

Multi Dwelling Unit (MDU) building engineering and design standard - new developments

FTTx Engineering

Document number	NBN-TE-CTO-284
Document category	Standard
Author	External Networks
Approver (owner)	National Engineering Manager, External Networks
Status	Approved
Issue date	12 DEC 2016
Revision number	8.0





Disclaimer

This document is provided for information purposes only. This document is subject to the information classification set out on this page. If no information classification has been included, this document must be treated as 'nbn-Confidential: Commercial' and must not be disclosed other than with the consent of nbn co. The recipient (including third parties) must make and rely on their own inquiries as to the currency, accuracy and completeness of the information contained herein and must not use this document other than with the consent of nbn co.

Copyright © 2016 nbn co limited. All rights reserved.

Document control

Revision history

Date	Revision	Details
21 OCT 16	8.0	<ul style="list-style-type: none">• Rebranding and update of security classification.• Update to title of the document.• Section 1.1 Background, Section 1.2 Purpose, Section 1.4 Scope and Section 1.6 Assumptions and constraints revised.• Section 2.1 updates to responsibilities for new development MPS/MDU locations added.• Sections 2.2 content added on working heights and spaces.• Section 2.4 the NBP revised for the various technologies.• Section 2.7 (and sub-sections) MDU/MPS classifications updated.• Section 3 (and sub-sections) space and location requirements updated for various technologies.• Section 6 (and sub-section) content added for FTTB solution.• Section 7 (and sub-sections) content added for FTTN - copper to the MDF solution.• Section 8 (and sub-sections) content added for HFC solution.• Appendix A and B conduit sizes updated. General updates to accommodate the various technologies.



Contents

1 About this document	7
1.1 Background	7
1.2 Purpose	7
1.3 Health, Safety & Environment (HS&E)	7
1.4 Scope	7
1.4.1 In scope	7
1.4.2 Out of scope	8
1.5 Audience	8
1.6 Assumptions and constraints	8
1.7 Referenced documents	8
1.8 Changes in this revision	9
2 General requirements	10
2.1 New development MPS/MDU	10
2.2 Working height and space	11
2.3 Australian Communications and Media Authority (ACMA) wiring rules	11
2.4 NBP	11
2.5 Essential services	12
2.6 Mounting template	14
2.7 nbn™ MDU/MPS classification	15
2.7.1 Basic principles	16
2.7.2 Lead-in to the building entry	16
3 Space and location requirements	17
3.1 FTTP solution	17
3.1.1 Premise Distribution Hub (PDH)	17
3.1.1.1 Spatial requirements	17
3.1.2 CTL	18
3.1.2.1 Spatial requirements	18
3.1.3 Fibre Collector Distributor (FCD) or Fibre Distribution Terminal (FDT)	18
3.1.3.1 Spatial requirements	18
3.2 Separation from other services	19



3.2.1	Gas meter clearances	19
3.2.2	Gas cylinder clearances	20
3.2.3	Other utility and obstruction clearances	21
3.2.4	Basement or telecommunications room	21
3.2.4.1	Concept drawing of communications room layout for an FTTP solution (combined PDH, FDT and outdoor NTDs).....	22
3.2.5	FCD and FDT within telecommunications riser/closet	23
3.2.5.1	FCD and FDT minimum requirements.....	23
4	Pathways	25
4.1	Property boundary to telecommunications room	25
4.2	Telecommunications riser/closet to living unit.....	25
4.2.1	Option 1: dedicated conduit.....	25
4.2.2	Option 2: cable tray and conduit	26
4.3	Concept drawing elevations.....	28
4.3.1	Vertical distribution single line diagram.....	28
4.3.2	Living unit NTD elevations	28
5	Mounting surface templates and locations.....	29
5.1	Indoor NTD mounting surface templates.....	29
5.2	Mounting locations	29
5.3	Minimum home distributor dimensions	30
5.3.1	Indoor composite layouts	31
5.3.2	Power outlet(s)	32
5.3.3	Installation specifications and rules for NTDs and PSUs.....	32
5.3.4	Ventilation requirements	35
5.3.4.1	Calculating ventilation area.....	35
5.3.4.2	Additional requirements	36
6	FTTB solution	40
6.1	CSD	40
6.2	Spatial requirements and network boundary	40
7	FTTN - copper to the MDF solution.....	42
7.1	Copper to the MDF.....	42
7.2	Spatial requirements and network boundary	42



8 HFC 44

 8.1 Large cabinet 44

 8.1.1 Spatial requirement 44

 8.2 Medium cabinet 44

 8.2.1 Spatial requirement 45

9 Glossary 46

Appendix A MPS/MDU pathway design checklist 48

Appendix B nbn™ FTTx pathways informal visual inspection checklist – MPS/MDU..... 50

Figures

Figure 1. Basic network elements in relation to a typical MPS 10

Figure 2. Earthing requirements 13

Figure 3. Outdoor NTD composite layout (landscape) 14

Figure 4. Outdoor NTD composite layout (portrait) 15

Figure 5. Normal conduit dimensions 16

Figure 6. Example fibre/PDH/internal locations clearance requirements 17

Figure 7. Example CTL clearance requirements 18

Figure 8. Example of access clearances for a single FDT or FCD (all dimensions in mm) 19

Figure 10. Gas meter enclosure 20

Figure 11. Gas cylinder clearances 20

Figure 12. Concept design of typical front elevation communications room 22

Figure 13. Example of typical communications room 22

Figure 14. Slot example telecommunications riser/closet floor or ceiling entry 24

Figure 15. Sleeve example telecommunications riser/closet floor or ceiling entry 24

Figure 16. nbn™ pathway from property boundary to communications room 25

Figure 17. nbn™ pathway using all nominal P20 conduit to feed typical apartment floor (example layout 1) 26

Figure 18. nbn™ pathway using combination cable tray and nominal P20 conduit to feed typical apartment floor (example layout 2) 27

Figure 19. Concept design of vertical single line diagram 28

Figure 20. Concept design of NTD location in living unit (in robe) 28

Figure 21. Indoor NTD mounting surface templates 29



Figure 22. NTD enclosure landscape orientation	31
Figure 23. NTD enclosure portrait orientation	32
Figure 24. Ventilation upper/lower	37
Figure 25. Ventilation openings.....	38
Figure 26. FTTB DSLAM spatial requirements	40
Figure 27. CSD network cable boundary	41
Figure 28. MDF spatial requirements	42
Figure 29. MDF network cable boundary	43
Figure 30. Spatial requirements for a large HFC cabinet.....	44
Figure 31. Spatial requirements for a medium HFC cabinet	45

Tables

Table 1. Outdoor NTD mounting template.....	14
Table 2. MDU/MPS categories.....	15
Table 3. Gas cylinder/bottle clearances	21
Table 4. Equipment clearances.....	21
Table 5. Mounting locations	29
Table 6. Home distributor dimensions	30
Table 7. NTD enclosure mounting template.....	31
Table 8. Ventilation requirements.....	35
Table 9. Additional ventilation requirements.....	36
Table 10. Ventilation requirements.....	37
Table 11. Greenfield MPS/MDU pathway design checklist for all technologies (i.e. FTTP/FTTN/FTTB/HFC)	48
Table 12. nbn™ FTTx pathways informal visual inspection checklist	50



1 About this document

1.1 Background

This document provides guidelines for developers building vertical Multi Dwelling Units (MDUs).

1.2 Purpose

This document deals with the provision of appropriate pathways and spaces in vertical MDU sites for the delivery of **nbn**[™] Fibre To The Premises (FTTP), Fibre To The Building (FTTB), Hybrid Fibre Coaxial (HFC) and copper to the Main Distribution Frame (MDF) (via Fibre To The Node [FTTN]) infrastructure in new developments. This includes the conduit and spatial requirements within an Multi Premises Site (MPS) that are required for the deployment of **nbn**[™] FTTP/FTTB/HFC/copper to the MDF infrastructure.

1.3 Health, Safety & Environment (HS&E)

nbn takes health, safety and environment very seriously and expects the same of our Delivery Partners (DPs), network planners, designers and constructors, who have a range of obligations under Workplace Health & Safety (WHS) and environmental legislation. You need to consider your specific duty of care; in particular, how you eliminate and minimise risks in the design that have an impact on later stages of the asset lifecycle (including construction, inspection and assurance) and how information about those risks, design rationale, and residual risks and controls are communicated to **nbn**.

nbn has considered the specific risks associated with these design standards for the lifecycle of the assets, and incorporated safety and environmental based design standards within this document where relevant. As a designer, you also have an obligation to:

- undertake whatever calculations, analysis, testing or examination are necessary to ensure your designs are without safety or environmental risks, so far as is reasonably practicable;
- communicate residual risks associated with the design and further controls/conditions required to manage those risks throughout the lifecycle of the design;
- demonstrate to **nbn** you have done this through the contract deliverables; and
- ensure adequate training and competency of workers involved in the design.

1.4 Scope

1.4.1 In scope

The following are in scope for this document:

- new MDU developments located within the FTTx footprint



1.4.2 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

1.5 Audience

The intended audience for this document is any of the following:

- new development site developer
- new development site designer
- new development site consultant
- building contractor
- **nbn** designer or planner

1.6 Assumptions and constraints

The developer and/or their representative should have a sound level of knowledge, understanding and experience in installing any telecommunications pathways for **nbn** to utilise in its FTTx network.

1.7 Referenced documents



Please ensure you are referencing the latest applicable version of any of the referenced documents.

Document number	Document name	Owner
AS 4086.2-1997	Secondary batteries for use with stand-alone power systems	Australian Standards
AS/NZS 3000:2007	Wiring Rules	Australian/New Zealand Standards
AS/NZS 3084:2003	Telecommunications installations - Telecommunications pathways and spaces for commercial buildings	Australian/New Zealand Standards
AS/NZS 4029.2:2000	Stationary batteries - Lead-acid	Australian/New Zealand Standards
AS/CA S009:2013	Installation requirements for customer cabling (Wiring rules)	Communications Alliance



Document number	Document name	Owner
0012-8-298	Critical Risk Controls	HSE
NBN-TE-CTO-194	New developments: deployment of the nbn ™ pit and conduit network	FTTx Engineering
n/a	Building Code of Australia	www.abcb.gov.au/

1.8 Changes in this revision

Changes in this document revision 8.0 dated 21 OCT 2016 compared to the previous revision 7.0 dated 7 SEP 2015 are summarised below:

Section	Details
ALL	<ul style="list-style-type: none"> Rebranding and update of security classification. Update to title of the document.
1.1, 1.2, 1.4 and 1.6	Revision of the Background, Purpose, Scope (In scope and Out of scope) and Assumptions and constraints.
2.1	Updates to responsibilities for new development MPS/MDU locations.
2.2	Section added on working heights and spaces.
2.4	NBP revised for the various technologies.
2.7 (and sub-sections)	MDU/MPS classifications updated.
3 (and sub-sections)	Space and location requirements updated for various technologies.
6 (and sub-sections)	Content added for FTTB solution.
7 (and sub-sections)	Content added for FTTN - copper to the MDF solution.
8 (and sub-sections)	Content added for HFC and solution.
Appendix A and B	Updates to conduit sizes (from P23 ID to nominal P20 and P50 ID to nominal P50). General updates to accommodate the various technologies.

2 General requirements

2.1 New development MPS/MDU

The developer, developer's consultant or contractor are responsible for the following:

- Provision of a suitable lead-in from the property boundary to the building entrance facility, and through to any area designated for telecommunications services. Where diversity or other special needs exist, an alternative entry location may also be required.
- Provision of suitable space and access for the installation, maintenance and repair of all **nbn**TM network elements up to and including the Network Termination Device (NTD) and Power Supply Unit (PSU).
- Provision of a minimum of nominal P20 rigid, white communications conduit with draw string, from either the telecommunications room or riser/closet location to each NTD location.
- Provision of mains power to all required **nbn**TM infrastructure equipment and end user modems as outlined by the specific technology being deployed.
- Provision of Communications Earth Terminal (CET) where required.

nbn is responsible for:

- Advising the developer, consultant or contractor of the technology to be deployed to the development area.
- The cabling, installation and maintenance of all network elements up to and including the NTD and PSU, with the exception of the optional PSU batteries originally supplied at the time of installation.
- Compliance to the Building Code of Australia (BCA) for all cabling and with reasonable directions provided by authorised developers, builders, owners, managers and customers in respect to building and fire authority requirements. Advice may be sought in instances where a building request is regarded as unreasonable.

