A Uniti Group Company

Ethernet Product Specification Guide

OPTICOMM Networks

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Disclaimer

The information in this document is provided for general information purposes only. Recipients must make their own inquiries as to the accuracy and completeness of information contained in this document. Opticomm may update this document from time to time.

Change History

Version	Description	Effective date
1.0	First release	20 June 2022

Changes in the Revision

The detailed changes to this document, from Version 1.0 to Version ___ are outlined in the table below.

Section / Sub-section	Detailed Changes
N/A	N/A

Related Documents and Defined Terms:

This document forms part of the ***RSPMA*** and is, for the purposes of the ***RSPMA***, a 'Service Schedule.' Capitalised terms which are used but not defined in this document have the same meaning given to them in the ***RSPMA***.

This document will reference the following Opticomm documents:

- Product Technical Specification
- Operations Manual
- RSPMA
- Service Level Agreement
- Wholesale Price List

References will be in bold and italicised (for example, ***Product Technical Specification***) and refer to the most recently published version of each document by Opticomm (as available at www.opticomm.com.au/legal).

Precedence: The ***RSPMA*** and the ***Wholesale Price List*** have precedence over the contents of this document. In the event of any discrepancies, those documents have precedence and should be referenced.

1.0 Introduction

The **Opticomm Ethernet portfolio** comprises Layer 2 wholesale ethernet Services used to provide services to residential, business, government, and other organisations, and consists of:

- Ethernet bitstream services with bundled CVC inclusions (for Residential End-users) (each, an **Ethernet Bitstream Service**); and

- Metro Ethernet Access for Business Grade Services (for commercial purposes i.e. non-Residential End-users) (**Metro Ethernet Access Service**).

2.0 Product Overview

The Opticomm Ethernet portfolio is used to provide a virtual connection between an End-user's premises to a POI located in each mainland state within Australia. End-user premises connected to the Opticomm Network within the territories of the Northern Territory and the Australian Capital Territory are serviced by backhaul links with South Australia (Adelaide) and New South Wales (Sydney), respectively.

The Opticomm Network is formed by a combination of access networks across Australia (including fibre and hybrid fibre technologies such as FTTP, FTTR, FTTB and HFC) (a full description of these access types can be found in ***Product Technical Specification***). The Opticomm Ethernet portfolio products allow RSPs to overlay carriage services, such as Layer 3 IP internet connectivity, to End-users.

The components of the Opticomm Ethernet portfolio are described in the table below and may vary depending on the actual Service purchased.

Type	Description	Availability on Opticomm Network
Product Components (required)	Product Type, NNI, CVC, AVC, UNI CIR, PIR, CoS Type; SLA level, State Based Data Centre Aggregation.	FTTP, HFC, FTTB, FTTR
Product Features (optional)	QinQ Tagging Configuration; Double/Single Tag; CoS Configuration; NNI Link Type	FTTP, HFC, FTTB, FTTR

Table 1: Product Component and Feature Table

Full details of inclusions in Services are published in the ***Wholesale Price List***.

2.1 Product Codes

Each Opticomm Ethernet Portfolio product element with a specific commercial component will have a product code. These codes define the type of billable product entity within Opticomm's ordering and billing systems. Not all product features and product components are billable as separate items. Product codes are critical in the ordering process, particularly when interfacing with APIs required for digital interactions with Opticomm systems.

3.0 Compulsory Product Components

The following services are required for all of the Opticomm Ethernet portfolio products and are pre-requisites for connection to, and access by, an RSP to the Opticomm network. Without these items in place, an RSP will not be able to order or receive services from the Opticomm Network, and will not be an active RSP on the Opticomm Network.

3.1 Network to Network Interface (NNI)

An NNI is required to pass traffic between the Opticomm network and an RSP's network.

The NNI is the handover point of all CVCs configured to pass traffic and is required to be configured with a physical bearer which interfaces between the Opticomm switch and the RSP's switches.

There are two types of NNI a physical NNI and Virtual NNI (**VXC**). Within Opticomm's systems, an NNI is also known as an ONI (Opticomm Network Interface).

3.1.1 Physical NNI

Physical NNIs are direct interfaces into the Opticomm Network at locations across Australia. These locations are state based and currently located at the following*:

NNI Location	Site Code	State	NNI Location Address
Global Switch	HAIS	NSW (inc. ACT)	Ground Floor, 390 - 422 Harris St, Ultimo, NSW 2007
Next DC S2	DCS2	NSW (inc. ACT)	Ground Floor, 6/8 Giffnock Ave, Macquarie Park, NSW 2113
Next DC M1	DCM1	VIC	Floor 1, 826 - 838 Lorimer Street, Port Melbourne, VIC 3207
Next DC M2	DCM2	VIC	Floor 1A, 75 Sharps Rd, Tullamarine, VIC 3043
Next DC B1	WHRF	QLD	Ground Floor, 20 Wharf Street, Brisbane, QLD 4000
Next DC B2	DCB2	QLD	Floor 3, 454 St Pauls Terrace, Fortitude Valley, QLD 4006
Your DC	BLIR	SA	Ground Floor, 60 Belair Rd, Hawthorn, SA 5062
Colo City D3	CDC2	SA	Floor 1, 172 Morphett St, Adelaide, SA 5000
Next DC P1	MLRS	WA	Ground Floor, 4 Millrose Dr, Malaga, WA 6090
Next DC P2	DCP2	WA	Ground Floor, 12 Newcastle St, Perth, WA 6000

** note: locations subject to change from time to time, on notice from Opticomm*

Table 2: Locations of NNI connection

The RSP equipment does not need to be collocated in the data center per state, however if the RSP equipment does not reside within the same data center, the RSP will need to make sure that the specific interface selected is capable of transmitting data reliably via interconnect (through the Opticomm Interconnect Port selected by the RSP) into the data centers.

Charging for each interconnect port is on a per port basis and has both a non-recurring charge and monthly recurring charge component. RSP is responsible for cross connects and/or transmission between the switches. Any interconnect ports that are over 100G and/or more than 10km in separation will be priced on application. Interconnect port pricing is published in the ***Wholesale Price List***.

3.1.2 Redundancy of NNIs

Redundancy of interconnect ports (**redundancy groups**) can be configured within NNIs to allow for multiple connections at a single POI. These multiple interfaces can be bundled together and will be charged on a per port basis as individual interconnect ports.

The following number of NNI interfaces are permitted based on the physical interface to an NNI. The bundling of these redundancy groups will need to use the Link Aggregation Control Protocol (**LACP**). For further information related to this, refer to Section 4.2.2 of the ***Product Technical Specification***.

Port Interface and Bandwidth	NNI Interfaces (number of interconnect ports permitted)
1Gpbs	8
10Gbps	8
40Gpbs	1
100Gbps	1

Table 3: NNI Redundance Groups supported.

All NNI interconnect ports must have the same configuration. For instance, a 10Gbps and a 1Gbps interconnect port cannot be contained in the same redundancy group.

A redundancy group can be applied as single Opticomm chassis or dual Opticomm chassis located at the NNI. Dual Opticomm chassis redundancy groups must reside in the same state.

The RSP is responsible for defining the technical parameters and operation and sequencing of priority on links within the redundancy group. This will need to be done in consultation with Opticomm during provisioning of the NNI.

3.2 Virtual NNI (VXC)

As well as physical interconnect ports to the Opticomm NNI's, a virtual interconnect port to the Opticomm NNI's are also available via Megaport. This allows an RSP to connect into a Megaport enabled data center and then use the facilities of the VXC made available by Megaport.

RSP's are permitted to interface with the Opticomm NNI's via both VXC and interconnect ports. Redundancy groups are, however, only possible via interconnect ports.

Product Code	**Interface Port**	**Maximum Bandwidth**
OPMEGA	Virtual	Up to 2000Mbps

Table 4: Virtual NNI Construct

RSP's will need to order their VXC via the Megaport portal and pay Megaport directly for this VXC. Opticomm is not responsible for any service ordered by an RSP from Megaport (which includes the VXC). RSP must notify Opticomm of the VXC, via the above produce code, as Opticomm will charge a setup fee to the RSP.

For further details on the VXC, refer to Section 4.2.3 of the ***Product Technical Specification***.

3.3 Connection Virtual Circuit (CVC)

A connectivity virtual circuit (**CVC**) is ethernet Layer 2 based capacity that connects on an aggregated basis between the RSP's NNI and the Opticomm NNI. It is used to connect multiple access virtual circuits (**AVCs**) into the aggregated NNI.

The CVC on the Opticomm Network is currently used to carry TC-1 and TC-4 based traffic (and may include TC-2 based traffic in the future, see Section 4.3 below).

The aggregation of each traffic class is used as a measurement of the total bandwidth of the CVC and this is measured in megabits per second. The CVC operates on each ethernet

bitstream service and does not include components for any Metro Ethernet Access Service which is described in Section 7.

CVCs can be ordered in increments of 50Mbps up to 500Mbps and then increments of 100Mbps up to 10Gbps.

4.0 Traffic Class Descriptions

Currently the Opticomm Network supports two traffic class types, TC-1 and TC-4. The technical details of these traffic classes are described in more detail in the ***Product Technical Specification***.

4.1 Traffic Class 1 (TC-1)

TC-1 is intended for low latency, low jitter traffic such as interactive video and voice services. It is provided at 150kbps as standard when ordered as part of the Ethernet Bitstream Services listed in the ***Wholesale Pricebook***.

TC-1 traffic is prioritised over other traffic in the Opticomm Network. This is achieved by the RSP tagging traffic on End-user equipment using class of service (DSCP) marking. Detailed information about the handling of TC-1 traffic can be found in ***Product Technical Specification***.

Additional TC-1 AVC capacity (above the standard included 150kbps) is not available for order.

4.2 Traffic Class 4 (TC-4)

TC-4 is intended for basic data transfer. It is not preferred in the Opticomm Network and is considered the default traffic class.

4.3 Future AVC Class Roadmap

Opticomm are exploring specific class configurations that are not yet available for service but will, if made available, be provided in specific bandwidth levels and follow the below bandwidth configurations:

Symmetrical TC-1 AVC Bandwidth Increments Mbps	Symmetrical TC-2 AVC Bandwidth Increments Mbps	Supported Networks
5	5	FTTP, FTTR
10	10	
20	20	
30	30	
40	40	
50	50	
100	100	

Table 5: Future Bandwidth Increment options for TC-1 and TC-2 Services

4.4 State Based Data Centre Aggregation

State Data Centre Aggregation is a billable component attached to each Service in the Opticomm Ethernet portfolio and relates to pricing for backhaul from the AVC into the POI located at the aggregation data center (refer Table 2 in Section 3.1.1).

Product Code	Description	Applicability
SDCAG	State Data Centre Aggregation charge	Per AVC Service

Table 6: State Based Data Centre Aggregation

The details of the actual charge for this billable component is located in the ***Wholesale Price List.***

5.0 Ethernet Bit Stream Services (EB Services)

5.1 Access Virtual Circuits (AVC)

An AVC is an ethernet-based Layer 2 virtual connection to the Opticomm Network

An AVC is required for each premises on the Opticomm Network that an Ethernet Bitstream Service will be supplied to for an End-user.

The AVC is equipped as standard with TC-4 traffic and uses a single VLAN tag as default.

The AVC terminates on an NTD in the case of FTTP and/or FTTR sections of the Opticomm Network. In the case of an FTTB connected premises, the AVC terminates on the RSP provided customer equipment (i.e. modem) within the End-users premises. Further details on the technical specifications of the AVC are available in the ***Product Technical Specification***.

The AVC is delivered as variable component of a Layer 2 Ethernet Bitstream Service which is contended, and the quoted bandwidth is the Peak Information Rate (**PIR**). PIR are the maximum bandwidth in megabits per second (defined as both upload and download rates) per ordered AVC. The ordered bandwidth will vary from time to time. The amount of PIR assigned to bandwidth levels for an Ethernet Bitstream Service is shown in Table 7.

It is possible to also order TC-1 AVC for an Ethernet Bitstream Service. Ordering TC-1 AVC is optional and has been fixed at a PIR of 150kbps. Multiple TC-1 AVC's for the same Ethernet Bitstream Service cannot be ordered. TC-1 AVC must be ordered at the same time as TC-4 AVC bandwidth for an Ethernet Bitstream Service.

TC-1 AVC can be ordered via the relevant fields set out in the RSP Portal or API. The intention of this optional TC-1 AVC (150kbps) in Ethernet Bitstream Services is to provide a channel for voice which the RSP may elect to provide a gateway and specific equipment for to the End-user. Information about the ordering of TC-1 AVC for Ethernet Bitstream Services can be found in the ***Operations Manual***.

The AVC TC-4 and optional TC-1 AVC bandwidth profiles are described below:

AVC TC-4 - Peak Information Rate - downstream bandwidth (Mbps)	AVC TC-4 - Peak Information Rate - upstream bandwidth (Mbps)	TC-1 AVC (Optional) - Peak Information Rate - downstream and upstream (Kbps)
12	1	
25	5	

50	20	150 kbps
100	20	
100	40	
250	25	
250	100	
500	200	
1000	50	
1000	400	
2000	100	
4000	200	

Table 7: AVC Bandwidth Options for Ethernet Bitstream Services

The availability of TC-1 AVC bandwidth and TC-4 AVC bandwidth profiles listed above are location dependent, and not available for all premises in the Opticomm Network. RSP's must perform Service Qualification (SQ) before ordering a Service to ensure these components are available for the particular premise for which the Service is intended. Services greater than 1Gbps will require an additional detailed assessment of the backhaul capacity and electronics. This assessment will verify if the infrastructure at the site is sufficient to support these services.

5.2 Bundled CVC Construct

The bundled CVC construct makes allowances for included AVC bandwidth per Ethernet Bitstream Service, referred to as 'inclusions'. These inclusions are used in the calculation of Overage as discussed in Section 5.3.

Table 8 below describes the Service constructs and CVC inclusions for TC4.

Product Code	**Product Description**	**AVC TC-4 downstream bandwidth Mbps (PIR)**	**AVC TC-4 upstream bandwidth Mbps (PIR)**	**CVC TC-4 Inclusions (Mbps)**
EBS-V	Opti-Bundle-ELB	12	1	0.15
EBS12	Opt-Bundle Home-12	12	1	1.00
EBS25	Opt-Bundle Home-25	25	5	1.6
EBS50	Opt-Bundle Home-50	50	20	2.65
EBS100-20	Opti-Bundle Home-100/20	100	20	4.5
EBS100	Opti-Bundle Home-100	100	40	4.5
EBS250-25	Opti-Bundle Home-250/25	250	25	5.75
EBS250	Opti-Bundle Home-250	250	100	5.75
EBS500	Opti-Bundle Home-500	500	200	6.25
EBS1000-50	Opti-Bundle Home-1000/50	1000	50	7.00
EBS1000	Opti-Bundle Home-1000	1000	400	7.00
EBS2000	Opti-Bundle 2000/100	2000	100	12.0
EBS4000	Opti-Bundle 4000/100	4000	200	18.0

Table 8: Ethernet Bitstream Services – Bundled AVC + CVC inclusions

The above CVC inclusions are correct at the time of publication, but should these differ from the ***Wholesale Price List*** then the ***Wholesale Price List*** will take precedence.

5.3 Overage Charges & Ordering

An RSP can order increases or decreases in CVC bandwidth to cater for traffic demand from End-users. It is the responsibility of the RSP to monitor their CVC bandwidth to meet the requirements of their End-users. CVC increases are purchased in addition to the aggregate of the CVC inclusions provided with the RSP's ordered Ethernet Bitstream Services.

The difference between the aggregate bandwidth of the CVC inclusions for eligible Ethernet Bitstream Services (referred to in Table 8) and any further ordered increased CVC bandwidth is referred to as "Overage".

The rate charged for Overage is quoted as a per month rate but applied daily. To do this the monthly rate is divided by the number of days in the relevant calendar month.

RSP's can order TC-4 CVC or TC-1 CVC capacity manually via the 'Ethernet Bitstream – Bundled CVC Order Form' (which is available within the ***Wholesale Price List***) or via the new Opticomm portal (May 2022 release) or relevant API Bandwidth can be increased or decreased by an RSP, through the same ordering process. Order form requests (upgrades or downgrades) will be acted upon as quickly as possible by Opticomm, while requests submitted via the RSP Portal or new API (May 2022 release) will be made in near-real time.

Billing for the service and calculation of Overage is based on the largest ordered AVC bandwidth for the day and configuration measured within the Overage Window:

The **Overage Window** is between 7.00pm (AEST) and 11.59pm (AEST) on that day including weekends and public holiday

The Overage Window is used to determine the largest provisioned TC-4 CVC for a particular calendar day, which is relevant to the determination of what (if any) Overage is payable by the RSP for that same calendar day.

Minimum TC4 CVC Inclusions

For each OSA which an RSP connects to, Opticomm will provide a minimum inclusion of TC-4 bandwidth of 1.1Gbps. RSPs may purchase additional bandwidth in the form of TC-4 CVC capacity beyond this default TC-4 bandwidth allowance. This allowance will be included in the CVC overage calculations until the sum of Service plan inclusions (being the aggregate of the TC-4 CVC inclusions for Services ordered by the RSP – as listed in the above Table 8) on that CVC exceeds 1.1Gbps.

Calculation of Overage

The calculation of Overage includes three components:

A. TC-4 CVC inclusions (within an OSA) as part of the Ethernet Bitstream Service bundled plans;
B. TC-4 CVC minimum allowance inclusion of 1.1Gbps within the same OSA; and
C. TC-4 CVC highest provisioned bandwidth within the same OSA during the Overage Window.

TC-4 CVC Overage will be calculated as the difference between the highest provisioned TC-4 CVC capacity during the Overage Window (Item C above) at an OSA and the greater of:

- the calculated daily entitlement (being the aggregate of the TC-4 CVC inclusions for the Ethernet Bitstream Services ordered by the RSP (as listed in the ***Wholesale Price List***) within that same OSA (*Item A above*)

  OR

- the OSA minimum allowance of 1.1Gbps (*Item B above*).

Overage is calculated at the OSA level. Overage will be charged at the TC-4 CVC Overage Rate listed in the ***Wholesale Price List***.

The formula for this calculation is:

Overage (in Mbps) =	***(aggregated TC-4 CVC bandwidth provisioned on each CVC within an OSA) – MAX (greater of (A) aggregated TC-4 CVC inclusions for Services within that OSA, and (B) TC-4 1.1 Gbps minimum inclusion within that OSA)***

Overage is calculated daily and charged at the rate set-out in the ***Wholesale Price List***. Opticomm will invoice Overage to the RSP monthly.

Example 1:

An RSP has customers located in the OSA for Victoria. In respect on the above three components for TC-4 Overage: the RSP has aggregated TC-4 CVC inclusions of 5200 Mbps (Item A) (based on the RSP's ordered services being ~866 x EBS250). RSP has one TC-4 CVC connected in Victoria. The TC-4 CVC has been provisioned at 5200Mbps, and there has been no changes to the order TC-4 CVC during this day. The Overage Window for the relevant day identifies a maximum provisioned bandwidth of 5200Mbps (Item C). Like all OSA there is a minimum inclusion of 1100Mbs (Item B).

The Overage will then be calculated as:

Overage (Mbps) = (5200Mbps) – MAX (5200Mbps OR 1100Mbps)

Overage = 5200Mbps – MAX (5200Mbps OR 1100Mbps)

Overage = 5200Mbps – 5200Mbps = ***0Mbps***

In this scenario, no Overage is payable on this particular calendar day.

Example 2:

An RSP has customers located in the OSA for Queensland. In respect on the above three components for TC-4 Overage: the RSP has aggregated TC-4 CVC inclusions of 5000 Mbps (Item A) (based on the RSP's ordered services being ~1819 x EBS50). RSP has two TC-4 CVC's connected in Queensland. The first CVC has been provisioned as 3000Mbps and the second at 2200Mbps, and there have been no changes to the order TC4 CVC during this day. The Overage Window for the relevant day identifies a maximum provisioned bandwidth of 5200Mbps (Item C). Like all OSA there is a minimum inclusion of 1100Mbs (Item B).

The Overage will then be calculated as:

Overage (Mbps) = (3000Mbps + 2200Mbps) – MAX (5000Mbps OR 1100MBPS)

Overage = 5200Mbps – MAX (5000Mbps OR 1100Mbps)

Overage = 5200Mbps – 5000Mbps = ***200Mbps***

In this scenario, 200Mbps of Overage is payable on this particular calendar day.

Example 3:

An RSP has customers located in the OSA for NSW. In respect on the above three components for TC-4 Overage: the RSP has aggregated TC-4 CVC inclusions of 500 Mbps (Item A) (based on the RSP's ordered services being ~182 EBS50Mbps). RSP has one TC-4 CVC connected in NSW. The TC4 CVC has been provisioned as 3000Mbps and there have been no changes to the order TC-4 CVC during this day. The Overage Window for the relevant day identifies a maximum provisioned bandwidth of 5200Mbps (Item C). Like all OSA there is a minimum inclusion of 1100Mbs (Item B).

The Overage will then be calculated as:

Overage (Mbps) = (3000Mbps) – MAX (500Mbps OR 1100Mbps)

Overage = 3000Mbps – MAX (500Mbps OR 1100Mbps)

Overage = 3000Mbps – 1100Mbps

Overage = ***1900 Mbps***

In this scenario, 1900Mpbs of Overage is payable on this particular calendar day.

Example 4:

An RSP has customers located in the OSA for Queensland. In respect on the above three components for TC-4 Overage: the RSP has aggregated TC-4 CVC inclusions of 5000 Mbps (Item A) (based on the RSP's ordered services being ~1820 EBS50Mbps). RSP has two TC-4 CVC's connected in Queensland. At the start of the day the first TC-4 CVC has been ordered as 3000Mbps and the second at 1200Mbps. RSP decides to adjust the bandwidth at 10am that morning to make the bandwidth 4000Mbps and 3000Mbps, respectively, on the two TC-4 CVC's. RSP then leaves this adjustment for the rest of the day. The Overage Window for the relevant day identifies a maximum provisioned bandwidth of 7000Mbps (Item C). Like all OSA there is a minimum TC4 inclusion of 1100Mbs (Item B).

The Overage will then be calculated as:

Overage (Mbps) = (Sum of Ordered CVC in OSA) – MAX (TC4 Inclusions and minimum inclusions)

Overage (Mbps) = (4000Mbps + 3000Mbps) – MAX (5000Mbps OR 1100MBPS)

Overage = 7000Mbps – MAX (5000Mbps OR 1100Mbps)

Overage = 7000Mbps – 5000 Mbps = ***2000Mbps***

In this scenario, 2000Mpbs of Overage is payable on this particular calendar day.

Example 5:

An RSP has customers located in the OSA for Queensland. In respect on the above three components for TC-4 Overage: the RSP has aggregated inclusions of 2000 Mbps (Item A) ((based on the RSP's ordered services being ~727 EBS50Mbps). RSP has two TC-4 CVC's connected in Queensland. At the start of the day the first TC4 CVC has been ordered as 4000Mbps and the second at 3000Mbps. RSP decides to adjust the bandwidth at 4pm that afternoon to make the bandwidth 1200Mbps and 2000Mbps, respectively, on the two TC4 CVC's. RSP then leaves this adjustment for the rest of the day. The Overage Window for the relevant day identifies a maximum provisioned bandwidth of 3200Mbps (Item C). Like all OSA there is a minimum TC4 inclusion of 1100Mbs (Item B).

The Overage will then be calculated as:

Overage (Mbps) = (Sum of Ordered CVC in OSA) – MAX (TC4 Inclusions and minimum inclusions)

Overage (Mbps) = (2000Mbps + 1200Mbps) – MAX (4000Mbps OR 1100MBPS)

Overage = 3200Mbps – MAX (2000Mbps OR 1100Mbps)

Overage = 3200Mbps – 2000Mbps = ***1200Mbps***

In this scenario, 1200Mpbs of Overage is payable on this particular calendar day.

CVC for TC-1 AVC Services

If an RSP elects to use the optional TC-1 AVC component within Ethernet Bitstream Services, they will need to also order TC-1 CVC bandwidth to support those Services.

TC-1 CVC and TC-4 CVC Overage Charging Construct

Product Code	**Description**	**Charge**
Overage TC4	Overage charged for CVCs in excess of CVC Inclusions in eligible Ethernet Bitstream Services (refer Table 8)	$ per Mbps per day (divided by days in the calendar month)*
Product Code	**Description**	**Charge**
TC1 CVC Usage	Overage charged for CVCs in excess of CVC Inclusions in eligible EB Services of 150kbps	$ per Mbps per day (divided by days in the calendar month)*

** refer **Wholesale Price List** for applicable pricing rates*

Table 9: Overage & TC1 Charging Construct

6.0 User Network Interface (UNI)

The UNI is the physical port or connector that Opticomm supplies to the RSP to connect the RSP's gateway or terminating equipment (such as modem and/or router) in the End-user premises.

Opticomm will supply to the RSP's End-user premises the following types of UNI to support various Opticomm Network types.

Network Type	**Premise Type**	**UNI Type**	**Port Option**	**Location of interface**	**Operational Network Boundary**
FTTP	SDU or MDU	GPON ONT	Single or Multiport	End-user Premises	Outbound port of NTD
HFC	SDU or MDU	Cable Modem	Single Port	End-user Premises	Outbound port of NTD
FTTR	MDU	Not Applicable	Single Port	Within Apartment or residence	Electrical Interface Cat5/6 Wall Plate
FTTB	MDU	Not Applicable	Single Port	Within Apartment or residence	Electrical Interface Cat5/6 Wall Plate - VDSL

Table 10: Description of the UNI

Section 5 of the ***Product Technical Specification*** outlines the requirements for network termination in further detail.

In the case of FTTP, the selection of single or multiport NTD will depend on the specifics of the premise and the likelihood that additional ethernet services required at the premises. This decision is made at the time of provisioning by the Opticomm engineering team.

7.0 Metro Ethernet Access Services

The Metro Ethernet Access Services are Layer 2 business grade symmetrical fibre services. They provide dedicated Committed Information Rate access and are intended as a Layer 2 access mechanism for dedicated internet, point to point ethernet services or access into Layer 3 networks (like Wide Area Networks).

For Metro Ethernet Access Services, backhaul has been configured and managed to be a 1:1 contention ratio. The Metro Ethernet Access Services provide access from 1Mbps up to 1Gpbs (depending on the selected Metro Ethernet Access Services).

Refer to the ***Wholesale Price List*** for backhaul zones attributable to Metro Ethernet Access Services.

7.1 Pricing Construct for Metro Ethernet Access Services

Metro Ethernet Access Services have the following configurations:

	Non-Recurring Costs	**Recurring Costs**	
Service Charge Element	Connection Fee* (once off)	Access Price* (monthly)	Backhaul Charge* (monthly)
Pricing Attribute	Term: 12, 24, 36 months with longer terms having different connection fees.	Bandwidth & Term	Bandwidth and Region – Metro (inner/outer) and Regional

** Refer **Wholesale Price List** for applicable pricing*

Table 11: Product Attributes of Metro Ethernet Access Services

Metro Ethernet Access Services have an Access Price with additional Backhaul Charges based on the location of the Service being either: Inner Metro, Outer Metro or Regional (refer Table 12). It should be noted that the Ethernet Protocol may limit the available speed due to inherent overheads including protocol headers. The CIR rate stated for the relevant Metro Ethernet Access Services (refer ***Wholesale Price List)*** above does not take into considerations these bandwidth limitations.

Charging Region Code	**Designation**	**Classification**
1	Inner Metro	Covers radial distance up to 10kms from Capital City GPO (e.g., Perth, Melbourne, Sydney, Brisbane, Adelaide)
2	Outer Metro	Covers radial distances between 10kms and approximately 50kms from Capital City GPO (e.g., Perth, Melbourne, Sydney, Brisbane, Adelaide)
3	Regional	Covers radial distances greater than 50kms from Capital City GPO (e.g., Perth, Melbourne, Sydney, Brisbane, Adelaide)

Table 12: Charging Designations for Metro Ethernet Access Services

Further information regarding the Connection Fee, including the applicable charge amount, can be found in the latest version of the ***Wholesale Price List***.

8.0 Service Fee Descriptions

8.1 Service Activation Fee

A Service Activation Fee is chargeable for the activation of each of the Ethernet Bitstream Service (including where an End-user changes their Service from the losing RSP to the gaining RSP).

Product Code	Description	Charge	Period
OPHAEB-CF	Service Activation Fee	$ per activation of an Ethernet Bitstream Service*	Once-off per Ethernet Bitstream Service activation (non-recurring)

** refer **Wholesale Price List** for applicable pricing*

Table 13: Service Activation Fee

The Service Activation Fee applies only to connection of the relevant Ethernet Bitstream Service and does not cover or apply to service changes in bandwidth or simple configuration changes. Further information regarding the Service Activation Fee can be found in the ***Wholesale Price List***.

8.2 Service Change Request

RSP's can submit requests for Opticomm to change particular elements in the Opticomm Network that can be configured remotely by Opticomm in the Opticomm Network (**Service Change Request**).

Product Code	Description	Charge	Period
OPHAEB-VF	Service Change Request	$ per request for service change*	Once off per service change

** refer **Wholesale Price List** for applicable pricing.*

Table 14: Service Change Request

8.3 Additional Connection Charges – NDC and NCC

In addition to the Service Activation Fee applicable to any Ethernet Bitstream Service, additional connection charges may apply based on the status of the premises which the Ethernet Bitstream Service has been ordered for.

The additional connection charges that may apply are the New Connection Charge (**NCC**) and New Development Charge (**NDC**). The NDC applies to Single Dwelling Units (**SDU**) while the NCC applies to Multi Dwelling Units (**MDU**).

These charges will be billed by Opticomm to the End-user or, where the RSP has elected to represent the End user, to the RSP. In this case the RSP is responsible for paying this charge to Opticomm and seeking repayment from its own End-user.

8.3.1 New Connection Charge (NCC)

A New Connection Charge will apply to SDU premises that have not been connected before, are located within an area that Opticomm are servicing, and require the physical installation of equipment to support the inaugural Service ordered for that premises. This charge covers the provision of infrastructure from the boundary of the property to the Opticomm Network (and may include where a truck role is required for NTD installation).

The NCC will be charged to:

1. the End-user at the dwelling where they have engaged directly with Opticomm; OR
2. the RSP, where the RSP has decided to represent the End-user in the connection of the Service (e.g. End-user is engaging with the RSP, who then engages with Opticomm).

The NCC applies to properties with a Service Class 2 in the Service Qualification (SQ) process. The Service Qualification (SQ) process will return the cost of the New Connection Charge for a specific address.

Product Code	Description	Charge	Period
NEWCON	Charge for inaugural connection of a Class 2 property in Service Qualification (SQ)	$ per dwelling*	Once off (non-recurring)

** refer **Wholesale Price List** for applicable pricing.*

Table 15: New Connection Charge

8.3.2 New Development Charge (NDC)

A new development charge (NDC) is levied when an MDU premises has had the NTD preinstalled by Opticomm but no inaugural service has been connected. The charge covers the accrued costs of installation and is levied on the inaugural service connection.

Product Code	Description	Charge	Period
NEWDEV	Charge for inaugural connection of a Class 5 property in Service Qualification (SQ)	$ per dwelling*	Once off (non-recurring)

** refer **Wholesale Price List** for applicable pricing.*

Table 16: New Development Charge

8.3.3 Supplementary Charges

Subsequent fees will apply for failed installations, customer non-attendance and re-attendance where the actions of the End-user (or RSP acting on behalf of the End-user) have impacted the ability of Opticomm to connect the premises.

These will be billed by Opticomm to the RSP and the RSP will be responsible for payment of the amounts to Opticomm. The RSP will be responsible for these seeking repayment of these costs from its End-user.

Product Code	Description	Charge	Period
Missed Appointment Fee (including reattendance)	Charge for missed appointment where the end user is not present or access is not possible during the schedule appointment window	$ per missed appointment*	Once off (non-recurring)

** refer **Wholesale Price List** for applicable pricing.*

Table 17: Missed Appointment Fee

8.4 Supplemental Work

As per Section 4.3 of the ***RSPMA,*** Supplemental Work includes, but is not limited to, trenching, ducting or cabling between the boundary of an End-user's property and the Service Delivery Point.

This Supplemental Work will be 'price on application' and will only commence once the scope and quoted costs have been approved by the RSP or if the end user has made arrangements directly with Opticomm.

9.0 Service Class Definitions

There are 5 service class definitions used within the Opticomm Network. These vary depending on the infrastructure available on site to deliver the Service.

Service Class	Service Class Description
1	The property is within Opticomm footprint, but currently not serviceable
2	The property is within Opticomm footprint, requires OTD (NTD) installation
3	The property is within Opticomm footprint, has OTD (NTD) installed and is ready for service
5	The property is within Opticomm footprint, has OTD (NTD) installed and is ready for service, first activation attracts NDC fee
12	The property is within Opticomm footprint, requires field visit

Table 18: Service Class Definitions

10.0 Service Levels

The Services and their respective service level categories and Service Levels are specified in the ***Service Level Agreement***.

11.0 Glossary of Terms

AVC means access virtual circuits.

CVC means connectivity virtual Circuit.

Ethernet Bitstream Service has the meaning given in Section 1 of this Ethernet Product Specification Guide. To avoid doubt, each Ethernet Bitstream Service is also a 'Service' under the ***RSPMA***.

FTTB means fibre-to-the-basement.

FTTP means fibre-to-the-premises.

HFC means hybrid fibre coaxial.

Kbps means kilobit per second.

LACP means Link Aggregation Control Protocol.

Metro Ethernet Access Service has the meaning given in Section 1 of this Ethernet Product Specification Guide. To avoid doubt, each Metro Ethernet Access Service is also a 'Service' under the ***RSPMA***.

Mbps means megabit per second. It is equivalent to 1,000,000 bits per second.

NCC means new connection charge.

NDC means new development charge.

NNI means network to network interface.

NTD means network termination device and in the case of an FTTP network is an ONT.

ONT means optical network termination device (also known as a 'network termination device' or NTD).

Overage Window has the meaning given in Section 5.3 of this Ethernet Product Specification Guide.

PIR means the peak information rate applicable to the relevant AVC ordered for a Service.

POI means point of interconnect.

RSPMA means the Opticomm RSP Master Agreement.

Service has the meaning given in the ***RSPMA***. To avoid doubt, each Ethernet Bitstream Service and Metro Ethernet Access Service will be a 'Service' under the ***RSPMA***.

Service Change Request has the meaning given in Section 8.2 of this Ethernet Product Specification Guide.

UNI means user network interface.

V-NNI means virtual NNI.