

2.2 REFERENCE OFFER REQUIREMENTS

1 INTRODUCTION

1.1 Background information

1.1.1 In order to meet the Minister's objectives, to provide high quality, highly available and future proof High Speed Broadband services, a number of different Wholesale Products shall be offered by NBPco in the Intervention Area. These Wholesale Products shall be offered to RSPs that wish to provide services to End Users (either residential, business or at Strategic Community Points) and to WSPs.

1.1.2 There are three different categories of Wholesale Products:

- (A) Minimum Required Wholesale Products;
- (B) Additional Required Wholesale Products; and
- (C) Other Permitted Wholesale Products (if applicable)

and to the extent NBPco elects to include any Other Permitted Wholesale Products in the NBPco Solution it acknowledges and agrees that those Other Permitted Wholesale Products will then form part of the NBPco Solution and may not be withdrawn or changed in any way unless otherwise permitted under this Agreement.

1.1.3 Except where stated otherwise in this Schedule, reference to the Wholesale Products includes all three different categories of Wholesale Products, (that is, Minimum Required Wholesale Products, Additional Required Wholesale Products and Other Permitted Wholesale Products).

1.1.4 As part of the process to ensure Equivalence of Input for the different Service Providers, NBPco shall prepare and publish Reference Offers for each of the Wholesale Products to be offered under the Agreement. Reference Offers shall be provided by NBPco for all Minimum Required Wholesale Products, Additional Required Wholesale Products and, if applicable, for any Other Permitted Wholesale Products offered by NBPco.

1.1.5 The provisions of this Schedule set out the requirements and specifications that NBPco shall include in NBPco's Reference Offers for each Wholesale Product.

1.2 Document structure

1.2.1 This Schedule is structured as follows:

- (A) Paragraph 2 (Service Requirements) describes the mandatory nature of this Schedule.
- (B) Paragraph 3 (Governance) sets out the requirements regarding the governance of Reference Offers.
- (C) Paragraph 4 (Wholesale Product Specifications) sets out the technical requirements for all Wholesale Products and defines Product Key Performance Indicators and associated minimum performance levels for each defined parameter.

- (D) Paragraph 5 (Operational Performance) sets out requirements regarding operational processes for each Wholesale Product and defines Operational Key Performance Indicators and associated minimum performance levels for each defined parameter.
- (E) Paragraph 6 (Pricing) sets out requirements on pricing principles for the Reference Offers.
- (F) Paragraph 7 (Standard Terms and Conditions) sets out general requirements on Service Provider Terms for NBPco to provide in its Reference Offer.

2 SERVICE REQUIREMENTS

- 2.1 NBPco shall, throughout the Contract Period, satisfy and comply with all the requirements and descriptions set out in, and all other aspects of, this Schedule.

3 GOVERNANCE

3.1 Background information

- 3.1.1 This Paragraph 3 (Governance) sets out the requirements with which NBPco shall comply in relation to the governance of Reference Offers.
- 3.1.2 Any Reference Offer that NBPco prepares or publishes shall not limit or affect any provision of this Agreement or any obligation of NBPco under this Agreement.

3.2 Requirements

- 3.2.1 NBPco shall provide all of its Wholesale Products on an EoI basis for all Service Providers (including Associated Service Providers). NBPco shall, provide products, services, facilities, and information to all Service Providers (including Associated Service Providers) such that such products, services, facilities, and information are provided within the same timescales, at the same price (subject to Paragraph 7.1 (Transparency and Non-Discrimination) of Part 1 (Wholesale Pricing Rules) of Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules)) functionality, service and quality levels and on the same terms and conditions and by means of the same systems and processes. NBPco shall ensure that the systems and processes operate in the same way and with the same degree of reliability and performance for all Service Providers (including potential Associated Service Providers).
- 3.2.2 NBPco shall publish a Reference Offer for each Wholesale Product offered as part of the Agreement and act in the manner required under this Agreement in respect of Reference Offers.
- 3.2.3 NBPco shall ensure that a Reference Offer in relation to the provision of Wholesale Products includes at least the following components:
 - (A) Wholesale Product functionality and specifications;
 - (B) Wholesale Product availability timing;

- (C) operational processes for Service Providers to manage the lifecycle of the Wholesale Product;
- (D) SP SLA (including SP Performance Levels, SP Performance Indicators and SP Performance Credits) for the Wholesale Product;
- (E) Wholesale Price; and
- (F) Service Provider Terms for the Wholesale Product.

3.2.4 NBPco shall ensure that the Reference Offer, and all associated invoices and bundles, are sufficiently unbundled to ensure that a Service Provider is not required to pay for or order Wholesale Products that are not necessary for the Wholesale Product required by it. NBPco shall ensure that the Wholesale Price in its Reference Offer, at a minimum, sets out in a clear, easily accessible, logically structured and transparent manner for each Wholesale Product the current:

- (A) maximum charge for Connection;
- (B) maximum charge for disconnection;
- (C) recurring charges;
- (D) process for setting and implementing any charge in excess of the Initial Connection Charges pursuant to Paragraph 6 (Initial Connection Charges and Other Connection Charges) of Part 1 (Wholesale Pricing Rules) of Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules);
- (E) charge for migration (between Service Provider and Wholesale Products); and
- (F) any other one-off charges associated with the portfolio of Wholesale Products on offer,

and in a manner that enables any reader of the Reference Offer to clearly identify and compare the differences in charges from one Wholesale Product to another by each constituent type of charge.

3.2.5 NBPco shall submit a statement of compliance in the form set out in Appendix 2 (EoI Statement of Compliance) of this Schedule 2.2 (Reference Offer Requirements) to demonstrate and verify its compliance with the non-discrimination and transparency requirements under this Agreement for Wholesale Products and Wholesale Prices.

3.2.6 NBPco shall publish and keep up-to-date a Reference Offer in relation to all Wholesale Products offered in its portfolio on its Public Portal (as described in Paragraph 4.5 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification), and in particular shall seek the prior written approval from the Minister prior to the Reference Offer becoming effective or being published. The timing for the publication of the Reference Offers is as described in Paragraph 7.2.3 (Service Provider Engagement Framework – Requirements) of Schedule 2.3 (Deployment Requirements) for all Wholesale Products which are to be implemented in the first Contract Year in accordance

with the Wholesale Product Launch Project Plan. The release of subsequent Reference Offer documentation shall be in accordance with Paragraph 9.2 (Product Management) of Schedule 2.4 (Operational Performance). The Minister shall act reasonably in providing its approval.

- 3.2.7 NBPco shall update and amend each Reference Offer in accordance with the process specified in Appendix 2 (Statement of Requirements and Product Development Processes) of Schedule 2.4 (Operational Performance), and, in particular, shall require the prior written approval from the Minister before the update or amendment becomes effective or is published (without limiting or affecting either NBPco's obligations and the Minister's rights under Appendix 3 (Wholesale Price Control Procedure and Wholesale Product Control Procedure) of Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules)). The Minister shall act reasonably in providing its approval. Any updates or amendments to the Reference Offer approved in writing by the Minister shall form part of this Agreement.
- 3.2.8 NBPco shall ensure that each version of each Reference Offer is sequentially numbered and that previous Reference Offer versions are archived on the Public Portal so that they remain accessible by members of the public.
- 3.2.9 For each new version of the Reference Offer, NBPco shall publish on the Public Portal a marked-up Reference Offer (including all components of the Reference Offer set out or referred to in Paragraph 3.2.3 (Governance) and Paragraph 3.2.4 (Governance) of this Schedule 2.2 (Reference Offer Requirements), clearly highlighting incremental changes with the previous version of the Reference Offer.
- 3.2.10 NBPco shall provide Wholesale Products at the pricing and under the terms and conditions in the relevant Reference Offer and shall not depart from them either directly or indirectly in any way. NBPco shall ensure that the Reference Offer complies with the Wholesale Pricing Rules, Retail Pricing Rules and Wholesale Product Benchmarking Rules.

4 WHOLESALE PRODUCT SPECIFICATIONS

4.1 Background information

- 4.1.1 The provisions of this Paragraph 4 (Wholesale Product Specifications) set out the Key Performance Indicators and associated minimum performance for the Wholesale Products to be provided by NBPco.
- 4.1.2 The three different categories of Wholesale Products are:
 - (A) Minimum Required Wholesale Products;
 - (B) Additional Required Wholesale Products; and
 - (C) Other Permitted Wholesale Products (if applicable)

and to the extent NBPco elects to include any Other Permitted Wholesale Products in the NBPco Solution it acknowledges and agrees that those Other Permitted Wholesale Products will then form part of the NBPco Solution and may not be withdrawn or changed in any way unless otherwise permitted under this Agreement.

4.1.3 Throughout the Contract Period, NBPco shall ensure that the performance specifications of all Wholesale Products provided as part of this Agreement (and including but not limited to those specified in this Paragraph 4 (Wholesale Product Specifications)) evolve in line with Equivalent Products offered outside of the Intervention Area and in accordance with the Wholesale Product Benchmarking Rules specified in Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules), Clause 26 (Service and Network Future Proofing and Continuous Improvement) and the processes set out in Schedule 6.4 (Service, Network and Wholesale Product Compliance and Future Proofing).

