Service Technical Specification

Facilities Access Service Module

Wholesale Broadband Agreement

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Version	Description	Effective Date
5.0	First issued version of WBA 5	1 December 2023

Contents

1.   Introduction and scope

The purpose of this document is to set out the technical specifications for the Facilities Access Service. This document forms part of the Facilities Access Service Module.

1.1   Scope

The Facilities Access Service is only available at Established POIs. This document does not apply to **nbn**'s interim facilities access solution for Temporary POIs. Nor does it contain information regarding physical access to the buildings in which POI Sites or Aggregation Node Sites are located. For information regarding physical access to the buildings in which POI Sites or Aggregation Node Sites are located, please refer to section 10 of the Service Description for the Facilities Access Service and the WBA Operations Manual.

1.2   Definitions

A capitalised term used in this document has the meaning given to that term in the Dictionary.

In this document, a reference to a "POI" is to be read and interpreted as a reference to an "Established POI", unless indicated otherwise.

2.   Facilities Access Service

The Facilities Access Service supports interconnection between the RSP Network and the **nbn**® Network at each of the 121 POIs.

The Facilities Access Service comprises one or more of the following Service Elements:

Service Element	Description in the Service Description for the Facilities Access Service
nbn® Building Entry Service	Section 4
ODF Termination	Section 5
Cross Connect	Section 6
Co-location	Section 7

Subject to the terms of this Agreement, RSP may acquire those Service Elements of the Facilities Access Service which suit RSP's interconnection requirements in respect of each POI.

3. Interconnection

3.1 Relationship between Service Elements

Figure 1, Figure 2 and Figure 3 below illustrate the relationship between the different Service Elements of the Facilities Access Service, depending on whether the POI is established in:

(1) a POI Site with an Incorporated Aggregation Node Site, other than the Eastern Creek POI Site (see Figure 1);

(2) a POI Site with an Annexed Aggregation Node Site (see Figure 2); or

(3) the Eastern Creek POI Site (see Figure 3).
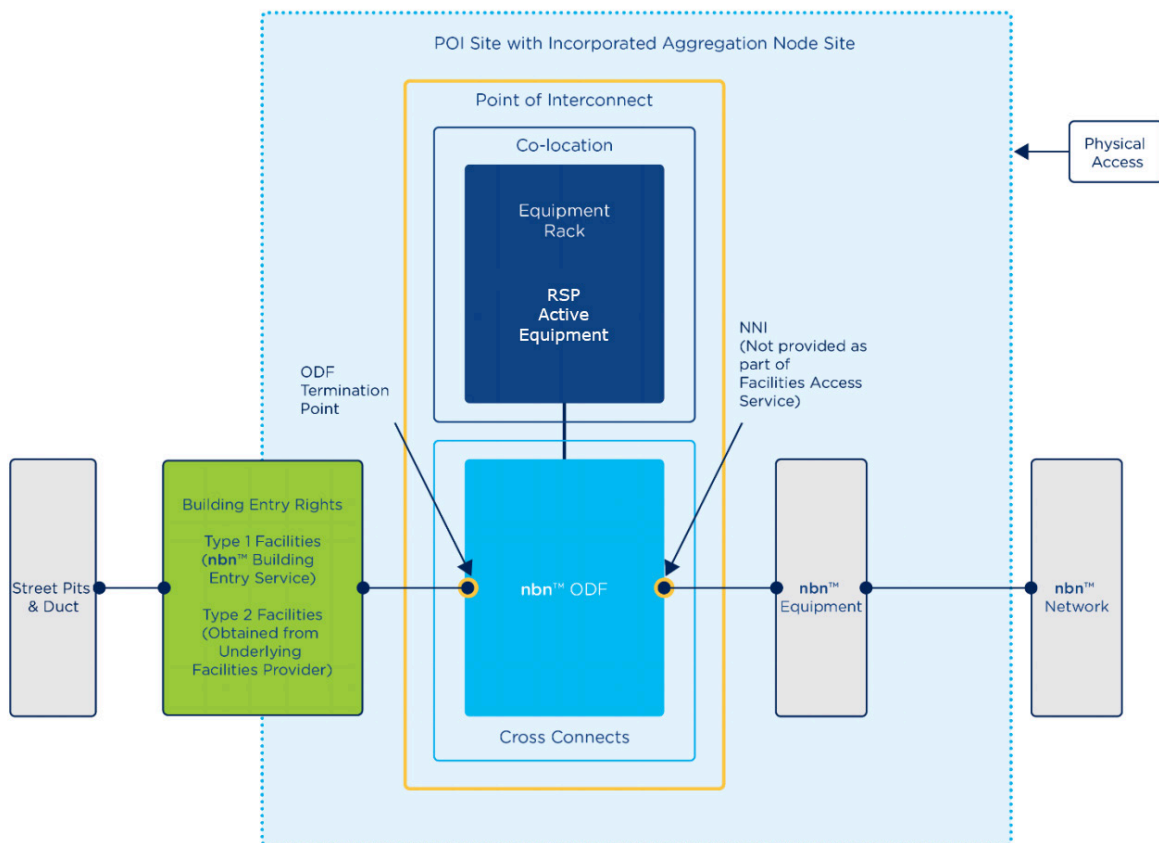
Figure 1: Relationship between different Service Elements of the Facilities Access Service at a POI Site with Incorporated Aggregation Node Site, other than the Eastern Creek POI Site
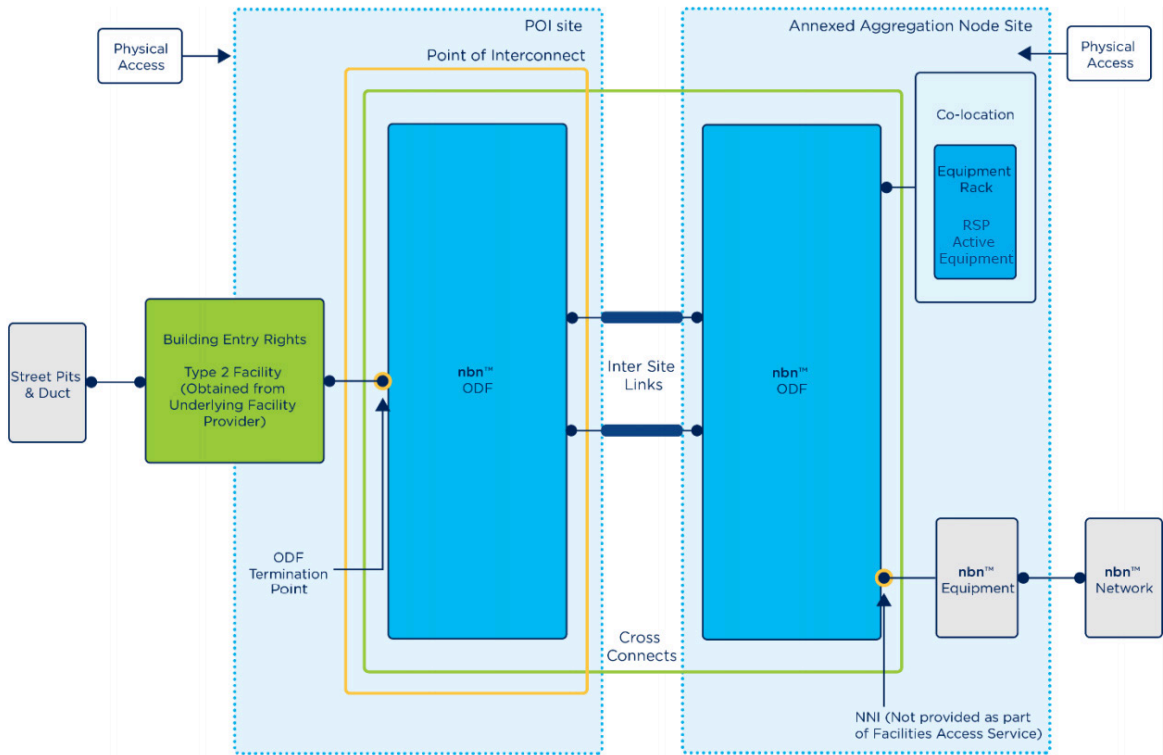
Figure 2: *Relationship between different Service Elements of the Facilities Access Service at a POI Site with Annexed Aggregation Node Site*
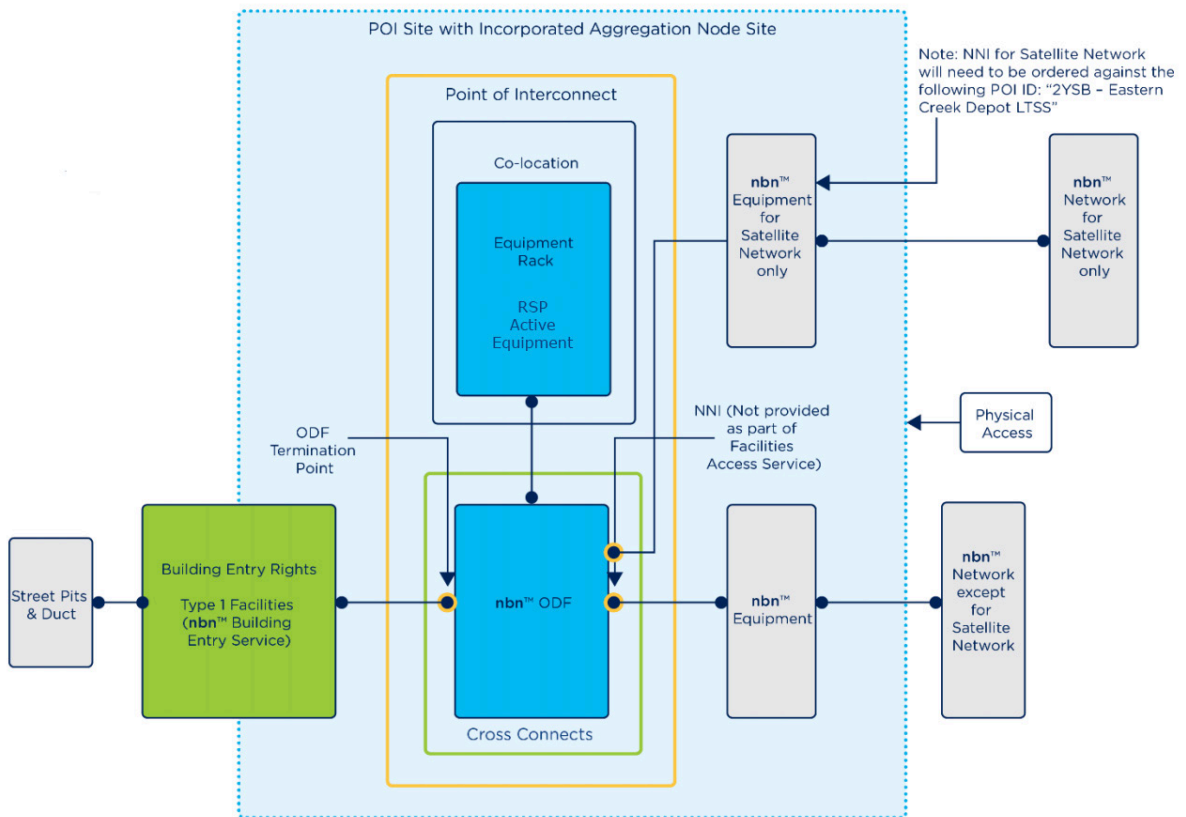
Figure 3: *Relationship between different Service Elements of the Facilities Access Service at the Eastern Creek POI Site*

