

MDU BUILDING ENGINEERING AND DESIGN STANDARD - NEW DEVELOPMENTS

Standards

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Document control

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1 About this document

1.1 Purpose

The purpose of this document is to specify nbn's requirements for the provisioning of appropriate underground lead-ins, pathways and spaces within residential, commercial and retail new development Multi-Dwelling Units (MDUs) to support future connection to nbn® FTTP services.

Note: Refer to unshaded area in Figure 1 below for the area covered by this document.

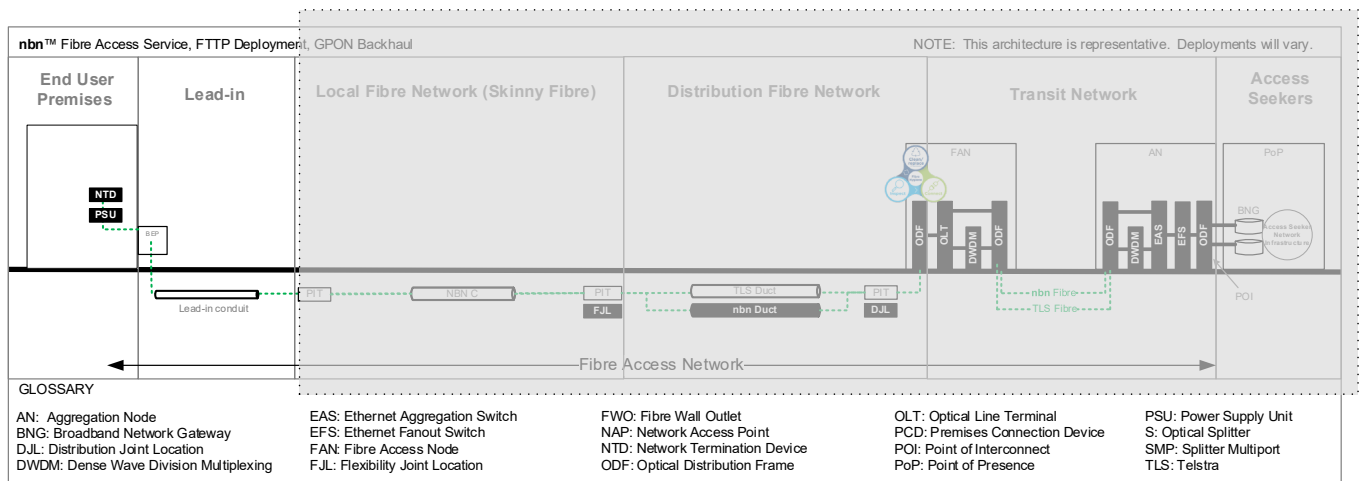


Figure 1. Area of nbn® network covered by this document (unshaded)

1.2 Objective

The objective of this document is to ensure that developers, consultants, builders and electrical contractors involved in the development of MDUs, make the appropriate pathway and space provisions at design and build, for the installation of nbn® network equipment (fibre, passive equipment etc) required to connect end user premises (EUPs) to the nbn® network.

1.3 Scope

1.3.1 In scope

Requirements for all new residential, commercial and retail MDU new developments located within the nbn fixed line footprint that will connect to the nbn® network.

1.3.2 Out of scope

The following are out of scope for this document:

- New developments within the satellite footprint
- New developments within the fixed wireless footprint
- Connection via Fibre to the Building (FTTB)

- Connection via Fibre to the Node (FTTN)
- Connection via HFC
- Connection via copper backbone customer cable
- Small or Horizontal MDUs i.e. those requiring or are to be serviced by their own lead-in (refer to [10]NBN-DES-STD-0011 Residential Preparation and Installation – Single Dwelling Units (SDUs) and Multi Dwelling Units (MDUs))

1.3.3 Project specific requirements

The standards contained within this document make clear and transparent information available to parties involved in design and build of MDU property development projects that will connect to the nbn® network.

nbn does recognise that bespoke design and build requirements may exist in some projects. In these cases, nbn's dedicated Relationship Managers and Deployment Specialists will work with the developer and builder to ensure project requirements and needs are understood, and that the best possible outcomes can be achieved for the project in accordance with the appropriate standards and codes.

1.4 Audience

This document is intended for:

- new development site designer, developer, consultant, builders and electrical contractors
- nbn designers or planners
- nbn Delivery Partners
- nbn enAble training partners

1.5 Assumptions and constraints

It is important to comply with the requirements described in this document.

Failure to do so may result in delays in connecting the premises to the nbn or result in nbn's inability to make a network connection to the new premises.

Developers, building owners and builders may face delays and additional costs (borne by the owner of the premises) until building preparations are brought into compliance with these requirements.



Note: This document replaces the 'Building Design Guide - New Developments' document referred in paragraph (b) of the definition of 'nbn Specifications' in nbn's Master Developer Agreement (MDA) as and from 19 SEP 23. This document should be used for the purposes of nbn's Specifications in the MDA.

1.6 Referenced documents

Note: The table below only contains documents referenced within this document.

Document	Owner
[1] AS/CA S009 <i>Installation requirements for customer cabling (Wiring rules)</i>	Communications Alliance
[2] AS/NZS 1477 <i>PVC pipes and fitting for pressure applications</i>	Standards Australia
[3] AS/NZS 1596 <i>The storage and handling of LP Gas</i>	Standards Australia
[4] AS/NZS 3000 <i>Electrical installations (known as the Australian/New Zealand Wiring Rules)</i>	Standards Australia
[5] AS/NZS 3084 <i>Telecommunications installations - Telecommunications pathways and spaces for commercial buildings</i>	Standards Australia
[6] AS/NZS 4645.1 <i>Gas distribution networks, Part 1: Network management</i>	Standards Australia
[7] <i>Building Code of Australia</i>	www.abcb.gov.au
[8] F0133-9-495 <i>nbn HSE Critical Risk Controls and Guidance</i>	nbn
[9] NBN-COO-EDS-017 <i>nbn New Development Pit and Pipe Design Guidelines.</i>	nbn
[10] NBN-DES-STD-0011 <i>Residential Preparation and Installation – Single Dwelling Units (SDUs) and Multi Dwelling Units (MDUs)</i>	nbn
[11] NBN-TE-CTO-194 <i>New developments: deployment of the nbn™ pit and conduit network</i>	nbn

1.7 Changes in this revision

Changes in this document revision 15.0 dated 13 JUN 25 compared to the previous revision 14.0 dated 19 SEP 23 are summarised below:

Item	Details
Reissued 13 June 2025.	<ul style="list-style-type: none">To correct minor formatting issues in section 9. Note: Revision number remains 15.0.
3.2 Network Boundary Point (NBP)	<ul style="list-style-type: none">Added network boundary point for Fibre TV.
9 Network Termination Device (NTD) requirements	<ul style="list-style-type: none">Added details for new 1-port and 4-port NTD models and adjusted information for legacy 4-port NTD.

Item	Details
10 Essential services	<ul style="list-style-type: none">Added new paragraph: 'On request for nbn to support essential services, nbn may deploy a single 4-port NTD to support up to 4 services when essential services are co-located.'
12 Customer Cabling	<ul style="list-style-type: none">Added new paragraph: 'RSP gateways/modems are best located centrally within the premises, outside of cupboards, home distributors and away from appliances such as refrigerators, televisions or microwaves'.Added bullet points:<ul style="list-style-type: none">'category 6 (or better to support nbn speed tiers)''may be a maximum 100m in length from the NTD''may require the use of a patch panel and multiple cables running to one or more rooms to support intended customer uses, e.g. a Wi-Fi router in a different location to the nbn® NTD'Added important box: 'Information for builders and homeowners to optimise use of the nbn® network, including considerations for Wi-Fi router location, structured cabling and other factors, is available online at: https://www.nbnco.com.au/learn/optimisation'.

2 Before you start

2.1 Health, Safety and Environment (HSE)



Note: The information below is for internal nbn employees and Delivery Partners. It is expected that Developers, Builders and anyone else following the requirements in this document will comply with relevant HSE legislation, and their own HSE processes.

nbn takes health, safety and environment management very seriously, and expects the same with all internal employees and our Delivery Partners. Whilst undertaking the activity associated with this document, all workers (both nbn employees and delivery partner's employees) must comply with relevant HSE legislation, their own HSE processes, contractual HSE obligations and nbn's HSE Critical Risk Controls.

The Critical Risk Controls (CRC) set out nbn's minimum expectations for carrying out work where there is a risk of exposure to one or more HSE critical risks. The mandatory requirements specified in the nbn HSE Critical Risk Controls are in addition to other requirements under legislation and do not replace or limit any nbn or Delivery Partner obligation to manage HSE risks. It is also important to note that the Critical Risk Controls are not exhaustive of all controls required to manage HSE risks.

The information within this document has been prepared with an understanding that HSE risks may be evident and will require assessment with due consideration to CRC requirements by nbn or the Delivery Partner participating in any activity prescribed within the document and controls are documented in relevant safe work systems (e.g. SWMS, Procedure etc.) and adhered to.

2.2 Compliance with Australian Standards and Codes

All design and build works undertaken in respect of the new development MDU should be done in accordance with this document and the following standards:

1. **Space requirements** must be applied in accordance with [5]AS/NZS 3084 *Telecommunications installations - Telecommunications pathways and spaces for commercial buildings*.
2. **Customer cabling** must be applied in accordance with [1]AS/CA S009 *Installation requirements for customer cabling (Wiring rules)*
3. **Power** must be applied in accordance with [4]AS/NZS 3000 *Electrical installations (known as the Australian/New Zealand Wiring Rules)*.
4. **Fire sealing** must be applied in accordance with the National Construction Code of Australia (NCC), relevant Australian Standards and State specific legislation.

3 Overview of nbn deployment areas

3.1 nbn deployment areas

MDUs can be broken down into four main areas for nbn deployment:

1. **Lead-in and Building Entry Point (BEP)** - allows the nbn outside plant cables to enter and be terminated at the building fibre device either located near the BEP or within a Telecommunications (Comms) room.
2. **Backbone distribution** – allows nbn fibres to provide connectivity via risers to the horizontal distribution.
3. **Horizontal Distribution** - runs with the hallways and drops a single connection to each end user premises.
4. **End User Premises** – individual premises in the building to which nbn services are provided.

Refer to circled areas in Figure 2 below.

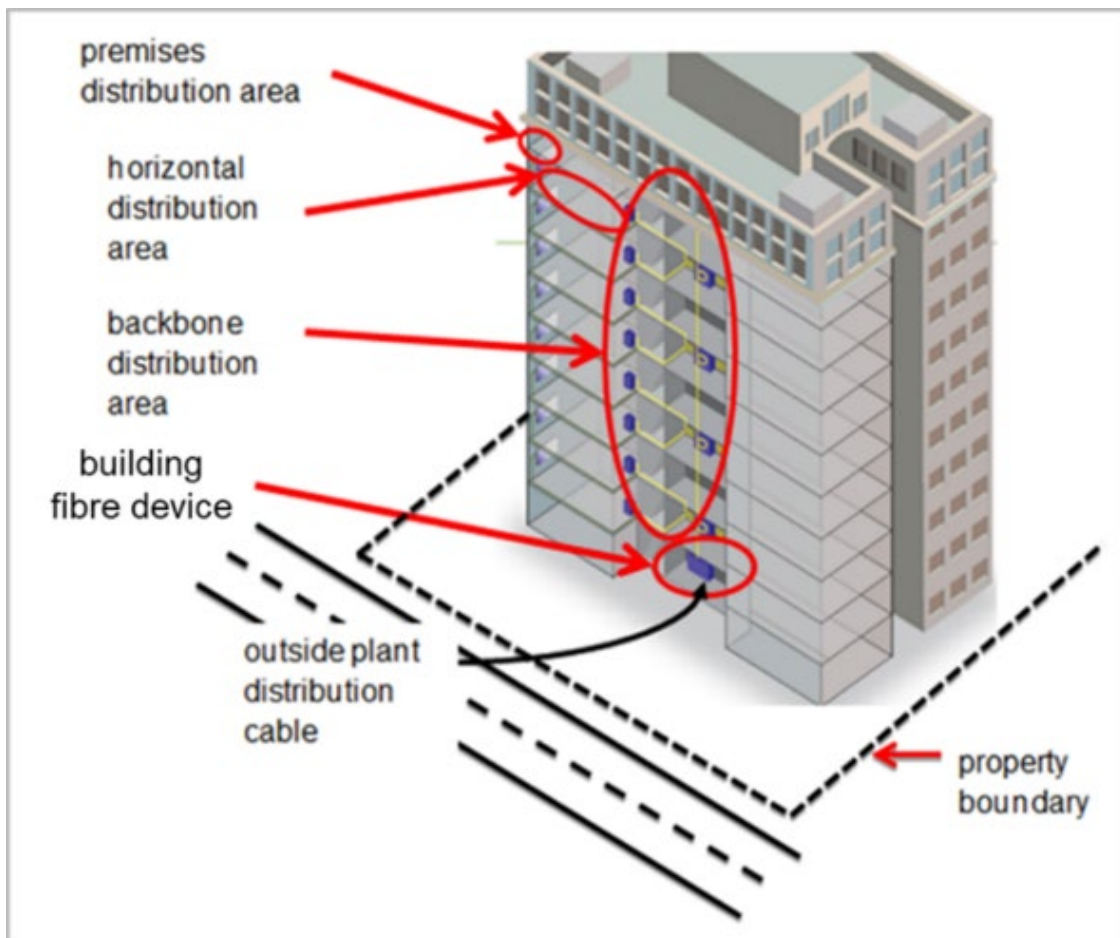


Figure 2. nbn network distribution within an MDU

nbn uses these areas within the MDU to apply nbn's Type 3 Architecture as per Figure 3 below,

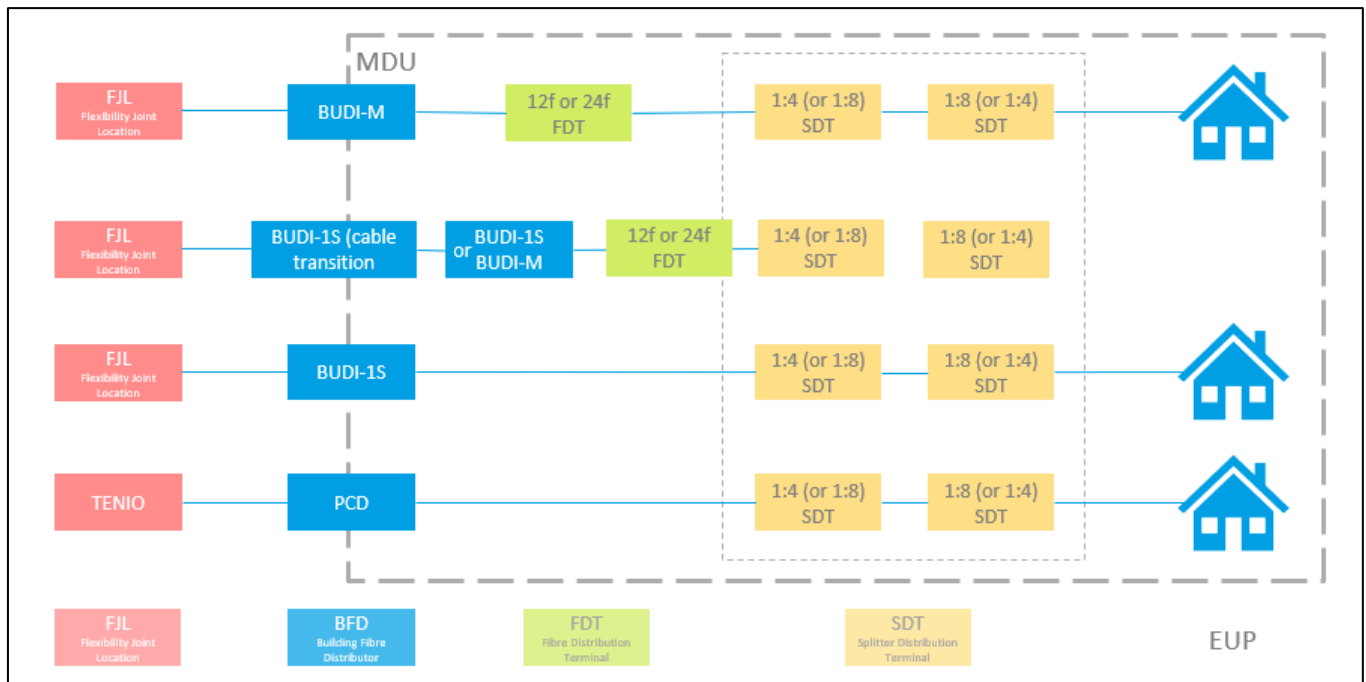


Figure 3. FTTP Type 3 architecture overview

3.2 Network Boundary Point (NBP)

The point which is deemed to be the boundary of a Carrier's Telecommunications Network for determining whether cabling or equipment is customer cabling or customer Equipment for the purpose of technical regulation under Part 21 of the Telecommunications Act 1997 (the Act).

The nbn NBP shall be:

- For FTTP: the service output ports on the nbn® NTD (i.e. the data [UNI-D] and phone [UNI-V] service sockets at the rear of the nbn® NTD) (in accordance with [1]AS/CA S009 *Installation requirements for customer cabling (Wiring rules)* the nbn® NTD is labelled as an NTD).'
- For Fibre TV: the UNI-RFe port of the Fibre TV receiver.

4 Responsibilities

Table 1 contains a simple matrix view of responsibilities split up by party (e.g. responsibility of nbn, responsibilities of builder/developer). The table is also organised in a sequential format based on the order each activity would generally occur.