4.2 Minimum Required Wholesale Product Requirements

4.2.1 For the duration of the Contract Period, NBPco shall provide throughout the Intervention Area the following Minimum Required Wholesale Products, and in respect of which NBPco shall meet or exceed all of the requirements and specifications set out or referred to in this Schedule:

- (A) Active Access Wholesale Products
 - (1) Minimum Bitstream Wholesale Product; and
 - (2) Minimum Virtual Unbundled Access (VUA) Wholesale Product
- (B) Passive Access Wholesale Products
 - (1) Duct Access Product;
 - (2) Pole Access Product;
 - (3) Unbundled Fibre Access Product;
 - (4) Dark Fibre Product; and
 - (5) Radio Tower and Mast Access Product
- (C) Active Backhaul Wholesale Products
 - (1) InterConnect Product; and
 - (2) Transmission Product.
- (D) Passive Backhaul Wholesale Products
 - (1) Duct Access Product;
 - (2) Pole Access Product;
 - (3) Dark Fibre Product;
 - (4) Radio Tower and Mast Access Product; and
 - (5) Building and Cabin Co-Location Product.

For each Minimum Required Wholesale Product provided as part of the Agreement, NBPco shall provide a Reference Offer, in accordance with the governance requirements set out in Paragraph 3.1 (Governance) and Paragraph 3.2 (Governance) of this Schedule 2.2 (Reference Offer Requirements).

NBPco shall not be required to provide a product in the above list where the Assets to form part of the Network in the NBPco Solution are evidenced by NBPco not to be owned or under the control (whether direct or indirect) of NBPco.

Active Access Wholesale Products – Minimum Bitstream Wholesale Product Requirements

Figure 4.1: Specifications for the Minimum Bitstream Wholesale Product

Product Key Performance Indicator	Minimum Performance
Minimum Download Speed between WCPE and PoH	30 Mbit/s
Minimum Upload Speed between WCPE and PoH	6 Mbit/s
Maximum utilisation of backhaul link between first point of active aggregation and PoH	80%
Maximum Latency (round-trip) between the WCPE and PoH	50 ms
Maximum Jitter between the WCPE and the PoH	25 ms
Maximum Packet Loss between the WCPE and PoH	0.1%
Minimum service availability	99.95%

- 4.2.2 NBPco shall provide a Minimum Bitstream Wholesale Product which meets or exceeds the minimum performance for all Product Key Performance Indicators set-out in Figure 4.1. NBPco shall refer to and adhere to the definition of the above Product Key Performance Indicators provided in Appendix 1 (Performance Level Requirements) of Schedule 2.4 (Operational Performance), when measuring the performance of its Wholesale Products.
- 4.2.3 NBPco shall clearly define in the Service Provider Terms, the circumstances where unavailability of a Wholesale Product shall be excluded from the calculation of unplanned service availability.
- 4.2.4 NBPco shall provide a Minimum Bitstream Wholesale Product which incorporates the following two distinct components, which each shall meet the Product Key Performance Indicators specified in Paragraph 4.2.2 (Wholesale Product Specifications):
 - (A) Access Network component; and

(B) Backhaul Network component.

- 4.2.5 NBPco shall meet or exceed all of the minimum Product Key Performance Indicators set out or referred to in Paragraph 4.2.2 (Wholesale Product Specifications) for the Minimum Bitstream Wholesale Product.
- 4.2.6 The Minimum Bitstream Wholesale Product shall be a layer 2 Ethernet-based unicast (or equivalent) Wholesale Product. Layer 2 shall be as defined in the Open Systems InterConnection (OSI) reference model from time to time.
- 4.2.7 NBPco shall provide a Minimum Bitstream Wholesale Product, for which Virtual LAN (VLAN) tags (being a broadcast domain in a computer network that is partitioned at the data link layer) are configurable, and shall ensure the exclusivity of VLAN IDs between Service Providers and End Users.
- 4.2.8 NBPco shall allow the transparent carriage of Customer-VLANs (C-VLAN) in its Minimum Bitstream Wholesale Product in order to provide transparent LAN services for business End Users.
- 4.2.9 NBPco shall provide a Minimum Bitstream Wholesale Product which is compatible with all security procedures a Service Provider wishes to run. Accordingly, controlling access to a set of port IDs, or Media Access Control Address addresses, is prohibited.
- 4.2.10 NBPco shall ensure that there is no discrimination between traffic from different Service Providers. For example, if the traffic is marked with the same priority and is subject to the same bandwidth agreements, then it shall be treated in the same way in NBPco's Network.
- 4.2.11 NBPco shall ensure that the Minimum Bitstream Wholesale Product allows the implementation of higher priority traffic control mechanisms.
- 4.2.12 NBPco shall design, maintain and implement its Minimum Bitstream Wholesale Product so that it easily allows the integration of higher priority traffic control mechanisms for the supply of Wholesale Products (as part of the supply of Additional Required Wholesale Products).
- 4.2.13 NBPco shall provide WCPEs which confirm that they are correctly powered and have appropriate connectivity to the Network by means of visual indication on the WCPE.
- 4.2.14 NBPco shall ensure that, when the technology is available and there is reasonable market demand (as agreed in the NBP Industry Council), the architecture and network design allows, the User Network Interface for a Bitstream Product to move from the LAN port of the WCPE back towards the physical termination of the Bitstream Product service at the End Users Premises. For example, at a particular time during the Contract Period, the WCPE and the Residential Gateway (RGW) may be combined into a single End User device owned by the End User or Service Provider. In such case, the termination of the Wholesale Product will be the physical termination of the medium at the End User's Premises.
- 4.2.15 NBPco shall offer a Connection Service to Service Providers to cater for bespoke Connection requirements from End Users and/or high cost Connection requirements (including Connections whose costs are in excess of

the Connection Cost Threshold). This service may be offered by NBPco to Service Providers by means of services provided by a Subcontractor (provided that the relevant contractual obligations shall at least apply as between NBPco and the Service Provider).

- 4.2.16 The Connection Service from NBPco shall be standardised for different types of surface (grass verge, tarmac, concrete, cobble or other surface types) and overhead infrastructure. It shall be priced on a per metre basis, where possible, and shall include any remedial and reinstatement works that are required.
- 4.2.17 As part of the Connection Service, NBPco shall identify and give examples of any likely Special Engineering Difficulties that could give rise to additional costs to End Users.
- 4.2.18 NBPco shall provide a minimum specification that the End User or their contractor shall follow if the End User takes responsibility for implementing the Infrastructure related to the Initial Connection.
- 4.2.19 As set out in Schedule 2.1 (Technical Solution Specification) and as part of its Minimum Required Wholesale Products, NBPco may also elect to provide an Alternative Bitstream Wholesale Product to some Premises provided that the number of such premises may not exceed the Alternative Technology Solution Threshold for Existing Premises or Alternative Technology Solution Threshold for New Premises (as applicable). As a Minimum Required Wholesale Product, the Alternative Bitstream Wholesale Product shall meet the minimum specifications defined in *Figure 4.1*.

Active Access Wholesale Products – Minimum Virtual Unbundled Access (VUA) Wholesale Product requirements

- 4.2.20 NBPco shall provide a Virtual Unbundled Access (VUA) Wholesale Product which meets or exceeds the minimum performance for all Product Key Performance Indicators set-out in *Figure 4.2*.

Figure 4.2: Minimum specifications for the Minimum Virtual Unbundled Access VUA Wholesale Product

Product Key Performance Indicator	Minimum Performance
Minimum Download Speed between WCPE and PoH	30 Mbit/s
Minimum Upload Speed between WCPE and PoH	6 Mbit/s
Maximum Latency (round trip) between the WCPE and PoH	50 ms
Maximum Jitter between the WCPE and the PoH	25 ms
Maximum Packet Loss between the WCPE and PoH	0.1%
Minimum service availability	99.95%

- 4.2.21 The Minimum Virtual Unbundled Access (VUA) Wholesale Product provided by NBPco shall, at a minimum, include an access component and NBPco shall not charge the Service Provider for any backhaul component the Service Provider acquires from NBPco as part of the Minimum Virtual Unbundled Access (VUA) Wholesale Product.
- 4.2.22 NBPco shall ensure that the Minimum Virtual Unbundled Access (VUA) Wholesale Product meets all requirements specified for the Minimum Bitstream Wholesale Product in Paragraph 4.2.2 (Wholesale Product Specifications) to Paragraph 4.2.15 (Wholesale Product Specifications) of this Schedule 2.2 (Reference Offer Requirements).
- 4.2.23 For each Minimum Required Wholesale Product provided as part of the Agreement, NBPco shall provide a Reference Offer, in accordance with the governance requirements set out in Paragraph 3.2 (Governance) of this Schedule 2.2 (Reference Offer Requirements).
- 4.2.24 If NBPco deploys an Alternative Bitstream Wholesale Product, it shall also offer a VUA equivalent which shall be a Minimum Virtual Unbundled Access (VUA) Wholesale Product that meets the specification. If deployed, it shall be considered a Minimum Required Wholesale Product and meet the minimum specifications defined in *Figure 4.2*.

