STANDARD TERMS DETERMINATION FOR CO-LOCATION ON CELLULAR MOBILE TRANSMISSION SITES

SCHEDULE 5
MOBILE CO-LOCATION INTERFERENCE MANAGEMENT AND DESIGN

PUBLIC VERSION

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1 Introduction

1.1 This Mobile Co-location Interference Management and Design document (**Interference Management and Design document**) forms part of the Mobile Co-location Terms. This Interference Management and Design document sets out the procedures for managing Interference in relation to the Mobile Co-location Service.

2 Definitions and Interpretation

2.1 References to clauses or sections are references to clauses and sections in this Interference Management and Design document unless expressly stated otherwise. The definitions set out in the Mobile Co-location General Terms and the Mobile Co-location Operations Manual apply to the extent that they are not expressly modified by or inconsistent with the context of this Interference Management and Design document. This Interference Management and Design document should be read in conjunction with the Mobile Co-location Operations Manual.

2.2 Any Access Provider obligation and/or procedure in respect of Access Provider Equipment in this Interference Management and Design document, including (without limitation):

(a) design principles as set out in section 7;

(b) measurement and testing as set out in section 8;

(c) procedures for Interference management as set out in section 9; and

(d) protocols for ongoing Interference management as set out in section 10,

includes an obligation on the Access Provider to use all reasonable commercial endeavours to ensure that equivalent obligations and/or procedures apply in respect of third parties who operate radiocommunications equipment installed and operating on or with the Relevant Facility, and who are not Existing Co-locators.

2.3 **Definitions**. For the purposes of this Interference Management and Design document, the following definitions apply:

Agreed Standard Solution	has the meaning set out in clauses 9.1.8(a) and 9.1.12(a).
Call Failure Rate	means the proportion of: (a) dropped calls; or (b) call setup failures, in each case, where any increase in the proportion of dropped calls or call setup failures is directly attributable to the Access Seeker co-locating at the Relevant Facilities.
dB	means decibels.
Design Principles	means those principles set out in section 7.
Desktop Analysis Meeting	has the meaning set out in clause 9.1.7.

Disagreed Solution	has the meaning set out in clause 9.1.12 (b).
EIRP	means effective isotropic radiated power.
Existing Co-locator	means any other Access Seeker who has installed and operates equipment on or with the Relevant Facilities.
Expert Determination	means a determination by an expert, in accordance with the procedures set out in clause 35.8 of the Mobile Co-location General Terms, and in accordance with the objectives and the principles of this Mobile Co-location Interference Management and Design document.
Interference	means 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 radio communications that form part of the Mobile Co-location Service.
Isolation	means the loss between the Antenna port of the Access Seeker's transmitting base station equipment and the Antenna port(s) of the existing receiving base station(s).
ITU	means the International Telecommunications Union.
Link Budget	means a calculation of power and noise levels between the transmitter and receiver (uplink or downlink) in a Cellular Mobile Telephone Network. A Link Budget takes account of all gain and loss factors to yield operating values of Signal to Noise Ratio and/or Bit Error Rate (BER). A Link Budget accounts for attenuation of the transmitted signals due to propagation; antenna gains; cable, connector, device and miscellaneous losses.
Maximum Configuration	has the meaning set out in clause 9.4.11.
Non-Compliant Solution	has the meaning set out in clause 9.1.12 (c) and 9.6.2.
Parties	includes, where the context requires, any Existing Co-locators.
Performance Degradation	has the meaning set out in clause 6.1.1.
Radiocommunication	means the transmission or reception of signs, signals, writing, images, sounds, or intelligence of any nature by radio waves as part of a Cellular Mobile Telephone Network.
Regulations	has the meaning set out in clause 3.1.
RF	means radio frequency.
Testing Procedures Meeting	has the meaning set out in clause 9.1.9.
Unacceptable Performance Degradation	has the meaning set out in clause 6.2.

3 Radiocommunications Act 1989

3.1 The Radiocommunications Act 1989 and Radiocommunications Regulations 2001 (together, the **Regulations**) provide for the management of radio frequency spectrum, and include provisions in relation to interference to receivers.

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 licence terms. Such Interference may cause Unacceptable Performance Degradation of Radiocommunications services provided to end-users but the Regulations do not necessarily provide for dealing with this Interference.

3.3 This Interference Management and Design document therefore sets out how Access Seekers and Access Providers will manage Interference specifically in relation to the Mobile Co-location Service.

4 Scope

4.1 This Interference Management and Design document sets out the following:

4.1.1 the objectives of managing Interference in relation to the Mobile Co-location Service;

4.1.2 the levels of Unacceptable Performance Degradation in relation to the Mobile Co-location Service;

4.1.3 Design Principles to avoid Unacceptable Performance Degradation; and

4.1.4 procedures for Interference management in co-location.

5 Objectives

5.1 **General Overview**

5.1.1 Radiocommunications services utilise RF and can cause Interference, but the risk of Unacceptable Performance Degradation can be reduced if providers of such services have in place, and abide by, design principles and testing protocols.

5.1.2 This Interference Management and Design document sets out design principles and testing protocols and the requirements that must be met by the Parties as part of the Mobile Co-location Service.

5.2 **Specific Objectives**

5.2.1 The objectives of this Interference Management and Design document are to:

(a) set out how Interference issues which arise with respect to the Mobile Co-location Service can be resolved in a timely manner;

(b) set out efficient solutions to maximise the use of physical resources as part of the Mobile Co-location Service;

(c) reflect the principle that Access Seekers shall not implement solutions which will, or will be likely to, degrade the performance or standard of existing Telecommunications Services to Customers beyond an acceptable level;

(d) reflect the principle that Access Providers shall not implement solutions which will, or will be likely to, degrade the performance or standard of existing Telecommunications Services to Customers beyond an acceptable level;

(e) set out a way in which provision is made for new and evolving Telecommunications Services and technologies, so that end-users may benefit from technology advances; and

(f) promote the long-term interests of end-users and the efficiency of the New Zealand Telecommunications industry.

