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

FTTx Engineering

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Document control

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<td>submission to nbn planning.</td>
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<td>• Updates to the ADT design requirements</td>
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<td>• Updated Appendix “A” MPS/MDU Pathway Design Checklist with the ADT</td>
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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 a Multi Premises Site (MPS) that are required for the deployment of nbn™ FTTP/FTTB/HFC/copper to the MDF infrastructure.

The Assisted Drafting Tool (ADT) information, nbn CAD standards and database compatibility requirements are to be followed when creating MDU pathway designs. Developers should also follow all requirements of their developer agreement or other agreement with nbn.

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.

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

Changes in this document revision 9.0 dated 16 FEB 2018 compared to the previous revision 8.0 dated 21 OCT 2016 are summarised below:

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<th>Section</th>
<th>Details</th>
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<td>New section</td>
<td>The Assisted Drafting Tool (ADT) has been introduced as a new section providing <strong>nbn</strong> MDU design details for creating MPS/MDU designs for submission to <strong>nbn</strong> planning.</td>
</tr>
<tr>
<td>1.2</td>
<td>Purpose, inclusion of the ADT</td>
</tr>
<tr>
<td>All</td>
<td>Document formatting to align tables and figure numbering</td>
</tr>
<tr>
<td>Appendix A and B</td>
<td>Updates to the ADT design requirements</td>
</tr>
<tr>
<td>Table 7</td>
<td>Updated table as per review feedback – removed rows as necessary</td>
</tr>
</tbody>
</table>
2 General requirements

2.1 New development MPS/MDU

The developer, developer’s consultant or contractor is 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™ 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™ infrastructure equipment and end user modems as outlined by the specific technology being deployed.

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.

![Diagram of network elements](image)

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 Assisted Drafting Tool (ADT)

This section aims to provide developers with:

- Key nbn drafting requirements.
- A description of the ADT and AutoCAD Template to be used when creating and submitting New Development MDU Pathway Designs for comment by nbn in accordance with the applicable developer agreement.

Developer agreement requirements

This document does not affect Developer’s obligations under their Developer Agreement or other agreement with nbn.

For example, while under the Developer Agreement, the Developer must submit the pathway design for comment by nbn and the design remains the responsibility of the Developer, regardless of any review or commenting by nbn on the pathway design.

As part of its agreement with nbn, the Developer warrants that the pathway design for the MDU will:

a. Comply with all nbn specifications as required by the developer agreement.
b. Be fit for the purpose of constructing the Pathway Works, including as reasonably ascertainable from – nbn’s specifications.

Nbn may make comments on, or have additional requirements for, your pathway design even after you submit it and you need to take those comments into account (whether covered in this document or otherwise) to modify your pathway design accordingly and resubmit it to nbn.

The Developer must not commence building until nbn has confirmed it has no additional comments on the design, or nbn has not provided any comments on the design within 20 business days of it being submitted (or if submitted before the developer agreement is signed, 20 business days from the developer agreement being signed).

Resources available on the nbn™ website:


ZIP file

The zip file contains:

a. ADT (assisted drafting tool) file ADT.VLX
b. Documents
c. Templates
d. NBN-TE-CTO-284 - Multi Dwelling Unit (MDU) building engineering and design standard - new development (this document).
e. SAMPLE .dwf (can be viewed with ‘Autodesk Design Review’, free download software).
f. New_Development_template_2017.dwt (AutoCAD template) AutoCAD template

2.4.1 AutoCAD software requirements

External plant drafting will be done using industry standard AutoCAD software and the fundamental ‘Model Space’ and ‘Paper Space’ CAD drafting approach.

It is assumed that users undertaking CAD drafting for nbn are conversant with use of ‘Model Space’ and ‘Paper Space’ in an AutoCAD environment.

The current minimum version of AutoCAD is AutoCAD 2013-R18.

Note: all submissions need to be in .DWG format, saved as a minimum 2013 version and also required in PDF format.

2.4.2 Design settings

The AutoCAD Template includes symbols, blocks, layers and title blocks. They are explained in detail in this document and intended to assist Developers in adhering to nbn’s CAD standards.

The sections below outline the drawing setup required.
2.4.2.1 Layers

There are many layers included within the template.

The names are specific to nbn systems and are to be used as presented, to load data into nbn’s database.

To assist with the design of MDU Pathways, a filter group called NEW DEVELOPMENT is created and all layers required are added to the filter group.

![Figure 2. Layers from the NEW DEVELOPMENT filter group](image)

Note: Developers can add their own layers to this list, but the MDU Pathway and Equipment needs to be captured on the specified layers.

2.4.2.2 Drawing units

Drawing units must be set up as per the table below:

<table>
<thead>
<tr>
<th>Table 1. AutoCAD drawing set-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawing Units</td>
</tr>
<tr>
<td>Length</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Angle</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Insertion scale</td>
</tr>
<tr>
<td>Direction Control - Base Angle</td>
</tr>
</tbody>
</table>
2.4.2.3 Font style

Font style must be adjusted as per the table below:

**Table 2. AutoCAD font style set-up**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Style in use</td>
<td>Standard</td>
</tr>
<tr>
<td>Font Style</td>
<td>Regular</td>
</tr>
<tr>
<td>Width Factor</td>
<td>0.8</td>
</tr>
<tr>
<td>Font name</td>
<td>ISOCPEUR</td>
</tr>
<tr>
<td>Height</td>
<td>2.0</td>
</tr>
<tr>
<td>Oblique Angle</td>
<td>0.0</td>
</tr>
</tbody>
</table>

2.4.2.4 Blocks

The table below shows the blocks from the template that must be present in your drawing for the ADT to function properly.
Table 3. Required blocks

<table>
<thead>
<tr>
<th>Block</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBN_PIT</td>
<td>nbn Pit</td>
</tr>
<tr>
<td>NBN_TRENCH_ANNO_TYPE</td>
<td>Duct Type Annotation (P100, P50, etc.)</td>
</tr>
<tr>
<td>NBN_TRENCH_ANNO_LEN</td>
<td>Duct Length Annotation (in metres)</td>
</tr>
<tr>
<td>NBN_A1</td>
<td>Title Block</td>
</tr>
<tr>
<td>NBN_CAP</td>
<td>End Cap</td>
</tr>
<tr>
<td>NBN_TPT</td>
<td>Telstra Pit</td>
</tr>
<tr>
<td>NBN_FIX</td>
<td>QA Issue Tracker (a tag which the QA command attaches to a wrongly design pathway)</td>
</tr>
<tr>
<td>NBN_MDU_NDI</td>
<td>Development information</td>
</tr>
<tr>
<td>NBN_ADDRESS</td>
<td>Lot / Unit / Apartment / Tenancy Number</td>
</tr>
</tbody>
</table>

2.4.2.5 Scaling

Despite the fact that scale is set to UNITLESS, you must draw property boundary lines on a 1:1 scale using METRES. This ensures that segments of network are drawn accurately using the nominated blocks.

