



Customer
Service

Service Description

Network Applications



Document Control

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1. Introduction

The purpose of this document is to explain how services are defined within the Network Applications TPA service tower, and then to define standard services using this framework. At this stage SD-WAN is the only service category defined in this new service tower, and SD-WAN as-a-Service is the only service type within this service category.

2. Service Tower Description – Network Applications

Network Applications provide additional and over-the-top services for network connectivity, enhancing one or more aspects of communication between sites. These services can utilise multiple types of underlying carriage in various configurations.

These services are expected to evolve as technology changes and the security and bandwidth demands related to Network Applications escalate, driven primarily by the continual move to public cloud and adoption of the Government’s Digital Strategy.

It is expected that individual services may be consumed from different Service Providers, and that services will be delivered in a modular fashion to facilitate that.

The services within this catalogue must meet the requirements for the respective Network Applications defined in the Requirements Schedule and comply with the Common Services Specification.

2.1 TPA Service Structure

All TPA Service Towers are composed of a four-level hierarchy; Service Tower, Service Category, Service Type and Service Instance. Each level in the hierarchy seeks to group services in a way that is intuitive to both the Customer and the Supplier. The final level of hierarchy, the Service Instance, describes the individual services that Customers will ultimately be purchasing from Suppliers and typically represents a price point. Figure 1 below illustrates the composition for a single Service Tower.

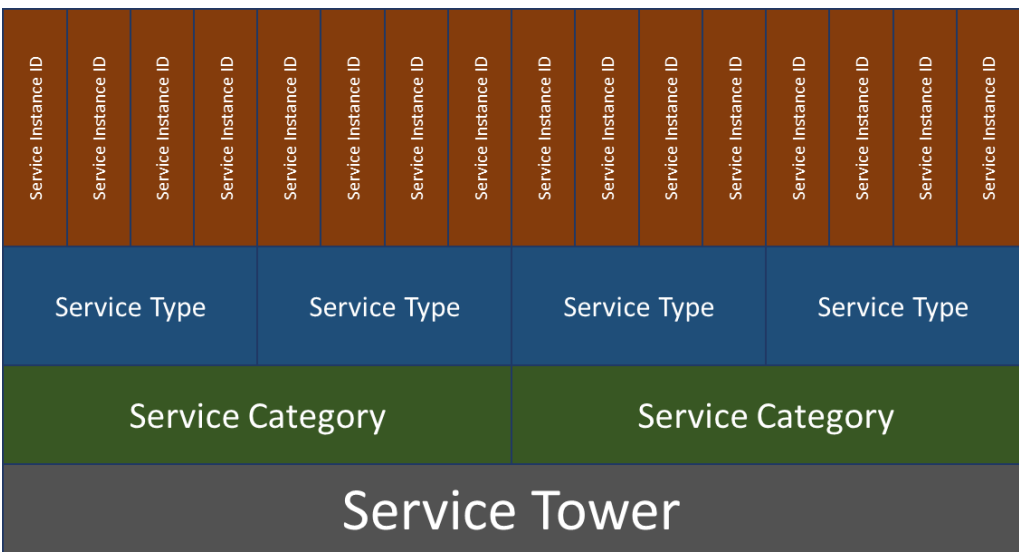


Figure 1 Service Tower Composition

Each layer of the hierarchy can be expressed as being made up of Modules, Components and Elements, as illustrated in Figure 2 below, which are referred to as Building Blocks. As each layer is comprised of the layers above, the lower layer Building Blocks can be considered supersets of the above layers Building Blocks. Another way of thinking of this is that you can define layers up the hierarchy by removing building blocks.

