A Uniti Group Company

OPT-006-GDE-08

MDU Developer Guidelines – New Developments

OPTICOMM Networks

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Please consider the environment before printing this document.

Change History

Version	Description	Effective Date
8.0	Complete rewrite	27 September 2022
8.1	Released version.	09 November 2022
8.2	Minor changes	07 February 2023

Changes in this revision

The detailed changes to this document, from Version 8.0 dated 27 Sep 2022 to Version 8.2 are outlined in the table below.

Version	Description
8.0	Complete rewrite
8.1	Minor corrections
8.2	Minor corrections

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1 Introduction

1.1 Purpose

This document provides guidelines for Consultants, Builders, Electrical Contractors, and Developers of Mulli Dwelling Units (MDU) on the provision of cable pathways and equipment room requirements in preparation for the installation of an Opticomm Fibre to the Premises (FTTP) network. This document does not cover Commercial, Retail, and other high density vertical high-rise developments however the principles outlined in this document may be applied, in most cases, to these types of developments

1.2 Scope

This document describes in general terms the requirements and responsibilities for the provision of cable pathways and equipment rooms for the installation of an Opticomm Fibre to the Premises (FTTP) network. This document does not override any requirements defined in relevant Australian Standards and Building Codes that must be followed by builders and subcontractors.

1.3 Project specific requirements

Opticomm recognise each development project can have its own bespoke requirements that may not fit within these guidelines. The dedicated Opticomm Project Manager for the project will always work with the developer and builder to achieve the best possible outcomes for the project within the requirements set by the appropriate standards and codes.

1.4 Definitions and Interpretations

Definitions as per Opticomm Ltd standards related to MDU passive network design, are outlined in the Definitions and Interpretations section of this document. Should the definition not be included in the Definitions and Interpretations section of this document, it is presumed the definition is per the telecommunications industry standard meaning.

Table 1 - Definitions

Acronym/Product Name	Definition
BAS	Building Automation Services
BoM	Bill of Materials
FDH	Fibre Distribution Hub. Used as an aggregation point for RDTs and may also contain optical splitters
FJC	Fibre Joint Closure. Splice joint for SMOF
FTA-TV	Free to Air Television
FTTP	Fibre to the Premises
FWO	Fibre Wall Outlet. Surface mounted fibre termination
GPON	Gigabit Passive Optical Network (GPON) is covered by ITU standards
ITU	The International Telecommunications Union is the international body that sets telecommunications standards
LC/APC	LC type angled physical connector
MDU	Multi Dwelling Unit. A single building containing more than one separate living unit
MPO	Multi-fibre Push On connector
ODF	Optical Distribution Frame, also referred to as Fibre Optic Breakout Tray (FOBOT) or Fibre Termination Panel (FTP)
ONT	Optical Network Terminal. Also referred to as a Network Termination Unit (NTU), or Optical Network Unit (ONU)
RDT	Rapid Distribution Terminal. Also referred to as Network Access Port (NAP) or Fibre Access Port (FAP)
RSP	Retail Service Provider
SC/APC	SC type angled physical connector
SMOF	Single Mode Optical Fibre
TOR	Top of Rack
WAP	Wireless Access Point
XGS-PON	Updated GPON standard to support higher data rates and is covered by ITU standards
Community Connect	Fibre Based Network that is used to transport building connectivity solutions (including BAS) via Ethernet where Opticomm supplies the active equipment
Smart Trunk	FTTP Dark Fibre passive network is also utilised to transport optical traffic for other BAS service providers

Acronym/Product Name	Definition
Essentials	An FTTP network designed for delivery of Data services only
Premium	An FTTP network designed for delivery of Data and FTA-TV

1.5 Reference Documents

Table 2 - Reference Documents

Standard No	Title
AS/NZS 3000:2018	Electrical Installation and wiring rules
AS/NZS 3080:2013	Generic cabling for customer premises
AS/NZS 3084:2017	Telecommunications pathways and spaces for Commercial Buildings
AS/CA S009:2020	Installation requirements for customer cabling (Wiring Rules)
AS/CA S008:2020	Requirements for Customer Cabling products
AS/NZS IEC61935.1	Testing of balanced communication cabling in accordance with ISO/IEC 11801 Installed cabling
NCC 2019 Vol 1	Building Code of Australia Volume 1
ANSI/TIA-568.0-D	Generic Telecommunications cabling for customer premises
ANSI/TIA-568-2.D	Balance Twisted-Pair Telecommunications cabling and Components
ANSI/TIA-568.4-D	Broadband Coaxial Cabling and components

2 Roles and responsibilities Matrix

The roles and responsibilities of the parties involved in the successful deployment of an FTTP network in an MDU are outlined in Appendix A in a matrix format for simplicity.

3 Telecommunications Pathways

Telecommunications pathways are the conduits and cable tray used to establish a physical pathway between the apartments and the point of building entry. A pathway must be provided to every endpoint location within the building.

Telecommunication pathways are the fundamental piece of infrastructure that makes a building "Fibre-ready" so Opticomm can enable the delivery of services.