2.4.2.6 Base data

Property survey data should be brought into the L141 Cadastre layer of the drawing.

Street names must be placed in L140 Addresses layer.

Street numbers inside the development boundary are to be created with the ADD command and also placed in the L140 Addresses layer.

Any other base data can be presented in the layers not designated for exclusive use by the ADT commands. The designated layers are mentioned later in this document.

2.4.2.7 Title Block

When preparing a drawing, the Title Block and View Ports must be placed on the correct layer, as per the table below:

Table 4. Title block and view ports

<table>
<thead>
<tr>
<th>Item</th>
<th>Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title Block</td>
<td>L010 Title block</td>
</tr>
<tr>
<td>View Ports</td>
<td>DefPoints</td>
</tr>
</tbody>
</table>
2.4.2.8 Projection

All designs must be geographically oriented to the GDA 94 datum with the correct MGA projection for the area of the country you are working in. The country is divided into 8 zones for each 6 degrees of longitude.

For example, all towns East of Longitude 150 use MGA Zone 56 (GDA94).

![Figure 3. Map grid of Australia](image)

Use the above map as a guide to determine the correct MGA Zone for the file you are preparing.


**Important Note:** The first item checked on designs submitted to nbn is the MGA zone. If designs are submitted with incorrect Projection and/or incorrect MGA Zone Eastings and Northings -, nbn will request you correct and resubmit the design.

2.4.3 XData (extended entity data)

XData is attached to CAD entities as a necessary requirement for the translation of attribute data between the AutoCAD dwg file and nbn’s Physical Network Inventory database.

This is in addition to the standard object data attributes that are used purely for visual representation.

ADT creates XData where necessary during its use. XData should not be edited directly. Objects containing XData should not be copied or moved around, as XData reflects the topology of the network.

2.4.4 Assisted Drafting Tool (ADT)

The ADT is provided in the zip file to assist in capturing the nbn™ MDU pathways and equipment locations, this will assist in auditing the design for compatibility with nbn’s CAD requirements and database compatibility.

Please note the following when using the ADT:

1. The tool is designed to automate the process of MDU Pathway drafting and its use is Mandatory.
• In order to exit any command you MUST press <Enter>, NOT <Esc> (pressing <Esc> breaks the loop and also breaks the program).

The nbn™ approved template has been provided as a starting point for you to complete with details of your design and also to assist you in providing a design that is consistent with nbn’s CAD standards for elements. The template includes all required Symbols, Blocks, Layers and settings.

2.4.4.1 Installation instructions

Download the zip file containing the tool from the nbn™ website.

Load the tool into the drawing:

1. Save the ADT.VLX file or its updated version to your computer.
   • Open the nbn™ AutoCAD Template.
     Note: ADT does not work with other templates.
   • Type appload in the command line.

The Load/Unload Applications screen will display prompting you to browse for the file you want to load:

Note: if the file is not added to history and start-up suite, it will need to be loaded every time you open up a drawing.

2.4.5 Drafting guidelines

This section describes the methods of data capture to assist Developers in complying with nbn CAD and database compatibility standards.

2.4.5.1 Cadastre layer fix

Before you begin, ensure the cadastre (or property survey data) is in the L141 Cadastre layer.
Note: the PIT command will not work if the cadastre layer is not set to L141 Cadastre.

Please keep the cadastre layer as simple as possible.

nbn’s internal drawing Quality Audit/Conversion tool creates a polygon out of any line work that looks like a polygon visually, because polygons are expected to be lot boundaries primarily.

Unnecessary cadastre layer imagery (i.e. other utilities and services, excessive detail) will slow the processing of your drawing considerably, causing a queue to form. This will result in a delay in the review of your and other people’s drawings.

The Cadastre layer must contain only the line work helpful with pathways and equipment placement when using ADT commands and must also provide sufficient visual reference for easy drawing review by nbn Planning (i.e. Address, Street name/s, unit or apartment numbers, equipment location/s, like floors, risers, communications room or cupboard).

![Figure 4. Good cadastre layer example](image)

2.4.5.2 Current development stage boundary

The Current Development Boundary goes around the MDU development drafting area, the drafting area is inclusive of all street facing premises, pit and pipe connectivity of these premises shall link to the internal pit and pipe of the development. The ADT tool works inside the boundary. The boundary must consist of one closed polyline. It must be in the L331 NBN Boundaries - GDAs layer. The boundary colour must be ByLayer.
2.4.5.3 Development information

Development information must be present in the drawing.

**Note:** All fields in the development information block (NBN_MDU_NDI) should be populated. The NBN_MDU_NDI block should be in 0-GENERAL-NOTES layer.

