

SCHEDULE 3B

LINE SHARING

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SCHEDULE 3B

LINE SHARING

1. SCOPE

- 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.
- 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.
- 1.3 This Schedule only applies to Requesting Licensees who are FBOs.
- 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;
- (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(d) has been amended on this basis.

- (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.

- (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.

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.

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
- (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.
- 4.2 SingTel shall process a combined total of no more than 30 applications for Local Loop, Sub Loop and Line Sharing under Schedules 3A and 3B 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 and Line Sharing.

SingTel has amended clause 4.2 to reflect actual demand by Requesting Licensee's for Local Loops, Sub Loops and Line Sharing. 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 and Line Sharing.

- 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.
 - (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
- 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

- 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)

- 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

- 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:
- (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;
 - (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 constitutes 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.

- 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.
- 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.
- 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.

- 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.
- 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.

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.
- 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.

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.

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.

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.

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.

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.

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.

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.

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.

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 : _____
<input type="checkbox"/> Request for Local Loop	POA Tie Termination Assigned : _____
<input type="checkbox"/> Request for Sub Loop	Building MDF Tie Termination Assigned : _____
	Outdoor Cabinet Tie Termination Assigned : _____
<u>Technical Specification</u>	

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

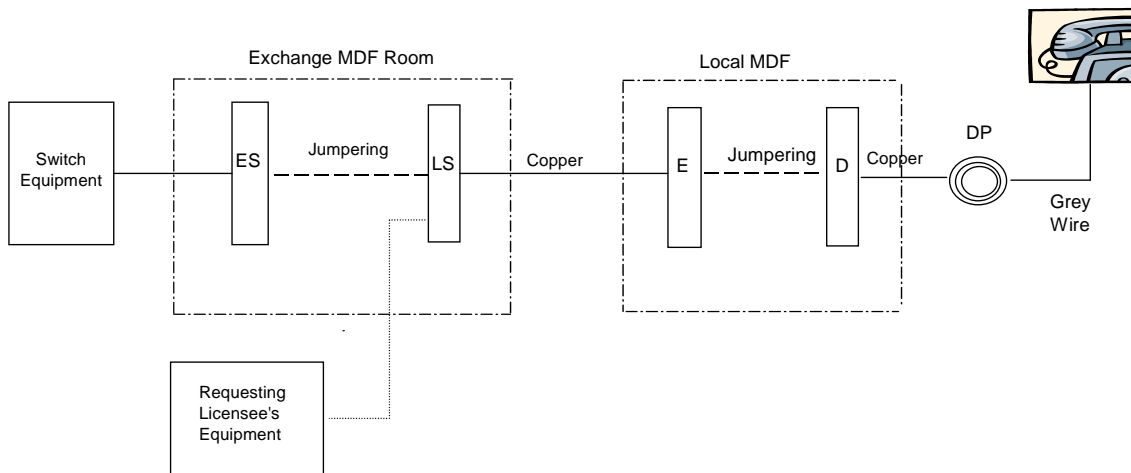
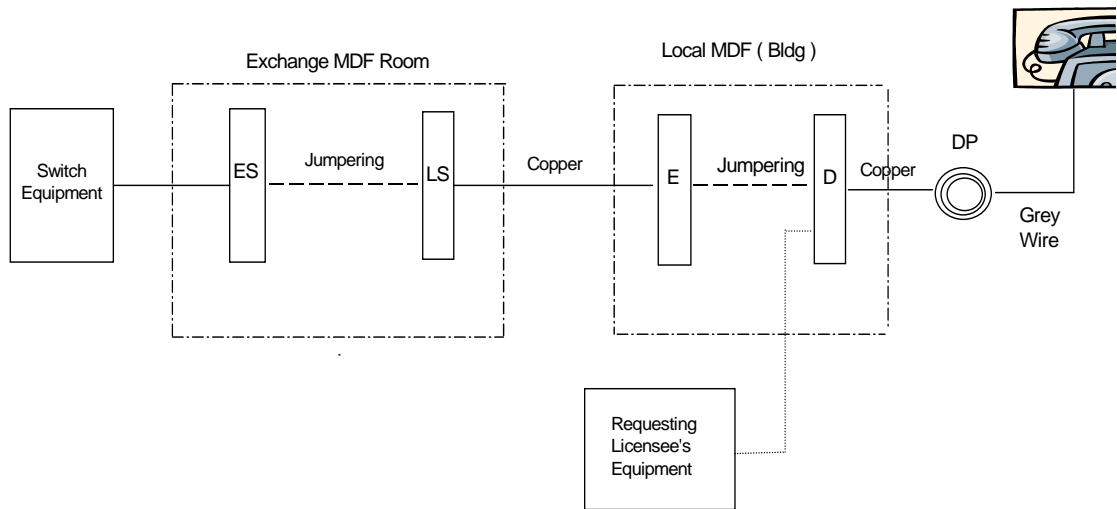


Figure 1

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.