6 Unacceptable Performance Degradation

6.1 Performance Degradation

6.1.1 Performance degradation in relation to the Mobile Co-location Service is a reduction in the level of quality of Radiocommunications service provided by the Access Provider and any Existing Co-locators to end-users and includes, but is not limited to, a rise in noise floor, loss of system gain, and losses suffered from electrical or physical causes (**Performance Degradation**).

6.1.2 Performance Degradation may affect Customers, for example, without limitation, through an increase in the number of dropped calls; call set-up failures; reduced call quality; reduced throughput; outage-time; and/or a reduction in or loss of Telecommunications Services.

6.1.3 Performance Degradation may be observed by Telecommunications Service providers through Customer complaints and/or statistical performance data including, without limitation, traffic volume; drop call rate; call setup failure rate; handover failure rate; quality (such as bit error and block error rates); attach failure rate; PDP[1] activations failure rate; throughput reduction or failure; location update failure rate; IMSI[2] update failure rate; and paging failure rate.

6.2 **Unacceptable Performance Degradation**

6.2.1 Subject to clause 6.2.4 “Unacceptable Performance Degradation” in this Interference Management and Design document means any one or more of the following:

(a) Isolation of less than 30dB between the Antenna port of the Access Seeker’s transmitting equipment and the Antenna port of the Access Provider’s receiving equipment or any Existing Co-locator’s transmitting or receiving equipment;

(b) a total level of degradation to the Access Provider’s or Existing Co-locator’s Link Budget of more than 0.5dB in either the uplink budget or the downlink budget;

(c) an incremental 5% increase in the Access Provider’s or Existing Co-locator’s Call Failure Rate. Any increase in Call Failure Rate is to be assessed:

[1] Packet Data Protocol

[2] International Mobile Subscriber Identity

(i) prior to Phase 1 of the Project Closure Checklist under section 20 of the Mobile Co-location Operations Manual; and

(ii) over a period with a reasonable number of calls and a mix of call types representative of the traffic at the Relevant Facility.

6.2.2 The degradation to the Access Provider's or Existing Co-locator's Link Budget is to be calculated as the difference between the pre co-location Link Budget and the post co-location Link Budget, where each Link Budget takes into account the existing system parameters and propagation conditions (noise floor, signal propagation losses, antenna and other system gains, receiver sensitivities at both ends, and losses including cable, connector, device and other miscellaneous losses).

6.2.3 The noise floor elevation (NFE) used in determining the degradation to the Access Provider's or Existing Co-locator's Link Budget will exclude internal interference originating within the Access Provider's network, and will be calculated as follows:

$$NFE = 10 * \log_{10}\left(\frac{N_{NF} + I_{Ext}}{N_{NF}}\right)$$

Where: N_{NF} = power level (Watt) of the noise floor
I_{Ext} = power level (Watt) of the interfering signal

6.2.4 The Parties may agree to a higher level of Performance Degradation than the definition of Unacceptable Performance Degradation set out in clause 6.2.1 in respect of individual Relevant Facilities. When such an agreement is reached in writing between the relevant Parties ,that level will be the agreed "Unacceptable Performance Degradation" for the specific co-location service in respect of that Relevant Facility.

7 Design Principles

7.1 The following clauses set out the co-location design principles.

7.2 **Isolation**

7.2.1 This section of the Interference Management and Design document sets out the design principles for how Isolation between the Access Seeker Equipment the Access Provider Equipment and the equipment of any Existing Co-locators may be achieved and managed.

7.2.2 Generally, Isolation can be achieved by various means including, without limitation:

(a) the separation of frequency bands;

(b) the physical horizontal and/or vertical separation of Antennas;

(c) the selection of Antenna gain, size and beam width to decrease the Interference;

(d) the use of filters to prevent:

(i) receiver blocking. Blocking in this sense means desensitisation of equipment which contributes to Performance Degradation;

(ii) spurious emissions. Spurious emissions in this sense means unwanted transmitter power; and

(iii) intermodulation. Intermodulation in this sense means the result of two or more forming additional signals that cause interference; and

(e) the use of shielding, by physical blocking.

7.3 **Isolation Drivers**

7.3.1 Factors which drive the need for Isolation include, without limitation:

(a) the level of net interference energy, which has several components including, without limitation, the energy resulting from:

- Adjacent Channel Selectivity (ACS) (as described in Report ITU-R M.2031) of the interfered receiver system;
- Adjacent Channel Leakage Ratio (ACLR) (as described in Report ITU-R M.2031) of the interfering transmitter system; and
- Intermodulation of one or more transmitters interfering with the receiver system.

(b) the degree to which equipment will not deliver ideal performance, for example, due to the aging of equipment.

7.3.2 The consequences of these factors on Isolation are influenced by, without limitation:

(a) the transmitter power levels and modulation of the Parties' equipment;

(b) the susceptibility of the receiver to net Interference energy; and

(c) the inter-system Isolation between transmitters and receivers, for base station and cellular mobile equipment.

7.4 **Antenna Separation**

7.4.1 The physical separation of Antennas is a common way in which Isolation can be achieved.

7.4.2 The distance required for the physical separation of Antennas used for the Mobile Co-location Service cannot be easily deduced by calculation because the co-located Antennas are in the "near field" rather than the "far field". For these reasons, Isolation needs to be verified on a Site-by-Site basis.

