

SUBJECT TO CHANGE

**SCHEDULE 1**

**PHYSICAL AND VIRTUAL (DISTANT) INTERCONNECTION**

## **SCHEDULE 1**

### **PHYSICAL AND VIRTUAL (DISTANT) INTERCONNECTION**

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## SCHEDULE 1

### PHYSICAL AND VIRTUAL (DISTANT) INTERCONNECTION

#### 1. GENERAL

- 1.1 This Schedule details the establishment of Interconnection between SingTel's Network and the Requesting Licensee's Network and describes the forecasting and provisioning procedures for Interconnection provided under this RIO Agreement.
- 1.2 Schedule 1A and 1B contain the details on the Network interface requirements and specifications for Interconnection between SingTel's Network and the Requesting Licensee's Network. Schedule 1A details the requirements for Physical or Virtual (Distant) Interconnection for a Requesting Licensee who is an FBO for Interconnection to SingTel's Interconnect Gateway Switches, while Schedule 1B details the requirements for Virtual (Distant) Interconnection for SBOs for Interconnection to SingTel's SBO Gateway Switches.
- 1.3 If the Requesting Licensee is an FBO, the Parties will comply with Schedule 1A.
- 1.4 If the Requesting Licensee is an SBO, the Parties will comply with Schedule 1B.
- 1.5 If SingTel requires Physical Interconnection or Virtual (Distant) Interconnection with the Requesting Licensee, the Requesting Licensee will provide such Interconnection on reciprocal terms and conditions to those set out in this Schedule 1.
- 1.6 SingTel shall cease offering new SS7-based interconnection arrangements with effect from 28 February 2027 [subject to variation as approved by the Authority](#).

**SCHEDULE 1A**  
**PHYSICAL AND/OR VIRTUAL (DISTANT) INTERCONNECTION**  
**FOR FBOs**

**SCHEDULE 1A**

**PHYSICAL AND/OR VIRTUAL (DISTANT) INTERCONNECTION FOR FBOS**

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## SCHEDULE 1A

### PHYSICAL AND/OR VIRTUAL (DISTANT) INTERCONNECTION FOR FBOS

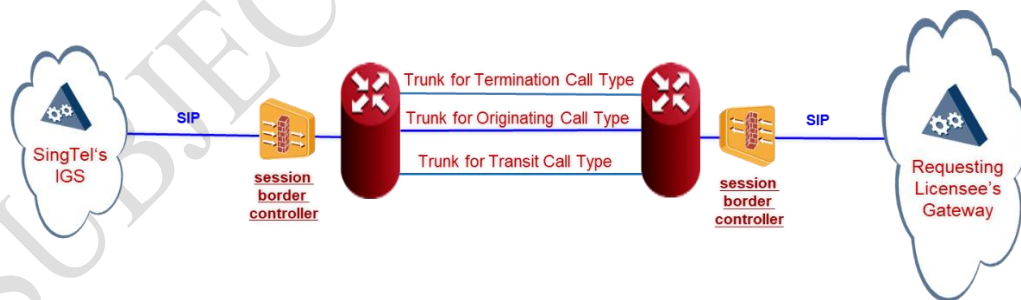
#### 1. GENERAL

- 1.1 Each Party agrees to interconnect and keep interconnected their respective Networks subject to and in accordance with the terms and conditions of this Schedule 1A.
- 1.2 For the avoidance of doubt and unless the Parties agree otherwise, where both Parties have established Interconnection of their respective Networks prior to the RIO Review Date:
  - (a) the existing interconnect configuration that applies between each Party's respective Network at the RIO Review Date will continue to apply; and
  - (b) the Parties need not change the Interconnection configuration of their respective Networks as may be required under this Schedule 1A.
- 1.3 The Requesting Licensee will notify SingTel whether it requires Physical Interconnection or Virtual (Distant) Interconnection under this Schedule. If there is insufficient Co-location Space at a SingTel Co-location Site to permit Physical Interconnection, SingTel shall provide Virtual (Distant) Interconnection under this Schedule 1A to the Requesting Licensee. The determination of whether sufficient Co-location Space exists will be made pursuant to the terms and conditions specified in Schedule 8A.
- 1.4 The provisions of this Schedule 1A apply to both Physical Interconnection and Virtual (Distant) Interconnection, unless otherwise indicated.
- 1.5 This Schedule 1A only applies to a Requesting Licensee which is an FBO.

#### 2. INTERCONNECT CONFIGURATION

- 2.1 SingTel's Network comprises of two (2) sites located at Paya Lebar Telephone Exchange and Jurong East Telephone Exchange. ~~Subject to clause 2.5, the~~ The Requesting Licensee must interconnect its Network with the SingTel Network at each of SingTel's Interconnect Gateway Switches (IGS).

- 2.2 Both Parties' Networks shall interface at IGS level via a session border controller.
- 2.3 SingTel and the Requesting Licensee are responsible for managing and maintaining their own Interconnection Links, taking into account the need for growth, diversity and security in the Data Links. For the avoidance of doubt, there is no obligation on either Party to manage or maintain the other Party's Interconnection Links.
- 2.4 ~~Unless otherwise agreed and subject to clause 2.5, the Requesting Licensee must interconnect its Network with the SingTel Network, whether by way of Physical Interconnection or Virtual (Distant) Interconnection, at each of SingTel's IGS at Paya Lebar Telephone Exchange and Jurong East Telephone Exchange. Not Used~~
- 2.5 Not Used
- 2.6 Not Used
- 2.7 The Minimum Interconnection Bandwidth for Interconnection by the Requesting Licensee to a SingTel IGS is two (2) 1Gbps Data Links.
- 2.8 Not Used
- 2.9 An Interconnection Link may comprise different Trunk Groups. The Requesting Licensee must designate the Trunk Groups to handle the different Call Types.