Table 1. Responsibilities

Item	Description	Area	Developer/ builder	nbn
1	Network connectivity.	nbn® Fibre Network		✓
2	Provision of Lead-in conduit to Building.	Building Entry Point	✓	
3	Allocation of space within the designated Comms room or area dedicated for telecommunications services.	Equipment Room	✓	
4	Pathways to Comms room or area dedicated for telecommunications services.	Pathways	✓	
5	Pathways throughout of the building risers.	Pathways	✓	
6	Individual pathways to end user premises.	Pathways	✓	
7	Fire sealing and certification of pathways.	Pathways	✓	
8	Allocation of space for nbn equipment at the end user premises.	End user premises	✓	
9	Provision of General power outlet at end user premises.	End user premises	✓	
10	Installation of fibre cables and connection to the nbn® fibre network.	Fibre Network		✓
11	Installation of nbn® NTD (and other nbn equipment as required).	End user premises		✓
12	Test and commission of nbn® Fibre to each end user premises.	nbn® Fibre Network		✓
13	Customer cabling past nbn® Network Boundary Point.	End user premises	✓	

5 Lead-in requirements

Lead-in conduit (LIC) requirements vary depending on the size and type of the development. The sizes below allow for possible future building requirements:

- a. SDU like MDU premises: Require a min P20 to each premises with a minimum wall thickness of 1.7mm (Note: SDU like MDU premises, where each premises is individually fed by a LIC, are out of scope for this document. For these types of MDUs, refer to [10]NBN-DES-STD-0011 *Residential Preparation and Installation – Single Dwelling Units (SDUs) and Multi Dwelling Units (MDUs)*).
- b. 2 to 60 premises: Require 1 x white P50 PVC conduit, with a minimum wall thickness of 3.65mm.
- c. Greater than 60 premises: Require a minimum of:
 - i. 1 x white P100 telecommunications conduit with a minimum wall thickness of 4.5mm
 - ii. or 2 x white P50s PVC conduit, with a minimum wall thickness of 3.65mm (minimum 100mm capacity is required).

All conduits must meet the requirements of [2]AS/NZS 1477 *PVC pipes and fitting for pressure applications* and normal conduit dimensions, as shown in Figure 3.

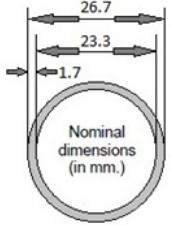
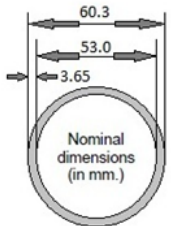
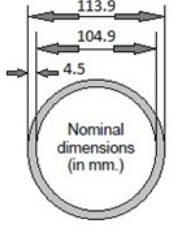
Conduit Dimensions	Nominal Size (Inside Diameter)	Conduit Dimensions	Nominal Size (Inside Diameter)	Conduit Dimensions	Nominal Size (Inside Diameter)
 <p>Nominal dimensions (in mm.)</p>	20 mm PN 12 AS/NZS 1477:2006 table 4.2(A)	 <p>Nominal dimensions (in mm.)</p>	50 mm PN 12 AS/NZS 1477:2006 table 4.2(A)	 <p>Nominal dimensions (in mm.)</p>	100 mm PN 9 AS/NZS 1477:2006 table 4.2(A)

Figure 3. Normal conduit dimensions

Communication pathways must be provided for nbn's lead-in cable(s) from the BEP to the first termination point situated in either the Comms room or a riser.

The pathway must be an accessible cable tray or single P50 conduit with drawstring.

No fibre is to be self-supported over a distance greater than 200mm.



All conduits must contain a drawstring.

6 Pathway and space requirements

6.1 Working height and space

Sufficient space is to be allocated for nbn fibre equipment to be installed within a Comms rooms or riser.

All nbn passive fibre equipment must be mounted at a comfortable working height and have sufficient access space around them for initial installation, ongoing maintenance, configuration modifications, and troubleshooting.

6.2 Space in Comms room/riser

nbn needs a minimum 1m x 1m allocated space within the main Comms room or first riser acting as a termination point for nbn fibre equipment and lead-in cable. The nbn fibre equipment is wall mounted and needs clear access initial installation, ongoing maintenance, configuration modifications, and troubleshooting.

The footprint must be between 400mm and 1800mm from finished floor level (FFL) and have clear front access of 1000mm directly in front.

The space requirement is an allocation of space for nbn passive equipment only and does not include any end user Network Termination Devices (NTDs) within the footprint detailed.

The 1m x 1m footprint allows for flexibility within the design when the design and device selection has not been confirmed.

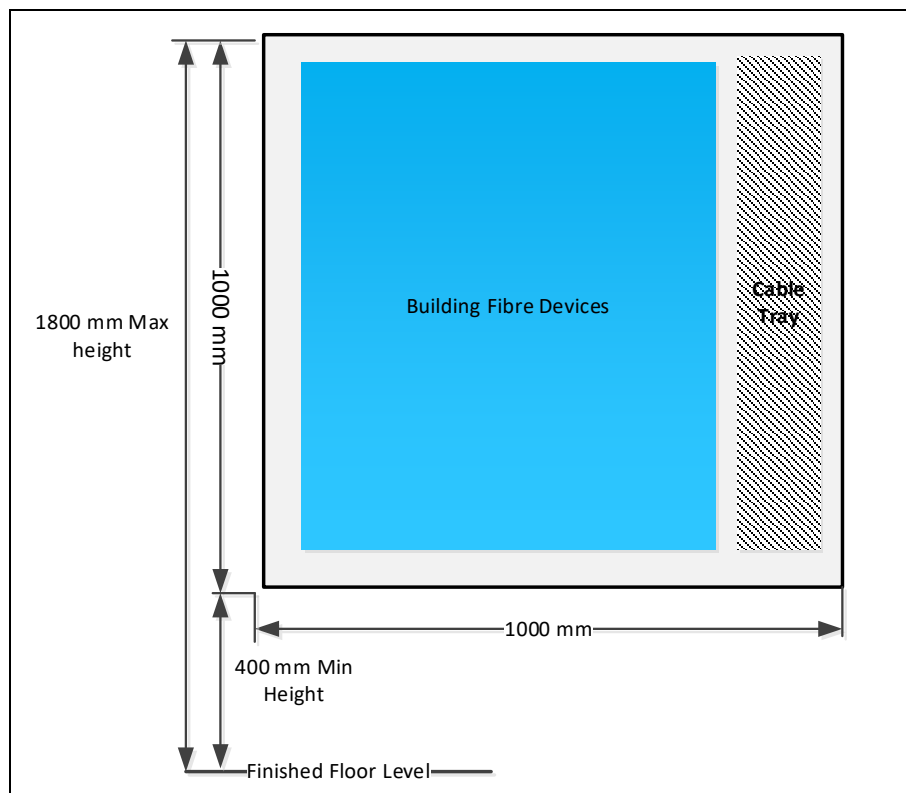


Figure 4. Generic landscape space - Comms room

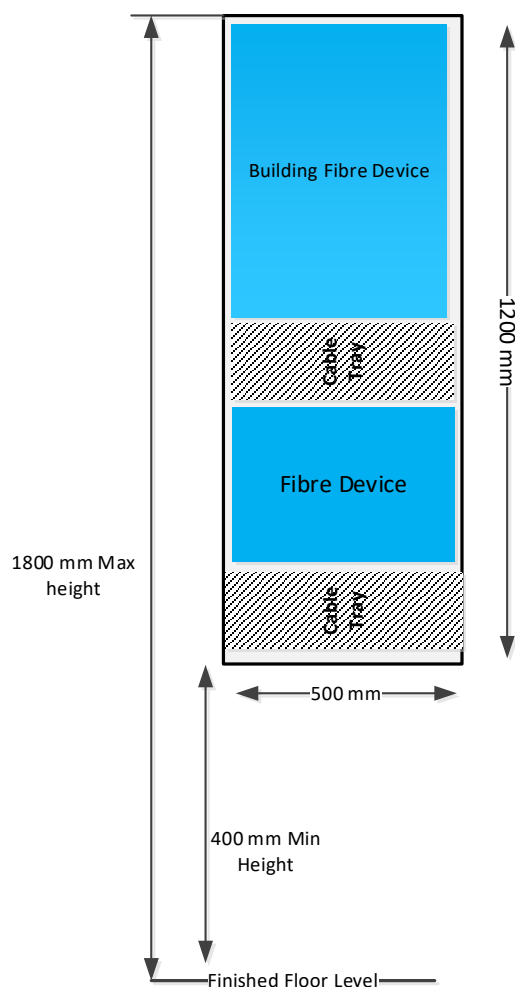


Figure 5. Generic portrait space - Comms room



Figure 6. Example of typical Comms room showing mounted BUDI and SDTs

6.3 Pathway from BEP/Comms room to riser

Communication pathways must be provided for nbn's lead-in cable(s) from the BEP to the first termination point situated with either a Comms room or riser.

The pathway must be an accessible cable tray or a P50 conduit with drawstring if within a ceiling space, with access panels every 15m and at change of direction.

No fibre is to be self-supported over a distance greater than 200mm.

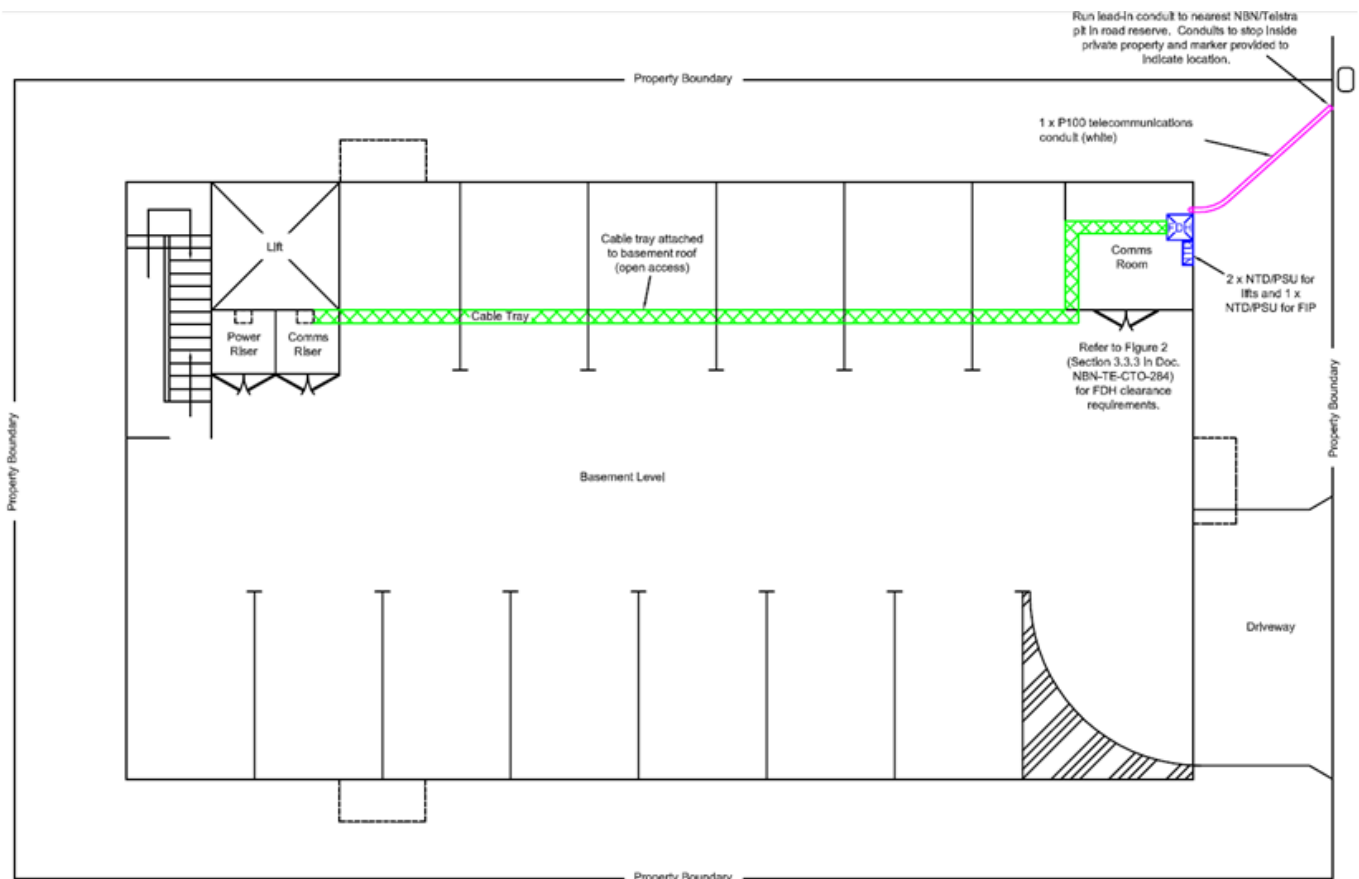


Figure 7. Example of typical Comms room to riser pathway

6.4 Risers

Risers are used for nbn's backbone cabling and for housing passive fibre devices. The main products commonly mounted in a riser are Fibre Distribution Terminals (FDTs) and Splitter Distribution Terminals (SDTs).

500mm x 500mm is the minimum footprint allocation within a riser or telecoms cupboard per floor room.

The footprint must be between 400mm and 1800mm from finished floor level and have clear front access of 1000mm directly in front footprint.

The space requirement is an allocation of space for nbn passive devices only and does not include any End-user NTDs within the footprint detailed.

The 500mm X 500mm footprint allows flexibility within the design when the design and device selection has not been confirmed.

Cable trays can run adjacent to nbn passive fibre equipment.

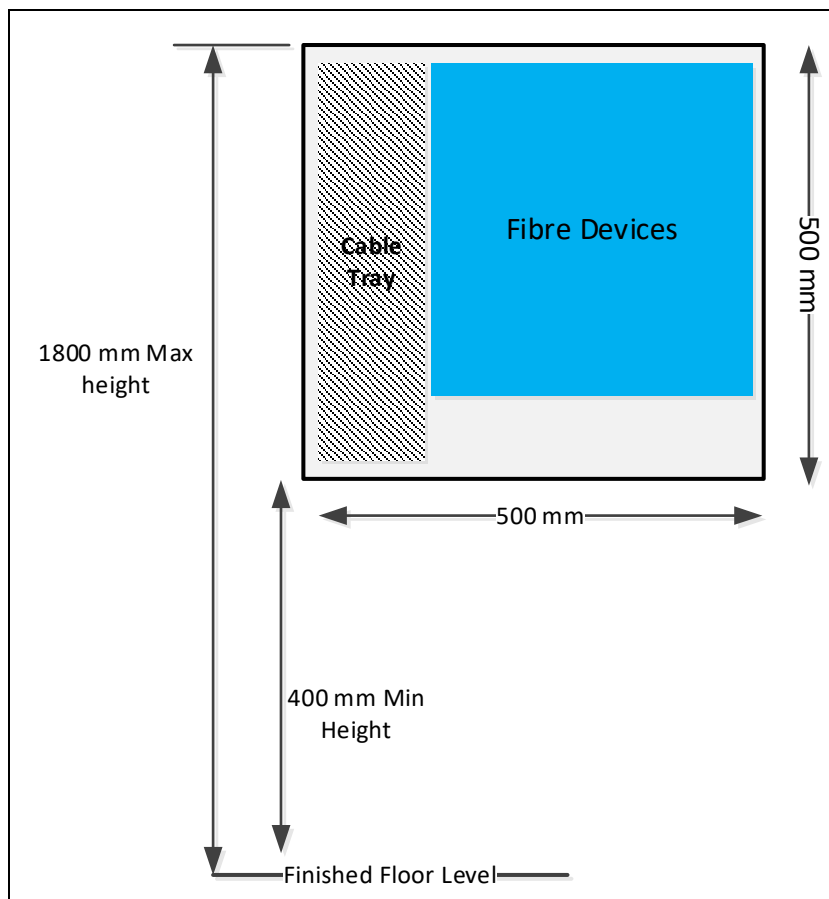


Figure 8. Generic riser footprint

6.5 Comms room to end user premises (EUP)

Communications pathways to end user premises (EUP) must be provided using one of the options below:

6.5.1 Option 1: Dedicated conduit

Cabling from the EUP to the Comms room or riser requires a minimum of a nominal P20 rigid white communication conduit.

Conduits must be draw stringed, from the Comms room or riser to each NTD location within an EUP (P50 ridged conduits can be utilised). No section of conduit must be longer than 50m between pull/draw points and contain the equivalent of no more than 3 x 90° 300mm radius bends. Conduits can be surface mounted in common areas or cast 'in slab'.



All conduits and drawstrings must be labelled to reference the respective apartment/unit number.

A single 100mm radius bend may be used to replace a 300mm radius bend at the final transition from horizontal to vertical, with the agreement of the relevant nbn representative.