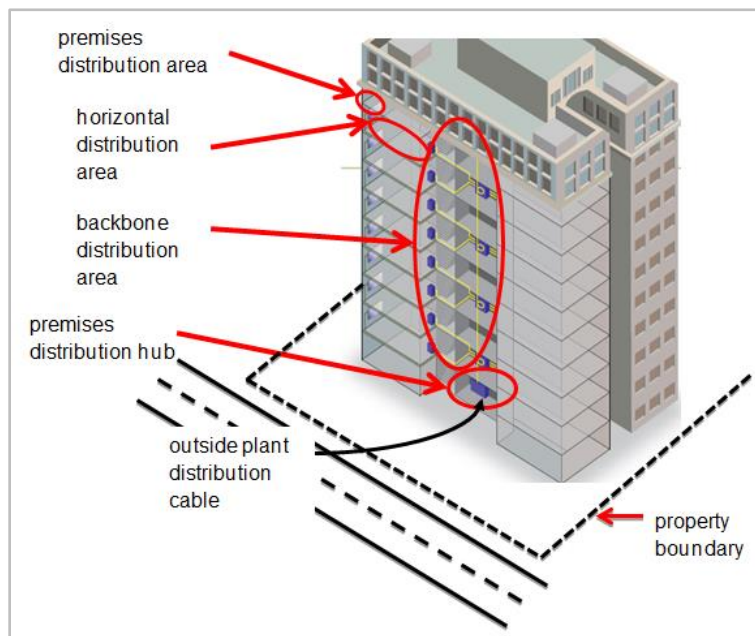


Figure 1. Basic network elements in relation to a typical MPS



2.2 Working height and space

All telecommunication products shall be mounted at a comfortable working height and have sufficient access space around the product(s) for initial installation, ongoing maintenance, configuration modifications and troubleshooting.

CAUTION: Falls from heights can result in serious injury or death.

nbn has developed equipment location information that takes into consideration the risks involved in working at heights. This information aims to eliminate or minimise the risks involved in working at heights through the design and installation processes employed by the surveyor, designer and installer. Before commencing any installation that requires working at heights, all personnel shall be thoroughly familiar with their applicable state or territory WHS regulations, and their company and/or principal contractor's safety practices and policies.



Working at heights requires the person or persons carrying out the work to be properly trained and deemed competent. Personnel performing the work shall require a Safe Work Method Statement (SWMS) or risk assessment that identifies the necessary controls to carry out the work safely. Refer to the document *0012-8-298 Critical Risk Controls* and the applicable legislation and codes of practice for further information.

2.3 Australian Communications and Media Authority (ACMA) wiring rules

The ACMA wiring rules do not apply to cabling up to and including the Network Boundary Point (NBP). Any cabling work performed on the customer side of the NBP is subject to ACMA requirements. Cabling work includes the connection, installation or maintenance (repair) of customer cabling.

2.4 NBP

The NBP shall be:

- 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 *AS/ACIF S009:2013 Installation requirements for customer cabling (Wiring rules)* the **nbn**[™] NTD is labelled as an NTD)
- FTTB/copper to the MDF: the NBP is the 'A' side of the MDF, also known as the carrier side (in accordance with *AS/ACIF S009:2013 Installation requirements for customer cabling (Wiring rules)* the MDF is labelled as an MDF)
- HFC: the NBP is the single data port on the HFC modem



2.5 Essential services

When provisioning for an essential service (such as a lift phone, managed alarm system or fire panel) the outdoor NTD device shall be used. The outdoor NTD, unlike the indoor NTD, has specific earthing requirements as described below. Refer to Section 2.4.1 Mounting template for further information.



- The CET earth shall be provided by a licensed electrician engaged by the developer or construction contractor.
- CET is not to be used for non **nbn** services.
- Whilst the NTD being used for essential services is called an 'outdoor NTD', this will always be used/located indoors for new development MDU areas (typically in a communications cupboard or room).

The outdoor NTD specific earthing requirements are:

- Earthing conductor for the **nbn**TM outdoor NTD shall be earthed for safety reasons and for remote testing purposes.
- Where the electrical earth electrode is near the **nbn**TM outdoor NTD and is accessible, a 6 mm² green/yellow equipotential bonding conductor may be run between the outdoor NTD and the electrode, and shall be connected to the electrode by a separate earthing clip. The connection shall be labelled 'Telecommunications Bonding Conductor' or '**nbn**TM' in accordance with the requirements of *AS/NZS 3000:2007 Wiring Rules*.
- Provide a 6 mm² green/yellow equipotential bonding conductor between the earthing bar in the electrical switchboard and a CET in the communications compartment of the combined enclosure or, where a combined enclosure has not been provided, located near - but not in - the switchboard (in accordance with Clause 5.6.2.7 of *AS/NZS 3000:2007 Wiring Rules*).
- Where a combined enclosure is not used, run a 2.5 mm², 4 mm² or 6 mm² green/yellow earthing conductor from the CET to the NTD location.

This arrangement is shown below:

- The length of the equipotential bonding and earthing conductors is unimportant for the purpose of earthing the outdoor NTD, as this earth is provided for electrical safety reasons - not for lightning surge protection purposes.

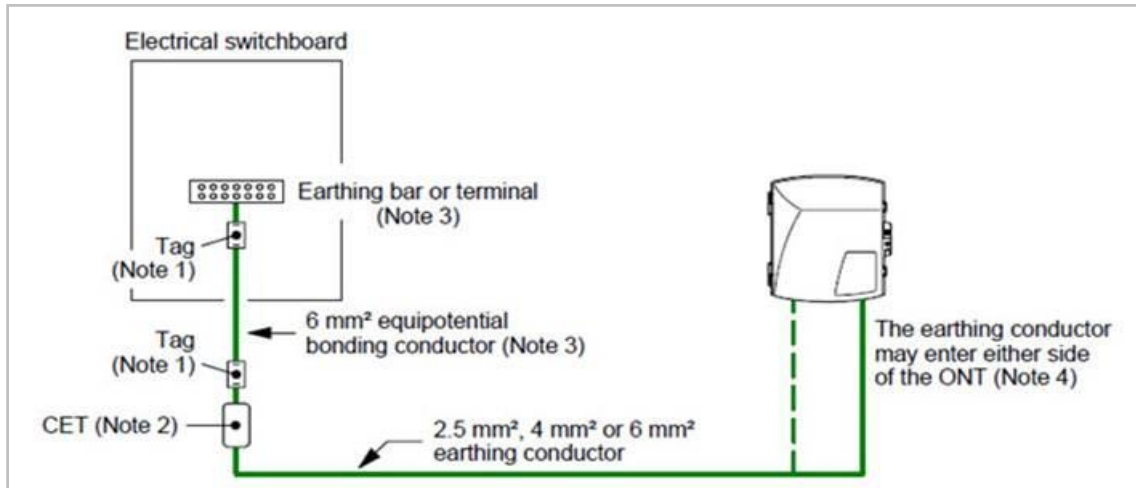


Figure 2. Earthing requirements

The following notes relate to Figure 2:

1. The bonding conductor shall be labelled 'Telecommunications Bonding Conductor' at the switchboard end and also at the CET end if the CET is not within sight of the switchboard.
2. The CET shall be located within one (1) m of the essential services outdoor NTD.
3. A licensed electrician shall make the bonding conductor connection inside the electrical switchboard.
4. The earthing conductor shall be connected to the outdoor NTD by the **nbn** installer.



2.6 Mounting template

- A General Power Outlet (GPO) shall be provided by the end user outside the area assigned for the installation of **nbn™** equipment.
- The position of the GPO in these diagrams is for illustrative purposes only. The GPO may be positioned anywhere adjacent to the perimeter of the mounting surface 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.

Table 1. Outdoor NTD mounting template

Parameter	Mounting surface template for outdoor NTD
<p>A landscape layout of the outdoor NTD</p>	<p style="text-align: center;">Figure 3. Outdoor NTD composite layout (landscape)</p>
<p>i</p>	<p>Additional area shall be provided if the open enclosure/home distributor is designed for non nbn™ cable patching, devices or equipment.</p>

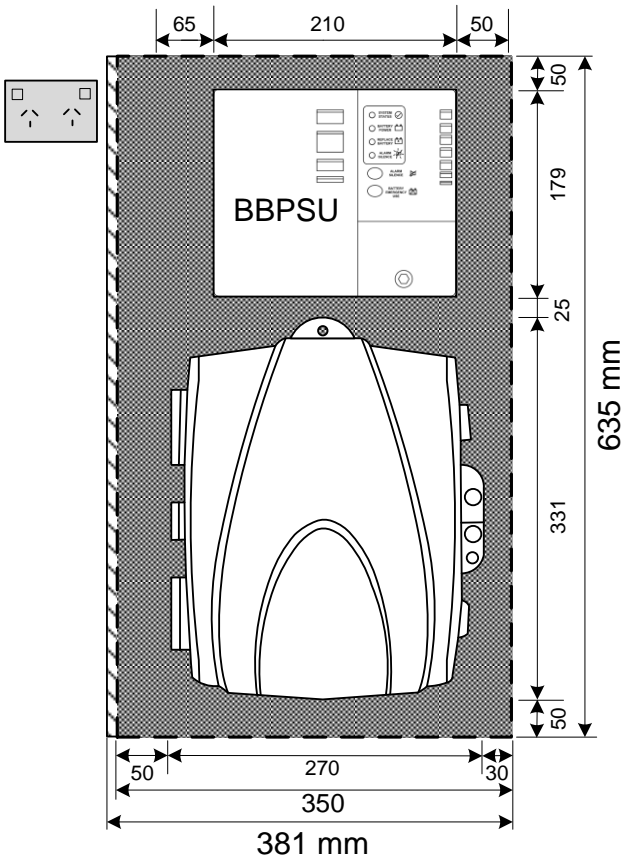
Parameter	Mounting surface template for outdoor NTD
<p>A portrait layout of the outdoor NTD</p>	

Figure 4. Outdoor NTD composite layout (portrait)

2.7 nbn™ MDU/MPS classification

This section specifies the minimum requirements for the various MDU/MPS types, but these are standard guidelines only. Please refer any concerns to **nbn** for non-standard installations or specific recommendations.

An MDU/MPS is classified by **nbn** according to the types of buildings on a site or development. Each MDU/MPS within a development can be categorised according to the following definitions:

Table 2. MDU/MPS categories

MDU/MPS category	Characterisation
horizontal	<ul style="list-style-type: none"> • close resemblance to single dwelling units in a street • buildings may be clustered into semi-detached or terrace arrangements, but the entry facility is common for at least two (2) living units • pathways between living units resemble those detailed in the document <i>NBN-TE-CTO-194 New developments: deployment of the nbn™ pit and conduit network</i>.
vertical	<ul style="list-style-type: none"> • multiple floors and/or multiple living units per floor; likely to have several vertical spaces for services



MDU/MPS category	Characterisation
	<ul style="list-style-type: none"> includes one (1) or more telecommunications rooms/spaces as per <i>AS/NZS 3084:2003 Telecommunications installations - Telecommunications pathways and spaces for commercial buildings</i>.
hybrid	<ul style="list-style-type: none"> multiple buildings on a site apartments in horizontal and vertical configurations that may have common access pathways between structures multiple access spaces are generally required

2.7.1 Basic principles

The following installation principles apply:

- Space requirements shall be applied in accordance with *AS/NZS 3084:2003 Telecommunications installations - Telecommunications pathways and spaces for commercial buildings*, unless otherwise specified in this document.
- The FTTP NTD and PSU shall be located in an area that is controlled by the end user at all times.
- The HFC wall plate and modem shall be located in areas controlled by the end user at all times.
- For all FTTB/copper to the MDF customer cabling, consideration should be made for the Telecommunications Outlet (TO) location within a unit/apartment/tenancy.
- All communication rooms, cupboards and riser cupboards must have lockable doors.

2.7.2 Lead-in to the building entry

- Two (2) to 60 premises: **nbn** requires one (1) x white P50 PVC conduit, with a minimum wall thickness of 3.65 mm.
- Greater than 60 premises: **nbn** requires a minimum of one (1) x P100 telecommunications conduit.

Conduit dimensions White Telecommunications	Nominal Size (Inside Diameter)	Conduit dimensions White Telecommunications	Nominal Size (Inside Diameter)	Conduit dimensions White Telecommunications	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 5. Normal conduit dimensions

3 Space and location requirements

3.1 FTTP solution

3.1.1 Premise Distribution Hub (PDH)

PDHs shall typically be mounted on the interior wall of an MDU. PDH locations should be a minimum of 900 mm from the ground and no higher than 2 m above ground level (without a ladder), and accessible from solid ground or a slab that is at ground level internally.

This will eliminate the risk of working at heights for future workers and ensure the PDH is easily accessible for repair, to minimise the impact of potential future service disruptions.

A PDH is required when there are 60+ residential premises. Otherwise a Cable Transition Location (CTL) is used.

Where multiple PDHs are necessary, the first PDH shall require a total clearance of 1200 mm horizontally and every subsequent PDH on the same wall shall require only 900 mm width of reservation.