- 2.10 Either Party may, at any time, request from the other Party an agreement to interconnect their respective Systems Network for the provision of a new Call Type. In such a case, the Parties shall enter into good faith negotiations to agree terms for interconnection of the Parties' respective Systems Network for the provision of the new Call Type on fair and reasonable terms. Upon terms being agreed, and after requirement to seeking the Authority's approval for the necessary modification, this Agreement shall be amended to give effect to the agreed terms.

2.11 If SingTel or the Requesting Licensee wishes to interconnect their respective Networks at additional IGSs, that Party may request an additional POI and the Parties will negotiate in good faith in relation to the interconnect configuration applicable to such additional Interconnection. The Party that wishes to interconnect their Network at additional IGSs is liable for any reasonable costs incurred by the other Party where those costs are caused by the requesting Party's request in relation to establishing any additional POI. Such costs are to be determined as part of the good faith negotiations, which shall take into account factors such as the principle of cost causality and the benefit enjoyed by both parties arising from the additional POIs. Each Party shall bear its own cost in relation to establishing any additional POI.

2.12 Neither Party shall be required to commence work on the installation of Network Facilities to support a new POI under clause 2.11 until the Parties have agreed on the interconnect configuration to apply under clause 2.11.

### **3. POINT OF INTERCONNECTION**

3.1 The Parties agree that the POI will be determined by the following criteria:

(a) subject to clause 3.1(c), if the Parties establish two (2) Interconnection Links, the first link to carry SingTel's traffic and the second link to carry the Requesting Licensee's traffic, the POI for each link may be established at the Fibre Distribution Frame (FDF) (or comparable equipment) of the Party providing the Call Origination, Call Termination and Call Transit Service; or

(b) subject to clause 3.1(c), if the Parties establish only one (1) Interconnection Link to carry each Party's traffic to the other Party's Network, the POI may be at a notional mid-point of the Interconnection Link; or

(c) the POI may be established at such other Interconnection configurations as the Parties may agree on.

~~3.1 The Parties agree that the POI for the Data Links shall be established at the Fibre Distribution Frame (FDF) of the Party providing the Call Origination, Call Termination, Call Transit and Emergency Service.~~

3.2 Each Party is responsible for the provisioning and maintenance of Network Facilities (including those Network Facilities which form part of the Interconnect Links and the network routing equipment) on its "side" of the POI.

- 3.3 The cost of the installation, maintenance and operation of the Network Facilities on each Party's side of the POI which form part of the Interconnect Link(s) shall be borne by that Party.
- 3.4 Each Party will ensure that its Network Facilities which form part of the Interconnection Link(s) are provisioned and maintained with Interconnect Bandwidth in accordance with the ordered Bandwidth under this Schedule 1A.
- 3.5 ~~The Requesting Licensee~~ Either Party (Requesting Party) may request the activation, deactivation, or modification of an Interconnection Link by completing the request form set out in Annex 1A.3. ~~SingTel~~ The Party receiving the request (Receiving Party) will consider ~~the such~~ request ~~for modification~~ and approve or reject the request ~~for modification~~ by written notice to the Requesting ~~Licensee Party~~ within fourteen (14) Calendar Days of receipt of a duly completed request form from the Requesting ~~Licensee Party~~. If ~~SingTel~~ the Receiving Party agrees to such ~~a~~ activation, deactivation, or modification, ~~SingTel~~ the Receiving Party will undertake the ~~modification~~ change in accordance with that request. The Requesting ~~Licensee Party~~ will be liable for any costs incurred by ~~SingTel~~ the Receiving Party in performing the activation, deactivation, or modification of the Interconnection Link. If ~~SingTel~~ the Receiving Party rejects the request ~~for modification~~, it will specify the reasons in its written notice to the Requesting ~~Licensee Party~~. ~~SingTel~~ the Receiving Party may reject a request for activation, deactivation, or modification of an Interconnection Link on reasonable grounds including (without limitation) where the requested ~~modification~~ change:
- (a) would have, or would likely have, the effect of impairing, disrupting or damaging ~~SingTel's~~ the Receiving Party's Network, ~~or SingTel's~~ equipment or other Interconnection Links;
  - (b) is not technically feasible;
  - (c) would cause, or would likely cause, ~~SingTel~~ the Receiving Party to be in breach of any applicable laws, regulations or its licence; or
  - (d) does not contain all the necessary information or is illegible.
- 3.6 The Requesting Licensee shall not conduct penetration testing of any kind of SingTel's Network or SingTel's equipment or other Interconnection Links.

**4. ALTERNATIVE INTERCONNECT CONFIGURATIONS AND/OR POINTS OF INTERCONNECTION**

4.1 The Requesting Licensee may request alternative interconnect configurations and/or locations for the POI at any technically feasible point.

4.2 On receipt of a request under clause 4.1 in respect of an alternative interconnect configuration or POI location specified in the Code, SingTel and the Requesting Licensee will promptly discuss the Requesting Licensee's request.

4.3 If, thirty (30) Calendar Days after the receipt of a request under clause 4.1 and following discussions under clause 4.2, the Requesting Licensee wishes to pursue the alternative interconnect configuration and/or locations for the POI and SingTel reasonably determines that the alternative interconnect configuration or locations for the POI requested is technically feasible, SingTel will commence the formulation of terms and conditions to incorporate into this RIO Agreement.

4.4 SingTel will submit terms and conditions to the Authority for approval and incorporation into the RIO and this RIO Agreement within sixty (60) Calendar Days after the receipt of a request under clause 4.1. Alternatively, SingTel may seek an exemption from the relevant aspects of the Code.