### Table 5. Development attributes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEV_NAME</td>
<td>Development Name</td>
</tr>
<tr>
<td>DEV_COMP</td>
<td>Development Company</td>
</tr>
<tr>
<td>DEV_ADD</td>
<td>Development Address</td>
</tr>
<tr>
<td>DEV_NBNREF</td>
<td>nbn Reference Number for Development</td>
</tr>
<tr>
<td>DEV_STG</td>
<td>Development Stage</td>
</tr>
<tr>
<td>DEV_REP</td>
<td>Development Authorised Representative</td>
</tr>
<tr>
<td>DEV_MOB</td>
<td>Authorised Representative’s Phone number</td>
</tr>
<tr>
<td>DEV_EML</td>
<td>Authorised Representative’s email</td>
</tr>
<tr>
<td>DEV_LEVEL</td>
<td>Number of Levels</td>
</tr>
<tr>
<td>DEV_PREM</td>
<td>Number of Premises</td>
</tr>
<tr>
<td>DEV_FLOOR</td>
<td>Number of Like Floor Layouts</td>
</tr>
<tr>
<td>DEV_REV</td>
<td>Design Revision</td>
</tr>
</tbody>
</table>
2.4.5.4 ADT command for the Development Block

- Enter **NBN_MDU_NDI** in the command line.
- The program will ask you to pick an insertion point.
- The program will then ask you to populate the following criteria, press enter to move to the next item:
  - Development name.
  - Development Company.
  - Development Address.
  - **nbn** Reference Number for Development (This is the ID **nbn** provided to the developer).
  - Development Stage.
  - Development Authorised Representative.
  - Authorised Representative Phone Number.
  - Authorised Representative email.
  - Number of levels.
  - Number of Premises.
  - Number of like floor layouts.
  - Design revision.

  Note: do not press Esc as it cancels the command.

Refer to the table below for **NBN_ADDRESS** block attributes.

### Table 6. Address block attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Prompt</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>STREET_NUMBER</td>
<td>Enter the street number for this building.</td>
<td>This is the lot number of the current stage.</td>
</tr>
<tr>
<td>ID</td>
<td>Enter the GNAF ID of this address.</td>
<td>This attribute is used for data translations and should be left empty.</td>
</tr>
<tr>
<td>STREET_NAME</td>
<td>Enter the street name.</td>
<td>This is the street name for the current stage. It contains both the street name and street type e.g. MARBLE LANE.</td>
</tr>
</tbody>
</table>

**Important Note:**

The combination of the **STREET_NUMBER** and **STREET_NAME** attribute values must be unique i.e. each street address text has to be unique. You may use the street number prefix or suffix, such as 1A, if necessary.

2.4.5.5 Assisted drafting tool (Address)

After loading the ADT.VLX file into the drawing, perform the following steps to insert an address:

1. Enter **ADD** at command line then follow the prompts.
• The address command counts the existing addresses inside the development stage boundary.

![AutoCAD Message]

12 Lots already added to the drawing

OK

• Click OK and follow the these prompts:

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Explanation/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please pick an insertion point:</td>
<td>Select the text representing the street name. <strong>Note:</strong> This prompt is asking you to pick an insertion point for the address block. Yet, your very first insertion point should always be the street name along which you are going to create addresses. You must select a street name from the L140 Addresses layer. The ADD command does not work with other layers’ street name texts.</td>
</tr>
<tr>
<td>![AutoCAD Message]</td>
<td>Above is an example of the message displayed when the street name is first selected or changed.</td>
</tr>
<tr>
<td>Please pick an insertion point:</td>
<td>Lot number location has to be picked this time</td>
</tr>
</tbody>
</table>
| Please enter lot number or press Enter for (x): | Enter the lot number with the desired prefix or suffix. **Note:** You can enter the lot number or press Enter or space bar to accept the default value (x) offered.  
  If you choose to prefix or suffix lot numbers with letters (i.e. 1A, A1) the tool is capable of automatically assigning prefix and suffix letters for you. Please refer to the tutorial for details.  
  Please note, that neither suffix nor prefix get incremented automatically in alphabetic order when you click next insertion point. For example, instead of the 101A, 101B, 101C you might be expecting, the generated sequence will be 101A, 102A, 103A. |
| Please pick an insertion point:            | You are in the loop of creating new addresses. From here on you can left-click at a new insertion point, then press Enter or Space to keep creating as many addresses as you need - if you are happy with the automatically generated lot number value.  
  Other actions at this prompt:  
  - Pick a different street name to start creating addresses along that street.  
  - Press Enter or Space to finish the ADD command. |
2.4.5.6 Assisted drafting tool MDU commands

Table 7. MDU ADT commands

<table>
<thead>
<tr>
<th>MDU commands</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTR</td>
<td>CableTray: Allows a cable tray to be inserted into the design cadastre layout.</td>
</tr>
<tr>
<td>COMM</td>
<td>Types of nbn communication equipment (PDH, CTL, FDT, CET) can be selected by using this command.</td>
</tr>
<tr>
<td>MDU_DCT</td>
<td>1. Duct Command for an MDU: Types of conduit (P100, P50, P20) can be selected by using this command. Note: P50 can only be used for the truncation conduit on any level between risers and access panels.</td>
</tr>
<tr>
<td>NTD</td>
<td>NTD Types [NTD, FIP, LIFT, SEC] can be selected by using this command</td>
</tr>
<tr>
<td>OBBU</td>
<td>Optional Battery Backup Unit, mandatory for essential service NTD’s i.e. FIP, LIFT, SEC; optional for premises NTD’s.</td>
</tr>
<tr>
<td>PET</td>
<td>Reflects the size (Inside Diameter) of a penetration provided i.e. between floors etc.</td>
</tr>
<tr>
<td>RISER</td>
<td>Represents the riser cupboard, on each level of the development.</td>
</tr>
<tr>
<td>MDU_QA</td>
<td>Performs the Quality Audit of the MDU pathway design.</td>
</tr>
<tr>
<td>AP</td>
<td>Represents the Access Panel: 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.</td>
</tr>
</tbody>
</table>

2.4.5.7 ADT command for a riser
- Enter **Riser** in the command line.
  
The program will ask you to pick an insertion point.
  
  Note: do not press **Esc** as it cancels the command.
  
- Press **Enter** to finish.

2.4.5.8 ADT command for an Access Panel:
- Enter **AP** in the command line.
The program will ask you to pick an insertion point

Note: do not press Esc as it cancels the command.

- Press Enter to finish.

### 2.4.5.9 ADT command for an NTD:

- Enter NTD in the command line.