Passive Access Wholesale Products – Pole Access Product requirements

- 4.2.25 NBPco shall provide a Pole Access Product, where NBPco's rights of access to the Assets forming part of the Network in the NBPco Solution enable such a Wholesale Product to be provided, in accordance with Paragraph 9 (Products Deployment – Requirements) of Schedule 2.3 (Deployment Requirements).
- 4.2.26 NBPco shall include in the Pole Access Product, as a minimum, access to all overhead infrastructure owned or controlled by NBPco, including but not limited to, access to all types of poles used by NBPco and associated ancillary products (including hosting of Service Providers' passive equipment such as cable coils, Joint Enclosures and passive splitters) to allow Service Providers to deploy their own infrastructure in NBPco's overhead infrastructure located in the Access Network.
- 4.2.27 Subject to the provisions of Paragraph 3.6 (Product Requirements, Evolution and Roadmap) and Figure 2.1 (Specifications for the Anchor Retail Product) of Schedule 2.1 (Technical Solution Specification), NBPco shall not restrict the services that the Service Provider can offer using the Pole Access Products or the part (or parts) of the Network where the Wholesale Product can be used.
- 4.2.28 NBPco shall publish, as part of its Reference Offer, transparent engineering rules to determine and allocate available space in its pole infrastructure. The validation of the feasibility of a Pole Access Product request shall be determined according to these rules.
- 4.2.29 NBPco shall design, maintain and implement its Poles Access Products in such a way that it makes efficient use of the space available in its infrastructure. In particular, NBPco shall design, maintain and implement its Pole Access Product engineering rules to support the efficient allocation of space in its poles so as to maximise the number of Service Providers who can access to the infrastructure.

- 4.2.30 NBPco shall ensure that space is fairly allocated, especially when more than one Service Provider is seeking to use shared infrastructure in a particular area. In this case, NBPco shall provide space on a first come first served basis, based on the timestamp of the infrastructure request of the Service Providers.
- 4.2.31 In the case where NBPco can demonstrate that the request from a Service Provider is not feasible (for example, due to lack of space in the infrastructure), NBPco shall offer alternative Wholesale Products, in the area where it is not feasible to satisfy a Pole Access Product request, to Service Providers. Such alternative Wholesale Products shall include Dark Fibre Product and Transmission Product. The Service Provider may choose at its discretion which Wholesale Product is to be provided to it by NBPco.
- 4.2.32 NBPco shall ensure that the allocation of available space to Service Providers in NBPco's pole infrastructure expires within three (3) months from the feasibility validation timestamp. That is, a Service Provider shall have three (3) months to deploy its cable(s) on the requested NBPco infrastructure before the order expires.
- 4.2.33 NBPco shall allow Service Providers to place fibre cable coils and Joint Enclosures on NBPco's poles, where space permits.

Passive Access Wholesale Products – Duct Access Product requirements

- 4.2.34 NBPco shall provide a Duct Access Product, where the Assets forming part of the Network in the NBPco Solution enable such a Wholesale Product to be provided, in a timely manner in accordance with Paragraph 9 (Products Deployment – Requirements) of Schedule 2.3 (Deployment Requirements).
- 4.2.35 NBPco shall include in the Duct Access Product access to all underground infrastructure owned or controlled by NBPco, including but not limited to access to ducts, sub-ducts, micro-ducts, chambers, manholes, handholes and associated ancillary products (including the deployment of Service Providers' passive equipment such as cable coils, Joint Enclosures and passive splitters in manholes/handholes) to allow Service Providers to deploy their own infrastructure in NBPco's underground infrastructure located in the Access Network.
- 4.2.36 Subject to the provisions of Paragraph 3.6 (Product Requirements, Evolution and Roadmap) and Figure 2.1 (Specifications for the Anchor Retail Product) of Schedule 2.1 (Technical Solution Specification), NBPco shall not restrict the services that the Service Provider can offer using the Duct Access Products or the part (or parts) of the Network where the Wholesale Product can be used.
- 4.2.37 NBPco shall publish transparent engineering rules to determine and allocate available space in its duct infrastructure. The validation of the feasibility of a Duct Access request shall be determined according to these rules. NBPco shall design, maintain and implement its Duct Access Product in such a way that it makes efficient use of the space available in its infrastructure. In particular, NBPco shall design, maintain and implement its Duct Access engineering rules to support the efficient allocation of space in its ducts as to maximise the amount of Service Providers who can get access to the infrastructure.

- 4.2.38 NBPco shall ensure that space is fairly allocated, especially when more than one Service Provider is seeking to use shared infrastructure in a particular area. In this case, NBPco shall provide space on a first come first serve basis, based on the timestamp of the infrastructure request by Service Provider.
- 4.2.39 Where NBPco can demonstrate that the request from a Service Provider is not feasible (for example, due to lack of space in the infrastructure), NBPco shall offer alternative Wholesale Products to Service Providers. Such alternative Wholesale Products shall include Dark Fibre Product and Transmission Product and the Service Provider may choose, at its discretion, which Wholesale Product is to be provided by NBPco.
- 4.2.40 NBPco shall ensure that the allocation of available space to Service Providers in NBPco's duct infrastructure expires within three (3) months from the feasibility validation timestamp. That is, a Service Provider shall have three (3) months to deploy its infrastructure in the requested NBPco's infrastructure before the order expires.

Passive Access Wholesale Products – Dark Fibre Product requirements

- 4.2.41 NBPco shall provide a Dark Fibre Product, where the Assets forming part of the Network in the NBPco Solution enable such a Wholesale Product to be provided, consisting of one or several fibres between two end points designated by NBPco as Passive PoH, and terminated by an Optical Distribution Frame (ODF) or an appropriate Joint Enclosure.
- 4.2.42 Subject to the provisions of Paragraph 3.6 (Product Requirements, Evolution and Roadmap) and Figure 2.1 (Specifications for the Anchor Retail Product) of Schedule 2.1 (Technical Solution Specification), NBPco shall not restrict the services that the Service Provider can offer using the Dark Fibre Products or the part (or parts) of the Network where the Wholesale Product can be used.
- 4.2.43 In providing the Dark Fibre Product, NBPco shall initially comply with ITU-T G652.D standards and shall ensure that it evolves throughout the Contract Period so that it complies with appropriate ITU-T (or relevant equivalent) fibre standards in force at a particular time during the Contract Period. For the avoidance of doubt, the application of the appropriate standard applies at the time of construction of the fibre infrastructure and does not extend to the requirement to undertake re-build or remediation of existing fibre infrastructure to meet any newly developed standard.
- 4.2.44 NBPco shall endeavour to ensure that the loss attributed to any splicing of the Dark Fibre Product shall be lower than 0.1dB for each splice along the route used by the Dark Fibre Product.
- 4.2.45 NBPco shall accommodate the provision of a Dark Fibre Product for at least three (3) Service Providers (that are not Associated Service Providers at the relevant time), in its Network, which shall be in addition to any dark fibre required by NBPco to provide its own products and services.

Passive Access Wholesale Products – Unbundled Fibre Access Product requirements

- 4.2.46 NBPco shall provide Unbundled Fibre Access Products, where the Assets forming part of the Network in the NBPco Solution enable such a Wholesale

Product to be provided, between the first point of active aggregation in the Network (for example, active PoH) and the End User's Premises.

- 4.2.47 Subject to the provisions of Paragraph 3.6 (Product Requirements, Evolution and Roadmap) and Figure 2.1 (Specifications for the Anchor Retail Product) of Schedule 2.1 (Technical Solution Specification), NBPco shall not restrict the services that the Service Provider can offer using the Unbundled Fibre Access Products or the part (or parts) of the Network where the Wholesale Product can be used.
- 4.2.48 Depending on the architecture of the Access Network, NBPco shall provide one of two products:
- (A) If NBPco uses a Point-to-Point architecture in its access network, the Unbundled Fibre Access Product shall be equivalent to providing a Dark Fibre Product between the PoH and the End User Premises (as further described in the Dark Fibre Product specifications in the subsection on Passive Access Wholesale Products – Dark Fibre Product requirements in Paragraphs 4.2.41 – 4.2.45 (Wholesale Product Specifications) above.
 - (B) If NBPco uses a Point-to-Multipoint architecture such as the Gigabit Passive Optical Network (GPON), the Unbundled Fibre Access Product shall be equivalent to providing an active service at the lowest layer of the OSI model.