**4. — NOT USED**

4.1 — Not Used

4.2 — Not Used

4.3 — Not Used

4.4 — Not Used

**5. PHYSICAL INTERCONNECTION**

5.1 Figure 1 depicts a possible configuration of the Physical Interconnection of the Interconnection Links between SingTel's Network and the Requesting Licensee's Network and the location of the POI.

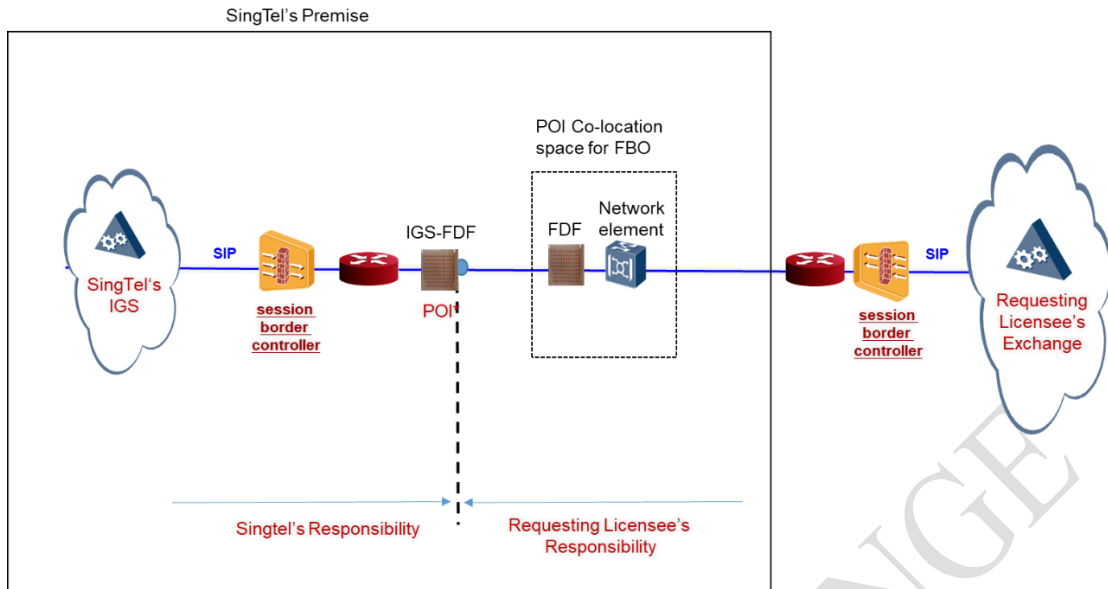


Figure 1: Depicts one possible FBO Physical Interconnection

5.2 The provisions in Schedule 8 will apply to access to and Co-location of Co-location Equipment at SingTel's IGS for Physical Interconnection.

**6. VIRTUAL (DISTANT) INTERCONNECTION**

6.1 Figure 2 depicts a possible configuration of the Virtual (Distant) Interconnection between SingTel's Network and the Requesting Licensee's Network and the location of the POI.

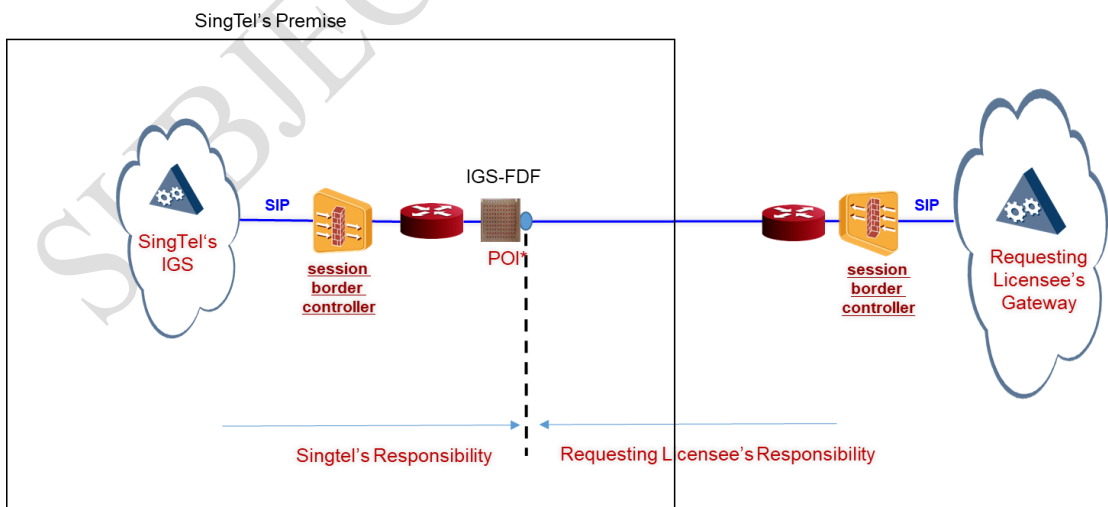


Figure 2: Depicts one possible FBO Virtual (Distant) Interconnection

6.2 The Requesting Licensee shall acquire Data Links from SingTel or a third party to form part of the Interconnection Links. The Requesting Licensee's leased Interconnection Links shall consist of ~~multiple~~ 1Gbps Data Links terminated at a FDF in SingTel's IGS. The Requesting Licensee is responsible for ordering sufficient Bandwidth on Data Links to enable Virtual (Distant) Interconnection to occur.

6.3 On the Requesting Licensee's request, SingTel will lease 1Gbps Data Links to the Requesting Licensee's Network based on SingTel's standard terms and conditions for supply of Data Link service.