When placing an order for the Facilities Access Service at the Eastern Creek POI Site (regardless of whether it relates to Satellite Network interconnection or to interconnection with any other **nbn**® Network), RSP must include in that order a reference to the standard identifier for the Eastern Creek POI Site.

3.2 Examples of types of interconnection that can be achieved

This section sets out a number of examples of the types of Cross Connections and types of interconnection that can be achieved using the Service Elements of the Facilities Access Service. These examples are not exhaustive.

3.2.1 Cross Connections

Table 1 sets out the types of Cross Connections that can be achieved between different points on an **nbn**® ODF using Cross Connect.

To / From (Points of appearance on an **nbn**® ODF)	RSP's lead-in or backhaul transmission cable	NNI	Equipment Rack made available to RSP as part of Co-location
RSP's lead-in or backhaul transmission cable	N	Y	Y
NNI	Y	N*	Y
Equipment Rack made available to RSP as part of Co-location	Y	Y	Y

Table 1: Matrix of permissible connections that can be achieved using Cross Connect

* Note: *Direct NNI to NNI connection is not possible because traffic egressing the NNI at the POI is required to traverse an IP device prior to being injected back into the **nbn**® Network. For more information, please refer to section 2.3 of the Network Interface Specifications – NNI.*

In respect of the Facilities Access Service, an RSP's lead-in or backhaul transmission cable is defined as either:

- a transmission cable brought in from the street into the POI Site and delivered to an **nbn**® ODF; or

- a transmission cable brought in from elsewhere within the building or buildings in which the POI Site is located and delivered to an **nbn**® ODF.

By way of example only, Figure 4 below illustrates a type of interconnection that can be achieved using a combination of ODF Termination, Cross Connect and Co-location in respect of the same POI.
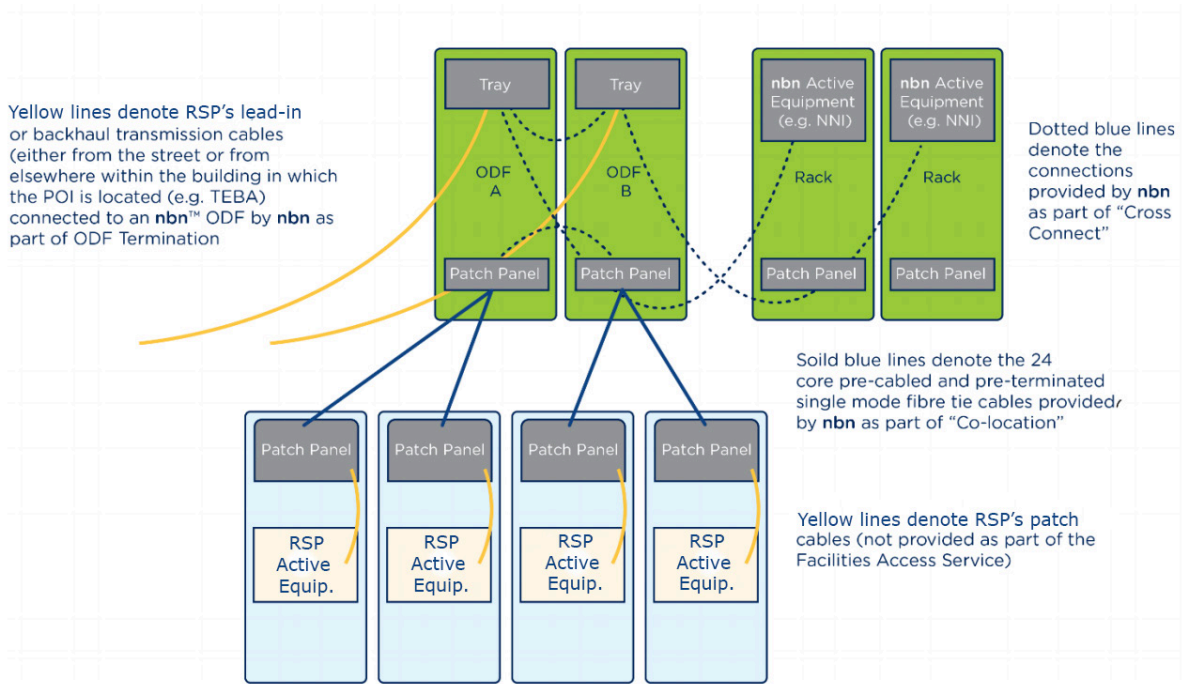
Figure 4: Type of interconnection that can be achieved using a combination of ODF Termination, Cross Connect and Co-location

4. Technical Specifications

4.1 Building Entry Service

This section 4.1 sets out technical specifications for the **nbn**® Building Entry Service.