7.4.3 In addition to the Isolation between Parties' equipment, the following design considerations should be taken into account by the Access Seeker when designing the Antenna separation distances:

(a) new Antennas should not unacceptably degrade the performance of other Antennas (including, without limitation, Interference that may occur if a new Antenna were to cause Interference by its beam azimuth crossing existing Antenna beam azimuth(s));

(b) the physical blockage of Antennas is to be avoided;

(c) Antenna separation shall allow for adequate space for the installation of Antenna ancillaries including, without limitation, remote electrical tilts, mast head amplifiers and feeders. Such Antenna ancillaries must occupy the space efficiently;

(d) access to the Antennas and their ancillaries for the purpose of maintenance should always be allowed; and

(e) the maintenance of Antennas and their ancillaries shall be carried out in such a way as to minimise outages to the other Party and any other third parties.

8 Measurement and Testing

8.1 Procedure for Measurement and Testing

8.1.1 This section sets out the requirements for measurement and testing the level of Interference for Unacceptable Performance Degradation and suggests some ways in which testing and measuring may be done.

8.1.2 Measurement and testing may be designed, implemented and performed at a test facility and on each of the Relevant Facilities where Access Seeker Equipment is installed in order to assess whether Unacceptable Performance Degradation is occurring to either the Access Providers' Equipment or to the equipment of the Existing Co-locators. The requirement to test at a test facility may be waived if the Parties agree. Measurement and testing shall be undertaken by the Access Seeker with the support of the Access Provider and any Existing Co-locators as required. The Access Provider and any Existing Co-locator may observe these tests, and have the right to a copy of all test results. This testing may be necessary when any of the co-locating parties rearrange their equipment.

8.1.3 The objective of performing such measurement and testing is to confirm that there is a low risk of any Unacceptable Performance Degradation occurring, and enable any identified Performance Degradation to be minimised (to a point where the Unacceptable Performance Degradation is not exceeded) including through the use of any or all of the following:

(a) Antenna Minimisation;

(b) Antenna rearrangement; and

(c) Mast extension, revision or replacement.

8.1.4 The Parties will share the results of such measurements and testing and attempt to align and agree the results. Where any testing results do not conclusively establish the existence of Unacceptable Performance Degradation, then the results will be deemed to be conclusive evidence of the absence of Unacceptable Performance Degradation.

8.1.5 The following are two separate approaches that contain examples of tests that may be undertaken:

(a) the Parties may test for Isolation to determine the likely "worst case" Interference mechanisms based on Antenna arrangements and/or Access Seeker Equipment configurations. For the worst case configuration(s) of the Access Seeker Equipment, the Parties will test the following elements at Maximum Configuration (the configuration requested by the Access Seeker) and at full power with a normal mix of traffic modulations and bursting (or using simulations):

(i) Measure the receiver sensitivity degradation and/or noise rise and/or blocking and/or other losses on the Access Provider Equipment and the equipment of any Existing Co-locator. This can be due to spurious emissions and intermodulation arising from the Access Seeker

Equipment. The following are examples of tests which may be undertaken to measure Link Budget loss:

- sweep the entire receive band of the Access Provider Equipment and the equipment of any Existing Co-locator with a low noise spectrum analyser then tune the receiver to the band where effects are found to assess the Interference (e.g. loss of receive sensitivity and/or noise rise) when the Access Provider Equipment is transmitting. This test should be done for all the Access Seeker transmitter systems and bands versus Access Provider and any Existing Co-locator receiver systems and bands in the worst case Antenna arrangement.

- Operate (or simulate) weak wanted signal (weak mobile for base station receive case). Observe indications of performance degradation (e.g. BER, noise rise, SQI), tune the receiver though the receive band to observe effects).

(ii) Measure the Isolation between the Parties' co-located Antennas in the worst case Antenna arrangement. These tests should be done for all the Access Seeker transmit systems and bands versus Access Provider and any Existing Co-locator receiver systems and bands in the worst case Antenna arrangement. The following test is an example of tests that may be undertaken to measure isolation:

- Transmit a CW sweeping signal from the Antenna port of the Access Seeker Equipment and receive the CW sweeping signal on the Antenna port of the Access Provider Equipment and any Existing Co-locator Equipment. This must be performed over the Access Seeker's transmit band and the Access Provider's and any Existing Co-locator's receive band(s).

(b) The Parties may carry out a full test to determine the possible Interference mechanisms. This would involve exhaustive testing to attempt to minimise the possibility of Unacceptable Performance Degradation occurring as follows:

- Test all systems on the Relevant Facilities, one to the other;

- Test all carriers on all cells, one to the other (exhaustive);

- Test the full range of Antenna arrangements and equipment configurations;

- Tests for sensitivity losses including noise rise, receiver blocking and desensitisation due to any effect of co-location including without limitation emissions (wanted or unwanted) and intermodulation distortion occurring when the Access Seeker's Equipment is installed or operated.

- Limits under the Access Seeker's Application shall be fully 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.

- System performance measurements for weak wanted received signals including without limitation Speech Quality Index (SQI), Bit Error Rate (BER) and noise rise as appropriate to the technology to ensure Unacceptable Performance Degradation criteria are 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.

8.2 Test Equipment

8.2.1 This section sets out the requirements for test equipment and how testing may be conducted.

8.2.2 The Parties' actual equipment shall be used for the tests where possible.

8.2.3 The transmit power levels and modulations need to be from, or need to adequately simulate, the real life target systems. If simulation is used, the receiver noise performance and Interference performance characteristics should reflect the specification of the Parties' equipment.