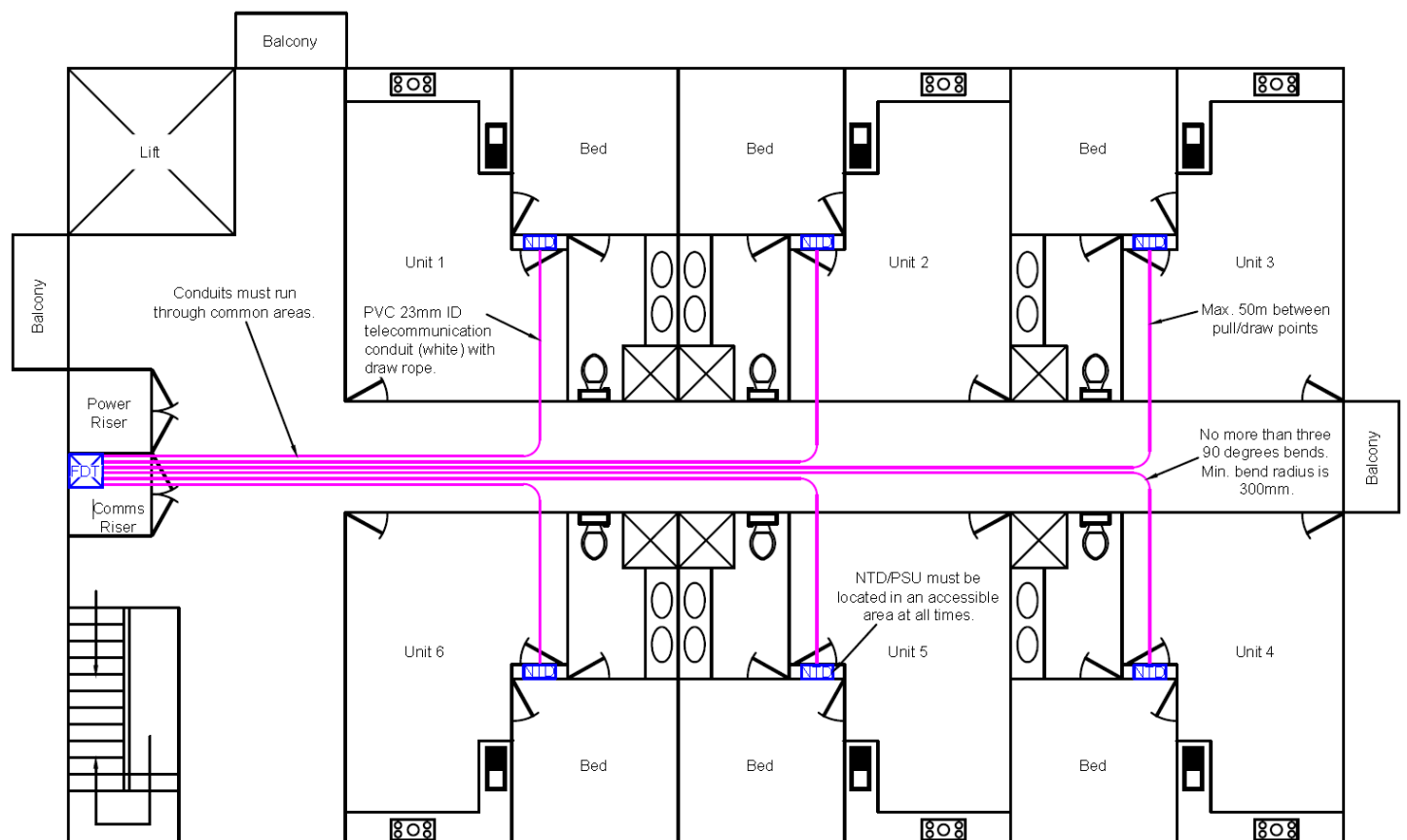


Figure 9. nbn® pathway using all nominal P20 conduit to feed typical apartment floor (example layout 1)

6.5.2 Option 2: Shared conduit

Where a combination of shared P50 truncation and dedicated conduits is used for cabling from the Comms room or riser to the EUP, access panels must be provided in accordance with the following requirements:

- at any cable conduit transition point
- 2 x P50
- a minimum of 450 x 450mm
- cable tray 150mm x 150mm or other suitable anchor to act as fixing point for cables at cable transition locations
- adjacent and within arm's reach of any transition and hauling points and placed where possible to avoid being placed at heights that required specialist equipment to access such as scissor platforms and boom lifts

There must be a minimum of 100mm separation from the nbn® network infrastructure and other utilities cables/ infrastructure.

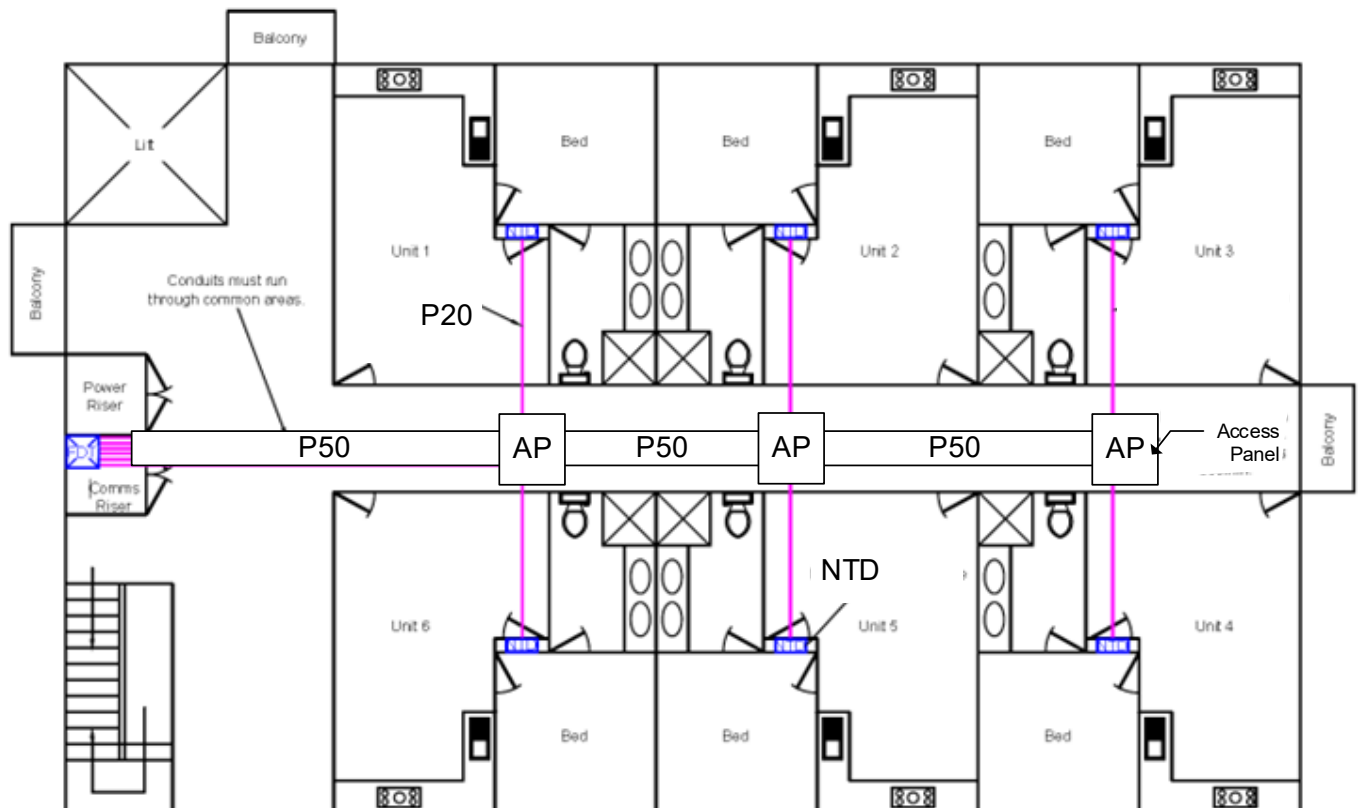


Figure 10. nbn® pathway using combination of P50 and nominal P20 conduit to feed typical apartment floor (example layout 2)

7 nbn passive fibre equipment requirements



This section provides an overview of the nbn passive fibre equipment to be installed to provide a better understanding of nbn's space requirements.

7.1 Building Fibre Devices (BFDs)

Building Fibre Devices (BFDs) are used to connect external fibres to the internal fibre cabling and devices. There are two types, Premises Connection Device (PCD) or BUDI, with the BUDI having two variants: BUDI-1S or BUDI-M.

7.1.1 Premises Connection Device (PCD)

The PCD is used as a BFD for up to 32 EUPs.

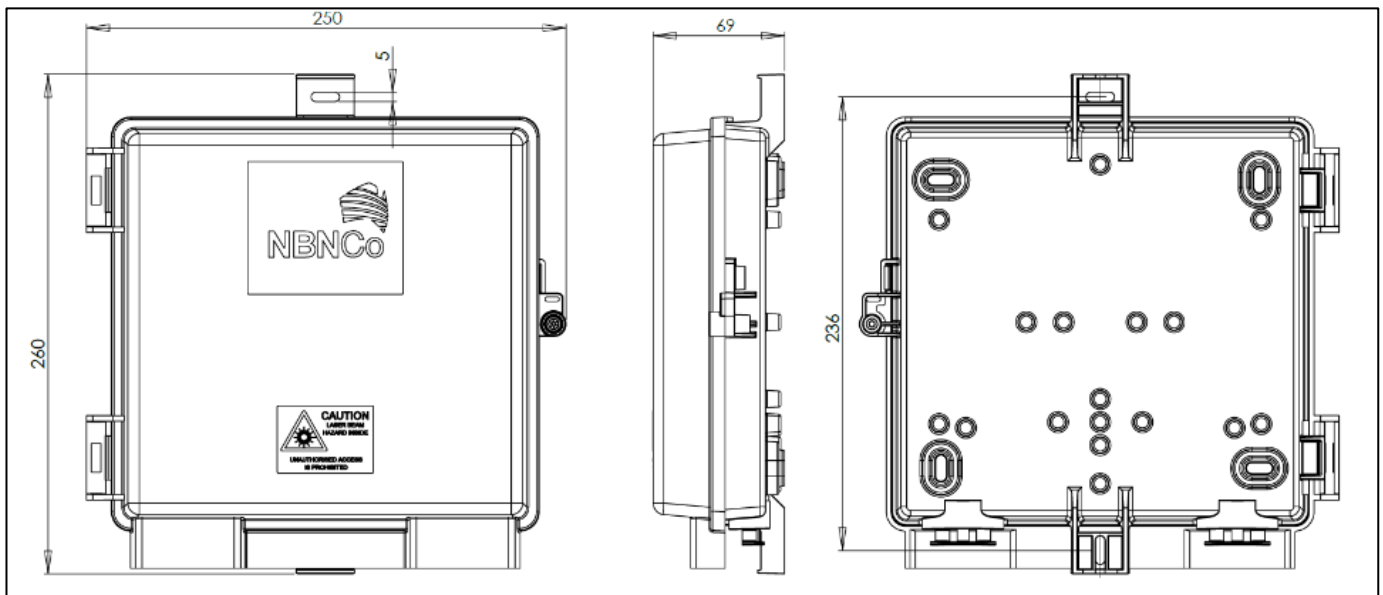


Figure 11. PCD dimensions

7.1.2 BUDI-1S

The BUDI-1S, is a medium sized BFD, that can be used for managing 12 fibre cables. It is used for medium to large MDU developments typically between 10 – 280 EUPs.

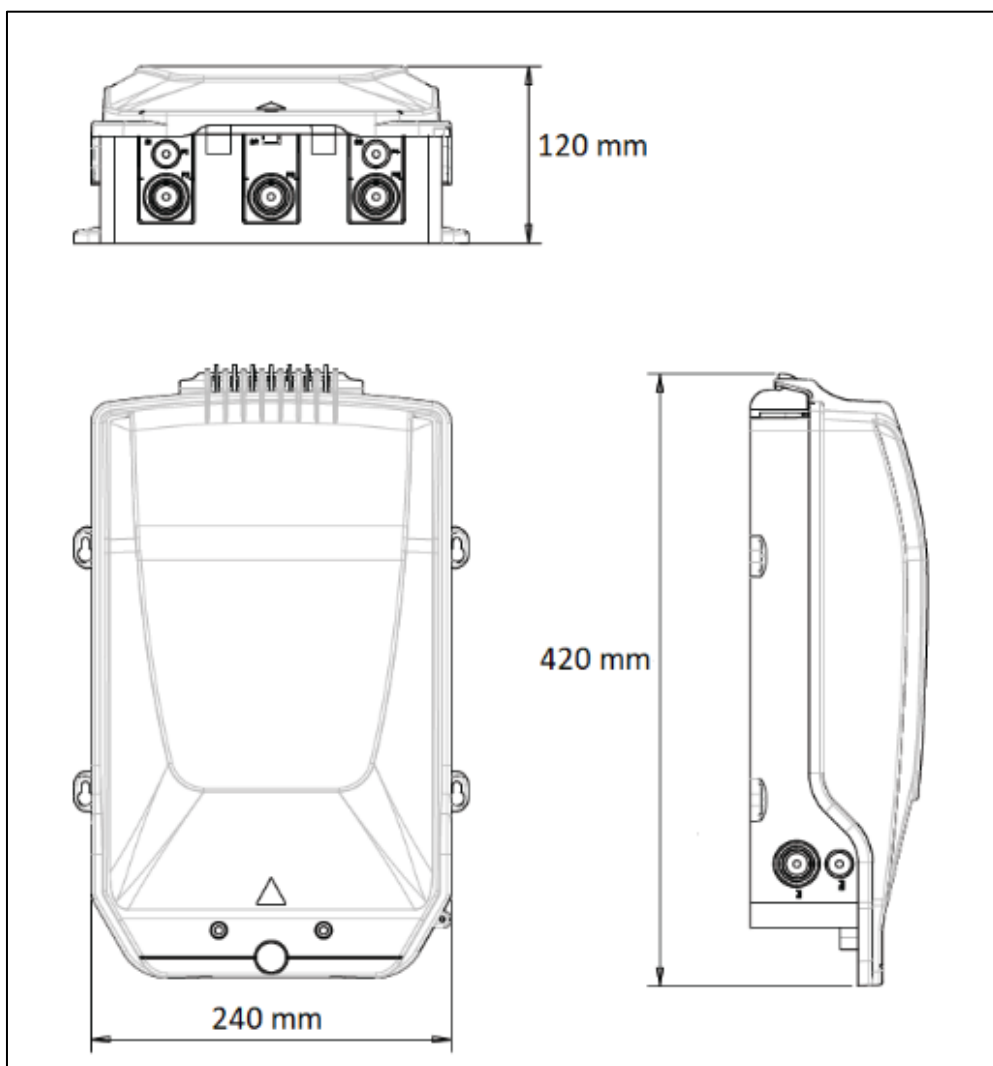


Figure 12. BUDI-1S dimensions

The BUDI-1S must be placed in secure and lockable rooms or risers such as a Main Distribution Frame (MDF) or Comms room. It can be placed externally within an enclosure for small to medium MDUs when required.

7.1.3 BUDI-M

The BUDI-M is a large BFD, used on buildings that have a fibre demand greater than 10 fibres.

It has the largest capacity of the BFDs and is used for large MDUs and when the building or development has a Fibre TV build requirement or the design needs to aggregate fibres via a Fibre Distribution Terminal (FDT).

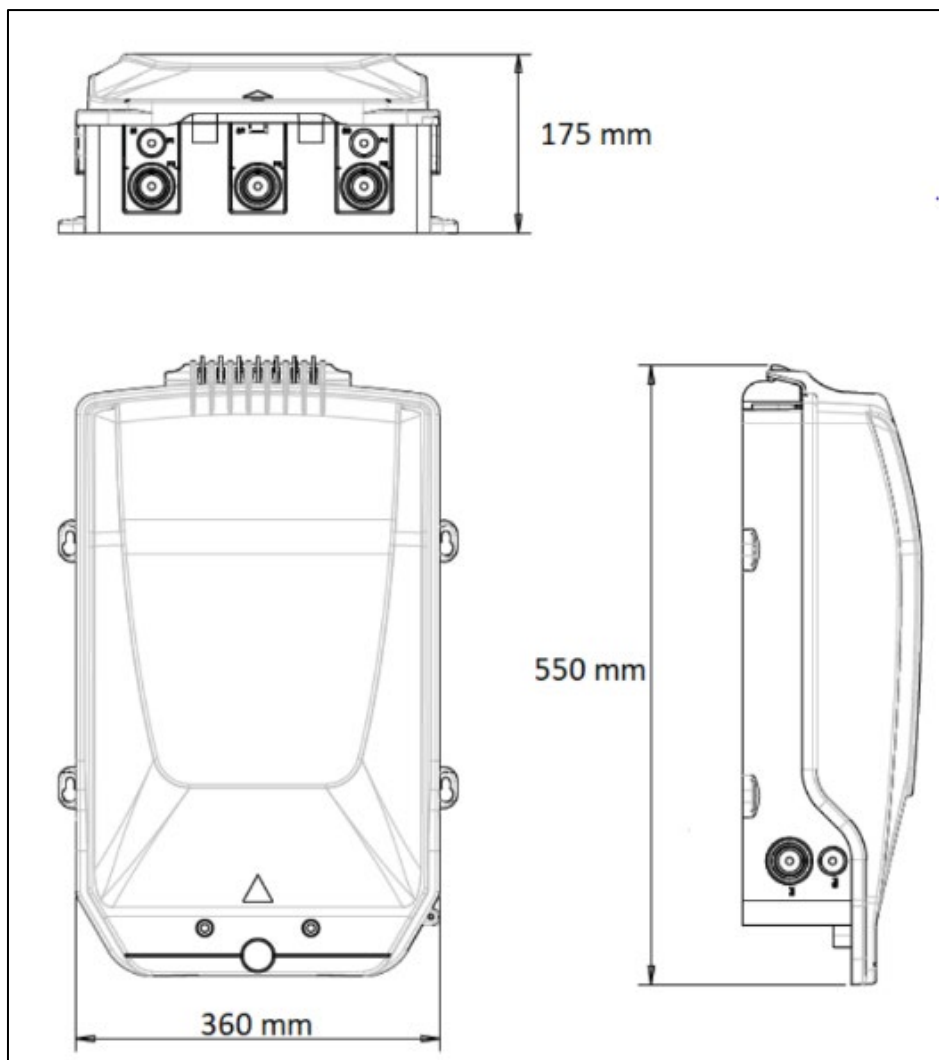


Figure 13. BUDI-M - dimensions

BUDI-M must be placed within secure and lockable rooms or risers such as an MDF or Comms room. It can be placed externally within an enclosure for small to medium MDUs without a Comms room.

7.2 Internal passive equipment

Splitter Distribution Terminals (SDTs) and FDTs are connected to the BFD and provide the internal nbn backbone distribution.

FDTs are internally rated and must be housed internally within Comms rooms or risers that provide a pathway to EUPs.

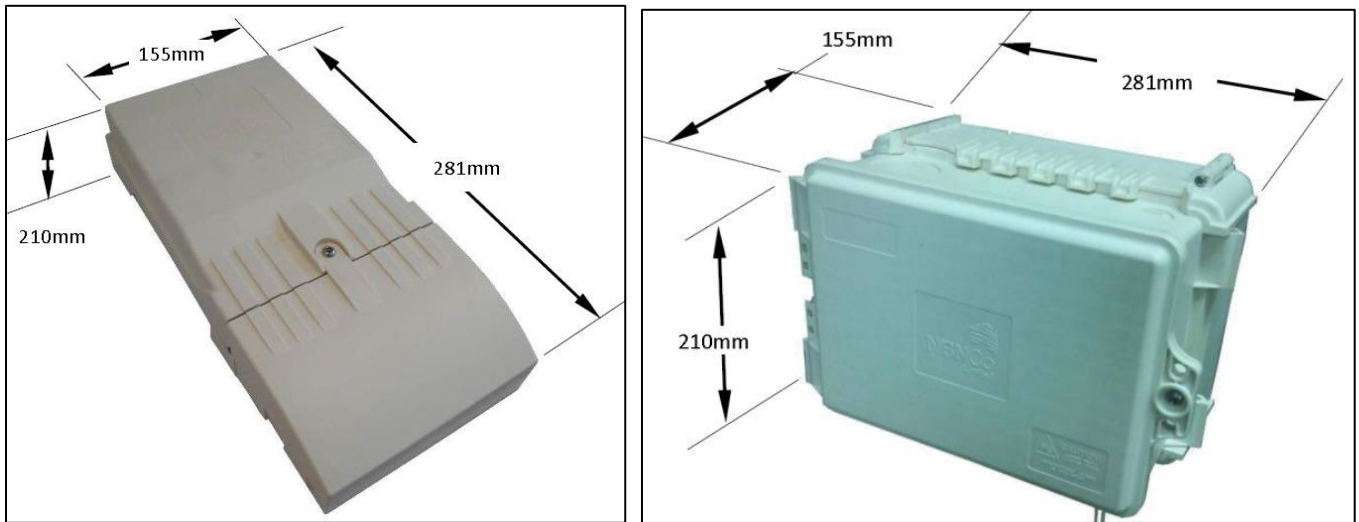


Figure 14. 12 fibre and 24 fibre FDT Dimensions

The FDTs and SDTs must be placed in secure and lockable Comms rooms or risers and are used to minimise Premises Internal Cable (PIC) and SDT cable installation lengths with distribution throughout the risers.