Passive Access Wholesale Products – Radio Tower and Mast Access Product requirements

- 4.2.49 NBPco shall provide a Radio Tower and Mast Access Product, where the Assets forming part of the Network in the NBPco Solution enable such a Wholesale Product to be provided, to allow Service Providers to deploy their own radio equipment (for example, antennas, feeders, access points, microwave equipment) on NBPco's mast infrastructure.
- 4.2.50 Subject to the provisions of Paragraph 3.6 (Product Requirements, Evolution and Roadmap) and Figure 2.1 (Specifications for the Anchor Retail Product) of Schedule 2.1 (Technical Solution Specification), NBPco shall not restrict the services that the Service Provider can offer using the Radio Tower and Mast Access Products or the part (or parts) of the Network where the Wholesale Product can be used.
- 4.2.51 NBPco shall provide Service Providers with a minimum vertical space of three (3) meters on the mast.
- 4.2.52 NBPco shall ensure that Radio Tower and Mast Access sites are equipped with secure entry systems, allowing only authorised personnel to access the site.
- 4.2.53 NBPco shall ensure that any existing site can accommodate at least equipment for one (1) additional Service Provider, in addition to NBPco.
- 4.2.54 If there is insufficient space on a mast to accommodate an access request from a Service Provider, NBPco shall, as an alternative, provide an Active Wholesale Product to the Service Provider.

- 4.2.55 NBPco shall ensure that any new mast constructed in the course of delivering the Network is engineered to support at least three (3) Service Providers (that are not Associated Service Providers) at the relevant time, in addition to NBPco space requirements to deliver its Wholesale Products.
- 4.2.56 NBPco shall provide suitable ground space at mast sites to ensure that Service Providers can co-locate their outdoor equipment at the site.
- 4.2.57 NBPco shall provide a cabin Co-Location Product at mast sites to ensure that Service Providers can host their indoor equipment at the site. NBPco shall ensure that the cabin Co-Location Product complies with the specifications provided in Paragraph 4.2.73 to Paragraph 4.2.81 (Wholesale Product Specifications) (Passive Backhaul Wholesale Products – Building and Cabin Co-Location Product requirements).
- 4.2.58 NBPco shall, subject to approval from the applicable planning authorities, ensure that any new mast constructed in the course of delivering the Network is future proof so that it can be extended to increase the number of Service Providers that can be accommodated at future points during the Contract Period.

Active Backhaul Wholesale Products – Transmission Product requirements

- 4.2.59 NBPco shall provide Transmission Products between the Service Provider's agreed PoP and NBPco's PoH.
- 4.2.60 Subject to the provisions of Paragraph 3.6 (Product Requirements, Evolution and Roadmap) and Figure 2.1 (Specifications for the Anchor Retail Product) of Schedule 2.1 (Technical Solution Specification), NBPco shall not restrict the services that the Service Provider can offer using the Transmission Products or the part (or parts) of the Network where the Wholesale Product can be used.
- 4.2.61 NBPco shall install its cable and terminating equipment at the Service Provider's PoP physical location agreed by the Parties.
- 4.2.62 NBPco shall offer Transmission Products which are symmetrical, point-to-point, based on Ethernet technology and with a guaranteed Committed Information Rate (CIR).
- 4.2.63 NBPco shall provide Transmission Products with various capacities with an incremental range of capacity. Without limiting Paragraphs 4.2.65 and 4.2.66 (Wholesale Product Specifications), by way of example, NBPco may provide Transmission Products with a range of capacities as follows: 30 Mbit/s, 50 Mbit/s, 100 Mbit/s, 300 Mbit/s, 500 Mbit/s, 1 Gbit/s) in order to meet this requirement.
- 4.2.64 Not used
- 4.2.65 NBPco shall ensure that, throughout the Contract Period, the maximum aggregate utilisation shall be less than 80% of the capacity of the link between the Service Provider's agreed PoP and NBPco's PoH.

Active Backhaul Wholesale Products – InterConnect Product requirements

- 4.2.66 NBPco shall provide three types of InterConnect Products to enable a Service Provider's network to connect to NBPco's Network (see Appendix 1 (InterConnect Reference Models) for illustration), namely:
- (A) Third-Party Premises InterConnect Product;
 - (B) In-building InterConnect Product; and
 - (C) In-span InterConnect Product.
- 4.2.67 NBPco shall provide a Third-Party Premises InterConnect Product, which shall extend the active PoH to the Service Provider by placing network termination equipment in an agreed Service Provider PoP and providing physical connectivity between the PoH and the agreed Service Provider PoP on the PoH.
- 4.2.68 NBPco shall provide an In-building InterConnect Product to allow the Service Provider to InterConnect to NBPco's Network within the PoH location, via an electrical or an optical interface. In this case, Service Providers will also be required to procure Co-Location Products to locate their equipment at NBPco's PoH.
- 4.2.69 NBPco shall provide an In-span InterConnect Product to allow a Service Provider to connect its fibre to the active PoH, which will usually be accomplished through a manhole/ODF configuration that is located between the Service Provider's agreed PoP location and NBPco's PoH. It shall also be possible for the Service Provider to connect their fibre directly at NBPco's active PoH through an ODF or an appropriate Joint Enclosure.
- 4.2.70 In active PoH locations where the Minimum Bitstream Wholesale Product is offered to RSPs, NBPco shall offer both un-protected InterConnect Products and protected InterConnect Products to connect to the Service Provider PoP site. For protected InterConnect Products, NBPco shall provide route disjoint paths over diversely routed cables between the two Demarcation Points of the InterConnect Product.
- 4.2.71 [Not used]

Passive Backhaul Wholesale Products – Pole Access, Duct Access, Dark Fibre Product and Radio Tower and Mast Access Product requirements

- 4.2.72 NBPco shall meet or exceed all of the requirements and specifications for Pole and Duct Access and Dark Fibre Products set out or referred to in Paragraphs 4.2.25 through to 4.2.48 (Wholesale Product Specifications) and for Radio Tower and Mast Access Product in Paragraph 4.2.49 through to Paragraphs 4.2.58 (Wholesale Product Specifications) when provided in the Backhaul Network.

Passive Backhaul Wholesale Products – Building and Cabin Co-Location Product requirements

- 4.2.73 At each designated PoH for specific Wholesale Products, NBPco shall provide Co-Location Products in order to allow Service Providers to co-locate their own equipment to connect to the specified Wholesale Product available at that PoH.
- 4.2.74 Subject to the provisions of Paragraph 3.6 (Product Requirements, Evolution and Roadmap) and Figure 2.1 (Specifications for the Anchor Retail Product) of Schedule 2.1 (Technical Solution Specification), NBPco shall not restrict the services that a Service Provider can offer using the Building and Cabin Co-Location Products or the part (or parts) of the Network where the Wholesale Product can be used.
- 4.2.75 In active PoHs, NBPco shall provide Co-Location space, for at least three (3) Service Providers (that are not Associated Service Providers at the relevant time), which shall include physical space in the form of dedicated room in a building, shared room in a building, dedicated cabin or shared room in a cabin or shared space in a cabinet. Where space permits, for example in large buildings or cabins, NBPco shall provide the option to have different physical rooms to co-locate different Service Providers and to have a shared room with adequate physical and secure separation (for example, cages). Alternatively, when space is not readily available, NBPco shall provide Co-Location services to different Service Providers in a shared room but with adequate physical and secure separation (for example, cages).
- 4.2.76 In the event that a Service Provider wishes to purchase AC power from NBPco, NBPco shall provide 230 V AC power in all Co-Location spaces.
- 4.2.77 In the designated Active PoHs, if required by the Service Provider, NBPco shall provide 48V DC power in its Co-Location spaces. However, NBPco shall also provide the Service Provider with the option to install the Service Provider's own DC power.
- 4.2.78 In the designated Active PoHs, NBPco shall provide suitable cable-management systems in the Co-Location space to enable Service Providers to route and manage their cables efficiently and minimise potential cable damage.
- 4.2.79 NBPco shall equip its Active PoH sites with secure entry systems to ensure that all visits by Service Providers are logged and recorded on an appropriate system and such records shall be provided to the Minister, if requested.
- 4.2.80 In the designated Active PoHs, NBPco shall provide appropriate air conditioning / ventilation systems as follows:
- (A) in a shared room/cabin, where an air conditioning / ventilation system is already present, NBPco shall assess the appropriateness of the existing air conditioning / ventilation system and determine if the air conditioning / ventilation system needs to be augmented. Any cost associated with the augmentation of the air-conditioning / ventilation system due to a Service Provider's request shall be charged to the Service Provider; and.
 - (B) in a dedicated Co-Location space (for example, room or cabin) with no existing air conditioning / ventilation systems, NBPco shall provide

Service Providers with the option to either provide the air-conditioning / ventilation system or to let Service Providers install their own air-conditioning / ventilation system.

4.2.81 Access to Building and Cabin Co-Location Products shall be granted by NBPCo 24 hours a day, 7 days a week and 365 days a year for both the installation of Service Providers equipment in the Co-Location space and the maintenance of the deployed equipment by Service Providers. Access shall be facilitated through appropriate security entry systems to allow authorised Service Providers access these sites.

4.3 Additional Required Wholesale Products Requirements

4.3.1 For the duration of the Contract Period, NBPCo shall provide Additional Required Wholesale Products on an EoI basis, throughout the Intervention Area in accordance with the requirements set out in Paragraph 3.3 (Product Requirements, Evolution and Roadmap of Schedule 2.1 (Technical Solution Specification)).