  The program will ask you to pick an insertion point

  The program will then ask you to: please select the nbn NTD type (NTD, FIP, LIFT, SEC)

- Select the NTD type

  Note: do not press Esc as it cancels the command.

- Press Enter to finish.

### 2.4.5.10 ADT command for a Penetration:

- Enter PET in the command line.

  The program will ask you to pick an insertion point

  Note: do not press Esc as it cancels the command.

- Press Enter to finish.

### 2.4.5.11 ADT command for an Optional Battery Backup Unit:

- Enter OBBU in the command line.

  The program will ask you to pick an insertion point

  Note: do not press Esc as it cancels the command.

- Press Enter to finish.

### 2.4.5.12 ADT command for a PDH:

- Enter COMM in the command line.

  The program will ask you to pick an insertion point.

  - Choose nbn COMM Type.

  - Select PDH.

    Note: do not press Esc as it cancels the command.

  - Press Enter to finish.

### 2.4.5.13 ADT command for a CTL:

- Enter COMM in the command line.

  The program will ask you to pick an insertion point.

  - Choose nbn COMM Type.
• Select CTL.
  
  **Note:** do not press Esc as it cancels the command.

• Press Enter to finish.

### 2.4.5.14 ADT command for a FDT:

• Enter **COMM** in the command line.
  
  The program will ask you to pick an insertion point.

• Choose **nbn COMM** Type.

• Select **FDT**.
  
  **Note:** do not press Esc as it cancels the command.

• Press Enter to finish.

### 2.4.5.15 ADT command for a CET:

• Enter **COMM** in the command line.
  
  The program will ask you to pick an insertion point.

• Choose **nbn COMM** Type.

• Select **CET**.
  
  **Note:** do not press Esc as it cancels the command.

• Press Enter to finish.

### 2.4.5.16 ADT for the MDU Cable Tray:

• Enter **CTR** in the command line.
  
  The program will ask to specify the start point of the cable tray and continue your cable tray line to the next riser, access panel or penetration.
  
  **Note:** do not press Esc as it cancels the command.

• Press Enter when you finish drawing the cable tray.
  
  The program draws a Polyline representing a cable tray.

• Please enter the cable tray length or press enter for the calculated length.

### 2.4.5.17 ADT for the MDU Truncation or Pathway Conduit:

• Enter **MDU_DCT** in the command line.
  
  The program will ask to specify the start point of the conduit.

• Draw the duct and press Enter to finish.
  
  **Note:** do not press Esc as it cancels the command.

• Please enter the conduit type or press Enter for the default (P100).
Please enter conduit length or press **Enter** for (Calculated length).

Please select an insertion point for the duct attributes.

**Note:**
You have the option of entering conduit length or using the calculated length.

### 2.4.6 Assisted drafting tool (Duct Update Command)

#### 2.4.6.1 Edit a conduit

- Enter **DCTUPD** in the command line.
- Select duct type annotation if you have to edit duct type.
  
  The program will ask you to select the line the annotation is related to.
  
  The program will ask you to enter the desired type.

- Enter the duct type (P50).
  
  **Note:** The conduit type will be updated in both the annotation and the line XData.

- Similar steps are applicable if you choose to update duct length.

#### 2.4.6.2 Lead-ins

When no **NBN_PIT** is chosen as the duct end, the **DCT** command will create a Lead-In with **NBN_CAP** block as its endpoint. The **NBN_CAP** will be placed in the duct layer **L460 NBN Support – Underground**.

**Note:**
The **nbn** preferred lead-in location at the property boundary should be confirmed with the **nbn** deployment specialist.

Refer to the table below for **NBN_CAP** attributes.

**Table 8. NBN_CAP block attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>M/O</th>
<th>Prompt</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>M</td>
<td>Enter a Unique ID within this drawing for this null node. <strong>This is the nbn identifier for the end cap and has the format NEC-XXX. XXX is a 3 digit number starting from 001 and incrementing sequentially.</strong></td>
<td></td>
</tr>
<tr>
<td>TYPE</td>
<td>M</td>
<td>Enter the type for this null node. <strong>ENDCAP</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 2.4.7 Telstra Pit

To capture Telstra pit located outside of the development to support the lead-in location, use the **TPT** command. This will place a **NBN_TPT** block in the **L402 Telstra Support – Pits** layer. Linetype and Lineweight properties are set to ByLayer.
See Table 9 for **NBN_TPT** block attribute description:

**Table 9. NBN_TPT block attribute**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>M/O</th>
<th>Prompt</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>M</td>
<td>Size</td>
<td>The size of the Telstra Pit</td>
</tr>
</tbody>
</table>

**2.4.7.1 Assisted drafting tool (TPT)**

- Enter **TPT** in the command line.
- At the prompt **PLEASE PICK AN INSERTION POINT OR PRESS Enter TO FINISH**, select the place for the Telstra pit.
- At this prompt **PLEASE ENTER TELSTRA PIT TYPE, (M) for MANHOLE, Enter FOR (S)**, either press **Enter** to accept **S**, or type a different number or **M** and press **Enter**.

To exit the loop of Telstra Pit creation, press `<Enter>` when asked to pick an insertion point again.

**2.4.8 Quality audit for MDU pathway design**

The MDU_QA command helps developers to audit their designs before submitting them to nbn.

Refer to the table below for the QA tests:

**Table 10. MDU_QA command**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
</table>
| Development Information | Checks if:  
- Development Information block is inserted  
- All fields are populated |
| Boundary Check | Checks if:  
- One (and only one) current development stage boundary, drawn with AutoCAD polyline, is present in **L331 NBN Boundaries – GDAs** layer.  
- There are no AutoCAD lines in the **L331 NBN Boundaries – GDAs** layer. |
| Special cases (QA run against an unfinished design by mistake) | Checks if:  
- There are no duct or cable trays inside the development stage boundary.  
- There are any risers, penetrations, access panels, NTD’s etc. not connected to any duct or cable tray. |
| Pit Check | Checks if:  
- All **nbn™** pits are set to the right layer and right colour.  
- All **nbn™** pits are the right type (2, 5, 6, 8, 9, Manhole).  
- No active pits are outside the development boundary.  
  **Note:** previous stage pits connected to the current stage must be coloured Yellow (2) —the new tool drags pits back into L462 automatically. |
Item | Description
--- | ---
 | Performs the following correction:
 | • Renumbers pits sequentially starting from one.
Duct Check | Checks if:
 | • All ducts have XData attached.
 | • All ducts have correctly snapped start and end points (to pits/endcaps).