4.1.1 Usage scenarios

RSP may use the **nbn**® Building Entry Service to install lead-in or backhaul transmission cables in **nbn**'s cable chamber, which **nbn** may connect from the cable chamber to the **nbn**® ODF (as part of ODF Termination). **nbn** may connect RSP's lead-in or backhaul transmission cables from the ODF Termination Point to other appearances on the **nbn**® ODF, including the appearance of an NNI or Co-location, by using Cross Connect supplied by **nbn**.

By way of example only, the following scenarios illustrate how the **nbn**® Building Entry Service can be used by RSP in conjunction with other Service Elements of the Facilities Access Service and other Products supplied by **nbn** under this Agreement:

- by acquiring ODF Termination and a Cross Connect between the ODF Termination Point and the appearance of the NNI on the **nbn**® ODF, RSP can supply services to End Users utilising NNIs, CVCs, AVCs and UNIs supplied by **nbn** as part of **nbn**® Ethernet, as illustrated in Figure 5 below:
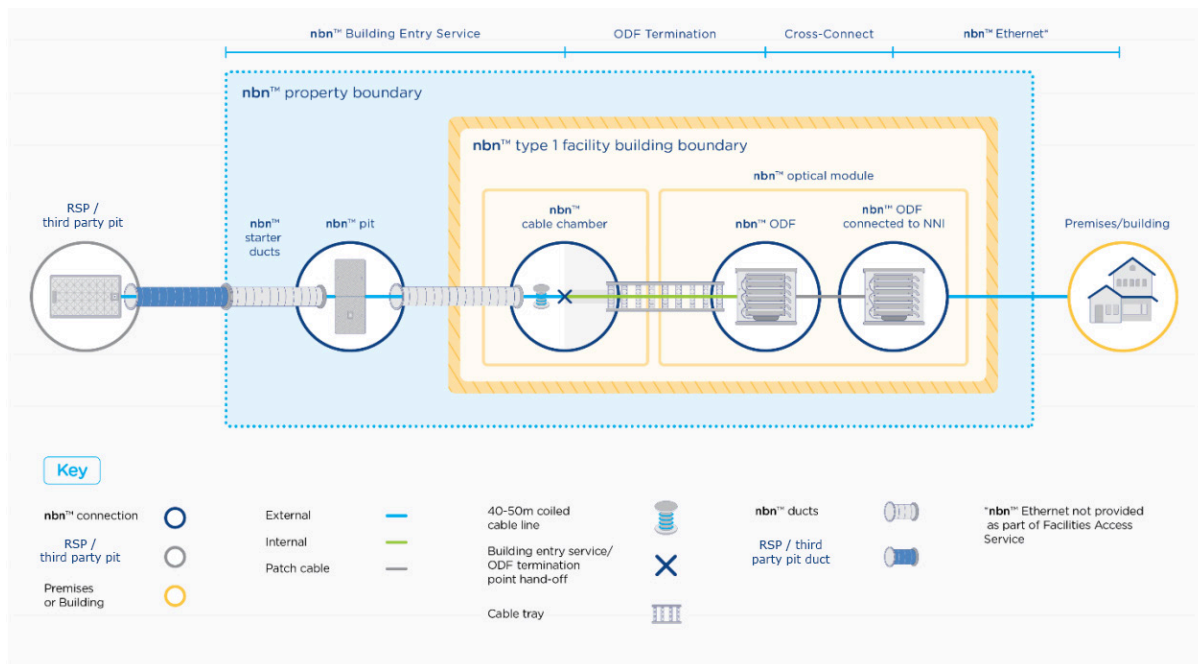
*Figure 5: Use of the **nbn**® Building Entry Services for delivery of services to End Users*

- by acquiring ODF Termination and a Cross Connect between the ODF Termination Point and the Co-Location Connection Point, RSP can establish a connection between RSP's lead-in or backhaul transmission cable and RSP Active Equipment that is installed in Equipment Racks made available by **nbn** as part of Co-location, as illustrated in Figure 6 below:
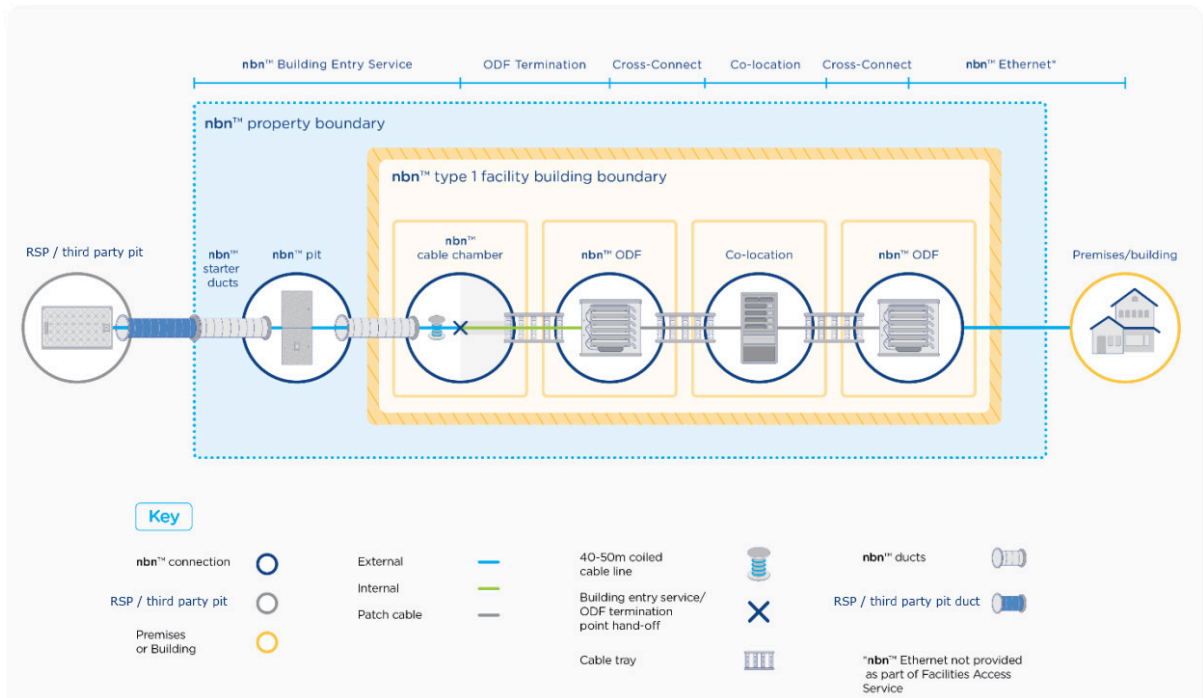
Figure 6: Use of nbn® Building Entry Services for connecting to RSP Active Equipment installed in Equipment Racks made available as part of Co-location

4.1.2   Points of termination

The two end-points for the **nbn**® Building Entry Service are:

- the beginning of **nbn**'s starter duct at the Type 1 Facility; and

- **nbn**'s cable chamber within the Type 1 Facility.

RSP must identify fibre cabling introduced into **nbn**'s cable chamber by specified labelling details (as further described in section 4.2.2).

4.1.2.1 External pit termination

nbn has installed starter ducts between **nbn**'s pit and the property boundary for interconnection to RSP or third party pits.

RSP is responsible for commissioning and maintenance of all infrastructure beyond the beginning of **nbn**'s starter duct at the Type 1 Facility, including the external pit beyond **nbn**'s property boundary.

4.1.2.2 Cable chamber termination

The **nbn**® Building Entry Service entitles RSP to draw a single fibre cable from the beginning of **nbn**'s starter duct at the Type 1 Facility, through the designated ducting, and into **nbn**'s cable chamber within the Type 1 Facility. This fibre cabling must be coiled and secured by RSP in a safe manner that can be further carried by **nbn** to the **nbn**® ODF (using ODF Termination).