4.3.2 NBPCo shall provide a common UWG to allow Service Providers to manage the lifecycle of all Additional Required Wholesale Products provided under this Agreement.

4.3.3 In supplying Active Access Wholesale Products as part of its Additional Required Wholesale Products portfolio, NBPCo shall meet or exceed all of the Wholesale Product specifications specified for the Minimum Bitstream Wholesale Product provided in Paragraph 4.2 (Minimum Required Wholesale Product Requirements).

4.3.4 NBPCo shall ensure that Active Access Wholesale Products in the Additional Required Wholesale Products category shall meet or exceed all Product Key Performance Indicators set out in *Figure 4.3*.

Figure 4.3: Minimum specifications for Active Access Wholesale Products in the Additional Required Wholesale Products category

Product Key Performance Indicator	Minimum Performance
Minimum Download Speed between WCPE and PoH	30 Mbit/s
Minimum Upload Speed between WCPE and PoH	6 Mbit/s
Maximum utilisation of backhaul link between WCPE and the PoH	80%
Maximum Latency (round trip) between the WCPE and PoH	50 ms
Maximum Jitter between the WCPE and the PoH	25 ms
Maximum Packet Loss between the WCPE and PoH	0.1%

Product Key Performance Indicator	Minimum Performance
Minimum service availability	99.95%

4.3.5 For each Additional Required Wholesale Product provided as part of the Agreement, NBPco shall provide a Reference Offer, in accordance with the governance requirements set out in Paragraph 3.1 (Governance).

4.4 Other Permitted Wholesale Products Requirements (if applicable)

4.4.1 Throughout the Contract Period, NBPco shall provide Other Permitted Wholesale Products in accordance with the requirements set out in Paragraph 3.4 (Product Requirements, Evolution and Roadmap) of Schedule 2.1 (Technical Solution Specification).

4.4.2 NBPco shall provide a common UWG to allow Service Providers to manage the lifecycle of all Other Permitted Wholesale Products provided as part of this Agreement.

4.4.3 In supplying Active Access Wholesale Products as part of its Other Permitted Wholesale Products portfolio, NBPco shall meet or exceed all of the Wholesale Product specifications specified for the Minimum Bitstream Wholesale Product in Paragraph 4.2 (Minimum Required Wholesale Product Requirements)

4.4.4 NBPco shall ensure that Active Access Wholesale Products in the Other Permitted Wholesale Products category shall, in particular, meet or exceed all Wholesale Product Key Performance Indicators set out in *Figure 4.4*. For the avoidance of doubt, wholesale voice products do not need to meet the minimum specifications set out in *Figure 4.4*.

Figure 4.4: Minimum specifications for Active Access Wholesale Products in the Other Permitted Wholesale Products category

Product Key Performance Indicator	Minimum performance
Minimum download speed between WCPE and PoH	30 Mbit/s
Minimum upload speed between WCPE and PoH	6 Mbit/s
Maximum utilisation of backhaul link between WCPE and the PoH	80%
Maximum Latency (round trip) between the WCPE and PoH	50 ms
Maximum Jitter between the WCPE and the PoH	25 ms
Maximum Packet Loss between the WCPE and PoH	0.1%
Minimum service availability	99.95%

- 4.4.5 For each Other Permitted Wholesale Product provided as part of the Agreement, NBPco shall provide a Reference Offer, in accordance with the governance requirements set out in Paragraph 3.2 (Governance) of this Schedule 2.2 (Reference Offer Requirements).

5 OPERATIONAL PERFORMANCE

5.1 Background

- 5.1.1 In order to ensure each Wholesale Product is offered on an EoI basis, NBPco shall clearly describe in its Reference Offers the operational processes required for the Service Provider to manage the lifecycle of the Wholesale Products from pre-service availability check to ordering, service provisioning, operational support, migration of services, test validation and cessation of services.
- 5.1.2 NBPco shall also clearly describe in its Reference Offers Operational Key Performance Indicators and Product Key Performance Indicators and associated minimum product performance levels that NBPco will commit to as part of providing each Wholesale Product, and which NBPco shall improve throughout the Contract Period.
- 5.1.3 The provisions of this Paragraph 5 (Operational Performance) define operational processes and Operational Product Key Performance Indicators required under this Agreement for the different Wholesale Products which will form NBPco's wholesale product portfolio and which comprise:
- (A) Minimum Required Wholesale Products;
 - (B) Additional Required Wholesale Products; and
 - (C) Other Permitted Wholesale Products (if applicable).

5.2 Minimum Required Wholesale Products - Operational Performance Requirements

Minimum Bitstream Wholesale Product - Operational Performance requirements

- 5.2.1 NBPco shall provide adequate processes to enable Service Providers to manage the lifecycle of Bitstream Products, in accordance with the specification of the Operational Environment described in Paragraph 4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification).
- 5.2.2 NBPco shall ensure that all processes associated with the management of the Minimum Bitstream Wholesale Product lifecycle (for example, ordering, service provisioning, operational support, migration of services, cessation of service, test validation and billing) are fully integrated into the Operational Environment systems.
- 5.2.3 NBPco shall ensure that any excluded measurements (that is, measurement taken at a particular time not accounted for in the performance of the

Wholesale Product) of appropriate operational parameters is adequately documented in the Reference Offer.

- 5.2.4 NBPco shall ensure that it meets or exceeds the minimum performance for all Operational Key Performance Indicators associated with the Support Desk function specified in Appendix 1 (Performance Level Requirements of Schedule 2.4 (Operational Performance)) when providing the Minimum Bitstream Wholesale Product.
- 5.2.5 NBPco shall ensure that the completion of service installation and provisioning meets or exceeds the minimum performance specification set out in Schedule 2.4 (Operational Performance).
- 5.2.6 NBPco shall ensure that service provisioning orders are delivered within the agreed appointment date and time in accordance with the appointment requirements specified in Appendix 1 (Performance Level Requirements) of Schedule 2.4 (Operational Performance).
- 5.2.7 Where there is an existing Connection and where an End User wants to migrate from an existing RSP to a new RSP for its broadband services, NBPco shall ensure that it meets or exceeds the minimum performance specifications indicated in Schedule 2.4 (Operational Performance).
- 5.2.8 NBPco shall ensure that the resolution time for faults affecting single residential Premises (that is, faults occurring on the Access Network or at the End User Premises) is compliant with the KPI minimum performance specifications provided in Schedule 2.4 (Operational Performance).
- 5.2.9 For all faults, NBPco shall populate its Fault Management System and Trouble Ticketing Systems with the appropriate fault codes, fault cause codes and fault resolution codes as specified in Paragraph 4.4.14 (OSS/BSS Requirements) of Schedule 2.1 (Technical Solution Specification) and NBPco shall make these codes available to Service Providers and the Minister through the UWG as specified in Paragraph 4.4.49 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification).
- 5.2.10 NBPco shall ensure that it meets or exceeds the minimum performance for all Operational Key Performance Indicators associated with End User Fault Repair Time, specified in Appendix 1 (Performance Level Requirements) of Schedule 2.4 (Operational Performance), when providing the Minimum Bitstream Wholesale Product.
- 5.2.11 NBPco shall ensure that billing enquiries for the Minimum Bitstream Wholesale Product meets or exceeds the Performance Levels defined in Appendix 1 (Performance Level Requirements) of Schedule 2.4 (Operational Performance).

Minimum Virtual Unbundled Access (VUA) Wholesale Product – Operational Performance Requirements

- 5.2.12 In providing the Minimum Virtual Unbundled Access (VUA) Wholesale Product, NBPco shall meet or exceed all of the operational Performance Levels associated with the Minimum Bitstream Wholesale Product as set out or referred to in Paragraphs 5.2.1 to 5.2.11 (Minimum Required Wholesale Products - Operational Performance Requirements) above.

Duct Access Product - Operational Performance requirements

- 5.2.13 NBPco shall ensure that the management of Duct Access Product lifecycle (from pre-service availability check to ordering, service provisioning, operational support, migration of services, test validation and cessation of service and billing) is performed through the UWG and is fully integrated in its Operational Environment, in the same way as any Wholesale Products offered by NBPco.
- 5.2.14 NBPco shall provide robust and consistent processes to enable Service Providers to manage the lifecycle of Duct Access Products. In particular, NBPco shall define at least the following processes:
- (A) order management;
 - (B) provision of Network Infrastructure Maps (as specified in Paragraph 4.4 (OSS/BSS Requirements) of Schedule 2.1 (Technical Solution Specification) identifying where underground infrastructure is available;
 - (C) publication of transparent engineering rules to determine space availability and space assignment;
 - (D) validation of the feasibility of the request;
 - (E) deployment of RSP infrastructure in shared infrastructure by the Service Provider;
 - (F) update of infrastructure plans;
 - (G) maintenance of infrastructure and fault resolution;
 - (H) Wholesale Product migration/cessation; and
 - (I) billing.
- 5.2.15 NBPco shall fully digitise its Network infrastructure in accordance with the Network Infrastructure Map requirements set out in Paragraph 4.4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification). This is to ensure that Service Providers can view the dark fibre infrastructure which is available in the different Deployment Areas, prior to placing an order.
- 5.2.16 NBPco shall meet or exceed all of the Operational Key Performance Indicators set out or referred to in Appendix 1 (Performance Level Requirements) of Schedule 2.4 (Operational Performance) when providing Duct Access Products.