3.1.1.1 Spatial requirements

PDH clearance requirements are detailed in Figure 6.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard

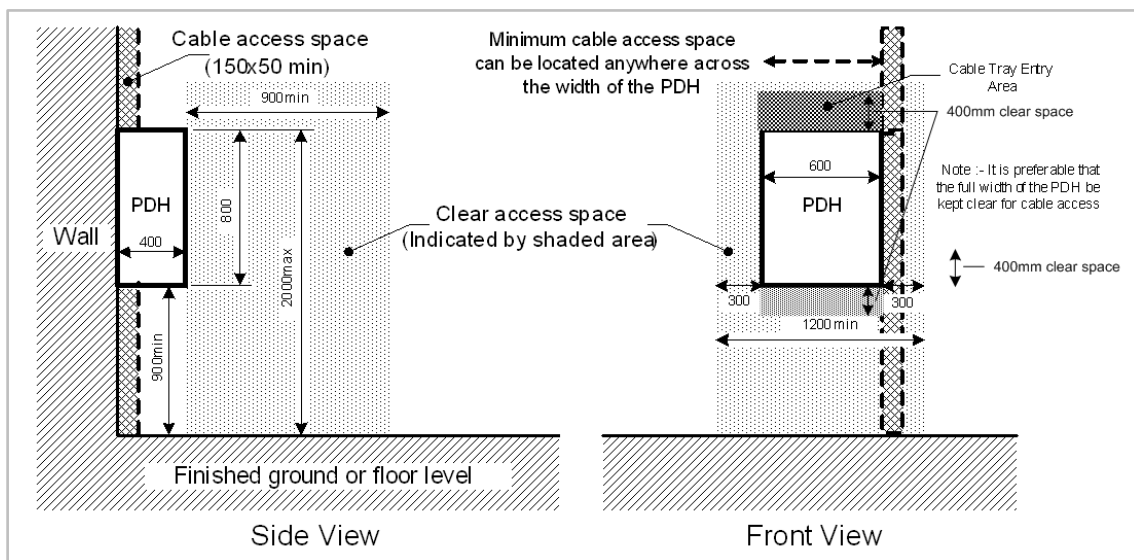


Figure 6. Example fibre/PDH/internal locations clearance requirements

3.1.2 CTL

CTL locations should be a minimum of 900 mm from the ground and no higher than 2 m above ground level (without a ladder), and accessible from solid ground or a slab that is at ground level internally

This will eliminate the risk of working at heights for future workers and ensure the CTL is easily accessible for repair, to minimise the impact of potential future service disruptions.

3.1.2.1 Spatial requirements

CTL clearance requirements are detailed in Figure 7.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard

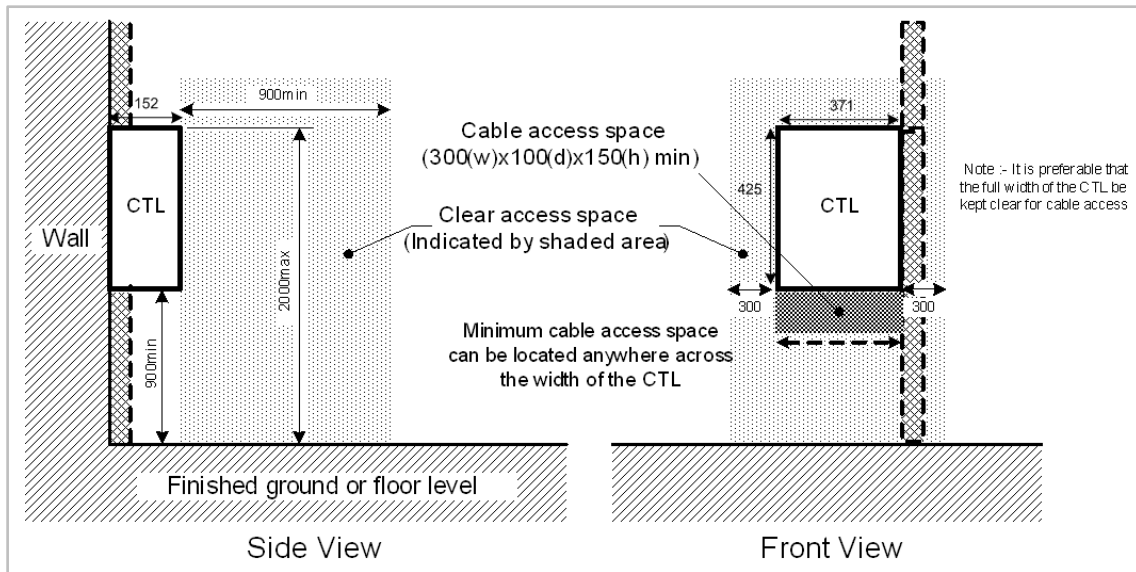


Figure 7. Example CTL clearance requirements

3.1.3 Fibre Collector Distributor (FCD) or Fibre Distribution Terminal (FDT)

FCDs/FDTs shall typically be mounted on the interior of an MDU. FCD/FDT locations should be a minimum of 450 mm from the ground and no higher than 1.8 m above ground level (without a ladder), and accessible from solid ground or a slab that is at ground level within risers/closets.

This will eliminate the risk of working at heights for future workers and ensure the FCD/FDT is easily accessible for repair, to minimise the impact of potential future service disruptions.

3.1.3.1 Spatial requirements

FCD or FDT clearance requirements are detailed in Figure 8.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard

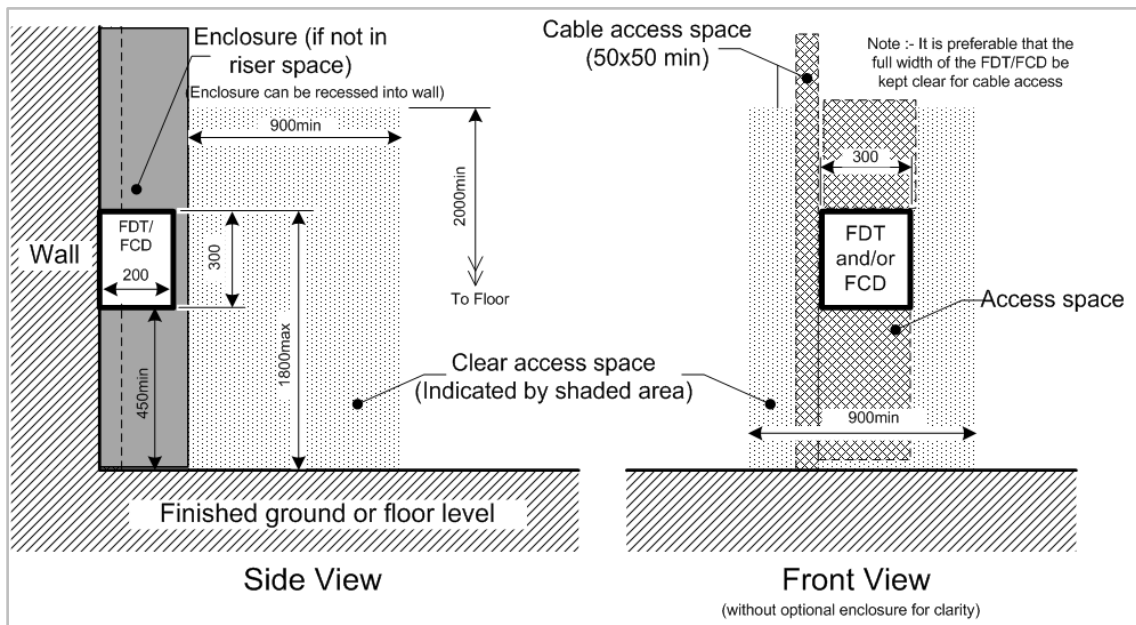


Figure 8. Example of access clearances for a single FDT or FCD (all dimensions in mm)

3.2 Separation from other services

The following sections detail the clearances that shall be maintained for the safety and practicality of installing **nbn™** equipment.

3.2.1 Gas meter clearances

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



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

Figure 9 depicts the clearances required for a gas meter that is not enclosed:

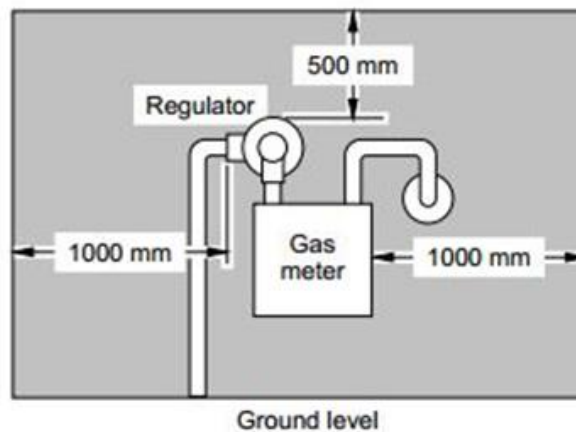


Figure 9. Normal conduit dimensions

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

The hazardous area does not extend outside:



- an approved gas enclosure
- the gas compartment of a combined gas and telecommunications enclosure approved by the relevant gas utility

Figure 10 depicts the clearances required for an enclosed gas meter:

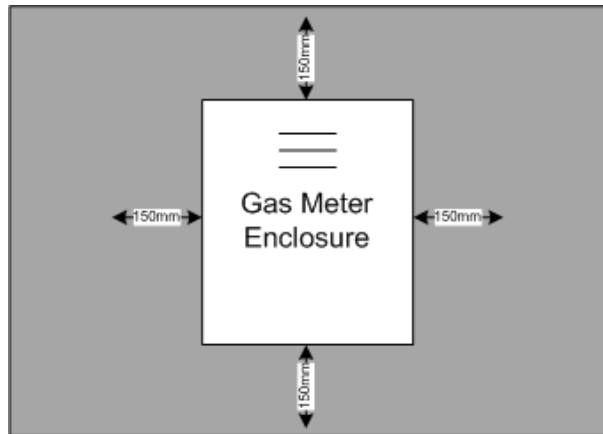


Figure 10. Gas meter enclosure

A minimum clearance of 150 mm is required from an approved gas meter enclosure.

3.2.2 Gas cylinder clearances

The following clearances apply to a fixed gas cylinder or an exchangeable gas bottle.

Figure 11 details the required clearances:

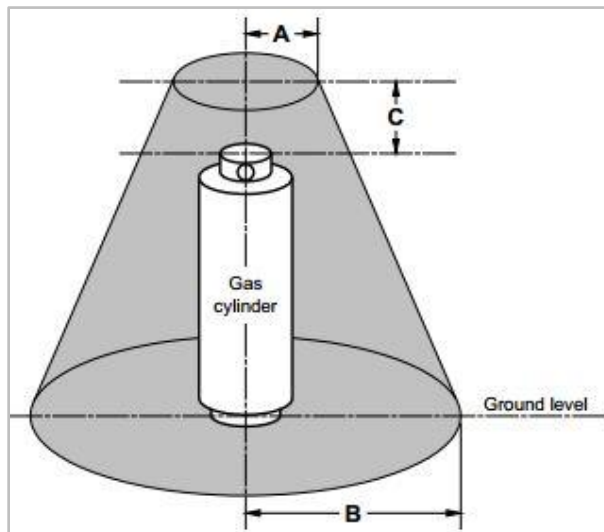


Figure 11. Gas cylinder clearances



Table 3. Gas cylinder/bottle clearances

Dimensions	Exchangeable gas bottle	In-situ gas cylinder
A	500 mm	1500 mm
B	1500 mm	3500 mm
C	500 mm	500 mm

The horizontal distances are measured from the centre line of the gas cylinder or bottle.

The vertical distances are measured from the top of any gas cylinder/bottle valve.

3.2.3 Other utility and obstruction clearances

Table 4 details the clearances for other utilities and obstructions.

Table 4. Equipment clearances

Obstruction/utility	Clearance
working clearances	2000 mm H x 900 mm W x 900 mm D
fixed services: pipes, taps, water meters	150 mm
power source: including the point where the premise power supply cable connects to the property electrical board	150 mm
corner of the wall and exterior structure, such as a window or balcony	100 mm
left of the Premise Connection Device (PCD) to allow for the door to open	255 mm
space under the eaves from an aerially fed PCD	100 mm

3.2.4 Basement or telecommunications room

The size of an MDU/MPS and the solution required will determine the space requirements. A dedicated telecom room is ideal, but not essential (e.g. if a PDH is required to service the building, then an adequate space to mount and work on and around the cabinet will be necessary - whether or not it is in a dedicated telecommunications room).

The specific area and clearance requirements will depend upon the number of premises being supported, as this will determine the amount and type of hardware products to be installed. Refer to Figure 6 for the generic clearance/space requirements for an MDU/MPS that requires a PDH cabinet with dimensions of 800 mm x 600 mm x 400 mm. Access clearances are defined in *AS/ACIF S009:2013 Installation requirements for customer cabling (Wiring rules)* (Figures D2 and D3) and these requirements shall be referred to for complete guidance. This configuration may be replicated multiple times for very large developments, however, it is recommended to refer the layout/design for each large installation to **nbn** to confirm compliance.