8.2.4 The equipment used by the Parties to test must operate in its linear operation range and must have adequate blocking, sensitivity and linearity, so that results show the actual Interference affects of the Parties' equipment.

8.2.5 Spectrum analysers signal generators, and other test equipment, shall have their calibration traceable back to a primary standard.

9 Procedures for Interference Management in Mobile Co-location

9.1 Determination of Agreed Standard Solutions and Disagreed Solutions.

9.1.1 This section sets out the procedures for determining whether solutions shall be Agreed Standard Solutions or Disagreed Solutions.

9.1.2 At any time the Access Seeker may propose to the Access Provider a solution for a co-location installation that conforms with this document.

9.1.3 The solution must specify the combination of services (e.g. technology, frequency) to be provided by the Access Seeker Equipment, the standard site RF configurations, Antenna separation, Antenna arrangement, proposed Antenna geometry, RF filters and devices, frequency and bandwidth, EIRP and any other relevant details of the Access Seeker Equipment and proposed changes to the Access Provider Equipment and any Existing Co-locator(s) equipment. This shall include details of the distances and dimensions of the Mast structure and the Antennas of the Parties.

9.1.4 The Access Seeker is to provide an analysis of the projected level of Interference and Performance Degradation in relation to the proposed solution.

9.1.5 The Access Provider will acknowledge the receipt of the analysis referred to in clause 9.1.4 within 4 Business Hours of receipt.

9.1.6 Following receipt of the proposed solution, the Access Provider and any Existing Co-locators will undertake a desktop study of the Interference and Performance Degradation that may occur. This study is to be provided within 15 Working Days of receipt the Access Seeker's solution proposal.

9.1.7 The Parties will meet to discuss the results of the Interference analysis within 20 Working Days of the Access Seeker's solution proposal (this meeting to be referred to as the "Desktop Analysis Meeting"), unless the Parties agree in writing that the risk of Performance Degradation is low, and that the Desktop Analysis Meeting is not required.

9.1.8 The outcome of the Desktop Analysis Meeting will be one of two scenarios:

(a) If the Parties agree, at all times acting in good faith, that the paper-based Interference study (i.e. a desktop study) indicates minimal risk of Unacceptable Performance Degradation to the Access Provider Equipment and to the equipment of any Existing Co-locators, both existing and forecasted at the Relevant Facilities in accordance with the provisions of the Mobile Co-location Operations Manual, then the solution shall be defined as an "Agreed Standard Solution", and may be deployed in accordance with clause 9.4; or

(b) If any of the Parties do not believe that the paper-based studies indicate minimal risk of Unacceptable Performance Degradation, then testing replicating the proposed solution configuration should be undertaken at a suitable test facility to confirm the extent of the Interference.

9.1.9 If testing is required by the Desktop Analysis Meeting, the Parties will meet within five Working Days of the completion of the Desktop Analysis Meeting, to discuss the nature of the tests to be completed, including, without limitation, the designated agreed test environment ("Testing Procedures Meeting"). If no agreement is reached after five Working Days, any of the Parties can advance the issue using Expert Determination.

9.1.10 Any testing will be completed within 20 Working Days of the Testing Procedures Meeting, or within a mutually agreed timeframe or as determined by Expert Determination in the dispute resolution process.

9.1.11 Testing may be required before Relevant Facilities are operational, or when changes are proposed to a Relevant Facility. The costs of any testing shall be met by the party proposing the changes to the Relevant Facilities.

9.1.12 The outcome of the testing process will be one of three scenarios:

(a) If the Parties agree that the testing indicates a minimal risk of Unacceptable Performance Degradation, the solution becomes an Agreed Standard Solution and may be implemented in accordance with the protocol provided in clause 9.4; or

(b) If any of the Parties do not agree that the testing indicates a minimal risk of Unacceptable Performance Degradation, the solution shall be defined as a Disagreed Solution, and may be implemented in accordance with the protocol provided in clause 9.5; or

(c) If the Parties agree that the testing indicates a significant risk of Unacceptable Performance Degradation the solution shall be a Non-Compliant Solution, and will not be built.

9.2 It is accepted that testing and analysis prior to the installation and operation of Access Seeker Equipment can only approximate reality and cannot eliminate the possibility that Unacceptable Performance Degradation will actually occur. For that reason, testing and monitoring once the Access Seeker Equipment is operating at the Relevant Facilities is required.

9.3 If a Full Site Application is rejected in accordance with the provisions of the Mobile Co-location Operations Manual solely for reasons relating to Unacceptable Performance Degradation, at the Access Seeker's request, the Parties will meet within five Working Days to revise those elements of the Full Site Application for which the Application was rejected. If the revised elements cannot be agreed within 10 Working Days, or such other time as may be agreed, then the Access Seeker can either:

9.3.1 progress the issue as a Disagreed Solution in accordance with clause 9.5; or

9.3.2 advance the issue using Expert Determination.

9.4 Protocol for deployment of an Agreed Standard Solution

9.4.1 This section sets out how an Agreed Standard Solution may be deployed and how it will be tested to avoid Unacceptable Performance Degradation occurring.

9.4.2 If the revised elements are agreed under clause 9.3, the Access Seeker may deploy that solution using this clause 9.4.

9.4.3 Once the Access Seeker Equipment has been commissioned and integrated on or with the Relevant Facilities in accordance with clause 20.3 of the Mobile Co-location Operations Manual, the Access Seeker shall design a measurement and testing program to test for Unacceptable Performance Degradation. The Access Seeker shall obtain the Access Provider's and any Existing Co-locators' approval of the program. If the Access Provider or any Existing Co-locator does not approve the program, such approval not to be unreasonably withheld, the Parties will meet within five Working Days to agree a measurement and testing program. If, within a further 10 Working Days a measurement and testing program has not been agreed, the Access Seeker can advance the issue using Expert Determination.