### 2.4.8.1 Assisted drafting tool (MDU_QA)

Enter MDU_QA in the command line.

The MDU_QA command will run and you must fix faulty items if any are found.

**Note:** the MDU_QA command works in steps. Upon the completion of one step it moves to the next step, so it is extremely important to follow through with the MDU_QA command and fix all issues.

If the MDU_QA command finds faulty items that need manual correction, it inserts an **NBN_FIX** block with commentary text.

Refer to the table below for an explanation of NBN_FIX errors.

**Table 11. NBN_FIX text description**

<table>
<thead>
<tr>
<th>Error text</th>
<th>Explanation</th>
<th>Required action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors tagged with <strong>NBN_FIX</strong> block (yellow circle with a short error message)</td>
<td>Pit type is not 2, 5, 6, 8, or 9</td>
<td>Manual editing of the pit type attribute of <strong>NBN_PIT</strong> block is allowed.</td>
</tr>
<tr>
<td><strong>TYPE</strong></td>
<td>Duct Polyline with no XData attached. This error usually means that a problem with one of the ducts was found, like polyline not created with the MDU_DCT command.</td>
<td>Delete the Duct and rebuild it with the MDU_DCT command.</td>
</tr>
<tr>
<td><strong>NO XDATA</strong></td>
<td>Orphan pit, risers, access panels, NTD’s etc. or a pit not properly snapped to the duct end, or a duct without a pit/end cap at its start or end.</td>
<td>Make sure there are no orphan pits risers, access panels, NTD’s etc. or unattached duct ends.</td>
</tr>
<tr>
<td><strong>NO CONNECTION</strong></td>
<td>Duct polyline length is 2.5 m or less.</td>
<td>You are allowed to draw ducts longer than you need, but the desired length can be entered at DCT command prompt. That value will be shown in the annotation.</td>
</tr>
<tr>
<td><strong>SHORT DUCT</strong></td>
<td>NTD/RISER/OBBU/AP/COMM</td>
<td>Incorrect Layer, move the item to the correct layer.</td>
</tr>
<tr>
<td>Error text</td>
<td>Explanation</td>
<td>Required action</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>COLOUR</td>
<td>NTD/RISER/OBBU/AP/COMM</td>
<td>Incorrect Colour, change the item to the correct colour.</td>
</tr>
<tr>
<td>Risers should have both ends snapped to P50</td>
<td>Where a P50 is required to connect offset risers the P50 should have its ends snapped to risers.</td>
<td>Draw the P50 snapping one end to a riser and the other to the offset riser.</td>
</tr>
<tr>
<td>P20 should its ends snapped to AP/Riser or NTD</td>
<td>A P20 should only be drawn snapping the ends to a Riser, Access Panel or NTD. Or a Cable Tray where there is a suspended accessible ceiling for commercial or retail tenancies.</td>
<td>Draw a P20 snapped to an AP, Riser, NTD or Cable Tray.</td>
</tr>
<tr>
<td>P50 should have its one end snapped to AP/Riser</td>
<td>A P50 truncation duct is drawn snapping between a Riser to Riser: Riser to Access panel: Access Panel to Access Panel. A P50 should not be used to connect between any nbn equipment.</td>
<td>Draw the P50 truncation duct snapping to Riser, Access Panel.</td>
</tr>
<tr>
<td>Overlapping ducts are not allowed</td>
<td>This error occurs when two or more ducts touch or cross each other.</td>
<td>Draw ducts maintaining separation.</td>
</tr>
<tr>
<td><strong>Message:</strong> No section of conduit shall be longer than 50m between pull/draw points</td>
<td>A continuous duct should not exceed 50m between pull / draw points.</td>
<td>Draw the duct reflecting the correct distance.</td>
</tr>
<tr>
<td><strong>Message:</strong> CTR length between access points should not be greater than 15m</td>
<td>A Cable Tray should be drawn no further than 15m between draw points i.e. Access Panel to Access Panel.</td>
<td>Draw the CTR reflecting the correct distance.</td>
</tr>
<tr>
<td><strong>Message:</strong> Duct length between Access Panels should not be greater than 15m</td>
<td>A duct length should not exceed 15m between Access Panels</td>
<td>Draw the duct reflecting the correct distance.</td>
</tr>
<tr>
<td><strong>Message:</strong> Start point is not selected</td>
<td>MDU_DCT was entered in the command and has not been drawn from a start point i.e. Riser, Access Panel</td>
<td>Enter MDU_DCT in the command line, select the start point, and draw the duct to the end point.</td>
</tr>
</tbody>
</table>

After identifying the issue, please take corrective actions to fix the faulty items.

If the Quality Audit is successful, the following message will display:
2.4.9 Checklists

The process for nbn commenting on multi dwelling unit designs and updating nbn’s systems and database requires Developers to use planning tools and methodologies consistent with nbn’s requirements.

An MDU design checklists have been created to assist you:

- Appendix A MPS/MDU pathway design checklist.

This checklist is designed to ensure that the system and database compatibility requirements have been met.

The checklist is available from the nbn™ website in the Multi Dwelling Unit (MDU) building engineering and design standard - new developments Design zip file.

2.4.10 Contact us

2.4.10.1 Design submission and queries

For all multi dwelling unit design submissions please submit all MDU Designs via the design upload tool.

All design review and corrective actions queries should be sent to: NBNCoPlanning@nbnco.com.au

2.4.10.2 Assisted drafting tool (ADT) support

All ADT technical issues should be sent to: NBNADTQuestions@nbnco.com.au.

Hours: 9:30am – 4:30pm AEST Monday to Friday.
2.5 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

2.6 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 2.7 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™ outdoor NTD shall be earthed for safety reasons and for remote testing purposes.