3.2.4.1 Concept drawing of communications room layout for an FTTP solution (combined PDH, FDT and outdoor NTDs)

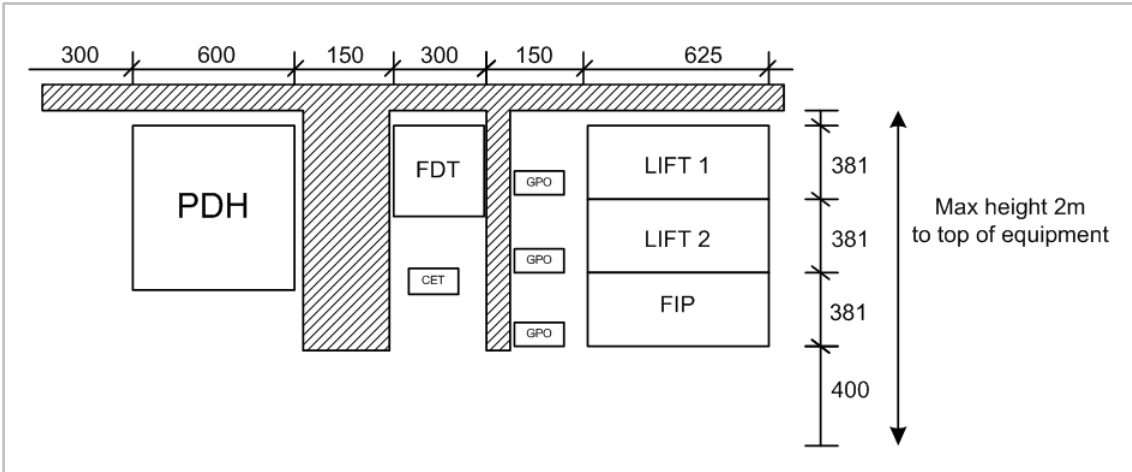


Figure 12. Concept design of typical front elevation communications room



Figure 13. Example of typical communications room



3.2.5 FCD and FDT within telecommunications riser/closet

Two (2) main products are mounted in a telecommunications riser/closet: the FCD and/or the FDT.

The types of dimensions referenced below are:

- the minimum space required to physically mount a FCD or FDT to a wall
- the minimum clearance required around a FCD/FDT or grouping of products (the working height and space)

3.2.5.1 FCD and FDT minimum requirements

A FCD and FDT have the following minimum requirements:

- mounted a minimum of 450 mm from the floor to the bottom of the FCD/FDT, and a maximum of 1800 mm from the floor to the top of the FCD/FDT
- a minimum of 900 mm clear space in front of the FCD/FDT
- a minimum of 300 mm on each side of the FCD/FDT (or on each side of a grouping of FCD/FDTs)

The telecommunications closet/riser is also required to have a minimum 50 mm x50 mm floor slot or one (1) x white telecommunications conduit cut nominally 25 mm above or below the floor slab, as appropriate (refer to Figure 14 and Figure 15). If there are living units above and below the floor slab, bi-directional access is required.



The diagrams in this section do not include the conduit or other pathway to units.

Any fire stopping requirements for penetrations of the walls, floors or ceilings shall be installed in accordance with the BCA.

nbn does not provide or certify any fire stopping requirements.

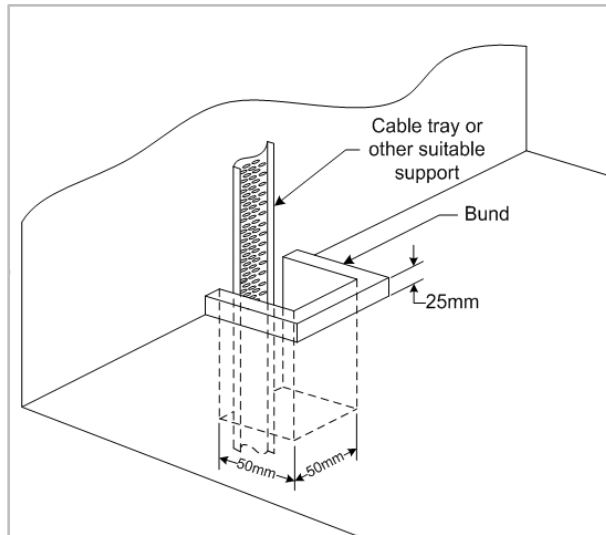


Figure 14. Slot example telecommunications riser/closet floor or ceiling entry

OR

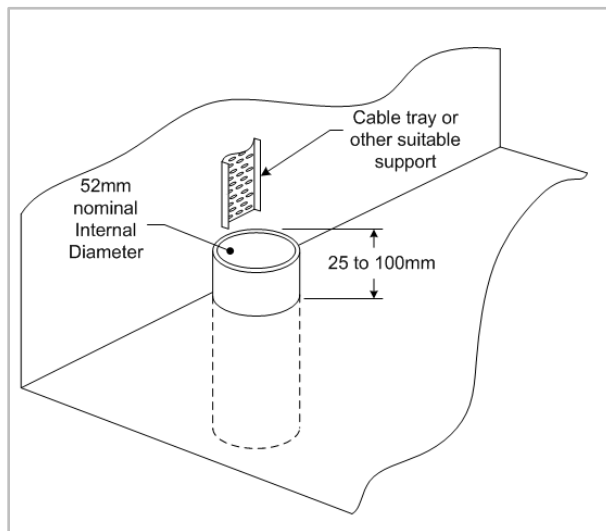


Figure 15. Sleeve example telecommunications riser/closet floor or ceiling entry

4 Pathways

4.1 Property boundary to telecommunications room

Communication pathways may be provided using the options below. At any pathway transition point, no fibre is to be self-supported over a distance greater than 200 mm.



Conduits require drawstring.

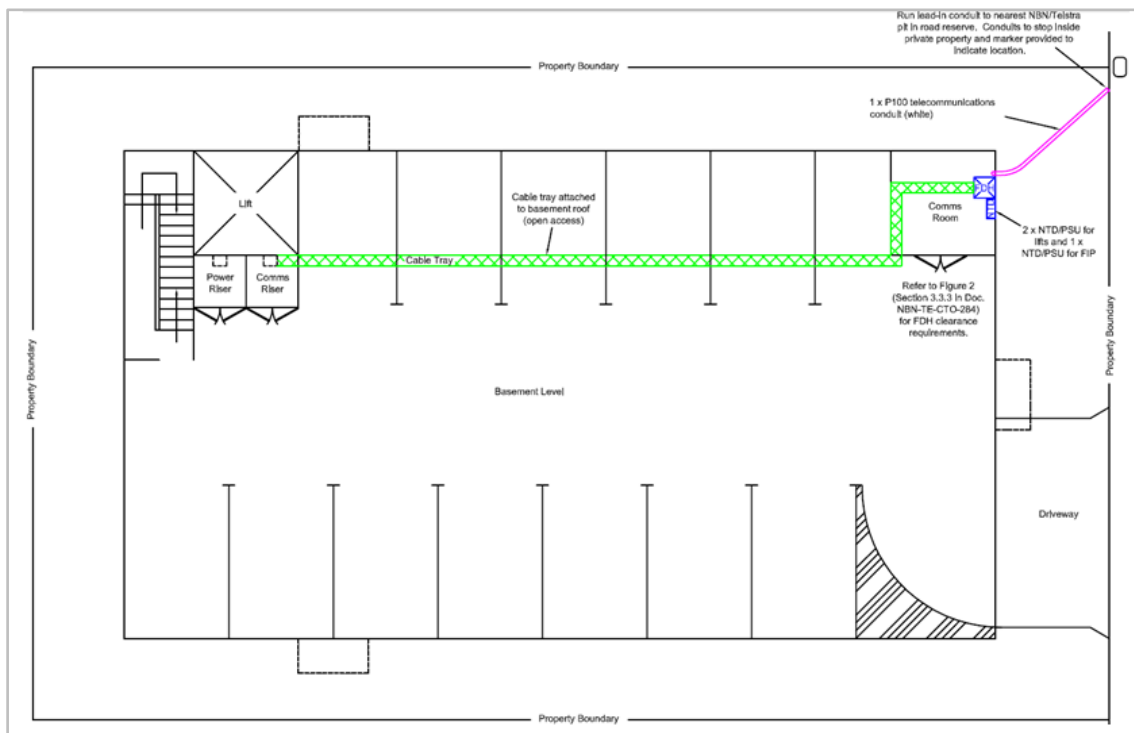


Figure 16. nbn™ pathway from property boundary to communications room

4.2 Telecommunications riser/closet to living unit

Communications pathways may be provided using the options below. Options 1 and 2 shall be used in new development MDU/MPS.

4.2.1 Option 1: dedicated conduit

Cabling from the living unit to the telecommunications riser/closet requires a minimum of a nominal P20 rigid white communication conduit with a drawstring, from the telecommunications riser or closet location to each NTD location within a premise. No section of conduit shall be longer than 50 m between pull/draw points and contain the equivalent of no more than three (3) 90° 300 mm radius bends. Conduits can be surface mounted in common areas or cast 'in slab'.



All conduits and drawstrings shall be labelled to reference the respective apartment/unit numbers.

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

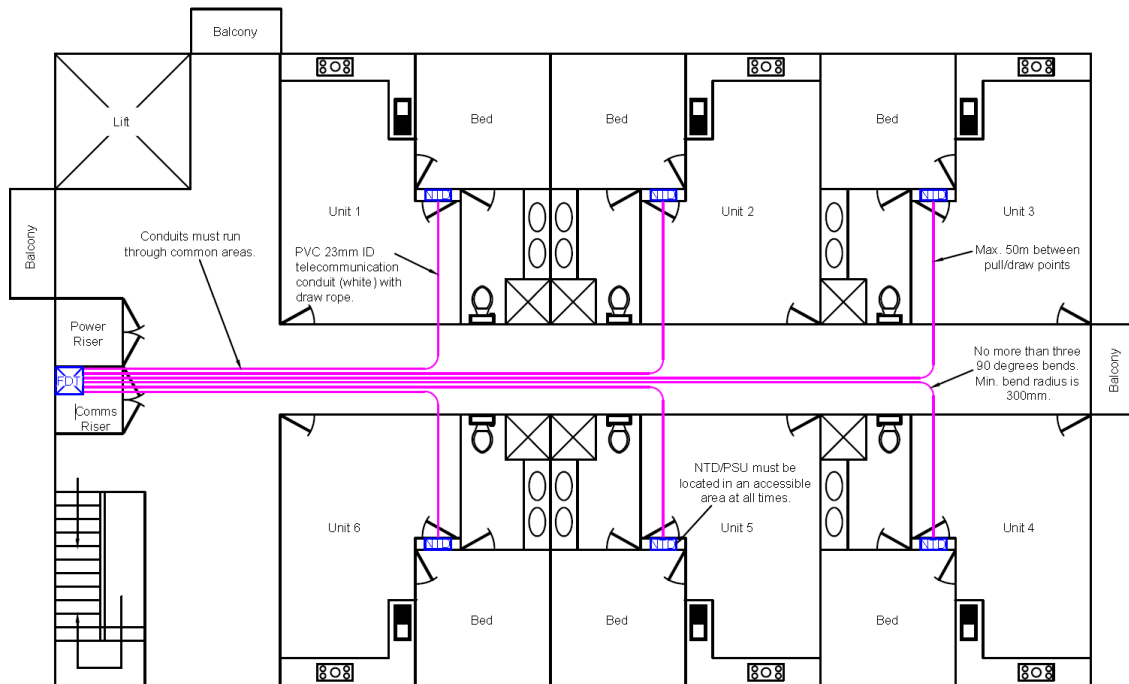


Figure 17. nbn™ pathway using all nominal P20 conduit to feed typical apartment floor (example layout 1)

4.2.2 Option 2: cable tray and conduit

Where a combination of cable tray and conduit is utilised for cabling from the telecommunications riser/closet to the living unit, access panels shall be provided:

- at any change of direction of cable tray
- at any cable tray/conduit transition
- no more than 15 m apart

Where cable tray is shared with other services, there shall be a minimum of 100 mm separation from the **nbn**™ network infrastructure.