Pole Access Product - Operational Performance requirements

- 5.2.17 NBPco shall provide the same operational performance and characteristics for its Pole Access Product as for its Duct Access Product specified in Paragraph 5.2.13 to 5.2.15 (Minimum Required Wholesale Products - Operational Performance Requirements).

- 5.2.18 NBPco shall meet or exceed all of the Operational Key Performance Indicators set out or referred to in Schedule 2.4 (Operational Performance) when providing Pole Access Products.

Unbundled Fibre Access Product - Operational Performance requirements

- 5.2.19 NBPco shall ensure that the management of the Unbundled Fibre Access Product lifecycle (from pre-service availability check to ordering, service provisioning, operational support, migration of services, test validation and cessation of service and billing) is performed through the UWG and is fully integrated in its Operational Environment, in the same way as any offered Wholesale Products by NBPco.
- 5.2.20 The nature of the Unbundled Fibre Access Product will depend on the technology and architecture used by NBPco. This means that:
- (A) if NBPco uses Point-to-Point architecture, the operational requirements associated with the Unbundled Fibre Access Product will be identical to the operational requirements associated with a Dark Fibre Product; or
 - (B) if NBPco uses a Point-to-Multipoint architecture (for example, GPON architecture), that uses TWDM PON technology, the operational requirements associated with the Unbundled Fibre Access Product will be equivalent to the operational requirements associated with the Active Access Wholesale Products.
- 5.2.21 NBPco shall provide adequate processes to enable Service Providers to manage the lifecycle of Unbundled Fibre Access Products. In particular, NBPco shall define, maintain and implement the following processes:
- (A) order management;
 - (B) provisioning of Network Infrastructure Maps (as specified in Paragraph 4.4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification)) identifying where Unbundled Fibre Access Product is available;
 - (C) validation of the feasibility of the request;
 - (D) provisioning of Unbundled Fibre Access Product;
 - (E) update of infrastructure plans;
 - (F) maintenance of Unbundled Fibre Access Products and fault resolution;
 - (G) Wholesale Product migration/cessation; and
 - (H) billing.
- 5.2.22 Without limiting or affecting any other provision of this Schedule in respect of Unbundled Fibre Access Products, this Paragraph does not include a detailed specification of operational parameters and associated minimum performance in respect of Unbundled Fibre Access Products in recognition that such

products are, as at the Commencement Date, immature. The operational parameters and associated minimum performance will be agreed by the NBP Industry Council and shall be implemented by means of the Change Control Procedure provided, however, that NBPco shall not be entitled to any increase in Subsidy Payments as a result of the setting of such operational parameters and associated minimum performance requirements.

Dark Fibre Product - Operational Performance requirements

- 5.2.23 NBPco shall ensure that the management of the Dark Fibre Product lifecycle (pre-service availability check to ordering, service provisioning, operational support, migration of services and cessation of service, test validation and billing) is performed through the UWG and is fully integrated into NBPco's Operational Environment.
- 5.2.24 NBPco shall provide robust and consistent processes to enable Service Providers to manage the lifecycle of Dark Fibre Products. In particular, NBPco shall at least define, maintain and implement the following processes:
- (A) order management;
 - (B) provisioning of Network Infrastructure Maps (as specified in Paragraph 4.4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification)) identifying where the Dark Fibre Product is available;
 - (C) validation of the feasibility of the request;
 - (D) provisioning of Dark Fibre Product;
 - (E) update of infrastructure plans;
 - (F) maintenance of Dark Fibre Products and fault resolution;
 - (G) Wholesale Product migration/cessation; and
 - (H) Billing.
- 5.2.25 NBPco shall meet or exceed all of the Operational Key Performance Indicators set out or referred to in Schedule 2.4 (Operational Performance) when providing Dark Fibre Products.

Radio Tower and Mast Access Product - Operational Performance requirements

- 5.2.26 All processes associated with the management of Radio Tower and Mast Access Product lifecycle (pre-service availability check to ordering, service provisioning, operational support, migration of services, test validation and cessation of service and billing) shall be fully integrated in the Operational Environment specified in Paragraph 4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification).
- 5.2.27 NBPco shall provide robust and consistent processes to enable Service Providers to manage the lifecycle of Radio Tower and Mast Access Products.

In particular, NBPco shall at least define, maintain and implement the following processes:

- (A) order management;
- (B) validation of the feasibility of the request;
- (C) equipment installation;
- (D) site access;
- (E) site maintenance;
- (F) Wholesale Product migration/cessation; and
- (G) billing.

5.2.28 NBPco shall meet or exceed all of the Operational Key Performance Indicators set out or referred to in Schedule 2.4 (Operational Performance) when providing Radio Tower and Mast Access Products.

InterConnect - Operational Performance requirements

5.2.29 All processes associated with the management of InterConnect Product lifecycle (pre-service availability check to ordering, service provisioning, operational support, migration of services and cessation of service, test validation and billing) shall be fully integrated in the Operational Environment specified in Paragraph 4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification).

5.2.30 NBPco shall provide robust and consistent processes to enable Service Providers to manage the lifecycle of InterConnect Products. In particular, NBPco shall at least define, maintain and implement the following processes:

- (A) order management;
- (B) validation of the feasibility of the request;
- (C) service provisioning;
- (D) capacity upgrade;
- (E) Wholesale Product maintenance;
- (F) Wholesale Product migration/cessation; and
- (G) billing.

5.2.31 NBPco shall implement robust and consistent processes to enable Service Providers to manage the lifecycle of the InterConnect Products including the feasibility validation process.

5.2.32 NBPco shall meet or exceed all of the Operational Key Performance Indicators set out or referred to in Schedule 2.4 (Operational Performance) when providing InterConnect Products.

Transmission Product - Operational Performance requirements

- 5.2.33 All processes associated with the management of Transmission Product lifecycle (from ordering, service provisioning, operational support, migration of services and cessation of service, test validation and billing) shall be fully integrated by NBPco in the Operational Environment specified in Paragraph 4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification).
- 5.2.34 NBPco shall provide robust and consistent processes to enable Service Providers to manage the lifecycle of Transmission Products. In particular, NBPco shall define, maintain and implement at least the following processes:
- (A) order management;
 - (B) validation of the feasibility of the request;
 - (C) service provisioning;
 - (D) capacity upgrade;
 - (E) Wholesale Product maintenance;
 - (F) Wholesale Product migration/cessation; and
 - (G) billing.
- 5.2.35 NBPco shall meet or exceed all of the Operational Key Performance Indicators set out or referred to in Schedule 2.4 (Operational Performance) when providing Transmission Products.

Building and Cabin Co-Location Product - Operational Performance requirements

- 5.2.36 All processes associated with the management of Building and Cabin Co-Location Product lifecycle (pre-service availability check to ordering, service provisioning, operational support, migration of services and cessation of service, test validation and billing) shall be fully integrated by NBPco in the Operational Environment specified in Paragraph 4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification).
- 5.2.37 NBPco shall provide robust and consistent processes to enable Service Providers to manage the lifecycle of Building and Cabin Co-Location Products. In particular, NBPco shall define, maintain and implement at least the following processes:
- (A) order management;
 - (B) service provisioning;
 - (C) equipment notification;
 - (D) site access for Service Providers;
 - (E) Wholesale Product maintenance;

- (F) Wholesale Product migration/cessation; and
- (G) billing.

5.2.38 NBPco shall implement robust and consistent processes to enable Service Providers to manage the lifecycle of the Building and Cabin Co-Location Products. For example, NBPco shall, for the feasibility validation process, provision the necessary data in the Operational Environment systems such as:

- (A) physical PoH infrastructure (e.g. building, cabin, cabinet, other);
- (B) type of Co-Location space available (e.g. dedicated room, shared room, other);
- (C) portfolio of Wholesale Products which can be provided at the PoH site;
- (D) availability of raised floors;
- (E) maximum rack space per Service Provider;
- (F) maximum alternating current (AC) power availability;
- (G) availability of direct current (DC) power and maximum DC power availability (if applicable);
- (H) availability of power backup services (for example, uninterruptable power supply (UPS));
- (I) site access security details (escort requirements, digital access systems requirements);
- (J) maximum authorised floor loading per rack footprint;
- (K) maximum allowed heat dissipation per rack; and
- (L) any details which will assist the Service Provider in understanding the nature and type of Co-Location services available in the PoH location of interest.

5.2.39 NBPco shall meet or exceed all of the Operational Key Performance Indicators set out or referred to in Schedule 2.4 (Operational Performance) when providing Building and Cabin Co-Location Products.

5.3 Additional Required Wholesale Products

5.3.1 If any Additional Required Wholesale Products are introduced during the Contract Period, the Operational Key Performance Indicators and associated minimum performance for these Additional Required Wholesale Products will be set out in the Change Authorisation executed in accordance with the Change Control Procedure.