9.4.4 Following the approval, agreement or imposition of a measurement and testing program, the Access Seeker shall, unless it is agreed otherwise, undertake that measurement and testing program at the Relevant Facilities.

9.4.5 If, during the measurement and testing program, the Access Provider or any Existing Co-locator reasonably believes that there is more than a minimal risk of Unacceptable Performance Degradation occurring it will give Notice of this to the Access Seeker.

9.4.6 Upon receipt of such Notice, the Access Seeker will ensure no Unacceptable Performance Degradation occurs until a solution is agreed or is imposed by the Disputes Resolution process referred to in clause 9.4.8.

9.4.7 The Parties will meet within one Working Day of the Notice to attempt to resolve the issue. The Parties will work together in good faith to find a solution.

9.4.8 If the Parties cannot agree a solution within five Working Days, then the issue can be advanced using Expert Determination procedure of the dispute resolution procedures in section 35 of the Mobile Co-location General Terms.

9.4.9 If the Access Provider and any Existing Co-locators agree that the measurement and testing program referred to in clauses 9.4.3 and 9.4.4, indicates no more than a minimal risk of Unacceptable Performance Degradation occurring the Access Seeker may proceed to give Notice under clause 9.4.10.

9.4.10 The Access Seeker must provide to the Access Provider and any Existing Co-locator at least 10 Working Days' Notice of the intention to start radiating power.

9.4.11 When the Access Seeker begins to radiate power from the Access Seeker Equipment at the Relevant Facilities, it will operate at maximum configuration for the first five days of radiation. "Maximum Configuration" means the maximum power and the maximum number of channels and carriers which have been agreed with the Access Provider and any Existing Co-locators for the Access Seeker Equipment installed at the Relevant Facilities, (**Maximum Configuration**).

9.4.12 If it is not possible to operate at or simulate the Maximum Configuration then prior to the Access Seeker radiating the Parties will meet within one Working Day to discuss a solution. If a solution cannot be found, the Access Seeker shall give ten Working Days' Notice prior to increasing the configuration of the Access Seeker Equipment at the Relevant Facilities. The steps in clauses 9.4.10, 9.4.11, and 9.4.14 - 9.4.27 will then apply as if the increase in configuration is the start of the radiating from the Relevant Facilities.

9.4.13 If a solution is found then the Access Seeker Equipment at the Relevant Facilities will operate at Maximum Configuration for five days.

9.4.14 If, during the five days of operating at Maximum Configuration, the Access Seeker experiences Unacceptable Performance Degradation, it will give notice to the Access Provider and any Existing Co-locators.

9.4.15 Upon receipt of a Notice given under clause 9.4.14, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that the Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.4.16 If, during the five days of operating at Maximum Configuration, the Access Provider or any Existing Co-locator reasonably believes that there is Unacceptable Performance Degradation it will give Notice of this to the Access Seeker.

9.4.17 Upon receipt of such Notice, the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities, as requested by the issuer of the Notice. Either an existing Co-locator or the Access Provider can issue this notice.

9.4.18 The Parties will meet within one Working Day of the Notice of Unacceptable Performance Degradation given under clause 9.4.14 to attempt to resolve the issue. The Parties will work together mutually and in good faith to find a solution. This solution will not impose Unacceptable Performance Degradation on the Access Provider Equipment.

9.4.19 If the Parties cannot agree a solution within five Working Days of the meeting under clause 9.4.18, then the issue can be advanced using Expert Determination procedure of the dispute resolution procedures in section 35 of the Mobile Co-location General Terms. Until a solution is found, whether by agreement or through dispute resolution, the Access Seeker must not permit the Unacceptable Performance Degradation to continue.

9.4.20 If no Unacceptable Performance Degradation is observed during the five days of operation at Maximum Configuration then, provided Phase 1 of the Project Closure Checklist has been approved by the Access Provider under section 20 of the Mobile Co-location Operations Manual, the Access Seeker Equipment may operate in its normal configuration.

9.4.21 If, at any stage during the first two months of operation at normal configuration, the Access Seeker experiences Unacceptable Performance Degradation it will give Notice to the Access Provider and any Existing Co-locators.

9.4.22 Upon receipt of a Notice given under clause 9.4.21, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that the Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.4.23 If at any stage during the first two months of operation at normal configuration, the Access Provider or any Existing Co-locator reasonably believes that Unacceptable Performance Degradation is occurring, it will give Notice of this to the Access Seeker.

9.4.24 Upon receipt of such Notice, the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all the Access Seeker Equipment at the Relevant Facilities.

9.4.25 The Parties will meet within one Working Day of the Notice given under clause 9.4.23 attempt to resolve the issue. The Parties will work together mutually and in good faith to find a solution.

9.4.26 If the Parties cannot agree on a solution within five Working Days, then the issue can be advanced using Expert Determination. Until a solution is found, whether by agreement or through dispute resolution, the Access Seeker must not permit the Unacceptable Performance Degradation to continue.

9.4.27 If there is no Unacceptable Performance Degradation at the conclusion of the two months of operation at normal configuration the Access Seeker may proceed to prepare Phase 2 of the Project Closure Checklist referred to in section 20 of the Mobile Co-location Operations Manual.

9.4.28 If the Access Seeker fails to comply with its obligations under clauses 9.4.17, 9.4.19, 9.4.24 or 9.4.26 then the Access Provider shall be entitled to take such steps as are reasonably necessary to alleviate Unacceptable Performance Degradation. This shall include, without limitation, taking steps to gain access to the Access Seeker Equipment, or any Utility Services used by the Access Seeker, to de-power or completely turn off the Access Seeker Equipment.