- Where the electrical earth electrode is near the nbn™ 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™’ 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.
The following notes relate to Figure 6:

2. 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.

3. The CET shall be located within one (1) m of the essential services outdoor NTD.

4. A licensed electrician shall make the bonding conductor connection inside the electrical switchboard.

5. The earthing conductor shall be connected to the outdoor NTD by the nbn installer.
2.7 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 12. Outdoor NTD mounting template**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mounting surface template for outdoor NTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A landscape layout of the outdoor NTD</td>
<td><img src="image" alt="Diagram of outdoor NTD mounting template" /></td>
</tr>
</tbody>
</table>

**Figure 7. Outdoor NTD composite layout (landscape)**

- Additional area shall be provided if the open enclosure/home distributor is designed for non nbn™ cable patching, devices or equipment.
2.8 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 13. MDU/MPS categories

<table>
<thead>
<tr>
<th>MDU/MPS category</th>
<th>Characterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>horizontal</td>
<td>• close resemblance to single dwelling units in a street</td>
</tr>
<tr>
<td></td>
<td>• buildings may be clustered into semi-detached or terrace arrangements, but the entry facility is common for at least two (2) living units</td>
</tr>
<tr>
<td></td>
<td>• pathways between living units resemble those detailed in the document NBN-TE-CTO-194 New developments: deployment of the nbn™ pit and conduit network.</td>
</tr>
<tr>
<td>vertical</td>
<td>• multiple floors and/or multiple living units per floor; likely to have several vertical spaces for services</td>
</tr>
</tbody>
</table>
### MDU/MPS category

**Characterisation**

- includes one (1) or more telecommunications rooms/spaces as per AS/NZS 3084:2003 *Telecommunications installations - Telecommunications pathways and spaces for commercial buildings*.

### hybrid

- 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

## 2.8.1 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.

## 2.8.2 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.

![Figure 9. Normal conduit dimensions](image-url)
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 10.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard

![Figure 10. Example fibre/PDH/internal locations clearance requirements](image_url)
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 11.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard

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 12.

Please note these apply to the following locations:

- communications room or cupboard
- riser cupboard
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 13 depicts the clearances required for a gas meter that is not enclosed:
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 14 depicts the clearances required for an enclosed gas meter:

![Figure 14. Gas meter enclosure](image)

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 15 details the required clearances:

![Figure 15. Gas cylinder clearances](image)
### Table 14. Gas cylinder/bottle clearances

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Exchangeable gas bottle</th>
<th>In-situ gas cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>500 mm</td>
<td>1500 mm</td>
</tr>
<tr>
<td>B</td>
<td>1500 mm</td>
<td>3500 mm</td>
</tr>
<tr>
<td>C</td>
<td>500 mm</td>
<td>500 mm</td>
</tr>
</tbody>
</table>

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 15. Equipment clearances

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

### 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 16. Concept design of typical front elevation communications room

Figure 17. 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 x 50 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 18 and Figure 19). 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 18. Slot example telecommunications riser/closet floor or ceiling entry

Figure 19. 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 20. nbn™ pathway from property boundary to communications room](image)

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 21. 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.
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

![Vertical distribution single line diagram](image1)

Figure 23. Concept design of vertical single line diagram

4.3.2 Living unit NTD elevations

![Living unit NTD elevations](image2)

Figure 24. 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 25. 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 16. Mounting locations

<table>
<thead>
<tr>
<th>Location type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>open wall areas</td>
<td>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.</td>
</tr>
<tr>
<td>open enclosures</td>
<td>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.</td>
</tr>
</tbody>
</table>
**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 17. Home distributor dimensions**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Home distributor dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>minimum mounting surface area required for an indoor NTD composite layout</td>
<td>2,000 cm², measured within the home distributor</td>
</tr>
<tr>
<td>minimum mounting surface area required for an indoor NTD composite layout</td>
<td>2,000 cm², measured within the home distributor</td>
</tr>
<tr>
<td>minimum internal clearance between nbn™ equipment and home distributor door/cover</td>
<td>2 cm</td>
</tr>
<tr>
<td>minimum internal clearance from the rear of the nbn™ equipment and home distributor/cover</td>
<td>10 cm</td>
</tr>
<tr>
<td>minimum inside volume required for a home distributor</td>
<td>20 L</td>
</tr>
</tbody>
</table>

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 18. NTD enclosure mounting template

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mounting surface template for NTD enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting surface template for a landscape orientation</td>
<td><img src="image" alt="Figure 26. NTD enclosure landscape orientation" /></td>
</tr>
</tbody>
</table>

Where a verified enclosure is installed: 100 mm min. 1700 mm from floor level.
### 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 accidently 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>
<thead>
<tr>
<th>Volume of open enclosure or home distributor</th>
<th>Required ventilation area (for each of the upper and the lower ventilation region)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 L (minimum volume requirement)</td>
<td>60 cm²</td>
</tr>
<tr>
<td>between 20 L and 60 L</td>
<td>60 cm², plus an additional 1.5 square centimetres per litre of volume over 20 L</td>
</tr>
<tr>
<td>between 20 L and 60 L</td>
<td>120 cm², plus an additional 0.1 square centimetres per litre of volume over 60 L</td>
</tr>
<tr>
<td>greater than 60 L</td>
<td>120 cm², plus an additional 0.1 square centimetres per litre of volume over 60 L</td>
</tr>
</tbody>
</table>

#### 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:

  \[
  \text{volume} = \left(\frac{W \times H \times D}{1000}\right)
  \]

- where:
  - \(W\), \(H\) and \(D\) are the internal width, height and depth of the enclosure (in centimetres)
  - \(\text{volume}\) 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:
\[ \text{ventilation area} = 60 + \left( (\text{volume} - 20) \times 1.5 \right) \]

- for volumes greater than 60 L:
\[ \text{ventilation area} = 120 + \left( (\text{volume} - 60) \times 0.1 \right) \]

**Example:**

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

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

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:

