

SCHEDULE 3B – MODIFICATION REQUIRED

***PLEASE SEE GENERAL REQUIREMENTS APPLICABLE TO SCHEDULE 3B
SET OUT IN APPENDIX 1 AND SPECIFIC REQUIREMENTS SET OUT IN
IDA'S ANNOTATIONS BELOW.***

SCHEDULE 3B

LINE SHARING

CONTENTS

1. SCOPE	1
2. AVAILABILITY OF LINE SHARING	3
3. ORDERING AND PROVISIONING PROCEDURE	4
4. RESPONSE TIME	6
5. DELIVERY	10
6. ACCESS TO DP	12
7. UNAUTHORISED ACCESS TO SHARED LINE	12
8. STANDARD TERMS AND CONDITIONS	14
9. ACCESS AND APPROVALS REQUIRED	17
10. FAULT REPORTING AND CLEARING	17
11. PROTECTION AND SAFETY	19
12. TERM OF LICENCE	20
13. SUSPENSION	22
14. TERMINATION OF LICENCE	22
15. SUB-LICENSING	26
ANNEX 3B.1 ORDER FOR LINE SHARING	
ANNEX 3B.2 SPECTRAL COMPATIBILITY OF XDSL SYSTEMS PLAN	

SCHEDULE 3B

LINE SHARING

1. SCOPE

CLAUSE 1.1 - MODIFICATION REQUIRED

1.1 This Schedule 3B sets out the terms and conditions under which SingTel will provide the Requesting Licensee with a licence for Line Sharing on a Shared Line for the sole purpose of the Requesting Licensee providing xDSL services to a Requesting Licensee's Customer using the same Local Loop that SingTel uses to provide POTS to that Customer. For the avoidance of doubt, this Schedule 3B is not to be used by the Requesting Licensee for the purpose of providing telecommunications services to itself.

SingTel's proposed amendments to Clause 1.1 restrict a Requesting Licensee from using Line Sharing on a Shared Line obtained under this Schedule 3B for the purpose of providing telecommunication services to itself. IDA's view is that there is no justification for such a restriction. Given that a Requesting Licensee is able to obtain Line Sharing on a Shared Line to provide telecommunication services to other FBOs, SBOs and End Users, there is no basis to restrict the Requesting Licensee from similarly doing so for itself. In any event, SingTel did not provide any justification for this proposed amendment. Accordingly, IDA rejects SingTel's proposed amendments to Clause 1.1 and further directs SingTel to delete the phrase "to the Requesting Licensee's Customers".

CLAUSE 1.2 - MODIFICATION REQUIRED

1.2 The Requesting Licensee may seek Line Sharing on the Customer's existing POTS Local Loop owned by SingTel subject to:

- (a) the use by the Requesting Licensee of the Shared Line for the purpose of the Requesting Licensee providing xDSL services to the Requesting Licensee's Customer; and
- (b) the terms and conditions of this Schedule.

Please see IDA's annotations above to Clause 1.1. As a consequential amendment, IDA directs SingTel to modify Clause 1.2 to remove any artificial restriction on the Requesting Licensee's ability for self-provisioning.

1.3 This Schedule only applies to Requesting Licensees who are FBOs.

CLAUSES 1.4 AND 1.5 - MODIFICATION REQUIRED

Please refer to Paragraph 3 of Appendix 1. Arising from IDA's requirement for SingTel to incorporate service level guarantees for each service and effective remedies for failure to comply with such guarantees (including service standards and timeframes for pre-provisioning, provisioning and fault rectification), IDA directs SingTel to propose for IDA's approval, the necessary consequential amendments to Clauses 1.4 and 1.5 to comply with IDA's requirements in relation to the service level guarantees and remedies that SingTel must provide under each Schedule.

- 1.4 (a) The timeframes in this Schedule relating to pre-provisioning work to be undertaken by SingTel under clause 4.3 (such as the completion of project studies and the assessment of applications) are subject to delays caused by events outside SingTel's reasonable control, in which case SingTel may extend these timeframes for a period equal to the period of such delays.
- (b) For the avoidance of doubt, a failure to meet these timeframes caused by events outside SingTel's reasonable control does not constitute a breach of this Schedule or this RIO Agreement.
- 1.5 (a) If SingTel fails to meet any timeframes in this Schedule relating to provisioning work to be undertaken by SingTel under clauses 5.1 and 6.2, and the failure to meet the timeframes is solely caused by SingTel, SingTel will provide a remedy to the Requesting Licensee.
- (b) Such remedy will be in the form of a credit to the Requesting Licensee of the recurring Charges payable for the delayed services over a period equal to the period of the delay.
- (c) The Requesting Licensee acknowledges that this remedy is a genuine pre-estimate of the Requesting Licensee's loss and will be the sole and exclusive remedy available to the Requesting Licensee for such failure to meet provisioning timeframes and shall be SingTel's sole and exclusive liability to the Requesting Licensee for such failure.

2. AVAILABILITY OF LINE SHARING

2.1 SingTel will provide a licence for Line Sharing on a Shared Line to the Requesting Licensee in individual pairs, however the Requesting Licensee may apply for multiple licences for multiple pairs at the same address per application.

2.2 For the purposes of this Schedule, SingTel may have regard to the following when assessing the availability of a Shared Line:

- (a) whether the Customer has applied to terminate any contract with SingTel for SingTel's xDSL services which are provided using that Shared Line;
- (b) the Requesting Licensee's and other Licensees' requirements which have been ordered but not yet delivered or which have been provided;

CLAUSE 2.2(c) - MODIFICATION REQUIRED

- (c) security and confidentiality requirements or restrictions imposed on SingTel by Governmental Agencies or Customers;

SingTel Comments: Clause 2.2(c)

SingTel notes that some Customers, such as foreign embassies, may impose certain restrictions on the availability and use of Shared Line in order to prevent or minimise the possibility of any security breach in respect of telecommunication services that are provided to that Customer through the relevant Shared Line. Clause 2.2(c) has been amended on this basis.

SingTel is proposing amendments to Clause 2.2(c) to expand the scope of its application to "restrictions" and "Customers". Customers have the ability to control access to their premises. IDA will not permit SingTel to impose any unjustified restriction on the availability of Line Sharing, to the detriment of Requesting Licensees. Accordingly, IDA rejects SingTel's proposed amendments to Clause 2.2(c).

CLAUSE 2.2(d) - MODIFICATION REQUIRED

- (d) whether SingTel has plans or otherwise proposes to decommission the Local Loop, Sub Loop or POA;

SingTel Comment: New clause 2.2(d)

SingTel should have the right to refuse an application to licence access to a Local Loop or Sub Loop where SingTel where the relevant SingTel Exchange is “earmarked” for decommissioning.

SingTel cannot guarantee or maintain the quality of Services following the commencement of and during decommissioning at an Exchange.

Furthermore, the provision of a licence to a Requesting Licensee to access the Local Loop or Sub Loop during the process of decommissioning would only delay and hinder the decommissioning process.

IDA’s position is that SingTel should only reject a request for Line Sharing on a Shared Line which has been earmarked by SingTel for decommissioning, if such decommissioning will occur within a reasonable timeframe of 6 months from the date of request. The Requesting Licensee should be given the flexibility to decide if it is feasible to obtain Line Sharing on a Shared Line for the period prior to 6 months from the actual decommissioning. IDA considers such a qualification of 6 months to be necessary and reasonable because it balances both the Requesting Licensee’s and SingTel’s interests: on one hand, the Requesting Licensee is assured that SingTel cannot reject a request for Line Sharing on a Shared Line in circumstances where it only has a remote plan to decommission the Shared Line without any firm timeframes; on the other hand, SingTel retains a fair amount of operational and business flexibility in deciding how to manage its Shared Lines. Accordingly, IDA directs SingTel to modify Clause 2.2(d) to incorporate the requirements specified.

PROPOSED NEW CLAUSES 2.2(e) AND 2.2(f) – REJECTION

- (e) security and confidentiality requirements imposed on SingTel by the building owner and the Requesting Licensee has not obtained the necessary permission, wayleave or access approval;
- (f) reasonable requirements or restrictions imposed by SingTel in relation to access to SingTel buildings.

SingTel has proposed new Clauses 2.2(e) and 2.2(f). IDA’s position is that the Requesting Licensee’s responsibility to obtain any necessary approval for access and any reasonable requirements imposed by SingTel for access, are irrelevant considerations in determining availability of Shared Lines at the application stage. SingTel has a regulatory obligation under the Code 2005 to offer to provide Shared Lines, and SingTel must do so where it has

availability. These proposed considerations are only relevant in the process of physical provisioning of Line Sharing on Shared Lines. In this respect, should the Requesting Licensee subsequently fail to obtain any necessary approval thereby preventing SingTel from physically provisioning the Line Sharing on Shared Lines, SingTel would have recovered the applicable Charges for processing the Requesting Licensee's application. In any event, SingTel has also not provided any justification for the inclusion of these new clauses. Accordingly, IDA rejects SingTel's proposed new Clauses 2.2(e) and (f).