9.5 Protocol for the Deployment of a Disagreed Solution

9.5.1 This section sets out how a Disagreed Solution may be deployed and how it will be tested to avoid Unacceptable Performance Degradation occurring.

9.5.2 If the Access Seeker wishes to proceed with a Disagreed Solution it will give Notice of this to the Access Provider and any Existing Co-locators.

9.5.3 The Parties will meet within ten Working Days of receipt of the Notice to revise the proposed solution. The issue can be advanced using Expert Determination.

9.5.4 If a revised solution is agreed by the Parties, the Access Seeker may make a Full Site Application. If Preliminary Site Approval is issued the solution shall be deployed in accordance with this clause 9.5.

9.5.5 Once the Access Seeker Equipment has been commissioned and integrated on or with the Relevant Facilities in accordance with clause 20.3 of the Mobile Co-location Operations Manual, the Access Seeker shall design a measurement and testing program to test for Unacceptable Performance Degradation. The Access Seeker shall obtain the Access Provider's and any Existing Co-locators' approval of the program. If the Access Provider or any Existing Co-locator does not approve the program, such approval not to be unreasonably withheld, the Parties will meet within five Working Days to agree a measurement and testing program. If, within a further ten Working Days, a measurement and testing program has not been agreed, the Access Seeker can advance the issue using Expert Determination.

9.5.6 Following the approval, agreement or imposition of a measurement and testing program, the Access Seeker shall, unless it is agreed otherwise, undertake that measurement and testing program at the Relevant Facilities.

9.5.7 If, during the measurement and testing program, the Access Provider or any Existing Co-locators reasonably believes that there is more than a minimal risk of Unacceptable Performance Degradation occurring it will give Notice of this to the Access Seeker.

9.5.8 Upon receipt of such Notice, the Access Seeker will ensure no Unacceptable Performance Degradation occurs until a solution is agreed or is imposed by the Disputes Resolution process referred to in clause 9.5.10.

9.5.9 The Parties will meet within one Working Day of the Notice to attempt to resolve the issue. The Parties will work together mutually and in good faith to find a solution.

9.5.10 If the Parties cannot agree a solution within five Working Days, then the issue can be advanced using Expert Determination.

9.5.11 If the Access Provider and any Existing Co-locators agree that the measurement and testing program referred to in clauses 9.5.5 and 9.5.6 indicates no more than a minimal risk of Unacceptable Performance Degradation occurring the Access Seeker may proceed to give Notice under clause 9.5.12.

9.5.12 The Access Seeker must provide to the Access Provider and any Existing Co-locator at least 20 Working Days Notice of the intention to start radiating power.

9.5.13 The Access Seeker may only begin to radiate power during a low traffic period, as reasonably determined by the Access Provider. The Access Seeker will radiate power for a period of no more than 30 minutes and will then stop radiating.

9.5.14 If, during or as a result of the radiation period referred to in clause 9.5.13, the Access Seeker experiences Unacceptable Performance Degradation, it will give Notice to the Access Provider and any Existing Co-locators.

9.5.15 Upon receipt of a Notice given under clause 9.5.14, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that the Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.5.16 If, during the radiation period referred to in clause 9.5.13, either the Access Provider or any Existing Co-locator reasonably believes that Unacceptable Performance Degradation is occurring, it will give Notice of this to the Access Seeker.

9.5.17 Upon receipt of a Notice given under clause 9.5.16, the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities, as requested by the issuer of the Notice.

9.5.18 If the Parties are satisfied that there is no Unacceptable Performance Degradation occurring during or as a result of the 30 minutes of radiation undertaken pursuant to clause 9.5.13 then the Access Seeker may give Notice to the Access Provider that it will proceed to activate the Access Seeker Equipment at the Relevant Facilities at limited power levels and capacity, for no more than one hour, and then shut down. The limited power levels, capacity and the hour shall be determined by the Access Provider in consultation with any Existing Co-locators.

9.5.19 If, during or as a result of the radiation period referred to in clause 9.5.18 , the Access Seeker experiences Unacceptable Performance Degradation, it will give Notice to the Access Provider and any Existing Co-locators.

9.5.20 Upon receipt of a Notice given under clause 9.5.19, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.5.21 If either the Access Provider or any Existing Co-locator reasonably believes that there is Unacceptable Performance Degradation occurring during or as a result of the radiation period referred to in clause 9.5.18, it will give Notice of this to the Access Seeker.

9.5.22 Upon receipt of a Notice given under clause 9.5.21, the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities, as requested by the issuer of the Notice.

9.5.23 If the Parties are satisfied that there is no Unacceptable Performance Degradation occurring during or as a result of the radiation period referred to in clause 9.5.18 then the Access Seeker will give Notice to the Access Provider that it intends to activate the Access Seeker Equipment at the Relevant Facilities at full power levels and full capacity for no more than one hour and shall then stop radiating. The full power levels, capacity and hour shall be determined by the Access Provider.

9.5.24 If, during or as a result of the radiation period referred to in clause 9.5.23 , the Access Seeker experiences Unacceptable Performance Degradation, it will give Notice to the Access Provider and any Existing Co-locators.

9.5.25 Upon receipt of a Notice given under clause 9.5.24, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that the Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.5.26 If either the Access Provider or any Existing Co-locator reasonably believes that there is Unacceptable Performance Degradation occurring during or as a result of the radiating period referred to in clause 9.5.23, it will give Notice of this to the Access Seeker.

