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<p>General Comments</p> <p>Please note that the numbering used in this submission corresponds to the numbering in the Vodafone Mobile Co-location STP Interference Management and Design document.</p>	<p>Telecom supports the principles and processes set out in the Interference Management and Design document. Telecom believes that this document provides a sound framework for interference management and design issues, which is consistent with international best practice.</p>
<p>1 Introduction</p>	<p>Telecom supports the establishment of a framework for testing site configurations before the deployment of equipment. This reduces risks to Access Providers, Access Seekers and Existing Co-locators and increases the speed of deployment for Access Seekers. Telecom submits that the following improvements to the framework proposed by Vodafone should be made to:</p> <ul style="list-style-type: none"> • ensure that there is protection and consideration of third parties that co-locate at Relevant Facilities. • require two-way testing of interference when applications are made. • distinguish between the two categories of Unacceptable Performance Degradation (interference and performance impacts from co-location site solutions).
<p>2 Definitions and Interpretation</p>	<p>The Interference Management and Design document should deal with interference between:</p> <ul style="list-style-type: none"> • the Access Seeker and the Access Provider; and • the Access Seeker and Existing Co-locators. <p>Existing Co-locators are given rights under the Interference Management and Design document because they should be protected from Interference caused by Access Seekers at Relevant Facilities.</p> <p>The Interference Management and Design document also imposes obligations on Existing Co-locators (for example obligations to meet with Access Providers and Access Seekers if Unacceptable Performance Degradation is experienced). The obligations only apply to Existing Co-locators which are previous Access Seekers at the Relevant Facility because the Interference Management and Design document cannot bind third parties. However, the Parties are required to use reasonable efforts to engage all other Existing Co-locators to the same extent.</p> <p>In addition, the Interference management plan should recognise that Access Providers and Existing Co-locators do not necessarily provide only Telecommunications Services from a co-location site. Broadcast services, for example, fall outside the definition of Telecommunication Services.</p> <p>Telecom submits that the Interference Management and Design document should protect all co-locators from Unacceptable Performance Degradation. In order to</p>

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	<p>achieve this result:</p> <ul style="list-style-type: none"> • A new definition for "Radiocommunications Services" should be inserted into section 2. Radiocommunications Services means "any goods, services, equipment, and facilities that enable or facilitate the transmission or reception of signs, signals, writing, images, sounds, or intelligence of any nature by radio waves". All references to Telecommunications Services in the Interference Management Plan should be replaced with "Radiocommunications Services". • The definition of "Link Budget" should include the phrase: "or any radio communications network" after "Cellular Mobile Telephone Network" (this will, for example, ensure land mobile services such as those provided by TeamTalk are provided the same level protection as mobile cellular services). • A new definition of Antenna should be included in the Interference Management and Design document: "equipment intended for deliberate radiation or reception of electromagnetic waves that transmit or receive radiocommunications". The agreement on the definition of Antenna in the TCF was limited to the General Terms. A technical definition, such as the definition proposed, is more appropriate for the Interference Management and Design document because of this document's technical application. • The definition of Isolation should include the "transmitting and /or receiving base station equipment" for both Access Providers and Access Seekers because Interference can affect both transmitting and receiving base station equipment. <p>The Interference Management and Design document refers to Customers and End Users in several places. Telecom has proposed that the definition of End Users should be deleted from the Mobile Co-location General Terms (see comments in that section of Telecom's submission and specific examples addressed below). For the avoidance of doubt, this amendment should be applied to the Interference Management and Design document also to ensure that Access Seekers, Access Providers and Existing Co-locators are treated consistently.</p> <p>For the avoidance of doubt, the word "meeting" in the Interference Management and Design document should include a meeting conducted by telephone or video. In many cases the Interference Management and Design document requires the Access Provider, Access Seeker and any Existing Co-locators to meet at short notice (e.g. within one Working Day in sub-clause 9.3.7). It will be difficult to achieve these timeframes if a meeting in person was required, particularly if the people required to meet are based in different cities.</p>
3 Radiocommunications Act 1989	
4 Scope	

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5 Objectives	<p>Sub-clause 5.2.1(b) states that an objective of the Interference Management and Design document is to "set out efficient solutions to maximise the use of physical resources...". Physical resources are one component of the assessment, but interference is an issue related to radio spectrum and its management which is not a physical resource.</p> <p>The Interference Management and Design document should be to make the best use of the radio spectrum available. Radio spectrum is a scarce resource and its efficient use is required to promote the long term interests of Customers. This can be achieved by amending sub-clause 5.2.1(b) to read:</p> <p style="text-align: center;">"set out efficient solutions to maximise the use of radio spectrum and physical resources as part of the Mobile Co-location Service".</p> <p>Sub-clause 5.2.1(g) only refers to the promotion of "the long term interests End Users". As detailed in Telecom's submissions on the General Terms, the definition of End User means only the end users of the Access Seeker. The Interference Management and Design document should promote the long term interests of the ultimate recipients of services provided by Access Seekers, Access Providers and other co-locators. There should not be any winners or losers from interference management. Therefore, Telecom submits that "End User" in sub-clause 5.2.1(g) should be replaced with "Customer".</p>
6 Unacceptable Performance Degradation	<p>Clause 6.1: Performance Degradation</p> <p>Telecom considers that a degree of performance degradation due to interference effects is unavoidable at co-location sites and that an Unacceptable Performance Degradation threshold should be set at a level that has a minimum impact to existing Customers.</p> <p>Telecom supports the examples provided by Vodafone in sub-clause 6.1.2.</p> <p>Telecom supports the examples provided by Vodafone in sub-clause 6.1.3. However, Telecom submits that "network drive testing (field testing)" should be added as a third method to observe Performance Degradation. Telecom submits that network drive testing is a useful way to measure Performance Degradation, which is different from Customer complaints and statistical performance data. Sub-clause 6.1.3 should provide:</p> <p style="text-align: center;">"Performance Degradation may be observed through customer complaints, network drive testing (field testing) and/or statistical performance data ...".</p>

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	<p>In order to improve clarity, sub-clause 6.1.2 should also refer to a "reduction in signal strength and /or effective coverage of Radiocommunications Services". It is unclear what the "reduction" refers to otherwise.</p> <p>As set out above, Telecom considers that customers of Existing Co-locators (including non-Access Seekers) should receive the same protection as Access Providers' customers when considering performance degradation impacts of an Access Seeker's request. Similarly, end users of non-Telecommunications Services should receive the same protections. Therefore, Performance Degradation should include a reduction in the level of Radiocommunications Service provided by Access Providers or Existing Co-locators.</p> <p>Clause 6.2: Unacceptable Performance Degradation</p> <p><i>Antenna Isolation</i></p> <p>Telecom supports Antenna Isolation of 30 dB. Telecom considers that isolation of 30dB is the minimum required for consistency with international best practice. However, Telecom's experience indicates that antenna isolation of 30dB will not always be sufficient to ensure against Unacceptable Performance Degradation. The isolation required depends on the technology and/or frequency separation between the systems involved. Therefore, antenna isolation of 30dB is not necessarily "... the commonly accepted value ensuring enough protection to minimise interference" as stated in paragraph 145 of Vodafone's submission. It is, however, an appropriate minimum value subject to any site, or solution, specific issues.</p> <p>In order to ensure protection for Existing Co-locators and the Access Seeker is encompassed by the Interference Management and Design document, Telecom submits that there be a minimum antenna isolation between the antenna ports of:</p> <ul style="list-style-type: none"> • the Access Seeker's transmitting equipment and the receiving equipment of the Access Provider and any Existing Co-locators; and • the Access Seeker's receiving equipment and the transmitting equipment of the Access Provider and Existing Co-locators. <p>It is important to include isolation requirements between all systems operating from the site, and also to ensure that this requirement is reciprocated for the Access Seeker, who will also require protection from interference from other systems once their services are fully operational.</p> <p><i>Link Budget</i></p>

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	<p>Telecom considers that the maximum acceptable performance degradation due to co-location interference effects from Access Seekers (including impacts of interference mitigating RF Filters) should be set at a level that does not exceed 0.5dB for Mobile Services which provide high speed broadband data. Therefore, Telecom supports the 0.5 dB value proposed in the Interference Management and Design document.</p> <p>PIB 38 Radio Licence Certification Rules (Dec-05) published by the Radio Spectrum Management Group of the MED (section 4.2) recommend that:</p> <p style="padding-left: 40px;">There is no single criterion for acceptable interference levels because this will depend on the nature of the victim service. However, commonly the total cochannel interference power calculated as above should cause no more than 1 dB degradation to the receiver noise floor at locations near the edge of coverage.</p> <p>Mobile radio communications have generally only provided voice services and/or low speed data services in the past and so a 1dB performance degradation limit may be acceptable in relation to such services. An increased noise floor or interference levels (at a base station site) on these services reduces the effective service area from the site. Only Customers located at the edge of the coverage area are affected when they drop outside the reduced coverage or service area.</p> <p>Telecom submits that it is appropriate to apply a performance degradation threshold which is lower than 1.0dB for Cellular Mobile Telephone Networks that are designed to support high speed broadband data services (such as CDMA-EVDO, UMTS-HSPA and GSM-EDGE etc) since all Customers will be affected by the increased interference at the base station, not only those end-users operating at the cell edge.</p> <p>Telecom considers that Vodafone's proposed limit of 0.5dB is appropriate in relation to mobile services which provide high speed broadband data.</p> <p>Modern mobile cellular systems now provide high speed mobile broadband data at speeds of several Mbit/second. The ability to deliver these high data speeds to each Customer is dependent on the overall signal quality available. The uplink and downlink data rates delivered to all Customers will be affected (not only those operating at the cell edge) if signal quality is reduced due to interference at the base station. This effect is shown in the graphs between paragraphs 146 and 156 of Vodafone's submission. Telecom supports these paragraphs and the graphs presented.</p> <p>Telecom supports the principles outlined in Vodafone STP submission point 152 and also notes that the trend shown in Figure 13.4 will continue for higher data rates up to 14.4Mbps HSPA, where the maximum data rates are only achieved within an even smaller relative distance of the cell edge.</p>