3. ORDERING AND PROVISIONING PROCEDURE

3.1 The Requesting Licensee may only lodge a Request for Line Sharing in accordance with this Schedule if the Customer of the Requesting Licensee has contracted with SingTel for the provision by SingTel of POTS.

CLAUSE 3.2 – MODIFICATION REQUIRED

A Requesting Licensee must provide the information as specified in Clause 3.2, when submitting its Request for Line Sharing. However, IDA notes that Form 3B.1 does not contain fields for all the information required. Accordingly, IDA directs SingTel to modify Forms 3B.1 to incorporate the missing fields.

3.2 The Requesting Licensee shall submit its Request for Line Sharing to SingTel in the form of Annex 3B.1 on a Business Day (**Request Date**) containing the following information:

- (a) the technical specifications, including the type of service to be offered and its signal power, frequency and bandwidth of the xDSL service the Requesting Licensee proposes to supply to its Customers;
- (b) the Customer's name, premises address and telephone number for the Shared Line;
- (c) authorisation from the lessee of the POTS for the provision of the Requesting Licensee's service over the Shared Line;
- (d) the name and location of the POA, Building MDF Room or Outdoor Cabinet;
- (e) the POA, Building MDF room or Outdoor Cabinet Tie Termination Pair allocated for connection in relation to the Request for Line Sharing; and

Please refer to Paragraph 1 of Appendix 1. SingTel must modify sub-clauses (d) and (e) to clarify their applicability given IDA's requirements specified.

- (f) the number of Shared Lines requested.

SingTel Comment: Clause 3.2

SingTel's amendments to clause 3.2 clarify the details the Requesting Licensee must provide in order for SingTel to jumper the licensed local loop to the Requesting Licensee's network.

4. RESPONSE TIME

- 4.1 SingTel shall process all Requests for Line Sharing on a 'first come, first served' basis up to the maximum amount specified in clause 4.2.

CLAUSE 4.2 - MODIFICATION REQUIRED

- 4.2 SingTel shall process a combined total of no more than 30 applications for Local Loop, Sub Loop, Line Sharing and Internal Wiring under Schedules 3A , 3B and 3C from all Licensees by 5.00 pm each Business Day and subsequent Requests shall overflow to the next Business Day.

SingTel Comments: Clause 4.2

SingTel has committed resources to process 200 wire pairs for 3 years since the IDA's last audit. The level of resources made available by the IDA in accordance with the requirements set out in Schedule 3 are disproportionate to the level of demand for Local Loops, Sub Loops, Line Sharing and Internal Wiring.

SingTel has amended clause 4.2 to reflect actual demand by Requesting Licensee's for Local Loops, Sub Loops, Line Sharing and Internal Wiring. It also ensures an efficient allocation of resources by SingTel, as SingTel's allocation of resources will be based on actual demand for Local Loops, Sub Loops, Line Sharing and Internal Wiring.

SingTel proposes to reduce the total number of applications that SingTel must process each Business Day, on the basis that the level of resources it has committed is disproportionate to the level of demand. IDA's position is that notwithstanding historical demand, SingTel must maintain the number of applications it is committed to process in order to provide for the situation where demand rises. Further, taking into account SingTel's experience in implementing the RIO since 2001, IDA would expect SingTel to be more efficient in processing applications. Therefore, SingTel should be able to reduce the amount of resources committed to meet its obligation in Clause 4.2, while maintaining the number of

applications it is to process. Accordingly, IDA rejects SingTel's proposed reduction from the current 200 wire pairs to 30 applications per Business Day. Notwithstanding, IDA reserves the right at any time to review and adjust the number of applications that SingTel must process.

CLAUSES 4.3, 4.4 AND 5.1 - MODIFICATION REQUIRED

IDA is of the view that the procedure for approving and rejecting applications set out in Clauses 4.3 and 4.4 are cumbersome and can be significantly streamlined to provide for a more efficient process. Accordingly, IDA directs SingTel to modify Clauses 4.3 and 4.4 to incorporate the following requirements:

- (a) Within 1 Business Day of the Request Date, SingTel must notify the Requesting Licensee whether its application is accepted or rejected. In this respect, SingTel may only reject the application for the following reasons:*
 - (i) the Requesting Licensee is not an FBO;*
 - (ii) the Request for Line Sharing is not in the prescribed form;*
 - (iii) the Request for Line Sharing does not contain all the required information;*
 - (iv) the Customer has not contracted for POTS from SingTel;*
 - (v) whether the line is capable of supporting Line Sharing;*
 - (vi) the information in the Request is incorrect or inaccurate; or*
 - (vii) that SingTel has plans or otherwise proposes to decommission the Local Loop, Sub Loop or POA within 6 months of the date of the Request for Line Sharing (under Clause 2.2(d)).*

IDA considers the timeframe of 1 Business Day to be reasonable given that the basis for determining acceptance or rejection would be apparent on the face of the application. In the event that the maximum capacity of the overflow specified in Clause 4.2 is reached, SingTel may overflow the applications to the next Business Day but SingTel must inform the Requesting Licensee within 1 Business Day of the Request Date. To compensate SingTel for its costs incurred, SingTel may propose a reasonable Charge under Schedule 9 for processing and determining whether a Requesting Licensee's application should be accepted or rejected.

- (b) Where SingTel rejects the application, SingTel must provide reasons explaining the basis for rejection.*

- (c) *In the case where SingTel notifies the Requesting Licensee of acceptance, SingTel must complete its detailed processing and inform the Requesting Licensee within 3 Business Days from the Request Date whether or not the Shared Line is available as determined under Clause 2 (except that the considerations in Clause 2.2(d) on decommissioning shall not apply). Where SingTel notifies the Requesting Licensee that the Shared Line is unavailable, SingTel must provide an explanation of why it has determined the Shared Line to be unavailable.*
- (d) *Under Clause 5.1, the estimated provisioning timeframe for SingTel to provide the Requesting Licensee with Line Sharing is up to 6 Business Days. Following the provisioning, a Requesting Licensee would still need to undertake testing, so activation for service to an End User would likely exceed more than 6 Business Days. This is not in line with the IDA QoS standard which requires operators to activate service for their broadband Internet customers within 5 Business Days. In order to ensure that Requesting Licensees are able to meet IDA's QoS standards, SingTel must ensure that Line Sharing is provisioned within 4 Business Days from the Request Date.*

IDA's position is that the Requesting Licensee's responsibility to obtain any necessary approval for access and any reasonable requirements imposed by SingTel for access, are irrelevant considerations in determining availability of Line Sharing at the application stage. SingTel has a regulatory obligation under the Code 2005 to offer to provide Line Sharing, and SingTel must do so where it has availability. These proposed considerations are only relevant in the process of physical provisioning of Line Sharing. In this respect, should the Requesting Licensee subsequently fail to obtain any necessary approval thereby preventing SingTel from physically provisioning the Line Sharing, SingTel will have recovered the applicable Charges for processing the Requesting Licensee's application.

In addition, please also refer to Paragraph 1 of Appendix 1. The Requesting Licensee must be permitted to submit its application for Line Sharing independently of its application for the necessary Subscriber Tie Cable, Termination Block and Co-Location Space. SingTel must not reject an application for Line Sharing on the basis that the Requesting Licensee has not obtained and installed the necessary Subscriber Tie Cable and Termination Block under Schedule 3D or 3E, or has not obtained a licence to the necessary Co-Location Space under Schedule 8B.

- 4.3 If SingTel approves an application for Line Sharing, SingTel shall provide the Requesting Licensee notice of its approval within four (4) Business Days of the

Request Date together with the following information for the licensing of Shared Lines:

- (a) the Shared Line estimated provisioning date which will be no later than six (6) Business Days from the date of processing; and
- (b) corresponding Circuit Reference number.

SingTel Comments: Former clause 4.2 and clause 4.3

SingTel has deleted former clause 4.2 and amended clause 4.3 (including deleting paragraph (c) to further streamline the ordering and provisioning process in relation to the licensing of Local Loops and Sub Loops as required by the IDA (IDA Letter to SingTel, 21 February 2005, page 1).

4.4 SingTel may reject a Request for Line Sharing within four (4) Business Days of the Request Date if:

- (a) the Requesting Licensee is not a FBO;
- (b) the Request for Line Sharing is not in the prescribed form;
- (c) the Request for Line Sharing does not contain all the required information;
- (d) Line Sharing is not available as determined under clause 2;
- (e) the Customer has not contracted for POTS from SingTel;
- (f) the line is not capable of supporting Line Sharing;

SingTel's Comments: Clause 4.4(f)

SingTel's amendment reflects circumstances in which SingTel deploys transmission equipment to the MDF room but the Loop Feeder is not available for Line Sharing.