SDTs are normally placed within risers with access to conduits to EUPs.

SDTs and FDTs provide connection to nbn's hallway cabling and the single fibres to each EUP.

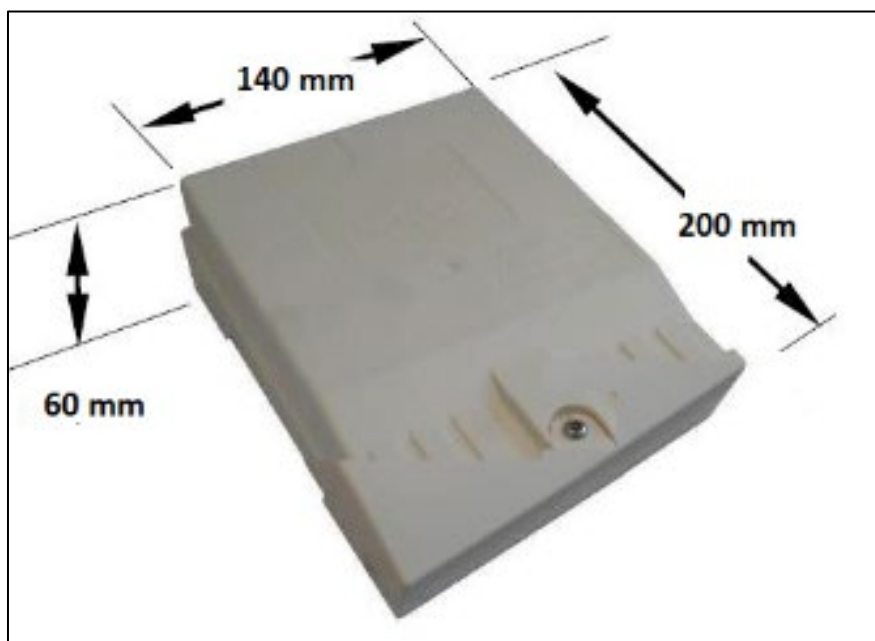


Figure 15. 4 and 8 port internal SDT dimensions

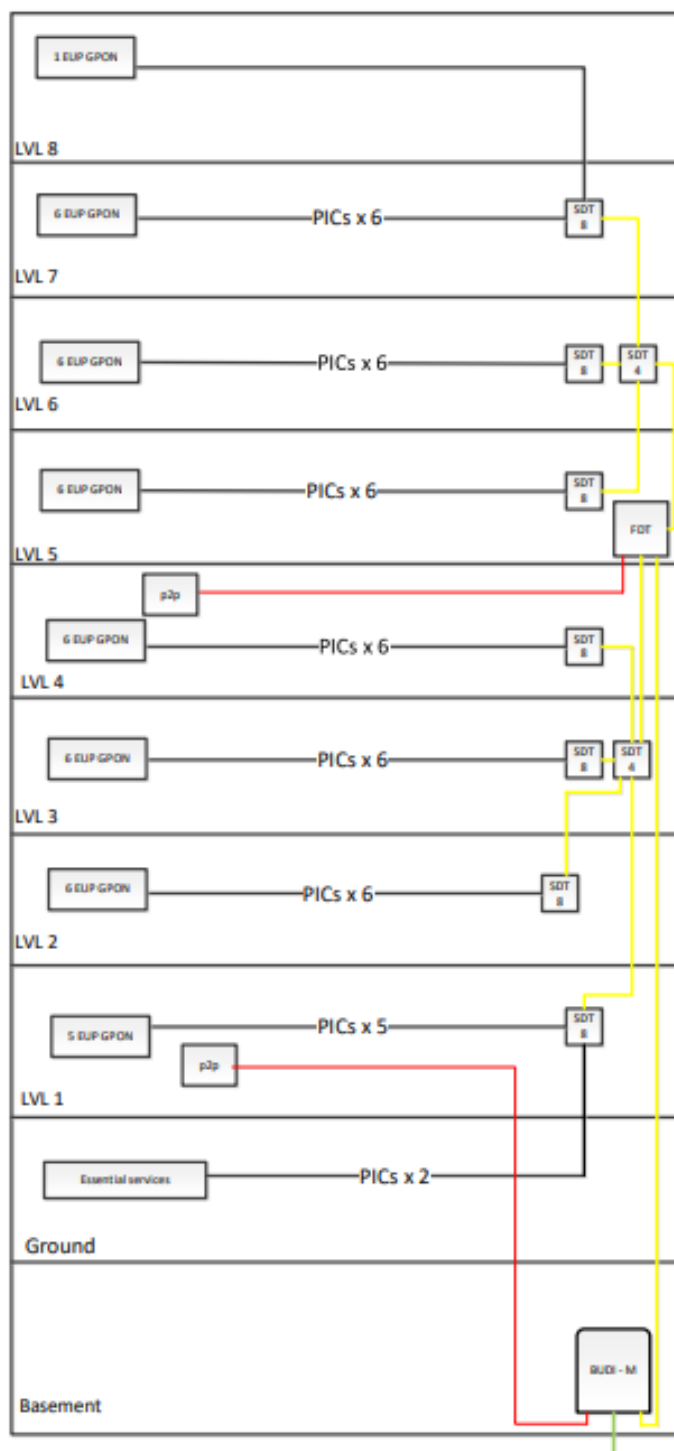


Figure 15. Example of FDTs and SDTs located in a vertical MDU

7.3 External enclosures for BFDs

nbn prefers that equipment is installed internally in a Comms room or riser but recognises that this is not possible in all instances particularly in small MDUs where there is no common area available for a Comms room or riser to house the nbn passive fibre equipment.

In these instances, the equipment can be installed within a suitable external enclosure on an external building wall in accordance with the requirements in the following sections.

7.3.1 Enclosure purpose

The enclosure should only be used for the following:

- to house the passive fibre equipment (PCD/BUDI/SDT) in extra small and small MDUs where there is no Comms room or riser
- as a suitable lead-in conduit transition point e.g. P50 to P20
- to act as the BEP for nbn's lead-in cable
- to provide additional security for nbn passive fibre equipment
- to allow for a more visually appealing cabinet, that can colour match the premises

7.3.2 Enclosure location

The enclosure must be:

- installed on an external wall in a safe and readily accessible location (can also be recessed within a cavity wall)
- set back from trafficable areas and must not block building walkways or encroach exit pathways, parking spaces or driveways
- positioned on the wall at a maximum height of 1800mm from FFL to the top of enclosure and a minimum 400mm from ground level, with clearances as shown in Figure 8 below.

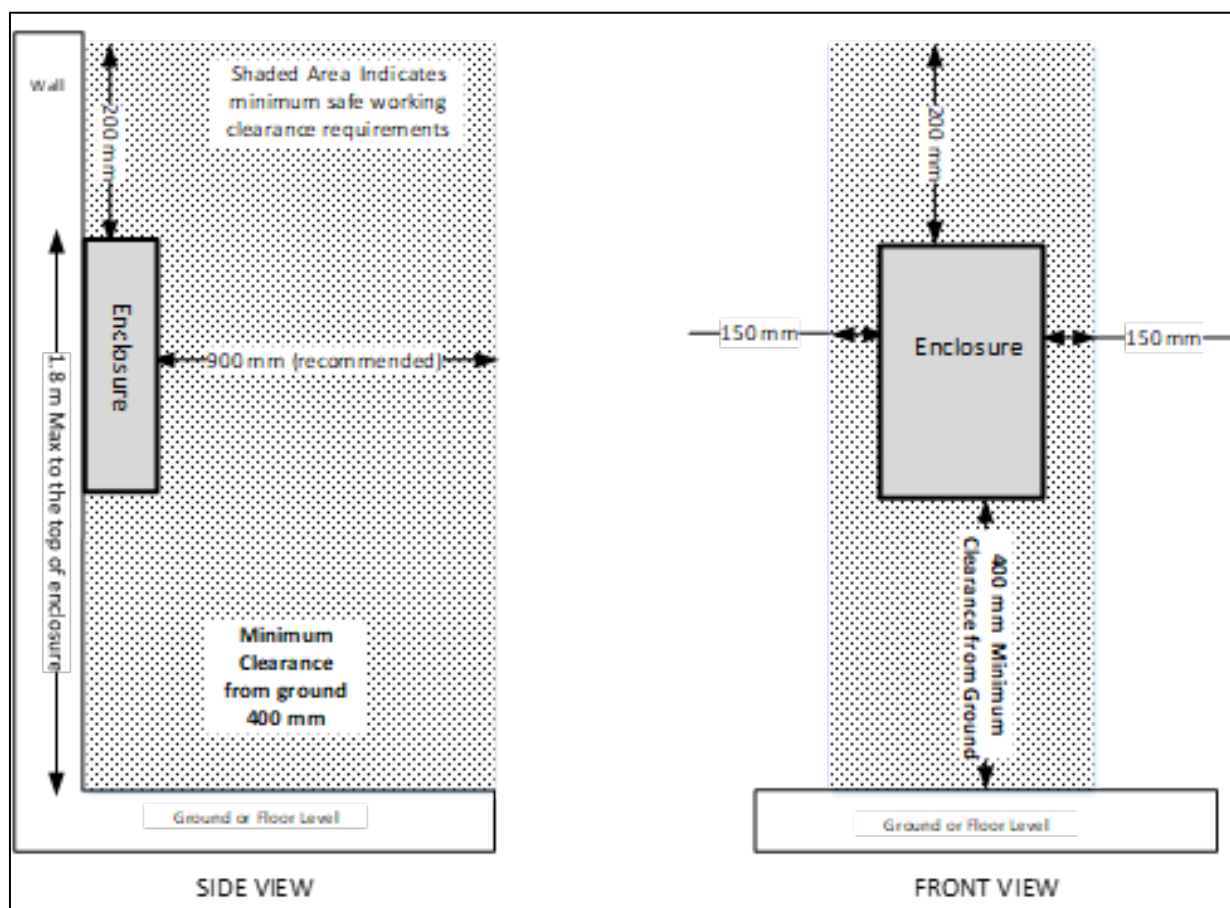


Figure 16. Enclosure clearances

7.3.3 Enclosure dimensions and clearances

Note: Larger or multiple enclosures can be used as required to meet the number of devices to be installed and clearance requirements.

Requirement	Dimension/clearance
Minimum external enclosure size for 1 – 4 Serviceable Locations (SLs)	600mm (h) x 600mm (w) x 300mm (d) to be used for a PCD, and single SDT if required.
Minimum external enclosure size for > 4 SLs	800mm (h) x 800mm (w) x 300mm (d) to be utilised to accommodate a BUDI BFD and maximum of 2 x SDTs.
Minimum internal mounting dimensions	760mm (h) x 760mm (w) x 250mm (d)
Minimum side and top clearance of equipment within the enclosure	50mm from enclosure walls and other equipment.
Clearance from bottom of devices for cable entry	250mm
Minimum degrees that PCD door must open to allow clear access to splice trays	120°

7.3.4 Enclosure conduits

Conduit entry points into the enclosure must:

- be adequately sealed to mitigate against ingress of vermin and weather and to maintain IP55 rating
- be free of sharp edges or burrs or have a grommet of insulating material fitted

Conduits entering the enclosure must be secured to the building, with no more than 30mm of conduit protruding into the enclosure internal space.

Conduits leaving the enclosure must not be installed in shared or dedicated underground trenches.

Conduits can be surfaced mounted - installed unbroken in a cavity via a common area to the Network Termination Device (NTD) location and/or cast in a concrete slab.

7.3.5 Enclosure labelling

The front enclosure door must be identified as **NBN**, with a permanent fixed label.

8 Utility clearances

The following sections detail the clearances that must be maintained for the safety and practicality of installing nbn passive fibre equipment within EUPs in relation to other utility services.

Clearance from other utilities such as fixed services, including pipes and taps and meters must adhere to the Building Code of Australia and the clearances listed below.



The developer must confirm any additional spatial separation with its local gas distribution authority, relating to commercial gas applications.

8.1 Gas meter clearances

Note: The clearances below are nbn's minimum clearances based on [6]AS/NZS 4645.1 *Gas distribution networks, Part 1: Network management*.

The clearance for a gas meter is dependent on whether the gas meter is located within an enclosure (enclosed) or outside of an enclosure (unenclosed).

The distances are measured from the surface of the gas meter, gas regulator or any gas fitting, whichever is the outermost.

8.1.1 Enclosed Gas Meter

A minimum clearance of 500mm is required from an approved gas meter enclosure.

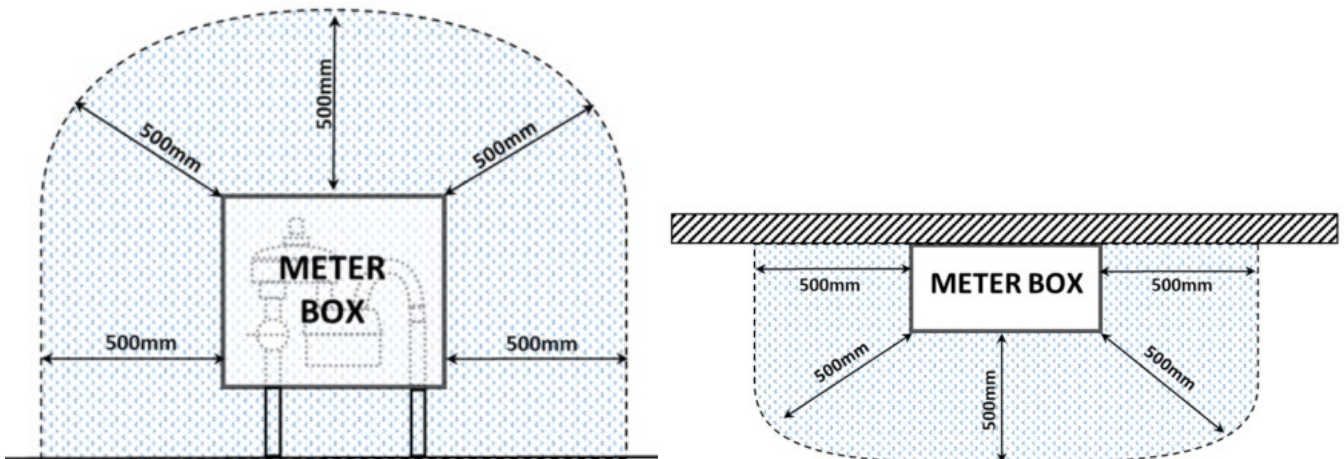


Figure 17. Gas meter clearances - enclosed

8.1.2 Unenclosed Gas Meter

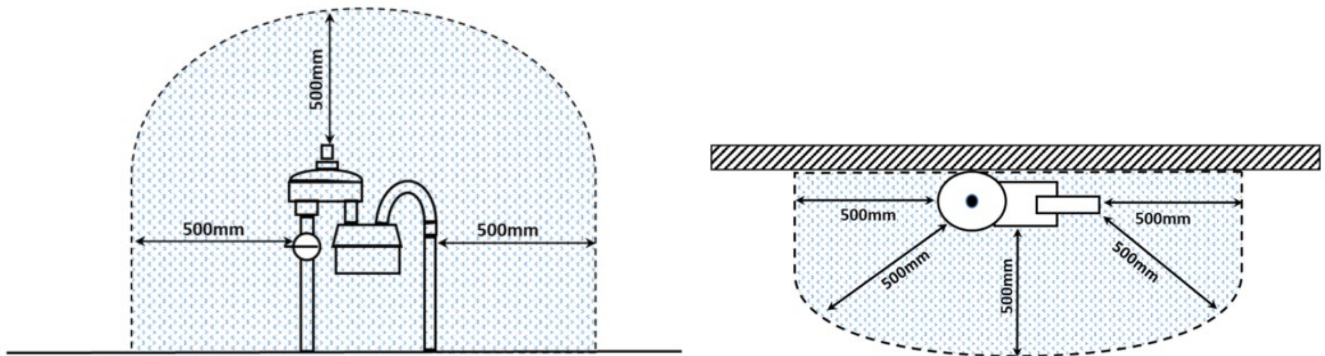


Figure 18. Gas meter clearances - unenclosed

8.2 Gas cylinder clearances

There are two types of gas cylinders: in-situ and exchangeable.

8.2.1 In-situ gas cylinders

In-situ gas cylinders are filled onsite and are not physically removed. Although the valve is on top of the cylinder, it will not have a fixed tap on top on it. The **On** and **Off** tap will be on the side. Typically, the valve will have a yellow cap on it, however if not yellow, it will be distinguishable by the fact it can be removed.



Figure 19. In-situ gas cylinder showing removable yellow cap

8.2.2 Exchangeable gas cylinder

Exchangeable gas cylinders are physically removed on empty to fill. The valve on the top of the cylinder will normally have a green tap to turn the gas on and off and cannot be removed. Typically, the tap will be green, however, if not green, it will be distinguishable by the fact it has **OPEN** and **CLOSE** marked on it.



Figure 20. Exchangeable gas cylinder showing green tap with 'OPEN' and 'CLOSE' markings

The following clearances apply for an in-situ or exchangeable gas cylinder and are nbn's minimum clearances based on [3]AS/NZS 1596 *The storage and handling of LP Gas*.