Figure 1 - High Level overview of Telecommunications Pathways

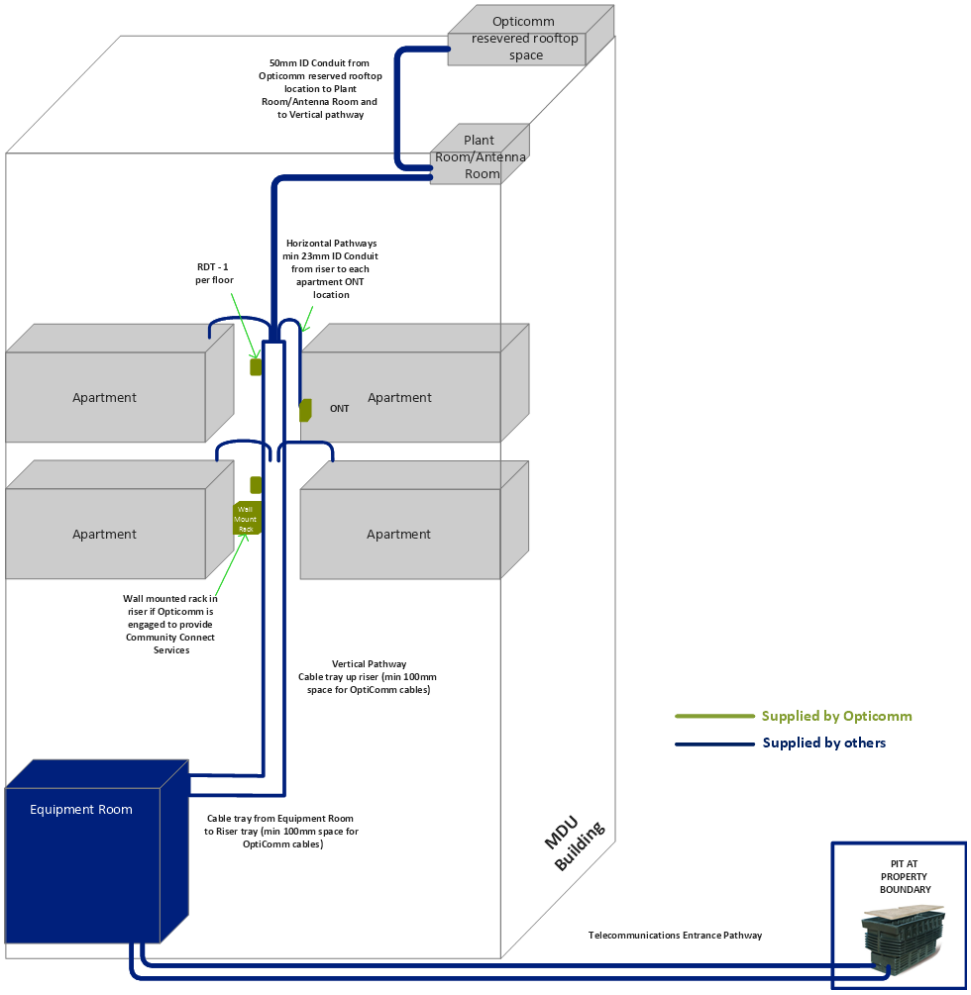


Figure 2 - Horizontal cable pathways design sample

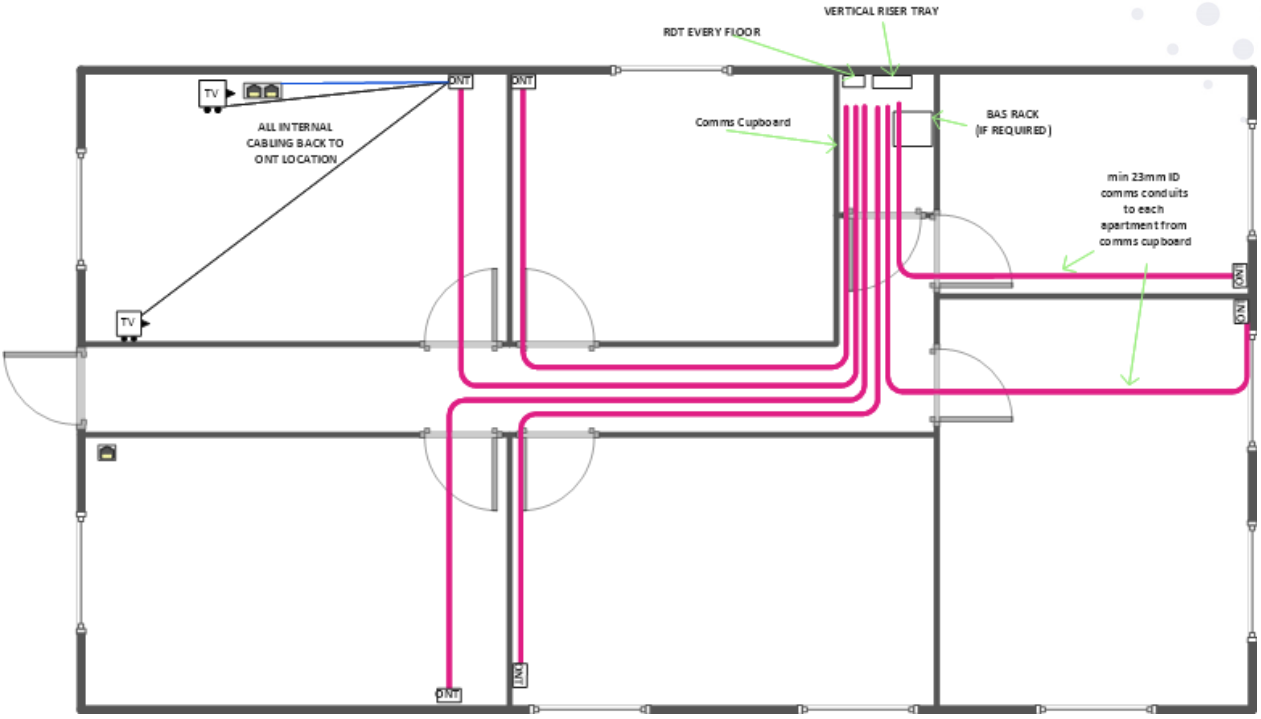
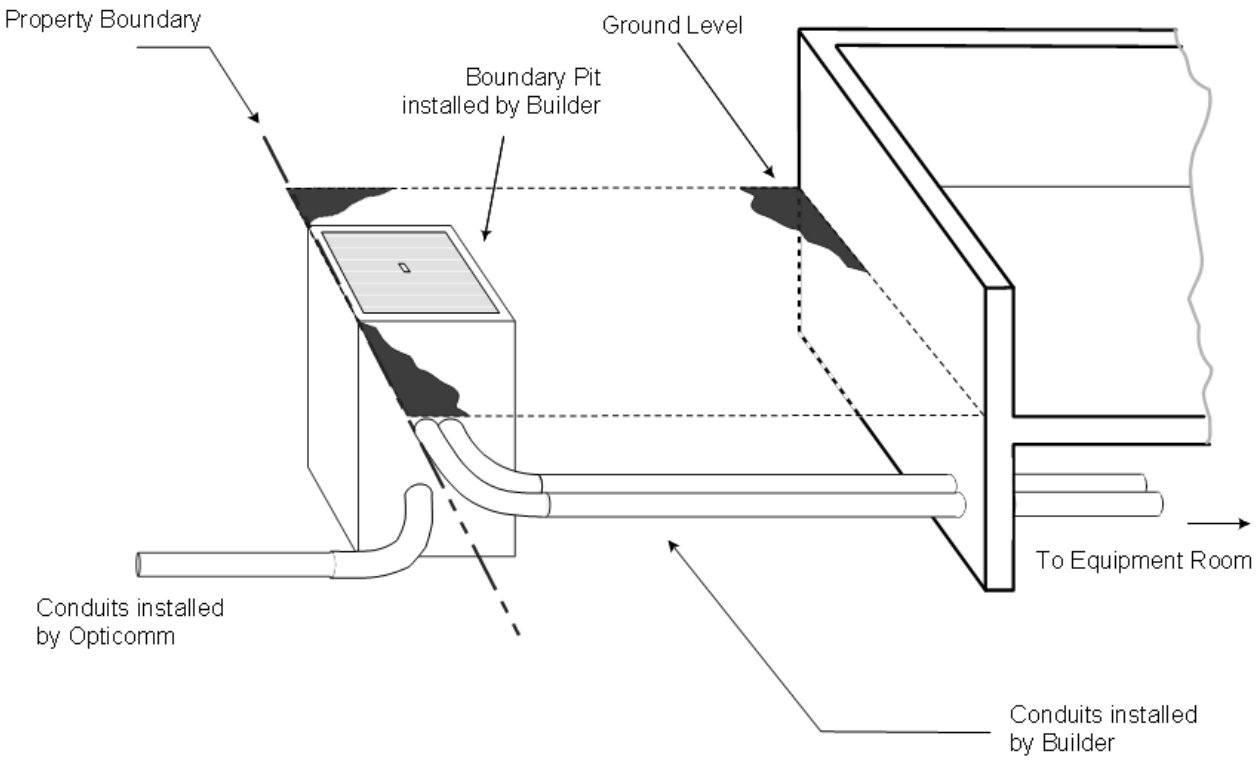


Figure 3 - Entrance Pathway concept



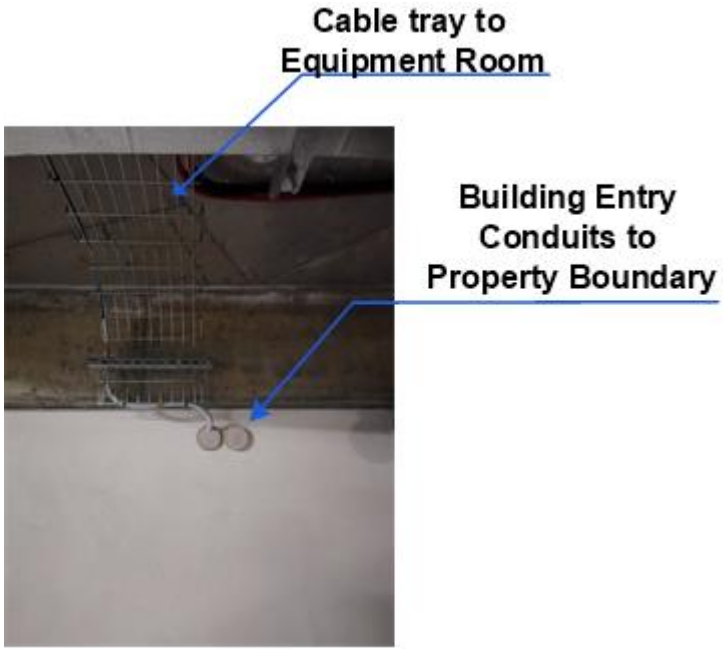
3.1 Telecommunications Entrance Pathway

The telecommunications entrance pathway (or Lead in Conduit) links the Equipment Room with the external telecommunication infrastructure located at the property boundary. Wherever possible the Lead-in Conduits should terminate at a Telecommunications pit at the property boundary. In some cases, this will not be practical and Opticomm will extend the Lead-in conduits from the property boundary to the nearest Telecommunications infrastructure.

Table 3 - Opticomm recommended minimum lead-in conduit requirements

Building size (living units)	Minimum number of entry conduits	Minimum Nominal Communication conduit size (mm)	Boundary pit
2 – 1000 units	2	100	P6
> 1000 units	3	100	P8

Figure 4 - Example of Lead-in conduit building entry



3.2 Vertical Pathway

Vertical pathway(s) is a facility for the installation of the backbone telecommunications cable running the vertical length of the building. It is used to interconnect the equipment room to the riser cupboards located on each floor and typically consist of penetrations and cable tray rising vertically through the building.

At the top floor or plant room, 2 x 32mm conduits must be provided from the vertical cable tray to the roof top area allocated to Opticomm.

Additionally, 2 x 32mm conduits must be provided from the Plant Room/Antenna Room to the vertical cable tray.

Vertical pathways are required for cable support fixing using either:

- Continuous accessible perforated cable tray with a minimum width of 100mm; or
- A shared cable tray with a minimum of 100mm allocated for Opticomm.

Where the riser(s) are not a single continuous shaft, additional pathways using cable tray or conduit (min 2 x 50mm) will be required to link the shafts with appropriate access at least every 15 metres and at every change of direction.