The **nbn**® Building Entry Service does not accommodate the installation of patching/splicing facilities within **nbn**'s cable chamber. RSP must perform all fibre patching/splicing outside of **nbn**'s property boundary. Where more than one fibre cable is required to satisfy multiple RSP scenarios (e.g., as described in section 4.1.1), RSP must separately order the **nbn**® Building Entry Service in respect of each such cable.

4.1.2.3 Fibre presentation

RSP's lead-in or backhaul transmission cables must be presented within **nbn**'s cable chamber as set out in section 4.2.2.

4.1.2.4 Fibre cable sheathing

RSP must ensure that RSP's lead-in or backhaul transmission cables introduced into **nbn**'s cable chamber (which will subsequently be introduced into the **nbn**® ODF by **nbn** as part of **nbn**'s supply of ODF Termination) are of a construction suitable for outside plant operation.

4.1.3   Conduit characteristics

This section describes the technical characteristics of the conduit used to carry RSP's lead-in or backhaul transmission cables from the external pit to **nbn**'s cable chamber.

4.1.3.1 Physical specifications

Upon acceptance of an **nbn**® Building Entry Service order, **nbn** will allocate to RSP a single conduit (conforming to the P100 specification described in CommsAlliance G645:2011, section 7.1), feeding from the nominated external pit, to **nbn**'s cable chamber.

4.1.3.2 Establishing connectivity between external pit and **nbn**'s starter duct

To establish connectivity between either a new or an existing pit and **nbn**'s starter duct, RSP must contact **nbn** and arrange for the allocation of and access to ducts before commencing construction.

4.1.3.3 Conduit naming convention

Ducts are identified within **nbn**'s cable chamber using the naming convention illustrated in Figure 7 below.
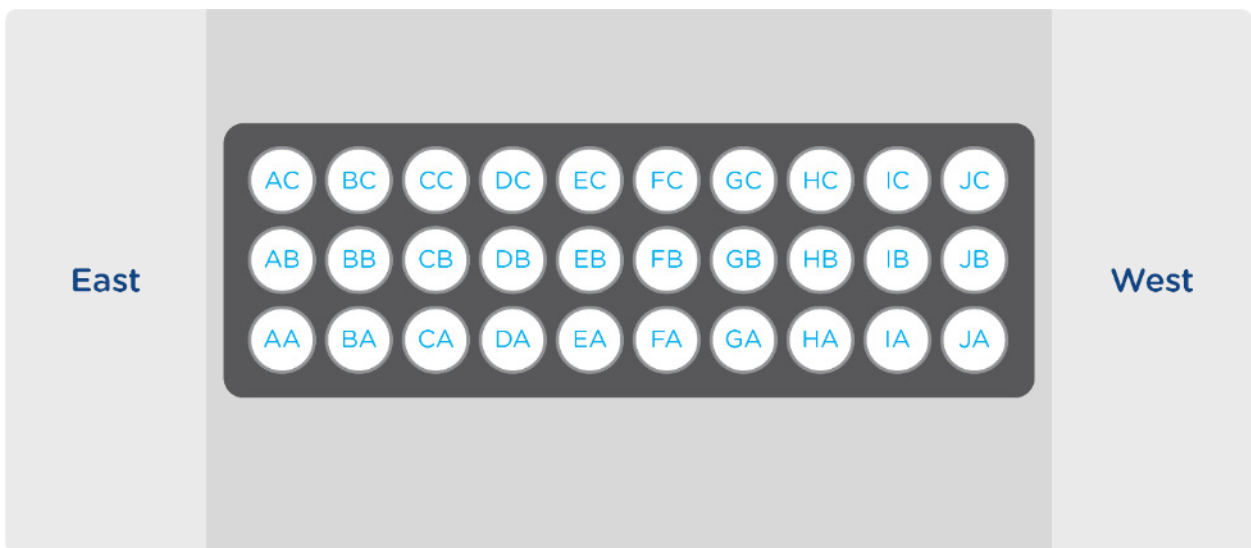
Figure 7: *Duct naming convention*

4.1.3.4 Conduit sealing

RSP must seal the allocated ducts before and after the installation of RSP's lead-in or backhaul transmission cables.

4.1.4 Building entry diversity

Type 1 Facilities allow building entry diversity, as illustrated in Figure 8 below. RSP may construct a diverse entry architecture using multiple **nbn**® Building Entry Service orders in respect of the same Type 1 Facility, and must highlight the requirement for diversity of services through the ordering process (i.e. Duct Allocation Design).
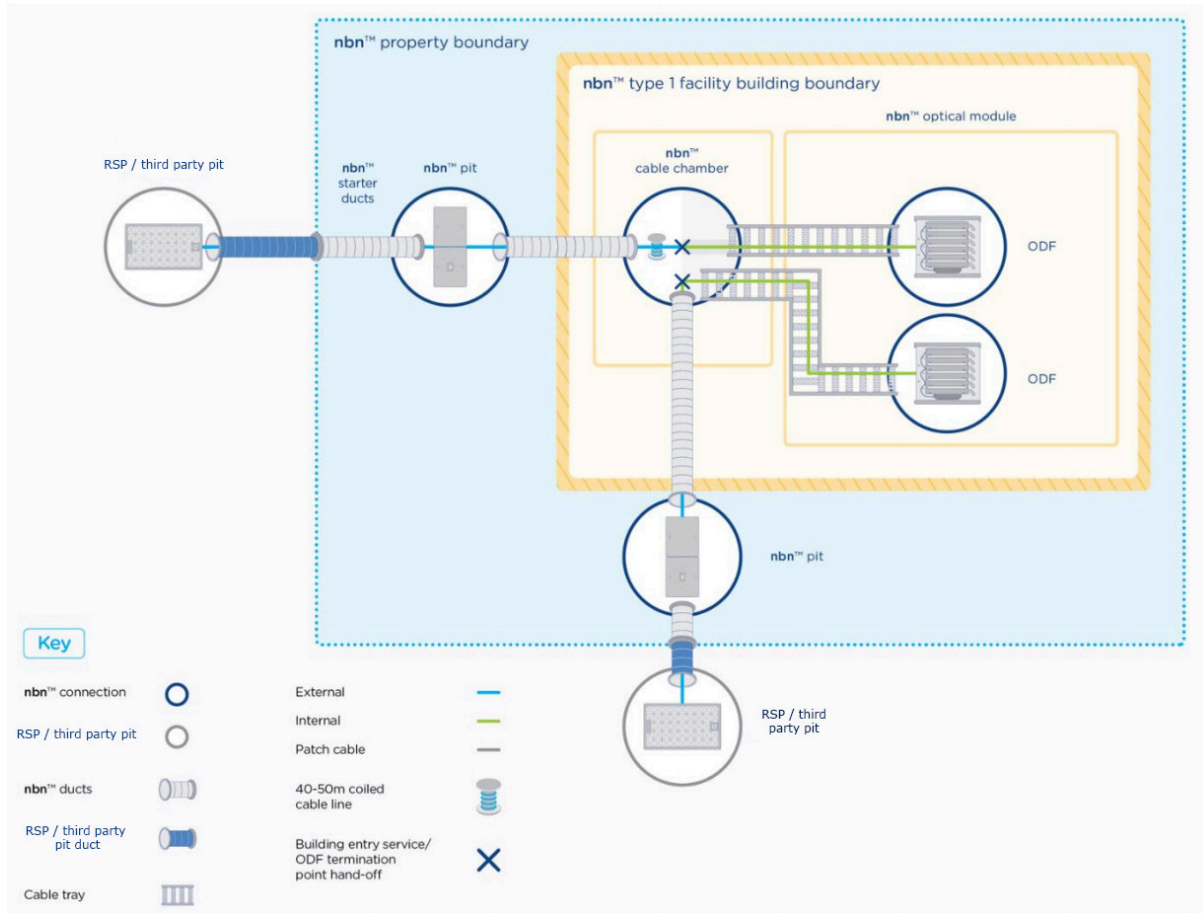
*Figure 8: **nbn**® Building Entry Service highlighting diverse fibre entry*

4.2 ODF Termination

This section 4.2 sets out technical specifications for ODF Termination.