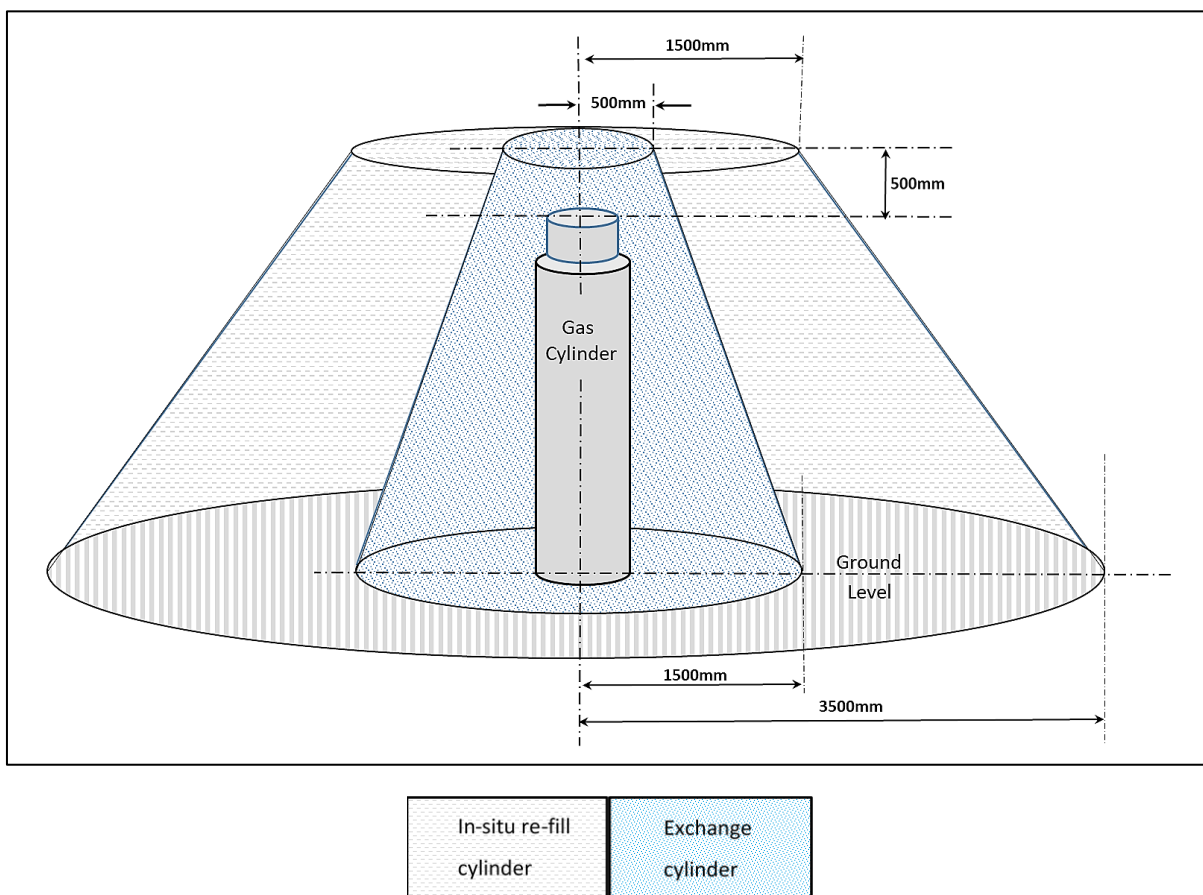


Figure 21. Gas cylinder clearances – 360° view

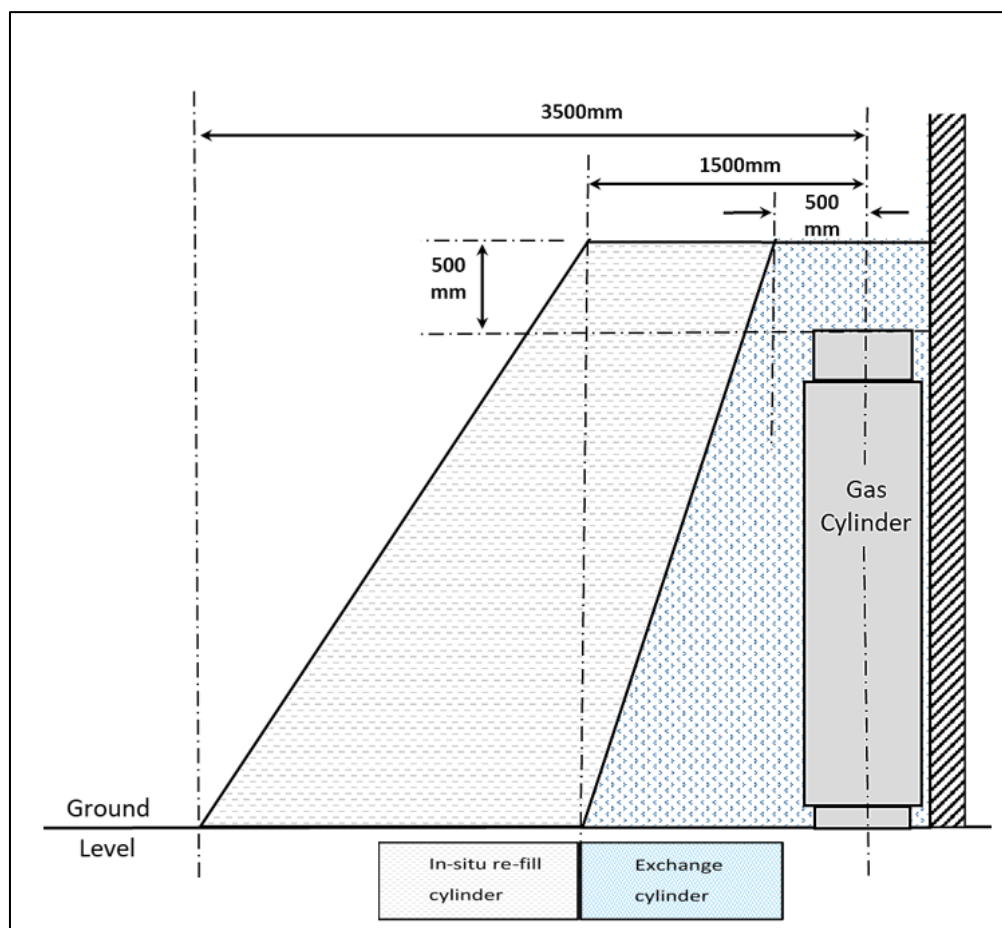


Figure 22. Gas cylinder clearances – side view against a wall

Note: The horizontal distances are measured from the centre line of the gas cylinder.

8.2.2.1 Electricity clearances

The clearance from any power sources including the point where the premises power supply cable connect to the property electrical switchboard is 150mm.

Refer to [4]AS/NZS 3000 *Electrical installations (known as the Australian/New Zealand Wiring Rules)* for clearances from electrical switch equipment.

8.2.2.2 Water clearances

The clearances from any fixed water services such as pipes, taps and meters must be a minimum of 150mm on all sides.

9 Network Termination Device (NTD) requirements



The NTD is installed by nbn or its Delivery Partners. Please use the information below to ensure the appropriate space/location is made available for this installation.

The nbn® Network Termination Device (NTD) provides a Fibre Connection from the nbn® network to each EUP.

The NTD is part of the nbn® FTTp equipment installed by nbn.

The NTD provides User Network Interface (UNI) ports that enable access to data (internet) services via an RSP modem, which the premises occupant orders from an ISP or RSP.

nbn has two current NTD models: a variant with one UNI-D port, and a variant with four UNI-D ports (both variants are supplied by two vendors).

Standard installations will use the 1-port variant. The new 4-port NTD will be deployed as required for services ordered through a Retail Service Provider (RSP), for example where a customer requires multiple services.

nbn previously used a legacy 4-port FTTp NTD device, which has been replaced by the two current variants.

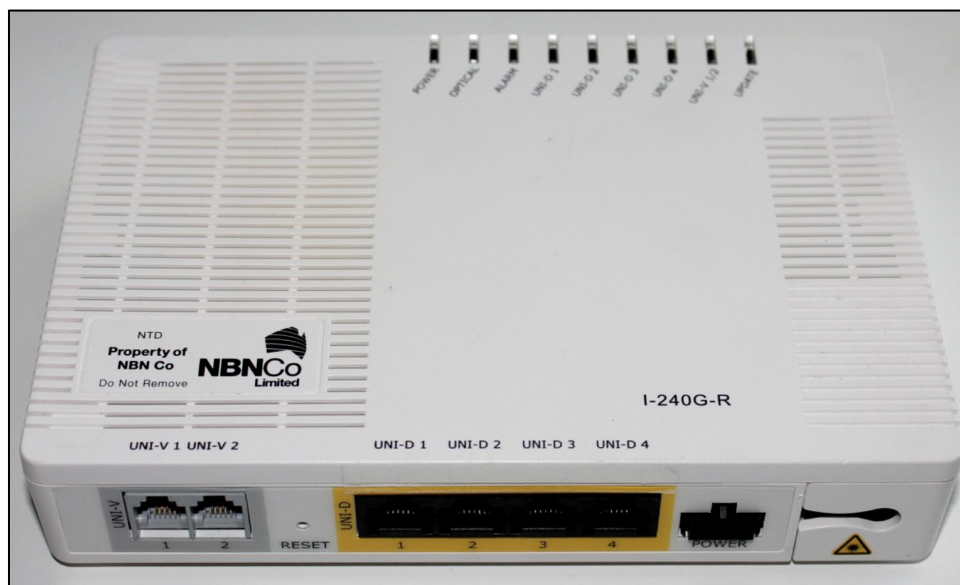


Figure 23. Legacy FTTp NTD

To activate any nbn® service, the occupant must contact an RSP of their choice. The RSP will provide services (and possibly additional equipment) to allow the occupant to access the nbn® network.



Figure 24. FTTP 1-port NTD



Figure 25. FTTP 4-port NTD

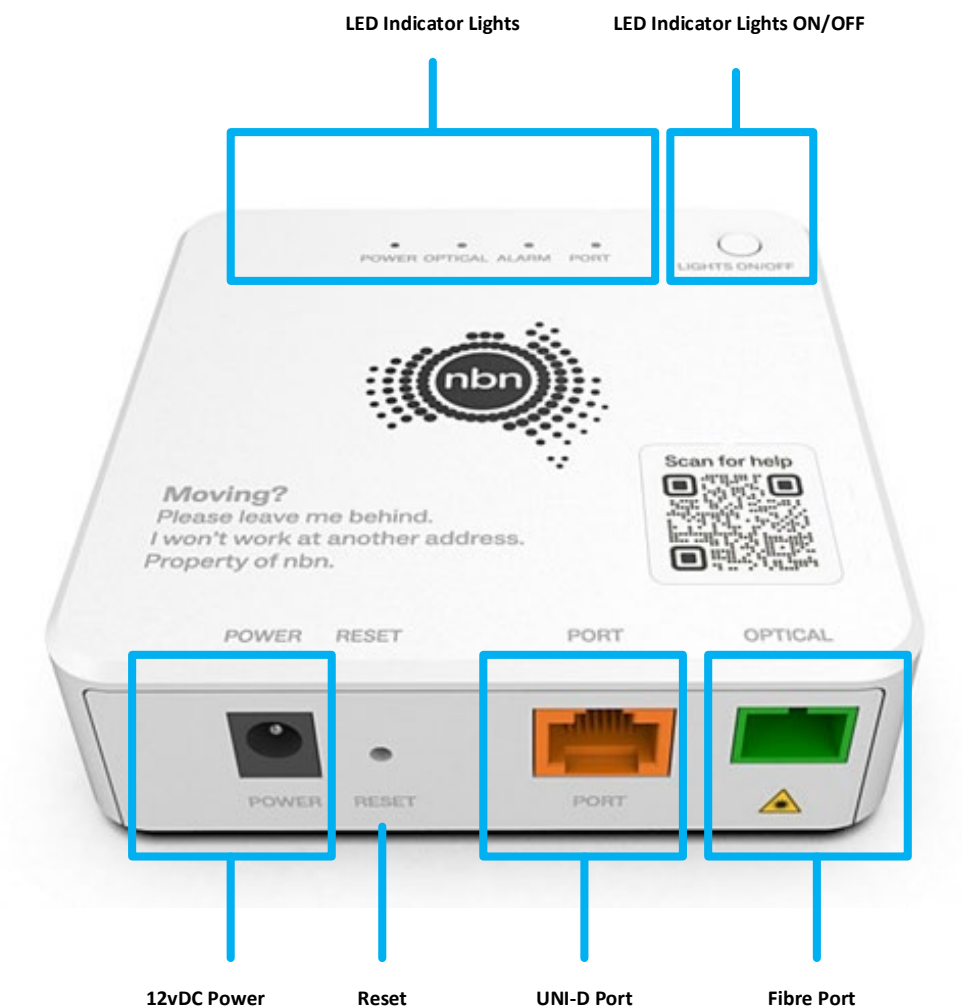


Figure 26. FTTP NTD - single UNI-D port

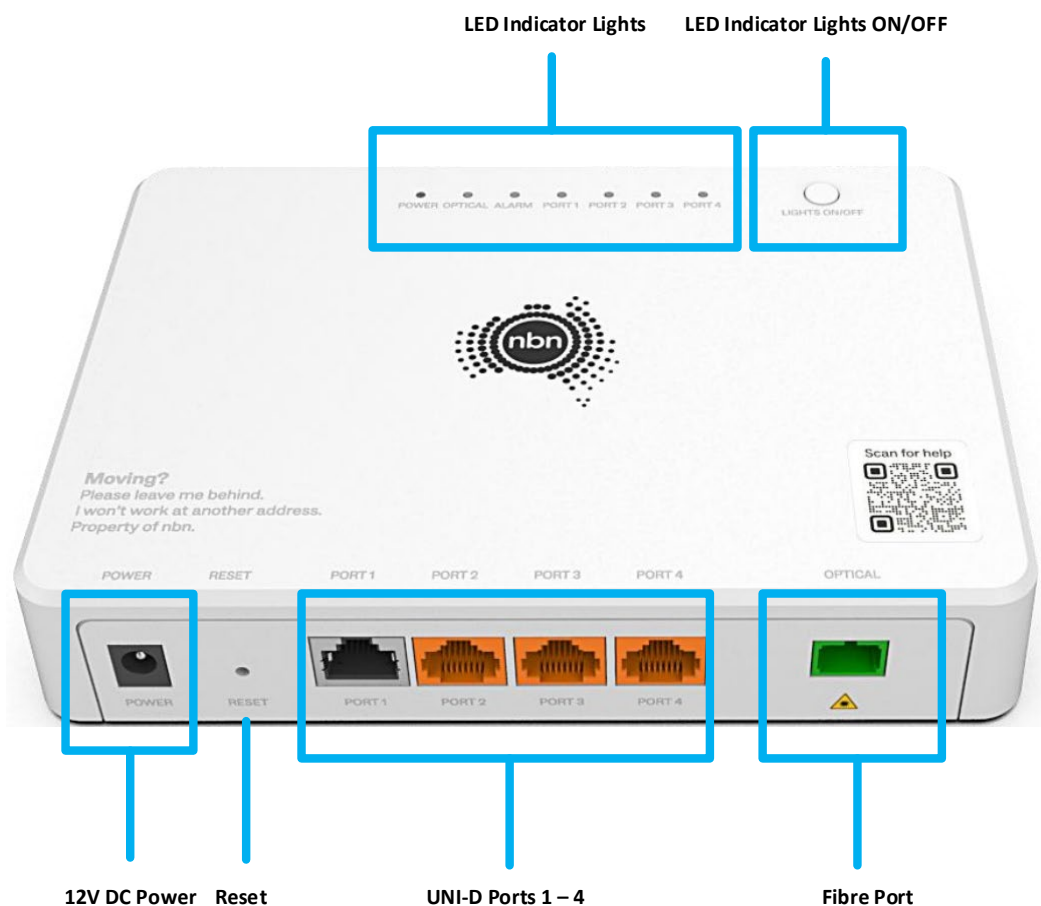


Figure 27. FTTP NTD - 4 UNI-D Port

Both NTDs are supplied with a wall mount bracket and a single PSU (12V DC, 2 PIN 1.5A power lead 1.5m in length).



Figure 28. FTTP NTD 12V DC PSU

Wall mount brackets cover the wall penetration for the incoming fibre-optic cable and provide cable management for the PSU lead and ethernet cabling.