Figure 5 - Examples of Vertical Telecommunications Pathways

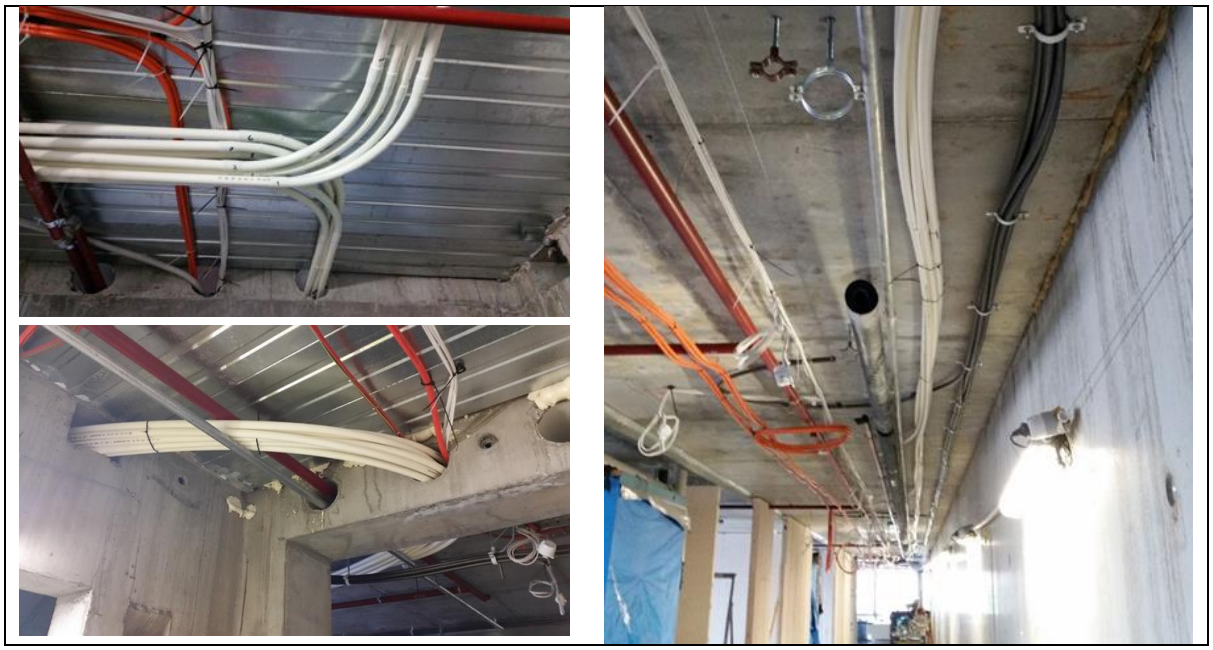
3.3 Horizontal Pathways

Horizontal pathways are conduits connecting each of the Apartments to the Riser Cupboards.

When installing a Horizontal conduit pathway:

- Use a continuous Telecommunication P20 conduit (23mm Inner diameter), between the Riser Cupboard and the individual Apartments, for exclusive use by Opticomm
- Use sweeping bends with a diameter of at least 300mm
    - The conduit may sweep at a large radius of greater than 2m and not be counted as a bend
- Conduits are to be tested with a mandrel of at least 80% of the conduit nominal inside diameter
- Keep bends to a maximum of three from riser to apartment if there is no access opening for hauling
- Fit each conduit with a drawstring
- Label each conduit with the Apartment number at the riser cupboard
- Conduits can be surface mounted below the soffit or cast 'in slab'

Figure 6 - Examples of Horizontal Telecommunications Pathways



3.4 Firestopping of cable pathways

Firestopping of the cable pathways are the responsibility of the builder and can only be completed after Opticomm has installed all fibre optic cables. The dedicated Opticomm Project Manager will coordinate with the builder's program to ensure the cables are installed before firestopping is scheduled to be completed.

4 Equipment Room (Communications Room)

The Telecommunication Equipment Room (commonly called the Main Comms Room (MCR) or Main Distribution Frame (MDF) Room) is located within the base building.

Where no Equipment Room is available, or the MDU is adjacent to an existing Opticomm network, the MDU may be serviced from a Roadside Cabinet, either within the MDU property boundary or in a road reserve or Public Open Space. This option must be agreed with Opticomm prior to execution of a Telecommunication Utility Agreement between Opticomm and the Developer as it will incur extra costs. This option also has limitations on the network supporting BAS services.

Where an Equipment Room is provided within the building it must meet the below minimum requirements.

4.1 Size

In an MDU development, the Developer will provide Opticomm a secure room with a floor area of at least 4m x 4m in an appropriate location in the MDU for Opticomm to install its equipment. Opticomm may install up to 5 equipment racks within the Equipment Room.

Table 4 - Equipment Room typical Rack dimensions

Product Name	Equipment Dimensions (HxWxD)(mm)			Comments
	H(mm)	W(mm)	D(mm)	
Equipment Rack	2000	800	800	Equipment Room Rack. Space for up to 5 required

4.2 Finishings

The Developer and Builder must ensure that the room is painted and finished, with linoleum flooring, no surface in the room shall be bare concrete or unpainted plasterboard.

4.3 Earthing

A Communications Earth Terminal (6mm2) must be provided from the Mains Distribution Board to a position adjacent to the Rack location. The Communications Earth Terminal (CET) is a link from the Main Distribution Board Earth and a Terminal in the communications room labelled as “CET”. This is fully described in AS/CA S009 and AS/NZS 3000, *see section 1.5 Reference Documents*

4.4 Electrical requirements

The Developer must provide a metered Single phase power connection for Opticomm use (20A min peak capacity) with three dedicated 15A GPO circuits with captive sockets provided to the power rack location. The GPO circuits must be non-RCD protected.

4.5 Lighting

Adequate lighting is to be provided in the Equipment room to meet appropriate Australian Standards and building codes.

4.6 UPS and Fire protection

Opticomm may install a UPS system in the equipment room. Typical battery capacities and voltages for different sized MDU's are listed below. It is the developer and builders responsibility to ensure fire protection is suitable to meet all Australian standards and building codes to accommodate this equipment. Wherever possible under the appropriate standards and codes there should not be a water sprinkler installed in the Equipment Room.

Building size (living units)	Typical UPS Battery capacity (Ah)	Typical UPS Battery Voltage (V)
2 – 200 units	No UPS	No UPS
201 – 1000 units	100	48
> 1000 units	450	48

4.7 Airconditioning dimensioning

The Developer must supply and install suitable local dedicated air-conditioning equipment with redundancy (filtered passive ventilation is acceptable) to support a maximum 3kW heat load from the Opticomm equipment and maintain a room temperature of not greater than 30 deg C.

4.8 Construction programme

The room must be available for occupation, including air-conditioning, and permanent power at least 2 months prior to commissioning of the network or any floor within the building.

4.9 Access

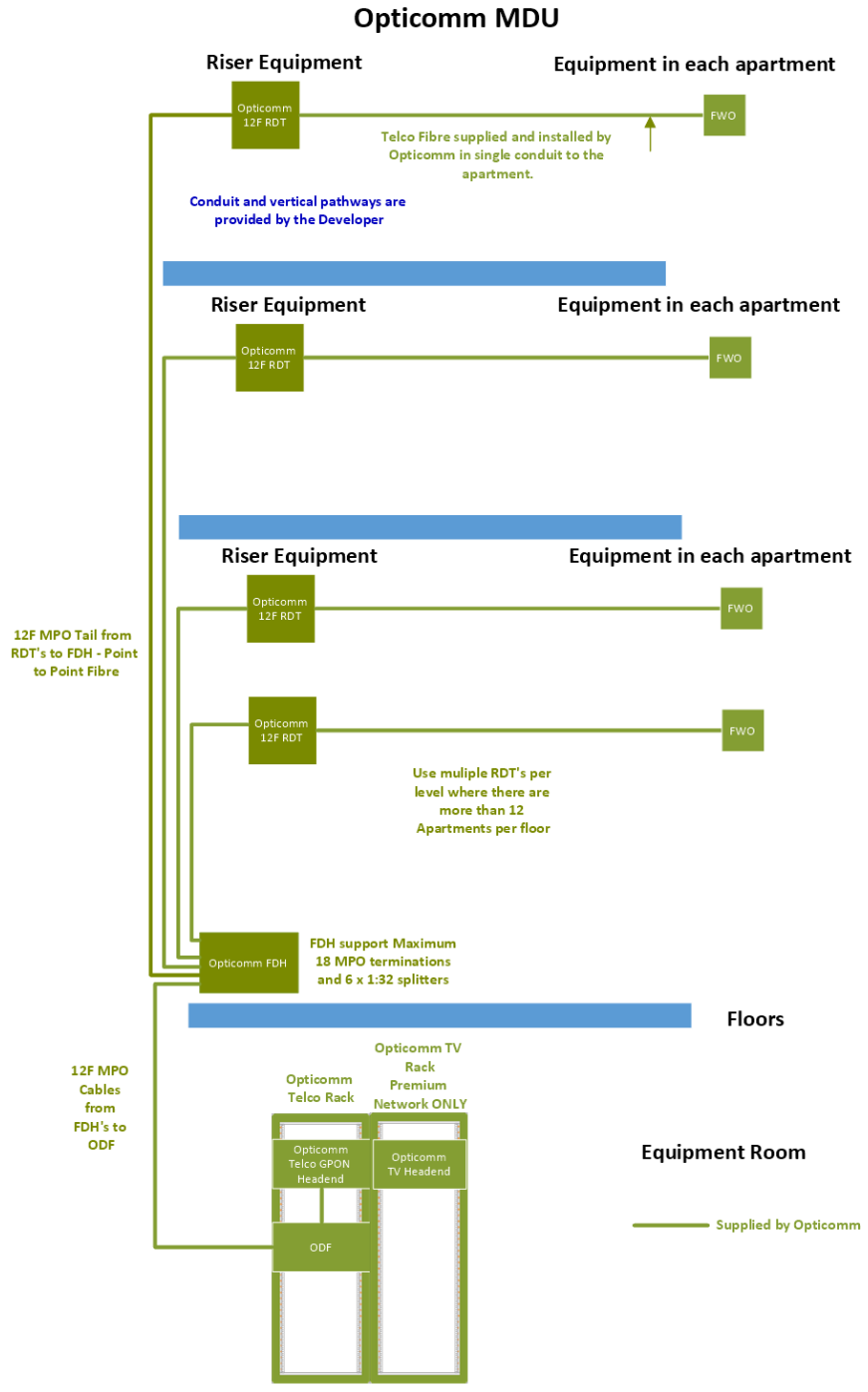
Opticomm must be granted unhindered access to the room 24/7. Wherever possible Opticomm prefer a room with exclusive access.

