any geographic area (such as when a major sporting event occurs) or at a universally significant time (such as New Year's Eve), degradation of the service is inevitable.
- 8.3 External factors such as reflections from buildings, vehicles travelling past and other people can disrupt signals to and from the mobile handset. The factors largely occur near the mobile handset end of the propagation path from the base station (the base station itself is usually clear of these types of obstructions).
- 8.4 3G cellular services are based on CDMA technology which has a "softer" determination of the maximum number of users per cell than earlier technologies

such as GSM. The service (and number of users / throughput) is interference limited, where users in the cell interfere with each other. As the number of users in a cell increases, or the throughput demanded by those users increases, total interference in the cell rises, and those on the edge of coverage, or in marginal areas, may lose coverage (the cell "shrinks"). As demand is reduced total interference reduces and the cell's nominal coverage area is restored (known as "cell breathing"). Additionally, since all cells in a CDMA cellular system are usually on the same RF frequency, interference can come from other cells as well as users within the same cell.

- 8.5 Therefore, coverage, interference and service quality are dynamic parameters in a CDMA cellular system and Kordia is concerned that Vodafone's UPD standard does not adequately address this.

9. UPD should be Harmful Interference

- 9.1 The UPD definition is also of concern because it does not align with industry practice for defining acceptable levels of interference, nor does it align with the New Zealand RA '89, or the International Telecommunications Union's Radio Regulations regarding their definitions of *harmful interference*.
- 9.2 Sub-paragraph (c) of the UPD definition in particular does not comply with the definition of *harmful interference* defined in the RA '89.
- 9.3 In New Zealand the RA '89 is the legislation providing for managing use of and co-existence in the radio spectrum.
- 9.4 *Harmful Interference* is defined in the RA '89 as follows:

"harmful interference" means interference which endangers the functioning of a radionavigation service, or of other safety services, or seriously degrades, obstructs, or repeatedly interrupts Radiocommunications" (emphasis added)

9.5 The International Telecommunications Union (ITU-R) also defines *harmful interference* in Article 1 of the International Radio Regulations

harmful interference: Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with Radio Regulations (CS).

9.6 Clearly the definitions of *harmful interference* in both the New Zealand Radiocommunications Act and the ITU-R Radio Regulations are well aligned.

9.7 The part of these definitions which is relevant to cellular mobile co-location is:

... or seriously degrades, obstructs, or repeatedly interrupts radiocommunications.

9.8 There is a significant difference between the definition of *harmful interference* and the proposed definition of UPD in 6.2.1(c) of Schedule 5:

"...which affects the quality of Telecommunications Services in more than a minor way"

9.9 Section 25(5)(c) of the RA '89 requires that an Approved Radio Engineer, when certifying a spectrum licence, prior to its registration by the Registrar of Radio Frequencies (Registrar) must certify that in the opinion of the Approved Radio Engineer the use of that licence:

(c) will not cause harmful interference to rights conferred by registered spectrum or radio licences (emphasis added);

9.10 The statutory benchmark here is *harmful interference*. Accordingly the STP should be directed at interference that seriously degrades, obstructs or repeatedly interrupts radio communications, not that which affects the quality in more than a minor way.

10. Inability of Vodafone to Estimate the Long Term Benefit to End Users of Co-location

10.1 Kordia is concerned with the comments at para 142 of the STP where Vodafone notes:

"Hence, while Vodafone can provide estimates of the potential detriment that could be caused to end-users as a result of different levels of performance degradation [...], it is not aware of any estimates of the quantum of benefits consumer might be expected to experience as a result of co-location on a given relevant facility".

10.2 Kordia considers this statement indicates a misunderstanding of the issues that the STP and subsequent STD process is seeking to resolve.

10.3 The co-location issue is not about measuring the quantum of long term benefit from end users *for each individual* co-location site. The Commission has already noted that co-location has not been occurring at an efficient level (i.e. it is only at 0.5%) in the Final Report.

10.4 Co-location is a *collectively beneficial* arrangement for end users as a group, and it is irrelevant to isolate the need to establish a benefit at each and every potential co-location site.

10.5 Kordia submits that in the market for co-location services, each Mast will have the correct number of entrants where co-location is regulated to effect competition. Another Access Seeker will not co-locate where UPD would result. Prior testing will enable such Access Seeker to be aware whether this will occur i.e. beyond the maximum point of co-location, the laws of diminishing marginal returns will set in, and no further Access Seeker will wish to proceed.