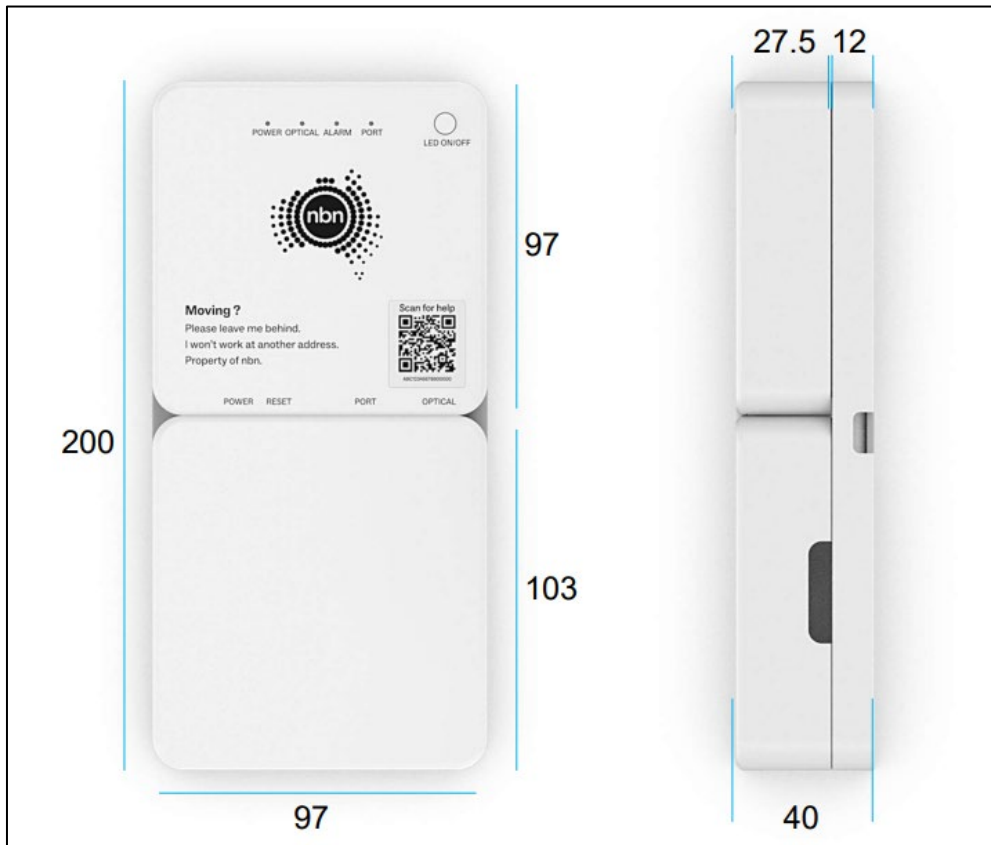


Figure 29. 1-port FTTP NTD and wall mount bracket dimensions

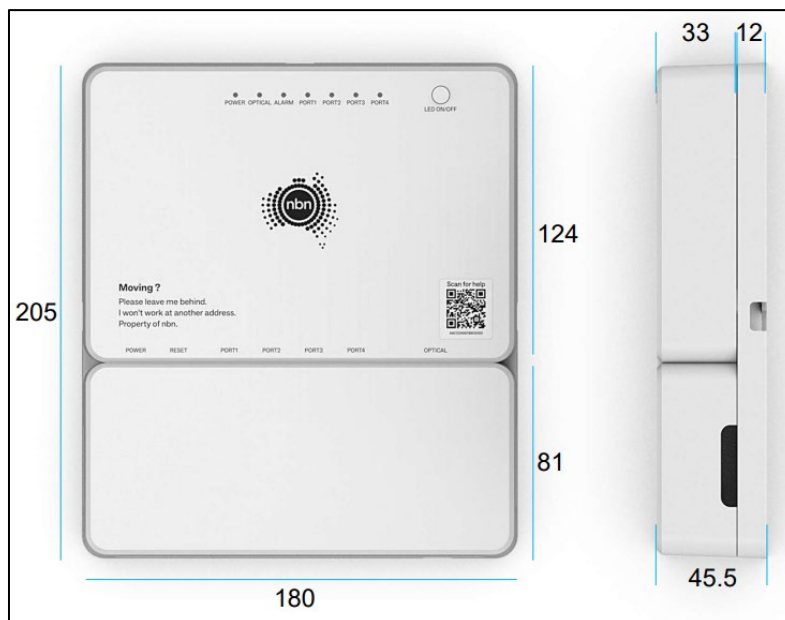


Figure 30. 4-port FTTP NTD and wall mount bracket dimensions

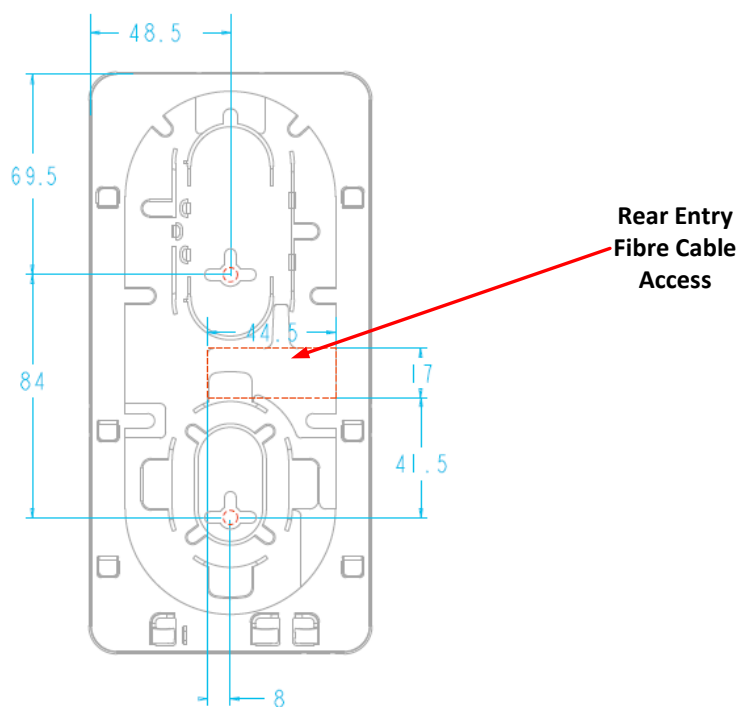


Figure 31. 1-port NTD wall mount bracket dimensions and rear access

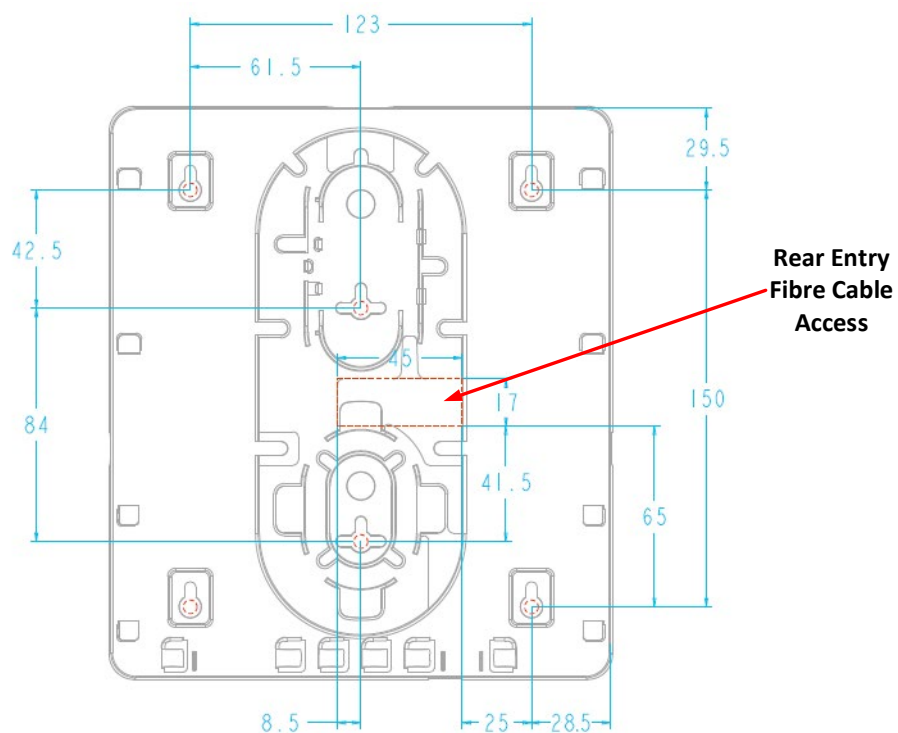


Figure 32. 4-port NTD wall mount bracket dimensions and rear access

9.1 NTD installation locations

The NTD and PSU must be installed

- a. In a building where people normally live, work or meet, but not in a place that is open to public access.
- b. In the same building as each other.

Note: The end user cabling remains wholly within the same premises containing the NTD and PSU.

The NTD and PSU must not be installed:

- a. Externally
 - b. In an enclosure situated on or embedded into the external surface of an external wall of the building.
 - c. In a situation where they might be reasonably expected to experience damp, moist or excessively humid conditions.
 - d. Within a roof cavity.
 - e. Below a floor outside the normal living, working or occupancy areas of the building.
 - f. In a cupboard, enclosure, home distributor or in a confined space where:
 - i. It might reasonably be expected that linen, clothing or towels might be stored in direct contact with the NTD or PSU.
 - ii. It might be reasonably presumed that items could be stored that restrict free airflow around the NTD or PSU.
 - iii. gases may be trapped due to limited or no ventilation, or because the design or situation of the enclosure or home distributor is such that there is potential for ventilation to be inhibited.
 - g. In a location where the ambient temperature in the immediate vicinity of the NTD or PSU might routinely exceed +40°C or fall below 0°C.
 - h. On a surface where the temperature might routinely exceed +40°C or fall below 0°C.
 - i. In a location where the power or end user cabling might:
 - i. Be a tripping or strangulation hazard.
 - ii. Be accidentally wrenched or damaged by tripping, passers-by or another inadvertent disturbance.
 - j. Onto an accessible conductive/metallic surface encompassing a general power outlet (GPO), unless all accessible conductive surfaces and parts have been protectively earthed in accordance with [4] AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules).
- Note:** The PSU power cord must not be routed through an opening in a metallic surface, unless the metallic edges of that opening are appropriately protected by a grommet or similar device.
- k. In a location where they are at risk of being damaged.

9.1.1 Height

nbn is committed to providing accessible products and services for people and customers with disability and access needs. nbn has a responsibility to ensure that its workplace environment, activities, and the network it builds are created accessibly and inclusively for employees, customers, communities, and Delivery Partners.

When allocating space for each nbn **NTD** please consider:

1. **Location** - where it is not difficult to access.
2. **Height** - ensuring it's within arm's reach.
3. **Relocatable** - should the customer make a request.

NTDs must be installed in an accessible location, allowing both the end user and technicians clear access for removal and replacement of the NTD. This should ensure it is feasible for those parties to install a router/gateway and connect customer cabling to the NTD (e.g. ethernet cables into the UNI-D port).

The location must be within arm's reach of an average person, with arm's reach defined as a zone extending from any point on a surface where persons usually stand or move about, to the limits that a person can reach with the hand in any direction without assistance (e.g. tools or ladder) and as shown in Figure 33. Arm's reach.

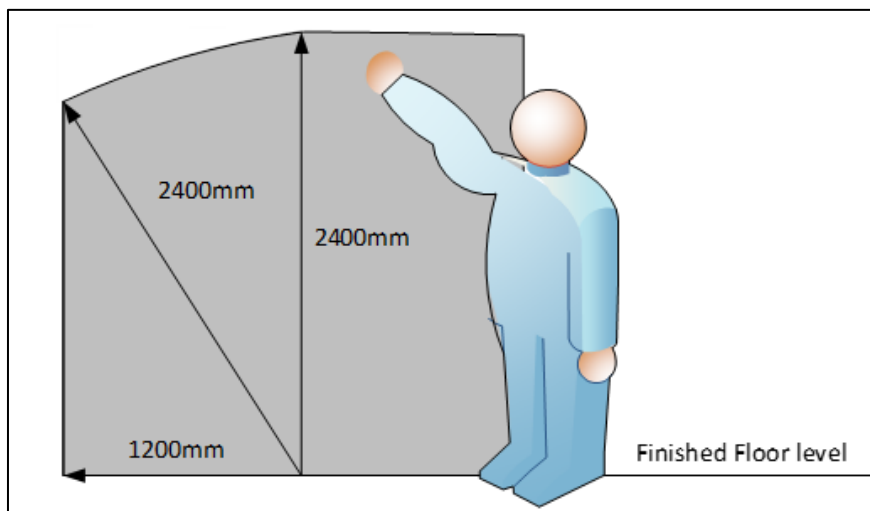


Figure 33. Arm's reach

The grey area shows the zone into which an average person can reach an arm from the surface shown, if there are no permanent obstructions such as walls or balustrading. The zone reduces if a permanent obstruction prevents access. If an obstruction has an opening in it, the access through the opening is to be considered when assessing mounting locations.

- The NTD must be located a minimum of 300mm from FFL to the base of the NTD bracket and up to a maximum height of 2.4m to the top of the NTD, with nbn's preferred height below 1.8m.
- Consideration should be given to end user's known and unknown accessibility requirements with optimal installation for access being between 300mm and 900mm from FFL.

9.1.2 Mounting locations

Builders and building owners must make one of the following three mounting locations available, within the defined height range requirements, for the installation of nbn® equipment.

Mounting location must be in an accessible location, allowing both the end user and technicians clear access for removal and replacement of the NTD from the enclosure, with recommend access clearance of 900mm from the front of the NTD.

Table 2. Mounting locations

Location	Description
1. Open wall area	An area on an open wall with either no obstructions or only partial obstructions. Note: Open wall areas use the bulk space of the room for air circulation.
2. Open enclosure	A partially enclosed area that contains no internal obstructions. Note: Open enclosures use the bulk space of the enclosure and the absence of obstructions for air circulation.
3. Confined area	A cabinet or cupboard (including a home distributor or utilities enclosure) dedicated to communications equipment. Note: Confined areas require ventilation to be added to the design to improve the air circulation.

Note: nbn requires contractors to adhere to construction and ventilation requirements when installing equipment in mounting locations.

9.1.3 Centrally located NTDs

End user NTDs can only be centrally located within large commercial developments, within a Comms room or riser, if it is possible to individually secure each NTD within a separate enclosure accessible only to the individual end user.

The enclosure must be sized to allow the standard indoor layouts as detailed in section 9.2 NTD , and meet the ventilation requirements required in section 9.3 Ventilation requirements.

Distance limitations for customer cabling will apply, with a maximum of 100m of ethernet cable to the end user's location refer to section 12 Customer Cabling.



Figure 34. Centrally located NTDs for commercial developments

9.1.4 Confined area

An internal NTD can be placed within a dedicated built out shelf within an EUP.

Ventilation is required to allow heat dissipation, as per section 9.3 Ventilation requirements.

Height of confined areas should be considered for optimal Installation height as per Section 9.1.1 Height.

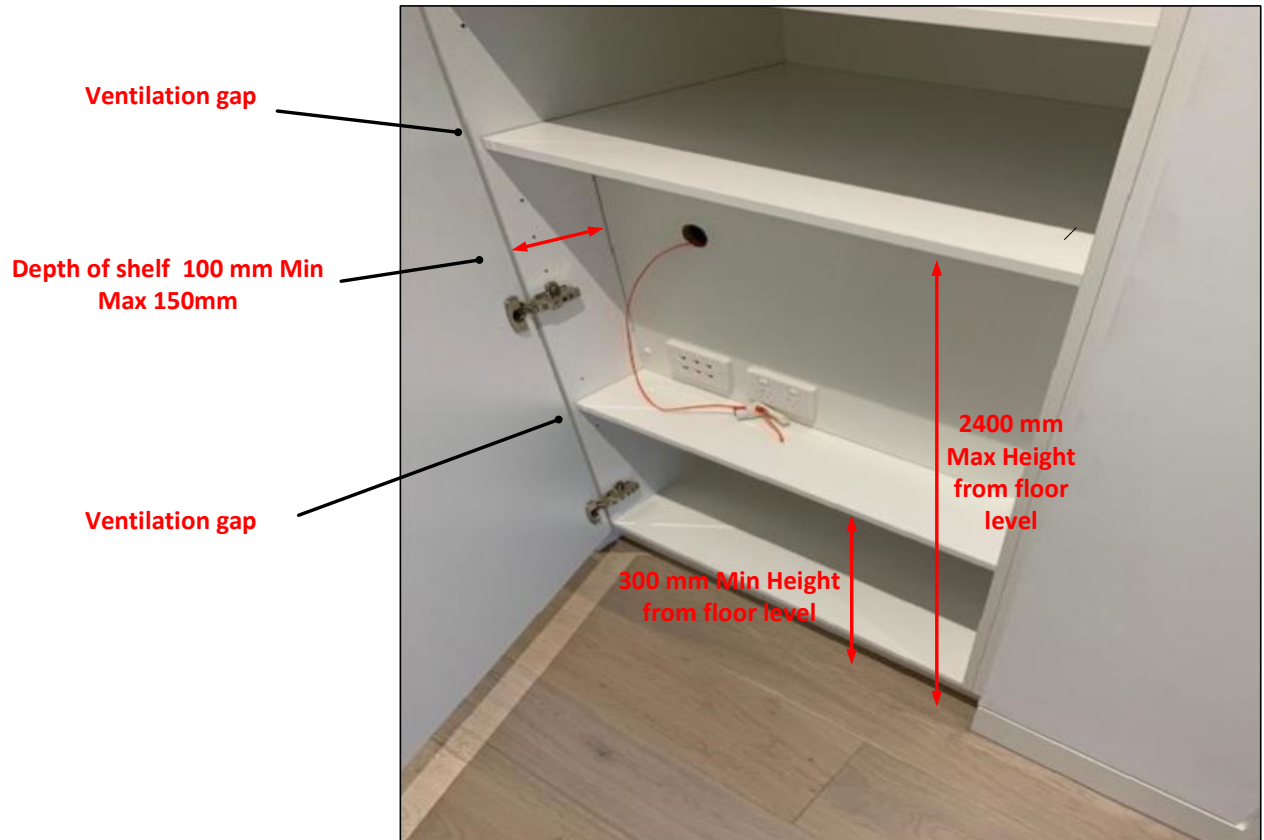


Figure 35. Typical built out shelf

The layouts and sizes shown are for a built-out shelf with Fibre TV RF equipment. If Fibre TV is not being deployed, then smaller layouts as per section 9.2.1 NTD only can be used.

The built-out shelf shall be no lower than 300mm from finished floor level, the maximum height to the top of the shelf shall be below 2400mm, and the depth of the shelf shall be between 100 mm – 150 mm for ease of access.