5 Riser requirements

To support the Telecommunications FTTP network Opticomm mounts equipment in the riser cupboards and Equipment Room to service the Apartments in an MDU. The locations of the equipment will depend on the building structure and apartment layouts. Typical requirements are described in this section.

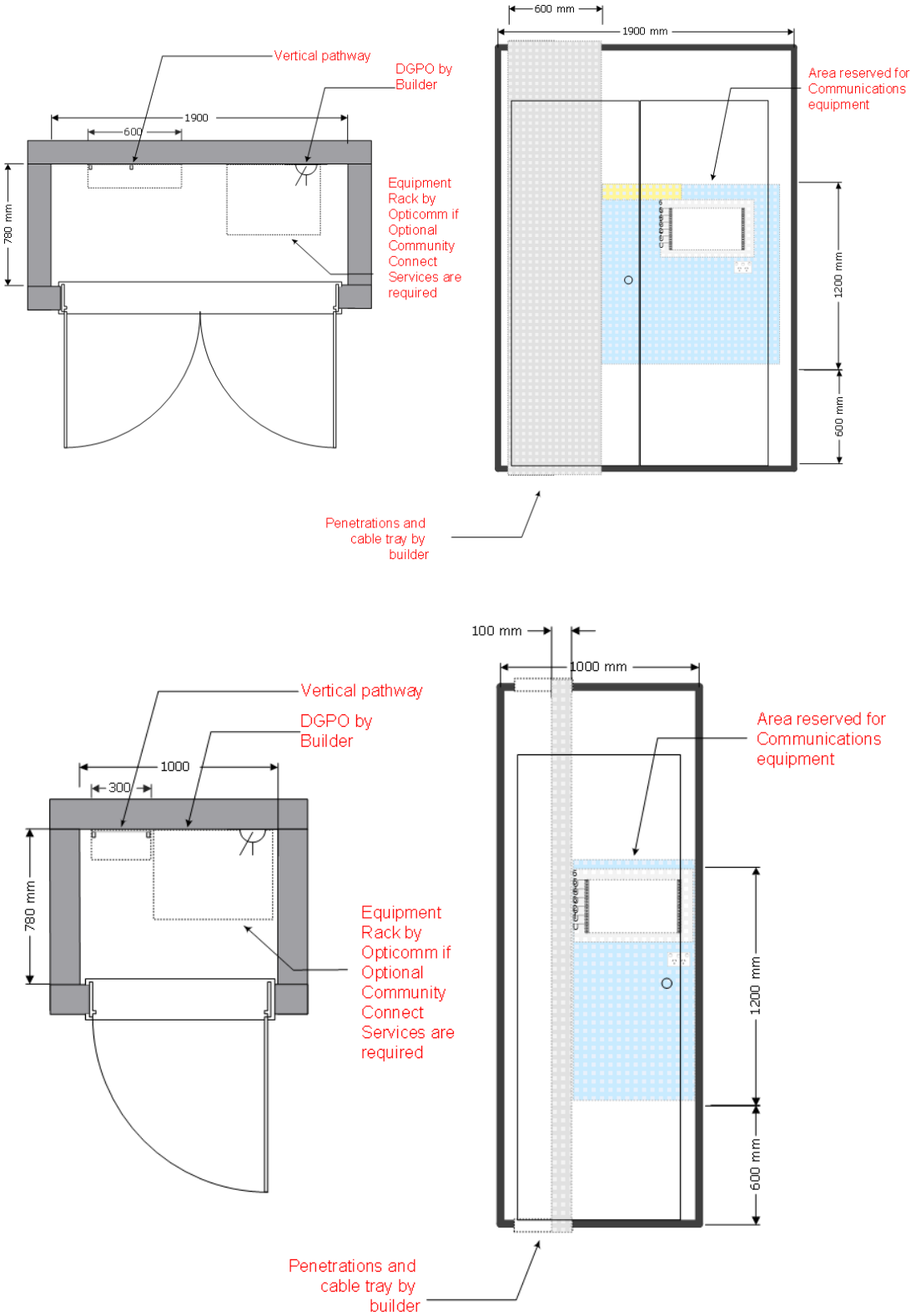
5.1 Typical MDU Topology

Figure 7 - Opticomm MDU Topology



5.2 Typical Riser cupboard Layouts

Figure 8 - Typical Riser Equipment layouts



5.3 Electrical requirements

Where Opticomm is contracted to provide Community Connect Services in addition to Telecommunications Services, a double 10A double GPO is required at each proposed equipment rack location and is to be provided to Opticomm by the Builder at no cost to Opticomm.

5.4 Equipment dimensions

Figure 9 - Typical RDT dimensions

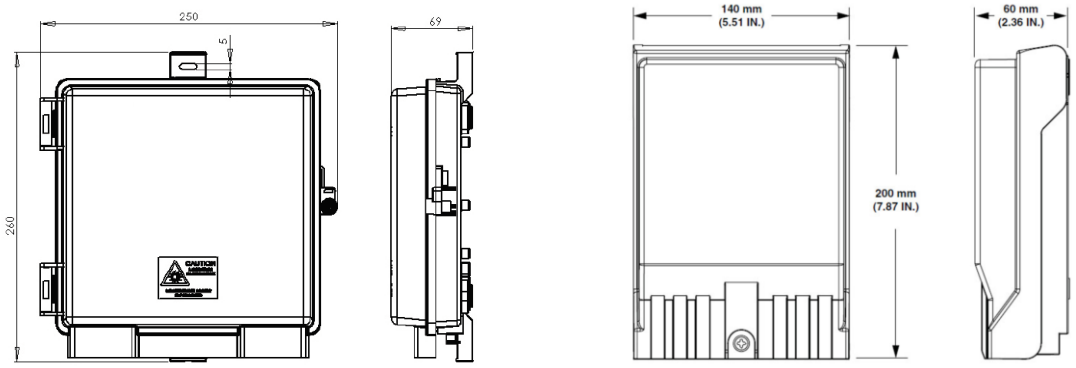


Figure 10 - Typical FDH Dimensions

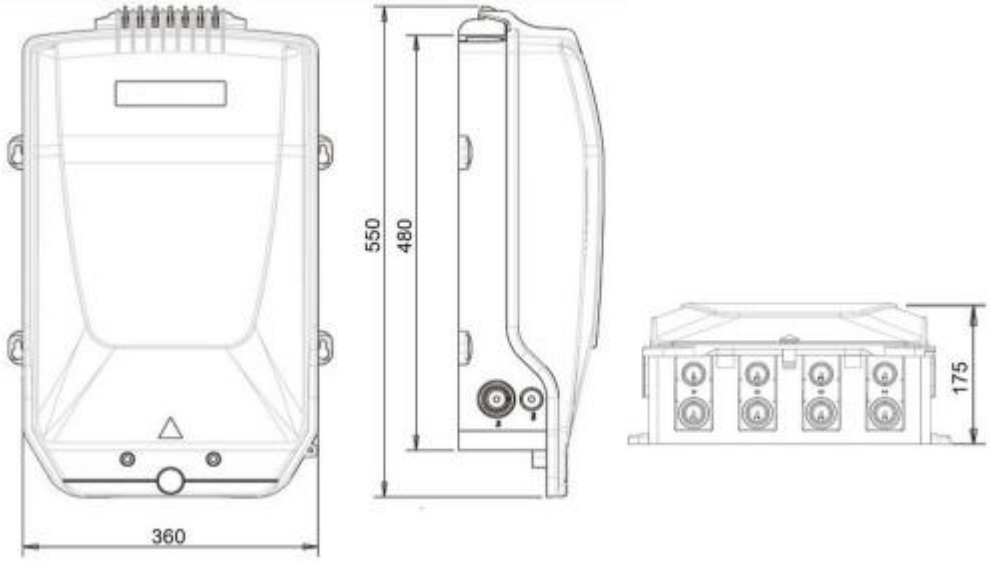


Table 5 - Riser Rack Dimensions

Product Name	Equipment Dimensions (HxWxD)(mm)			Comments
	H(mm)	W(mm)	D(mm)	
Riser Rack	600	600	600	Community Connect only. *See Section 9.2.*

6 Roof Equipment

At Opticomm's request, the Developer must provide Opticomm with exclusive use of a 4m x 4m area on the MDU's roof that meets Opticomm's requirements for the installation, maintenance and operation of telecommunications facilities including antennas. It is the Developers responsibility to ensure Opticomm has safe access to the MDU roof to install and maintain facilities.