11. Limitation Access Principles as Part of Colocation Design Principles

- 11.1 At para 159 Vodafone states *"Vodafone is not aware of any regulator that mandates an Access Provider to move, add or change its equipment in order to accommodate an Access Seeker"* in a way that contravenes the "Limits on Access Principles" listed under Part 3 of Schedule 1 of the Act, *OR* gives rise to changes that will exceed the acceptable level of performance degradation.
- 11.2 Kordia agrees that in theory, if the interference parameters are clarified, both aspects are correct.
- 11.3 However, Kordia objects to Vodafone's limiting statements that *"it is quite a serious matter to require an Access Provider to move, add or change[s] its equipment in order to accommodate another party"*.
- 11.4 Vodafone in their STP suggest a request to move, add or change its equipment in order for the Mobile co-location service to be provided, should only occur where (1) no other options are available, (2) where it does not compromise limits on access principles, and (3) where it might generate a net benefit to end users.
- 11.5 Kordia considers this three pronged approach to be unacceptable.
- 11.6 Although, Kordia accepts that the limits on the standard access principles prescribed under clause 6 of Schedule 1 of the Act are meant to apply as a safeguard of some minimum standards, it expresses concern at the above view. Vodafone appears to establish a need by Access Seekers to evidence a net benefit to end users. This position is unsustainable, even by Vodafone's own standards, where they state earlier that there is no way to quantify consumer benefits for individual co-location sites.
- 11.7 Kordia is also concerned with the first part of Vodafone's test that there are no other options available. This seems to place the default position to negate co-location in the first instance, unless proven otherwise. This is directly contrary to the intention of the Commission.

11.8 Kordia submits that the approach proposed indicates factors Vodafone may use in the rejection of applications. For that reason, Kordia wishes the words "*include but are not limited to*" be replaced with "*are*" in Schedule 3, 12.8.2.

12. Pragmatic Solutions Needed

12.1 Kordia notes that the Masts at pgs 46 and 47 of the STP are Masts in jurisdictions where co-location is regulated. Whilst Vodafone's current Masts may not be of the same standard as international Masts (including those presented in the STP at pgs 46 and 47), that does not excuse the need to find pragmatic solutions to enable co-location, for example adopting antenna minimisation approaches.

12.2 Kordia submits that whilst technical interference is easier to manage when transmitting and receiving antennas are located on the same Mast at differing heights this may not be optimal for co-location.

12.3 The vertical option described in Schedule 5, 7.2.2(b) (central image of Figure 5A) which involves centrally mounted antennas means that antennas located below the antenna at the top of the Mast will have a reduced coverage, especially when the height of the local clutter is close to the height of the Mast.

12.4 The Access Seeker may therefore suffer impaired coverage compared to the access provider due to the access seeker being located on the Mast below the access provider.

12.5 A solution to this is to require horizontal separation of antennas to enable co-location. This can be managed as suggested by Vodafone at para 7.2.2 (c) of Schedule 5.

12.6 As a solution to the interference management where horizontal separation of antennas can not be accommodated, the service provider could extend the Mast upwards to enable the access seeker to co-locate above the Access Provider.

12.7 The alternative to co-location is a distinctly more unfavourable outcome to both parties (i.e. additional site or Mast building creates an even greater extent of performance degradation). Accordingly, the degradation arguments outlined need to be weighed against detriments to the long term benefits against end users by not allowing co-location or forcing replication of the Mast. Kordia considers that ultimately co-location to enable a competitive environment is also more mutually beneficial to an Access Provider than having a potential Access Seeker replicate the Mast.

12.8 To maximise the efficient use of the Masts so that multiple operators can achieve good coverage, Kordia submits that there should be a requirement for the Access Provider to use antenna minimisation solutions and co-location RF filter solutions on existing equipment to facilitate co-location and avoid Mast replacement provided that:

12.8.1 These solutions should only be deployed when necessary; and

12.8.2 The overall impact of the co-location solution does not impact the performance of existing services by more than an agreed level.

13. Costs of Co-location

13.1 The assumption that the Access Seeker must bear all costs of getting to co-location reinforces the impression that co-location is a concession on the part of the Access Provider, as opposed to a regulatory obligation that is designed to offer long term benefits to end users. Kordia believes that the presumption that Access Seekers should pay dual costs for prior Desktop analysis needs to be challenged.