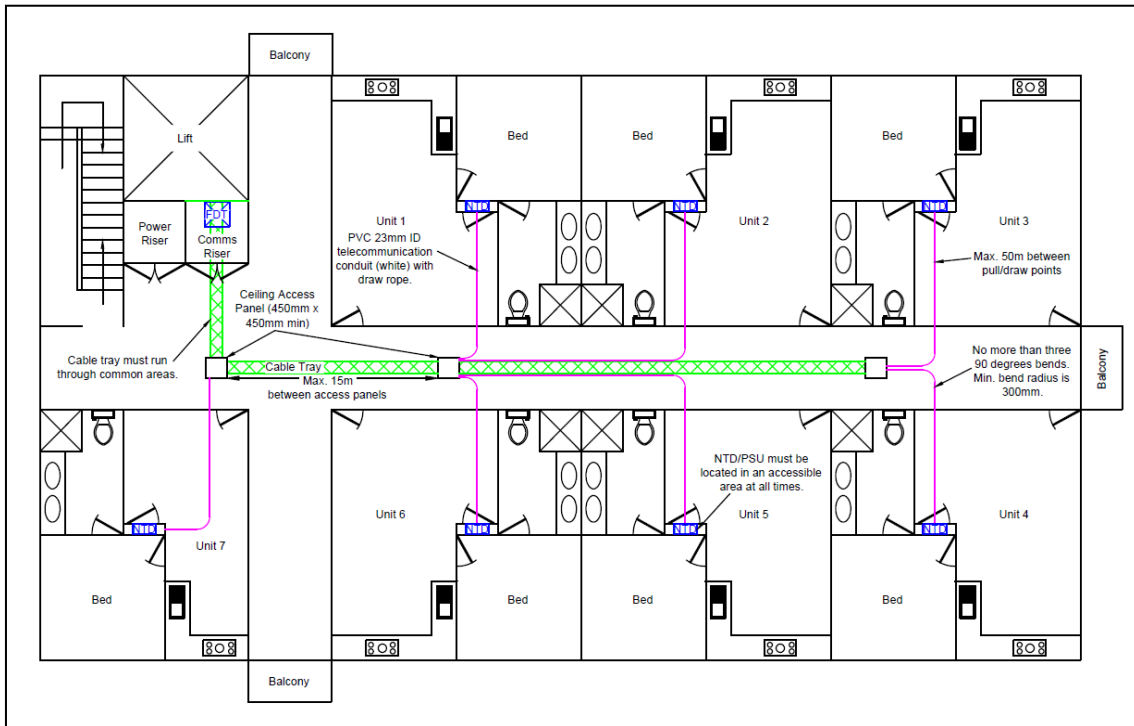


Figure 18. nbn™ pathway using combination cable tray and nominal P20 conduit to feed typical apartment floor (example layout 2)

The allowable pathway solutions in **nbn's** order of preference are:

1. nominal P20 rigid communications conduit
2. nominal P50 rigid communications trunk conduit
3. cable tray

4.3 Concept drawing elevations

4.3.1 Vertical distribution single line diagram

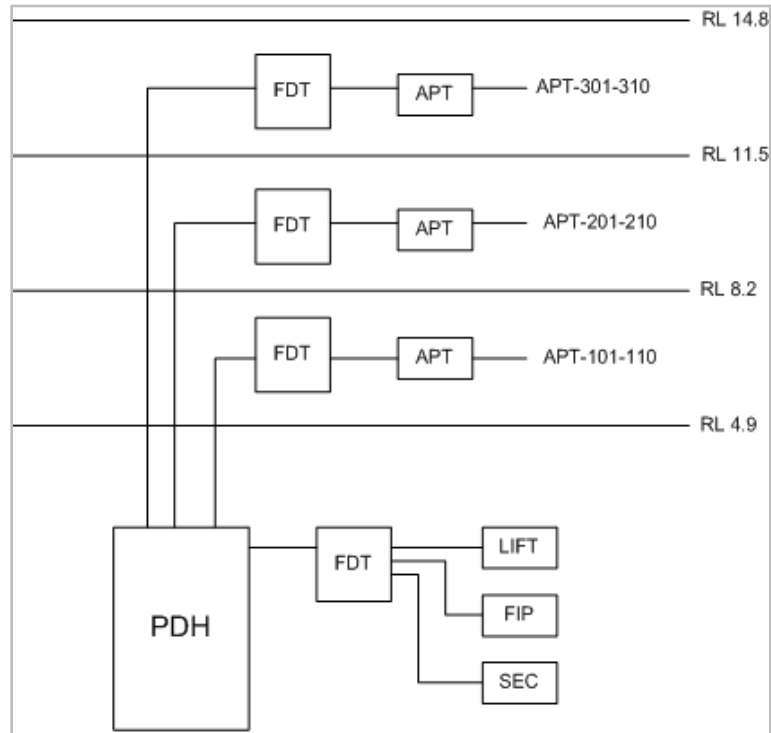


Figure 19. Concept design of vertical single line diagram

4.3.2 Living unit NTD elevations

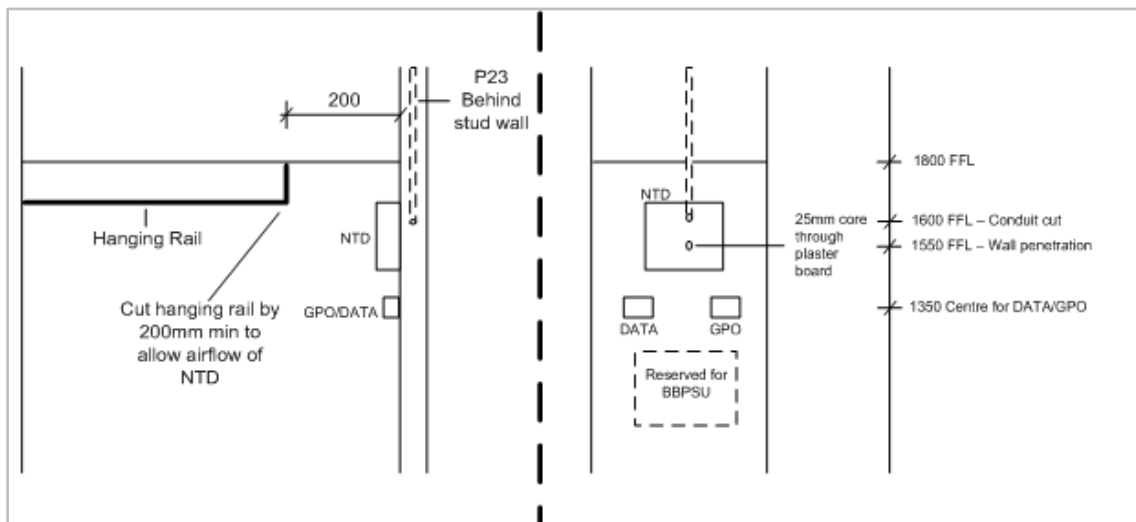


Figure 20. Concept design of NTD location in living unit (in robe)

5 Mounting surface templates and locations

Builders and building owners shall make one (1) of the following types of locations available for the installation of **nbn™** equipment. Each location shall provide for the minimum mounting template requirements shown in Figure 21.

5.1 Indoor NTD mounting surface templates

Figure 27 shows the requirements for NTD landscape and portrait indoor mounting surface templates. Space should be available for a 230V AC power outlet adjacent to the mounting surface template. The 230V AC power outlet may be positioned anywhere adjacent to the perimeter of the mounting surface template and as close as practical to it (in accordance with wiring standards) to minimise cable length.



- Maximum mounting height above ground level is 1.7 m to the top of the NTD enclosure.
- Minimum mounting height above ground level is 0.7 m to the top of the NTD enclosure.

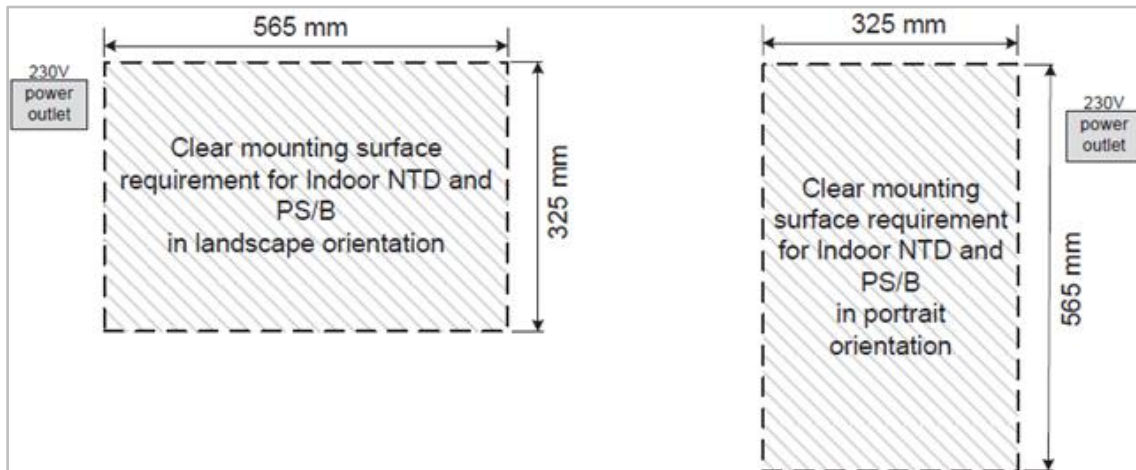


Figure 21. Indoor NTD mounting surface templates

5.2 Mounting locations

nbn distinguishes between three (3) types of mounting locations, where equipment may be mounted within the confines of a mounting surface template. Table 5 summarises the types of mounting locations.

Table 5. Mounting locations

Location type	Description
open wall areas	An area on an open wall with either no obstructions or only partial obstructions. Open wall areas use the bulk space of the room for air circulation.
open enclosures	A partially-enclosed area that contains no internal obstructions. Open enclosures use the bulk space of the enclosure and the absence of obstructions for air circulation.






Location type	Description
confined areas	A cabinet or cupboard (including a home distributor or utilities enclosure) dedicated to communications equipment. Confined areas require ventilation to be added to the design to improve the air circulation.

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

5.3 Minimum home distributor dimensions

nbn™ equipment may be installed in a home distributor that meets or exceeds the following size requirements:

Table 6. Home distributor dimensions

Parameter	Home distributor dimensions
minimum mounting surface area required for an indoor NTD composite layout	2,000 cm ² , measured within the home distributor  This volume is sufficient to accommodate the I-240G-R indoor NTD, the battery backup PSU, NTD enclosure and GPO. Additional volume should be provided to accommodate patch panels or other end user equipment.
minimum mounting surface area required for an indoor NTD composite layout	2,000 cm ² , measured within the home distributor  This volume is sufficient to accommodate the I-240G-R indoor NTD, the battery backup PSU, NTD enclosure and GPO. Additional volume should be provided to accommodate patch panels or other end user equipment.
minimum internal clearance between nbn ™ equipment and home distributor door/cover	2 cm
minimum internal clearance from the rear of the nbn ™ equipment and home distributor/cover	10 cm
minimum inside volume required for a home distributor	20 L  This volume is sufficient to accommodate the I-240G-R indoor NTD, the battery backup PSU, NTD enclosure and GPO. Additional volume should be provided to accommodate patch panels or other end user equipment.

5.3.1 Indoor composite layouts


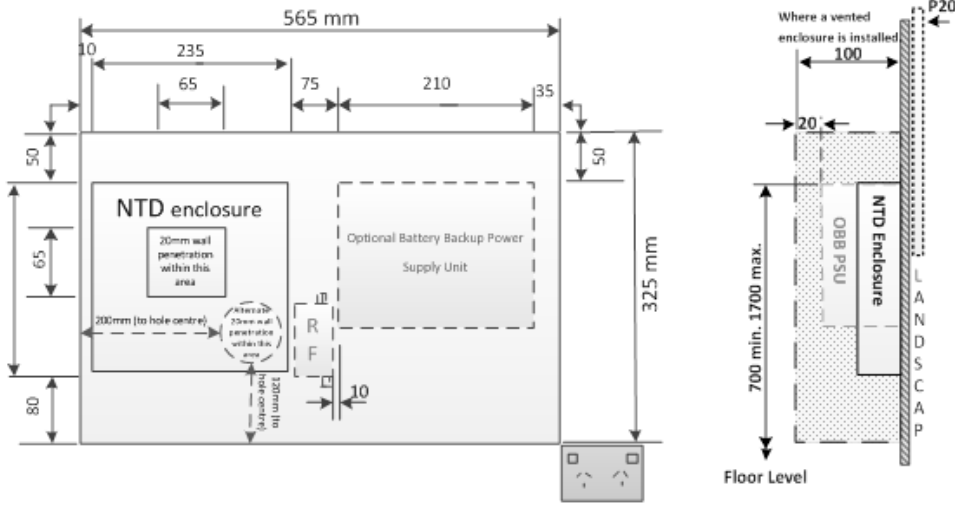
- A GPO shall be provided by the end user outside the area assigned for the installation of **nbn™** equipment.
-  The position of the GPO in these diagrams is for illustrative purposes only. The GPO may be positioned anywhere adjacent to the perimeter of the mounting surface template and as close as practical to it, in accordance with wiring standards. The electrician should avoid mixing power cabling with data, telephone, RF and fibre in the same vertical corridor.

Table 7. NTD enclosure mounting template

Parameter	Mounting surface template for NTD enclosure
<p>Mounting surface template for a landscape orientation</p>	 <p style="text-align: center;">Figure 22. NTD enclosure landscape orientation</p>

Parameter	Mounting surface template for NTD enclosure
<p>Mounting surface template for a portrait orientation</p>	<p style="text-align: center;">Figure 23. NTD enclosure portrait orientation</p>

5.3.2 Power outlet(s)

The GPO to power the installation is not included within the dimensions of the mounting surface, but is shown adjacent in each of the above examples.

Ensure the GPO is positioned up to 200 mm from the **nbn™** equipment template.



The provision of a double GPO is recommended, so that one (1) socket 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.

5.3.3 Installation specifications and rules for NTDs and PSUs



The indoor NTD and its PSU are suitable for installation in standard circumstances.

All of the following checks shall be true for an installation to be categorised as ‘standard circumstances’:

- The NTD and PSU are installed in a building where people normally live, work or meet, but not in a place that is open to public access.



This means the indoor NTD and PSU should not be installed in a building or structure separate from where the services will be reticulated, or in a hut or street cabinet or another kind of enclosure such as a telephone booth, where the environmental conditions may extend outside the specifications permitted for the NTD, PSU or battery.

- The NTD and PSU:
 - **are** installed inside the same building as each other
 - **are not** installed on the external surface of an external wall
 - **are not** installed in an enclosure situated on or embedded into the external surface of an external wall of the building



The 'external surface of an external wall' refers to the outside of a building and would include, as an example, an undercover area within an enclosed patio or similar circumstances. The installation of an NTD and PSU on the 'internal surface of an external wall' refers to the inside of a building and this situation is not meant to be precluded by these points, however, may fall under other circumstances described later in this list.