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	<p>If the Unacceptable Performance Degradation limits are set too high, the resulting effect on the ability to achieve high data speeds will be inconsistent with the Government's policy of increasing the availability of high speed broadband.</p> <p>In addition to this, the reduction in Customer data rates will also lead to a reduced carrier data throughput and an overall reduction in site capacity, which leads to the requirement to deploy more infrastructure (at increased cost) to support the equivalent level of traffic.</p> <p>For these reasons, Telecom considers that an Unacceptable Performance Degradation limit of 0.5dB is appropriate for mobile services and should apply to both the uplink and downlink budgets of Access Providers and Existing Co-locators. A higher limit of 1dB is appropriate to be applied to other services.</p> <p>Telecom recognises that some Existing Co-locators may not require this level of protection. For example, an Existing Co-Locator may be willing to accept a higher Unacceptable Performance Degradation threshold in particular circumstances. Access Seekers, Access Providers and Existing Co-locators should be able to agree to a different Unacceptable Performance Degradation threshold, but the minimum threshold should apply as a default where no agreement can be reached.</p>
<p>7 Design Principles</p>	<p>Clause 7.2: Isolation</p> <p>Telecom notes sub-clause 7.2.2(a) identifies that Isolation can be achieved by the separation of frequency bands. This separation is fixed by the allocation of Management Rights under the Radiocommunications Act 1989, which is designed for high spectrum usage not for co-location of services.</p> <p>Telecom considers that it is difficult to design sites to maintain their service footprint even with vertical separation as suggested by sub-clause 7.2.2(b). Relevant Facilities, particularly those in urban areas, are often in non-ideal radio environments and suffer limitation from backscatter from surrounding buildings and other objects. This adds to the unwanted interaction between antennas and makes it difficult for co-location to occur without adversely affecting the Radiocommunications Services of the Access Provider and Existing Co-locators even with vertical separation.</p> <p>Telecom notes that Isolation can be achieved by low coupling between Antennas through physical separation and a low interaction configuration as suggested by sub-clause 7.2.2(c). Low interaction relies on:</p> <ul style="list-style-type: none"> • Antenna element pattern null (omni directional and panel antennas). Minimum interaction is achieved by end-on i.e. vertical separation, because the Antenna elements direct no signal in this direction. • Backplane shielding. This relies on the shielding provided by the backplane of panel Antennas to avoid much of the signal being directed to the side or to the rear. Panel Antennas must not be directed toward each other, as this causes

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	<p>significant coverage management limitations where Antennas are horizontally located as it limits Antenna panning options for sector reorientation.</p> <p>However, sub-clause 7.2.2(c) differs from the text agreed in the TCF, which was: "minimise coupling between affecting and affected equipment". The proposed text in the STP goes further than the TCF agreement by suggesting this can be achieved by avoiding the overlap of beamwidths in the near field and shows an example in Figure 5B.</p> <p>Telecom considers this sub-clause should revert to the agreed TCF text or should be limited to the first sentence of sub-clause 7.2.2(c) in the Interference Management Plan. The additional text explaining how this can be achieved is not required and is only partially correct.</p> <p>The associated Figure 5B is also flawed. Figure 5B shows mixing antennas from different mobile systems so in effect antenna A3 comes in very close proximity to antenna B1 and B2. This design directly contradicts the principle agreed at the TCF to "minimise coupling between affecting and affected equipment". Therefore, Telecom considers that Figure 5B should be deleted.</p> <p>It is important to note that filters, which are suggested as a way to achieve Isolation by sub-clause 7.2.2(e), introduce loss. This loss is mostly to the frequencies the filters are designed to reject. However, filters do not reject out-of-band signals universally and introduce some loss in the wanted pass band.</p> <p>Telecom supports the principles in sub-clauses 7.2.2(e) and 7.2.2(f). However, Telecom submits that the phrase "physical blocking" in sub-clause 7.2.2(f) should be replaced with "obstruction loss" to improve clarity.</p> <p>Clause 7.4: Antenna Separation</p> <p>Telecom agrees that Isolation should be determined on a site-by-site basis as suggested by clause 7.4. Far field gain values and antenna directional plots (antenna patterns) that manufacturers may provide for coverage estimation have no relevance to the direct interactions between antennas at such short distances that occur in co-location. As a result, no solution to Isolation requirements can rely on them. Actual testing between Access Providers, Existing Co-locators and Access Seekers has confirmed this. Telecom also supports Vodafone's position that the equation in clause 7.4 is indicative only.</p> <p>Telecom submits that the phrase "new Antenna beam azimuths shall not cross existing Antenna beam azimuths" should be replaced with "new Antenna beam azimuths should avoid crossing existing Antenna beam azimuths".</p> <p>Site design is often a compromise between a wide range of factors. Other undesirable design issues may result from making any element a mandatory design requirement.</p>

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	<p>Design requirements should be determined on a site-by-site basis taking into account all constraints.</p> <p>Clause 7.5: Co-location issues</p> <p>Telecom submits that any co-location site solutions (including antenna minimisation solutions) proposed by the Access Seeker which modify any existing RF equipment and configurations (and therefore interfere with Access Providers' technology and network optimisation choices) must not be forced on an Access Provider. Therefore, Telecom does not support sub-clause 7.5.1 of the Interference Management and Design document.</p> <p><i>End User impact</i></p> <p>Telecom considers that Access Providers and Existing Co-locators should be able to maintain existing services to Customers currently benefiting from those services. Designs that may be used to increase space on the mast will result in a reduction in RF equipment performance including a reduction in the uplink budget and downlink budget. The size of the performance reduction depends on factors that impact the correlation/decorrelation between the two diversity uplink signal paths, such as the propagation environment and the degree of multipath propagations due to reflections and non-line of sight propagation effects.</p> <p>As explained above under section 6, a reduction in the downlink budget or uplink budget will result in a loss of coverage and a reduction of service to all Customers of high speed data services. Mobile phones will also have a shorter battery life as they transmit at high power to offset a lower uplink budget. These effects will harm the mobile Customers of Telecom and Existing Co-locators in a manner inconsistent with the purpose of the Telecommunications Act.</p> <p><i>Network inefficiency</i></p> <p>Further, the designs that may be used to increase space on the mast may require the Access Provider's RF equipment for different frequencies to point in the same direction or to be placed lower on the mast. This reduces the coverage available from a Relevant Facility and may result in the Access Provider and Existing Co-locators having to build more Relevant Facilities to recoup the coverage loss.</p> <p>The limitation on Telecom's ability to alter its network design will result in Telecom's network becoming inefficient as a direct result of the STD requirements if Antenna minimisation is included.</p>

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	<p><i>Other options</i></p> <p>There are other options available to Access Seekers which avoid the problems identified above. As set out in the Mobile Co-location Operations Manual, mast replacement, revision and extension are realistic alternatives that do not have negative effects on existing Customers and the Access Provider's and Existing Co-locators' investment choices.</p> <p>The Access Seeker should not be able to reduce:</p> <ul style="list-style-type: none"> • the existing services provided to Customers by Access Providers and Existing Co-locators; and • the efficiency of the Access Provider's network, solely to reduce its deployment costs at a proposed co-location site. For example, the Access Seeker is effectively degrading services provided to the Access Provider's existing Customers if it proposes Antenna minimisation solutions to reduce structural load on the co-location mast in order to avoid or defer the requirement for a mast replacement. <p><i>Other jurisdictions and previous STDs</i></p> <p>An approach that does not require Access Providers to modify their existing RF equipment or configuration is consistent with other jurisdictions. Telecom (and also our technology partner Alcatel-Lucent) has researched cellular co-location regulations introduced by regulatory authorities in several jurisdictions (Australia, USA, EU, UK, Germany, France, and Scandinavia) and have not found any regulations that require Access Providers to minimise existing Antenna infrastructure in order to reduce an Access Seeker's deployment costs.</p> <p>Finally, the Commission has not required Telecom to modify the deployment of its technology to the detriment of its Customers and the efficiency of its network in other Standard Terms Determinations and should not do so for the Mobile Co-location Service.</p>
<p>8 Measurement and Testing</p>	<p>Clause 8.1: Procedure for Measurement and Testing</p> <p>The phrase "at an experimental test facility" should be included in clause 8.1.2 to make it clear that measurement and testing under section 8 is undertaken in at a facility specifically for that purpose and not at a commercial facility. Access Providers will not know the effect of the solution on its Customers at this stage.</p> <p>Telecom submits that a new sub-clause 8.1.3 should be inserted to allow the Access Provider to charge for its involvement in the measurement and testing process in</p>