There must be a minimum 2 x 32mm ID conduit pathways from this reserved rooftop location to the Plant Room/Antenna Room and the vertical cable pathways. Opticomm may require access to the plant room depending on the size of the MDU, to install equipment to provide FTA TV. Opticomm will require access to a single phase 10A double GPO in the Plant Room/Antenna Room where equipment is installed.

7 Apartment Equipment

The following figures describe the equipment that will be mounted in the apartments in the MDU and typical layouts.

Figure 11 - Apartment wiring diagram and demarcation

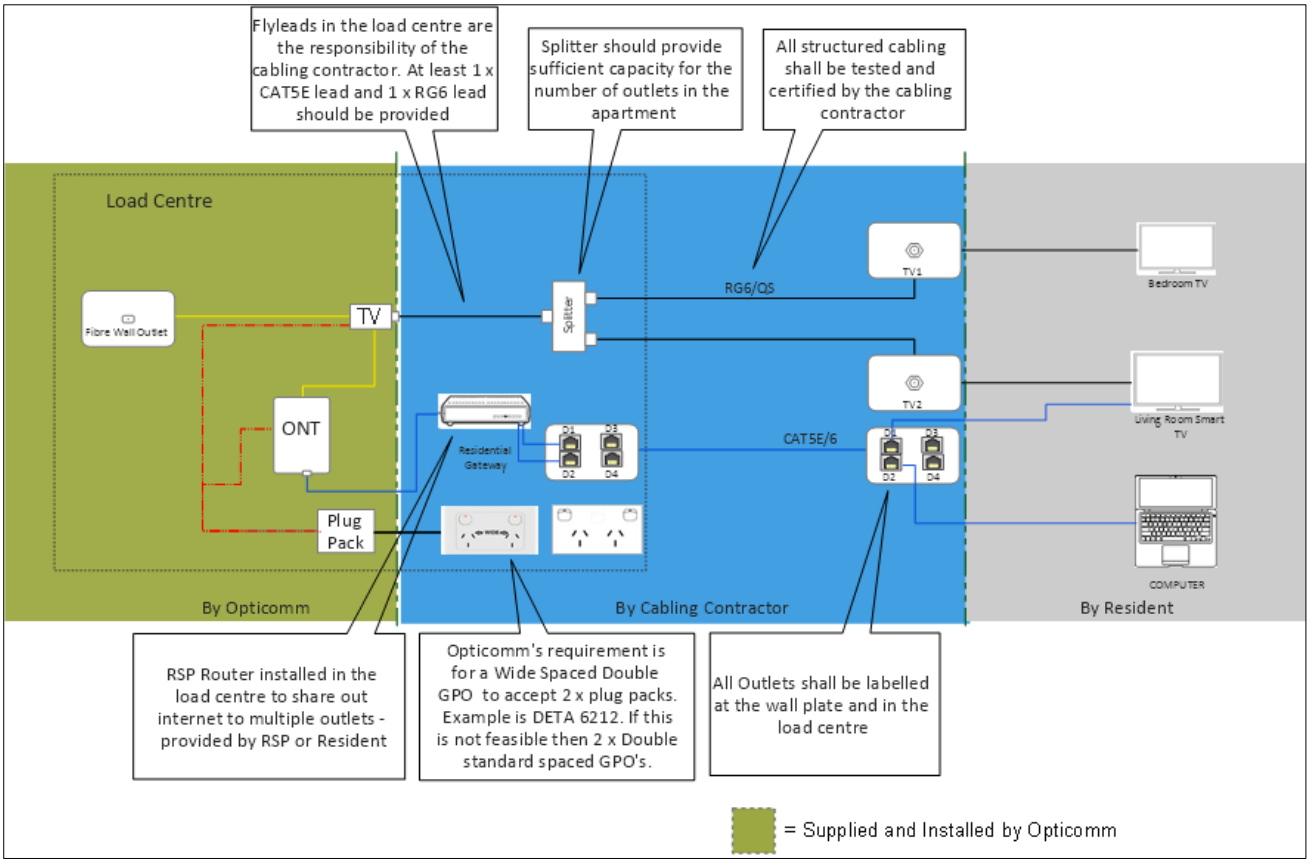


Figure 12 - Essentials Typical Apartment Equipment typical layout

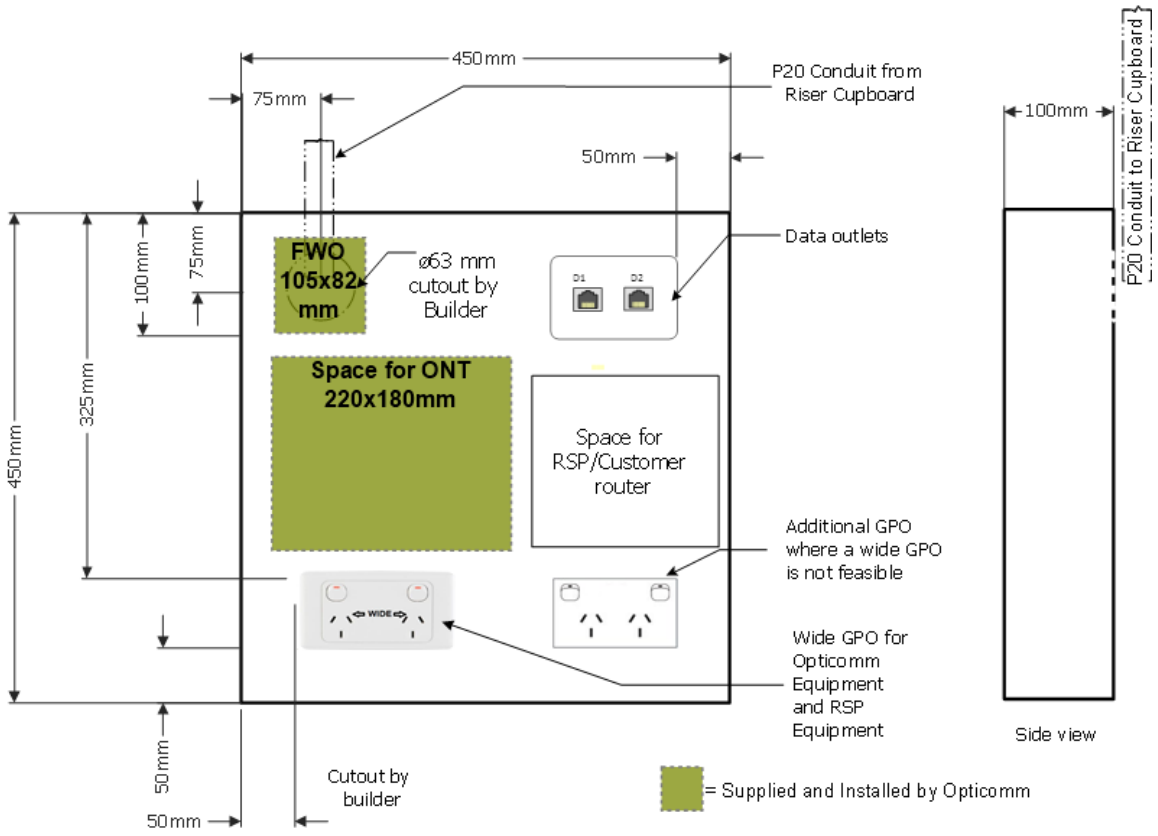


Figure 13 - Premium Apartment Equipment typical layout

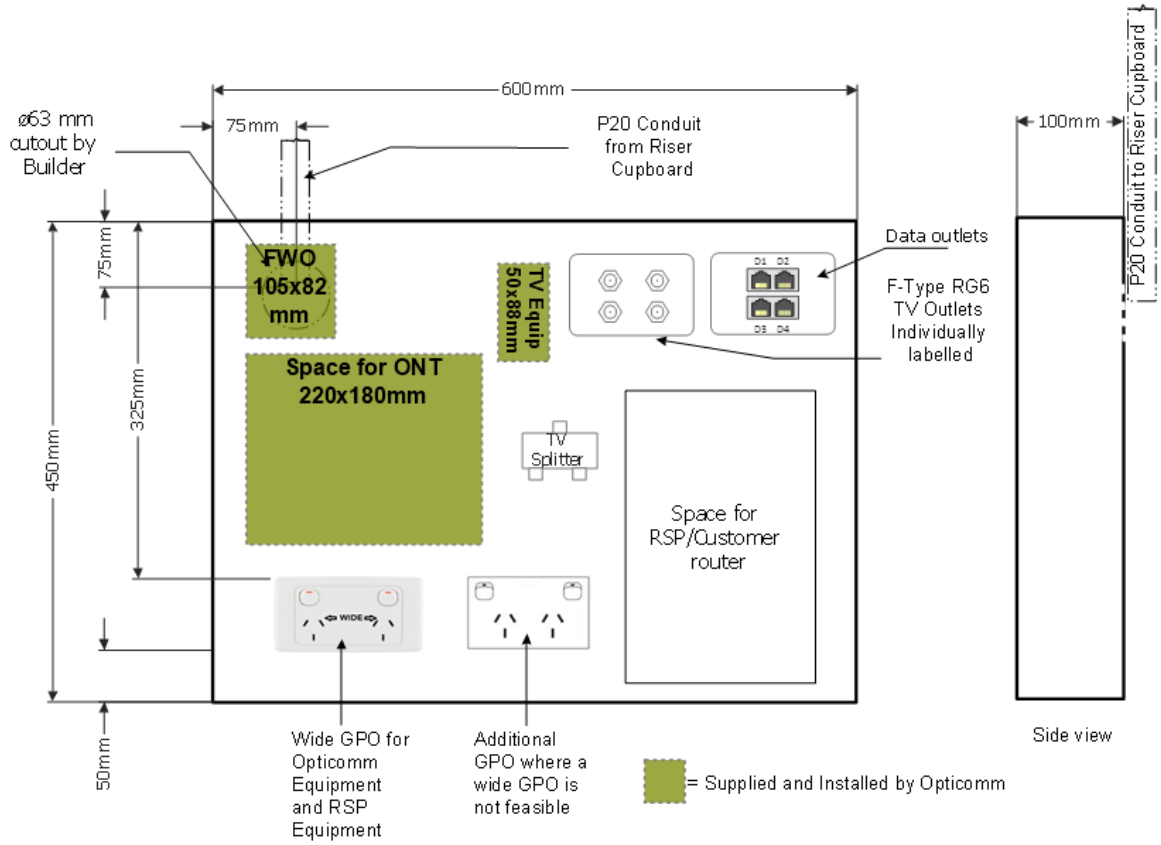
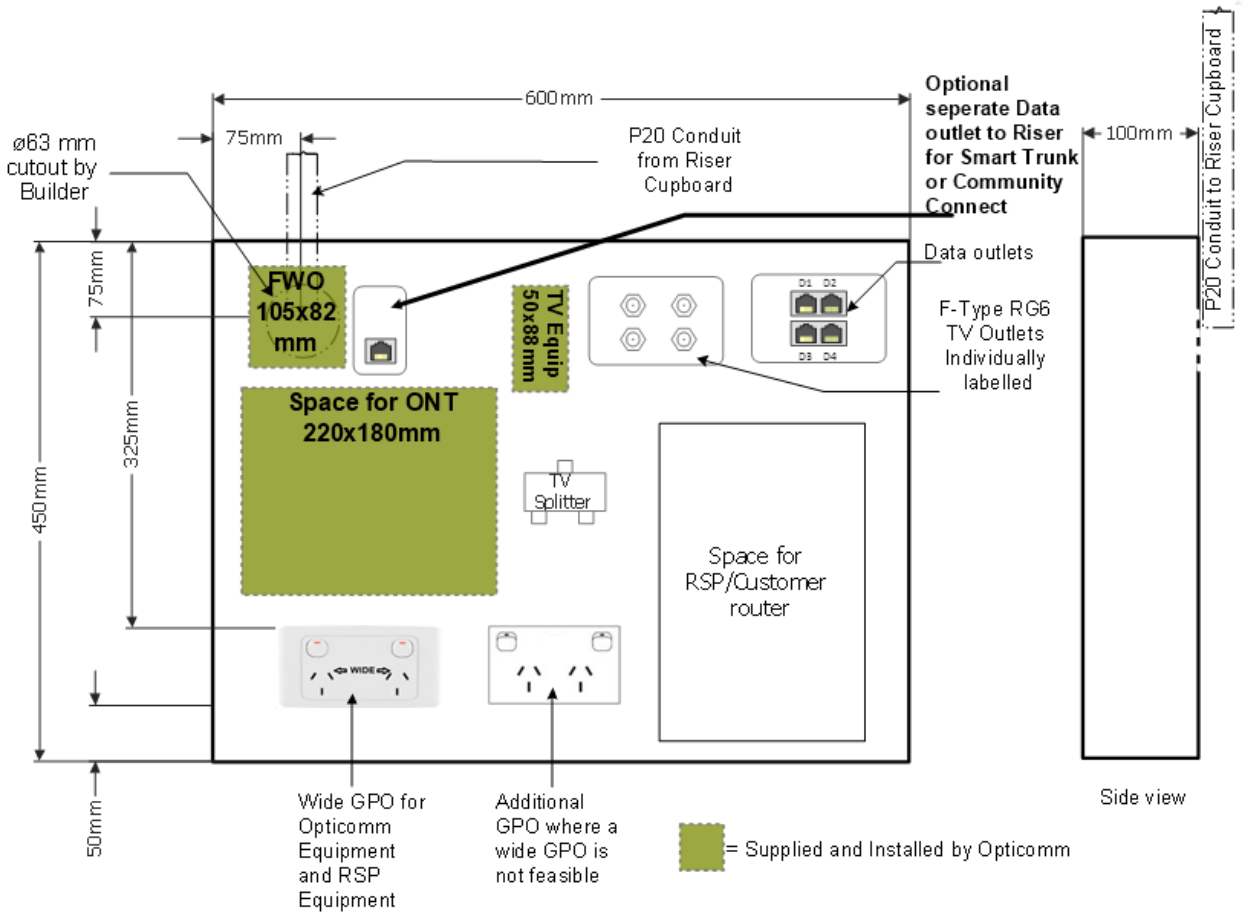


Figure 14 - Community Connect/Smart Trunk Apartment Equipment typical layout



8 Documentation to be provided by developer

Prior to the commencement of works the developer and/or builder will issue to Opticomm copies of the following documents:

- Address List (Opticomm document supplied to Developer to be completed & returned)
- Electrical/cable tray reticulation design of every floor
- Riser layout design & dimensions
- Apartment end point location and dimensions
- Equipment Room design & dimensions

9 Optional add-on services

Opticomm may offer to the developer additional add on services utilising some of the Telecommunications infrastructure to support a parallel network transporting Ethernet based Building Automation Services (BAS). The options for these services are based on either Opticomm providing Dark fibre only for use by other BAS contractors or providing the active ethernet network.

The two options are Smart Trunk (Dark fibre only) and Community Connect (Complete ethernet network).