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

### 5.3.4.2 Additional requirements

**Table 20. Additional ventilation requirements**

<table>
<thead>
<tr>
<th>Rule</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>doors or covers shall not obstruct ventilation</td>
<td>An open enclosure or home distributor design shall not rely on a cover or doors being opened to meet the thermal ventilation requirements.</td>
</tr>
<tr>
<td>obstructed ventilation does not count towards thermal ventilation assessment</td>
<td>Examples of obstructed ventilation include (but are not limited to) the following:</td>
</tr>
<tr>
<td></td>
<td>- an open enclosure or home distributor is installed into a cavity</td>
</tr>
<tr>
<td></td>
<td>- an open enclosure or home distributor is surrounded by a purpose-designed architrave</td>
</tr>
<tr>
<td></td>
<td>- an open enclosure or home distributor is fitted with fixed shelving</td>
</tr>
<tr>
<td></td>
<td>- an open enclosure or home distributor has the capability of being fitted with removable shelving.</td>
</tr>
<tr>
<td>ventilation openings shall not be used for cable ingress/egress at any time</td>
<td>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.</td>
</tr>
</tbody>
</table>
Table 21. Ventilation requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ventilation requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilation to dissipate gases released during battery charging</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>c. The combined cross-sectional ventilation area in the upper ventilation region shall be at least 5 cm² unimpeded.</td>
</tr>
<tr>
<td></td>
<td>d. The combined cross-sectional ventilation area in the lower ventilation region shall be at least 5 cm² unimpeded.</td>
</tr>
</tbody>
</table>

![Ventilation in the upper 100mm region](image)

![Ventilation in the lower 100mm region](image)

**Figure 28. Ventilation upper/lower**

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.

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.

‘Unimpeded’ is also intended to mean ‘unobstructed’, and refers to the minimum effective cross-sectional area of airways intended for ventilation.

The requirements for separate upper and lower ventilation areas may be met with:

- 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
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ventilation requirement</th>
</tr>
</thead>
</table>
| **Arrangement of enclosure/home distributor ventilation openings** | Where feasible, ventilation openings should be arranged in accordance with the recommendations in *AS 4086.2-1997 Secondary batteries for use with stand-alone power systems*. In particular:  
  - 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 |

---

**AS 4086.2-1997 Secondary batteries for use with stand-alone power systems** 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 *AS 4086.2-1997 Secondary batteries for use with stand-alone power systems*, which are arguably agnostic to the source of power and provide relevant guidance regarding ventilation.

---

**Proximity of a ventilation opening to the face of a device**  
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.

![Figure 29. Ventilation openings](image)

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.

**Cable ingress/egress and ventilation**  
Ventilation openings shall not be used or intended to be used for cable ingress/egress.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ventilation requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>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.</td>
</tr>
<tr>
<td>Doors or covers may not obstruct ventilation</td>
<td>An open enclosure or home distributor design shall not rely on a cover or doors being open to meet any of the ventilation requirements.</td>
</tr>
<tr>
<td>Compliance with standards governing safe location of VRLA batteries and battery backup PSUs</td>
<td>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.</td>
</tr>
<tr>
<td>i</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 30. 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 31. 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 32. 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 33. 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™ 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 34. Spatial requirements for a large HFC cabinet](image)

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 35. Spatial requirements for a medium HFC cabinet](image-url)
# 9 Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>ACMA</td>
<td>Australian Communications and Media Authority</td>
</tr>
<tr>
<td>BCA</td>
<td>Building Code of Australia</td>
</tr>
<tr>
<td>CET</td>
<td>Communications Earth Terminal</td>
</tr>
<tr>
<td>CPE</td>
<td>Customer Premises Equipment</td>
</tr>
<tr>
<td>CSD</td>
<td>Compact Sealed DSLAM</td>
</tr>
<tr>
<td>CTL</td>
<td>Cable Transition Location</td>
</tr>
<tr>
<td>DP</td>
<td>Delivery Partner</td>
</tr>
<tr>
<td>FCD</td>
<td>Fibre Collector Distributor</td>
</tr>
<tr>
<td>FDT</td>
<td>Fibre Distribution Terminal</td>
</tr>
<tr>
<td>FIP</td>
<td>Fire Indicator Panel</td>
</tr>
<tr>
<td>FTTB</td>
<td>Fibre To The Building</td>
</tr>
<tr>
<td>FTTN</td>
<td>Fibre To The Node</td>
</tr>
<tr>
<td>FTTP</td>
<td>Fibre To The Premises</td>
</tr>
<tr>
<td>FTTx</td>
<td>Fibre To The ‘x’ (building, curb, node, premises)</td>
</tr>
<tr>
<td>GNAF</td>
<td>Geo-coded National Address File</td>
</tr>
<tr>
<td>GPO</td>
<td>General Power Outlet</td>
</tr>
<tr>
<td>HFC</td>
<td>Hybrid Fibre Coaxial</td>
</tr>
<tr>
<td>HS&amp;E</td>
<td>Health, Safety &amp; Environment</td>
</tr>
<tr>
<td>LIC</td>
<td>Lead-In Conduit</td>
</tr>
<tr>
<td>living unit</td>
<td>A valid physical address in the Geo-coded National Address File (GNAF) provided by PSMA Australia Ltd.</td>
</tr>
<tr>
<td>LSZH</td>
<td>Low-Smoke Zero-Halogen</td>
</tr>
<tr>
<td>MDF</td>
<td>Main Distribution Frame</td>
</tr>
<tr>
<td>MDU</td>
<td>Multi Dwelling Unit</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>MPS</td>
<td>Multi Premises Site</td>
</tr>
<tr>
<td>nbn</td>
<td>National Broadband Network</td>
</tr>
<tr>
<td>NBP</td>
<td>Network Boundary Point</td>
</tr>
<tr>
<td>NTD</td>
<td>Network Termination Device</td>
</tr>
<tr>
<td>PCD</td>
<td>Premise Connection Device</td>
</tr>
<tr>
<td>PDH</td>
<td>Premise Distribution Hub</td>
</tr>
<tr>
<td>PSU</td>
<td>Power Supply Unit</td>
</tr>
<tr>
<td>RF</td>
<td>Radio Frequency</td>
</tr>
<tr>
<td>RG</td>
<td>Radio Grade</td>
</tr>
<tr>
<td>SWMS</td>
<td>Safe Work Method Statement</td>
</tr>
<tr>
<td>TO</td>
<td>Telecommunications Outlet</td>
</tr>
<tr>
<td>WHS</td>
<td>Workplace Health &amp; Safety</td>
</tr>
</tbody>
</table>
Appendix A  MPS/MDU pathway design checklist