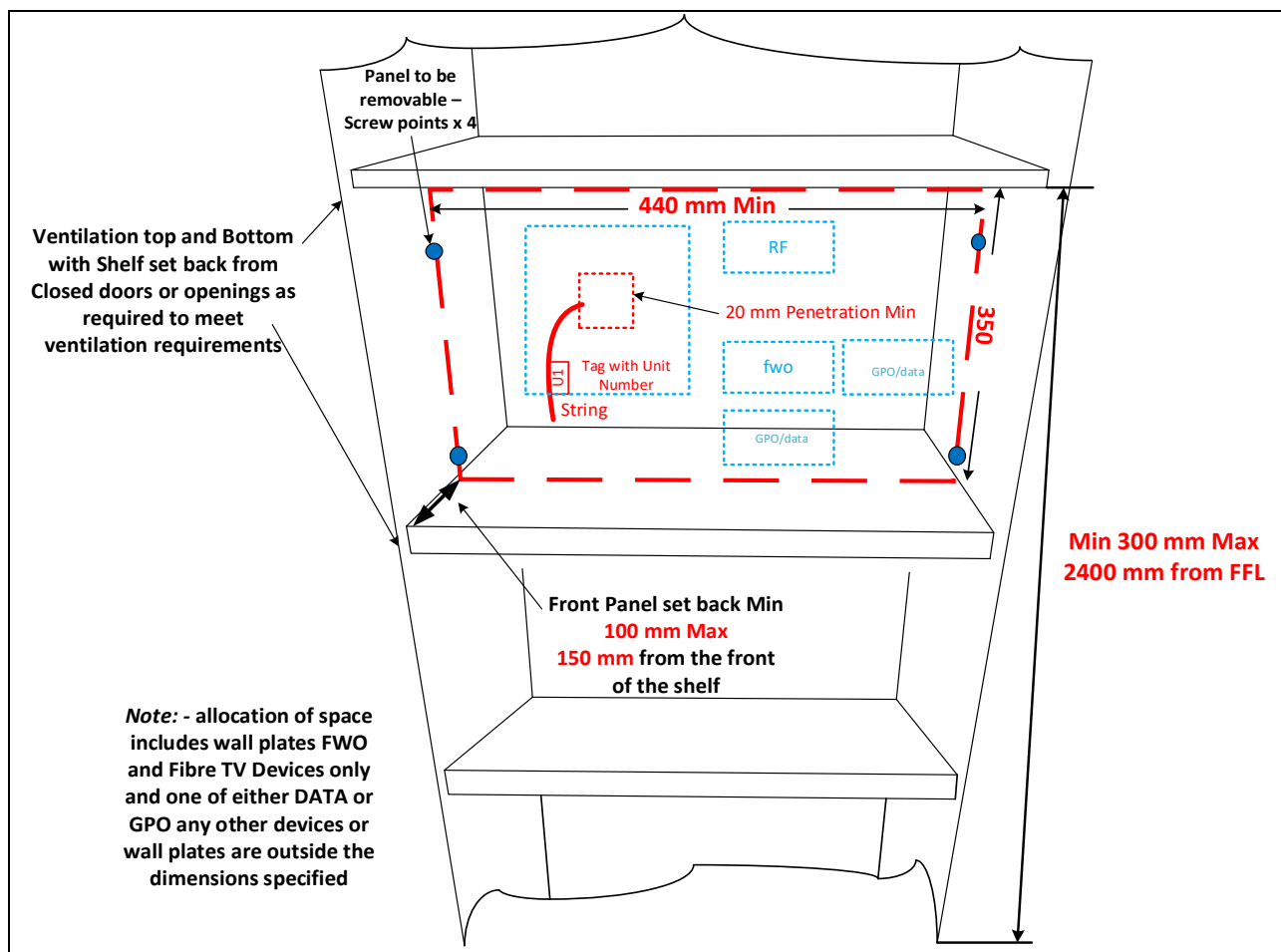


Figure 36. Built-out shelf - landscape

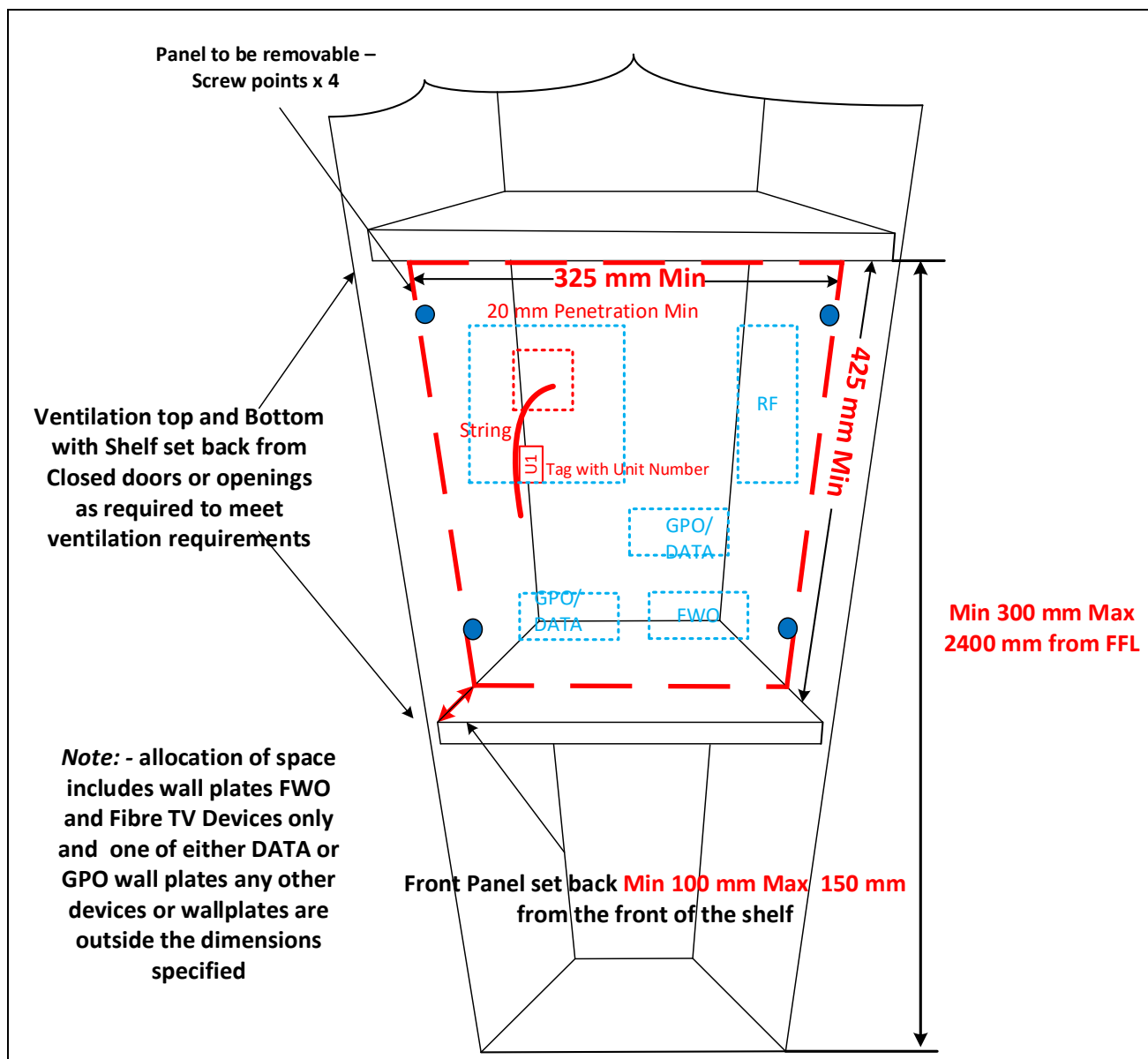


Figure 37. Built-out shelf - portrait

Where an NTD is installed within a wardrobe, there must be a clearance of 200mm from the wall to the end of the hanging rail to ensure accessibility to the NTD and suitability ventilation. Refer to Figure 38 below.

Whilst 300mm minimum clearance from the Finished Floor Level is required, it is desirable to position the NTD higher up the wall to avoid items stored on the floor of the wardrobe blocking airflow and/or access.

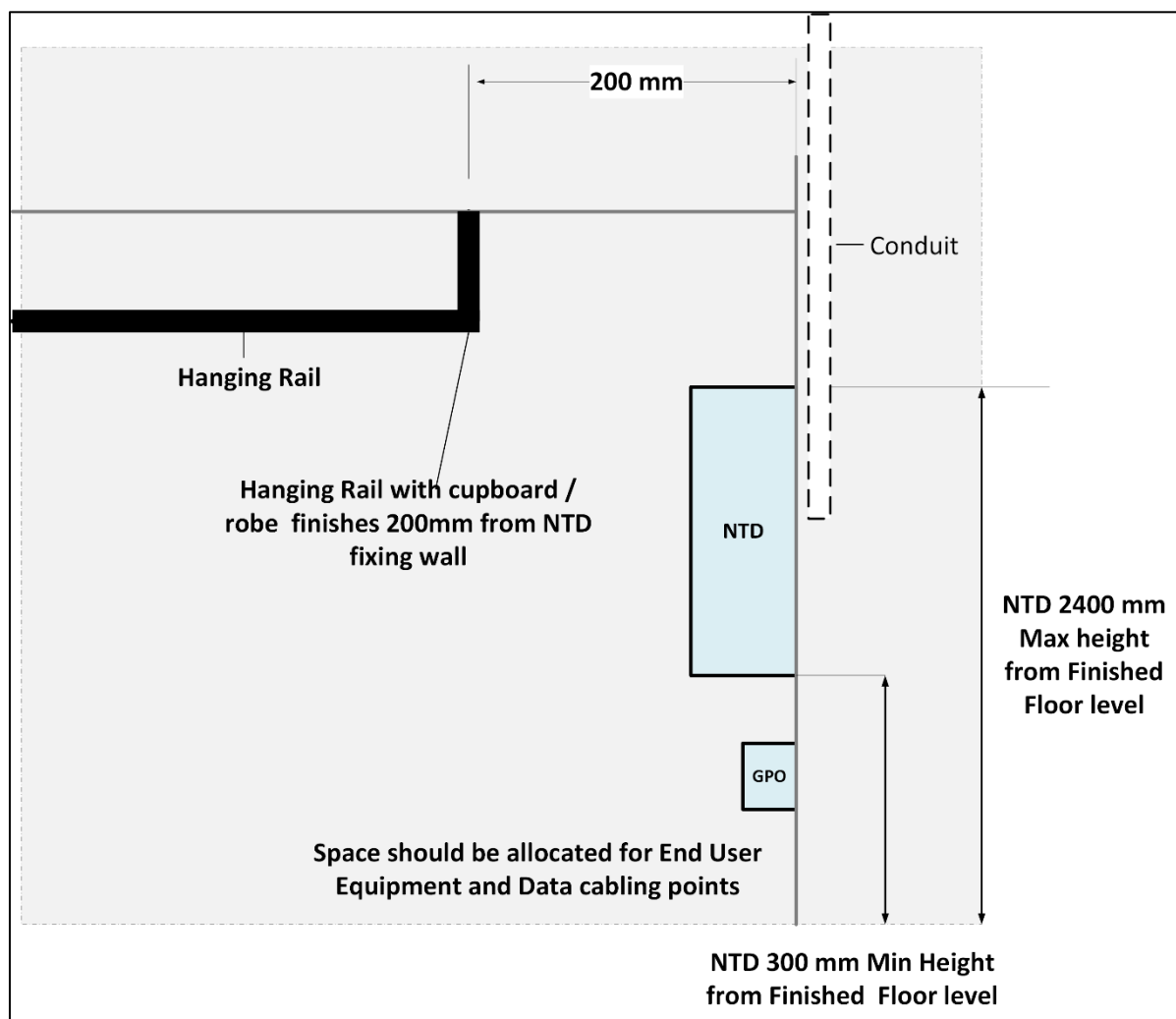


Figure 38. Typical side view of NTD within an open enclosure/robe

9.2 NTD equipment templates

Minimum clearances must be maintained to allow for installation and maintenance of the NTD.

Two sets of layout examples are provided below. They are split into 'NTD only' (i.e. without Fibre TV deployment) and 'NTD and Fibre TV' (i.e. with Fibre TV deployment). Both sets are available in landscape or portrait and include spatial provisions for customer cabling, data face plates, double GPO outlets, Fibre TV receivers (Fibre TV layouts only), and future nbn® fibre wall outlets (FWO)

Either a landscape or portrait layout can be applied.

The sizes shown are the minimum footprints that can accommodate a 4-port NTD. This footprint must be used for the smaller 1-port NTD to accommodate a potential future upgrade to a 4-port NTD. In both layouts, the NTD and enclosure must be mounted with the NTD LED Indicators at the top, as shown in Figure 39.



Figure 39. NTD orientation

All clearances and dimensions below are in mm.

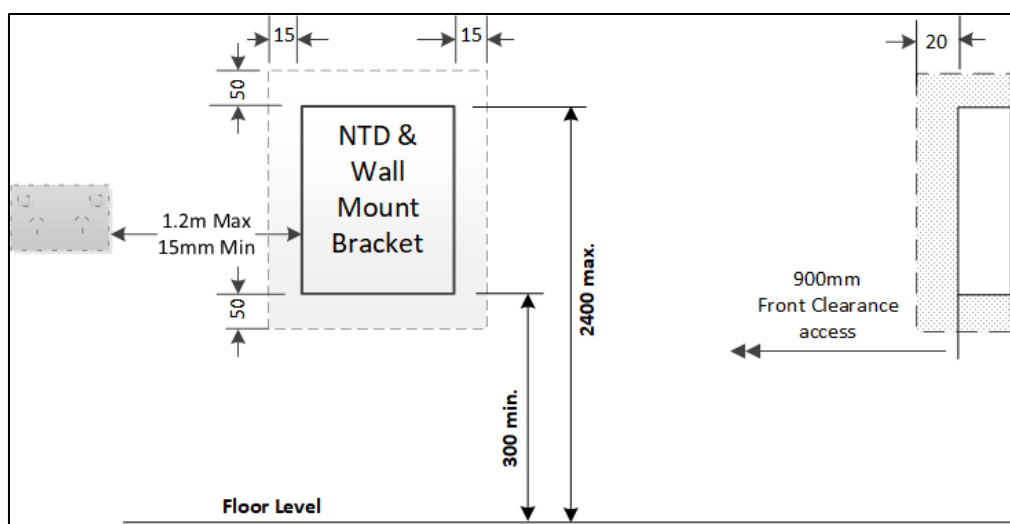


Figure 40. NTD clearances and minimum / maximum height schematic

9.2.1 NTD only

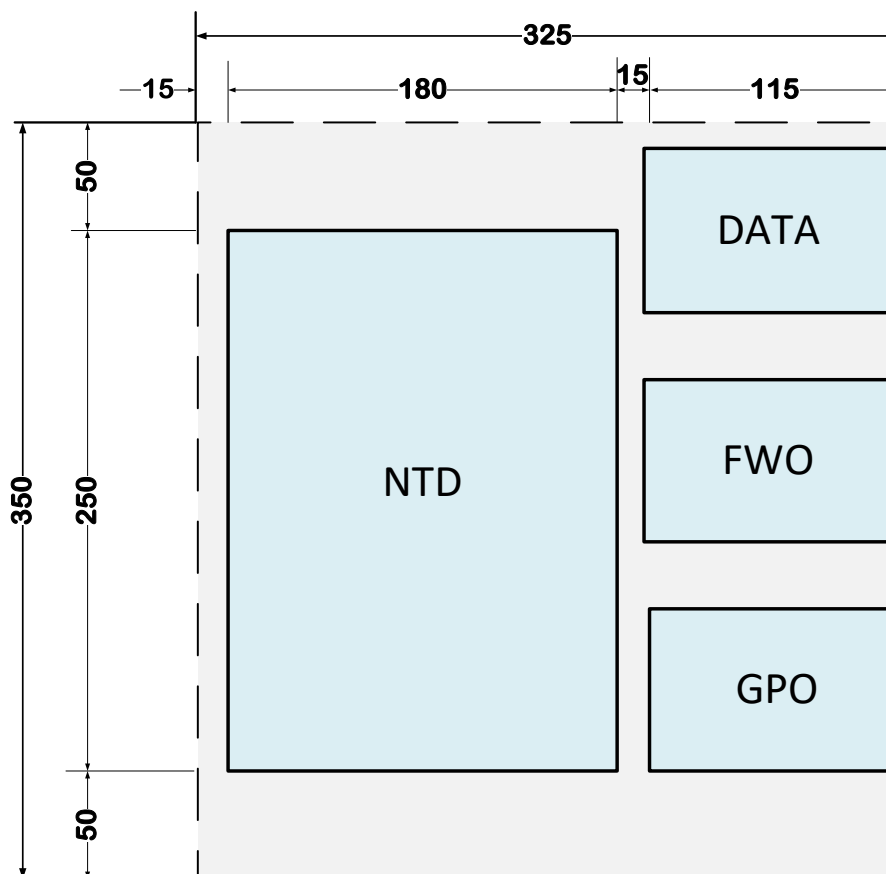


Figure 41. NTD landscape layout orientation (dimensions in mm)

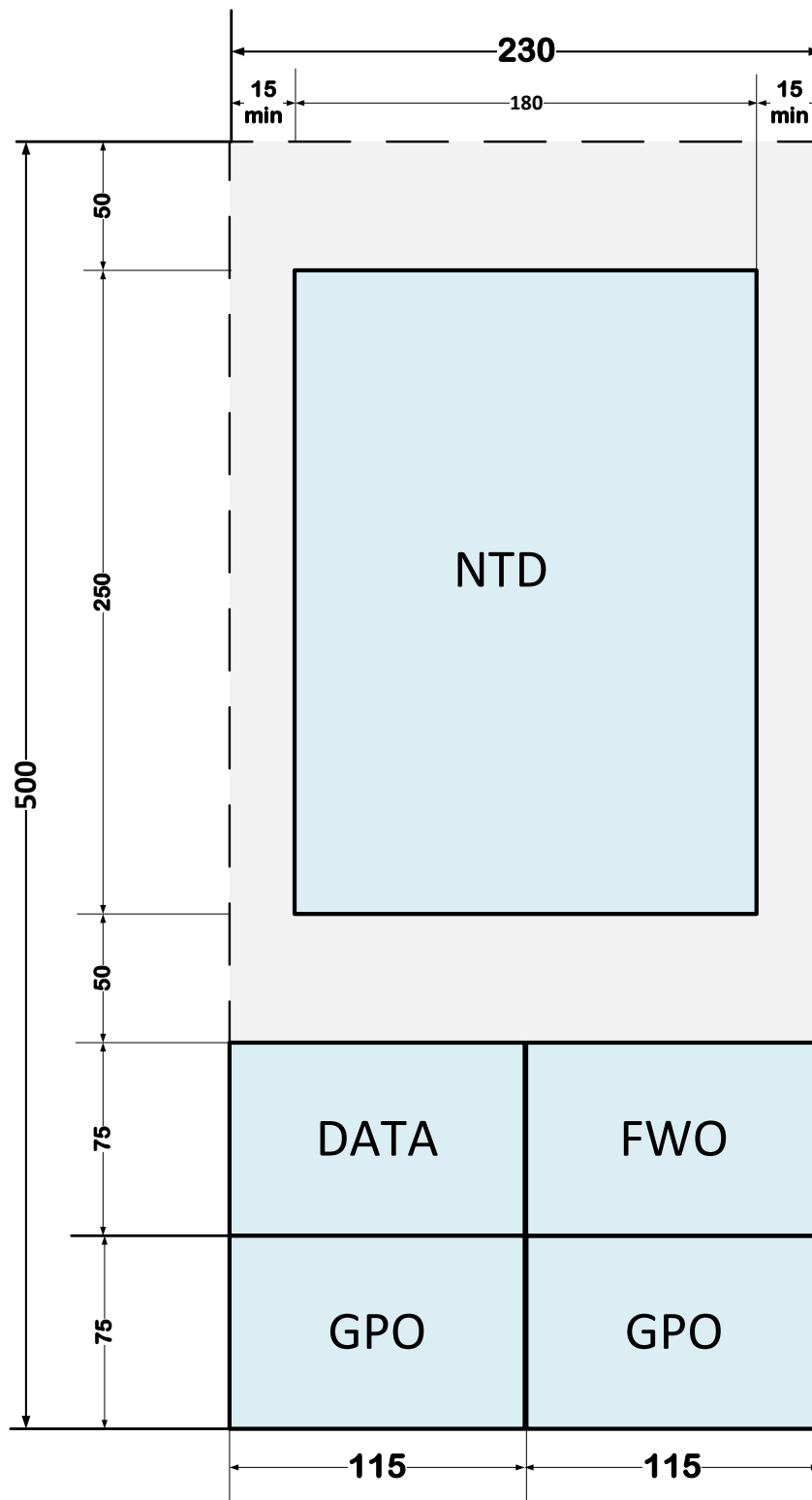


Figure 42. NTD portrait layout orientation (dimensions in mm)

9.2.2 NTD and Fibre TV

The following or larger layouts shall be applied with 1 or 4-port NTDs when Fibre TV is to be included in the development.