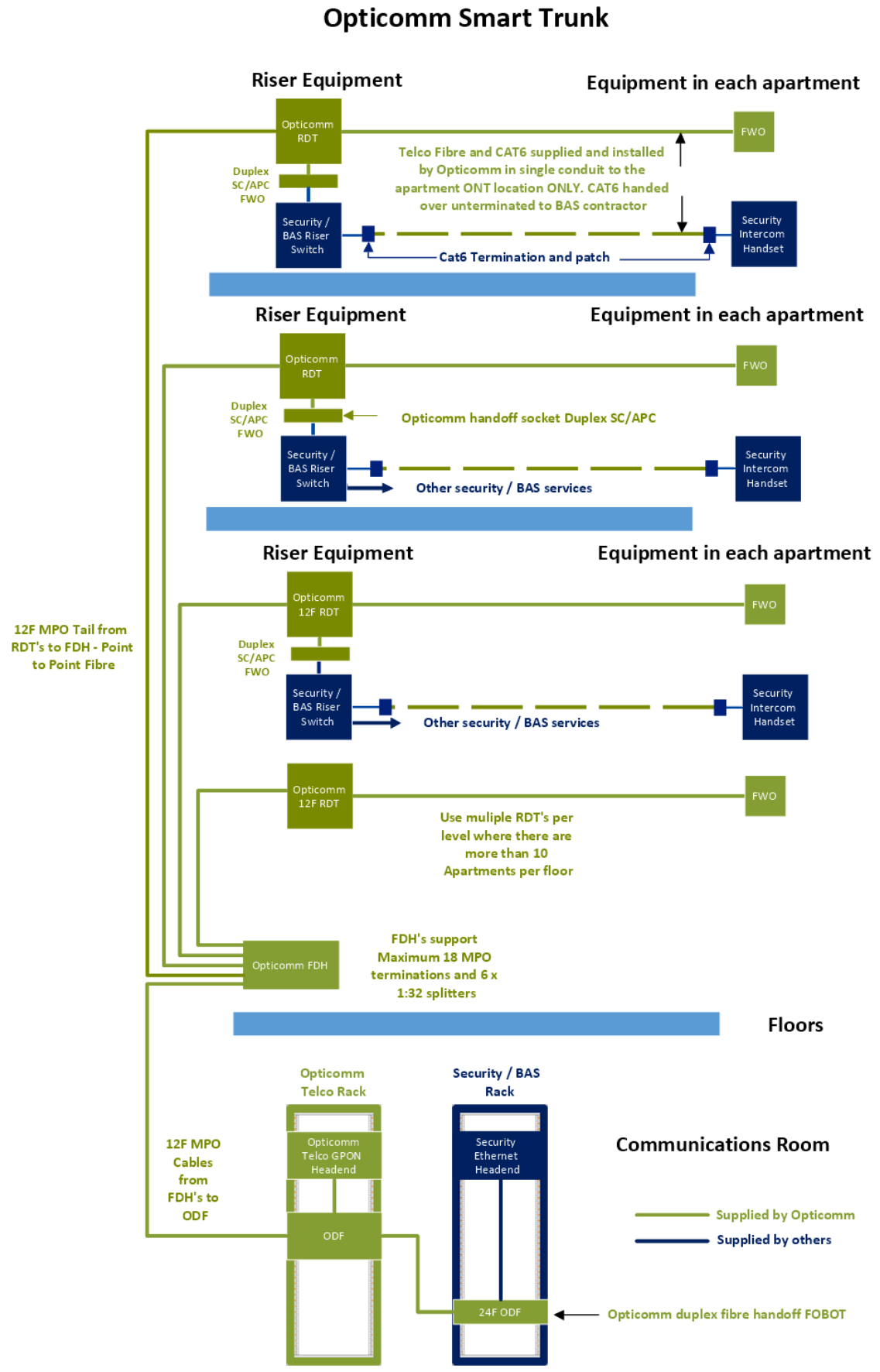
The Dark Fibre or Ethernet connections must only be used to support building services and are not available for use by other Telecommunications carriers. Opticomm maintains ownership of any Dark fibre provided for Smart Trunk or Community Connect services.

9.1 Smart Trunk concept

The following diagram summarises the topology of the Opticomm Smart Trunk Product. In essence the Smart Trunk Product utilises the Opticomm Telecommunications fibre network to transport Optical traffic from the BAS contractor's equipment. At each location where the BAS contractor requires single mode dark fibre, Opticomm provides a pair of dark fibres which connects back to the Equipment Room. The dark fibre is handed off as a duplex pair SC/APC fibre to the BAS contractor.

Additionally, Opticomm install an unterminated Cat6 cable between the riser and the apartment for use by the BAS contractor to support in room services such as security and intercom. The BAS contractor is responsible to terminate the cable at the riser and apartment end.

Figure 15 – Opticomm Smart Trunk Topology

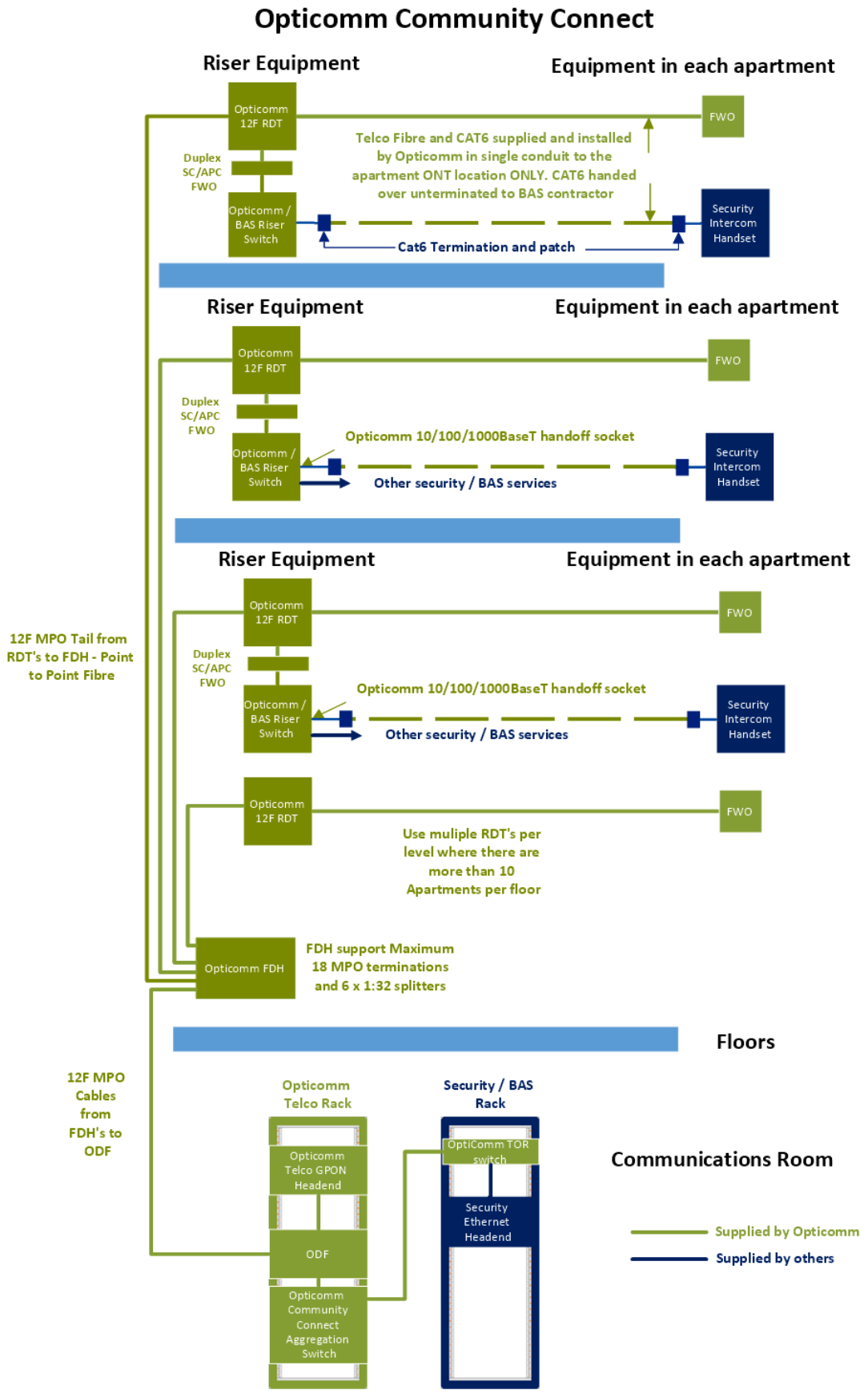


9.2 Community Connect concept

The following diagram summarises the topology of the Opticomm Community Connect Product. In essence the Community Connect Product utilises the Opticomm Telecommunications fibre network to transport Optical traffic from the BAS equipment supplied and installed by Opticomm. At each location where the BAS equipment is installed by Opticomm a single mode dark fibre transports data back to the BAS core provided by Opticomm Equipment Room. The BAS services are handed off at the equipment room by a “Top of Rack Switch” supplied and installed by Opticomm in the BAS rack.

Additionally, Opticomm install an unterminated Cat6 cable between the riser and the apartment for use by the security contractor to support in room services such as security and intercom. The security contractor is responsible to terminate the cable at the riser and apartment end.