4.2.1 Building Entry Rights

Please refer to section 8 of the Service Description for the Facilities Access Service for a description of Building Entry Rights, an explanation of the relevance of Building Entry Rights and the terms that apply in respect of Building Entry Rights.

4.2.2 Cabling

Only **nbn** and its contractors are permitted to:

•   access or perform work within an **nbn**® ODF; and

•   introduce cabling into an **nbn**® ODF and Equipment Racks.

RSP may:

- within Type 1 Facilities, if permitted by **nbn**, install cabling into **nbn**'s cable chamber, but not into the fibre module, utilising only the permitted cable trays, ducts or superstructure; and

- within Type 2 Facilities, if permitted by the Underlying Facility Provider, install cabling up to, but not into, the nominated **nbn**® ODFs, utilising only the permitted cable trays, ducts or superstructure.

The following requirements apply to the installation by RSP or an **nbn**-approved contractor of RSP's lead-in or backhaul transmission cables in accordance with section 5 of the Service Description for the Facilities Access Service:

RSP must ensure that:

- in Type 1 Facilities, at least 40 metres of slack cable is coiled up neatly, safely and securely to the superstructure directly above the duct used to haul that cable into the cable chamber;

- in Type 2 Facilities, at least 15 metres of slack cable is coiled up neatly, safely and securely above or beside the **nbn**® ODF nominated by **nbn**;

- RSP's cables are clearly labelled with the RSP's name and circuit details, using a durable and securely adhered label at the end of the cable length. The label should be printed using a size 18 font such as the example in Figure 9 below. Handwritten labels will not be accepted;

- the installation of fibre cables complies with the specifications as required by **nbn** and the Underlying Facility Provider;

- RSP's fibre cabling is not damaged or incorrectly installed;

- RSP's fibre cabling complies with AS/CA S008:2010 and is fit for purpose;

- all light sources are disconnected from fibre cables until successful completion of a joint completion inspection under section 4.5.2.2 of the WBA Operations Manual or such time as agreed with **nbn**; and

- RSP complies with other design and construction requirements notified by **nbn** or any other directions that may be given by **nbn** to RSP in relation to the performance of the installation.
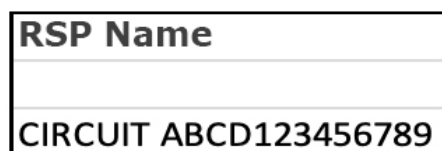
Figure 9: Example of a cable label

Provided that RSP has complied with the above requirements and subject to this Agreement, **nbn** will prepare and terminate (fusion splice) the RSP's lead-in or backhaul transmission cabling into a fibre termination tray within the **nbn**-nominated **nbn**® ODF.

At the time of ordering ODF Termination, RSP can specify which fibres of its lead-in or backhaul cable require splicing and whether transposition of fibres is required. If no transposition is specified, **nbn** may assume that the standard colour code specified in AS/CA S008:2010, Table B7 (Optical Fibre Colour Code) applies.

After **nbn** terminates the RSP cable within the **nbn**-nominated **nbn**® ODF, RSP may request inspection of the terminated cable. During this inspection, RSP may temporarily connect its test equipment and test the terminations.

4.2.3   Fibre termination trays

RSP may use up to two **nbn**-provided fibre termination trays within the **nbn**® ODF for the purposes of terminating RSP's lead-in or backhaul transmission cabling (or additional trays in accordance with section 5.3 of the Service Description for the Facilities Access Service). At the time of ordering, RSP may choose fibre termination trays in either 24 or 72 fibre counts and in either loose tube or ribbon fibre type.

4.2.3.1 24 fibre termination tray

Where RSP orders a 24 fibre termination tray, **nbn** will provide a 1 RU fibre termination tray with 24 single mode pigtails, in standard colour coding, pre-terminated with SC/APC connectors, 24 pre-mounted SC/APC adaptors and 2 splice trays.

4.2.3.2 72 fibre termination tray

Where RSP orders a 72 fibre termination tray, **nbn** will provide a 2 RU fibre termination tray with 72 single mode pigtails, in standard colour coding, pre-terminated with SC/APC connectors, 72 pre-mounted SC/APC adaptors and 6 splice trays.

4.2.3.3 Port nomenclature

Where RSP orders ODF Termination or Cross Connect (when used as straight through connections) for the purposes of connecting to an NNI:

- odd port numbers represent TX (light out) from **nbn**® Equipment towards RSP Equipment; and

- even port numbers represent RX (light in) towards **nbn**® Equipment.

4.3   Co-location

This section 4.3 sets out technical specifications for Co-location.

4.3.1   Equipment Rack specifications

4.3.1.1 Size and dimensions

As specified in the Service Description for the Facilities Access Service, Equipment Racks can be ordered by RSP as either 'lockable full height Equipment Racks' or 'lockable half height Equipment Racks'.

4.3.1.2 'Lockable full height Equipment Rack' specifications

nbn will ensure that each 'lockable full height Equipment Rack' that is supplied by **nbn** to RSP as part of Co-location will have the following specifications:

- external dimensions of 2195mm height and 1000mm depth including door handles as per ANSI/EIA RS-310C;

- minimum internal depth clearance between the front and rear door frames of 900mm;

- 39 usable RUs (ANSI) for use by RSP;

- 19 inch ANSI rail spacing (the Equipment Rack can also support a 21 inch ETSI retrofit kit);

- 4 equipment mounting rails (the rear 2 rails can be reconfigured for varying depths);

- use of 4 equipment rails that are designed to sustain up to 600 kilograms of static weight per rack;

- individually numbered RUs;

- a fixed cable tray mounted vertically inside the rack, with a minimum width of 150mm;

- rack space accessible by RSP from the front and rear of the racks, but not from the sides of the racks; and

- side panels and power distribution units fitted to all racks.

4.3.1.3 'Lockable half height Equipment Rack' specifications

nbn will ensure that each 'lockable half height Equipment Rack' that is supplied by **nbn** to RSP as part of Co-location will have the following specifications:

- a single compartment (either the top compartment or the bottom compartment) housed with a rack with external dimensions of 2195mm height and 1000mm depth including door handles as per ANSI/EIA RS-310C;

- minimum internal depth clearance between the front and rear door frames of 900mm;

- a fixed, vented dividing shelf providing segregation between top and bottom compartments;

- cabling to the bottom compartment protected from top compartment;

- 15 usable RUs (ANSI) for use by RSP;

- 19 inch ANSI rail spacing (the Equipment Rack can also support a 21 inch ETSI retrofit kit);

- 4 equipment mounting rails (the rear 2 rails can be reconfigured for varying depths);

- use of 4 equipment rails that are designed to sustain up to 300 kilograms of static weight per rack;

- individually numbered RUs;

- a fixed cable tray mounted vertically inside the rack, with a minimum width of 150mm;

- rack space accessible by RSP from the front and rear of the racks, but not from the sides of the racks; and

- side panels and power distribution units fitted to all racks.