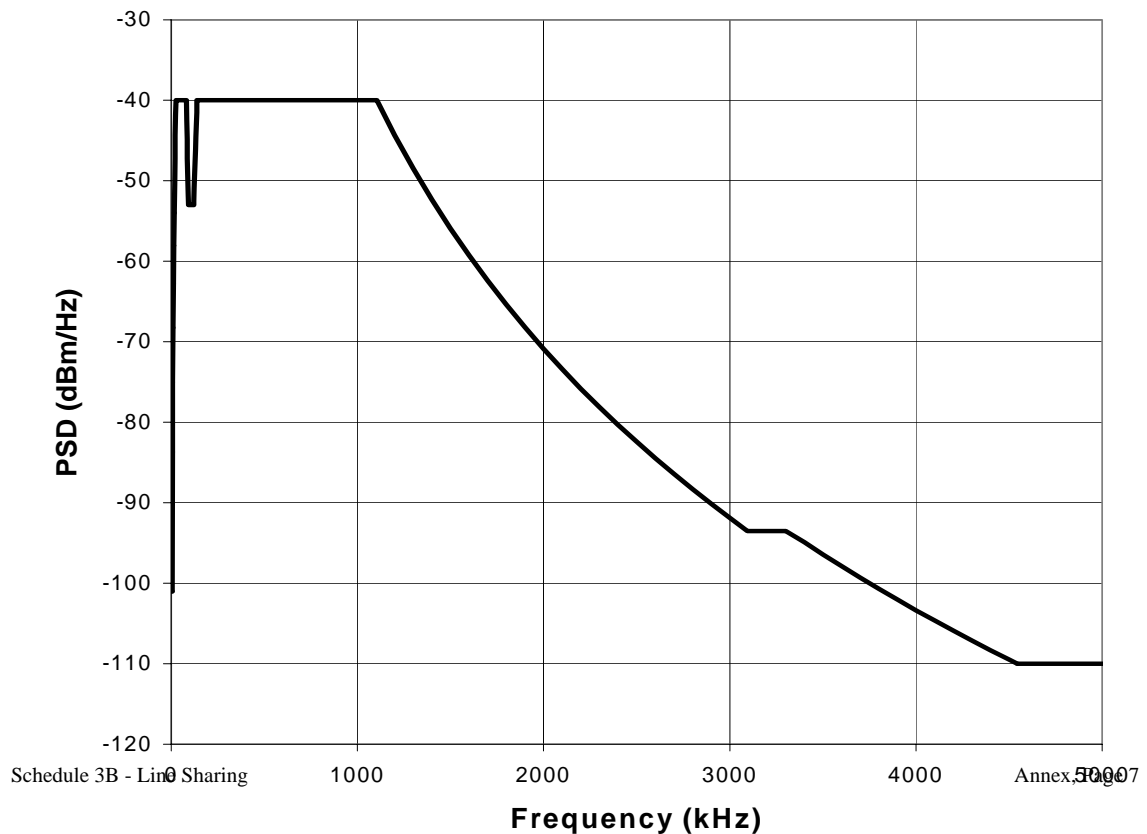
4. Performance Requirement For Requesting Licensee's Equipment For Line Sharing