Figure 16 - Opticomm Community Connect Topology



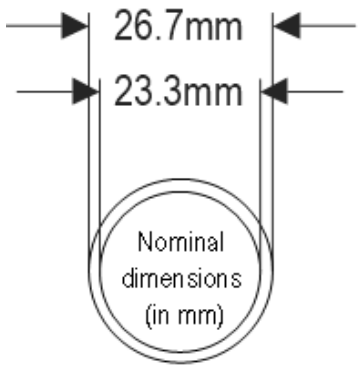
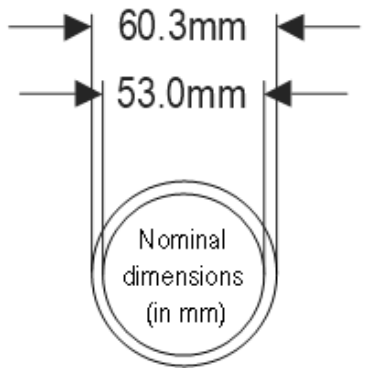
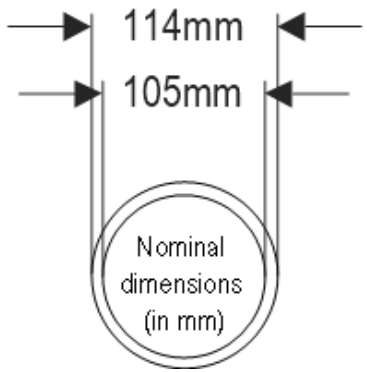
10 Appendices

10.1 Appendix A – General Roles and responsibilities

Telcommunications Network

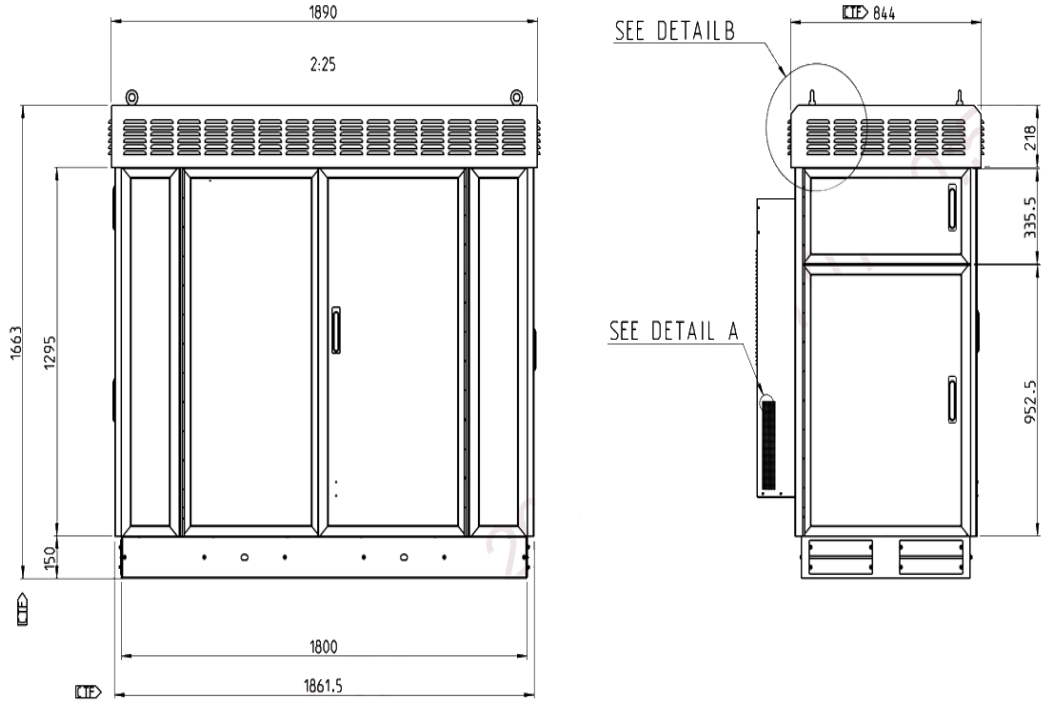
Line Item	Role	Component	Applies to:	Specify	Supply	Install	Commission	Test	Sign Off
1	Backhaul Provider	Backhaul connectivity to Site	Premium, Essentials	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
2	Backhaul Connection	Optical Fibre interlink from external Splice Point to MDF room	Premium, Essentials	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
3	Backhaul Containment	Pit and Pipe connection from MDF room to Property Boundary	Premium, Essentials	Opticomm	Builder/Developer	Builder/Developer	Builder/Developer	Builder/Developer	Opticomm
4	Equipment Room	Suitable Air-Conditioned MDF Room with Single Phase Power	Premium, Essentials	Builder/Developer	Builder/Developer	Builder/Developer	Builder/Developer	Builder/Developer	Opticomm
5	Headworks	Install Headworks Active Equipment	Premium, Essentials	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
6	Cable Pathways	Min. 23mm I/D Conduit from ONT location in Apartment to Comm. Riser cupboard per floor with draw string. Cable tray in comm. riser cupboard. Fire Sealing and Certification	Premium, Essentials	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Opticomm
7	Passive Optical Network	Fibre connection from each floor to basement	Premium, Essentials	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
8	Passive Optical Network	Fibre connection from Apartment to comm. riser	Premium, Essentials	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
9	Customer Equipment	Supply and install Optical Network Terminal	Premium, Essentials	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
10	In Apartment Cabling	Apartment copper cabling, TV - Phone/ Internet - Data from ONT location to wall outlet. Plus termination of cables onto 4 gang wall plate at ONT location and patch leads into ONT.	Premium, Essentials	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Opticomm
11	In Apartment Cabling	Double GPO outlet at ONT location in apartment for ONT	Premium, Essentials	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Opticomm
13	Documentation	Customer hand-over documentation	Premium, Essentials, Smart Trunk, Community Connect	Builder/Developer & Opticomm	Builder/Developer & Opticomm	Builder/Developer & Opticomm	Builder/Developer & Opticomm	Builder/Developer & Opticomm	Builder/Developer& Opticomm
Community Connect/Smart Trunk									
14	BAS	Supply and Install riser switch including Rack	Community Connect	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
15	BAS	Network Integration to 3rd Party Systems	Community Connect	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
16	BAS	System Integration to Opticomm supplied and installed building systems	Community Connect	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm
17	BAS	System Integration to 3rd Party supplied and installed building systems	Community Connect	Developer/BAS Contractor	Developer/BAS Contractor	Developer/BAS Contractor	Developer/BAS Contractor	Developer/BAS Contractor	Opticomm
18	BAS	Supply and install an unterminated Cat6 cable from Riser to Apartment	Community Connect, Smart Trunk	Opticomm	Opticomm	Opticomm	Developer/ Electrical Contractor	Developer/ Electrical Contractor	Developer/ Electrical Contractor
19	BAS	Supply and install aa Duplex SM Fibre connection from each floor to basement	Community Connect, Smart Trunk	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm	Opticomm

10.2 Appendix B – Conduit sizes

P20	P50	Conduit P100
		

10.3 Appendix C – External Cabinet Option

Alternatively, where previously agreed and a comms room is not available a Roadside cabinet may be deployed. The cabinet may be mounted external to the building or in a carpark. This option incurs extra expenses to be agreed at the time of signing of the Telecommunications Agreement.



10.4 Appendix D - Minimum Separation Requirements

The below diagrams and tables are extracted from AS/CA S009:2013 Installation requirements for customer cabling (Wiring Rules)

Telecommunications cabling — minimum separation requirements from other services in or on a building (informative)

Telecommunications		Electricity								Oxygen or flammable gas				Water or waste [9]				Heating oil, steam or compressed air		
		ELV		LV		HV														
		Cable	Connection	Cable	Connection	Cable		Connection [4]		Pipe	Connection	Meter	Cylinder	Pipe	Connection	Meter	Pump/ Cistern	Pipe	Connection	Pump/ Tank
						MC [5]	SC [5]	MC [5]	SC [5]											
Metallic cable	Unenclosed	0		50 [2]	150 [3]	300 [6]		450		150 [7]	150			50		150		150 [7]	150	
	In conduit	0		0	150 [3]	150		450		150 [7]	150			0		150		150 [7]	150	
	Connection, TO or joint	0	150 [3]	50 [2]	150 [3]	450				150	Outside hazardous area [8]			150				150		
Optical fibre cable [1]	Unenclosed	0		0	150 [3]	0		450		150 [7]	150			50		150		150 [7]	150	
	In conduit	0		0	150 [3]	0		450		150 [7]	150			0		150		150 [7]	150	
	Connection or splice	0	150 [3]	0	150 [3]	0		450		150	Outside hazardous area [8]			150				150		

Note 1: If the optical fibre cable contains any electrically conductive elements (e.g. a metallic strengthener or tracer), it is to be treated as a metallic cable (i.e. a cable with electrically conductive elements).

Note 2: If the cables are separated by a barrier of durable insulating material or metal (including enclosure in conduit), no further separation is required unless the cables are within 50 mm of any securing face of building framework.

Note 3: Accidental contact with ELV or LV connections by a telecommunications worker is to be prevented by effective means (e.g. a shield, shroud or suitable distance). In addition, the telecommunications and ELV/LV connections are to be separated by at least 150 mm unless they are separated by a permanent, rigidly fixed barrier of durable insulating material or earthed metal, in which case no further separation is required.

Note 4: The installation of conductors or terminations in the same enclosure as any HV conductor or terminations is not permitted.

Note 5: MC = Multi-Core SC = Single Core

Note 6: Only 150 mm is required if the cables are separated by a permanent, rigidly fixed barrier of durable insulating material or earthed metal as long as at least 175 mm is maintained between the cables around the barrier.

Note 7: Separation by a suitable barrier or heat insulation, as appropriate, is acceptable at crossings, within wall cavities or within shared trunking

Note 8: Connection devices, telecommunications outlets, joints or splices are not to be installed within a hazardous area unless they are selected and installed in accordance with Clause 7.1.3.7.

Note 9: These are the recommended minimum separation distances to ensure compliance with Clause 9.2.1 and to provide adequate clearance to install or access the telecommunications cabling.

Note 10: All dimensions given are in millimeters (mm).