13.2 Kordia proposes therefore the deletion of Schedule 5, para 7.5.4 and instead proposes the following:

In the event that such a request is accepted by the Access Provider, the Access Seeker and the Access Provider will share all costs in equal shares associated with the request and its implementation.

13.3 Prior Desktop analysis need not be expensive. Kordia's engineering advisors suggest that options could be explored in the form of Masts being managed three dimensionally.

14. Access Providers - Measurement and Testing

14.1 In the Schedule 5, Measurement and Testing and Interference Management are discussed.

14.2 On overall review of the testing process and consideration of the desktop studies required, Kordia is concerned that the procedures may create further unnecessary delays, and foresees a situation where the testing of equipment, and preliminary approval process and the standards of measurement may be used to become a forum where battles of experts arises.

14.3 With any desktop study it is possible that another party could formulate a distinctly different desktop study outcome depending on the parameters used and terms of the study.

14.4 Whilst there is a place for preliminary testing, Kordia considers the drafting of Schedule 5 to be procedurally over prescribed and considers that much of the issues regarding UPD are over emphasised, as there will always be the fall back position where the Access Provider may take reasonably necessary steps to alleviate the UPD including the right to de-power or turn off the Access Seekers Equipment (see para 11.2.5).

15. Search UCLL Prioritisation and Queuing - Site Applications Maximum

15.1 Kordia is concerned that Vodafone is only prepared to consider 30 new site data pack applications in any month for the total number of access seekers. Kordia recognises that Vodafone may face resource constraints, but considers the figure

of 30 to be too low to enable the benefits of co-location to be realised. At para 106 of the STP, Vodafone states that potentially by month six, the Access Provider could be processing up to 180 applications all at different states in the end to end process.

- 15.2 Whilst Kordia appreciates there may be some degree of staggering of the work load in the process, it also expresses a concern that if such situation does arise and many co-location applications are still unimplemented after six months, i.e. the turnover of the applications into actual co-location is low, then it will be clear that this regulation has failed and the Commission should consider moving the co-location service to designated service status.

16. Cellular Mobile Telephone Network

- 16.1 The regulated service under the Act is a service that enables co-location of cellular mobile telephone network transmission and reception equipment.
- 16.2 Although *third generation cellular telephone network* is defined in Clause 1 of Schedule 1 of the Act, *cellular mobile telephone network* is not itself defined.
- 16.3 While Kordia agrees with Vodafone's submission that the Mobile Co-location service definition should not be extended in scope beyond what is set out in the Act, Kordia also considers that in defining the elements of that service for the purposes of the STD care should be taken not to unnecessarily or unduly narrow the scope.
- 16.4 For that reason Kordia submits that the definition of "cellular mobile telephone network", "Intercell Handover Functionality" and "Mobile Telecommunications Service" as set out in the recommendations of the TCF (although these were not unanimously agreed by the working party) should be used under preference to Vodafone's definition of Cellular Mobile Telephone Network in clause 1 of the Mobile Co-location General Terms.

17. *Unplanned Outages*

- 17.1 Kordia is concerned that clause 23.8 of the General Terms as inserted by Vodafone appears to give the Access Provider the ability to work on the Access Seeker's equipment. The Access Provider should only be entitled to turn off the Access Seeker equipment or withhold the power supply to it. Accordingly Kordia suggests clause 23.8.2 be deleted and the words "or 23.8.2" be deleted from clause 23.8.4.

18. *Health and Safety*

- 18.1 Under clause 40.1 of the General Terms Kordia queries whether for the purpose of the Mobile Co-location, the Access Provider will be working on the Access Seekers premises. If not, then clause 40.1 should be amended accordingly.

- 18.2 Clause 40.2 should be deleted and replaced with the following:

The Access Seeker and the Access Provider warrant while that they each comply with and will continue to comply with all approved codes of practice under the Health and Safety in Employment Act 1992 and other regulatory provision (safety or otherwise) connected with any obligations under the mobile co-location terms.

- 18.3 Clause 40.3 as added by Vodafone should be deleted. Kordia submits that it is not acceptable for the Access Seekers' employees to have enter onto the relative facilities pursuant to a regulated service at the Access Seeker's sole risk. Kordia submits that the Access Provider has statutory duties under the Health and Safety in Employment Act 1992 and regulations that it must comply with.