5.3.2 All processes associated with the management of Additional Required Wholesale Product lifecycle (pre-service availability check to ordering, service provisioning, operational support, migration of services, test validation and cessation of service and billing) shall be fully integrated in the Operational

Environment specified in Paragraph 4 (Operational Environment Requirements) of Schedule 2.1 (Technical Solution Specification).

5.3.3 NBPco shall provide robust and consistent processes to enable Service Providers to manage the lifecycle of Additional Required Wholesale Products. In particular, NBPco shall at least define, maintain and implement the following processes:

- (A) order management;
- (B) validation of the feasibility of the request;
- (C) service provisioning;
- (D) Wholesale Product maintenance;
- (E) Wholesale Product migration/cessation; and
- (F) billing.

5.3.4 NBPco shall automate the processes described above and minimise the need for human intervention.

5.4 Other Permitted Wholesale Products

5.4.1 As it is not possible for the Minister to predict the exact nature of Other Permitted Wholesale Products, the Operational Key Performance Indicators and associated minimum performance specifications for Other Permitted Wholesale Products are not included in this Agreement as at the Commencement Date. The Operational Key Performance Indicators and associated minimum performance specifications for Other Permitted Wholesale Products shall be set out in the relevant Change Authorisation executed in accordance with the Change Control Procedure in respect of any Other Permitted Wholesale Products introduced during the Contract Period.

5.4.2 All processes associated with the management of Other Permitted Wholesale Product lifecycle (pre-service availability check to ordering, service provisioning, operational support, migration of services, test validation, cessation of service and billing) shall be fully integrated by NBPco in the Operational Environment specified in Paragraph 5 (Network Requirements for Wholesale Products) of Schedule 2.1 (Technical Solution Specification).

5.4.3 NBPco shall provide adequate processes to enable Service Providers to manage the lifecycle of Other Permitted Wholesale Products. In particular, NBPco shall at least define, maintain and implement the following processes:

- (A) order management;
- (B) validation of the feasibility of the request;
- (C) service provisioning;
- (D) Wholesale Product maintenance;
- (E) Wholesale Product migration/cessation; and

(F) billing.

6 PRICING

6.1 NBPco shall refer to and comply with all of the obligations set out in Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules) for implementing its pricing structure for all Wholesale Products and associated services to be provided under this Agreement.

7 STANDARD TERMS AND CONDITIONS

7.1 NBPco shall ensure that the Service Provider Terms are:

7.1.1 fair and balanced and do not impose undue or disproportionate requirements on small or medium sized Service Providers having regard to the scale of usage of the Wholesale Products;

7.1.2 appropriate to each Wholesale Product; and

7.1.3 not inconsistent with, and do not prevent or hinder the achievement of, the objectives of the Project set out in the Broadband Strategy for Ireland Report dated 15 July 2015 and as updated on 22 December 2015 and as may be updated from time to time.

7.2 The Service Provider Terms (or Reference Offer as applicable) shall include:

7.2.1 all provisions required by this Agreement, or required so that NBPco can comply with:

(A) any of its obligations under this Agreement, including but not limited to:

- (1) reporting,
- (2) auditing,
- (3) monitoring;
- (4) the provision of information and grant of audit, access, step-in and monitoring rights to the Minister;
- (5) its obligations on termination of this Agreement;
- (6) the requirement for NBPco to suspend or cease the provision of any Wholesale Products to any Service Provider and to terminate any agreement with a Service Provider where required to do so pursuant to this Agreement including the Wholesale Pricing Rules and/or Retail Pricing Rules and/or Part 4 (Review and Compliance) of Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules); and

(B) its obligations under Law,

7.2.2 provisions with respect to novation of the Agreement which are sufficient to enable novation of the Agreement to the Minister or a replacement supplier upon notification by or on behalf of the Minister, consistent with the provisions of Part 5 (Change in Ownership and Asset Transfer) of Schedule 6.9 (Consequences of Termination).

7.3 NBPco shall ensure that:

7.3.1 any restrictions on the use of the Wholesale Products (to the extent not prohibited or restricted under this Schedule); and

7.3.2 any conditions for rights of use or application for use of the Wholesale Products,

in the Service Provider Terms are proportionate and justifiable and, in particular, do not create undue or disproportionate obstacles to business for Service Providers, including small, medium and/or large Service Providers.

7.4 Without limiting or affecting Clause 19.5 (Wholesale Products), prior to amending the Service Provider Terms, NBPco shall consult with, and consider any feedback from, the NBP Industry Council.

APPENDIX 1 (INTERCONNECT REFERENCE MODELS)

1 INTRODUCTION

- 1.1 The InterConnect Product enables Service Providers to aggregate their traffic together for handover at specific PoH locations. Service Providers can use the InterConnect product to handover Active Access Wholesale Products.
- 1.2 There are three variants of the Interconnect offering:
 - 1.2.1 Third Party Premises InterConnect Product;
 - 1.2.2 In-span InterConnect Product; and
 - 1.2.3 In-building InterConnect Product.

2 THIRD PARTY PREMISES INTERCONNECT PRODUCT

- 2.1 The physical access is delivered on a single mode fibre from NBPco's Co-Location point to the Service Provider's PoH located at a third party premises. The following diagram shows the fibre connected from the aggregation node in the co-location to the 3rd party premises.

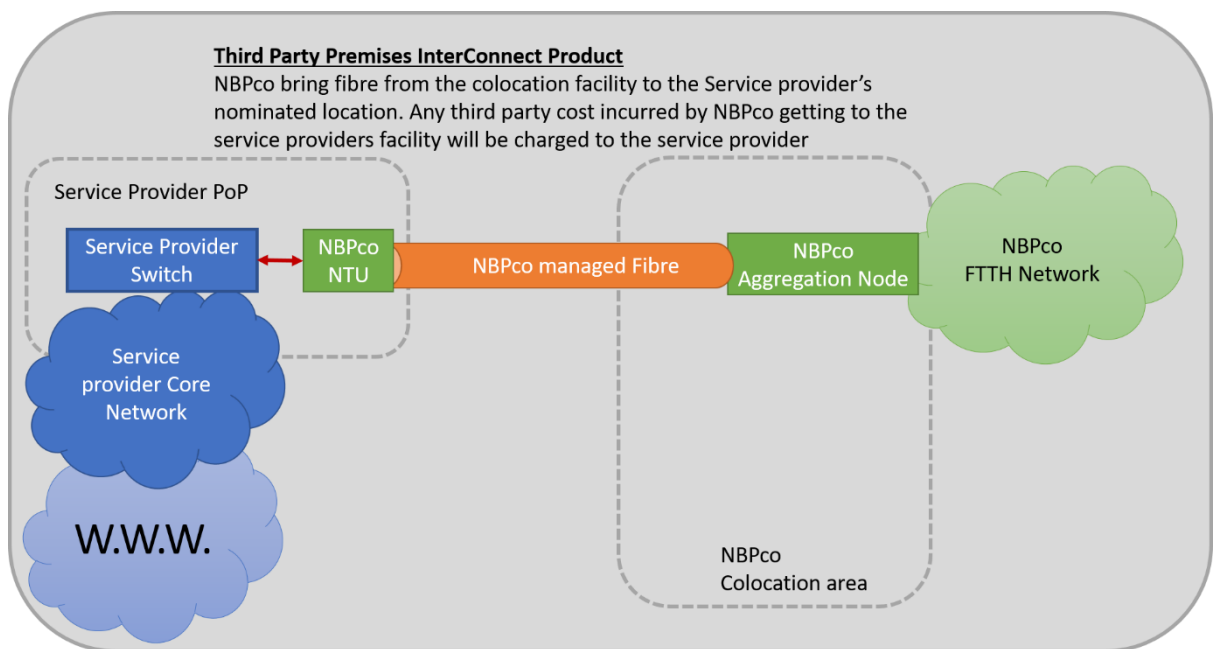


Fig 1. Third Party Premises InterConnect Product

3 IN-SPAN INTERCONNECT PRODUCT

- 3.1 The In-span InterConnect Product enables the Service Provider to Interconnect with NBPco in a nominated NBPco chamber which must be less than 100m from the Co-Location site or PoP.
- 3.2 Below is a more detailed view of the chamber set-up proposed outside the cabin / Co-Location site.