- (g) the information in the Request is incorrect or inaccurate;
- (h) the Requesting Licensee has not obtained and installed the necessary Subscriber Tie Cable and Termination Block under Schedule 3D or 3E;

- (i) the Requesting Licensee has not obtained the necessary permits, consents, waivers, authorisations or other rights required for SingTel to provide the licence for Line Sharing;
- (j) the Requesting Licensee has not obtained a licence to the necessary Co-Location Space under Schedule 8B and has not installed Co-Location Equipment at Co-Location Space in accordance with clause 1 of Attachment A of Schedule 8 (Attachments);

SingTel Comments: Clause 4.4(j)

SingTel cannot provide access to Local Loops or Sub Loops without the installation of Co-Location Equipment at Co-Location Space by the Requesting Licensee. Clause 4.4(j) makes it clear that Co-Location under Schedule 8 is required before SingTel can grant a licence for Local Loop or Sub Loop.

- (k) the Requesting Licensee has not obtained all necessary permissions or rights of access from the Customer or owner of the premises.

CLAUSE 4.4(l) – MODIFICATION REQUIRED

- (l) in SingTel’s reasonable opinion, the equipment (including the splitters) and services that the Requesting Licensee proposes to use to provide the xDSL services may interfere or cause deterioration to POTS supplied by SingTel; or

Upon request, SingTel must provide the Requesting Licensee with a list of equipment that it knows to be prohibited. This is to avoid any dispute, should the Requesting Licensee propose to use equipment that SingTel considers objectionable. Accordingly, IDA directs SingTel to modify Clause 4.4(l) to incorporate the requirements specified.

- 4.5 The Requesting Licensee shall pay to SingTel the application fee regardless of whether its Request for Line Sharing is successful or not.

5. DELIVERY

CLAUSE 5.1 – MODIFICATION REQUIRED

- 5.1 SingTel shall provide the Shared Line by the end of six (6) Business Days from the Request Date. If it cannot meet this date, SingTel shall notify the Requesting Licensee of the delay in installation.

SingTel Comments: Clause 5.1

SingTel has amended clause 5.1 to streamline the ordering and provisioning process in relation to the licensing of Local Loops and Sub Loops as required by the IDA (IDA Letter to SingTel, 21 February 2005, page 1)

Please refer to IDA's annotations above at Clauses 4.3, 4.4 and 5.1. IDA directs SingTel to modify Clause 5.1 to incorporate the requirement that SingTel will provide the Line Sharing within 4 Business Days from the Request Date. In addition, in order to provide the Requesting Licensee with business certainty, and to allow the Requesting Licensee to schedule its operations efficiently, SingTel must notify the Requesting Licensee upon the completion of provisioning. Accordingly, IDA directs SingTel to modify Clause 5.1 to incorporate the requirements specified.

- 5.2 Unless otherwise stated, SingTel shall retain the responsibility for working at the SingTel Exchange MDF, Building MDF, SingTel Outdoor Cabinet and DP, including jumpering works at the SingTel Exchange Building, MDF, SingTel Outdoor Cabinet and Exchange MDF as well as termination of Internal Wiring to SingTel DP. The Requesting Licensee shall bear the Charges for such work carried out by SingTel.
- 5.3 SingTel will only use Jumper Wires conforming to CW6000 series with a nominal gauge of 0.5mm and use the proper tools for installing Jumper Wires at the Requesting Licensee's Termination Block.
- 5.4 The Jumper Wires shall be installed horizontally either left or right out from its starting Termination Block and then across the jumper field and vertically up or down to the destination Termination Block. Jumper Wires shall not be installed with any slack nor will they be left dangling to cause obstruction to the jumper field.
- 5.5 SingTel shall first verify any jumpering points assigned before recovering any unused Jumper Wire for the running of the new Jumper Wire for the connection of licensed Line Sharing.
- 5.6 SingTel shall promptly notify the Requesting Licensee on the completion of provisioning the Shared Line under clause 5.1.
- 5.7 Nothing in this Schedule vests in the Requesting Licensee any right, title or proprietary interest in the Shared Line or Jumper Wire.

6. ACCESS TO DP

CLAUSE 6 – MODIFICATION REQUIRED

In relation to Clause 6.2, IDA understands that under current practice, the Requesting Licensee performs jumpering work at the Building MDF, while jumpering work at SingTel's Exchange Building is performed by SingTel. IDA sees no reason for deviating from the current practice. Accordingly, IDA directs SingTel to modify Clause 6.2 to retain the current practice.

- 6.1 The Requesting Licensee shall not, and shall ensure that its employees, agents and contractors do not, at any time access the SingTel MDF, SingTel Outdoor Cabinet or SingTel's DP.
- 6.2 Where required, the Requesting Licensee shall submit an application requesting SingTel to jumper to a new Tie Cable pair. Subject to clause 4, SingTel will perform the jumpering within three (3) Business Days from the receipt of request. For the avoidance of doubt, the grant of a licence in respect of Line Sharing does not provide the Requesting Licensee with a licence to access SingTel's Distribution Point, Building MDF or Outdoor Cabinet that is associated with the Line Sharing.

SingTel Comment: Clause 6.2

SingTel has amended clause 6.2 to make it clear that the Requesting Licensee must obtain licences to access SingTel's Distribution Point, Building MDF or Outdoor Cabinet under other applicable Schedules of the RIO Agreement.

7. UNAUTHORISED ACCESS TO SHARED LINE

- 7.1 Without prejudice to any other rights SingTel may have (whether under contract, at law, or in equity), where SingTel identifies that the Requesting Licensee has accessed Shared Line without having obtained a licence in accordance with this Schedule 3B, SingTel may do any one or more of the following:

CLAUSE 7.1(a) - MODIFICATION REQUIRED

- (a) notify the Authority that a material breach of this Schedule 3B has occurred and request that the Authority issue an order under clause 12.2 or 13.2 of the RIO Agreement (as the case may be) for SingTel to suspend or terminate this Schedule 3B;

SingTel must obtain IDA's approval under Clauses 12.2 or 13.2 of Part II of the Main Body of the RIO Agreement for suspension or termination of the RIO Agreement and IDA has discretion whether to grant its approval. In this respect, SingTel must modify Clause 7.1(a) to provide that SingTel must obtain the Authority's approval under Clauses 12.2 or 13.2 before it can suspend or terminate Schedule 3B as the case may be.

- (b) direct the Requesting Licensee to, within five (5) Business Days of the notice, remove its equipment that permits Line Sharing; and/or
- (c) direct the Requesting Licensee to, within two (2) Business Days of the notice, submit a Request for Line Sharing in accordance with clause 3.

SingTel Comment: New clause 7.1(a) and (b)

SingTel notes that a failure by the Requesting Licensee to obtain a licence for access to the Line Sharing is a very serious matter. SingTel considers that such a failure to constitute a material breach of Schedule 3B and therefore justifies suspension or termination following the receipt of approval from the IDA.

Clause 7.1(b) permits SingTel to direct the Requesting Licensee to remove its equipment that permits line Sharing on 5 Business Days notice by SingTel. SingTel already has this right under clause 7.5 (formerly 7.3) where SingTel rejects a Request for Line Sharing. Clause 7.1(b) permits SingTel to exercise this right upon discovery that the Requesting Licensee has access the Line Sharing without a licence.

7.2 The Requesting Licensee must pay SingTel's reasonable costs incurred in investigating the unauthorised use.

7.3 If the Requesting Licensee does not remove its equipment within five (5) Business Days of the notice under clause 7.1(b), SingTel may remove the equipment and the Requesting Licensee shall be liable for any reasonable costs associated with its removal.

SingTel Comments: Clause 7.3

Consequential amendment only. New clause 7.3 is based on former clause 7.5.

7.4 If the Requesting Licensee is directed to submit a Request for Line Sharing under clause 7.1(c), the Requesting Licensee must provide documentary evidence of the date of installation as part of the Request for Line Sharing. If the Requesting Licensee is unable to provide credible documentary evidence substantiating the date of

installation, the date of access shall be deemed to be the Effective Date of this RIO Agreement. The Requesting Licensee must pay the Charges in arrears calculated from the date of access in accordance with Schedule 9.

SingTel Comments: Clause 7.4

Consequential amendment only. New clause 7.4 is based on former clause 7.1.

CLAUSE 7.5 – MODIFICATION REQUIRED

7.5 Where SingTel approves the Request for Line Sharing under clause 7.1(c), the Requesting Licensee must pay, within five (5) Business Days from the date of approval, SingTel's reasonable costs incurred in investigating the unauthorised use and the Charges in arrears calculated from the date of access (including the date of deemed access under clause 7.4) in accordance with Schedule 9.

Clause 7.2 already provide for SingTel's recovery of its reasonable costs for investigating unauthorised access. The reference to doing so under Clause 7.5 is redundant and should be deleted. Accordingly, IDA directs SingTel to modify Clause 7.5 to incorporate the requirements specified.

7.6 If the Requesting Licensee fails to pay the arrears after five (5) Business Days from the date of approval, the Requesting Licensee must discontinue use and remove its equipment from the Shared Line within five (5) Business Days.