9.5.27 Upon receipt of a Notice given under clause 9.5.26 , the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities, as requested by the issuer of the Notice.

9.5.28 If the Access Seeker, Access Provider and any Existing Co-locator are satisfied that there is no Unacceptable Performance Degradation occurring during or as a result of the radiating period referred to in clause 9.5.23, then the Access Seeker will give Notice to the Access Provider that it intends to activate the Access Seeker Equipment at the Relevant Facilities at full power levels and full capacity for one day and then stop radiating. The full power levels and full capacity shall be determined by the Access Provider.

9.5.29 If, during or as a result of the radiation period referred to in clause 9.5.28, the Access Seeker experiences Unacceptable Performance Degradation, it will give notice to the Access Provider and any Existing Co-locators.

9.5.30 Upon receipt of a Notice given under clause 9.5.29, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that the Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.5.31 If either the Access Provider or any Existing Co-locator reasonably believes that there is Unacceptable Performance Degradation occurring during or as a result of the radiating period referred to in clause 9.5.28, it will give Notice of this to the Access Seeker.

9.5.32 Upon receipt of a Notice given under clause 9.5.31, the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities, as requested by the issuer of the Notice.

9.5.33 If the Parties are satisfied that there is no Unacceptable Performance Degradation occurring during or as a result of the radiating period referred to in clause 9.5.28, then the Access Seeker may proceed to activate the Access Seeker Equipment at the Relevant Facilities under normal operating conditions supporting standard commercial traffic for one day and then stop radiating.

9.5.34 If, during or as a result of the radiation period referred to in clause 9.5.33 , the Access Seeker experiences Unacceptable Performance Degradation, it will give notice to the Access Provider and any Existing Co-locators.

9.5.35 Upon receipt of a Notice given under clause 9.5.34, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that the Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.5.36 If either the Access Provider or any Existing Co-locator reasonably believes that there is Unacceptable Performance Degradation occurring during or as a result of the radiating period referred to in clause 9.5.33, it will give Notice of this to the Access Seeker.

9.5.37 Upon receipt of a Notice given under clause 9.5.36 , the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities, as requested by the issuer of the Notice.

9.5.38 If the Parties are satisfied that there is no Unacceptable Performance Degradation occurring during the radiating period referred to in clause 9.5.33, then, provided Phase 1 of the Project Closure Checklist has been approved by the Access Provider under section 20 of the Mobile Co-location Operations Manual, the Access Seeker may proceed to activate the Access Seeker Equipment at the Relevant Facilities under normal operating conditions supporting standard commercial traffic on a continuous basis.

9.5.39 If, at any stage during the first twelve months of normal operation, the Access Seeker experiences Unacceptable Performance Degradation, it will give Notice of this to the Access Provider and any Existing Co-locators.

9.5.40 Upon receipt of a Notice given under clause 9.5.39, the Parties shall meet to discuss and agree a solution to the Unacceptable Performance Degradation, provided that the Parties shall not be required to agree to any solution that causes Unacceptable Performance Degradation that cannot be avoided in accordance with this Mobile Co-location Interference Management and Design document.

9.5.41 If at any stage during the first twelve months of normal operation, the Access Provider or any Existing Co-locator reasonably believes that Unacceptable Performance Degradation is occurring, it will give Notice of this to the Access Seeker.

9.5.42 Upon receipt of a Notice of Unacceptable Performance Degradation given under clause 9.5.41, the Access Seeker will immediately take measures to alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities.

9.5.43 If a Notice of Unacceptable Performance Degradation is given under any of clauses 9.5.14, 9.5.21, 9.5.24, 9.5.31, 9.5.36 and 9.5.39, the Parties will meet within one Working Day of the Notice to attempt to resolve the issue. The Parties will work together mutually and in good faith to find a solution.

9.5.44 If the Parties cannot agree on a solution within five Working Days, then the issue can be advanced using Expert Determination. Until a solution is found, whether by agreement or through dispute resolution, the Access Seeker must not permit Unacceptable Performance Degradation to occur. If a solution is found, then the Access Seeker may take the next step (if any) of the radiation period testing or, if that testing is complete, may return to operation in accordance with the solution.

9.5.45 If at any stage during the testing the Parties agree that Unacceptable Performance Degradation is occurring, the solution will be deemed to be a Non-Compliant Solution.

9.5.46 The Access Seeker may not make any change to the solution tested in this section, other than as agreed with the Access Provider and Existing Co-locators, as provided for in this section 9. Any change will require a new Application.

9.5.47 If the Access Seeker fails to comply with its obligations under clauses 9.5.22, 9.5.27, 9.5.28, 9.5.37, 9.5.30, 9.5.32, 9.5.35, 9.5.42, 9.5.44, 9.5.46 or 9.5.48 then the Access Provider and any Existing Co-locator shall be entitled to take such steps as are reasonably necessary to alleviate Unacceptable Performance Degradation. This shall include, without limitation, the right to gain access to the Access Seeker Equipment, or any Utility Services used by the Access Seeker, to de-power or completely turn off the Access Seeker Equipment.

9.5.48 If the Parties cannot agree on a solution within five Working Days, then the issue can be advanced using the dispute resolution procedure in section 35 of the Mobile Co-location General Terms. Until a solution is found whether by agreement, Expert Determination or through dispute resolution, the Access Seeker must not permit the Unacceptable Performance Degradation to continue.

9.5.49 If there is no Unacceptable Performance Degradation at the conclusion of the 12 months of operation at normal configuration the Access Seeker may proceed to prepare Phase 2 of the Project Closure Checklist referred to in section 20 of the Mobile Co-location Operations Manual.