- The end user cabling remains wholly within the same building containing the NTD and PSU.



- End user cabling includes any cables that contain electrical conductors or conductive components, for the purpose of reticulating any UNI-V or UNI-D service, or reticulating PSU power. This term is intended to mean the same as the term 'customer cabling' in *AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules)*.
- This means there shall not be any electrically conductive telephone or data or PSU power cables between the main building and a separate freestanding building.

- If a battery backup PSU is deployed, it is mounted and semi-permanently secured to a wall or permanent fixed enclosure.
- Neither the NTD nor PSU are installed in a situation where they might be reasonably expected to experience damp, moist or excessively humid conditions.
- Neither the NTD nor the PSU are installed within a roof cavity.
- Neither the NTD nor the PSU are installed below a floor outside the normal living, working or occupancy areas of the building.



This means that neither the NTD nor the PSU may be installed under a premise between the floor and bare earth, or in a location that cannot be locked up.

- Neither the NTD nor the PSU are installed in a cupboard, enclosure, home distributor or in a confined space where:
 - it might reasonably be expected that linen, clothing or towels might be stored in direct contact with the NTD or PSU
 - it might be reasonably presumed that items could be stored that restrict free airflow around the NTD or PSU



- 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



VRLA batteries, of the kind used in the battery backup PSU, may emit hydrogen and oxygen gas under some circumstances, such as battery overcharging. VRLA batteries may be installed into office or end user enclosures if the space provides for an exchange of air with the ambient atmosphere, as described in Section 2.4 of *AS/NZS 4029.2:2000 Stationary batteries - Lead-acid*. While not strictly applicable to **nbn**'s application, Sections 2.6 and 2.7 of *AS 4086.2-1997 Secondary batteries for use with stand-alone power systems* provide cogent recommendations.

- Neither the NTD nor the PSU are installed:
 - 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
 - on a surface where the temperature might routinely exceed +40°C or fall below 0°C.



- This means that neither the NTD nor the PSU may be installed directly onto a northern or western facing masonry wall where:
 - the wall is likely to be subjected to heating through solar loading and the heat may be transferred to the surface on which the NTD or PSU is mounted
 - the NTD or PSU will be near a space or water heater, or a heater vent
- Note that indoor NTDs and PSUs may be installed on northern or western facing masonry cavity walls provided the cavity is fitted with R1.5 or higher rated insulation batts
- Also note that if a wall would be subjected to solar loading except for a tree that is currently providing shade, the installer should assess future circumstances whereby the tree may be removed.

- Neither the NTD nor the PSU are installed in a location where the power or end user cabling might:
 - be a tripping or strangulation hazard
 - be accidentally wrenched or damaged by tripping, passers-by or another inadvertent disturbances



- End user cabling includes any cables that contain electrical conductors or conductive components, for the purpose of reticulating any UNI-V or UNI-D service, or reticulating PSU power. This term is intended to mean the same as the term 'customer cabling' in *AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules)*.
- Cables and equipment shall be installed in accordance with local OH&S regulations and requirements. It is beyond the scope of this document to specify values.

- Neither the NTD nor the PSU are installed:
 - onto an accessible conductive/metallic surface
 - encompassing a GPO, unless all accessible conductive surfaces and parts have been protectively earthed in accordance with *AS/NZS 3000:2007 Wiring Rules* and *AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules)*.



This addresses potential breaches of primary insulation, an inadvertent detachment of live conductors coming into contact with exposed metallic parts, and other similar risks in situations where conductors carrying mains potential are routed into conductive/metallic enclosures. Refer to Section 8.4 of *AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules)* (Section 8.4 Earthing of cable support systems and cable enclosures states that ‘An electrically conductive support system may be connected to protective earth in accordance with Clause 20.19’).

- The PSU AC power cord is not routed through an opening in a metallic surface, unless the metallic edges of that opening are appropriately protected by a grommet or similar device.
- Neither the NTD nor the PSU are at risk of being damaged.

5.3.4 Ventilation requirements

nbn requires that enclosures for nbn™ equipment only, satisfy the following thermal ventilation requirements:

Table 8. 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)	60 cm ²
between 20 L and 60 L	60 cm ² , plus an additional 1.5 square centimetres per litre of volume over 20 L
between 20 L and 60 L	120 cm ² , plus an additional 0.1 square centimetres per litre of volume over 60 L
greater than 60 L	120 cm ² , plus an additional 0.1 square centimetres per litre of volume over 60 L

5.3.4.1 Calculating ventilation area

For each ventilation region, use the following steps to calculate the required ventilation area (in square centimetres):

- 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
- based on the volume you calculated in the previous step, determine the required ventilation area (in square centimetres).
 - for volumes between 20 L and 60 L:



$$ventilation\ area = 60 + [(volume - 20) \times 1.5]$$

- for volumes greater than 60 L:

$$ventilation\ area = 120 + [(volume - 60) \times 0.1]$$

Example:

An enclosure with internal dimensions of width 38 cm, height 65 cm and depth 13 cm, has the following volume:

$$volume = \left(\frac{38 \times 65 \times 13}{1000} \right) = 32.13\ L$$

As this volume is **between 20 L and 60 L**, we calculate the required ventilation area for each of the upper and lower ventilation areas as:

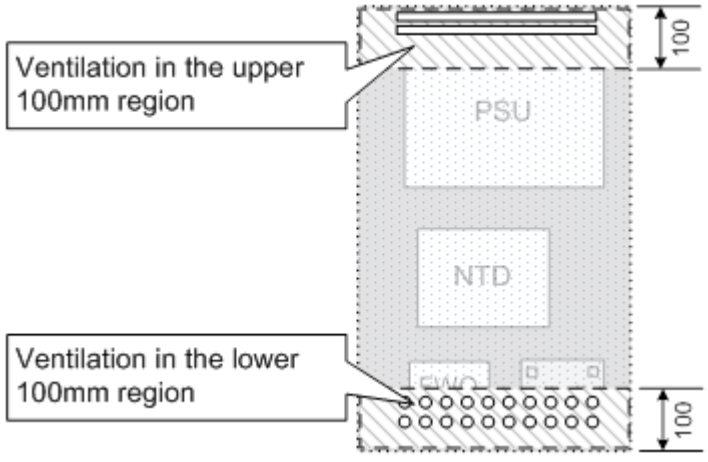
$$ventilation\ area = 60 + \left[\left(\frac{38 \times 65 \times 13}{1000} - 20 \right) \times 1.5 \right] = 78.2\ cm^2$$


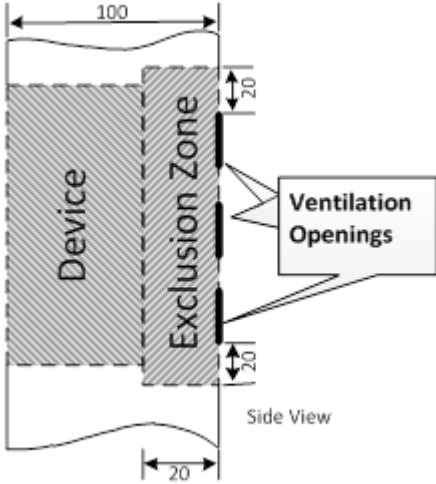

5.3.4.2 Additional requirements

Table 9. Additional ventilation requirements



Rule	Notes
doors or covers shall not obstruct ventilation	An open enclosure or home distributor design shall not rely on a cover or doors being opened to meet the thermal ventilation requirements.
obstructed ventilation does not count towards thermal ventilation assessment	Examples of obstructed ventilation include (but are not limited to) the following: <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 shall 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.

Table 10. Ventilation requirements

Parameter	Ventilation requirement
<p>Ventilation to dissipate gases released during battery charging</p>	<p>a. Ventilation shall be provided in an ‘upper ventilation region’ no further than 100 mm from the top surface of the open enclosure area or home distributor.</p> <p>b. Ventilation shall be provided in a ‘lower ventilation region’ no further than 100 mm from the bottom surface of the open enclosure area or home distributor.</p> <p>c. The combined cross-sectional ventilation area in the upper ventilation region shall be at least 5 cm² unimpeded.</p> <p>d. The combined cross-sectional ventilation area in the lower ventilation region shall be at least 5 cm² unimpeded.</p> <div data-bbox="638 884 1348 1344" style="text-align: center;">  </div> <p style="text-align: center;">Figure 24. Ventilation upper/lower</p> <p>This ventilation shall exit towards the top/bottom, sides or front of the open enclosure area or home distributor, and shall not exit into a wall cavity.</p> <p>Ventilation that may be obstructed when an open enclosure area or home distributor is embedded into a wall cavity or surrounded by a purpose designed architrave is to be disregarded when the adequacy of ventilation is assessed.</p>
<p>i</p>	<p>‘Unimpeded’ is also intended to mean ‘unobstructed’, and refers to the minimum effective cross-sectional area of airways intended for ventilation.</p> <p>The requirements for separate upper and lower ventilation areas may be met with:</p> <ul style="list-style-type: none"> • upper and lower circular holes each of at least 25 mm diameter • multiple circular holes with areas that sum to at least 5 cm² in each of the upper and lower enclosure spaces • one (1) or more ventilation slots in each of the upper and lower enclosure

Parameter	Ventilation requirement
	spaces with cross-sectional areas that sum to at least 5 cm ² each
Arrangement of enclosure/home distributor ventilation openings	Where feasible, ventilation openings should be arranged in accordance with the recommendations in <i>AS 4086.2-1997 Secondary batteries for use with stand-alone power systems</i> . In particular: <ul style="list-style-type: none"> • ventilation openings should be distributed across the breadth of the upper and lower ventilation regions of the enclosure/home distributor, as close to the top and as close to the bottom of the enclosure as practical • ventilation openings should be positioned to ensure airflow across both the NTD and the battery backup PSU
	<p><i>AS 4086.2-1997 Secondary batteries for use with stand-alone power systems</i> covers ‘secondary batteries for use with standalone power systems’ and so is not strictly applicable to nbn’s application, which draws power from the consumer AC mains. In the absence of a relevant standard covering the battery capacity deployed in nbn[™] battery backup PSU, we have referenced sections of <i>AS 4086.2-1997 Secondary batteries for use with stand-alone power systems</i>, which are arguably agnostic to the source of power and provide relevant guidance regarding ventilation.</p>
Proximity of a ventilation opening to the face of a device	<p>The perimeter of the inner opening of a ventilation opening shall be at least 20 mm from any of the six (6) faces of an active or passive device.</p>  <p style="text-align: center;">Figure 25. Ventilation openings</p>
	<p>This is equivalent to saying that a device may not be mounted within 20 mm of a ventilation hole, either in the two dimensions of the mounting surface or in the third dimension above the mounting surface.</p>
Cable ingress/egress and ventilation	Ventilation openings shall not be used or intended to be used for cable ingress/egress.



Parameter	Ventilation requirement
	This requirement is to ensure that cables cannot obstruct or reduce the free flow of air into and out of the open enclosure or home distributor, thereby compromising the ventilation.
Doors or covers may not obstruct ventilation	An open enclosure or home distributor design shall not rely on a cover or doors being open to meet any of the ventilation requirements.
Compliance with standards governing safe location of VRLA batteries and battery backup PSUs	Battery backup PSUs shall not be installed onto a wall area or into an open enclosure or home distributor if an unenclosed battery backup PSU would be contrary to local standards or regulation at that location.
	Batteries should not be situated in areas where gas emission, however minor, could give rise to a safety risk. Installing the battery backup PSU in an open enclosure or home distributor that is itself in such an area will not mitigate the latent safety risk, so the battery backup PSU should not be installed in such locations.

6 FTTB solution

6.1 CSD

CSDs should be located a minimum of 350 mm from the ground and the top of the CSD should be no higher than 1.9 m above ground level (without a ladder). This will eliminate the risk of working at heights for future workers and ensure the CSD is easily accessible for repair, to minimise the impact of potential future service disruptions.



- The developer is responsible for providing all required copper cabling and pathways, the MDF and 10A captive power socket outlet, customer cabling and the GPO to support the end user equipment within each unit/apartment/tenancy. Refer to Section 4 Pathways for further information.
- The nominal P20 communications conduit should be provisioned in a safe and accessible location within the unit/apartment/tenancy for the developer to install the customer cabling and TO.

6.2 Spatial requirements and network boundary

CSD clearance requirements are detailed in Figure 26.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard

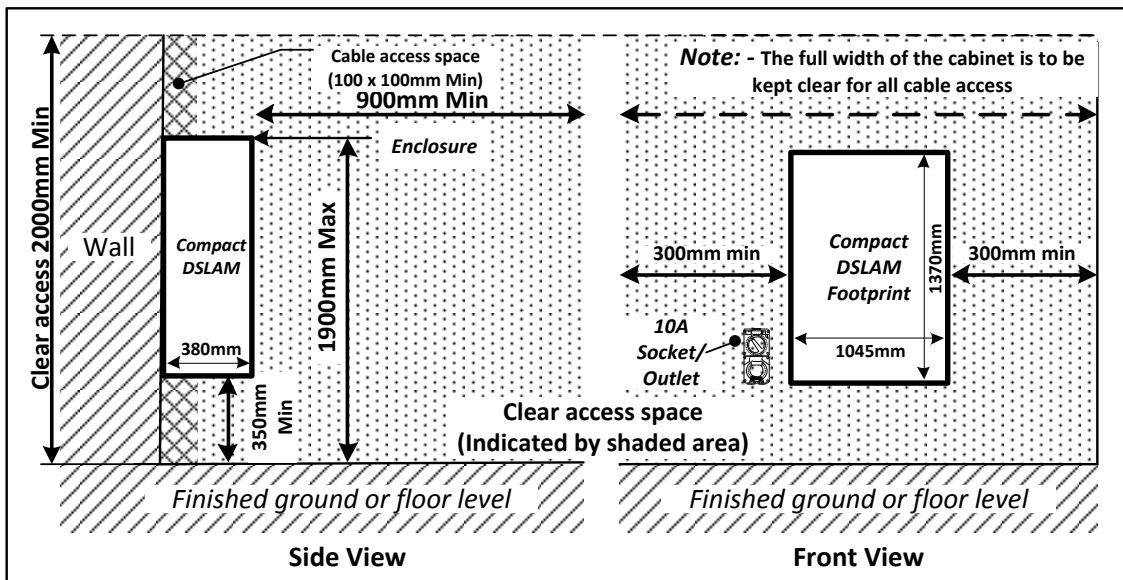


Figure 26. FTTB DSLAM spatial requirements

nbn is responsible for terminating on the 'A' side of the developer provided MDF and termination blocks, as per AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules).

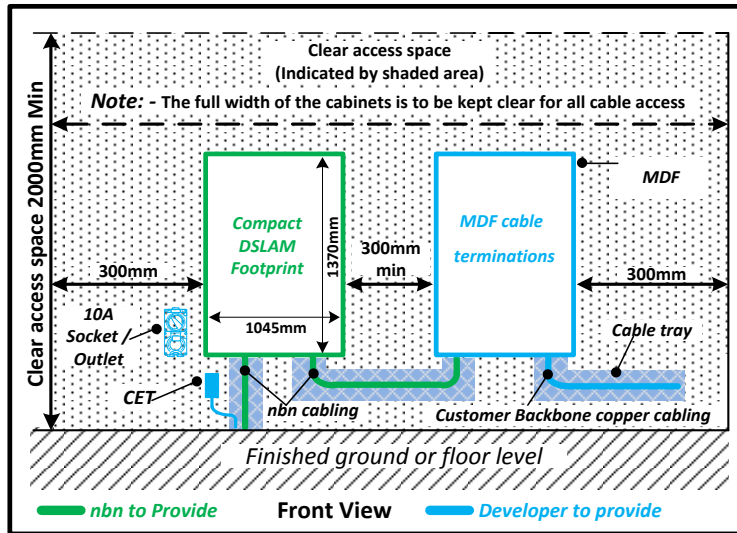


Figure 27. CSD network cable boundary

7 FTTN - copper to the MDF solution

7.1 Copper to the MDF

Copper to the MDF should be located a minimum of 350 mm from the ground and the top of the MDF should be no higher than 1.8 m above ground level (without a ladder). This will eliminate the risk of working at heights for future workers and ensure the copper to the MDF is easily accessible for repair, to minimise the impact of potential future service disruptions.

- The developer is responsible for providing all required copper cabling and pathways, customer cabling and the GPO to support the end user equipment within each unit/apartment/tenancy. Refer to Section 4 Pathways for further information.
- The developer is responsible for providing a CET, an MDF, copper termination modules and mounting frames (current industry approved type e.g. Krone). The capacity of the MDF must support the total EUP requirement (e.g. 1.5 copper pairs/premises + 20% redundancy).
- The nominal P20 communications conduit should be provisioned in a safe and accessible location within the unit/apartment/tenancy for the developer to install the customer cabling and TO.

7.2 Spatial requirements and network boundary

An MDF shall be mounted on the interior of the MPS. The clearance requirements are detailed in Figure 28.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard

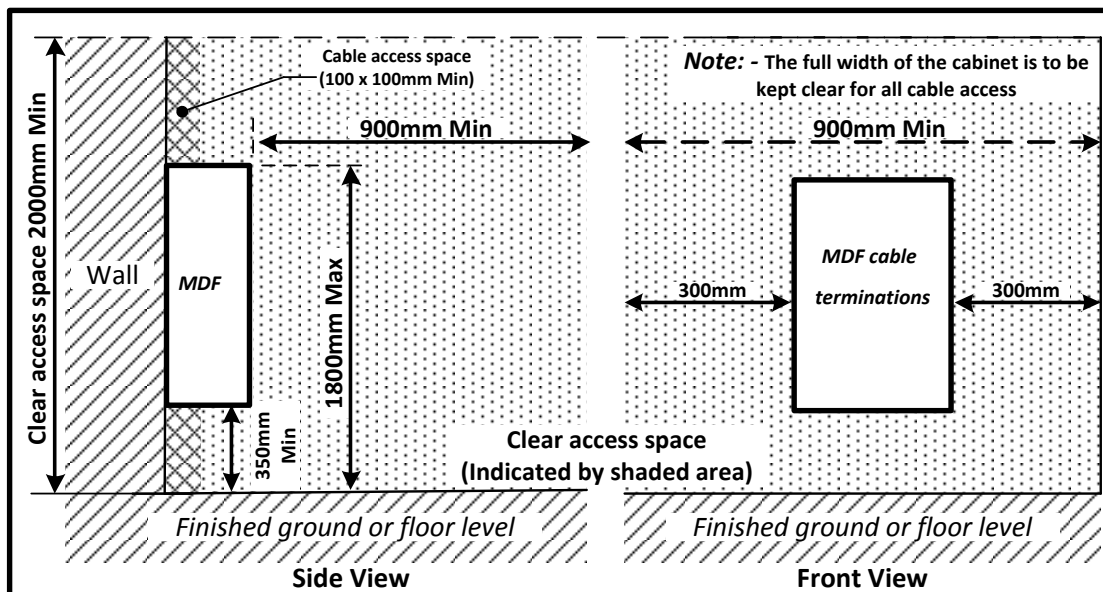


Figure 28. MDF spatial requirements

nbn is responsible for terminating on the 'A' side of the developer provided MDF and termination blocks, as per AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules).

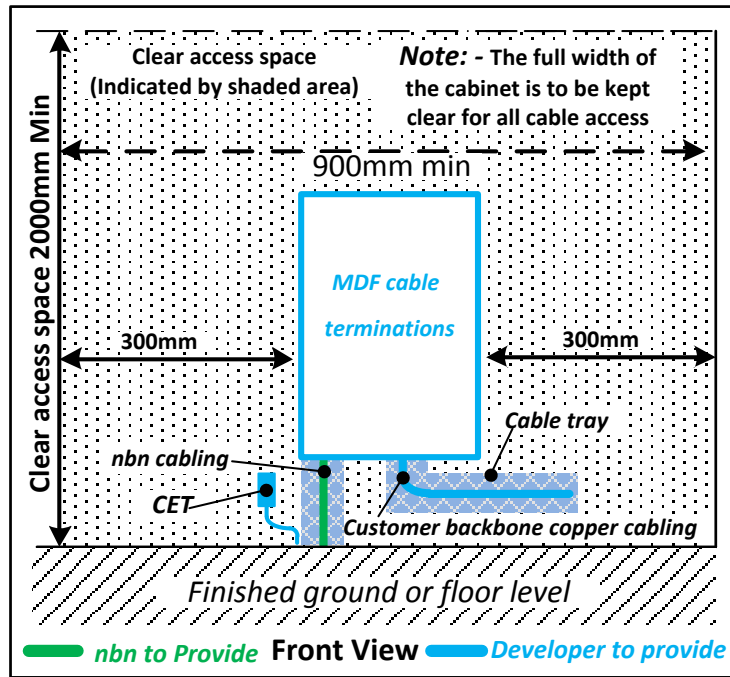


Figure 29. MDF network cable boundary

8 HFC

8.1 Large cabinet

The large cabinet location should be a minimum of 500 mm from the ground and the top of the cabinet should be no higher than 1.8 m above ground level (without a ladder). This will eliminate the risk of working at heights for future workers and ensure the cabinet is easily accessible for repair, to minimise the impact of potential future service disruptions.



- The developer is responsible for providing pathways, CET (to support both large and medium cabinets) and a double GPO (to support the large cabinet), customer cabling and a GPO to support the end user equipment and **nbn**TM modem within each unit/apartment/tenancy. Refer to Section 4 Pathways for further information.
- The nominal P20 communications conduit should be provisioned in a safe and accessible location within the unit/apartment/tenancy, for **nbn** to install the Radio Grade (RG) cable and TO.

8.1.1 Spatial requirement

HFC large cabinet clearance requirements are detailed in Figure 30.

Please note these apply to the following location:

- communications room or cupboard

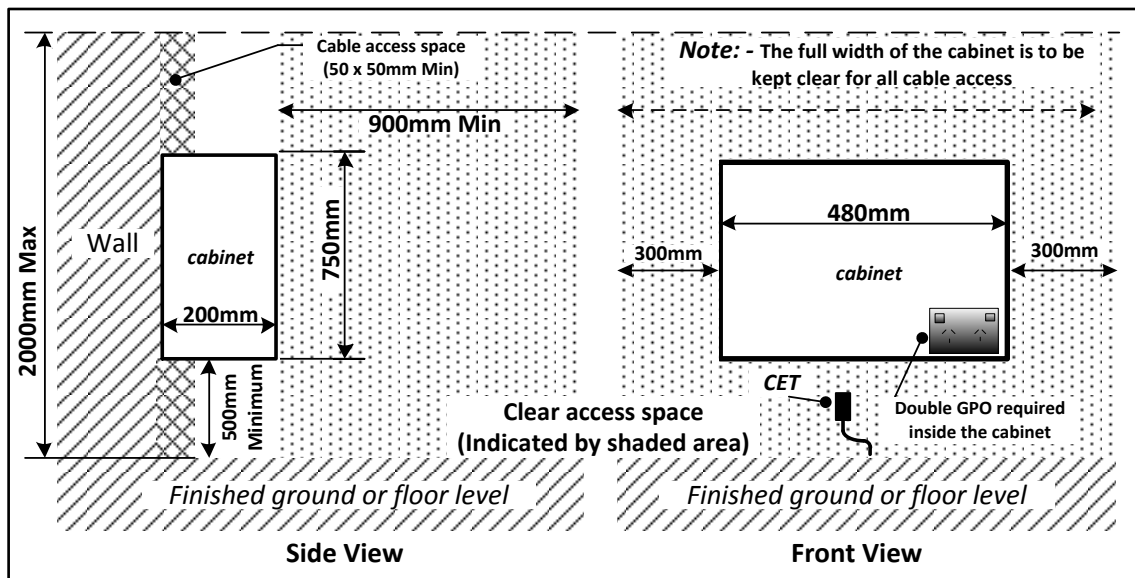


Figure 30. Spatial requirements for a large HFC cabinet

8.2 Medium cabinet

The medium cabinet location should be a minimum of 500 mm from the ground and the top of the cabinet should be no higher than 1.8m above ground level (without a ladder). This will eliminate the risk of working at heights for future workers and ensure the cabinet is easily accessible for repair, to minimise the impact of potential future service disruptions.

8.2.1 Spatial requirement

HFC medium cabinet clearance requirements are detailed in Figure 31.

Please note these apply to the following location:

- riser cupboard

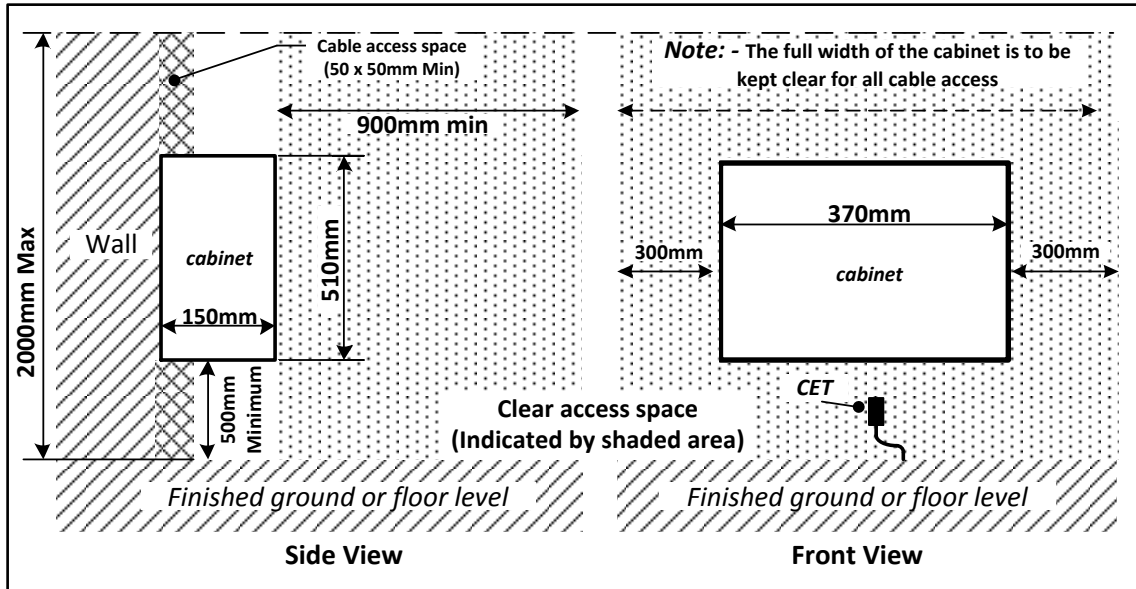


Figure 31. Spatial requirements for a medium HFC cabinet



9 Glossary

Term	Description
AC	Alternating Current
ACMA	Australian Communications and Media Authority
BCA	Building Code of Australia
CET	Communications Earth Terminal
CPE	Customer Premises Equipment
CSD	Compact Sealed DSLAM
CTL	Cable Transition Location
DP	Delivery Partner
FCD	Fibre Collector Distributor
FDT	Fibre Distribution Terminal
FIP	Fire Indicator Panel
FTTB	Fibre To The Building
FTTN	Fibre To The Node
FTTP	Fibre To The Premises
FTTx	Fibre To The 'x' (building, curb, node, premises)
GNAF	Geo-coded National Address File
GPO	General Power Outlet
HFC	Hybrid Fibre Coaxial
HS&E	Health, Safety & Environment
LIC	Lead-In Conduit
living unit	A valid physical address in the Geo-coded National Address File (GNAF) provided by PSMA Australia Ltd.
LSZH	Low-Smoke Zero-Halogen
MDF	Main Distribution Frame
MDU	Multi Dwelling Unit



Term	Description
MPS	Multi Premises Site
nbn	National Broadband Network
NBP	Network Boundary Point
NTD	Network Termination Device
PCD	Premise Connection Device
PDH	Premise Distribution Hub
PSU	Power Supply Unit
RF	Radio Frequency
RG	Radio Grade
SWMS	Safe Work Method Statement
TO	Telecommunications Outlet
WHS	Workplace Health & Safety





Appendix A MPS/MDU pathway design checklist

Table 11. Greenfield MPS/MDU pathway design checklist for all technologies (i.e. FTTP/FTTN/FTTB/HFC)

<input type="checkbox"/>	<p>1. Ensure a floor plan for each floor layout is supplied, depicting the communication pathway from riser cupboard to apartment (identical floors can be shown on the same floor plan). Unit/apartment/tenancy numbering shall be shown on all floor plans.</p> <p>i</p> <p>All efforts should be made to ensure the pathways are supplied with minimal layers, sufficient to capture nbn's requirements. No other utilities are to be reflected.</p>
<input type="checkbox"/>	<p>2. Ensure the lead-in pathway is shown from the property boundary to the communications room (conduit, cable tray or a combination of both). Reflect the lead-in conduit size (i.e. P100 or P50).</p>
<input type="checkbox"/>	<p>3. Street names shall be reflected in relation to the address and frontage of the MDU/MPS.</p> <p>i</p> <p>The nbn preferred lead-in location at the property boundary should be confirmed with the nbn deployment specialist.</p>
<input type="checkbox"/>	<p>4. The application ID shall be represented in the design.</p>
<input type="checkbox"/>	<p>5. The northing reference shall be shown in the design.</p>
<input type="checkbox"/>	<p>6. Provide a front elevation of the riser cupboard layout, with appropriate space reserved for nbnTM equipment.</p>
<input type="checkbox"/>	<p>7. For FTTP: ensure the communications room has the spatial requirements for NTD/PSUs to service lifts and the Fire Indicator Panel (FIP).</p> <p>Provide a front elevation of the communications room and/or cupboard layout, with appropriate space reserved for nbnTM equipment (PDH and essential services Customer Premises Equipment [CPE]).</p> <p>i</p> <ul style="list-style-type: none"> • There is one (1) x NTD/PSU combination per lift and one (1) x NTD/PSU combination per FIP, including the CET. • NTD/PSU combinations for essential services can be placed in alternate locations after consultation with and agreement from your nbn account manager.
<input type="checkbox"/>	<p>8. Ensure the pathways from the communications room to each riser are shown (conduit, cable tray or a combination of both).</p>



<input type="checkbox"/>	9. Ensure the riser cupboard shows an FDT/FCD/HFC medium cabinet on each floor and the spatial dimensions of the riser cupboards are in accordance with nbn guidelines on a floor plan.
<input type="checkbox"/>	10. Provide a schematic of the riser shaft depicting the distance between floors.
<input type="checkbox"/>	11. If the pathways from the riser cupboard to the apartment are a full conduit solution, then depict each individual pathway in no more than three (3) bends.
<input type="checkbox"/>	12. If the pathway from the riser cupboard to the apartment is a combination conduit/cable tray, then access panels shall be depicted in the designs at every change in 'cable tray' direction, as well as any point where the individual nominal P20 lead-ins meet the cable tray. Access panels shall be no more than 15 m apart.
<input type="checkbox"/>	13. P20 conduits shall have no more than three (3) x preformed bends between the riser cupboard or the access panel to the unit/apartment/tenancy.
<input type="checkbox"/>	14. The location and spatial separations for the nbn [™] CPE (NTD/PSU) shall be in accordance with nbn guidelines.
<input type="checkbox"/>	<p>15. All design drawings shall be submitted to scale in AutoCAD .dwg format (version 2010 only) to scale 1:1.</p> <p> All .dwg format pathway design drawings shall be a single DWG/CAD, with all information built in the file (i.e. no attachments, binding or X-Refs). Minimum AutoCad version 2010.</p> <p>All technical guidelines can be found at the nbn website at: http://www.nbn.com.au/develop-or-plan-with-the-nbn/new-developments/resources-guidelines.html#.VCD0CPmSxsM</p>
<input type="checkbox"/>	16. Floor plans shall denote unit/apartment numbers.
<input type="checkbox"/>	17. For horizontal or hybrid MDUs, the developer must submit a pit and conduit as-built design in AUTOCAD .dwg format (version 2010 only) to scale 1:1. The design shall be presented in the nbn template and reflect the correct symbols and version control. The design must adhere to the technical guidelines in <i>NBN-TE-CTO-194 New developments: deployment of the nbn[™] pit and conduit network</i> (including the as-built checklists) before nbn can deem it fit for purpose. (For hybrid MDUs, checkpoints 1-11 shall be verified as well).

 Refer to your **nbn** account manager for any clarification of the communications pathway designs.



Appendix B nbn™ FTTx pathways informal visual inspection checklist – MPS/MDU

This is not an nbn certificate of practical completion

DEVELOPMENT SITE	
PROJECT ID	
ADDRESS	
INSPECTION DATE	
INSPECTED FLOOR/S	
TECHNOLOGY	

Table 12. nbn™ FTTx pathways informal visual inspection checklist

Item	Description	Pass Y/N or N/A	Photo taken Y/N	Details
Lead-In Conduit (LIC)				
LIC is the conduit from the property boundary to within the communication room/cupboard.				
1	Lead in conduit is located at the property boundary edge within 2 m of an nbn™ pit (or Telstra manhole/pit where applicable) in road reserve or as close to 2 m as possible.			
2	The LIC is strung.			
3	The LIC is capped at the property boundary.			
4	The LIC is installed as per the design.			
Communications room				
The PDH, CTL, MDF, FTTB, HFC and FTTN and essential services shall be located in the communications room.				
1	Depending on the specific technology being delivered, there should be sufficient space for following items as per the guidelines: PDH/CTL/CSD/MDF/FCD/HFC large enclosure.			
2	There is sufficient space for essential services.			



Item	Description	Pass Y/N or N/A	Photo taken Y/N	Details
3	A location is reserved for essential service GPO sockets.			
4	For FTTB), installation of the 10A captive power outlets.			
5	CET 6 mm ² earth cable is installed from the electrical switchboard.			
6	There is sufficient reserved space and cable tray for cable management requirements around nbn TM equipment.			
7	Pathway transition points are adequately supported (no fibre is to be self-supported over a maximum distance of 200 mm).			
8	Pathway transition points are adequately supported (no HFC cable is to be self-supported over a maximum distance of 200 mm).			
9	The fibre route is not crossing other services.			
10	The HFC cable route is not crossing other services.			
11	The copper cabling route is not crossing others ervices.			
12	Cable tray or a minimum of nominal P50 has been used.			
13	Permanent lighting is available.			
14	A lockable door is present.			
15	The communications room is clean, tidy and dry.			
<p>Trunk pathways</p> <p>Trunk pathways are the pathways from the communications room to the riser and from the riser to nominal P20 premises conduit.</p>				
1	Cable tray or a minimum of nominal P50 has been used.			



Item	Description	Pass Y/N or N/A	Photo taken Y/N	Details
2	All conduit is strung and labelled as required.			
3	The fibre route is not crossing other services.			
4	The HFC cable route is not crossing other services.			
5	The copper cable route is not crossing other services.			
6	A minimum of 100 mm separation has been reserved within the cable tray from other services.			
7	450 mm x 450 mm ceiling access panels are installed in locations where cable tray shall be enclosed. Small sections of perforated cable tray are installed at intersections of P50 and nominal P20 conduits to tie up transitioning premise cables.			
8	Ceiling access panels are no more than 15 m apart where cable tray is in use.			
9	No section of P50 conduit is longer than 50 m.			
10	Pre-formed 90 degree bends radius is used for all P50.			
11	Pathway transition points are adequately supported (no fibre is to be self-supported over a maximum distance of 200 mm).			
12	Pathway transition points are adequately supported (no HFC cable is to be self-supported over a maximum distance of 200 mm).			
13	The conduit and cable tray are installed as per the design.			

Riser cupboards

Riser cupboards are the cupboards where the FDT, FCD and HFC medium cabinet shall be located.




Item	Description	Pass Y/N or N/A	Photo taken Y/N	Details
1	There is sufficient space for nbn™ equipment as per the guidelines.			
2	There is sufficient reserved space and cable tray for cable management requirements around nbn™ equipment.			
3	Wall mounted cable management is installed from riser hole to riser hole.			
4	A minimum of 100 mm separation has been reserved within the cable tray from other services.			
5	The fibre route is not crossing other services.			
6	The copper cable route is not crossing other services.			
7	The HFC cable is not crossing other services.			
8	Pathway transition points are adequately supported (no fibre is to be self-supported over a maximum distance of 200 mm).			
9	Pathway transitions points are adequately supported (no HFC cable is to be self-supported over a maximum distance of 200 mm).			
10	Fire stopping arrangements have been discussed.			
For FTTP/L premise conduit and the NTD location				
1	All premises conduit is rigid, white, nominal P20 telecommunications conduit.			
2	All conduit is strung.			
3	All conduit is labelled with the unit ID (on the string and conduit).			
4	There are no more than three (3) x 90 degree bends between drawer points.			
5	Pre-formed 90 degree bends are used: 300			



Item	Description	Pass Y/N or N/A	Photo taken Y/N	Details
	mm for lateral pathways and 100 mm for the ceiling drop to the wall cavity. (There are no handmade bends.)			
6	No conduit section is longer than 50 m.			
7	The NTD/PSU spatial location is reserved as per nbn guideline templates.			
8	The NTD/PSU location has sufficient ventilation as per the nbn guidelines.			
9	All conduits are installed as per the design.			
10	Conduits finish a maximum of 100 mm from the location of the NTD enclosure.			
11	All conduits are glued.			
For HFC: premise conduit and the HFC wall plate location				
1	All premises conduit is rigid, white, nominal P20 telecommunications conduit.			
2	All conduit is strung.			
3	All conduit is labelled with the unit ID (on the string and conduit).			
4	There are no more than three (3) x 90 degree bends between drawer points.			
5	Pre-formed 90 degree bends are used: 300 mm for lateral pathways and 100 mm for the ceiling drop to the wall cavity (there are no handmade bends.)			
6	No conduit section is longer than 50 m.			
7	All conduits are installed as per the design.			
8	Conduits finish a maximum of 100 mm from the location of the wall plate location.			
9	Ensure the position for the wall plate is in a safe and accessible location (to support the nbn™ and customer modems)			
10	All conduits are glued.			



Item	Description	Pass Y/N or N/A	Photo taken Y/N	Details
Miscellaneous				
1				

 Provision of this document does not confirm that the developer shall achieve practical completion in relation to the pathway works or any other works. If the developer believes it has achieved practical completion of the pathway works, it should give a formal Notice of Practical Completion to **nbn** in accordance with the requirements of the developer agreement. Upon receipt of the formal Notice of Practical Completion, **nbn** shall assess whether practical completion has been achieved in respect of the whole of the pathway works (or any agreed separable portion). Unless **nbn** has agreed in its developer agreement with the developer, or signed a separate letter of agreement confirming that separable portions apply, an inspection for the purposes of practical completion may only be conducted where the whole of the pathway works have been completed by the developer.

Construction Project Manager _____

Quality Assurance (QA) and Construction Supervisor _____



Photos of observations