Table 22. Greenfield MPS/MDU pathway design checklist for all technologies (i.e. FTTP/FTTN/FTTB/HFC)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>All design drawings shall be submitted to scale in AutoCAD.dwg format (minimum version 2013) to scale 1:1.</td>
</tr>
<tr>
<td></td>
<td>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 minimum version 2013. This design is also required in PDF format.</td>
</tr>
<tr>
<td>2.</td>
<td>The latest version of the ADT (Assisted Drafting Tool) is being used in AutoCAD.</td>
</tr>
<tr>
<td>3.</td>
<td>The latest version nbn ADT Template has been applied and populated in the AutoCAD design reflected in the paper space.</td>
</tr>
<tr>
<td>4.</td>
<td>The ADT Development Information block is populated in the AutoCAD design (NBN_MDU_NDI).</td>
</tr>
<tr>
<td>5.</td>
<td>The Northing reference shall be shown in the design.</td>
</tr>
<tr>
<td>6.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>7.</td>
<td>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).</td>
</tr>
<tr>
<td>8.</td>
<td>Street names shall be reflected in relation to the address and frontage of the MDU/MDP.</td>
</tr>
<tr>
<td></td>
<td>The nbn preferred lead-in location at the property boundary should be confirmed with the nbn deployment specialist.</td>
</tr>
<tr>
<td>9.</td>
<td>Provide a front elevation of the riser cupboard layout, with appropriate space reserved for nbn™ equipment.</td>
</tr>
</tbody>
</table>
10. For FTTP: ensure the communications room has the spatial requirements for NTD/PSUs to service lifts and the Fire Indicator Panel (FIP).

   Provide a front elevation of the communications room and/or cupboard layout, with appropriate space reserved for nbn™ equipment (PDH and essential services Customer Premises Equipment [CPE]).

   - 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.

11. Ensure the pathways from the communications room to each riser are shown (conduit, cable tray or a combination of both).

12. 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.

13. Provide a schematic of the riser shaft depicting the distance between floors.

14. 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.

15. 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.

16. 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.

17. The location and spatial separations for the nbn™ CPE (NTD/PSU) shall be in accordance with nbn guidelines.

18. Floor plans shall denote unit/apartment numbers.

19. 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 NBN-TE-CTO-194 New developments: deployment of the nbn™ pit and conduit network (including the as-built checklists) before nbn can deem it fit for purpose. (For hybrid MDUs, checkpoints 1-11 shall be verified as well).

   This design is also required in PDF format.
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*

<table>
<thead>
<tr>
<th>DEVELOPMENT SITE</th>
<th>PROJECT ID</th>
<th>ADDRESS</th>
<th>INSPECTION DATE</th>
<th>INSPECTED FLOOR/S</th>
<th>TECHNOLOGY</th>
</tr>
</thead>
</table>

Table 23. nbn™ FTTx pathways informal visual inspection checklist

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Pass Y/N or N/A</th>
<th>Photo taken Y/N</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lead-In Conduit (LIC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The LIC is strung.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The LIC is capped at the property boundary.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The LIC is installed as per the design.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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. |
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Pass Y/N or N/A</th>
<th>Photo taken Y/N</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>A location is reserved for essential service GPO sockets.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>For FTTB), installation of the 10A captive power outlets.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CET 6 mm² earth cable is installed from the electrical switchboard.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>There is sufficient reserved space and cable tray for cable management requirements around nbn™ equipment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Pathway transition points are adequately supported (no fibre is to be self-supported over a maximum distance of 200 mm).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pathway transition points are adequately supported (no HFC cable is to be self-supported over a maximum distance of 200 mm).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>The fibre route is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The HFC cable route is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>The copper cabling route is not crossing others services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Cable tray or a minimum of nominal P50 has been used.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Permanent lighting is available.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>A lockable door is present.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>The communications room is clean, tidy and dry.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Trunk pathways**

Trunk pathways are the pathways from the communications room to the riser and from the riser to nominal P20 premises conduit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Pass Y/N or N/A</th>
<th>Photo taken Y/N</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable tray or a minimum of nominal P50 has been used.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>All conduit is strung and labelled as required.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The fibre route is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The HFC cable route is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The copper cable route is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>A minimum of 100 mm separation has been reserved within the cable tray from other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>450 mm x 450 mm ceiling access panels are installed in locations were 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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Ceiling access panels are no more than 15 m apart where cable tray is in use.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>No section of P50 conduit is longer than 50 m.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Pre-formed 90 degree bends radius is used for all P50.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Pathway transition points are adequately supported (no fibre is to be self-supported over a maximum distance of 200 mm).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Pathway transition points are adequately supported (no HFC cable is to be self-supported over a maximum distance of 200 mm).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>The conduit and cable tray are installed as per the design.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Riser cupboards**

Riser cupboards are the cupboards where the FDT, FCD and HFC medium cabinet shall be located.
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Pass Y/N or N/A</th>
<th>Photo taken Y/N</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>There is sufficient space for nbn™ equipment as per the guidelines.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>There is sufficient reserved space and cable tray for cable management requirements around nbn™ equipment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Wall mounted cable management is installed from riser hole to riser hole.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>A minimum of 100 mm separation has been reserved within the cable tray from other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The fibre route is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>The copper cable route is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>The HFC cable is not crossing other services.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pathway transition points are adequately supported (no fibre is to be self-supported over a maximum distance of 200 mm).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pathway transitions points are adequately supported (no HFC cable is to be self-supported over a maximum distance of 200 mm).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Fire stopping arrangements have been discussed.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**For FTTPL premise conduit and the NTD location**

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