## 7. TECHNICAL REQUIREMENTS AND SPECIFICATIONS

### 7.1 Link Connectivity

7.1.1 The Parties shall ~~interface-interconnect~~ with 1Gbps Data Links.

### 7.2 Protocol Handshaking

7.2.1 The Parties shall comply with the Internet Engineering Task Force SIP standards.

7.2.2 The Requesting Licensee shall obtain its own signalling/media IP address for peering purpose from the Authority.

7.2.3 The Requesting Licensee shall not use the Internet for interconnection with SingTel's Network or SingTel's equipment or other Interconnection Links.

7.2.4 The Parties' IGS shall interwork on SIP protocol for the establishment of Interconnected VoIP Calls between the Parties' Network.

7.2.5 Not Used

7.2.6 The Parties shall adhere to additional SIP protocol requirement as follows:

- (a) The Calling Party Number and Redirecting Number if available shall be conveyed for all calls across the Network Interconnection without manipulation;
- (b) The Dummy CLI received from Mobile Operators from inbound and outbound roamers shall be an eight (8) digit Dummy CLI; where the Dummy CLI refers to

[the list of non-subscriber CLI used in the resolution of service issues in accordance with clause 18.6 of the RIO Main Body.](#)

- (c) The number dialled by the calling subscriber shall not be changed or amended for the routing of international outgoing calls from one Party's Network to the other Party's Network.
- (d) The Requesting Licensee shall ensure all international calls that spoof emergency numbers such as 999 and 995 are blocked within their network and the '+' sign prefix shall be appended for all international incoming calls in the CLI display when interconnection with SingTel's Network or SingTel's equipment or other Interconnection Links.

**7.3 Not Used**

7.3.1 Not Used

**7.4 Routing**

7.4.1 The Parties shall route Interconnected VoIP Calls in accordance with the agreed arrangements applicable to that Call Type under Schedule 2.

**7.5 Interconnect Testing**

7.5.1 The Parties shall comply with the testing procedures in Annex A of Schedule 1 Annexures.

7.5.2 The Parties shall comply with the technical and security requirements as listed in Schedule 1 Annexures.

**8. PROVISIONING OF INTERCONNECT BANDWIDTH**

8.1 Not Used

8.2 Not Used

8.3 Not Used

8.4 Not Used

8.5 Not Used

8.6 Not Used

8.7 Not Used

8.8 Not Used

8.9 Not Used

8.10 Not Used

8.11 Not Used

8.12 **Not Used**

8.12.1 Not Used

8.12.2 Not Used

8.13 **Not Used**

8.13.1 Not Used

8.13.2 Not Used

8.13.3 Not Used

8.13.4 Not Used

8.14 **Not Used**

8.14.1 Not Used

8.15 **Ordering and Provisioning Procedure for Interconnect Bandwidth**

8.15.1 ~~The Requesting Party Licensee~~ Each Party (**Requesting Party**) shall submit its Request for Interconnect Bandwidth to ~~the Supplying Party~~ the other Party (**Receiving Party**) in the form of Annex 1A.2.

8.15.2 ~~The Supplying Party~~ The Receiving Party shall process all Requests for Interconnect Bandwidth on a 'first come, first served' basis.

8.15.3 ~~The Supplying Party~~ The Receiving Party shall respond to a Request for Interconnect Bandwidth within fifteen (15) Business Days, or any other period as may be agreed, of receipt of such request, or such other period as may be agreed. The response shall be either:

(a) an acknowledgement that ~~the Supplying Party~~ the Receiving Party is able to provide the full Interconnect Bandwidth by the “**Required By Date**”;

(b) an acknowledgement that ~~the Supplying Party~~ the Receiving Party is able to provide the Interconnect Bandwidth, but not be able to provide the quantities by the “**Required By Date**”; or

(c) an advice that ~~the Supplying Party~~ the Receiving Party is unable to provide the Interconnect Bandwidth as procurement is required.

8.15.4 When procurement is required in order to meet the request, and ~~the Supplying Party~~ the otherReceiving Party advises the Requesting Party pursuant to clause 8.15.3, ~~the Supplying Party~~ the otherReceiving Party shall seek confirmation of the required Bandwidth from the Requesting Party. Upon confirmation, ~~the Supplying Party~~ the otherReceiving Party shall complete the procurement no later than it would complete such procurement for itself.

8.15.5 The Requesting ~~Party Licensee~~ shall not procure Interconnection Links or capacity in excess of its actual traffic requirements. Any request for additional capacity shall be accompanied by a traffic forecast submitted to SingTel and shall be subject to SingTel’s prior written approval. ~~The Requesting Party Licensee shall be liable for any additional charges, beyond the standard Link charges, for capacity provisioned in excess of its demonstrated traffic needs.~~

**9. NOT USED**

**9.1 Not Used**

9.1.1 Not Used

9.1.2 Not Used

9.1.3 Not Used

**9.2 Not Used**

9.2.1 Not Used

9.2.2 Not Used

9.2.3 Not Used

9.2.4 Not Used

9.3 **Not Used**

9.3.1 Not Used

9.3.2 Not Used

9.3.3 Not Used

9.3.4 Not Used

## 10. **DECOMMISSIONING**

10.1 Subject to clauses 10.2 and 10.3, a Party (**Decommissioning Party**) may, for whatever reason upon giving no less than six (6) months prior written notice to the other Party (**Decommissioning Period**), close, replace or relocate any IGS in respect of which an Interconnection Link is connected, decommission an Interconnection Link or close a POI (**Decommissioning**).

10.2 Subject to paragraph (a), the Decommissioning Party shall be responsible for and bear all direct costs incurred by both Parties in carrying out the Decommissioning. Direct costs are limited to removal of equipment and cabling at the POI or IGS. Each Party will bear its own costs of recovering its own part of the Interconnection Link.

- (a) When the request for Decommissioning is at the direction of a Third Party pursuant to a legal obligation binding on the Decommissioning Party, each Party shall bear its own costs associated with the Decommissioning together with the direct costs incurred by that Party in respect of the establishment of alternative arrangements necessary to support the provision of Call Origination, Call Transit and Call Termination Services provided at the time of the Decommissioning.

- 10.3 If Decommissioning is to occur where Physical Interconnection has been established, the Decommissioning Party will, if requested by the other Party within thirty (30) Business Days after receiving a notice under clause 10.1, offer alternative interconnection solutions to the other Party. The alternative interconnection solutions offered must, to the extent feasible, be comparable in terms of cost and functionality and, if accepted by the other Party within sixty (60) Calendar Days from the date of the offer, must permit the full implementation of the alternative interconnection solutions. Nothing in this clause prevents the Decommissioning from occurring on the expiry of the Decommissioning Period provided that the Decommissioning Party has complied with this clause 10.3.
- 10.4 If Decommissioning is to occur where Virtual (Distant) Interconnection has been established:
- (a) the Requesting Licensee is the Decommissioning Party, the Requesting Licensee must also comply, where the Requesting Licensee has acquired Data Links from SingTel, with the terms and conditions under which Data Links are supplied by SingTel (including the payment of any early termination payments); or
  - (b) SingTel is the Decommissioning Party, SingTel will arrange for the connection of Data Links to the alternative or relocated IGS or POI prior to the Decommissioning.
- 10.5 Upon the happening of an event which causes or is likely to cause significant damage to the Network of a Party or which endangers or is likely to endanger the health or safety of any person (**Emergency Event**), that Party may close or replace its IGS or a POI or Decommission an Interconnection Link without prior written notice to the other Party, provided that it notifies the other Party as soon as practicable that the Emergency Event exists and that emergency relocation work is being or will be performed. The costs incurred as a result of, or in connection with, a closure or replacement of an IGS or a POI or Decommissioning of an Interconnection Link under this clause 10.5 shall be borne as follows:
- (a) where the occurrence of the Emergency Event was caused as a result of the negligence or wilful act or omission of the first-mentioned Party, its employees, agents or contractors, that Party shall bear the costs associated with the closure, replacement or Decommissioning incurred by both Parties; and
  - (b) where the occurrence of the Emergency Event was not caused as a result of the negligence or wilful act or omission of the first-mentioned Party, its employees, agents or contractors, each Party shall bear its own costs associated with the closure, replacement or Decommissioning.

SUBJECT TO CHANGE

**ANNEX 1A.1: NOT USED**

SUBJECT TO CHANGE

**ANNEX 1A.2: INTERCONNECT BANDWIDTH**

<b>Request For Interconnect Bandwidth</b>				
Name of Operator:				
<del>Purchase Order</del> <a href="#">Link Reference</a> No:				
Required By Date:				
Operator's Switch <a href="#">Location &amp; SBC IP Address</a> :				
SingTel's Switch <a href="#">Location &amp; SBC IP Address</a> :				
	Trunk Group for Origination Call Type	Trunk Group for Termination Call Type	Trunk Group for Transit Call Type	<a href="#">Trunk Group for Emergency Call Type</a>
<a href="#">No. of 1Gbps Data Links Bandwidth/Concurrent Calls on particular Link Reference</a>				

**ANNEX 1A.3: REQUEST FORM FOR ACTIVATION, DEACTIVATION AND MODIFICATION OF INTERCONNECT LINKS**

Date: \_\_\_\_\_ Application Reference Number: \_\_\_\_\_

To: Manager, Network Integration and Interconnect

- Activation of New Interconnection Links
- Deactivation of Interconnection Links
- Modification of Interconnection Links

Requesting Licensee Particulars																			
Requesting Licensee Name : _____ Requesting Licensee's BRN: _____ Name : _____ Designation : _____ Signature : _____ Telephone : _____ Email : _____ Company Stamp : _____																			
<p><b>Intended Ready For Service Date:</b> _____</p> <p><b>Interconnection Link Information</b> (for more than 4 links, please complete a separate form)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>IP</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Link Ref</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>SingTel POI</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Requesting Licensee Switch</u></th> </tr> </thead> <tbody> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> </tbody> </table> <p>Call Type and Access Code (where applicable): _____</p> <p><b>Network configuration Diagram</b> (where applicable) Please attach to this form.</p> <p><b>Information for Modification of Interconnection Links:</b></p> <p>_____</p> <p>_____</p>				<u>IP</u>	<u>Link Ref</u>	<u>SingTel POI</u>	<u>Requesting Licensee Switch</u>												
<u>IP</u>	<u>Link Ref</u>	<u>SingTel POI</u>	<u>Requesting Licensee Switch</u>																

**SingTel's Reply to the Requesting Licensee**

- Application returned – incomplete/illegible
- Not Approved Reason for Rejection : \_\_\_\_\_
- Approved SingTel Approval Code : \_\_\_\_\_  
Ready for Service Date : \_\_\_\_\_

**On Behalf of SingTel**

Sign : \_\_\_\_\_ Contact Number : \_\_\_\_\_  
\_\_\_\_\_  
Name : \_\_\_\_\_ Email : \_\_\_\_\_  
Processed Date : \_\_\_\_\_

**SCHEDULE 1B**

**VIRTUAL (DISTANT) INTERCONNECTION FOR SBOs**

## SCHEDULE 1B

### VIRTUAL (DISTANT) INTERCONNECTION FOR SBOS

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## SCHEDULE 1B

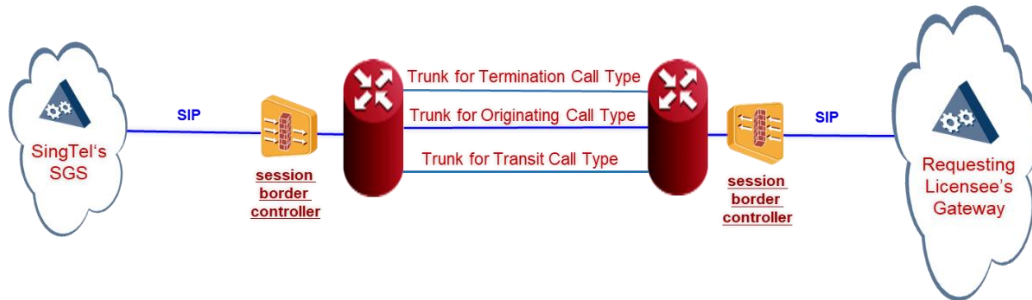
### VIRTUAL (DISTANT) INTERCONNECTION FOR SBOS

#### 1. GENERAL

- 1.1 Each Party agrees to interconnect and keep interconnected their respective Networks subject to and in accordance with the terms and conditions of this Schedule 1B.
- 1.2 This Schedule 1B only applies to a Requesting Licensee which is an SBO.
- 1.3 For the avoidance doubt and unless the Parties agree otherwise, where both Parties have established Interconnection of their respective Networks prior to the RIO Review Date:
- (a) the existing interconnect configuration that applies between each Party's respective Network at the RIO Review Date will continue to apply; and
  - (b) the Parties need not change the Interconnection configuration of their respective Networks as may be required under this Schedule 1B.

#### 2. INTERCONNECT CONFIGURATION

- 2.1 The Requesting Licensee must interconnect its Network with the SingTel Network at SingTel's SBO Gateway Switches (**SGS**) as specified in [Schedule 1 Annexures Annex A Section 2](#)~~FD of Annex A~~.
- 2.2 SingTel and the Requesting Licensee are responsible for managing and maintaining their own Interconnection Links, taking into account the need for growth, diversity and security in the Data Links. For the avoidance of doubt, there is no obligation on either Party to manage or maintain the other Party's Interconnection Links.
- 2.3 The Minimum Interconnection Bandwidth for Interconnection by the Requesting Licensee to a SingTel SGS is two (2) 1Gbps Data Links.
- 2.4 Not Used
- 2.5 An Interconnection Link may comprise different Trunk Groups. The Requesting Licensee must designate the Trunk Groups to handle the different Call Types.



2.6 The Requesting Licensee is responsible for the correct dimensioning of the Data Links that it will require.

~~2.7 If SingTel or the Requesting Licensee wishes to interconnect at additional POIs, that Party may request an additional POI and the Party will negotiate in good faith in relation to the interconnect configuration applicable to such additional Interconnection. Each Party shall bear its own cost in relation to establishing any additional POI. If SingTel or the Requesting Licensee wishes to interconnect at additional POIs, that Party may request an additional POI and the Party will negotiate in good faith in relation to the interconnect configuration applicable to such additional Interconnection. The Party that wishes to interconnect at additional POIs is liable for any reasonable costs incurred by the other Party where those costs are caused by the requesting Party's request in relation to establishing any such additional POIs. Such costs are to be determined as part of the good faith negotiations, which shall take into account factors such as the principle of cost causality and the benefit enjoyed by both parties arising from the additional POIs.~~

~~2.7~~

2.8 Neither Party shall be required to commence works on the installation of Network Facilities to support a new POI under clause 2.7 until the Party has agreed on the interconnect configuration under clause 2.7.

### 3. POINT OF INTERCONNECTION

3.1 The Parties agree that the POI will be determined by the following criteria:

(a) subject to clause 3.1(c), if the Parties establish two (2) Interconnection Links, the first link to carry SingTel's traffic and the second link to carry the Requesting Licensee's traffic, the POI for each link may be established at the Fibre Distribution Frame (FDF) (or comparable equipment) of the Party providing the Call Origination, Call Termination and Call Transit Service; or

(b) subject to clause 3.1(c), if the Parties establish only one (1) Interconnection Link to carry each Party's traffic to the other Party's Network, the POI may be at a notional mid-point of the Interconnection Link; or

(c) the POI may be established at such other Interconnection configurations as the Parties may agree on.

3.1 The Parties agree that the POI will be located on the Requesting Licensee's side of the SingTel SGS Fibre Distribution Frame (FDF) at the SingTel SGS.

3.2 Each Party is responsible for the provisioning and maintenance of Network Facilities (including those Network Facilities which form part of the Interconnect Links and the network routing equipment) on its "side" of the POI.

3.3 The Interconnection between SingTel's SGS and the Requesting Licensee's Network located at a different site will be implemented by means of 1Gbps Data Links. The cost of installation, maintenance and operation of the Network Facilities on each Party's side of the POI which form part of the Interconnect Link(s) shall be borne by that Party.

3.4 The Requesting Licensee will be responsible for the connection of the Interconnection Link between the POI and the Requesting Licensee's Network.

3.5 The Requesting Licensee shall acquire Data Links from SingTel or a third party to form part of the Interconnection Links. The Requesting Licensee's Interconnection Links must consist of ~~multiple~~ 1Gbps Data Links terminated at a FDF in SingTel's designated SGS exchanges.

3.6 At the Requesting Licensee's request, SingTel will lease 1Gbps Data Links to the Requesting Licensee's Network based on SingTel's standard terms and conditions for supply of Data Link service.

3.7 ~~The Requesting Licensee~~ Either Party (Requesting Party) may request the activation, deactivation, or modification of an Interconnection Link by completing the request form set out in Annex 1B.1. ~~SingTel~~ The Party receiving the request (Receiving Party) will consider ~~the such~~ request ~~for modification~~ and approve or reject the request ~~for modification~~ by written notice to the Requesting ~~Licensee~~ Party within fourteen (14) Calendar Days of receipt of a duly completed request form from the Requesting ~~Licensee~~ Party. If ~~SingTel~~ the Receiving Party agrees to such a modification, ~~SingTel~~ the Receiving Party will undertake the modification in accordance with that request. The Requesting ~~Licensee~~ Party will be liable for

any costs incurred by ~~SingTel~~ the Receiving Party in performing the activation, deactivation, or modification of the Interconnection Link. If ~~SingTel~~ the Receiving Party rejects the request ~~for modification~~, it will specify the reasons in its written notice to the Requesting ~~Licensee~~ Party. ~~SingTel~~ The Receiving Party may reject a request for activation, deactivation, or modification of an Interconnection Link on reasonable grounds including (without limitation) where the requested ~~modification~~ change:

- (a) would have, or would likely have, the effect of impairing, disrupting or damaging ~~SingTel's~~ the Receiving Party's Network, ~~SingTel's~~ equipment or other Interconnection Links;
- (b) is not technically feasible;
- (c) would cause, or would likely cause, ~~SingTel~~ the Receiving Party to in breach of any applicable laws or regulations or its licence; or
- (d) does not contain all the necessary information or is illegible.

~~3.8~~ 3.8 — Requesting Licensee shall not conduct penetration test of any kind of SingTel's Network or SingTel's equipment or other Interconnection Links.

#### 4. ALTERNATIVE INTERCONNECT CONFIGURATIONS OR POINTS OF INTERCONNECTION

4.1 The Requesting Licensee may request alternative interconnect configurations or locations for the POI at any technically feasible point.

4.2 On receipt of a request under clause 4.1 in respect of an alternative interconnect configuration or POI location specified in the Code, SingTel and the Requesting Licensee will promptly discuss the Requesting Licensee's request.

4.3 If, thirty (30) Calendar Days after the receipt of a request under clause 4.1 and following discussions under clause 4.2, the Requesting Licensee wishes to pursue the alternative interconnect configuration or locations for the POI and SingTel reasonably determines that the alternative interconnect configuration or locations for the POI requested is technically feasible, SingTel will commence the formulation of terms and conditions to incorporate into this RIO Agreement.

4.4 SingTel will submit terms and conditions to the Authority for approval and incorporation into the RIO and this RIO Agreement within sixty (60) Calendar

Days after the receipt of a request under clause 4.1. Alternatively, SingTel may seek an exemption from the relevant aspects of the Code.

#### **4.5. TECHNICAL REQUIREMENTS AND SPECIFICATIONS**

##### **4.15.1 Link Connectivity**

4.1.15.1.1 The Parties shall ~~interface~~ interconnect with 1Gbps Data Links.

##### **4.25.2 Protocol Handshaking**

4.2.15.2.1 The Parties shall comply with the SIP Internet Engineering Task Force Specification.

4.2.25.2.2 The Requesting Licensee shall obtain its own signalling/media IP address for peering purpose from the Authority.

4.2.35.2.3 Requesting Licensee shall not use the Internet for interconnection with SingTel's Network or SingTel's equipment or other Interconnection Links.

4.2.45.2.4 The Parties shall adhere to additional SIP requirement as follows:

- (a) The Calling Party Number and Redirecting Number if available shall be conveyed for all Calls across the Network connection without manipulation.
- (b) The Dummy CLI received from Mobile Operators from inbound and outbound roamers shall be an eight (8) digit Dummy CLI; where the Dummy CLI refers to the list of non-subscriber CLI used in the resolution of service issues in accordance with clause 18.6 of the RIO Main Body.
- (c) The number dialled by the calling subscriber shall not be changed or amended for the routing of international outgoing Calls from one Party's Network to the other Party's Network.
- (d) Not Used

##### **4.35.3 Interconnect Testing**

~~4.3.15.3.1~~ The Parties shall comply with the testing procedures in Annex A of Schedule 1 Annexures.

4.3.2 The Parties shall comply with the technical and security requirements as listed in Schedule 1 Annexures.

#### 4.45.4 Routing

5.4.1 The Parties shall route Interconnected VoIP Calls in accordance with the agreed arrangements applicable to that Call Type under Schedule 2.

### 6. PROVISIONING OF INTERCONNECT BANDWIDTH

#### 6.1 Ordering and Provisioning Procedure for Interconnect Bandwidth

6.1.1 ~~The Requesting Licensee~~ Each Party (**Requesting Party**) shall submit its Request for Interconnect Bandwidth to ~~the other Party~~ the other Party (**Receiving Party**) in the form of Annex 1B.2.

6.1.2 ~~The other~~ Receiving Party shall process all Requests for Interconnect Bandwidth on a 'first come, first served' basis.

6.1.3 ~~The other~~ Receiving Party shall respond to a Request for Interconnect Bandwidth within fifteen (15) Business Days, or any other period as may be agreed, of receipt of such request, or such other period as may be agreed. The response shall be either:

(a) an acknowledgement that the other Receiving Party is able to provide the full Interconnect Bandwidth by the "Required By Date";

(b) an acknowledgement that the other Receiving Party is able to provide the Interconnect Bandwidth, but not be able to provide the quantities by the "Required By Date"; or

(c) an advice that the other Receiving Party is unable to provide the Interconnect Bandwidth as procurement is required.

6.1.4 When procurement is required in order to meet the request, and ~~the other~~ Receiving Party advises the Requesting Licensee Party pursuant to clause ~~8.15.36.1.3~~, the ~~other~~ Receiving Party shall seek confirmation of the required Bandwidth from the Requesting Licensee Party. Upon confirmation, the ~~other~~ Receiving Party shall

complete the procurement no later than it would complete such procurement for itself.

6.1.5 The Requesting Licensee shall not procure Interconnection Links or capacity in excess of its actual traffic requirements. Any request for additional capacity shall be accompanied by a traffic forecast submitted to SingTel and shall be subject to SingTel's prior written approval.

## **5.7. DECOMMISSIONING**

5.17.1 Subject to clauses 7.2 and 7.3, a Party (**Decommissioning Party**) may, for whatever reason, upon giving no less than six (6) months prior written notice to the other Party, close, replace or relocate any SGS in respect of which an Interconnection Link is connected, decommission an Interconnection Link or close a POI (**Decommissioning**).

5.27.2 Subject to paragraph (a), the Decommissioning Party shall be responsible for and bear all direct costs incurred by both Parties in carrying out the Decommissioning. Direct costs are limited to removal of equipment and cabling at the POI.

(a) When the request for Decommissioning is at the direction of a Third Party pursuant to a legal obligation binding on the Decommissioning Party, each Party shall bear its own costs associated with the Decommissioning together with the direct costs incurred by that Party in respect of the establishment of alternative arrangements necessary to support the provision of Call Origination, Call Transit and Call Termination Services provided at the time of the Decommissioning.

5.37.3 If Decommissioning is to occur where Virtual (Distant) Interconnection has been established:

(a) if the Requesting Licensee is the Decommissioning Party, the Requesting Licensee must comply, where the Requesting Licensee has acquired the Data Links from SingTel, with the terms and conditions under which the Data Links are supplied by SingTel (including the payment of any early termination payments); and

(b) if SingTel is the Decommissioning Party, SingTel will arrange for the connection of the Data Links which are supplied by SingTel to the alternative or relocated SGS or POI prior to the Decommissioning.

5.47.4 Upon the happening of an event which causes or is likely to cause significant damage to the Network of a Party or which endangers or is likely to endanger the health or safety of any person (**Emergency Event**), that Party may close or replace its SGS or a POI or Decommission an Interconnection Link without prior written notice to the other Party, provided that it notifies the other Party as soon as practicable that the Emergency Event exists and that emergency relocation work is being or will be performed. The costs incurred as a result of, or in connection with, a closure or replacement of an SGS or a POI or Decommissioning of an Interconnection Link under this clause shall be borne as follows:

- (a) where the occurrence of the Emergency Event was caused as a result of the negligence or wilful act or omission of the first-mentioned Party, its employees, agents or contractors, that Party shall bear the costs associated with the closure, replacement or Decommissioning incurred by both Parties; and
- (b) where the occurrence of the Emergency Event was not caused as a result of the negligence or wilful act or omission of the first-mentioned Party, its employees, agents or contractors, each Party shall bear its own costs associated with the closure, replacement or Decommissioning.

**ANNEX 1B.1: REQUEST FORM FOR ACTIVATION, DEACTIVATION AND MODIFICATION OF INTERCONNECT LINKS**

Date: \_\_\_\_\_ Application Reference Number: \_\_\_\_\_

To: Manager, Network Integration and Interconnect

- Activation of New Interconnection Links
- Deactivation of Interconnection Links
- Modification of Interconnection Links

Requesting Licensee Particulars																							
Requesting Licensee Name : _____ Requesting Licensee's BRN: _____ Name : _____ Designation : _____ Signature : _____ Telephone : _____ Email : _____ Company Stamp : _____																							
<p><b>Intended Ready For Service Date:</b> _____</p> <p><b>Interconnection Link Information</b> (for more than 4 links, please complete a separate form)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>IP</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Link Ref</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>SingTel POI</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Requesting Licensee Switch</u></th> </tr> </thead> <tbody> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> <tr> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> <td style="border-bottom: 1px solid black;"> </td> </tr> </tbody> </table> <p>Call Type and Access Code (where applicable): _____</p> <p><b>Network configuration Diagram</b> (where applicable) Please attach to this form.</p> <p><b>Information for Modification of Interconnection Links:</b></p> <p>_____</p> <p>_____</p>				<u>IP</u>	<u>Link Ref</u>	<u>SingTel POI</u>	<u>Requesting Licensee Switch</u>																
<u>IP</u>	<u>Link Ref</u>	<u>SingTel POI</u>	<u>Requesting Licensee Switch</u>																				

**SingTel's Reply to the Requesting Licensee**

- Application returned – incomplete/illegible
- Not Approved      Reason for Rejection      : \_\_\_\_\_
- Approved      SingTel Approval Code      : \_\_\_\_\_  
Ready for Service Date      : \_\_\_\_\_

**On Behalf of SingTel**

Sign : \_\_\_\_\_      Contact Number : \_\_\_\_\_  
\_\_\_\_\_  
Name : \_\_\_\_\_      Email : \_\_\_\_\_  
Processed Date : \_\_\_\_\_

SUBJECT TO CHANGE

**ANNEX 1B.2: INTERCONNECT BANDWIDTH**

<u>Request For Interconnect Bandwidth</u>				
<u>Name of Operator:</u>				
<u>Link Reference No:</u>				
<u>Required By Date:</u>				
<u>Operator's Switch Location &amp; SBC IP Address:</u>				
<u>SingTel's Switch Location &amp; SBC IP Address:</u>				
	<u>Trunk Group for Origination Call Type</u>	<u>Trunk Group for Termination Call Type</u>	<u>Trunk Group for Transit Call Type</u>	<u>Trunk Group for Emergency Call Type</u>
<u>1Gbps Bandwidth/Concurrent Calls on particular Link Reference</u>				