- 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

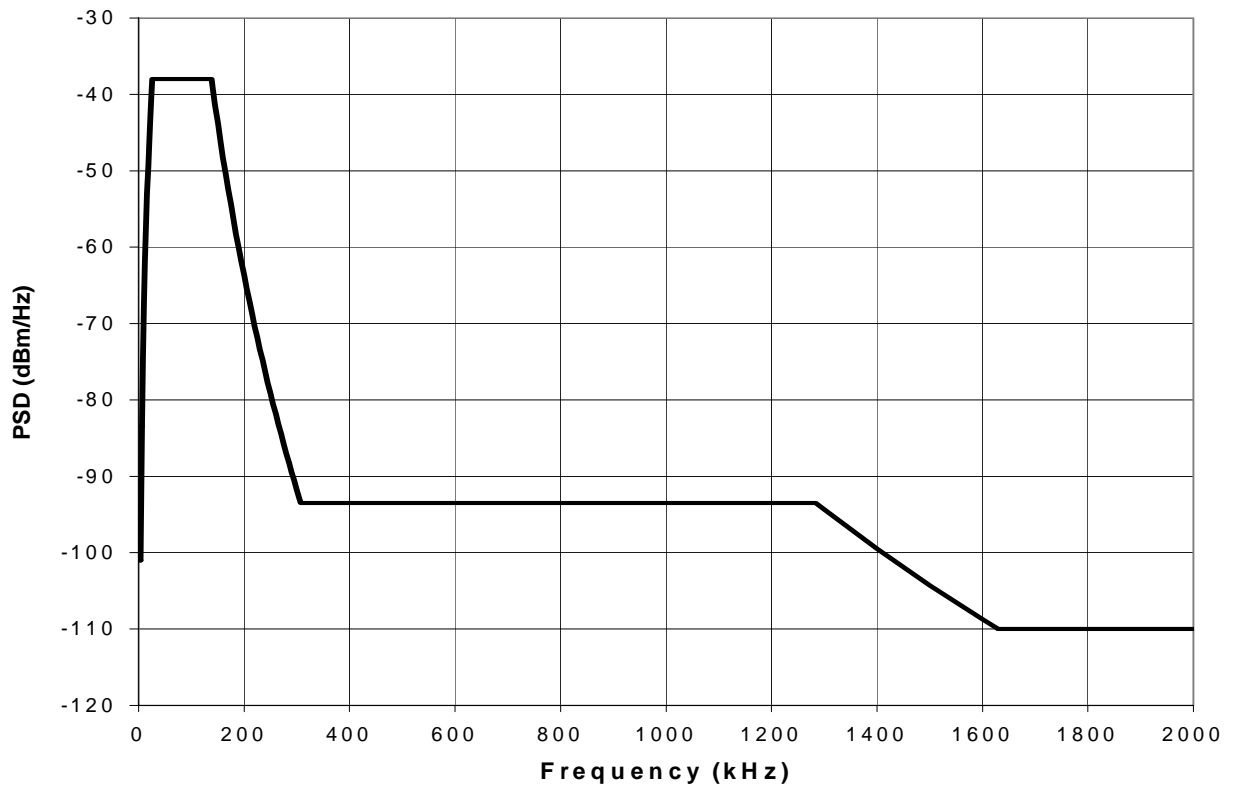
Frequency Band (kHz)	PSD (dBm/Hz)
$0 < f \leq 4$	-101, with max power in the in 0-4 kHz band of +15 dBm
$4 < f \leq 25.875$	$-96 + 21 \times \log_2(f/4)$
$25.875 < f \leq 81$	-40
$81 < f \leq 92.1$	$-40 - 70 \times \log_2(f/81)$
$92.1 < f \leq 121.4$	-53
$121.4 < f \leq 138$	$-53 + 70 \times \log_2(f/121.4)$
$138 < f \leq 1104$	-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 G992.2.

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.

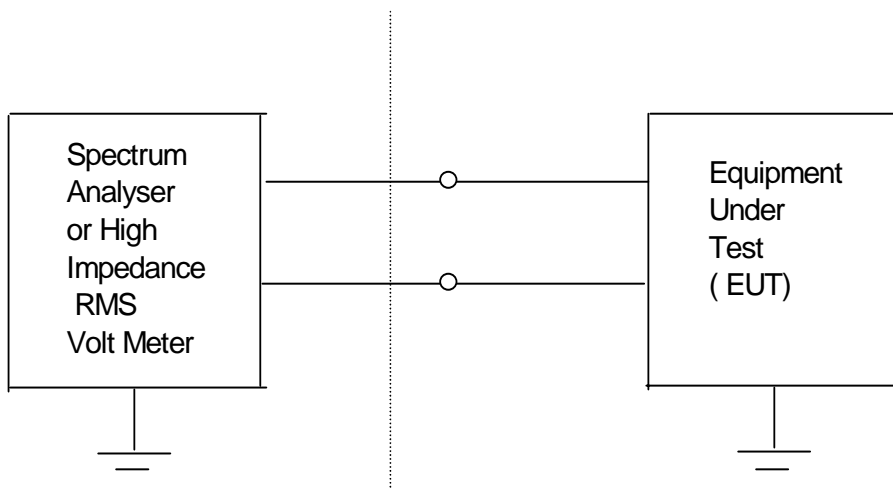


Figure 3 PSD and Total Average Power measurement set up.

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 MHz < f ≤ 30 MHz	100 kHz
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- 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.]