- 18.4 The Access Seeker already has to indemnify the Access Provider from and against any loss, damage or liability incurred by the Access Provider resulting from the failure by the Access Seeker or the Access Seeker's agents, contractors or employees to comply with Health and Safety in Employment Act 1992 or any

policies or procedures notified to the Access Seeker under clause 19.6.2 of the General Terms.

19. Greenfield Co-location

- 19.1 Kordia disputes Vodafone's submission (see paras 114-117 of Vodafone's STP) that because sites not yet built, they do not fall within the definition of the Mobile Co-location Service and that the process in relation to greenfield sites in section 11 of the Mobile Co-location Operations Manual is a voluntary one.
- 19.2 Vodafone asserts that the Mobile Co-location Service only extends to existing relevant facilities only.
- 19.3 The Act will apply as soon as any relevant facilities are used for the transmission or reception of telecommunications.
- 19.4 Vodafone shouldn't consider it does not have to have regard to the regulated service under the Act over any Masts not yet built. It would be contrary to public policy if Vodafone could continue to erect Masts that are not designed for the purpose of accommodating multiple operations.

20. Schedule 5 Redrafting with respect to the Radiocommunications Act 1989

- 20.1 Schedule 5 of Vodafone's draft STP dated 28 April 2008 states at clause 3.2:

The Regulations do not provide for the way in which Interference should be managed where such Interference arises out of mobile co-location where equipment is transmitting within its licensed terms. Such Interference may disrupt or degrade the performance of Telecommunications, Services, provided to Customers or End Users but the Regulations do not provide for dealing with this Interference (emphasis added).

- 20.2 Vodafone defines *Regulations* in this context as meaning both the Radiocommunications Act 1989 (RA '89) and Radio Communications Regulations 2001.

- 20.3 Kordia submits that the statement above is incorrect at law in that Part 12 of the RA '89 relates specifically to the issue of *Interference* (as defined in the RA '89) and sections 108 and 109 of the RA '89 are relevant specifically to the matter of interference from lawful transmission of radio waves (including cellular mobile transmissions) under a registered spectrum licence or radio licence.
- 20.4 Consequently, it is not necessary or appropriate for interference to be separately regulated within the purview of the Commission as part of the STD, given that there is adequate provision under the RA '89 for issues concerning interference to be dealt with under existing law, and that therefore the STP should be amended in accordance with this submission.

21. Interference

- 21.1 Vodafone has defined *Interference* under clause 2 of Schedule 5 of the STP.
- 21.2 Vodafone has sought to define the issue of interference management as being one related simply to *unwanted* interference (as opposed to Harmful Interference which is regulated under the RA '89) by otherwise using the definition of *Interference* contained within the RA '89 but adding the word *unwanted* as follows:
- The unwanted effect of radio waves owing to one or more emissions, radiations or inductions, or any combination of one or more of those things, on the reception of radiocommunications.*
- 21.3 Defining the *Interference* this way ignores that under the RA '89 the legislature has already provided a regime where it is *Harmful Interference* (as defined in the RA'89) only that requires resolution or management pursuant to sections 108 and 109.
- 21.4 Because a robust interference management regime already exists under the RA'89, there is no need for the STP to include an alternative to deal with *unwanted* interference as proposed by Vodafone.

21.5 *Harmful Interference* is defined in the RA '89 as:

Interference which endangers the functioning of a radionavigation service, or of other safety services, or seriously degrades, obstructs, or repeatedly interrupts radiocommunications.

21.6 Part 12 of the RA '89 deals specifically with the issue of interference management.

21.7 Sections 108 to 109 of the RA'89 are concerned with the Harmful Interference caused by lawful transmissions.

21.8 Section 108(1) reads:

Where a respondent is lawfully transmitting radio waves under a registered spectrum licence or radio licence, and those transmissions cause or contribute to harmful interference in the protection area of another registered spectrum licence or radio licence, the claimant may serve on the respondent a notice concerning that interference.

21.9 The subsequent sub-sections of section 108 and section 109 contain the processes under which issues related to Harmful Interference are to be dealt with in accordance with the RA '89.

21.10 It is helpful to look closely at the words used in section 108(1).

21.11 The transmission of radiocommunications at co-located cellular mobile transmission sites falls within the definition of *radiocommunications* under the RA '89 as such transmission involves *radio waves* as that term is defined in the Act.

21.12 Moreover, a *respondent transmitting* such radiocommunications under the terms of a *registered spectrum licence or radio licence* will be doing so *lawfully*.

21.13 Accordingly, if such transmission leads to a claim of *Harmful Interference*, being the only standard of interference necessary to require management under the law, then and only then is it necessary for sections 108 and 109 to be used to provide a process under which a resolution can be achieved.

22. Spectrum and Radio Licences


22.1 A party transmitting radiocommunications lawfully is required to first obtain a registered spectrum licence or radio licence under the RA '89.

22.2 Pursuant to section 25(4) of the RA '89, the Registrar of Radio Frequencies must not register any spectrum licence unless the Registrar receives, from or on behalf of the applicant for registration, a certificate from an approved radio engineer dated not more than 3 months before the receipt of that certificate by the Registrar.

22.3 Pursuant to section 25(5) of the RA '89 the approved radio engineer's certificate must certify that, in the opinion of that engineer, the exercise of rights to which the spectrum licence relates:

- (a) *Will not endanger the functioning of any radio navigation service;*
- (b) *Will not endanger the functioning of any radio service essential to the protection of life and property;*
- (c) *Will not cause harmful interference to rights conferred by registered spectrum or radio licences;*
- (d) *Is technically compatible with services authorised to be operated under existing spectrum licences and radio licences; and*
- (e) *Will sufficiently define the protection area and the nature and characteristics of the proposed transmissions to enable subsequent spectrum licences and radio licences to be co-ordinated with the exercise of rights to which the spectrum licence related for the purpose of avoiding harmful interference (emphasis added).*

22.4 Section 25A provides that an Approved Radio Engineer issuing a certificate under section 25 must, before issuing a certificate, have regard to:

- 
- (a) The nature and characteristics of the rights described in the spectrum licence;
 - (b) The International Radio Regulations;
 - (c) The ITU-R reports and recommendations;
 - (d) Annex 10 to the Convention of International Civil Aviation;
 - (e) The International Convention for the Safety of Life at Sea;
 - (f) The nature of the service proposed to be operated under the spectrum licence;
 - (g) and any relevant reference standards issued by the Secretary; but
 - (h) Must not, in considering whether to issue the certificate, have regard to the reception of radio waves by inappropriate receivers.

22.5 Accordingly, before issuing a certificate for a spectrum licence to permit transmission from a co-located mobile site the approved radio engineer is required by the RA '89 to go through an interference management and design process, which Kordia submits, is adequate for the purposes of the proper licensing of co-located mobile facilities.

22.6 However, in making this submission Kordia recognises that the matters that the approved radio engineer is required to take into account may not be or remain mobile co-location specific.

22.7 Kordia accepts that it would be beneficial if the parameters that define harmful interference could be agreed. To that end we set out our analysis on those parameters as Appendix B to these submissions and propose alternative to clause 6.2 of Schedule 5 of the STP in Appendix A.

22.8 However Kordia submits that if the Commission receives a consistent view from industry participants that certain matters relating to interference management (for

example parameters such as those contained in (amended) clauses 6.2.1(a) and 6.2.1(b) below) should be considered by the approved radio engineer before the issue of a certificate, the matter is properly dealt with under the auspices of section 133 of the RA '89 rather than the STP/STD.

22.9 Kordia refers the Commission to the section headed Guidelines/Standards below.

23. *Dispute Resolution*


23.1 If any other spectrum licence holder or radio licence holder subsequently claims harmful interference in the protection area of the claimant's licence, the further provisions of section 108 and the provisions of section 109 apply and under those provisions if the matter cannot be resolved between the parties it may be referred to arbitration by the Secretary (i.e. the Chief Executive of the Ministry of Economic Development) pursuant to section 109.

23.2 Kordia submits that the RA '89 already sets out dispute resolution procedures specifically related to *harmful interference* at sections 108 and 109 which are the appropriate procedures for resolving all disputes related to Interference management under the STP. It is therefore not appropriate that disputes related to interference be resolved under the procedures set out in section 39 of the Mobile Co-location General Terms as proposed by the Vodafone STP.

24. *Guidelines/Standards*

24.1 Under Schedule 5, Vodafone is seeking standards set down under the Telecommunications Act 2001 (and therefore under the purview of the Commission) which are designed to prevent, as well as to resolve, issues related to *unwanted interference*.

24.2 If such guidelines or standards are deemed necessary or desirable, the RA '89 already provides at section 133 that the Chief Executive of the Ministry of



Economic Development (i.e. the Secretary under the RA '89) may issue reference standards or specifications relating to the performance of:

- (a) Any radio apparatus;
- (b) Radio apparatus of any class or classes;
- (c) Any system for the effecting of radiocommunication, whether by transmission or reception, or both.

24.3 Accordingly, the RA '89 and in particular ss.25, 72A, 108, 109, 133 provides the proper legal context and mechanisms for interference management, and while it is related to the Mobile Co-location Service, the Commission should not include this in any standard terms determination.

APPENDIX A: RECOMMENDED AMENDMENT TO SCHEDULE 5

For the reasons set out in its main submission, Kordia submits that Vodafone's draft Schedule 5 should be amended as follows:

Definitions and Interpretation

Add *Harmful Interference* has the meaning given to that term in the Radiocommunications Act 1989.

Add *Dispute Resolution Procedures* means the procedures set out in sections 108 and 109 of the Radiocommunications Act 1989.

Amend *Interference* to read has the meaning given to that term in the Radiocommunications Act 1989.

Delete *Unacceptable Performance Degradation* and in the general text of the draft STP replace the words *Unacceptable Performance Degradation* wherever they appear with the words *Harmful Interference*.

3 Radiocommunications Act 1989

Clause 3.2: delete the words *do not* which appear after the word *Regulations* and insert the word *and* in place of the word but where that word appears after the words *End Users*.

6 Unacceptable Performance Degradation now Harmful Interference

Replace clause 6.2.1 with the following:

6.2.1 For the purposes of this Interference Management and Design Document Harmful Interference includes without limitation;

- (a) *isolation of less than 30 dB between the Antenna port of the Access seeker's transmitting equipment and the Antenna port of the Access Provider's receiving equipment; and*
- (b) *a total level of loss from Access Provider's Link Budget of more than 1.0 dB in either the uplink budget or the downlink budget;*
- (c) *an incremental 5% increase in outages in Telecommunications Services.*

10 Procedures for Interference Management in Mobile Co-Location

Insert the words *Dispute Resolutions Procedures* (i.e. the procedures set out in sections 108 and 109 of the Radiocommunications Act 1989) in place of the following phrases wherever they appear:

- 1.1 *expert determination in the Dispute Resolution procedure in section 39 of the Mobile Co-location General Terms;*
- 1.2 *Disputes Resolution process*
- 1.3 *Dispute Resolution procedures in section 39 of the Mobile Co-location General Terms; and*
- 1.4 *Dispute Resolution.*
- 1.5 *At para 10.1.13 delete (a), (b) and (c) reference to a minimal risk of interference, given that we have earlier suggested a replacement of all references to UPD by Harmful Interference.*


11 Protocol for Ongoing Interference Management

Insert the words *Dispute Resolutions Procedures* (i.e. the procedures set out in sections 108 and 109 of the Radiocommunications Act 1989) in place of the following phrases wherever they appear:

- 1.1 *expert determination in the Dispute Resolution procedure in section 39 of the Mobile Co-location General Terms; and*
- 1.2 *Dispute Resolution procedures in section 39 of the Mobile Co-location General Terms.*

13 Licensing

Replace clause 13.1.1 with the following:



13.1.1 *Nothing in this Interference Management and Design document limits the need for Spectrum Licences and Radio Licences to be registered with the Registrar of Radio Frequencies in accordance with the Radiocommunications Act 1989.*

Delete clauses 13.1.2 and 13.1.3.

APPENDIX B – PARAMETERS OF HARMFUL INTERFERENCE

2. Drafting Interference

- 2.1 The TCF could not agree to quantify the parameters that would define acceptable and unacceptable interference.
- 2.2 Interference can be either nominally *constant* in level, or may *vary with time*. Hence a definition of the threshold between acceptable and unacceptable interference should address both aspects of interference.

3. Constant interference


- 3.1 Sub-paragraph 6.2.1(b) of the UPD definition describes an acceptable 0.5 dB degradation in the link budget addresses constant interference. This may be more conservative than industry practice for *constant* interference to mobile cellular systems.
- 3.2 Report ITU-R M.2109 "Sharing studies between IMT Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 and 4 500-4 800 MHz frequency bands" describes a method for calculating the *constant* interference and gives in Table 3 of that report, as the sharing criterion:
- 3.3 "*protection criterion (I/N) interference to individual base station*" of $I/N = -6$ dB.
- 3.4 In engineering terms, interference I which is 6 dB below the receiver noise floor N results in a noise floor degradation or link budget degradation of 0.97 dB, which is usually rounded off to "1.0 dB". This is more lenient than the 0.5 dB loss from the access provider's Link Budgets proposed by Vodafone.
- 3.5 Although Report M.2109 refers to sharing studies between IMT-2000 (which is ITU-R term for third generation cellular mobile systems, or "3G" systems) and *satellite networks*, the principle for interference to IMT-2000 systems is the same when the interference is from other IMT-2000 systems or mobile cellular systems.

- 3.6 Report M.2109 notes in Table 3 that only for interfering services that do not have a primary allocation status in the band, does the criterion become $I/N = -10$ dB. In engineering terms, this translates to a loss of Link Budget of 0.5 dB.
- 3.7 This industry standard figure of -6 dB I/N resulting in Link Budget reduction of 1.0 dB is also supported by Report ITU-R M.2030, which in discussing criteria for maximum allowable interference (MAI) in the case of co-located base stations, gives the following definition (in section 4.2.1.4) for MAI:
- 3.8 $MAI_{Desen.} (dBm) = Noise\ floor (dBm) + Receiver\ noise\ figure - 6\ dB$, which results in a 1.0 dB Link Budget reduction, as noted above.
- 3.9 Hence Kordia believes that the correct figure to use in the UPD definition, subpart (b) would be 1.0 dB, not 0.5 dB.

4. Time varying interference

- 4.1 A number of parameters have been used in the industry to describe acceptable thresholds for *time varying* interference. Such parameters include:
- (a) **Outage:** The proportion of dropped calls due to interference, compared with the proportion of dropped calls in the absence of the interference.
 - (b) **Area reduction:** The proportional reduction in the area within the cell that the service is available, relative to the area availability without the particular interference
 - (c) **Cell capacity:** The proportional decrease in the number of users or the data throughput that a cell can support in the presence of the interference, relative to the number without the interference.
- 4.2 Each of these and similar "statistical" parameters can quantify what is *acceptable interference* when it is of a time varying nature. Sub clause 6.2.1(c) would be better quantifying some of these parameters for time varying interference, than proposing interference that is "more than minor".

- 4.3 Recommendation ITU-R M.1635 "General methodology for assessing the potential for interference between IMT-2000 or systems beyond IMT-2000 and other services" gives a thorough description of the methodology for determining both *continuous* and *time varying* interference to "3G" and "4G" cellular mobile systems.
- 4.4 Report ITU-R M.2041 "Sharing and adjacent band compatibility in the 2.5 GHz band between the terrestrial and satellite components of IMT 2000 " describes two methods of analysing interference between IMT-2000 systems in adjacent bands:
- (a) The first approach used for continuous interference is the minimum coupling loss (MCL) method. For this method the report notes "... in T [terrestrial] IMT 2000 systems, the interference usually results in loss of capacity and/or of coverage."
 - (b) The second approach is the Monte Carlo simulation, which gives a probability of interference for the given set of parameters and a deployment and power control model.
- 4.5 This Monte Carlo approach is used for *time varying* interference. The report notes in section 2.2, the threshold for acceptable *time varying* interference;
- (i) *The acceptable interference probability used in Monte Carlo studies will depend on the scenario under consideration. For example, in the case of interference between MES and the terrestrial UE, the maximum acceptable interference probability for terrestrial IMT 2000 CDMA direct spread, is considered to be 2%.*
- 4.6 This is clarified in section 2.1.2.1:



When considering T IMT 2000 simulation, a level around 2% of probability of interference is required to ensure the agreed 5% of outage.

... It is also possible to accommodate this kind of interference in the system design by adjusting powers or by changing the link budget margin requirements.

Kordia believes that an agreed definition of the threshold for harmful interference should include a quantified parameter for time varying interference such as: an incremental 5% increase in outage.

ENDS