4.3.2   Equipment Rack configuration

The lockable full and lockable half height Equipment Racks are supplied in the configurations as illustrated in Figure 10 with the following dimensions (+/- 15mm):

- clearance between front and rear equipment rails of 715mm for full height racks;

- clearance between front and rear equipment rails of 708mm for half height racks;

- clearance between door frames of 910mm for full height and half height racks;

- clearance between front and rear door mesh of 955mm for full height and half height racks;

- clearance between front equipment rails and front door frame of 155mm for full height and half height racks;

- clearance between rear equipment rails and rear door frame of 40mm for full height racks; and

- clearance between rear equipment rails and rear door frame of 47mm for half height racks.
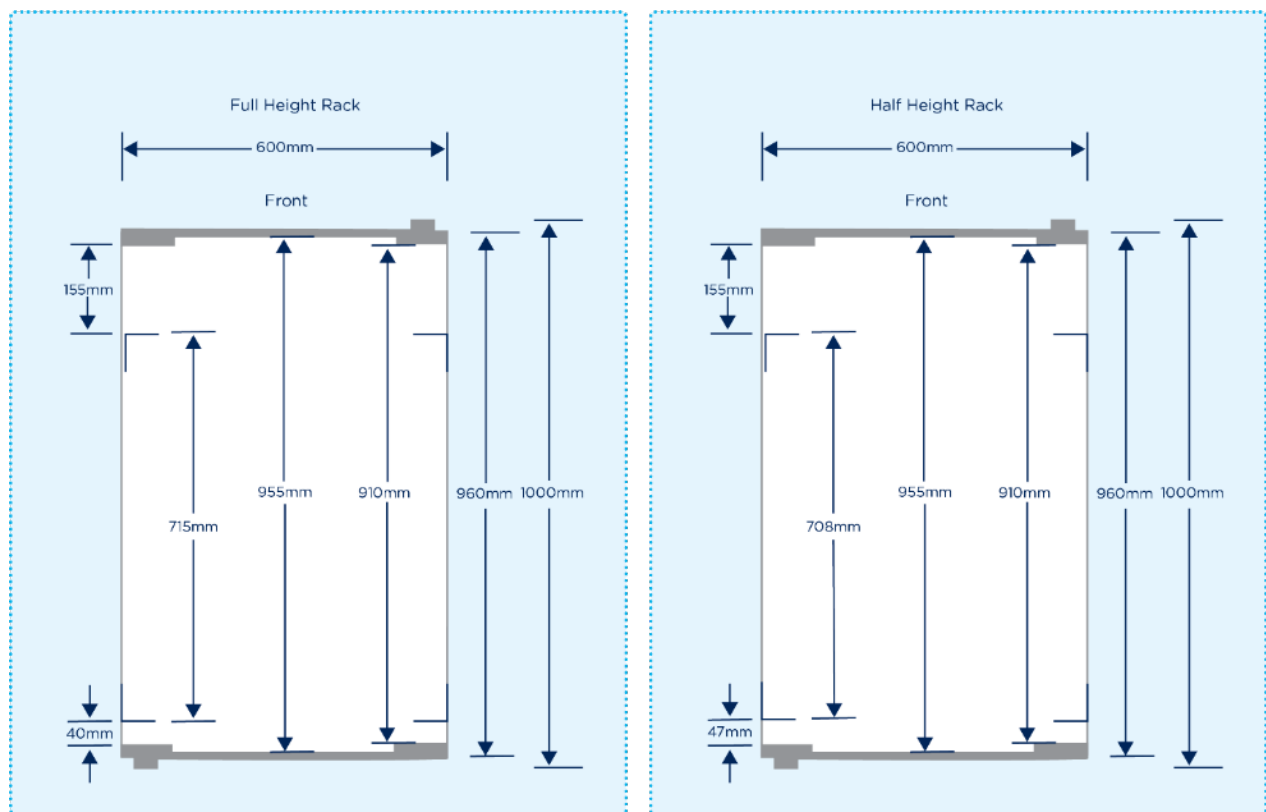
Figure 10: Plan view perspective of the default rack configurations with dimensions and clearances shown

4.3.3 Doors

nbn will ensure that front and rear lockable doors are provided in respect of each Equipment Rack.

nbn will ensure that these doors are ventilated by mesh and provide an equivalent open area of at least 63%.

4.3.4 Panels

nbn will ensure that side and top panels are provided in respect of each Equipment Rack and are configured such that they cannot be removed (in the normal course of usage) whilst front and rear doors of the Equipment Rack are locked.

4.3.5   Equipment Rack security

4.3.5.1 Locks

nbn will:

- fit locks to the front and rear of the Equipment Rack doors;

- ensure each Equipment Rack door has a three point locking system;

- manage keys and access authorisation in respect of Equipment Racks;

- manage the issuance and revocation of keys and access authorisation in respect of Equipment Racks; and

- provide a method by which locks fitted by **nbn** can be rekeyed or reconfigured on request.

Please refer to the Service Description for the Facilities Access Service for further terms that apply in relation to locks, keys and access cards.

4.3.5.2 Cameras

Please refer to the Service Description for the Facilities Access Service for terms that apply in relation to the use of cameras within rack space.

4.3.5.3 Door alarms

nbn will ensure that Equipment Racks supplied as part of Co-location are fitted with pre-cabled door switches on the front and rear doors that are designed to enable RSP to monitor door state (i.e. open/closed). The door switches are pre-cabled with 1.5 metre length, 0.5mm diameter solid conductor cable. If RSP wishes to monitor door state, RSP must provide its own monitoring equipment and connect the provided door switch cabling in accordance with **nbn**'s instructions (set out below and otherwise as notified by **nbn** to RSP from time to time). **nbn** is not responsible for monitoring any door switches, door alarms or door states (i.e. open/closed) in relation to Equipment Racks supplied as part of Co-location, or installing, operating or maintaining any such monitoring equipment and monitoring cabling within those Equipment Racks.

If RSP wishes to connect its own monitoring equipment to the provided door switch cabling, RSP can use the door switch Normally Open (NO) or Normally Closed (NC) and common outputs.

The maximum voltage and current that can be switched or interrupted by the door switch is 63V and 0.5A.

4.3.6   Cabling

4.3.6.1 Cable specifications

nbn will procure, install and maintain an initial 24 core, pre-cabled and terminated single mode fibre tie cable and 1 RU fibre termination tray/patch panel in respect of each 'lockable full height Equipment Rack' and each 'lockable half height Equipment Rack' compartment. A maximum of 2 RUs of fibre termination/patch panel trays can be installed in respect of the space allocated in the Equipment Rack for fibre termination/patch panel trays. Subject to section 4.3.6.4, this allows for a maximum of up to 288 fibres per rack, depending on the configuration chosen by RSP.

These tie cables form part of fixed infrastructure and will be connected to (and run between) an **nbn**® ODF and the fibre termination tray/fibre patch panel within each Equipment Rack supplied as part of Co-location.

In respect of each 'lockable full height Equipment Rack' and each 'lockable half height Equipment Rack' compartment, the pre-cabled and terminated single mode fibre tie cables will present the 24 terminated fibres on a 1 RU fibre termination tray/patch panel with SC/APC connectors.

If RSP requires augmentation to the pre-cabled and terminated single mode fibre tie cables beyond the original 24 fibres, RSP may request **nbn** to either:

- provide an additional 24 terminated fibres and 1 RU of fibre termination tray/patch panel presented with SC/APC connectors, or 72 or 144 terminated fibres and 1 RU of fibre termination tray/patch panel presented with LC/APC connectors, where RSP has started using the pre-cabled and terminated single mode fibre tie cables provided in respect of a single Equipment Rack and cannot disrupt the services running over those initial 24 core tie cables; or

- replace the initial 24 terminated fibres and fibre termination tray/patch panel with 72 or 144 terminated fibres and tie cables and 1 RU of fibre termination tray/patch panel presented with LC/APC connectors where RSP has not yet started using the initial 24 core tie cables.

If RSP requests augmentation under this section 4.3.6.1, Charges will apply as set out in the Facilities Access Service Price List.

RSP is responsible for connecting, procuring, installing and maintaining its own single mode patch leads between the fibre patch panel within the relevant Equipment Rack and the RSP Active Equipment installed within that relevant Equipment Rack.

4.3.6.2 Cabling restrictions

RSP and its Personnel may perform cabling within Equipment Racks that have been made available as part of Co-location, on the terms set out in the Service Description for the Facilities Access Service.

4.3.6.3 Fibre strand attributes

The fibre strand attributes set out below only relate to fibre provided by **nbn** to RSP under the Facilities Access Service. The tables below exclude splice losses.

Individual strands:

- All strands will be single mode optical fibre.

- All fibre strand attributes will meet or exceed the recommendations as set out in ITU-T G.652 Standard, Characteristics of a Single Mode Optical Fibre and Cable, Table 4 G.652-G.652D attributes, Telcordia GR-20-CORE, IEC 60793, and IEC 60794.

- Point discontinuities will have an optical loss no greater than 0.10dB.

- **nbn** specific optical insertion losses are listed in Table 2.

- **nbn** specific dispersion values are listed in Table 3.

Wavelength (nm)	Mean Insertion Loss (dB/km)	Standard Deviation (dB/km)	Maximum Insertion Loss (dB/km)
1310	0.31	0.0133	0.35
1383	0.31	0.0133	0.35
1490	0.22	0.0066	0.24
1550	0.20	0.0033	0.21
1625	0.22	0.0033	0.23

Table 2: Maximum Optical Values

Wavelength (nm)	Dispersion Value [ps/(nm.km)]
1550	≤ 18.0
1625	≤ 22.0

Table 3: Maximum Dispersion Values

Patch leads provided by **nbn** will meet or exceed the recommendations as set out in ITU-T G.657.

4.3.6.4 Additional augmentation of 1RU of fibre termination/patch panel trays

Where RSP has one Equipment Rack at the relevant Aggregation Node Site

(a) RSP may request **nbn** to install an additional 1 RU of fibre termination/patch panel tray in respect of an Equipment Rack such that the respective Equipment Rack has a maximum of 3 RUs of fibre termination/patch panel trays installed where the following conditions are met:

    (i) RSP has one Equipment Rack with 2 RUs of fibre termination/patch panel trays installed at the relevant Aggregation Node Site;

    (ii) RSP has utilised at least 80% of the existing fibre tie cables within the 2 RUs of fibre termination/patch panel trays installed on the respective Equipment Rack;

    (iii) **nbn** does not have capacity to fulfil any order for an additional or replacement Equipment Rack at the relevant Aggregation Node Site; and

    (iv) **nbn** has appropriate space available on the **nbn**® ODF to connect the additional fibre tie cables.

Where RSP has two Equipment Racks at the relevant Aggregation Node Site

(b) RSP may request **nbn** to install an additional 1 RU of fibre termination/patch panel tray in respect of an Equipment Rack such that the respective Equipment Rack has a maximum of 3 RUs of fibre termination/patch panel trays installed where the following conditions are met:

    (i) RSP has two 'lockable full height Equipment Racks' with 2 RUs of fibre termination/patch panel trays with 72 or more fibre tie cables installed in each Equipment Rack at the relevant Aggregation Node Site;

    (ii) RSP has utilised at least 80% of the existing fibre tie cables within the 2 RUs of fibre termination/patch panel trays installed across the two Equipment Racks;

    (iii) RSP is unable to request further augmentation of the fibre tie cables as set out in section 4.3.6.1 to either Equipment Racks; and

    (iv) **nbn** has appropriate space available on the **nbn**® ODF to connect the additional fibre tie cables.

(c) If RSP requests augmentation under this section 4.3.6.4, RSP must make available to **nbn**, 1 RU of space in the relevant Equipment Rack for the additional fibre termination/patch panel tray to be installed.

(d) **nbn** may cancel the order made pursuant to:

    (i) section 4.3.6.4(a) if any of the conditions in section 4.3.6.4(a) are not met;

    (ii) section 4.3.6.4(b) if any of the conditions in section 4.3.6.4(b) are not met; or

(iii) section 4.3.6.4(a) and 4.3.6.4(b) if RSP does not make available 1 RU of space for augmentation as required by section 4.3.6.4(c).

(e) If RSP requests augmentation under this section 4.3.6.4, Charges will apply as set out in the [Facilities Access Service Price List](#).

4.3.7 **Power**

4.3.7.1 Amount

nbn will supply a feed of up to a maximum of 3kW at each 'lockable full height Equipment Rack' and a feed of up to a maximum of 1.5kW at each 'lockable half height Equipment Rack' compartment. These are the standard power limitations.

With respect to RSP Active Equipment, the ratio of inrush current to maximum continuous input current must not exceed the limits specified in clause 4.7.1 of ETSI ETS 300 132-2 when measured with test circuit in accordance with clause 4.7.2 of ETSI ETS 300 132-2. The maximum instantaneous value of inrush current for an equipment interface must not exceed 500A.

Power utilisation may be monitored by **nbn**.

4.3.7.2 Specification

nbn will supply -48V DC telecommunications power. The operating voltage range will be in the range of -40.5V DC to -60V DC.

4.3.7.3 Presentation

nbn will provide a single DC power distribution unit (**DCD**) in respect of each 'lockable full height Equipment Rack' or 'lockable half height Equipment Rack' compartment to enable RSP Active Equipment to be powered.

Ten circuit breaker positions are available on the DCD for use by RSP – five positions for each power feed (A + B). RSP is responsible for the procurement, installation, operation and maintenance of its own **nbn**-approved pluggable circuit breakers.

nbn-approved pluggable circuit breakers are:

- Airpax (formerly Eltek) 165A Circuit breaker – Part Number LELBXPB111-1REC4-70014-165 (formerly C401203);

- Airpax (formerly Eltek) 100A Circuit Breaker – Part Number LELBXB1-1REC4-70014-100 (formerly 289595);

- Airpax (formerly Eltek) 80A Circuit breaker – Part Number LELBXB1-1REC4-70014-80 (formerly C401261);

- Airpax (formerly Eltek) 50A Circuit breaker – Part Number LELBXB1-1REC4-70014-50 (formerly 288474);

- Airpax (formerly Eltek) 40A Circuit Breaker – Part Number LELBXB1-1REC4-70014-40 (formerly C401260);

- Airpax (formerly Eltek) 30A Circuit Breaker – Part Number LELBXB1-1REC4-70014-30 (formerly C401259);

- Airpax (formerly Eltek) 25A Circuit Breaker – Part Number LELBXB1-1REC4-70014-25 (formerly C401296);

- Airpax (formerly Eltek) 20A Circuit Breaker – Part Number LELBXB1-1REC4-70014-20 (formerly C401295);

- Airpax (formerly Eltek) 16A Circuit Breaker – Part Number LELBXB1-1REC4-70014-16 (formerly C401294);

- Airpax (formerly Eltek) 5A Circuit Breaker – Part Number LELBXB1-1REC4-70014-5 (formerly 289155);

- Airpax (formerly Eltek) 2A Circuit Breaker – Part Number LELBXB1-1REC4-70014-2 (formerly C401258);

- Airpax 6A Circuit Breaker – Part Number LELBXB1-1REC4-70014-6; or

- Airpax 60A Circuit Breaker – Part Number LELBXB1-1REC4-70014-60.

4.3.7.4 DC distribution unit

RSP is responsible for providing its own DC cabling between the DCD and RSP Active Equipment.

DC and earthing cabling provided by RSP must comply with AS/NZS 3015:2004 "*ELVDC Power Supplies for Telecommunications*" and as such, the cable sheath colours must be provided as follows:

- Positive (also called 0V, return or Positive earth) is red in colour.

- Negative (also called -48V or active) is blue in colour.

- Earth is green/yellow in colour.

RSP-side DC cabling must be of a dimension at, or between, 2.5mm and 25mm cross sectional area and may be terminated to each individual circuit breaker output lug. RSP must ensure that the circuit breaker output terminal cable lug nuts are not exposed to torque exceeding 4.5 Newton metres.

When populated with approved circuit breakers, the DCD provides for circuit breaker trip alarm output via a voltage free relay. RSP may connect to the relay base for the purpose of monitoring circuit breaker trip alarms. Upon circuit breaker trip, all relay contacts transition simultaneously. Figure 11 below shows the mapping of the contact outputs on the relay base.

8NO	7NO	6NO	5NO
4NC	3NC	2NC	1NC
-			+
12COM	11COM	10COM	9COM

Figure 11: Relay base output

The voltage free dry contact relay is rated to 60V, 0.5A.