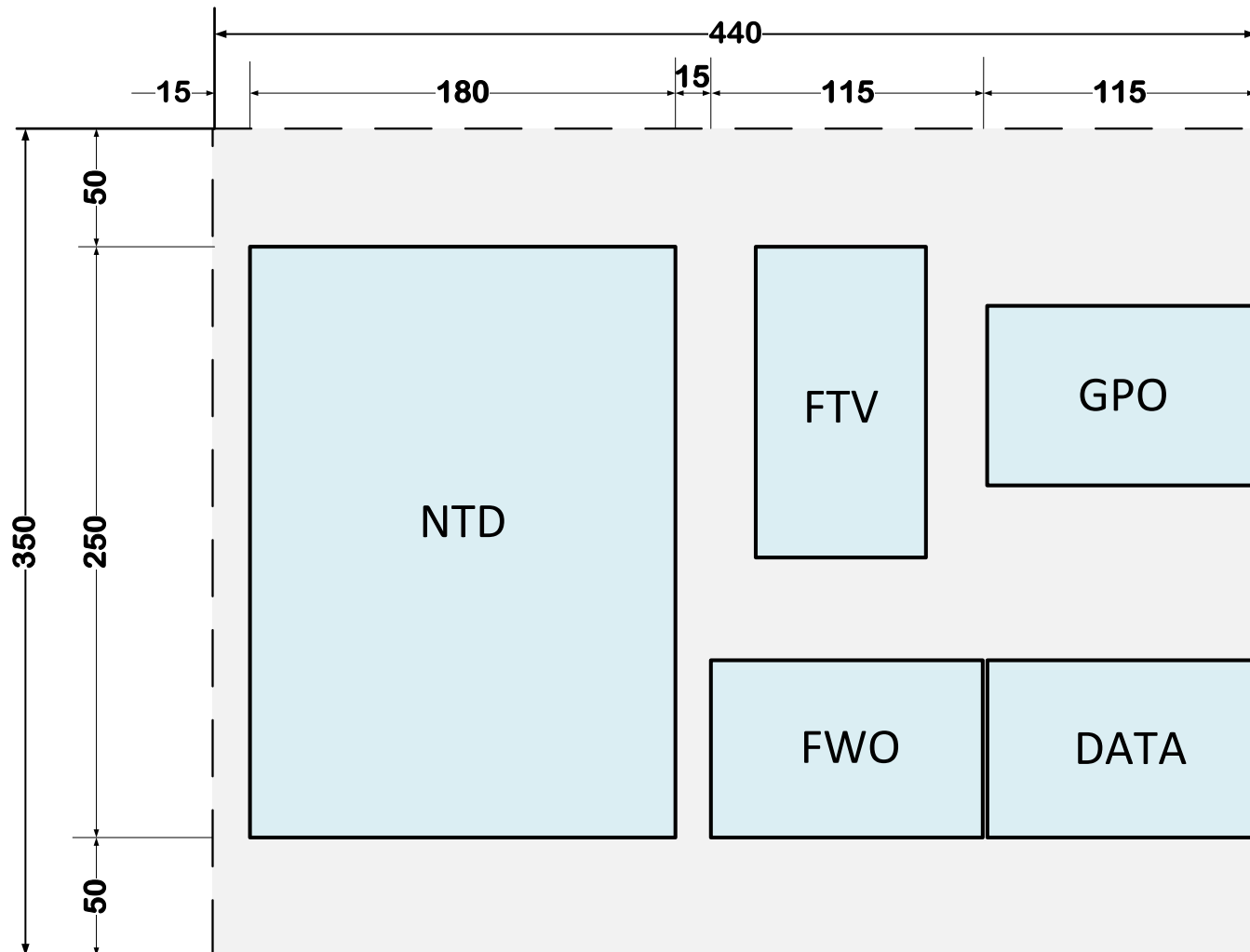


Figure 43. Fibre TV and NTD - landscape layout orientation (dimensions in mm)

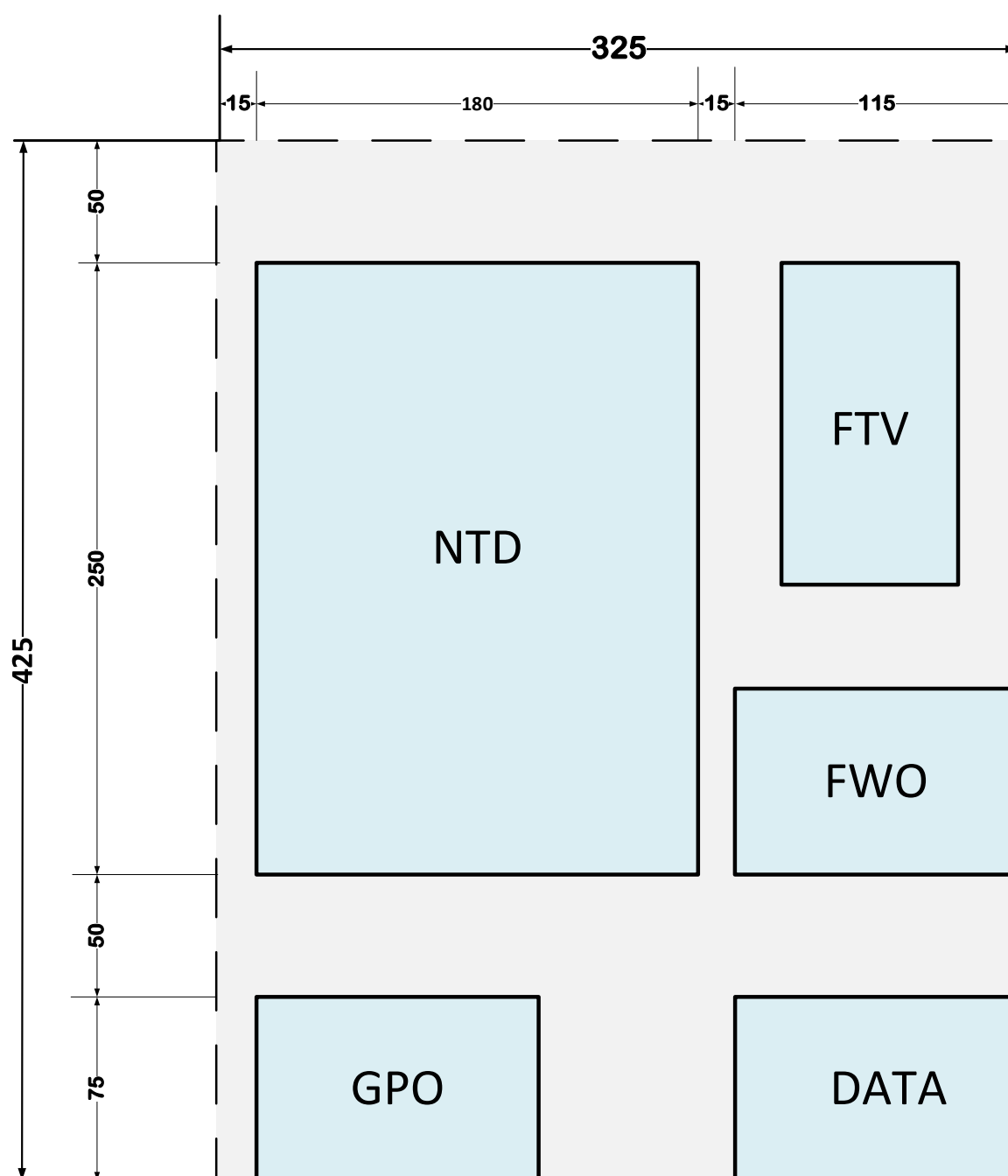


Figure 44. Fibre TV and NTD - portrait layout orientation (dimensions in mm)

Installation of GPOs Data cabling faceplates and Fibre TV Units shall maintain clearances from the 4-port NTD Footprint even on the installation of a 1-port NTD.

Note: Larger areas can be used.

A GPO is required to power each NTD installation. Double GPOs are recommended.

All power provisioned for nbn® equipment must meet the requirements in [4] *AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)*.

A second double GPO is recommended for developments with Fibre TV, so that one socket is available for customer devices (such as an internet router).and may be positioned anywhere adjacent to the perimeter of

the equipment template and as close as practical to it, in accordance with wiring standards. The electrician should avoid mixing power cabling with data, telephone, radio frequency (RF) and fibre in the same vertical corridor.

In scenarios where only two GPO are available, a double adaptor or power board may be used to provide power to the nbn® NTD and/or Fibre TV equipment. However, where at all possible this should be avoided to prevent accidental disconnection.

Secondary GPOs must be located within 200mm of the nbn® equipment template.

The Fibre Wall Outlet (FWO) footprint within the NTD equipment template, has been allocated to allow for future build changes by nbn.

The Fibre TV unit is included within the NTD equipment templates.

Space has been allocated within the dimensions of the equipment templates for one data wall plate/socket.



The provision of 2 double GPOs is highly recommended, so that one GPO is available for customer devices (such as an internet router). Locating the new GPO as close as possible to the equipment location minimises safety issues with excess cord and improves the look of the installation.

All power provisioned for nbn equipment must meet the requirements within [4]AS/NZS 3000 *Electrical installations (known as the Australian/New Zealand Wiring Rules)*.

9.3 Ventilation requirements

The nbn NTD, PSU and other end user devices (e.g. residential gateway) consume energy, which is dissipated as heat. When installed into a closed enclosure or space, the combined energy dissipated by devices accumulates and causes the ambient temperature of the surrounding air to rise.

If the warm air is trapped and cannot easily escape, the operating temperature of the devices can increase significantly, with long term average operating temperature directly affecting equipment failure rates.

Appropriate ventilation can be physical gaps in joinery, slots or circular openings and sized as per the volume of the enclosure. confined space.

nbn requires that enclosures for nbn® equipment satisfy the following thermal ventilation requirements (**note:** if other end user devices are stored in the same location, new calculations will need to be made).

Table 3. Ventilation requirements

Volume of open enclosure or home distributor	Required ventilation area (for each of the upper and the lower ventilation region)
20 L (minimum volume requirement)	60cm ²
Between 20 L and 60 L	60cm ² , <i>plus</i> an additional 1.5 square centimetres per litre of volume over 20 L

Volume of open enclosure or home distributor	Required ventilation area (for each of the upper and the lower ventilation region)
Greater than 60 L	120cm ² , <i>plus</i> an additional 0.1 square centimetres per litre of volume over 60 L

Use the following formula to calculate the volume:

$$volume = \left(\frac{W \times H \times D}{1000} \right)$$

Where:

- W, H and D are the internal width, height and depth of the enclosure (in centimetres)
- volume is expressed in litres

The ventilation openings are required to be present in both the top and bottom end faces of the enclosure/ confined space or within 100mm of the top or bottom, if placed within the front face.

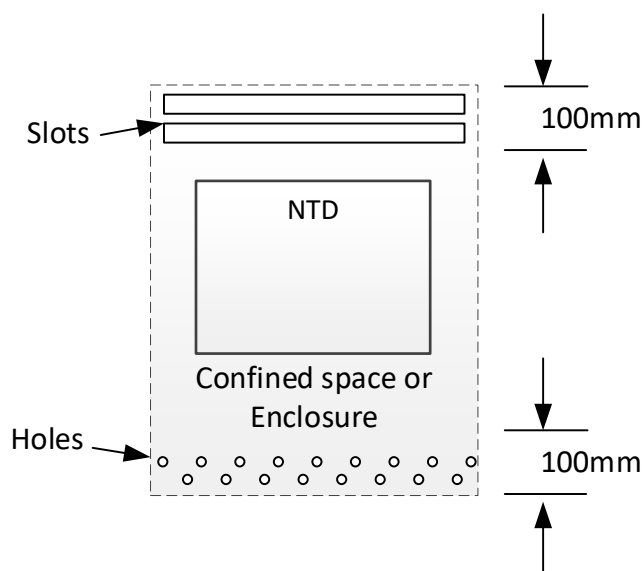


Figure 45. Ventilation upper/lower areas

Table 4. Additional ventilation requirements

Rule	Notes
Doors or covers must not obstruct ventilation	An open enclosure or home distributor design must not rely on a cover or doors being opened to meet the thermal ventilation requirements.
Obstructed ventilation does not count towards thermal ventilation assessment	<p>Examples of obstructed ventilation include (but are not limited to) the following:</p> <ul style="list-style-type: none"> • An open enclosure or home distributor is installed into a cavity. • An open enclosure or home distributor is surrounded by a purpose-designed architrave. • An open enclosure or home distributor is fitted with fixed shelving. • An open enclosure or home distributor has the capability of being fitted with removable shelving.
Ventilation openings must not be used for cable ingress/egress at any time	This ensures that cables can neither obstruct nor reduce the free flow of air into and out of the open enclosure or home distributor and compromise its effective ventilation.

10 Essential services

Please confirm with individual essential services suppliers (e.g. lift communications, fire indicator panels/control rooms) on their specific requirements.

On request for nbn to support essential services, nbn may deploy a single 4-port NTD to support up to 4 services when essential services are co-located.

11 Fibre TV

Where an agreement for nbn[®] Fibre TV has been entered into with nbn, please contact your Content Service Provider for their requirements.

12 Customer cabling

Customer cabling can be used to provide connectivity to electronic devices or other equipment that is not located near the planned nbn® equipment location.

Note: Customer cabling within premises is not within the scope of the nbn.

All cabling work performed on the customer side of the NBP is subject to ACMA requirements (refer to [1]AS/CA S009 *Installation requirements for customer cabling (Wiring rules)*).

Customer cabling allows owners of premises to choose a location of nbn® equipment away from where the services may be used, to improve data speeds within the premises, assist with aesthetics and/or cater for greater additional scope (such as a wired home network).

RSP gateways/modems are best located centrally within the premises, outside of cupboards, home distributors and away from appliances such as refrigerators, televisions or microwaves.

nbn recommends the installation of data cabling from the nbn® equipment location to wall sockets elsewhere in the premises.

In many instances, a routing gateway is needed to make full use of the internet services.

Data cabling:

- can be used for internet (UNI-D)
- Category 6 (or better to support nbn speed tiers)
- uses four (4) pair data cables, with eight (8) positions, eight (8) contact (8P8C) modular sockets and connecting cables
- is 'star-wired' with a cable dedicated to each socket in the premises
- may be a maximum 100m in length from the NTD
- may require the use of a patch panel and multiple cables running to one or more rooms to support intended customer use, e.g. a Wi-Fi router in a different location to the nbn® NTD



Important: While builders and cabling should let customers know about the benefits of pre-wiring at the time of home construction, it is important to note that customer cabling is optional and entirely at the discretion of the developer, builder or premises owner.



Important: Information for builders and homeowners to optimise use of the nbn® network, including considerations for Wi-Fi router location, structured cabling and other factors, is available online at: <https://www.nbnco.com.au/learn/optimisation>.

13 Glossary

Term	Description
AC	Alternating Current
ACMA	Australian Communications and Media Authority
ATA	Analog Telephone Adapter
BEP	Building Entry Point
BCA	Building Code of Australia
BFD	Building Fibre Device
BUDI	Building Distribution Enclosure
CET	Communications Earth Terminal
CPE	Customer Premises Equipment
CRC	Critical Risk Control
CSD	Compact Sealed DSLAM
CTL	Cable Transition Location
DP	Delivery Partner
EUP	End User Premises
FCD	Fibre Collector Distributor
FDT	Fibre Distribution Terminal
FFL	Finished floor level
FIP	Fire Indicator Panel
FJL	Flexible Joint Location
FTTB	Fibre to the Building
FTTN	Fibre to the Node
FTTP	Fibre to the Premises
FTTX	Fibre to the 'X' (building, curb, node, premises)
FWO	Fibre Wall Outlet
GNAF	Geo-coded National Address File
GPO	General Power Outlet
HSE	Health, Safety and Environment

Term	Description
LIC	Lead-In Conduit
LSZH	Low-Smoke Zero-Halogen
MDF	Main Distribution Frame
MDU	Multi Dwelling Unit
MPS	Multi Premises Site
MT-LFN	Multi-Technology - Local Fibre Network
nbn	National Broadband Network
NBP	Network Boundary Point
NTD	Network Termination Device
PCD	Premise Connection Device
PDH	Premise Distribution Hub
PIC	Premises Internal Cable
PSU	Power Supply Unit
RF	Radio Frequency
SDT	Splitter Distribution Terminal
SDU	Single Dwelling Unit
SDU Like MDU	Multi Dwelling Unit that is serviced like a Single Dwelling Unit (individual LIC to each premises)
SL	Serviceable Location
SWMS	Safe Work Method Statement
TO	Telecommunications Outlet
WHS	Workplace Health & Safety