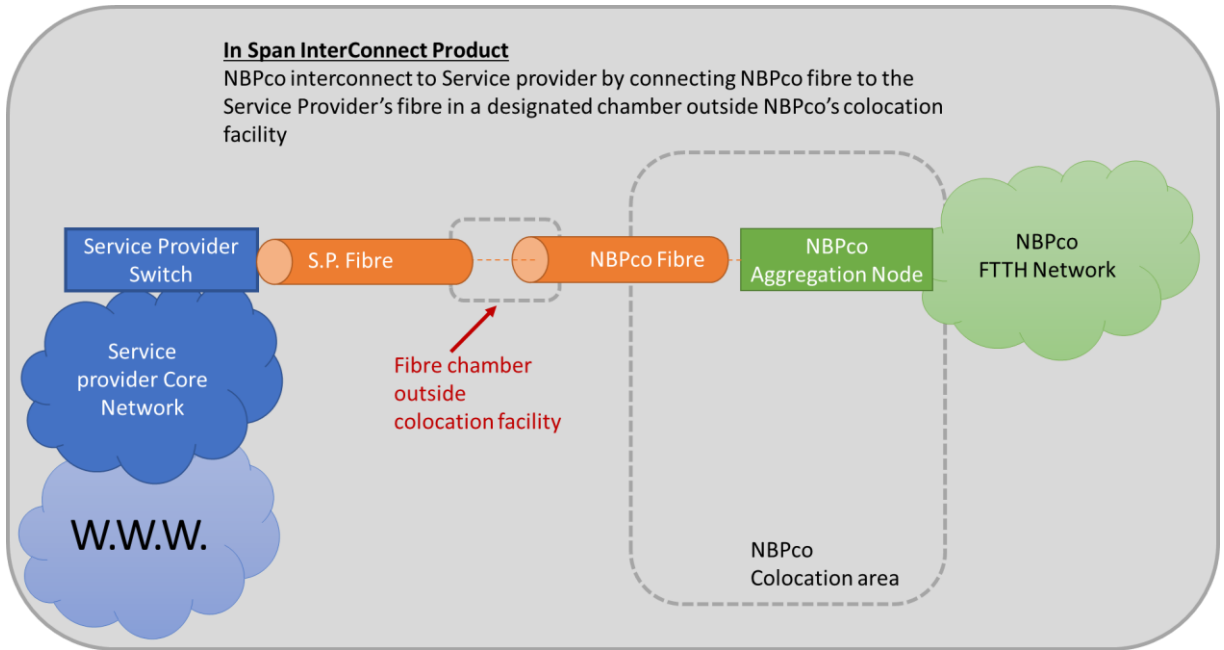


Fig 2. In-span InterConnect Product

4 IN-BUILDING INTERCONNECT PRODUCT

- 4.1 In-building InterConnect Product enables the Service Provider to interconnect with NBPco “across the floor” within the Co-Location site. The Service Provider must first have ordered and completed a Co-Location product and have the relevant rack space identified and all terminal equipment in place.
- 4.2 A fibre cable is installed between the Service Provider rack footprint in the Co-location PoH and the aggregation node. NBPco will install a patch panel at the Service Provider rack which acts as the demarcation point for the In-building InterConnect Product service.

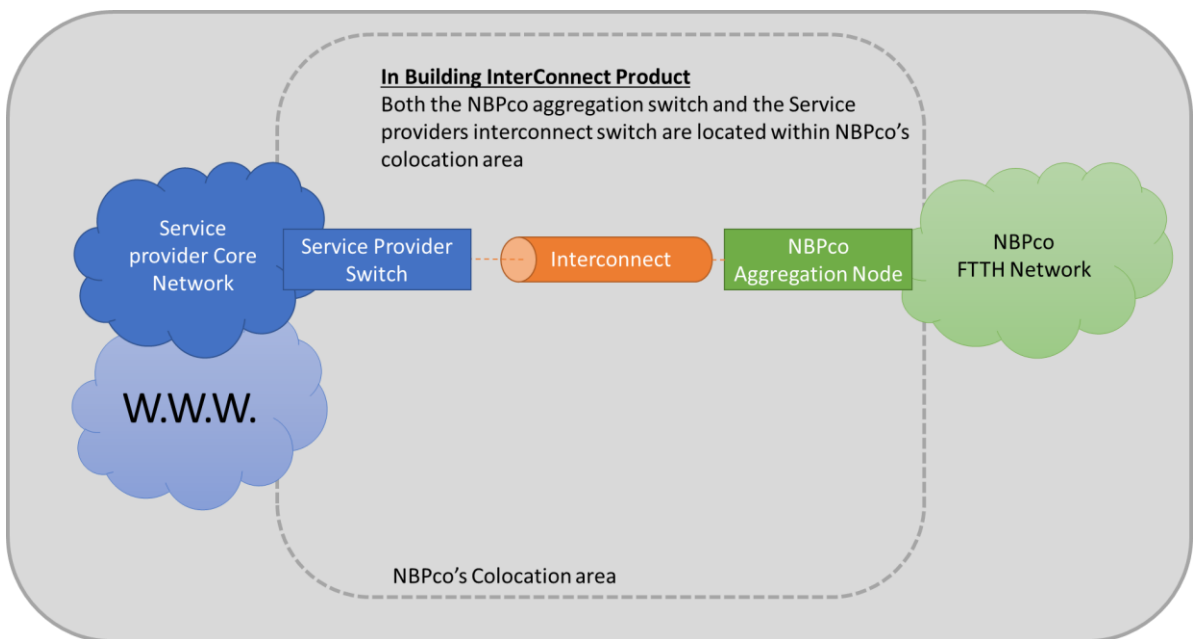


Fig. 3. In-building InterConnect Product

APPENDIX 2 (EOI STATEMENT OF COMPLIANCE)

This document constitutes an ‘EOI Statement of Compliance’ for the purposes of Paragraph 3.2.5 (Governance) of Schedule 2.2 (Reference Offer Requirements) of the Agreement in respect of the National Broadband Intervention Project (the “**Agreement**”) between the Minister for Communications, Climate Action and Environment (the “**Minister**”) and NBI Infrastructure DAC (“**NBPco**”) dated [●].

Capitalised terms used but not defined in this document shall have the meanings assigned to them in the Agreement.

NBPco HEREBY CONFIRMS THAT:

1. it shall, throughout the Contract Period, satisfy and comply with the provisions of Clause 36 (Non-Discrimination and Transparency) and Schedule 2.2 (Reference Offer Requirements) of the Agreement;
2. any Reference Offer that NBPco prepares or publishes shall not limit or affect any provision of the Agreement or any obligation of NBPco under the Agreement;
3. it shall provide all of its Wholesale Products on an EoI basis for all Service Providers (including Associated Service Providers) and shall provide products, services, facilities, and information to all Service Providers (including Associated Service Providers) such that such products, services, facilities, and information are provided within the same timescales, at the same price (subject to Paragraph 7.1 (Transparency and Non-Discrimination) of Part 1 (Wholesale Pricing Rules) of Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules)), functionality, service and quality levels and on the same terms and conditions and by means of the same systems and processes to all Service Providers.
4. it shall ensure that its systems and processes operate in the same way and with the same degree of reliability and performance for all Service Providers (including potential Associated Service Providers).
5. it shall publish a Reference Offer for each Wholesale Product offered as part of the Agreement and act in the manner required under the Agreement in respect of Reference Offers;
6. it shall ensure that a Reference Offer in relation to the provision of Wholesale Products includes at least the following components:
 - 1.6.1 Wholesale Product functionality and specifications;
 - 1.6.2 Wholesale Product availability timing;
 - 1.6.3 operational processes for Service Providers to manage the lifecycle of the Wholesale Product;
 - 1.6.4 SP SLA (including SP Performance Levels, SP Performance Indicators and SP Performance Credits) for the Wholesale Product;
 - 1.6.5 Wholesale Price; and
 - 1.6.6 Service Provider Terms for the Wholesale Product;

- 7 it shall ensure that the Reference Offer, and all associated invoices and bundles, are sufficiently unbundled to ensure that a Service Provider is not required to pay for or order Wholesale Products that are not necessary for the Wholesale Product required by it. NBPco shall ensure that the Wholesale Price in its Reference Offer, at a minimum, sets out in a clear, easily accessible, logically structured and transparent manner for each Wholesale Product the current:
- 7.1.1 maximum charge for Connection;
 - 7.1.2 maximum charge for disconnection;
 - 7.1.3 recurring charges;
 - 7.1.4 process for setting and implementing any excess Initial Connection Charges pursuant to Paragraph 6 (Initial Connection Charges and Other Connection Charges) of Part 1 (Wholesale Pricing Rules) of Schedule 5.2 (Wholesale Prices, Price Benchmarking Rules and Wholesale Product Benchmarking Rules);
 - 7.1.5 charge for migration (between Service Provider and Wholesale Products); and
 - 7.1.6 any other one-off charges associated with the portfolio of Wholesale Products on offer, and in a manner that enables any reader of the Reference Offer to clearly identify and compare the differences in charges from one Wholesale Product to another by each constituent type of charge;
- 8 it shall publish and keep up-to-date a Reference Offer in relation to all Wholesale Products offered in its portfolio on its Public Portal;
- 9 it shall update and amend each Reference Offer in accordance with the process specified in the Statement of Requirements and Product Development Processes, and, in particular, shall require the prior written approval from the Minister before the update or amendment becomes effective or is published;
- 10 it shall ensure that each version of each Reference Offer is sequentially numbered and that previous Reference Offer versions are archived on the Public Portal so that they remain accessible by members of the public; and
- 11 for each new version of the Reference Offer, NBPco shall publish on the Public Portal a marked-up Reference Offer clearly highlighting incremental changes with the previous version of the Reference Offer.

Signed:

Duly authorised
For and on behalf of *[insert NBPco name here]*

Date: