

SERVICE SCHEDULE - IP MULTICAST CONNECTION

NUCLEUS CONNECT PTE. LTD.

INTERCONNECTION OFFER (ICO) AGREEMENT

SERVICE SCHEDULE – IP MULTICAST CONNECTION

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1. INTRODUCTION

- 1.1 This Service Schedule sets out the terms and conditions under which Nucleus Connect will provide the service known as IP Multicast Connection (as defined below) to the Contracting QP.
- 1.2 This Service Schedule comprises the following:
- (a) the provisions herein;
 - (b) subject to paragraph 6, the General Service Terms and Conditions and the following Appendices:
 - (i) Appendix 1: Provisioning Timeframe;
 - (ii) Appendix 2: Service Level Guarantees; and
 - (c) Orders submitted by the Contracting QP in relation to this Service Schedule.
- 1.3 In the event of any inconsistency or conflict between the provisions herein, the General Service Terms and Conditions and Orders submitted by the Contracting QP in relation to this Service Schedule, the order of precedence shall be as follows:
- (a) the provisions herein;
 - (b) Orders submitted by the Contracting QP in relation to this Service Schedule; and
 - (c) the General Service Terms and Conditions.
- 1.4 The Master ICO Agreement, including the Annexes, shall apply unless and to the extent amended or supplemented by the provisions of this Service Schedule.
- 1.5 In this Service Schedule, a reference to a paragraph, unless stated otherwise, is to a paragraph of this Service Schedule.

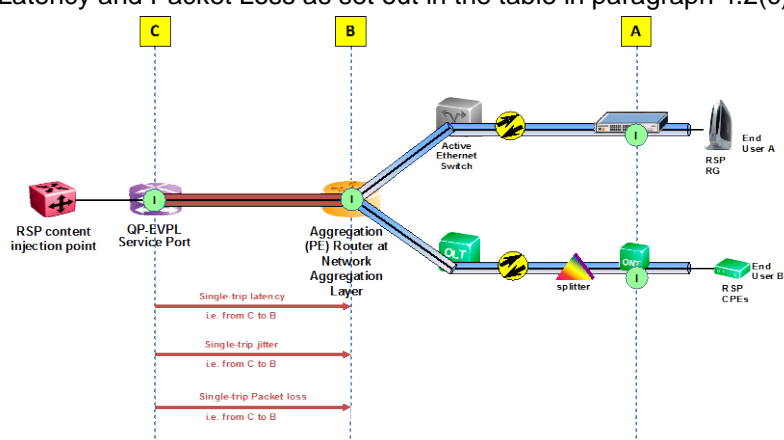
2. DEFINITIONS AND INTERPRETATION

- 2.1 Unless otherwise defined herein this Service Schedule, all terms and expressions used herein will be construed to have the same meanings as found in the Master ICO Agreement and the General Service Terms and Conditions. Where a term or expression is defined specifically in this Service Schedule herein, the provisions herein shall prevail.
- 2.2 In this Service Schedule:
- | | |
|----------------------------------|--|
| Class of Service or CoS | means any of the following class of service: <ul style="list-style-type: none">(a) Class B Near Real Time (Class B); or(b) Class D Best Effort (Class D), each of which is prescribed QoS parameters as set out in the table in paragraph 4.2(c); |
| Committed Information Rate (CIR) | means the minimum bandwidth that Nucleus Connect guarantees over the B-C segment of the diagram in the definition of “QoS” for each IP Multicast Connection; |
| Downlink | means bandwidth in the downstream direction (from QP-EVPL Service Port to the Aggregation Network); |

IP Multicast Connection means a service to allow the Contracting QP to deliver IP multicast content over the NGNBN using Nucleus Connect's IP multicast technology. An IP Multicast Connection will allow the Contracting QP to deliver its IP multicast content from its QP-EVPL Service Port to Nucleus Connect's Aggregation Layer at an OpenNet CO;

Latency means the one-way delay in packet delivery as a result of physical distance, and the Active Network components from the Aggregation to the Core Layer;

Quality of Service or (QoS) means the service levels committed for ensuring delivery of services over the B-C segment of the diagram below, measured by Jitter, Latency and Packet Loss as set out in the table in paragraph 4.2(c);



Service Port ID means an identification number assigned by Nucleus Connect to a QP-EVPL Service Port that has been provisioned for the Contracting QP; and

Uplink means bandwidth in the upstream direction (from the Aggregation Network to QP-EVPL Service Port).

3. COMMENCEMENT

This Service Schedule shall commence with effect from the date that the Contracting QP first places an Order to take up an IP Multicast Connection, in accordance with the General Service Terms and Conditions.

4. SERVICE REQUIREMENTS

4.1 The Contracting QP shall place one (1) Order for each IP Multicast Connection. For example, if the Contracting QP wishes to take up two (2) IP Multicast Connections, the Contracting QP shall submit two (2) separate Orders.

4.2 When placing an Order for an IP Multicast Connection, the Contracting QP shall be required to:

- (a) Specify one (1) Service Port ID of the QP-EVPL Service Port and the OpenNet CO within Nucleus Connect's Aggregation Network.

- (b) Specify the following Network protocol options:
- (i) Layer 2 VLAN (IEEE 802.1q);
 - (ii) either IPv4 multicast address or (if and only where it is commercially available at Nucleus Connect's determination) IPv6 multicast address;
 - (iii) IGMP v2/v3.

- (c) Subscribe to one or more block(s) of 100Mbps Downlink CIR and 1Mbps Uplink CIR. The Downlink CIR shall comprise Class B Near Real Time and the Uplink CIR shall comprise Class D Best Effort, as set out below.

The Contracting QP may subsequently from time to time, increase or decrease the number of block(s) of 100Mbps Downlink CIR and 1Mbps Uplink CIR, up to a maximum aggregate of Downlink CIR of 10Gbps/Uplink CIR of 100Mbps and no less than a minimum aggregate of Downlink CIR of 100Mbps/Uplink CIR of 1 Mbps. Such increase or decrease shall constitute a Modification for which the Contracting QP shall be required to submit an Order pursuant to and in accordance with the General Service Terms and Conditions.

The table below sets out the performance parameters of each Class of Service:

Class Of Service	Jitter	Latency	Packet Loss
Class B Near Real Time	0.5ms	3ms	0.1%
Class D Best Effort	Best Effort	10ms	Best Effort

- 4.3 If the Contracting QP injects traffic into any IP Multicast Connection which exceeds the CIR purchased for such IP Multicast Connection pursuant to paragraph 4.2(c), the excess traffic will not be delivered.
- 4.4 The Contracting QP must adhere to Nucleus Connect's QoS tagging scheme when sending or receiving data traffic through any IP Multicast Connection from the relevant Service Port(s). Such QoS tagging scheme requires the use of priority bit value 4 for Class B and priority bit value 1 for Class D.
- 4.5 The Contracting QP must procure and maintain, at its own cost, any equipment or software needed to receive or use and for the testing and commissioning of the IP Multicast Connection(s).
- 4.6 In the event that Nucleus Connect accepts an Order for IP Multicast Connection submitted by the Contracting QP in accordance with the General Service Terms and Conditions, Nucleus Connect will in relation to such accepted Order create VRF (Virtual Router Forwarding) and mVPN (multi-cast VPN).

5. CHARGES

The charges set out in this paragraph 5 are the rates payable by the Contracting QP on a per IP Multicast Connection basis.

5.1 Monthly Recurring Charges

Nucleus Connect will commence charging the Contracting QP the Monthly Recurring NC Charges specified below on the RFS Date.

Description	Monthly Recurring NC Charge (Per block of 100Mbps Class B Downlink CIR and 1Mbps Class D Uplink CIR)
IP Multicast Connection	\$6,900

5.2 One-Time Charges

The Charges set out below are non-refundable once they are imposed on the Contracting QP by Nucleus Connect in the manner specified below. In addition, depending on when the relevant action is preferred by Contracting QP to be undertaken by Nucleus Connect, the following multiplier factor will be applied to the Charges set out below. For the avoidance of doubt, the multiplier factor to be applied shall be one (1) unless the Contracting QP requests that the relevant action be undertaken by Nucleus Connect on off-working hours during Business Day(s) or on non Business Day(s).

	Period	Time		Multiplier Factor
Business Day	Monday to Friday	Working Hours	9.00am to 5.00pm	1
	Monday to Friday	Off-working hours	Before 9am and after 5.00pm	1.5
Non-Business day	Saturday, Sundays and Public Holidays	Throughout		2

(a) Cancellation Charge

Upon any Cancellation of an Order relating to IP Multicast Connection by the Contracting QP, the following Charges shall be imposed on the Contracting QP:

- (i) an NC Charge of \$50 if Cancellation happens before Nucleus Connect's acknowledgement of its receipt of the Order or an NC Charge of an amount equal to the applicable NC Charges as set out in paragraph 5.2 if Cancellation happens after Nucleus Connect's acknowledgement of its receipt of the Order;
- (ii) ON Charges, except those ON Charges which would be subject to paragraph 5.2(a)(iv), which have been incurred by Nucleus Connect, or which Nucleus Connect has committed to incur, at the time of such Cancellation;

- (iii) any Third Party Charges which have been incurred by Nucleus Connect, or which Nucleus Connect has committed to incur, at the time of such Cancellation; and
- (iv) any other third party charges, OpenNet's charges and/or ON Charges agreed pursuant to paragraph 5.2 or 6.3 of the General Service Terms and Conditions which have been incurred by Nucleus Connect, or which Nucleus Connect has committed to incur, at the time of such Cancellation.

(b) Installation Charge

Upon the installation of a IP Multicast Connection by Nucleus Connect, a one-time Installation Charge specified in the table below shall be imposed on the Contracting QP on a per IP Multicast Connection basis.

Description	Charges
IP Multicast Connection Setup Charge 1. Configuration of IP Multicast Connection addresses/group 2. Testing and commissioning of IP Multicast Connection distribution 3. Project management	\$3,000

(c) Modification Charge

A NC Charge of \$500 shall be imposed on the Contracting QP upon the submission of a Modification Order by the Contracting QP.

(d) Maintenance or Repair

- (i) Nucleus Connect will charge for every onsite visit or joint investigation requested by the Contracting QP, according to the length of time spent by Nucleus Connect's representative during such onsite visit or joint investigation respectively, if such onsite visit or joint investigation is requested by the Contracting QP. There will be a minimum charge of \$400 per onsite visit or joint investigation (as the case may be) up to the first two hours. Subsequent hour blocks are charged at \$200 per hour.
- (ii) The No Fault Found Charge referred to in the General Service Terms and Conditions is \$350 per Fault report.

(e) Disconnection

Upon a disconnection of a IP Multicast Connection by reason of suspension pursuant to the ICO Agreement, a NC Charge of \$500 shall be imposed on the Contracting QP.

(f) Deactivation

- (i) Upon the Deactivation of a IP Multicast Connection Service, the following Charges shall be imposed on the Contracting QP:

- (1) the following NC Charges:

Description	Charges
Deactivation Charge	\$500
Early Termination Charge	100% of remaining contract value

- (2) ON Charges, except those ON Charges which would be subject to paragraph 5.2(f)(i)(4), which have been incurred by Nucleus Connect, or which Nucleus Connect has committed to incur, at the time of such Deactivation;
- (3) any Third Party Charges which have been incurred by Nucleus Connect, or which Nucleus Connect has committed to incur, at the time of such Deactivation; and
- (4) any other third party charges, OpenNet's charges and/or ON Charges agreed pursuant to paragraph 5.2 or 6.3 of the General Service Terms and Conditions which have been incurred by Nucleus Connect, or which Nucleus Connect has committed to incur, at the time of such Deactivation.
- (ii) If the Contracting QP places an Order to Deactivate IP Multicast Connection(s), the Contracting QP shall specify in such Order the date on which such Deactivation is to take place, provided that such date shall be no earlier than the date falling 30 days from the date such Order was placed. If the Contracting QP does not comply with the aforesaid requirement, Nucleus Connect reserves the right to reject such Order.
- (iii) The Contracting QP shall ensure that there are no more subscribers on its IP Multicast Connection Service by the time Nucleus Connect effects the Deactivation. Nucleus Connect shall not be responsible for any service outage to the Contracting QP's End-Users resulting from the Deactivation of the IP Multicast Connection Service.

6. CHANGES FROM THE GENERAL SERVICE TERMS AND CONDITIONS

6.1 Paragraph 2.8 of the General Service Terms and Conditions

For the purpose of this Service Schedule, paragraph 2.8 of the General Service Terms and Conditions shall be deleted in their entirety and replaced with the following provisions:

- “2.8 Where the Contracting QP submits an Order to take up an IP Multicast Connection, the Contracting QP acknowledges and agrees that Nucleus Connect shall be entitled to reject such Order in the following circumstances:
- (a) where the IP multicast technology requested is not supported by the NGNBN;
- (b) where such Order is not in the prescribed form; or

- (c) where the information in such Order is illegible, inaccurate, incomplete or incorrect.”

6.2 Paragraph 5.1 of the General Service Terms and Conditions

For the purpose of this Service Schedule, paragraph 5.1 of the General Service Terms and Conditions shall be deleted in its entirety and replaced with the following provisions:

- “5.1 (a) If an Order to take up a IP Multicast Connection is accepted by Nucleus Connect, Nucleus Connect will provide a project schedule (the “**Project Schedule**”) to the Contracting QP within ten (10) Business Days thereafter stating (i) the period within which Nucleus Connect will activate such IP Multicast Connection and (ii) such other terms and conditions relating to the provision of the IP Multicast Connection as Nucleus Connect may specify.
- (b) The Contracting QP will be able to raise to Nucleus Connect any terms that are not acceptable to it in the Project Schedule within five (5) Business Days from its receipt thereof, failing which the Contracting QP shall be deemed to have accepted and agreed to the terms in the Project Schedule in its entirety.
- (c) If the Contracting QP and Nucleus Connect are unable to reach a mutual agreement on the terms of a Project Schedule within ten (10) Business Days after such Project Schedule is made available to the Contracting QP:
- (i) the Order which is the subject of such Project Schedule shall be deemed to be Cancelled whereupon paragraph 5.2(a) shall apply; and
 - (ii) such Project Schedule and this Service Schedule shall lapse, unless Nucleus Connect is separately providing IP Multicast Connection to the Contracting QP at the time, in which case this Service Schedule shall remain in force.

Nucleus Connect shall not unreasonably reject the Contracting QP's request for extension of the said ten (10) Business Days timeframe to reach a mutual agreement on the terms of the Project Schedule.

- (d) As soon as practicable after the mutual agreement of the Contracting QP and Nucleus Connect to the terms of a Project Schedule (as modified or with such additional terms as the Contracting QP and Nucleus Connect may require), the Contracting QP shall confirm in writing to Nucleus Connect that the Contracting QP agrees to the terms of such Project Schedule in their entirety (and such agreed Project Schedule shall hereinafter be referred to as an “**Approved Project Schedule**”) within the ten (10) Business Days timeframe (or as the case may be, the agreed extended timeframe) referred to in paragraph 5.1(c) above, whereupon the Approved Project Schedule shall be binding on Nucleus Connect and the Contracting QP.
- (e) If the Contracting QP subsequently does not wish to proceed with an Approved Project Schedule, the Contracting QP shall be required to pay Nucleus Connect the Charges for cancelling such Approved Project Schedule as set out in the Service Schedule for IP Multicast Connection, in accordance with the Master ICO Agreement.

- (f) The RFS Date shall be no less than fifteen (15) and no more than thirty (30) Business Days from the date the Project Schedule was approved. If Nucleus Connect fails to meet the timeframes relating to the provisioning of the IP Multicast Connection other than due to events outside of Nucleus Connect's reasonable control, Nucleus Connect shall compensate the Contracting QP by way of a credit rebate equal to 5% of the Installation Charge for each day of delay, subject to a maximum of 100% of such Installation Charge. The amount of the rebate will be credited into the Contracting QP's account after it has been processed by Nucleus Connect and will be reflected in Nucleus Connect's next invoice to the Contracting QP in accordance with Nucleus Connect's billing cycle."

6.3 Paragraph 9.10 of the General Service Terms and Conditions

For the purpose of this Service Schedule, the tables in paragraph 9.10 of the General Service Terms and Conditions shall be deleted in their entirety and replaced with the following table:

Specific MTTR per Month	Reduction in Monthly Recurring Charge per affected circuit
≤ 3 hours	No Compensation
> 3 hours but ≤ 5 hours	10%
> 5 hours but ≤ 10 hours	20%
> 10 hours	30%

6.4 Appendix 1 of the General Service Terms and Conditions

For the purpose of this Service Schedule, the entire Appendix 1 of the General Service Terms and Conditions shall be deleted in its entirety and shall not apply to this Service Schedule.

Application Form

IP Multicast Connection Service



ATTN: NUCLEUS CONNECT, ORDER DESK
FACSIMILE NO.: (65) 6808 2820
EMAIL: orderdesk@nucleusconnect.com

Business Customer Information

Company Details	Authorised Officer Particulars
Name of Firm/Company as in RCB:	Name of Authorised Officer as in NRIC/PASSPORT/FIN*. Please underline surname. (Dr/Mr/Miss/Mrs/Mdm):
Registered Address as in RCB:	NRIC/PASSPORT/FIN* No. of Authorised Officer (Dr/Mr/Miss/Mrs/Mdm):
	E-mail of Authorized Officer:
Main Office Contact No.:	Designation:
Main Office Fax No.:	Contact No. (Office):
Business Registration Number (BRN):	Contact No. (Fax):
Account Information (For New Accounts, please refer to www.nucleusconnect.com for instruction to sign up Nucleus Connect's Services)	<input type="checkbox"/> Account Number:
Customer Reference ID : (This ID is issued by customer for their internal reference of the service that is set out in this application form)	

Billing Details (If different from Business Customer Information)

Company Name:	Billing Address :
City & Postal Code:	Country:
Contact Person Name (Billing):	Customer Contact Number :
Customer Fax Number:	E-mail:

* Please select where appropriate

Customer Technical Contact

Installation Contact (for service delivery)	Operations/Technical Contact (after service delivery)
Name: _____	Name: _____
Telephone (O): _____	Telephone (O): _____
Mobile: _____	Mobile: _____
Email: _____	Email: _____
Notification Mode: 24 Hours Daily <input type="checkbox"/> Office Hours (9am-5pm, Mon-Fri) <input type="checkbox"/>	Notification Mode: 24 Hours Daily <input type="checkbox"/> Office Hours (9am-5pm, Mon-Fri) <input type="checkbox"/>

Application Form

IP Multicast Connection Service



Network Layer Configuration			
	<input type="checkbox"/> New	<input type="checkbox"/> Modification	<input type="checkbox"/> Deactivation
Network protocol options	<input type="checkbox"/> L2 VLAN IEEE802.1q <input type="checkbox"/> Layer 3 IPV4		
Service Destinations	<input type="checkbox"/> QP-EVPL Service Port ID: _____ <input type="checkbox"/> Aggregation Layer CO: _____		
Bandwidth option: Total subscribed bandwidth shall be in block of 100Mbps Downlink CIR and 1Mbps Uplink CIR.	Class Of Service	Total CIR Bandwidth	
	Class B Near Real Time (Downlink)	Bandwidth :	VLAN:
	Class D Best Effort (Uplink)	Bandwidth :	VLAN:
Network PIM setting	RP Address	Multicast Addresses	Static join Multicast Addresses
<input type="checkbox"/> BSR (Sparse mode)			
<input type="checkbox"/> Static (sparse mode)			
Contract Period			
Minimum Term ^R	<input type="checkbox"/> 12 Months <input type="checkbox"/> Others (Please specify): _____		
Customer requested RFS date [^]			
Additional Information			

[^] Subject to agreement, resource availability and confirmation by Nucleus Connect.

^R If Minimum Term is not specified, the Contracting QP shall be deemed to have selected 12 months..

Customer Signature		
We hereby agree to subscribe to the abovementioned services on the terms and subject to the conditions contained in the Master ICO Agreement and the Service Schedule for the abovementioned services, which terms and conditions shall apply upon Nucleus Connect's acceptance of this application. We certify that all information provided by us herein are true, correct and complete. Further, we agree that any cancellation of the abovementioned services may result in a charge to us at Nucleus Connect's prevailing rates.		
<u>Signature of Authorised Officer</u>	<u>Date</u>	<u>Company Stamp</u>
For Nucleus Connect Use		
<input type="checkbox"/> Application Rejected:	Reason for rejection:	
<input type="checkbox"/> Application Accepted	Service ID/s:	Work Order No.: _____
No. of pages attached (Excluding application forms):	Approval code:	Processed by (Name, Contact, Signature and Date)