9.6 Non-Compliant Solution Protocol

9.6.1 The Access Seeker will not build any Non-Compliant Solutions, and any solutions which become Non-Compliant shall be removed. If the Access Seeker and Access Provider agree that Unacceptable Performance Degradation occurs from a Disagreed Solution, the Disagreed Solution will at that point become a Non-Compliant Solution and shall be removed.

9.6.2 If as a result of dispute resolution the Access Seeker may not radiate from the Relevant Facilities, or where it is decided in the dispute resolution process that any radiation from the Access Seeker Equipment at the Relevant Facilities will cause Unacceptable

Performance Degradation, then this shall be deemed to be a Non-Compliant Solution and shall be removed.

10 Protocol for Ongoing Interference Management

10.1 This section sets out how Unacceptable Performance Degradation which occurs outside the time frames of clauses 9.4 and 9.5 shall be managed but it shall only apply where the Access Seeker and the Access Seeker Equipment complies with both the terms of the Full Site Application and the solution finally agreed under clauses 9.4 or 9.5.

10.1.1 If at any time after:

(a) the first two months of normal operation of an Agreed Standard Solution; or

(b) the first twelve months of normal operation of a Disagreed Solution;

any of the Parties reasonably believes that Unacceptable Performance Degradation is occurring it may give Notice requiring the other Party or Parties to meet to attempt to resolve the issue.

10.1.2 If such Notice is given by any Party or any Existing Co-locator (**Affected Party**), the Affected Party will undertake testing to establish the cause of the Interference.

10.1.3 The Parties and any Existing Co-locator will facilitate the testing undertaken by the Affected Party.

10.1.4 Parties will meet as soon as practicable but within five Working Days of the Notice and agree that they will work together to identify techniques to avoid or mitigate Unacceptable Performance Degradation.

10.1.5 If the Parties cannot agree to appropriate mitigation methods or the mitigation methods agreed, do not reduce the Performance Degradation to an acceptable level, then the issue can be advanced using Expert Determination

10.2 This section sets out how Unacceptable Performance Degradation which occurs outside the time frames of clauses 9.4 and 9.5 shall be managed where the Access Provider determines that the Access Seeker and/or the Access Seeker Equipment does not comply with either the Full Site Application or the solution finally agreed under clause 9.4 or 9.5. This section shall apply regardless of whether the Access Seeker has obtained a Permit to Work or Planned Work Approval under the Mobile Co-location Operations Manual.

10.2.1 If at any time after:

(a) the first two months of normal operation of an Agreed Standard Solution; or

(b) the first twelve months of normal operation of a Disagreed Solution;

either the Access Provider or any Existing Co-locator reasonably believes that Unacceptable Performance Degradation is occurring it may give Notice of this to the Access Seeker.

10.2.2 Upon receipt of such Notice, the Access Seeker will immediately take measures to:

(a) restore the installation so that it is compliant with the Approved Solution; and

(b) alleviate the Unacceptable Performance Degradation up to and including de-powering and/or completely turning off some or all of the Access Seeker Equipment at the Relevant Facilities.

10.2.3 The Parties will meet within one Working Day of the Notice of Unacceptable Performance Degradation to attempt to resolve the issue. The Parties will work together mutually and in good faith to find a solution.

10.2.4 If the Parties cannot agree on a solution within five Working Days, then the issue can be advanced using the dispute resolution procedures in section 35 of the Mobile Co-location General Terms. Until a solution is found, the Access Seeker must not permit Unacceptable Performance Degradation to occur.

10.2.5 If the Access Seeker fails to comply with its obligations under clauses 10.2.2 and 10.2.4 then the Access Provider shall be entitled to take such steps as are reasonably necessary to alleviate Unacceptable Performance Degradation. This shall include, without limitation, the right to gain access to the Access Seeker Equipment, or any Utility Services used by the Access Seeker, to de-power or completely turn off the Access Seeker Equipment.

11 Expansion or Modification of Access Seeker Equipment

11.1 This section sets out how Access Seeker Equipment may be modified or expanded. This section shall not apply to Access Seeker Equipment which was deployed as a Disagreed Solution.

11.1.1 In the event that the Access Seeker wishes to expand or modify (other than reduce) the configuration of any Access Seeker Equipment, it must follow the procedure for making a Planned Work Application (clause 46.4 of the Mobile Co-location Operations Manual). “Expand or Modify” in this clause shall exclude maintenance, repairs or fault rectification which, under the Mobile Co-location Operations Manual, require only a Permit to Work.

11.1.2 In the event that the Access Seeker expands and/or modifies (other than reducing) the Access Seeker Equipment at a Site without complying with clause 11.1.1 or clause 9.4.11, the Access Provider or any Existing Co-locator may give Notice to the Access Seeker requiring it to immediately de-power and/or switch off the Access Seeker Equipment.

11.1.3 Upon receipt of such Notice the Access Seeker shall immediately de-power and/or switch off the Access Seeker Equipment.

11.1.4 If the Notice relates to a failure to comply with clause 9.4.11 then the Access Seeker may only reactivate the Access Seeker Equipment once it has complied with clauses 9.4.10, 9.4.11, and 9.4.14 - 9.4.27.

11.1.5 If the Notice relates to a failure to comply with clause 11.1.1, then the Access Seeker may only reactivate the Access Seeker Equipment if it is reduced or modified to comply with the configuration approved in the Final Site Approval.

11.1.6 If the Access Seeker fails to comply with clauses 11.1.1, 11.1.3, 11.1.4 or 11.1.5 then the Access Provider shall be entitled to take such steps as are reasonably necessary to depower and/or switch off the Access Seeker Equipment including de-powering and/or switching off any Utility Services used by the Access Seeker.