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	<p>accordance with the Charges agreed under the Mobile Co-location General Terms. Telecom supports the general intent of sub-clauses 8.1.5(a) and 8.1.5(b).</p> <p>Testing should also include:</p> <ul style="list-style-type: none"> • Test for sensitivity losses including noise rise, receiver blocking and desensitisation due to any effect of collocation including without limitation emissions (wanted or unwanted) and intermodulation distortion occurring when the Access Seekers facility is installed or operated. • Limits under the Access Seeker's application shall be maximally tested, including without limitation power transmitted, proximity, interaction and transmitted power of any linking Antennas. All options shall be tested such that all configurations are measured, including without limitation antenna azimuth and down-tilt directions. • System performance measurements for weak wanted received signals including with limitation Speech Quality Index (SQI), Bit Error Rate (BER), noise rise as appropriate to the technology to ensure Unacceptable Performance Degradation criteria is 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. <p>Testing should be designed and performed on each of the Relevant Facilities to ensure that no Unacceptable Performance Degradation occurs with fully configured facilities (within the limits sought by the Access Seeker at the Relevant Facility). There must be a margin of error for Unacceptable Performance Degradation criteria to ensure that the Future Use provisions are meaningful.</p> <p>Telecom also submits that the scope of the measurement and testing should include all of the following cases and not just the first case:</p> <ul style="list-style-type: none"> • Access Seeker transmitter equipment into the Access Provider receiver equipment; • Access Seeker transmitter equipment into all other radio services receiver equipment operating from the relevant facility; • Access Provider transmitter equipment into the Access Seeker receiver equipment; and • All other radio services transmitter equipment operating from the relevant facility into the Access Seeker receiver equipment. <p>The interference caused to the Access Seeker by the Access Provider's Equipment and other radio services transmitter design or equipment will not be known without these tests. This could lead to disputes later if the Access Provider or an Existing Co-locator alters the design of its Antenna. The Access Seeker may claim that it is suffering increased interference as a result of such change. Two way testing will</p>

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	provide a base line for assessing such claims.
<p>9 Access Provider's Forecasting</p>	<p>Telecom supports the need for Forecasting by the Access Provider. However, Telecom submits that section 9 is more appropriately located in the Operations Manual rather than in the Interference Management Plan. Vodafone possibly included this section in Schedule 5 since the issue was primarily dealt with the TCF working group focused on interference management and design issues. However, Telecom believes that forecasting by the Access Provider's is a process that should be incorporated in the general processes outlined in the Operations Manual.</p> <p>Telecom's position on the requirement for the Access Provider to forecast is noted below. These submissions apply regardless of which document the Access Provider forecasting is included in:</p> <ul style="list-style-type: none"> • the Access Provider should be required to forecast its capacity requirements and the future deployment of new services. • Telecom supports the forecasting of three categories of capacity and services requirements as agreed by the TCF and outlined in clause 9.2. • Telecom supports the principle of a forecasting period of 5 years set out in clause 9.3: <ul style="list-style-type: none"> ○ This is consistent with the 5 year "use it or lose it" provisions period associated with spectrum management rights currently being auctioned by the Government. ○ Such a time frame takes into account the relatively long time period required to plan and deploy new services on a regional or nationwide basis. Such roll outs often require the acquisition of new sites in addition to overlay of equipment on existing sites that are already operated by the Access Provider. ○ Access Providers have acquired spectrum on the basis of a 5 year "use it or lose it right" and that right would be significantly undermined on a site by site basis where a short time frame for forecasting was set under the STD. • Telecom submits that the requirement for the Access Provider to hold suitable spectrum management rights in sub-clause 9.5.1 is reasonable as agreed at the TCF. However, "intent to acquire such right" was not a principle agreed by the TCF working group. Telecom considers that this provision creates uncertainty for the Access Seeker and would be difficult to substantiate.
<p>10 Procedures for interference Management in Mobile Co-location</p>	<p>Clause 10.1: Determination of Agreed Standard Solutions and Disagreed Solutions</p> <p>Telecom submits that sub-clause 10.1.2 should be amended so that a solution proposed by an Access Seeker must be compliant with the Interference Management and Design document and the Mobile Co-location Operations Manual. These two</p>

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	<p>documents work together and particular solutions must be consistent with both documents.</p> <p>Telecom submits that sub-clause 10.1.3 should be amended to:</p> <p style="padding-left: 40px;">"The solution must specify the combination of services to be co-located, the Standard Site Type, Antenna separation, Antenna arrangement, proposed Antenna geometry, RF filters and devices, frequency and bandwidth, EIRP, the specifications of any relevant Access Seeker Equipment and any other relevant details. This shall include details of the distances between and the dimensions of the mast structure and the Antennas of the Access Seeker, Access Provider and any Existing Co-locators."</p> <p>Telecom submits that there is no need to have a meeting, as required by sub-clause 10.1.7, if both the Access Seeker and the Access Provider agree that a meeting to discuss the results of testing is not required provided that written confirmation of this agreement is received by the Access Seeker, Access Provider and any Existing Co-locators.</p> <p>For the Access Seeker's benefit, two sub-clauses should be inserted at 10.1.5 and 10.1.6 to require the Access Provider to acknowledge the receipt of the analysis received under sub-clause 10.1.5 within 4 consecutive Business Hours of the receipt of the proposed solution and to provide the desktop study within 10 Working Days of the Access Provider's receipt of the proposed solution. These timeframes are consistent with the Mobile Co-location Service Level Terms.</p> <p>The last sentence of sub-clause 10.1.9(b) is not consistent with the agreed principle of the TCF working group and should be deleted. This sentence makes it possible for an Access Seeker to avoid experimental testing and go straight to a disagreed solution scenario by not agreeing on the testing. The Interference Management and Design document should encourage agreed solutions and the use of the test environment to test for interference. In this way the process will be more efficient and certain which will benefit Access Providers, Access Seekers and Existing Co-locators. Sub-clause 10.1.9(b) should be amended to:</p> <p style="padding-left: 40px;">"If either the Access Seeker, Access Provider or any Existing Co-locator does not believe that the paper based studies indicate minimal risk of Interference, and minimal risk of Unacceptable Performance Degradation, then experimental testing replicating</p>

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	<p data-bbox="1361 236 1928 320">the proposed solution configuration should be undertaken at a suitable test facility to confirm the extent of Interference."</p> <p data-bbox="1137 355 2063 491">The heading "Experimental Testing" should be inserted above sub-clause 10.1.10 to make it clear that the following clauses refer to Experimental Testing. Sub-clause 10.1.10 should be amended to reflect the amendment to sub-clause 10.1.9. The word "experimental" should also be included before the word "testing" in sub-clauses 10.1.11 to 10.1.13 to improve the clarity of these sub-clauses.</p> <p data-bbox="1137 523 1928 550">Clause 10.3: Protocol for deployment of an Agreed Standard Solution</p> <p data-bbox="1137 587 2063 694">Sub-clause 10.3.2 is not an appropriate part of the protocol for deployment of an Agreed Standard Solution. An Agreed Standard Solution would not be rejected at the Full Site Application stage solely for reasons relating to Performance Degradation. Sub-clause 10.3.2 should be moved into clause 10.2.</p> <p data-bbox="1137 707 2063 922">In order to provide protection for Access Seekers, a new sub-clause should be added setting out a procedure requiring the Access Seeker to notify the Access Provider and Existing Co-locators if the Access Seeker experiences Performance Degradation. Such a sub-clause should follow sub-clause 10.3.14. A second sub-clause should require the Access Provider, Access Seeker and any Existing Co-locators to meet to discuss how the Performance Degradation should be dealt with. This sub-clause should not require the Access Provider to take any steps to resolve the Performance Degradation.</p> <p data-bbox="1137 935 2063 986">Similar sub-clauses should also be inserted following sub-clause 10.3.18 for the same reason.</p> <p data-bbox="1137 999 2063 1106">Sub-clause 10.3.18 should refer to Stage 1 of the Checklist for Project Closure in 19.5 of the Mobile Co-locations Operations Manual. From this point the Access Seeker can operate normally at the Relevant Facility. Therefore, Stage 1 of the Checklist for Project Closure, which is required for normal operation, should be completed.</p> <p data-bbox="1137 1137 1883 1165">Clause 10.4: Protocol for the Deployment of a Disagreed Solution</p> <p data-bbox="1137 1201 2063 1337">To ensure an Access Seeker's request is not stalled due to lack of agreement with the Access Provider, Telecom considers that sub-clause 10.4.3 should include a dispute resolution process if the revised solution cannot be agreed. This provides better protection to Access Seekers than if, as drafted, the solution is simply deemed non-compliant and is not built.</p> <p data-bbox="1137 1350 2063 1401">To further protect Access Seekers, a new sub-clause providing a process for the Access Seeker to notify the Access Provider and Existing Co-locators if the Access</p>

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	<p>Seeker experiences Performance Degradation should be added.</p> <p>A second sub-clause should require the Access Seeker, Access Provider and any Existing Co-locators to meet to discuss how to deal with the Performance Degradation. However, it should not require the Access Provider to take any steps to deal with the Performance Degradation. These sub-clauses should follow sub-clauses 10.4.13, 10.4.15, 10.4.18, 10.4.21, 10.4.23, 10.4.26 and 10.4.34.</p> <p>Sub-clause 10.4.33 should apply to all Existing Co-locators and not just the Access Seeker and Access Provider.</p> <p>Sub-clause 10.4.25 should refer to Stage 1 of the Checklist for Project Closure under the Mobile Co-locations Operations Manual. From this point the Access Seeker can operate normally at the Relevant Facility. Therefore, Stage 1 of the Checklist for Project Closure, which is required for normal operation, should be completed.</p> <p>A new sub-clause should be inserted following sub-clause 10.4.35 allowing the Access Seeker, Access Provider and any Existing Co-locators to advance a disagreement over the resolution of Unacceptable Performance Degradation through the dispute resolution procedure in section 39 of the Mobile Co-location General Terms.</p> <p>A new sub-clause should be inserted following sub-clause 10.4.35. This sub-clause should be similar to sub-clause 10.3.24. The sub-clause would allow the Access Seeker to proceed to the Project Closure Checklist under clause 19.5 of the Mobile Co-location Operations Manual after 12 months of operation without Unacceptable Performance Degradation.</p>
<p>11 Protocol for Ongoing Interference Management</p>	<p>Sub-clause 11.1.2 requires the Parties to meet within five Working Days to resolve an Unacceptable Performance Degradation issue. Telecom submits that the Parties should be required to meet as soon as practical but in any event within two Working Days. Unacceptable Performance Degradation is a worst-case scenario which affects the service that the Access Provider and Existing Co-locators are required to provide their Customers under contract. The timeframe for meeting to resolve this issue should be short given the effect it has on the business of the Access Provider and Existing Co-locators.</p> <p>Further, sub-clause 11.1.2 should set out further detail on how the Parties will "work together to identify techniques to avoid or mitigate Unacceptable Performance Degradation". Such a process will give meaning to sub-clause 11.1.2 and will provide more certainty for all parties. Telecom proposes that the process should involve:</p> <ul style="list-style-type: none"> • The Party giving the Notice ("Affected Party") under sub-clause 11.1.2 should be required to undertake testing to establish the cause of the interference. • The Access Provider and Existing Co-locators should be required to facilitate the Affected Party's testing. • All parties must work together to identify techniques to avoid or mitigate the

SECTION/CLAUSE of the VODAFONESTP	COMMENT
	<p>Interference.</p> <ul style="list-style-type: none"> • The causer of the interference should pay the costs of the solution, subject to the Access Provider's reasonable future forecast, discussed below. • Where the Access Provider is operating within its reasonable future forecast, it will not be required to pay the costs of avoiding or mitigating the Interference and no solution may require the Access Provider to move, add, decrease or change the Access Provider Equipment or take any steps to avoid the Unacceptable Performance Degradation. <p>Telecom submits that this process provides incentives for the parties to find efficient and timely solutions to interference issues, while protecting the Access Provider's reasonable future forecasts.</p> <p>Clause 11.2 deals with situations where the Access Seeker's Equipment does not comply with the Final Site Application or the solution agreed under clauses 10.3 or 10.4. Telecom submits that sub-clause 11.2.2 should require the Access Seeker to restore the Access Seeker Equipment to a compliant solution as well as taking measures to alleviate the Unacceptable Performance Degradation:</p> <p style="padding-left: 40px;">Upon receipt of such Notice, the Access Seeker must immediately take measures to:</p> <ul style="list-style-type: none"> (a) restore the installation so it is compliant with the Approval 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. <p>Clause 11.3 is no longer necessary because the obligations of Existing Co-locators have been included in clause 2.4. Therefore, clause 11.3 can be deleted.</p>
12 Expansion or Modification of Access Seeker Equipment	<p>Section 12 should state that the Planned Work Procedure in the Operations Manual should be followed for Planned Work. All other work should be undertaken through a site application.</p>
13 Licensing	<p>Section 13 should include technical compatibility measures as agreed in the TCF.</p> <p>Telecom considers that an Access Seeker must not prevent the Access Provider from deploying the Access Provider's reasonably forecast services by obtaining a new spectrum licence, modifying a new spectrum licence or applying for a radio licence at Relevant Facilities for Access Seeker Equipment that has not been approved by the Access Provider.</p> <p>Telecom notes that this issue could be resolved by an amendment to the</p>

SECTION/CLAUSE of the VODAFONESTP	COMMENT
	Radiocommunications Act 1989 to prevent licence applications for sites in which the applicant does not have a property interest.

TELECOM MARKUP OF THE VODAFONE

**STANDARD TERMS FOR THE CO-LOCATION ON
CELLULAR MOBILE TRANSMISSION SITES
SERVICE**

SCHEDULE 5

**CO-LOCATION ON CELLULAR MOBILE
TRANSMISSION SITES INTERFERENCE
MANAGEMENT AND DESIGN**

PUBLIC VERSION

~~28 April 2008~~ 23 May 2008

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1 Introduction

- 1.1 This Co-location on Cellular Mobile Transmission Sites 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 are references to clauses 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 interpreted in conjunction with the Mobile Co-location Service Operations Manual.
- 2.2 **Definitions.** For the purposes of this Interference Management and Design document, the following definitions apply:

~~Access Provider's Forecast~~ has the meaning set out in clause 9.2.

Agreed Standard Solution has the meaning set out in clauses 9.1.11(a) and 9.1.15(a).

Antenna means equipment intended for deliberate radiation or reception of electromagnetic waves that transmit or receive radiocommunications.

dB means decibels.

Design Principles means those principles set out in section 7.

Desktop Analysis Meeting has the meaning set out in clause 9.1.9

Disagreed Solution has the meaning set out in clauses ~~9.1.11(b) and~~ 9.1.15(b).

EIRP means effective isotropic radiated power.

Existing Co-locator means any other Access Seeker and any other third party who have installed and operate equipment on or with the Relevant Facilities.

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 radiocommunications.

Isolation means the loss between the Antenna port of the Access Seeker's transmitting base station [equipment](#) and the Antenna port of the:

[\(a\) Access Provider's transmitting and / or receiving base station equipment; and / or-](#)

[\(b\) Existing Co-locator's transmitting and / or receiving base station equipment.](#)

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 [or any radiocommunications network](#). A Link Budget takes account of all gain and loss factors to yield operating values of Signal to Noise Ratio (SNR) 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 9.3.11.

Non-Compliant Solution has the meaning set out in clause 9.1.15(c) and 9.5.2.

Performance Degradation has the meaning set out in clause 6.1.1.

[Radiocommunications](#)

[Services](#) [means any goods, services, equipment, and facilities that enable or facilitate the transmission or reception of signs, signals, writing, images, sounds, or intelligence of any nature by radio waves.](#)

Regulations has the meaning set out in clause 3.1.

RF means radio frequency.

Testing Procedures Meeting has the meaning set out in clause 9.1.12.

Unacceptable Performance Degradation has the meaning set out in clause 6.2.

[2.3 For the purposes of this Interference Management and Design document, the word "meeting" includes a meeting conducted by telephone or video conference.](#)

[2.4 Where an Existing Co-locator is a previous Access Seeker at the Relevant Facility, it will fully participate in all aspects of this Interference Management and Design document as required. The Parties will use reasonable efforts to engage other Existing Co-locators to the same extent.](#)

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 disrupt or degrade the performance of [Telecommunications Radiocommunications](#) Services provided to Customers ~~or End Users~~ but the Regulations do not provide for dealing with this Interference.
- 3.3 This Interference Management and Design document therefore sets out how the Access Seeker and the Access Provider 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 ~~Telecommunications~~ [Radiocommunications](#) Services which utilise RF can cause Interference to each other but the risk of Interference occurring can be reduced if providers of such ~~Telecommunications~~ [Radiocommunications](#) Services have in place, and abide by, design principles and testing protocols.
- 5.1.2 This Interference Management and Design document sets out some recommended design principles and testing protocols and the requirements which must be met by an Access Seeker 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 [radio spectrum and](#) physical resources as part of the Mobile Co-location Service;
- (c) ensure that disruption and degradation of [Telecommunications Radiocommunications](#) Services to Customers ~~and to End Users~~ is minimised;
- (d) reflect the principle that Access Seekers shall not implement solutions which will, or could, degrade the performance or standard of existing [Telecommunications Radiocommunications](#) Services to Customers ~~or End Users~~;
- (e) reduce the risk of Interference arising between the co-located equipment in relation to the provision and receipt of the Mobile Co-location Service;
- (f) set out a way in which provision is made for new and evolving [Telecommunications Radiocommunications](#) Services and technologies, so that Customers ~~and End Users~~ may benefit from technology advances; and
- (g) promote the long term interests of ~~End Users~~ [Customers](#) and the efficiency of the New Zealand communications 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 quality of the level of [Telecommunications Radiocommunications](#) Services provided by the Access Provider, ~~or any Existing Co-locators, to Customers~~ 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 ~~and/or End Users~~, 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 [signal strength and / or effective coverage or loss](#) of [Telecommunications Radiocommunications](#) Services.
- 6.1.3 Performance Degradation may be observed by [Telecommunications Radiocommunications](#) Service providers through Customer complaints, [network drive testing \(field testing\)](#) 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 activations failure rate; throughput reduction or failure; location update failure rate; IMSI update failure rate; and paging failure rate.

6.2 Unacceptable Performance Degradation

6.2.1 Subject to clause 6.2.3, "Unacceptable Performance Degradation" in this Interference Management and Design document means any one or more of the following:

- (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 or any Existing Co-locator's transmitting or receiving equipment;
- (b) a total level of loss from the Access Provider's or any Existing Co-locator'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 Telecommunications Radiocommunications Services in more than a minor way.

6.2.2 The Performance Degradation in clause 6.2.1(c) above may occur even if the Isolation level in clause 6.2.1(a) is met and the Link Budget loss in clause 6.2.1(b) is not exceeded.

6.2.3 An Access Provider and / or any Existing Co-locator may agree to accept a higher level of Performance Degradation than the definition of Unacceptable Performance Degradation set out in clause 6.2.1. Where such an agreement is reached in writing between the Access Seeker and the Access Provider and / or any Existing Co-locator, that level will, as between the relevant parties, be the definition of "Unacceptable Performance Degradation".

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, and 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. Refer to Figure 5A for examples of vertical and horizontal separation with the same Antenna orientation;

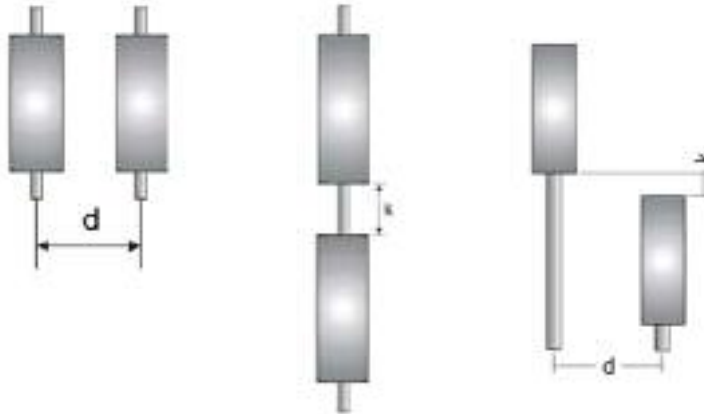


Figure 5A: Example of vertical and horizontal separation with same Antenna orientation

- (c) the arrangement of Antenna in such a way so as to minimise the Interference between affecting and affected equipment. ~~This can be achieved by the alignment of Antenna azimuths in such a way so as to avoid the overlap of beamwidths in the near field. Refer to Figure 5B for examples of horizontal separation with different Antenna orientation;~~

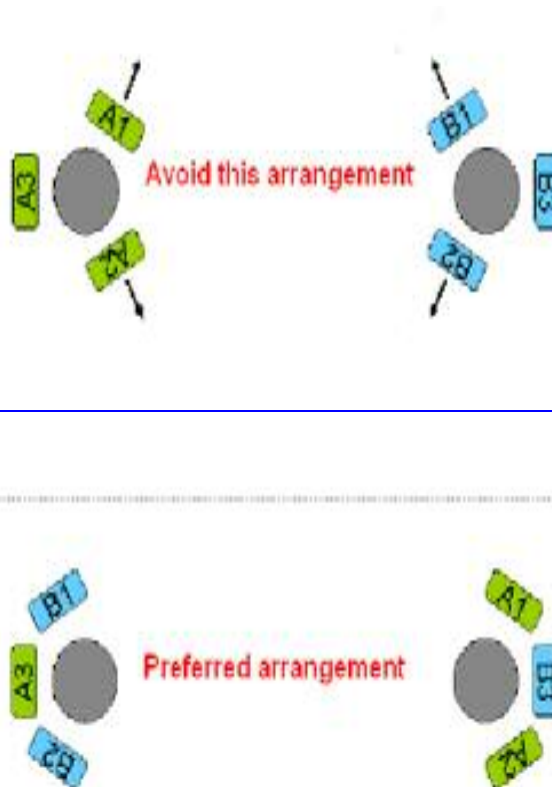


Figure 5B: Example of horizontal separation with different Antenna orientation

- (d) the selection of Antenna gain, size and beamwidth to decrease the Interference;

- (e) 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;
- (f) the use of shielding, by ~~physical blocking~~[obstruction loss](#); and
- (g) the attenuation (reduction) of transmit power levels of the Access Seeker Equipment.

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 Access Seeker 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. Clauses 7.4.2 – 7.4.4 set out various other ways to achieve Isolation.

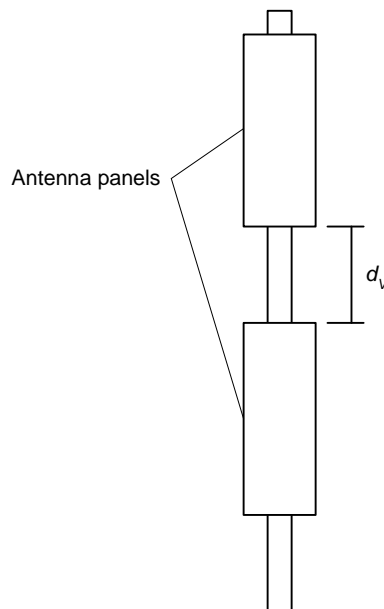
7.4.2 The distance required for the physical separation of Antennas used for the Mobile Co-location Service cannot be easily deduced by calculation because the co-located Antennas are in the “near field” rather than the “far field”. Therefore, the following formulas provide an indicative-only physical separation distance for a given Isolation value. Field measurements can be used to confirm the calculated values. For these reasons, Isolation needs to be verified on a Site-by-Site basis.

7.4.3 “Vertical Separation Distance” can be calculated approximately from the general formula:

Isolation: $A_V \approx 28 + 40 \log (d_V / \lambda)$ [dB]

where d_V = vertical tip-to-tip distance between Antennas [m]

λ = wavelength [m]



7.4.4 “Horizontal Separation Distance” can be calculated approximately from the general formula:

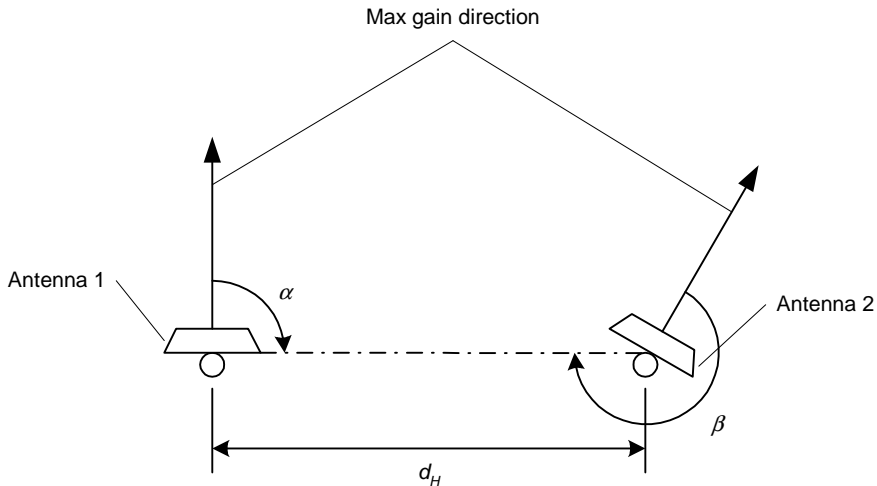
Isolation: $A_H \approx 22 + 20 \log (d_H / \lambda) - (G_1(\alpha) + G_2(\beta))$ [dB]

where d_H = horizontal distance between the centrelines of Antennas [m]

λ = wavelength [m]

$G_1(\alpha)$ = gain of Antenna 1 [dBi] at the relative angle, α , to Antenna 2

$G_2(\beta)$ = gain of Antenna 2 [dBi] at the relative angle, β , to Antenna 1



7.4.5 In addition to the Isolation between the Access Seeker Equipment, ~~and~~ Access Provider Equipment ~~and the equipment of any Existing Co-locators~~, 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;
- (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) new Antenna beam azimuths ~~shall not~~ should avoid ~~crossing~~ existing Antenna beam azimuths;
- (e) access to the Antennas and their ancillaries for the purpose of maintenance should always be allowed; and
- (f) 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.

~~7.5~~ Co-location issues

~~7.5.1 When, even with the use of Mast replacement, extension or revision (as referred to in section 21 of the Mobile Co-location Operations Manual), Relevant Facilities cannot be used for mobile co-location only then may the Access Seeker request that the Access Provider move, add, decrease or change in any way the Access Provider Equipment.~~

~~7.5.2—Any proposal from the Access Seeker which requests the Access Provider to move, add, decrease or change in any way the Access Provider Equipment must not result or risk resulting in:~~

- ~~(a) Unacceptable Performance Degradation;~~
- ~~(b) unreasonable technical or operational practicability having regard to the Access Provider's Network;~~
- ~~(c) a loss or reduction in Network security and/or safety;~~
- ~~(d) the Access Provider not being able to meet its existing legal duties to provide a defined level of service to Customers or End Users;~~
- ~~(e) an inability, or likely inability, of the Access Seeker to comply with any reasonable conditions on which the Mobile Co-location Service is supplied;~~
- ~~(f) the Access Provider's current and reasonable forecast requirements for capacity (as set out in section 9) on the Relevant Facilities not being met;~~
- ~~(g) any relevant requirements under the Resource Management Act 1991, the Building Act 2004 and/or any relevant District or Regional Plan not being met;~~
- ~~(h) any relevant health and safety requirements under any enactment not being met;~~
- ~~(i) any existing contractual obligations to third parties, including lessors of land on which the Relevant Facilities are located not being met; and~~
- ~~(j) the interests of third parties who use the Relevant Facilities not being taken into account.~~

~~7.5.3—In the event of such a request the Access Seeker shall provide to the Access Provider all relevant information in relation to its proposal, including the following:~~

- ~~(a) all relevant technical and design specifications, dimensions, load factors and the radiocommunications characteristics of the Access Seeker Equipment;~~
- ~~(b) a construction timetable and work plan for the works; and~~
- ~~(c) anything else reasonably required by the Access Provider.~~

~~7.5.4—In the event that such a request is accepted by the Access Provider, the Access Seeker shall pay all costs associated with the request and its implementation. The Access Provider's consideration and involvement in the implementation of such a request shall be charged for by the Access Provider in accordance with the Charges, as agreed between the Parties pursuant to the Mobile Co-location General Terms.~~

8 Measurement and Testing

8.1 Procedure for Measurement and Testing

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

8.1.2 Measurement and testing shall be designed, implemented and performed [at an experimental 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. Measurement and testing shall be undertaken by the Access Seeker with the support of the Access Provider [and any Existing Co-locators](#) as required.

[8.1.3 The Access Provider's involvement in the measurement and testing may be charged for by the Access Provider in accordance with the Charges, as agreed between the Parties pursuant to the Mobile Co-location General Terms.](#)

[8.1.38.1.4](#) 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 Interference to be minimised.

[8.1.48.1.5](#) The Parties [and any Existing Co-locators](#) should share the results of such measurements and testing and attempt to align and agree the results.

[8.1.58.1.6](#) The following are two separate approaches that contain examples of tests that may be undertaken:

(a) the Parties [and any Existing Co-locators](#) 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 [and any Existing Co-locators](#) will test the following elements at Maximum Configuration (the configuration requested in the Access Seeker's co-location [Application](#)) 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-locators](#). 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-locators](#) 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, VQI), tune the receiver though the receive band to observe effects).

(ii) Measure the Isolation between the Access Provider, ~~and~~ Access Seeker [and any Existing Co-locator](#) 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 the equipment of any Existing Co-locators](#). This must be performed over the Access Seeker's transmit band and the Access Provider's [and any Existing Co-locator's](#) receive band.

(b) The Parties [and any Existing Co-locators](#) 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;
- ~~Test (a) for the above (3) test cases at the maximum configuration of the Access Seeker Equipment and full power with normal mix of traffic modulations and bursting (or simulated).~~

- 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 facility is installed or operated.
- Limits under the Access Seeker's Application shall be maximally tested, including without limitation power transmitted, proximity, interaction and transmitted power of any linking Antennas. All options shall be tested such that all configurations are measured, including without limitation Antenna azimuth and down-tilt directions.
- 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.

8.1.7 For the avoidance of doubt, measurement and testing should be undertaken for all of the following cases:

- (a) Access Seeker transmitter equipment into Access Provider transmitter and receiver equipment.
- (b) Access Seeker transmitter equipment into all other radiocommunications transmitter and receiver equipment operating from the Relevant Facility.
- (c) Access Provider transmitter equipment into the Access Seeker transmitter and receiver equipment.
- (d) All other radiocommunications transmitter equipment operating from the Relevant Facility into the Access Seeker transmitter and receiver equipment.

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 actual Access Provider Equipment and Access Seeker 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 Access Provider Equipment and Access Seeker 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 Access Provider Equipment and Access Seeker Equipment.

8.2.5 Spectrum analysers and/or signal generators, if used, shall be calibrated.

~~9 Access Provider's Forecasting~~

~~9.1 This section 9 sets out what the Access Provider's Forecast comprises and the requirements that the Access Provider must meet.~~

~~9.2 The Access Provider's current and reasonable forecast requirements for capacity ("Access Provider's Forecast") include the following:~~

~~9.2.1 any plans for the future expansion of capacity or capability of existing Telecommunications Services currently being provided at the Relevant Facilities;~~

~~9.2.2 any plans for the future deployment of Telecommunications Services that are provided by the Access Provider elsewhere but that are not provided at the Relevant Facilities;~~

~~9.2.3 any plans for the future deployment of new Telecommunications Services and for technology evolution requirements that are planned for deployment by the Access Provider but that are not currently operating.~~

~~9.3 The Access Provider's Forecast shall not extend for more than five years from the date when the Access Provider's Forecast was last updated in the Common Format Site Database.~~

~~9.4 The Access Provider's Forecast must be included in the Access Provider's site database and must also be disclosed in the Common Format Site Database at the time of the forecasting.~~

~~9.5 The Access Provider must have reasonable intent and the ability to deploy the Access Provider Forecasts which will be evidenced by the following:~~

~~9.5.1 the Access Provider must hold suitable spectrum management rights, or intend to acquire such rights, to deploy the relevant requirement; and~~

~~9.5.2 if relevant, the new Telecommunications Service or technology must be standardised and must be one which is recognised by the ITU.~~

~~9.6 The Access Provider must not use the Access Provider's Forecast for anti-competitive purposes.~~

~~9.7 The Access Seeker may only invoke the provisions of section 39 of the Mobile Co-location General Terms (Dispute Resolution) in respect of the Access Provider's Forecast if the Access Seeker reasonably believes that the Access Provider has not complied with clauses 9.3, 9.4 and 9.5 and then only in respect of whether or not the Access Provider has complied with those clauses.~~

409 Procedures for interference Management in Mobile Co-location

9.1 ~~40.4~~ Determination of Agreed Standard Solutions and Disagreed Solutions.

~~40.4.19.1.1~~ This section sets out the procedures for determining whether solutions shall be Agreed Standard Solutions or Disagreed Solutions.

~~40.4.29.1.2~~ At any time the Access Seeker may propose to the Access Provider and any Existing Co-locators a solution for a co-location installation type that conforms with this ~~document~~ Interference Management and Design document and the Mobile Co-locations Operations Manual.

~~40.4.39.1.3~~ The solution ~~is to~~ must specify the combination of services to be co-located, ~~and~~ the Standard Site Type, Antenna separation, Antenna arrangement, proposed Antenna geometry, RF filters and devices, frequency and bandwidth, EIRP, the specifications of any relevant Access Seeker Equipment and any other relevant details. This shall include details of the distances ~~and between and the~~ dimensions of the mast structure and the Antennas of the Access Seeker, Access Provider and any Existing Co-locators.

~~40.4.49.1.4~~ The solution must:

- (a) Avoid Interference.
- (b) Not cause Unacceptable Performance Degradation to existing ~~Telecommunications-Radiocommunications~~ Services or to Access Provider's Forecast ~~Telecommunications-Radiocommunications~~ Services at or on the Relevant Facilities.
- (c) Comply with the Mobile Co-Location Operations Manual.

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

~~40.4.59.1.6~~ The Access Provider will acknowledge the receipt of the analysis referred to in this clause 9.1.5 within 4 consecutive Business Hours following the receipt time.

9.1.7 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.

~~40.4.69.1.8~~ Access Provider will complete the desktop study referred to in clause 9.1.7 within 10 Working Days from date of receipt of Proposed Solution.

~~40.4.79.1.9~~ The Access Seeker, ~~and~~ the Access Provider and any Existing Co-locators will meet to discuss the results of the Interference analysis within twenty Working Days of the Access Seeker's solution proposal (this meeting to be referred to as the "Desktop Analysis Meeting"), unless the Access Provider, Access Seeker and any Existing Co-locators agree in writing that

the risk of Interference and Performance Degradation is low, and that the Desktop Analysis Meeting is not required.

40.1.89.1.10 The Access Provider's desktop study (referred to clause 9.1.7) and participation in the Desktop Analysis Meeting (referred to clause 9.1.9) will be charged for by the Access Provider in accordance with the Charges, as agreed between the Parties pursuant to the Mobile Co-location General Terms.

40.1.99.1.11 The outcome of the Desktop Analysis Meeting or the agreement not to hold a Desktop Analysis Meeting will be one of two scenarios:

- (a) If the Access Seeker, ~~and~~ Access Provider and any Existing Co-locators agree that the paper based Interference study (i.e. a desktop study) indicates minimal risk of Interference and minimal risk of Unacceptable Performance Degradation to the Access Provider Equipment and the equipment of any Existing Co-locators, both existing and forecasted at the Relevant Facilities, then the solution shall be defined as an "Agreed Standard Solution"; and may be deployed in accordance with clause 9.3; or
- (b) If either the Access Seeker, ~~or the~~ Access Provider or any Existing Co-locator does not believe that the paper based studies indicate minimal risk of Interference, and minimal risk of Unacceptable Performance Degradation, then experimental testing replicating the proposed solution configuration should may be undertaken at a suitable test facility to confirm the extent of Interference. ~~If experimental testing is not agreed then the solution shall be a Disagreed Solution and may only be implemented under the protocol in clause 10.4.~~

Experimental Testing

40.1.109.1.12 If experimental testing is ~~agreed~~ required by the Desktop Analysis Meeting, the Access Seeker, ~~and~~ Access Provider and any Existing Co-locators 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, either the Access Seeker, ~~or~~ the Access Provider or any Existing Co-locators can advance the issue using the expert determination in the Dispute Resolution procedures in section 39 of the Mobile Co-location General Terms.

40.1.149.1.13 Any experimental testing will be completed within twenty Working Days of the Testing Procedures Meeting, or within a mutually agreed timeframe or as determined by the expert determination in the Dispute Resolution process.

40.1.129.1.14 The costs of any experimental testing shall be met by the Access Seeker and the involvement of the Access Provider in agreeing and participating in the testing referred to in

clauses 9.1.12 and 9.1.13 will be charged for by the Access Provider in accordance with the Charges, as agreed between the Parties pursuant to the Mobile Co-location General Terms.

~~40.1.139.1.15~~ The outcome of the experimental testing process will be one of three scenarios:

- (a) If the Access Seeker, ~~and~~ the Access Provider and any Existing Co-locators agree that the testing indicates a minimal risk of Interference and 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 9.3; or
- (b) If either the Access Seeker, ~~or~~ the Access Provider or any Existing Co-locators does not agree that the testing indicates a minimal risk of Interference and 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 9.4; or
- (c) If the Access Seeker, ~~and~~ the Access Provider and any Existing Co-locators agree that the testing indicates a significant risk of Interference or a significant risk of Unacceptable Performance Degradation the solution shall be a Non-Compliant Solution, and will not be built.

~~40.29.2~~ 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.

9.2.1 If a Full Site Application is rejected in accordance with the provisions of the Mobile Co-location Operations Manual solely for reasons relating to Interference or Performance Degradation, and if the Access Seeker wishes, the Parties and any Existing Co-locators will meet within five Working Days to revise these elements of the Full Site Application. If the revised elements cannot be agreed within ten Working Days, or such other time as may be agreed, then the Access Seeker can either:

- (a) _____ progress the issue as a Disagreed Solution in accordance with clause 9.4; or
- (b) _____ advance the issue using the expert determination procedure of the Dispute Resolution procedures in section 39 of the Mobile Co-Location General Terms.

~~40.39.3~~ Protocol for deployment of an Agreed Standard Solution

~~40.3.19.3.1~~ This section sets out how an Agreed Standard Solution may be deployed and how it will be tested to avoid Unacceptable Performance Degradation occurring.

~~10.3.2 If a Full Site Application is rejected in accordance with the provisions of the Mobile Co-location Operations Manual solely for reasons relating to Interference or Performance Degradation, if~~

~~the Access Seeker wishes, the Parties will meet within five Working Days to revise these elements of the Full Site Application. If the revised elements cannot be agreed within ten Working Days, or such other time as may be agreed, then the Access Seeker can either:~~

- ~~(a) progress the issue as a Disagreed Solution; or~~
- ~~(b) advance the issue using the expert determination procedure of the Dispute Resolution procedures in section 39 of the Mobile Co-Location General Terms.~~

~~40.3.39.3.2~~ If the revised elements are agreed under clause 9.2.1, the Access Seeker may deploy that solution using this clause 9.3.

~~40.3.49.3.3~~ Once the Access Seeker Equipment has been commissioned and integrated on or with the Relevant Facilities in accordance with clause ~~4921~~.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 Access Seeker, ~~and~~ Access Provider and any Existing Co-locators 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 the expert determination in the Dispute Resolution procedure in section 39 of the Mobile Co-location General Terms.

~~40.3.59.3.4~~ 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.

~~40.3.69.3.5~~ 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.

~~40.3.79.3.6~~ 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 9.3.8.

~~40.3.89.3.7~~ The Access Seeker, ~~and~~ Access Provider and any Existing Co-locators will meet within one Working Day of the Notice to attempt to resolve the issue. The Access Seeker, ~~and~~ Access Provider and any Existing Co-locators will work together mutually and in good faith to find a solution.

~~40.3.99.3.8~~ If the Access Seeker, ~~and~~ Access Provider and any Existing Co-locator cannot agree a solution within five Working Days, then the issue can be advanced using the expert determination procedure of the Dispute Resolution procedures in section 39 of the Mobile Co-Location General Terms.

[40.3.109.3.9](#) If the Access Provider [and any Existing Co-locators](#) agrees that the measurement and testing program referred to in clauses 9.3.3 and 9.3.4, indicates no more than a minimal risk of Unacceptable Performance Degradation occurring the Access Seeker may proceed to give Notice under clause 9.3.10.

[40.3.119.3.10](#) The Access Seeker must provide to the Access Provider and any Existing Co-locator not less than ten Working Days Notice of the intention to start radiating power.

[40.3.129.3.11](#) 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").

[40.3.139.3.12](#) If it is not possible to operate at or simulate the Maximum Configuration then prior to the Access Seeker radiating the Access Seeker, Access Provider and any Existing Co-locator 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 9.3.10, 9.3.11, 9.3.14 - 9.3.27 will then apply as if the increase in configuration is the start of the radiating from the Relevant Facilities.

[40.3.149.3.13](#) If a solution is found then the Access Seeker Equipment at the Relevant Facilities will operate at Maximum Configuration for five days.

[9.3.14](#) If, during the five days of operating at Maximum Configuration, the Access Seeker experiences Performance Degradation, it will give notice to the Access Provider and any Existing Co-locators.

[9.3.15](#) Upon receipt of a Notice given under clause 9.3.14, the Parties and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

[40.3.159.3.16](#) 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.

[9.3.17](#) Upon receipt of ~~such a~~ Notice given under clause 9.3.16, 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.

40.3.169.3.18 The Access Seeker, Access Provider and any Existing Co-locator will meet within one Working Day of the Notice of Unacceptable Performance Degradation given under clause 9.3.16 to attempt to resolve the issue. The Access Seeker, Access Provider and any Existing Co-locator will work together mutually and in good faith to find a solution.

40.3.179.3.19 If the Access Seeker, Access Provider and any Existing Co-locator cannot agree a solution within five Working Days of the meeting under clause 9.3.18, then the issue can be advanced using the expert determination procedure of the Dispute Resolution procedures in section 39 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.

9.3.20 If no Unacceptable Performance Degradation is observed during the five days of operation at Maximum Configuration then, provided Stage 1 of the Project Closure Checklist has been approved by the Access Provider under section 21 of the Mobile Co-location Operations Manual, the Access Seeker Equipment may be reduced to operate at its normal configuration.

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

40.3.189.3.22 Upon receipt of a Notice given under clause 9.3.21, the Parties and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

9.3.23 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.

9.3.24 Upon receipt of a Notice given under clause 9.3.23, 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.

40.3.199.3.25 The Access Seeker, Access Provider and any Existing Co-locator will meet within one Working Day of the Notice of Unacceptable Performance Degradation given under clause 9.3.23 to attempt to resolve the issue. The Access Seeker, Access Provider and any Existing Co-locator will work together mutually and in good faith to find a solution.

40.3.209.3.26 If the Access Seeker, Access Provider or any Existing Co-locator cannot agree on a solution within five Working Days, then the issue can be advanced using the Dispute Resolution procedures in section 39 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.

[40.3.219.3.27](#) 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 ~~the~~ [Stage 2 of the Project Closure Checklist](#) referred to in ~~clause-section 49.521~~ of the Mobile Co-location Operations Manual.

[40.3.229.3.28](#) If the Access Seeker fails to comply with its obligations under clauses 9.3.17; 9.3.19; 9.3.24 or 9.3.27 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.

[40.49.4](#) Protocol for the Deployment of a Disagreed Solution

[40.4.19.4.1](#) This section sets out how a Disagreed Solution may be deployed and how it will be tested to avoid Unacceptable Performance Degradation occurring.

[40.4.29.4.2](#) 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](#).

[40.4.39.4.3](#) The Parties [and any Existing Co-locators](#) will meet within ten Working Days of receipt of the Notice to revise the proposed solution. If a revised solution cannot be agreed within a further twenty Working Days, ~~the solution shall be deemed non-compliant and not be built~~ [then the issue can be advanced using the expert determination procedure of the Dispute Resolution procedures in section 39 of the Mobile Co-location General Terms](#).

[40.4.49.4.4](#) If a revised solution is agreed [by the Access Seeker, Access Provider and any Existing Co-locators](#), the Access Seeker may make a Full Site Application. If ~~Conditional Preliminary~~ Site Approval is issued the solution shall be deployed in accordance with this clause 10.4.

[40.4.59.4.5](#) Once the Access Seeker Equipment has been commissioned and integrated on or with the Relevant Facilities in accordance with clause ~~4921~~.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 Access Seeker, ~~and~~ Access Provider [and any Existing Co-locators](#) 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 the expert determination procedure of the Dispute Resolution procedure in section 39 of the Mobile Co-location General Terms.

10.4.69.4.6 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.

10.4.79.4.7 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.

10.4.89.4.8 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 9.4.10.

10.4.99.4.9 The Access Seeker, ~~and~~ Access Provider and any Existing Co-locators will meet within one Working Day of the Notice to attempt to resolve the issue. The Access Seeker, ~~and~~ Access Provider and any Existing Co-locators will work together mutually and in good faith to find a solution.

10.4.109.4.10 If the Access Seeker, ~~and~~ Access Provider and any Existing Co-locators cannot agree a solution within five Working Days, then the issue can be advanced using the expert determination procedure of the Dispute Resolution procedures in section 39 of the Mobile Co-Location General Terms.

10.4.119.4.11 If the Access Provider and any Existing Co-locators agrees that the measurement and testing program referred to in clauses 9.4.5 and 9.4.6, indicates no more than a minimal risk of Unacceptable Performance Degradation occurring the Access Seeker may proceed to give Notice under clause 9.4.12.

10.4.129.4.12 The Access Seeker must provide to the Access Provider and any Existing Co-locator not less than twenty Working Days Notice of the intention to start radiating power.

10.4.139.4.13 The Access Seeker may only begin to radiate power during a ~~designated~~ 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.

9.4.14 If, during the 30 minute radiation period, the Access Seeker experiences Performance Degradation, it will give Notice of this 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 and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

9.4.16 If, during the 30 minute radiation period, 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.

~~10.4.14~~9.4.17 Upon receipt of ~~such a~~ Notice given under clause 9.4.16, 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.

~~10.4.15~~9.18 If the Access Seeker, Access Provider and any Existing Co-locators 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 9.4.13 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 during a normal traffic period~~Business Hour, and then shut down. The limited power levels, capacity and ~~normal traffic period~~Business Hour shall be determined by the Access Provider.

9.4.19 If, during or as a result of the radiation period referred to in clause 9.4.18, the Access Seeker experiences Performance Degradation, it will give Notice of this to the Access Provider and any Existing Co-locators.

9.4.20 Upon receipt of a Notice given under clause 9.4.19, the Parties and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

~~10.4.16~~9.21 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 9.4.18, it will give Notice of this to the Access Seeker.

~~10.4.17~~9.22 Upon receipt of ~~such a~~ Notice given under clause 9.4.21, 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.

~~10.4.18~~9.23 If the Access Seeker, Access Provider and any Existing Co-locators are satisfied that there is no Unacceptable Performance Degradation occurring during or as a result of the radiation period referred to in clause 9.4.18 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 during a normal traffic period~~Business Hour and shall then stop radiating. The full power levels, capacity and ~~normal traffic period~~Business Hour shall be determined by the Access Provider.

9.4.24 If, during or as a result of the radiation period referred to in clause 9.4.23, the Access Seeker experiences Performance Degradation, it will give Notice of this to the Access Provider and any Existing Co-locators.

~~10.4.199~~9.4.25 Upon receipt of a Notice given under clause 9.4.24, the Parties and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

~~10.4.209~~9.4.26 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 9.4.23, it will give Notice of this to the Access Seeker.

9.4.27 Upon receipt of ~~such a~~ Notice given under clause 9.4.26, 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.

~~10.4.219~~9.4.28 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 9.4.23, 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.

9.4.29 If, during or as a result of the radiation period referred to in clause 9.4.28, the Access Seeker experiences Performance Degradation, it will give Notice of this to the Access Provider and any Existing Co-locators.

9.4.30 Upon receipt of a Notice given under clause 9.4.29, the Parties and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

~~10.4.229~~9.4.31 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 9.4.28, it will give Notice of this to the Access Seeker.

9.4.32 Upon receipt of ~~such a~~ Notice given under clause 9.4.31, 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.

~~10.4.239~~4.33 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 9.4.28, 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.

9.4.34 If, during or as a result of the radiation period referred to in clause 9.4.33, the Access Seeker experiences Performance Degradation, it will give Notice of this to the Access Provider and any Existing Co-locators.

9.4.35 Upon receipt of a Notice given under clause 9.4.34, the Parties and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

~~10.4.249~~4.36 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 9.4.33, it will give Notice of this to the Access Seeker.

~~10.4.259~~4.37 Upon receipt of ~~such a~~ Notice given under clause 9.4.36, 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.

~~10.4.269~~4.38 If the Access Seeker, Access Provider and any Existing Co-locators are satisfied that there is no Unacceptable Performance Degradation occurring during the radiating period referred to in clause 9.4.33, then, provided Stage 1 of the Project Closure Checklist has been approved by the Access Provider under section 21 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.

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

~~10.4.279~~4.40 Upon receipt of a Notice given under clause 9.4.39, the Parties and Existing Co-locators shall meet to discuss how the Performance Degradation will be dealt with. For the avoidance of doubt, Performance Degradation experienced by the Access Seeker shall not require the Access Provider or any Existing Co-locator to take any steps and no issue arising from it may

be referred to the dispute resolution process in section 39 of the Mobile Co-location General Terms. The Access Seeker must either accept such Performance Degradation or amend its solution through a new Application.

~~10.4.289.4.41~~ 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.

~~10.4.299.4.42~~ Upon receipt of ~~such a~~ Notice of Unacceptable Performance Degradation given under clause 9.4.41, 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.

~~10.4.309.4.43~~ If a Notice of Unacceptable Performance Degradation is given under any of clauses 9.4.16, 9.4.21, 9.4.26, 9.4.31, 9.4.36 and 9.4.41, the Access Seeker, Access Provider and any Existing Co-locator will meet within one Working Day of the Notice to attempt to resolve the issue. The Access Seeker, Access Provider and any Existing Co-locator will work together mutually and in good faith to find a solution.

~~10.4.319.4.44~~ If the Access Seeker, Access Provider and any Existing Co-locator cannot agree on a solution within five Working Days, then the issue can be advanced using the expert determination procedure of the Dispute Resolution procedures in section 39 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 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.

~~10.4.329.4.45~~ If at any stage during the testing the Access Provider, ~~and~~ the Access Seeker and any Existing Co-locators agree that Unacceptable Performance Degradation, is occurring, the solution will be deemed to be a Non-Compliant Solution.

~~10.4.339.4.46~~ The Access Seeker may not make any change to the solution tested in this section, other than as agreed with the Access Provider as provided for in this section 9. Any change will require a new ~~Initial Site~~ Application.

9.4.47 If the Access Seeker fails to comply with its obligations under clauses 9.4.8; 9.4.17; 9.4.22; 9.4.27, 9.4.32, 9.4.37, 9.4.42, 9.4.44, ~~or~~ 9.4.46 or 9.4.48 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.

9.4.48 If the Access Seeker, Access Provider or any Existing Co-locator cannot agree on a solution within five Working Days, then the issue can be advanced using the Dispute Resolution procedure in section 39 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.

10.4.349.4.49 If there is no Unacceptable Performance Degradation at the conclusion of the twelve months of operation at normal configuration the Access Seeker may proceed to prepare Stage 2 of the Project Closure Checklist referred to in section 21 of the Mobile Co-location Operations Manual.

10.59.5 Non-Compliant Solution Protocol

10.5.19.5.1 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.

10.5.29.5.2 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.

1110 Protocol for Ongoing Interference Management

11.410.1 This section sets out how Unacceptable Performance Degradation which occurs outside the time frames of clauses 9.3 and 9.4 shall be managed but it shall only apply where the Access Seeker and the Access Seeker Equipment complies with both the terms of the Final Site Application and the solution finally agreed under clauses 9.3 or 9.4.

11.4.110.1.1 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;

either the Access Seeker, the Access Provider or any Existing Co-locator 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 (the Affected Party), the Affected Party will undertake testing to establish the cause of the Interference.

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

11.4.210.1.4 The 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 Subject to clause 10.1.6, the Party or Existing Co-locator causing the Unacceptable Performance Degradation must take steps to avoid or mitigate the Unacceptable Performance Degradation and must pay the costs of all parties in relation to the avoidance or mitigation of the Unacceptable Performance Degradation.

10.1.6 Where the Access Provider is operating within its reasonable future forecast and causes Unacceptable Performance Degradation:

(a) The Access Provider is not required to pay any of the costs of avoiding or mitigating the Unacceptable Performance Degradation; and

(b) The Access Provider is not required to move, add, decrease or change the Access Provider Equipment or take any steps to avoid or mitigate the Unacceptable Performance Degradation.

10.1.7 Where an Existing Co-locator is not a previous Access Seeker at the Relevant Facilities and is not willing to meet such costs of avoiding or mitigating the Unacceptable Performance Degradation, those suffering the Unacceptable Performance Degradation shall share the costs.

10.1.8 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 the expert determination procedure of the Dispute Resolution procedures in section 39 of the Mobile Co-Location General Terms. In reaching his or her decision the expert shall apply the principles set out above at clause 10.1.6 and the decision must be consistent with them.

~~11.1.3~~10.1.9 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 the expert determination procedure of the Dispute Resolution procedures in section 39 of the Mobile Co-Location General Terms.

11.210.2 This section sets out how Unacceptable Performance Degradation which occurs outside the time frames of clauses 9.3 and 9.4 shall be managed where the Access Provider determines that the Access Seeker and/or the Access Seeker Equipment does not comply with either the Final Site Application or the solution finally agreed under clause 9.3 or 9.4. 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.

11.210.2.1 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 Seeker, 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 [must immediately take measures to:](#)

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

[11.2.2\(b\)](#) [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.

[11.2.310.2.3](#) The Access Seeker, Access Provider and any Existing Co-locator will meet within one Working Day of the Notice of Unacceptable Performance Degradation to attempt to resolve the issue. The Access Seeker, Access Provider and any Existing Co-locator will work together mutually and in good faith to find a solution.

[11.2.410.2.4](#) If the Access Seeker, Access Provider and any Existing Co-locator cannot agree on a solution within five Working Days, then the issue can be advanced using the Dispute Resolution procedures in section 39 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 Unacceptable Performance Degradation to occur.

[11.2.510.2.5](#) 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 reasonable 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 Access](#) Seeker, to de-power or completely turn off the Access Seeker Equipment.

~~[11.3](#) In the event that an Access Seeker has Access Seeker Equipment installed at the Relevant Facilities when another Access Seeker installs its Access Seeker Equipment at those Relevant Facilities, the Access Seeker with installed Access Seeker Equipment shall be bound to clauses [9.310.3](#), [9.510.4](#) and [1011](#), where relevant, as an Existing Co-locator.~~

[1211](#) Expansion or Modification of Access Seeker Equipment

[12.411.1](#) 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.

[12.4.111.1.1](#) 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 [4245.4](#) of the Mobile Co-location Operations Manual) [for planned work](#) or must make an Initial Site Application [for all other work](#). "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.

[42.4.211.1.2](#) 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 9.3.11, 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.

[42.4.311.1.3](#) Upon receipt of such Notice the Access Seeker shall immediately de-power and/or switch off the Access Seeker Equipment.

[42.4.411.1.4](#) If the Notice relates to a failure to comply with clause 9.3.11 then the Access Seeker may only reactivate the Access Seeker Equipment once it has complied with clauses 9.3.10, 9.3.11, 9.3.14-9.3.27.

[42.4.511.1.5](#) 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.

[42.4.611.1.6](#) 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.

1312 Licensing

[13.4.12.1](#) Spectrum Licensing Process

[13.4.112.1.1](#) The Radiocommunications Act 1989 and its subsequent modifications govern the ~~licencing~~licensing process. However, there are issues specific to mobile co-location that are not explicitly addressed in the Radiocommunications Act 1989.

[13.4.212.1.2](#) Before the Access Seeker may issue a new spectrum licence, modify an existing spectrum licence or apply for a radio licence at Relevant Facilities it must:

- (a) take into account and allow for services already operating at the Relevant Facilities;
- (b) ~~take into account and allow for~~not prevent services that are forecast to operate at the Relevant Facilities ~~from obtaining spectrum licences~~; ~~and~~
- (c) take steps to ensure that Unacceptable Performance Degradation will not occur as a consequence of any service covered by the proposed new or modified spectrum licence; ~~and~~
- ~~(c)~~(d) agree technical compatibility measures with the Access Provider and any Existing Co-locators at the Relevant Facilities.

[13.4.312.1.3](#) If the Access Provider wishes to modify existing licences, [the Access Provider](#) will give considerations to existing services at the Relevant ~~Facilities~~[Facilities](#).