The DCD provides LED indicators on the front panel. The green LED represents that DC power is present and there are no circuit breakers in a tripped state. The red LED represents that DC power is active, but a circuit breaker has tripped and is in the OFF position.

Other than for the purposes of connecting RSP-side DC cabling and alarm output cabling, RSP must not tamper with, modify, move or remove the DCD, DCD power supply feed cabling, or power monitoring system.

4.3.7.5 Diverse feeds / redundancy

Where available, **nbn** will provide two -48 V DC feeds (A and B) to each Equipment Rack.

Where available, **nbn** will provide the A and B feeds within a single DCD allowing RSP to install up to five breakers on each feed. In certain circumstances, the A and B feeds may be fed from a single source.

4.3.7.6 AC in Equipment Racks

AC power supply is not provided or permitted in respect of Equipment Racks.

RSP must not generate or attempt to generate an AC power supply within Equipment Racks.

4.3.8   Earthing

nbn will ensure that Equipment Racks are:

- earthed in accordance with AS/NZS 3015:2004 as updated from time to time;

- wired and configured for 3-wire earthing practices in respect of Co-location space located within Type 1 Facilities and 2-wire earthing in respect of Co-location space located within Type 2 Facilities; and

- configured with two earth connection points – one at the top and one at the base of the Equipment Rack.

RSP must not tamper with or remove Equipment Rack earthing.

4.3.9   Electromagnetic interference

Equipment installed by or on behalf of RSP within Equipment Racks must not radiate or conduct electromagnetic interference in excess of the limits defined in the following standards:

- EN55024 (Class A) – Immunity;

- CISPR22 (Class A or Class B depending upon the environment) – Emissions;

- EN61000-3 – Electromagnetic compatibility; and

- AS/NZS 60950.1:2010 (SELV) - Safety.

4.3.10   Test switched sockets

Where available, **nbn** will procure, install, manage, maintain and make available to RSP 230V 10A switched sockets (which meet AS 60038:2000) in pendant form hanging in the aisle from the ceiling or mounted to the bottom of the superstructure or in Equipment Rack aisles at periodic intervals. Subject to any contrary prior arrangement which RSP has entered into with **nbn**, RSP must only use test switched sockets for incidental and temporary power connections, such as to power a laptop or test equipment. RSP must not connect any equipment installed in an Equipment Rack to the test switched sockets. **nbn** may, without notice, disconnect any connections made to the switched sockets.

As these switched sockets may not be protected by safety switches or residual current devices, it is recommended that 230V AC connected equipment be protected by a portable residual current device that meets AS/NZS 3760:2010 and is certified as being suitable for use connection to a residual current device.

4.3.11   Allowed equipment for Co-location

Subject to the Service Description for the Facilities Access Service and the Service Terms for the Facilities Access Service, RSP may install and operate the following types of equipment in an Equipment Rack supplied by **nbn** as part of Co-location:

- equipment used to support **nbn**® Network access;

- Ethernet switches;

- transmission equipment;

- routers (including BNG, B-RAS and general purpose routers);

- servers used to authenticate and configure End Users (including RADIUS, DHCP, AAA and ACS);

- voice equipment such as a softswitch or session border controller;

- video conferencing controller;

- bandwidth management devices;

- management equipment (including terminal servers and alarm devices);

- test or monitoring equipment; and

- other types of equipment notified by **nbn** to RSP from time to time or otherwise approved by **nbn** in writing.

Subject to the Service Description for the Facilities Access Service and the Service Terms for the Facilities Access Service, RSP must not install or operate any of the following types of equipment in an Equipment Rack supplied by **nbn** as part of Co-location:

- equipment used to support access to networks other than the **nbn**® Network;

- content storage or content distribution network equipment;

- servers used for hosting or cloud applications;

- devices that are used to store, forward and route professional profile video and audio;

- coding and multiplexing equipment;

- transmission devices for voice interconnect (including X.161);

- DSLAM equipment or associated splitters;

- mobile base station equipment and other wireless and RF devices;

- DC to AC inverters;

- any AC powered equipment; and

- other types of equipment notified by **nbn** to RSP from time to time.

4.3.12 RSP Equipment location restrictions

Except as permitted by the Service Description for the Facilities Access Service and this Service Technical Specification, RSP must not install equipment or cabling in rack positions:

- RU40 to RU46 in respect of 'lockable full height Equipment Racks'; or

- RU16 to RU22 in respect of 'lockable half height Equipment Racks'.

These locations are required for **nbn**® Equipment, safe working clearances and fibre expansion.

4.3.13 Environmental

4.3.13.1 Climate control

nbn will use reasonable endeavours to maintain the ambient temperature of the area in which Co-location is made available by **nbn** to RSP. **nbn** will use reasonable endeavours to provide climate control up to a maximum ambient temperature of 45ºC with a maximum rate of change of temperature of 1.33°C/minute.

4.3.13.2 Air handling

nbn will ensure that air handling is provided within the Co-location space to facilitate hot aisle/cold aisle, with the cold aisle provided at the front of the Equipment Rack.

RSP must ensure that all RSP Active Equipment used or installed within the Co-location space maintains front-to-back air handling.

4.3.13.3 Fire suppression

nbn will ensure that fire suppression is provided in accordance with the Building Code of Australia in respect of Co-location space that is located within Type 1 Facilities.

4.3.13.4 Lighting

nbn will ensure that general lighting is supplied within the area in which Co-location is made available and that such lighting meets AS/NZS 1680.1:2006, *Interior and workplace lighting – General principles and recommendations*.

4.3.13.5 Static suppression

nbn may, but is not obliged to, provide grounded antistatic flooring and static discharge points within Co-location space.

4.3.13.6 Cardboard eradication

RSP must ensure that:

- any equipment that is delivered on behalf of RSP to the building in which Co-location space is located is unpacked outside of the Co-location space to prevent airborne contaminants; and

- all packaging and waste materials for equipment that is delivered on behalf of RSP to the building in which Co-location space is located is immediately removed and disposed of by RSP Personnel.

4.3.13.7 Metalwork

RSP must not use or install any equipment within Equipment Racks or the Co-location space that has a surface or plating finish which may produce conducting flakes or particles.

This includes hot dip galvanizing which may produce zinc whiskers or burrs.

4.3.14 Facilities

4.3.14.1 Parking spaces

Where there are parking spaces available for **nbn**'s use at the building in which Co-location space is located, RSP may access those parking spaces for maintenance and operational purposes, provided they are not already in use by **nbn** or Other RSPs, subject to reasonable conditions that may be notified by **nbn** to RSP from time to time.

On request by **nbn**, RSP must move any vehicle parked by or on behalf of RSP in a parking space that is available for **nbn**'s use at the building in which Co-location space is located.

4.3.14.2   Loading dock

Where there is a loading dock available for **nbn**'s use at the building in which Co-location space is located, RSP may access it for maintenance and operational purposes, provided it is not already in use by **nbn** or Other RSPs, subject to reasonable conditions that may be notified by **nbn** to RSP from time to time.

4.3.14.3   Lifts

Where goods lifts, cranes, mechanical lifting devices, slings and chains are present within the building in which Co-location space is located, subject to RSP obtaining and maintaining the necessary accreditations, RSP may use those facilities with **nbn**'s consent, subject to reasonable conditions that may be notified by **nbn** to RSP from time to time.

If RSP wishes to use an uncertified mechanical lift device that is available at the building in which Co-location space is located, RSP is responsible for organising and paying for the certification of that device prior to using that device.

RSP must not use, or permit or authorise the use of, any uncertified mechanical lift device that is available at the building in which Co-location space is located.

4.3.14.4   Ladders

RSP may use approved non-conducting ladders within the Co-location space. RSP must not use any non-approved or conducting ladders within the Co-location space. RSP must ensure that all ladders used by RSP Personnel comply with the occupational health and safety requirements of the building in which Co-location space is located and any other requirements provided by **nbn** to RSP from time to time.