7.7 If SingTel rejects the Request for Line Sharing under clause 7.1(c), the Requesting Licensee must pay, within five (5) Business Days from the date of rejection, SingTel's reasonable costs incurred in investigating the unauthorised use and the Charges in arrears calculated from the date of access in accordance with clause 7.4 and the Requesting Licensee must discontinue use and remove its equipment from the Shared Line within ten (10) Business Days.

SingTel Comment: Former clause 7.5

Consequential deletion only. Please refer to clause 7.2.

8. STANDARD TERMS AND CONDITIONS

8.1 SingTel will be responsible for the maintenance and administration of the Shared Line and POTS under this Schedule.

CLAUSES 8.2 AND 8.3 - MODIFICATION REQUIRED

Paragraph 6.6.1 of the IRS/MWS Schedule provides that the Dominant Licensee must provide a DSL-capable loop (in the same manner as described in Paragraph 6.6.4 above). Paragraph 6.6.4 provides that the loop performance should be typical of those used by the Dominant Licensee for its own DSL services. Amongst others, paragraph 6.6.4 also requires SingTel to condition the loop, remove any impediments to DSL service, and to supply loops to a Requesting Licensee for DSL that perform at a level equivalent to the loops that SingTel uses for its own DSL services. Given that SingTel provides DSL services to its own End Users, IDA therefore directs SingTel to modify Clauses 8.2 and 8.3 to incorporate the following requirements:

- (a) SingTel must remove all qualifications that it does not guarantee loop length, attenuation, noise level or loss and that the Shared Lines are licensed on an “as-is-where-is” basis; and*
- (b) SingTel must provide an appropriate performance guarantee to the Requesting Licensee for Shared Lines that is, at the minimum, equivalent to that which it provides to its End Users for DSL services.*

8.2 Subject to SingTel’s obligations to the Authority under the Code, SingTel does not guarantee that the loop length, attenuation, noise level or loss would remain the same throughout the licence period. The loop length, attenuation, noise level or loss may change during routine maintenance or cable diversion, or due to wear and tear.

SingTel Comment: Clause 8.2

Clarifying amendment only.

8.3 SingTel licenses Shared Lines on an “as-is-where-is” basis in the same condition that it would provide to itself for an equivalent service. The Requesting Licensee is responsible for costs incurred due to its use of the Shared Line for the purpose of providing xDSL services.

SingTel Comment: Clause 8.3

SingTel has amended clause 8.3 to ensure that the condition of Shared Lines that SingTel provides to a Requesting Licensee are equivalent to what it provides itself (IDA letter to SingTel, 21 February 2005, page 5).

- 8.4 Except to the extent strictly necessary to accurately describe the service to actual or potential Customers, the Requesting Licensee shall not use SingTel's name, any SingTel's trademarks or the fact that any service is supplied using SingTel's Network in promoting the Requesting Licensee's service.
- 8.5 The Parties shall in good faith co-operate with each other and take reasonable measures to ensure that there is no interference with or deterioration to SingTel's existing services or those of a Third Party as a result of the Requesting Licensee's use of the Shared Line.

SingTel Comment: Clause 8.5

Consequential amendment only. Previously clause 8.9.

- 8.6 The Requesting Licensee shall be responsible to the Requesting Licensee's Customers for all aspects of operations and maintenance of the Requesting Licensee's services.
- 8.7 The Requesting Licensee shall not make physical contact with or otherwise interfere, change or damage SingTel's Building MDF, SingTel's Outdoor Cabinet, MDF Termination Block, Termination Pin, Jumper Wires, DP, or DP Termination Pin that is used to provide the SingTel POTS.
- 8.8 The Requesting Licensee shall be responsible for the installation and connection of a Tie Termination Block to access the licensed Shared Line. The Requesting Licensee may request to licence SingTel's Distribution Frame Mounting or Cabinet Distribution Frame Mounting subject to availability. For the avoidance of doubt, licence of Distribution Frame Mounting is not covered under this Schedule and is covered in Schedule 3D and Schedule 3E.
- 8.9 The Requesting Licensee acknowledges that if SingTel's and the Requesting Licensee's plant is damaged by a Third Party at the same location, SingTel has priority over the Requesting Licensee to work in SingTel's Building MDF, SingTel's Outdoor Cabinet, DP or damaged site.
- 8.10 The Parties acknowledge that licences in respect of :
- (a) SingTel's Distribution Frame Mounting is governed by Schedule 3D;
 - (b) Cabinet Distribution Frame Mounting is governed by Schedule 3E; and
 - (c) Co-Location for POA is governed by Schedule 8B.

SingTel Comment: Clause 8.10

Consequential and clarifying amendment only.

CLAUSE 8.11 - MODIFICATION REQUIRED

8.11 The Requesting Licensee shall comply with any Spectral Compatibility of xDSL Systems Plan developed by SingTel from time to time and as approved by the Authority.

IDA agrees that it is necessary for SingTel to develop, and for Requesting Licensees to comply with, a xDSL Systems Plan, to minimise the risk of interference. However, contrary to Clause 8.11 which provides that SingTel may develop the xDSL Systems Plan from time to time, Paragraph 6.8.3 of the IRS/MWS Schedule requires SingTel to include such a plan in the RIO. Accordingly, as part of this proceeding, IDA directs SingTel to develop and incorporate into the RIO such an xDSL Systems Plan for IDA's approval.

8.12 The Requesting Licensee shall provide both splitters at each end of the Shared Line to separate the Shared Line into two independent channels to avoid interference between the signals of the services on each channel.

9. ACCESS AND APPROVALS REQUIRED

9.1 The Parties shall comply with clause 16.5 of the main body of this RIO Agreement in relation to the obtaining of all licences, permits, consents, waivers, authorisations and intellectual property or other rights required for the provision of the licensed Shared Lines.

CLAUSE 10 – MODIFICATION REQUIRED

Clause 10 only prescribes the procedures to be undertaken by the Requesting Licensee to take action to remove interference to POTS. However, in the case where there is interference to the Requesting Licensee's use of the Shared Line and the source of the interference is caused by SingTel, IDA considers it reasonable for SingTel to take action to remove the interference. Accordingly, IDA directs SingTel to modify Clause 10 to incorporate the requirements specified.

10. FAULT REPORTING AND CLEARING

- 10.1 Each Party must have or establish a Fault Reporting and Control Centre (FCC) to act as a single point of contact for the reporting and management of fault reporting and clearing. The FCC must be available twenty-four (24) hours a day, seven (7) days a week.
- 10.2 Each Party will perform fault analysis to determine the source of the fault and check that the fault does not lie within its Network before reporting the fault to the other Party.
- 10.3 Where a Party's use of the Shared Line interferes with the other Party's service, the other Party shall report the fault to the first mentioned Party.
- 10.4 Upon receipt of a fault report under clause 10.1 with respect to interference by the Requesting Licensee's service with POTS or a SingTel or Third Party service which pre-existed the Requesting Licensee's service, the Requesting Licensee shall remove the cause of the interference within two (2) Business Days.
- 10.5 If the Requesting Licensee fails to remove the cause of the interference as required by clause 10.4, SingTel may immediately terminate the licence of the Shared Line under this Schedule and remove the Requesting Licensee's service. The Requesting Licensee shall pay SingTel for the cost incurred in the investigation and removal of the interference.
- 10.6 Each Party shall maintain and store its own records of faults and repairs.
- 10.7 The Requesting Licensee shall compensate SingTel for the cost incurred in responding to a fault that is caused by the Requesting Licensee.
- 10.8 The Requesting Licensee acknowledges that SingTel may temporarily disconnect the Requesting Licensee's xDSL services at either the Exchange MDF, Outdoor Cabinet or Building MDF for SingTel to perform reasonable fault analysis and line testing on the Shared Line for up to three (3) hours. SingTel will use its reasonable endeavours to provide the Requesting Licensee with prior notice of any such disconnection.

CLAUSE 10.9 – MODIFICATION REQUIRED

- 10.9 If it is necessary to carry out any planned repair or upgrade to any equipment or facility forming part of the SingTel Shared Line and SingTel reasonably considers that the planned repair or upgrade would result or be likely to result in the interruption of

the Requesting Licensee's service for more than three (3) hours, SingTel shall, where reasonably practicable, provide the Requesting Licensee with reasonable notice of such repairs or upgrades. SingTel shall not be liable for any loss caused by such repair or upgrading.

SingTel Comments: Clause 10.9

SingTel has amended clause 10.9 to eliminate the requirement for SingTel to notify the Requesting Licensee of planned repairs or upgrades in circumstances where the repair or upgrade would not or would not be likely to result in a disruption, or where the disruption is for a very limited time (i.e. less than 3 hours). The current requirement to notify a Requesting Licensee in all instances where there will be a repair or upgrade is overly burdensome on SingTel and does provide any benefit to the Requesting Licensee where there will be no disruption or such a disruption is for a very limited or only a very limited time.

IDA requires SingTel to modify Clause 10.9 to incorporate a procedure for planned maintenance/upgrading/repair works. At a minimum, SingTel must provide the Requesting Licensee with reasonable written notice of at least 14 Calendar Days prior to undertaking any planned maintenance/upgrading/repair works. IDA considers this timeframe to be reasonable because SingTel should be aware of its planned maintenance/upgrading/repair schedule well in advance. In all cases, SingTel must take reasonable measures to avoid/minimise any service disruption to the Requesting Licensee. Following any maintenance/upgrading/repair works, the performance level of the Shared Line must continue to meet the performance guarantee for Line Sharing, as specified in Paragraphs 6.6.4 and 6.8.1 of the IRS/MWS Schedule. (Please also refer to IDA's annotations above at Clauses 8.2 and 8.3.)

11. PROTECTION AND SAFETY

11.1 Each Party is responsible for the safe operation of its Network and in particular the safe operation of equipment within its Network on its side of the connection at the Subscriber Tie Cable Termination Pin or DP Termination Pin.

11.2 Each Party shall, so far as reasonably practicable, take all necessary steps to ensure that the licence of the Shared Line, its operations and its implementation of this Schedule:

(a) do not endanger the safety or health of any person, including the employees and contractors of the Parties;

- (b) do not damage, interfere with or cause any deterioration in the operation of the other Party's Network provided that SingTel's POTS and SingTel and Third Party services which pre-existed the Requesting Licensee's services shall take precedence; and

11.3 The Requesting Licensee shall not deploy any hazardous power feed onto the Shared Line licensed to it under this Schedule.

CLAUSE 12 - MODIFICATION REQUIRED

IDA directs SingTel to modify Clause 12 to incorporate the following requirements:

- (a) *SingTel must not impose any minimum term for the licence of the Shared Line. To compel a Requesting Licensee to retain its licence for the Shared Line that the Requesting Licensee no longer requires is inefficient and wasteful.*
- (b) *Therefore, while the term of the licence for Shared Line shall continue until the expiry of the RIO Agreement, the Requesting Licensee may terminate the licence at any time by giving SingTel 1 month notice period. However, where the Requesting Licensee requires termination of the licence before the expiry of the 1 month notice period, the Requesting Licensee will remain liable for the recurring charges for the Shared Line until the date of expiry of the 1 month notice period term.*

This amendment is necessary to provide the industry with certainty as to the duration of the licence and obviates the unnecessary process of renewing the licence. Further, IDA is of the view that the current notice period of 6 months prescribed in Clause 12.3 unnecessarily hinders the Requesting Licensee's ability to structure its business operations to meet changing market conditions.

- (c) *IDA will not permit SingTel to unilaterally terminate the licence for Shared Line by giving prior written notice to the Requesting Licensee. Please also refer to IDA's annotations to Clause 14 below on the circumstances under which SingTel may terminate the licence for Shared Line upon the occurrence of certain specified events.*
- (d) *Finally, the licence for Shared Line will commence from the date of provisioning and not from the Request Date.*

12. TERM OF LICENCE

12.1 Subject to clause 12.2, the Line Sharing shall commence on the date that SingTel approves the Request for Line Sharing under clause 4.3 and continues for two (2) years from the Request Date.

12.2 The term of the Line Sharing licence under clause 12.1 shall be automatically extended for six (6) month periods until:

- (a) the Local Loop or Sub Loop licence is terminated in accordance with this Schedule;
- (b) the SingTel RIO is revoked by the Authority under clause 13.8 of the RIO Agreement;
or
- (c) until the Authority removes the requirement for SingTel to supply Line Sharing under the SingTel RIO or exempts SingTel from supplying Line Sharing under clause 13.9 of the RIO Agreement.

SingTel Comment: Clause 12.2

Clarifying amendment only. SingTel has inserted paragraphs (b) and (c) to ensure consistency of language with the main body of the RIO Agreement.

12.3 The Requesting Licensee may terminate the licence of the Line Sharing after the expiry of the original term set out in clause 12.1 by giving SingTel no less than six (6) months written notice. Such termination will take effect from the date of expiry of this notice.

SingTel Comment: Clause 12.3

SingTel has amended clause 12.3 to prevent Requesting Licensees from obtaining a licence to access the Local Loop or Sub Loop for only a brief period of time before terminating the licence. Clause 12.3, as amended, provides SingTel with greater certainty in respect of network planning and removes any incentive for Requesting Licensees to make frivolous or vexatious requests for access to the Local Loop or Sub Loop.

12.4 SingTel may terminate the Line Sharing licence with effect on or after the expiry of the original term under clause 12.1 by giving the Requesting Licensee no less than six (6) months written notice.

13. SUSPENSION

- 13.1 SingTel may suspend the Requesting Licensee's licence to Line Sharing at any time until further notice to the Requesting Licensee if the Line Sharing licence causes or is likely to cause physical or technical harm to any telecommunications network, system or services (whether of SingTel or any other person) including but not limited to causing damage, interfering with or causing deterioration in the operation of the SingTel Network.
- 13.2 Without limiting the exclusions or limitations of liability in this RIO Agreement, SingTel shall not be liable to the Requesting Licensee for any Loss resulting from, or in connection with, suspension of a licence under this Schedule under this clause 13.

14. TERMINATION OF LICENCE

- 14.1 The Requesting Licensee may terminate its licence within five (5) Business Days from the date on which SingTel notifies the Requesting Licensee of delivery of the Shared Line under clause 5.1 of this Schedule, if the line condition is not suitable for the provision of xDSL service. The Requesting Licensee will be liable for all charges payable up to the date of termination but not for ongoing charges payable beyond the date of termination.

CLAUSE 14.2 – MODIFICATION REQUIRED

IDA directs SingTel to modify Clause 14.2 to incorporate the following requirements:

- (a) *IDA will not permit SingTel to terminate the Line Sharing licence immediately by written notice, except in the circumstances specified in Clauses 14.2(a), (b), (d), (e), (g) and (i).*
- (b) *Where Clause 14.2(c) applies, SingTel may either migrate the Requesting Licensee's licence for a Shared Line to that of a Local Loop/Sub Loop, or allow the Requesting Licensee to retain its Shared Line Licence. IDA requires SingTel to propose for IDA's approval, the applicable process and procedures in such an event. At the minimum, SingTel must ensure that the Requesting Licensee's provision of DSL services to its Customers is not disrupted.*
- (c) *Please refer to IDA's annotations above at Clause 1.1. Accordingly, IDA directs SingTel to modify Clause 15.1(c) to incorporate the requirements specified.*

- (d) *Where Clause 14.2(f) applies, SingTel must provide the Requesting Licensee with 10 Business Days' notice prior to terminating the Line Sharing licence. This is to avoid any dispute, should SingTel wrongly conclude that the Requesting Licensee has abandoned the Shared Line (i.e. no longer uses the Shared Line to provide services).*
- (e) *The right of SingTel to terminate a licence on the basis of unsuitability is already provided for in Clause 14.4(a). Accordingly, IDA directs SingTel to modify clause 14.2(g) by deleting the reference to "unsuitable".*
- (f) *In respect of Clause 14.2(h), IDA's position is that the specified events relating to SingTel's right to own, maintain or operate the Shared Line would have been addressed under the provision relating to decommissioning. Accordingly, unless SingTel can provide satisfactory justification for its retention, IDA directs SingTel to delete Clause 14.2(h).*

14.2 SingTel may immediately terminate a licence of Shared Line under this Schedule if:

- (a) the Requesting Licensee is no longer an FBO;
- (b) in SingTel's reasonable opinion, the Requesting Licensee is using the Shared Line in contravention of an applicable law, licence, code, regulation or direction and SingTel has the necessary confirmation from the relevant Governmental Agencies that the Requesting Licensee is in contravention of the applicable law, licence, code, regulation or direction;
- (c) the supply of POTS by SingTel to the Customer to whom the Requesting Licensee is supplying its services is cancelled, expires or terminates;
- (d) the Shared Line is used for a purpose other than for the purpose of the Requesting Licensee providing xDSL services to the Requesting Licensee's Customer;
- (e) the licence in respect of Co-Location Space to which the Shared Line is connected is terminated or expires;
- (f) the Requesting Licensee abandons the Shared Line;
- (g) the Shared Line has become unsafe or unsuitable for its purpose;
- (h) SingTel's right to own, maintain or operate the Shared Line is revoked or terminates or expires; or

- (i) use of the Shared Line causes or is likely to cause physical or technical harm to any telecommunications network, system or services (whether of SingTel or any other person) including but not limited to causing damage, interfering with or causing deterioration in the operation of SingTel's Network.

CLAUSE 14.3 - MODIFICATION REQUIRED

- 14.3 Either Party (**Terminating Party**) may terminate a licence of Line Sharing if the other Party is in breach of this Schedule and such breach remains unremedied for a period of five (5) Business Days after receiving notice from the Terminating Party to do so.

Consistent with IDA's required amendments to Clauses 12.1(d) and 13.1(d) of Part 2 of the Main Body of SingTel's RIO, IDA directs SingTel to modify Clause 14.3 by extending the notice period to 14 Calendar Days.

CLAUSE 14.4 - MODIFICATION REQUIRED

- 14.4 If during the term of the Line Sharing, any Shared Line used by the Requesting Licensee in accordance with this Schedule is:

- (a) no longer suitable for use in SingTel's reasonable opinion; or
- (b) no longer available to be licensed as determined by SingTel,

SingTel may terminate the licence in respect of the Shared Line by giving six (6) months notice to the Requesting Licensee.

IDA directs SingTel to modify Clause 14.4 to incorporate the following requirements:

- (a) *In relation to Clause 14.4(a), IDA accepts technological obsolescence as the only ground for which SingTel may determine that the Shared Line is "no longer suitable for use".*
- (b) *In relation to Clause 14.4(b), where a Shared Line becomes unavailable, the provision relating to decommissioning would apply. Otherwise, SingTel has not provided any satisfactory justification of what other events may result in the unavailability of the Shared Line. Therefore, SingTel must delete Clause 14.4(b) in its entirety.*

CLAUSE 14.5 - MODIFICATION REQUIRED

14.5 SingTel may give the Requesting Licensee no less than six (6) months notice at any time during the term of a licence in respect of the Shared Line that the licence is to be terminated because of the closure of a POA or Building MDF room or Outdoor Cabinet. The Requesting Licensee shall bear its own cost associated with the closure of the POA or Building MDF room or Outdoor Cabinet and the termination of the licence to the Shared Line, and the Requesting Licensee shall be solely responsible for making such alternative arrangements as are necessary to continue to provide its Customers with the services it provided to them using the Shared Line. In the event that the Requesting Licensee requests assistance from SingTel within thirty (30) Business Days after receiving a notice under this clause to provide an alternative solution to the Co-Location Space which is being terminated SingTel shall use its reasonable endeavours to assist the Requesting Licensee in finding suitable alternatives to the Shared Line that is the subject of termination provided that nothing in this clause shall restrict SingTel's right to terminate under this clause 14 and that the ultimate responsibility to find an alternative lies with the Requesting Licensee.

The closure of a POA, Building MDF room or Outdoor Cabinet at which a Requesting Licensee takes Shared Lines will affect the Requesting Licensee's service provisioning to End Users. Given that the closure of such sites is an event that is planned for by SingTel well in advance, IDA considers it reasonable to require SingTel to provide at least 6 months prior notice to the Requesting Licensee before such event. This will provide the Requesting Licensee with reasonable sufficient notice to make alternative arrangements and minimise service disruption to End Users. However, in situations where SingTel is unable to provide the minimum required notice of 6 months under Clause 14.5 as a result of circumstances beyond SingTel's reasonable control (for example, where a third party requires SingTel to close the site without providing sufficient notice to SingTel), SingTel must notify the Requesting Licensee as soon as practicable upon becoming aware of any pending closure of the site. IDA directs SingTel to modify Clause 14.5 to incorporate the requirements specified.

14.6 Upon expiry or termination of the licence of Shared Line:

- (a) the Requesting Licensee must discontinue the use of the Shared Line; and
- (b) the Requesting Licensee must disconnect all equipment connected to the Shared Line; and
- (c) SingTel will be responsible for removing jumpering,

within ten (10) Business Days after the expiry of the Requesting Licensee's licence or from the date of termination of the licence, whichever is the earlier.

CLAUSE 14.7 – MODIFICATION REQUIRED

14.7 If the Requesting Licensee fails to disconnect its equipment from the Shared Line under clause 14.7, SingTel shall remove the Requesting Licensee's equipment. The Requesting Licensee shall pay to SingTel all reasonable costs associated with the work undertaken by SingTel under clauses 14.6 and 14.7 including the disposal of the Requesting Licensee's equipment. In such event, the Requesting Licensee shall have no claim whatsoever against SingTel.

IDA directs SingTel to modify Clause 14.7 to clarify that the exclusion of liability applies only in connection with the removal of the Requesting Licensee's equipment.

15. SUB-LICENSING

15.1 The Requesting Licensee must not assign the licence in respect of or sub-let the Shared Line. For the avoidance of doubt, nothing in this clause places any restriction on the end users to whom the Requesting Licensee may resell services provided using the Shared Line.

ANNEX 3B.1 ORDER FOR LINE SHARING

ORDER FOR LINE SHARING

The Requesting Operator

Date of Application : _____ Application Reference Number : _____

Request for Local Loop POA Tie Termination Assigned : _____

Request for Sub Loop Building MDF Tie Termination Assigned : _____

Outdoor Cabinet Tie Termination Assigned : _____

Technical Specification

Type of xDSL Service to Share Bandwidth : _____

Signal Power : _____

Frequency and Bandwidth : _____

Customer Name : _____

Customer Address : _____

Customer Telephone Number : _____ Singapore : _____

On Behalf of the Requesting licensee

Sign : _____ Name of Requesting Licensee: _____

Name : _____ (Company Name)

Designation : _____

Department : _____

Contact Number : _____ Company Stamp : _____

Fax Number : _____

SingTel's Reply to the Requesting Operator

Application returned - incomplete/illegible

Not Approved Reason for Rejection : _____

Approved Circuit identification Number : _____

Estimated Provision Date : _____

SingTel Approval Code : _____

On Behalf of SingTel

Sign : _____ Contact Number : _____

Name : _____ Fax Number : _____

Date : _____

Processing Status

Received Date : _____ Queue Status : _____ Processed Date : _____

ANNEX 3B.2 SPECTRAL COMPATIBILITY OF xDSL SYSTEMS PLAN

1. Scope

- 1.1 This Annex (the “Spectral Compatibility of xDSL Systems Plan”) forms part of Schedule 3B of SingTel’s Reference Interconnection Offer (RIO), which specifies the terms and conditions with which Requesting Licensee must comply for SingTel to provide them with Line Sharing.
- 1.2 As the only currently available xDSL loop transmission technology which allows Line Sharing is Asymmetric Digital Subscriber Line (ADSL) technology, this Annex focuses exclusively on the ADSL loop transmission system. This Annex does not address other DSL technologies including ISDN, HDSL or VDSL. SingTel will review this Annex periodically to determine whether further DSL technologies can be used for Line Sharing as well as ADSL, and to amend the plan to provide for such other technologies.
- 1.3 This Annex covers the technical requirements for Requesting Licensee Equipment and Customer Premise Equipment (CPE) for Line Sharing purposes, and the relevant test requirements.
- 1.4 The Annex is intended to minimize the risk of possible Cross-talk interference with existing loop transmission systems and services located in other cable pairs within the same cable sheath as the line being shared. Such undesirable Cross-talk interference could cause unacceptable degradation of performance of the existing loop transmission system and/or services in the SingTel network.
- 1.5 This Annex does not guarantee system performance for any Requesting Licensee’s deployed system.
- 1.6 Spectrum management and spectrum compatibility is a new area which many telecommunications authorities have been studying and working in to develop industry standards. This Annex is therefore subject to periodic review by SingTel, taking these considerations into account.

2. Line Sharing Network Reference Configurations

- 2.1 There are two possible Line Sharing configurations.
- 2.2 Figure 1 depicts Configuration 1 in which the Requesting Licensee uses SingTel's local loop between the local exchange and the customer.
- 2.3 Figure 2 depicts Configuration 2 in which the Requesting Licensee uses SingTel's local loop between the local MDF room and the customer.

ADSL Line Sharing - Network Configuration 1

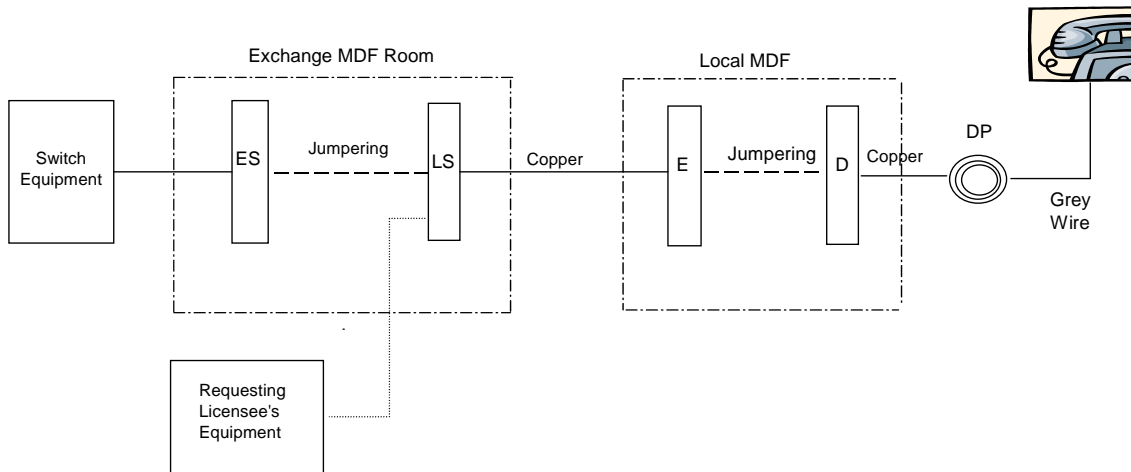
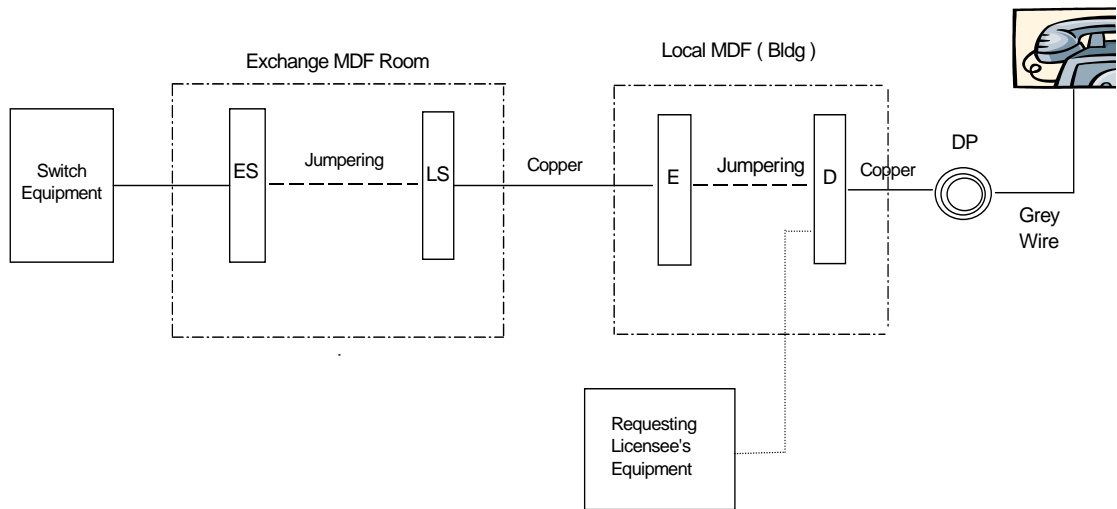


Figure 1

ADSL Line Sharing - Network Configuration 2



Note: POTS could also be provided through fibre-based DLC system which is located in local MDF

Figure 2

3. Cross-Talk information (extract from ANSI T1E1.4/2000, Spectrum Management Draft Standard)

- 3.1 The electromagnetic energy that couples into a metallic cable pair from services and transmission system technologies in use on other pairs in the same cable unit is unwanted energy, and is called “Cross-talk noise” (“**Cross-talk**”).
- 3.2 Cross-talk is sensitive to frequency, signal strength, and exposure. High frequency energy couples into other pairs more easily than low frequency energy because as the signal frequency increases, the Cross-talk coupling loss between the pairs of a cable decreases. Hence, for two signals of equal strength, the higher the frequency, the greater the Cross-talk noise which is produced.
- 3.3 A strong signal will therefore transfer more power into other pairs than a weaker signal will. The amount of Cross-talk noise is directly proportional to the power of the disturbing signal. The stronger the signal, the greater the Cross-talk noise.
- 3.4 Exposure is a measure of the proximity of metallic pairs at various points along a cable and the length over which pairs are in close proximity. The greater the exposure, the greater the total Cross-talk noise.

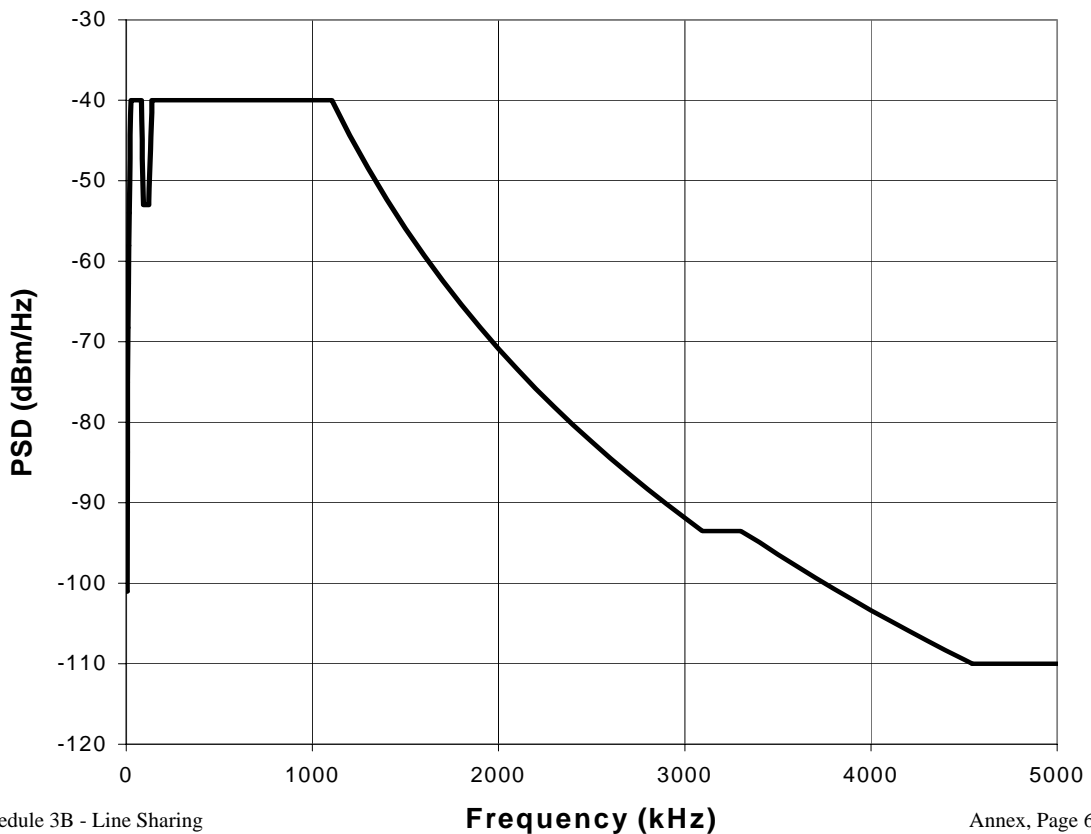
4. Performance Requirement For Requesting Licensee's Equipment For Line Sharing

- 4.1 As strong signals create more Cross-talk noise than weaker signals, the most effective and widely used method of controlling Cross-talk interference is through the use of Signal Power Limitation. Signal Power Limitations specify the amplitude, frequency distribution, and total power of electrical signals at the point where the signal enters the subscriber loop cable.
- 4.2 To minimize and control the Cross-talk interference introduced by Requesting Licensee's Equipment into the existing loop transmission systems and services, the performance requirements in this clause specify power limits in terms of:
- Transmitted Power Spectral Density (PSD); and
 - Total Average Transmit Power.
- 4.3 The Signal Power Limitations apply to signals transmitted by ADSL transceiver units located in local exchanges (ATU-C) or a remote terminal location (ATU-R) that is usually at the customer premises. This Annex specifies both PSD and total average power for both upstream (the signal travelling away from the customer) and downstream (the signal travelling toward the customer) signals.
- 4.4 The characterization of a transmitted signal by power level and frequency content is called the power spectral density (PSD) of the signal. The primary signal power requirements in this plan are specified through the use of PSD masks and templates. The PSD mask shows the maximum power boundary or limit, in dBm per Hz, for the transmitted signal.
- 4.5 The Requesting Licensee's equipment must not transmit a signal above the PSD Mask or which exceeds the total average power for both upstream and downstream signals.
- 4.6 The PSD masks and templates are drawn from the ANSI T1 E1.4 Spectrum Management Class 5 which is intended for DSL transmission systems that use ATU-C equipment and operate in the frequency spectrum from approximately 25 kHz to approximately 1104 kHz and ATU-R equipment that operates in the frequency spectrum from approximately 25 kHz to approximately 138 kHz.

4.7 PSD template (Downstream)

PSD template definition for downstream transmission

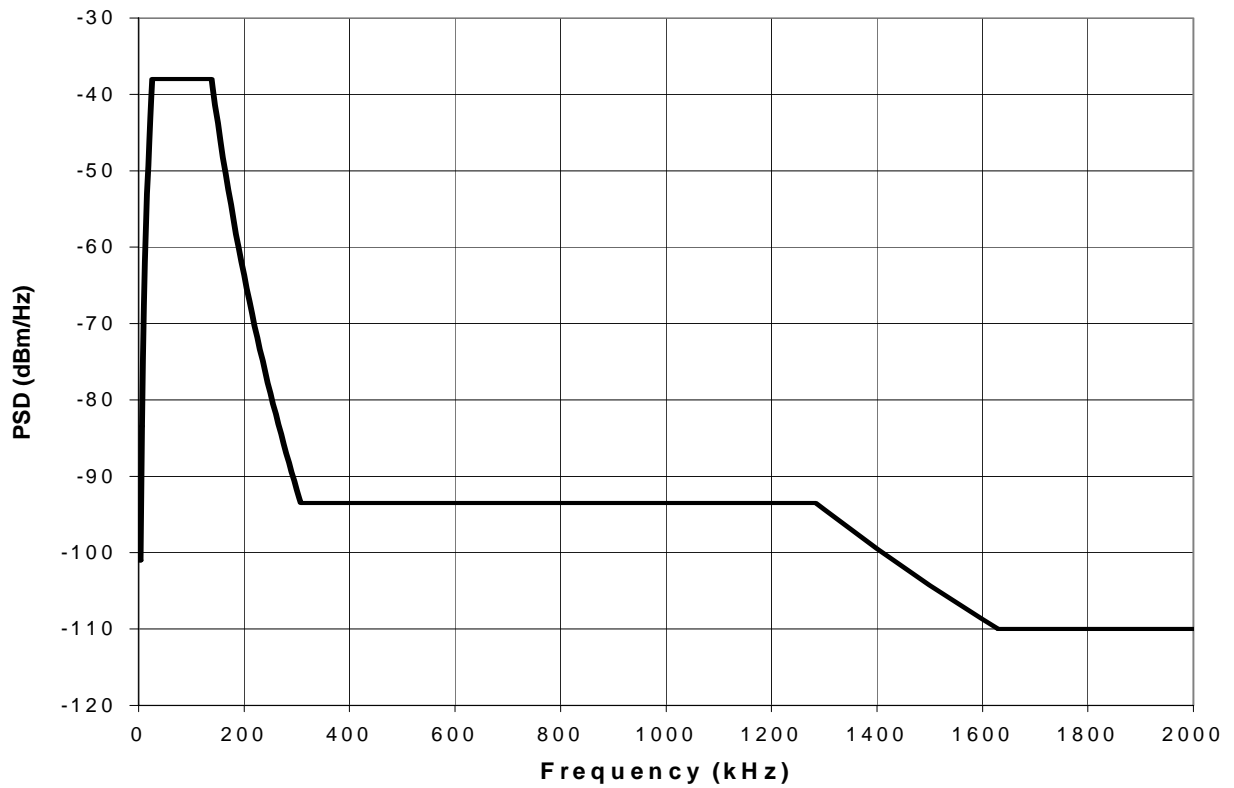
Frequency Band (kHz)	PSD (dBm/Hz)
$0 < f \leq 4$	-101, with max power in the in 0-4 kHz band of +15 dBm
$4 < f \leq 25.875$	$-96 + 21 \times \log_2(f/4)$
$25.875 < f \leq 81$	-40
$81 < f \leq 92.1$	$-40 - 70 \times \log_2(f/81)$
$92.1 < f \leq 121.4$	-53
$121.4 < f \leq 138$	$-53 + 70 \times \log_2(f/121.4)$
$138 < f \leq 1104$	-40
$1104 < f \leq 3093$	$-40 - 36 \times \log_2(f/1104)$
$3093 < f \leq 4545$	$\text{Min}(-36.5 - 36 \times \log_2(f/1104), -93.5)$
$4545 < f \leq 11040$	- 110



4.8 PSD template (Upstream)

PSD template definition for upstream transmission

Frequency Band (kHz)	PSD (dBm/Hz)
$0 < f < 4$	-101, with max power in the in 0-4 kHz band of +15 dBm
$4 < f < 25.875$	$-96 + 21.5 \times \log_2(f/4)$
$25.875 < f < 138$	-38
$138 < f < 307$	$-38 - 48 \times \log_2(f/138)$
$307 < f < 1221$	-93.5
$1221 < f < 1630$	$\min(-90 - 48 \times \log_2(f/1221), -93.5)$
$1630 < f < 11040$	-110



4.9 Total average power (Downstream)

Total average downstream power between 25 kHz and 1104 kHz that is transmitted by the ATU-C shall not exceed 20.9 dBm.

4.10 The total average power (Upstream)

The total average upstream power below 138 kHz that is transmitted by the ATU-R shall not exceed 13 dBm.

4.11 There is a higher potential for Cross-talk in Configuration 2 since the Requesting Licensee's equipment is deployed nearer to the customer than under Configuration 1. To reduce such risk, the Requesting Licensee equipment must have Power Cutback feature as specified in ITU standard G992.1 and G922.2.

4.12 Reverse Mode ADSL operation

4.12.1 Reverse Mode ADSL Operation occurs when the ATU-C equipment as defined in the relevant Recommendation ITU G992.1 and G992.2 is used to transmit in the reverse direction, that is away from the customer.

4.12.2 Such Reverse Mode ADSL Operation will cause unacceptable Cross-talk interference and performance degradation and is not allowed under this Annex.

5. Test and Measurement Methods

5.1 Measurement setup for PSD and total average power measurement is shown in Figure 3 below.

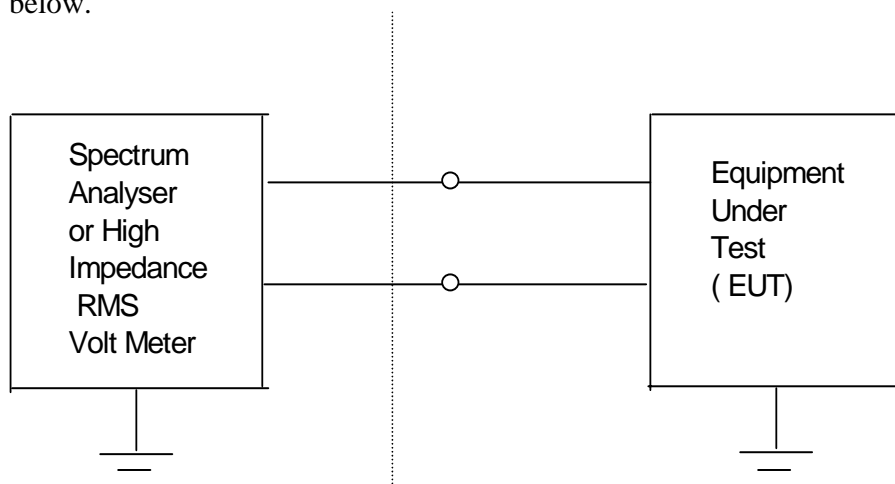


Figure 3 PSD and Total Average Power measurement set up.

5.2 Total average power measurement

5.2.1 The total average power shall be measured and averaged over a time span of at least 10 seconds.

5.3 Power spectral density (PSD) measurement

5.3.1 The PSD is measured by averaging the observed output power of the EUT on each of a number of contiguous, regularly spaced, small frequency bands, with each frequency band having a defined resolution bandwidth as shown in the Table below:

Resolution bandwidth for measuring an EUT PSD

Frequency Band	Resolution Bandwidth
$f \leq 10 \text{ kHz}$	100 Hz
$10 \text{ kHz} < f \leq 25.875 \text{ kHz}$	1 kHz
$25.875 \text{ kHz} < f \leq 3.1 \text{ MHz}$	10 kHz
$3.1 \text{ MHz} < f \leq 30 \text{ MHz}$	100 kHz

5.3.2 Each frequency point of a PSD (corresponding to a measurement in a single resolution bandwidth) shall be measured by averaging the power in the resolution bandwidth of that frequency point for a time period of at least 2.0 seconds. This requirement is equivalent to setting the sweep time for a single sweep of a spectrum analyzer for a duration equal to at least 2.0 seconds per frequency point.

5.3.3 The EUT shall be tested while it transmits maximum power and maximum PSD levels at all frequencies over which it can transmit data when deployed. The EUT shall not have any power cutback enabled during testing

5.3.4 The EUT input shall consist of a pseudo-random uniformly distributed data sequence, and the EUT output shall be a fully modulated transmitted signal with all overhead, framing, coding, scrambling, modulation, filtering and all other operations performed on the data stream that the modem would normally perform while transmitting data.

6 Definitions

The following definitions apply to this Annex 3B.2

“ADSL” means Asymmetric Digital Subscriber Line.

“Cross Talk” means the unwanted electromagnetic energy that couples into a metallic cable pair from services and transmission system technologies in use on other pairs in the same cable unit.

“Downstream” means signals sent using xDSL technology from the network towards the customer.

[**“DSL”** means Digital Subscriber Line technology.]

[**“EUT”** means Equipment Under Test.]

[**“HDSL”** means High bit-rate Digital Subscriber Line technology.]

[**“ISDN”** means Integrated Services Digital Network technology.]

“Signal Power Limitation” means the specific amplitude, frequency distribution, and total power of electrical signals at the point where the signal enters the subscriber loop cable as specified in Annex 3B.2.

“Upstream” means signals sent using xDSL technology from the customer towards the network.

[**“VDSL”** means Very High bit-rate Digital Subscriber Line technology.]