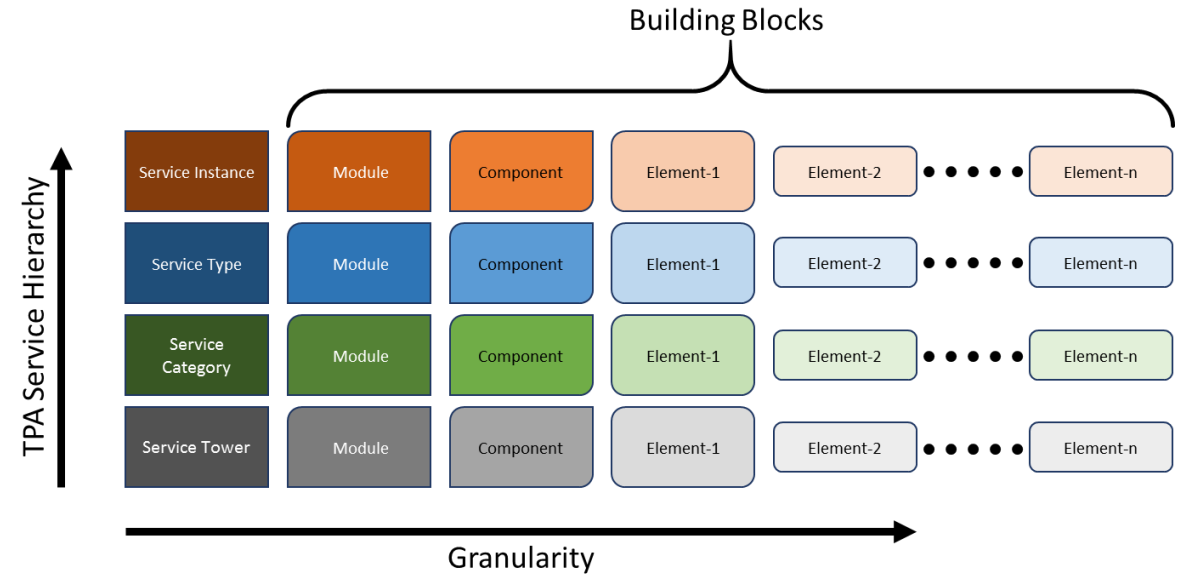


Figure 2 TPA Service Hierarchy and Granularity

By configuring permutations of the Building Blocks at each layer, different variations of Service Towers, Service Categories, Service Types and ultimately Service Instances can be defined.

Figure 3 shows examples of how each layer could vary by the configuration of Modules and Components. These examples may be extrapolated to include Elements as well.

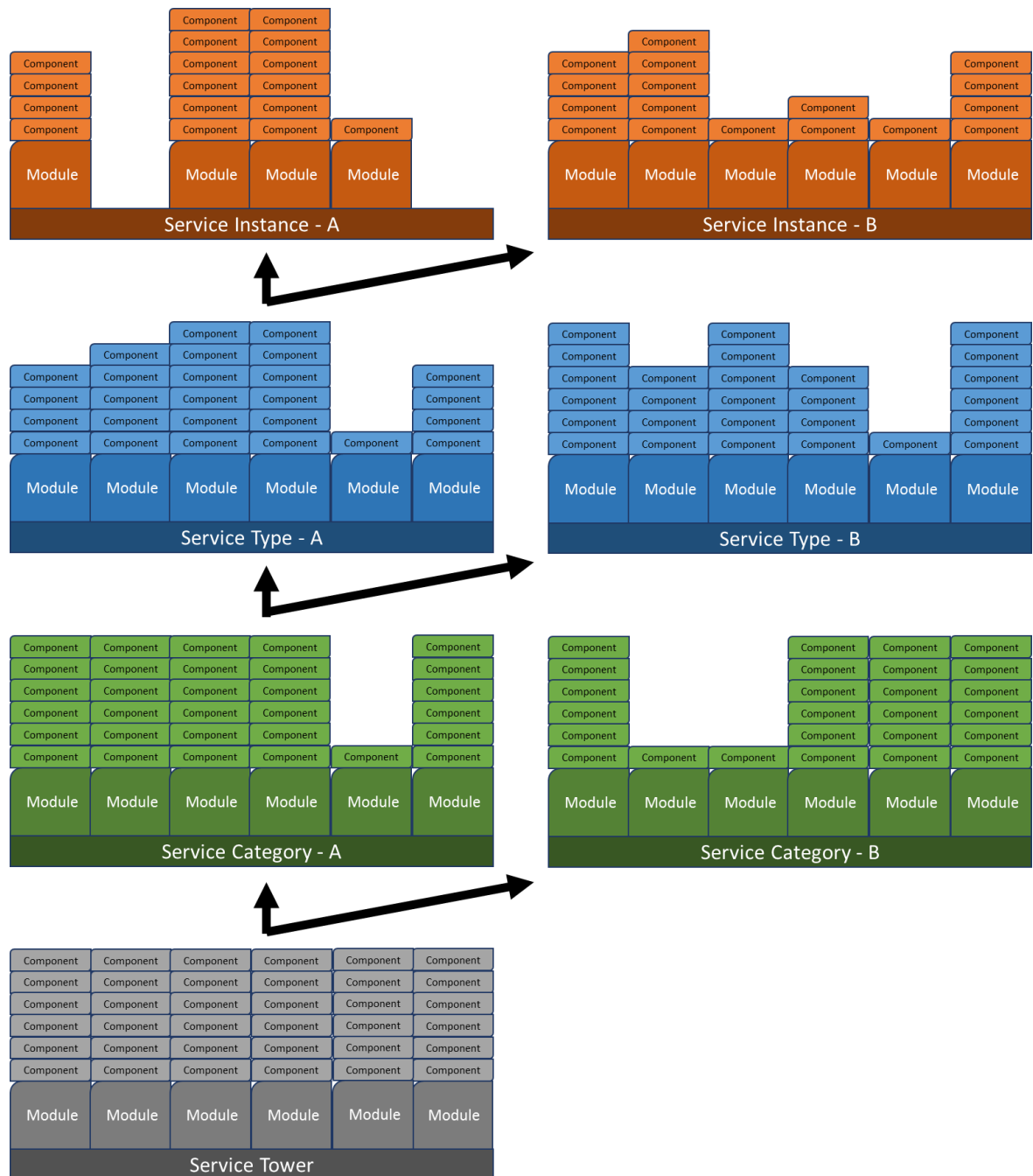


Figure 3 Service Tower Composition Examples

Figure 4 below shows the current Telecommunication Purchasing Arrangements (TPA) Service Towers and Service Categories with Network Applications, the focus of this document, highlighted.

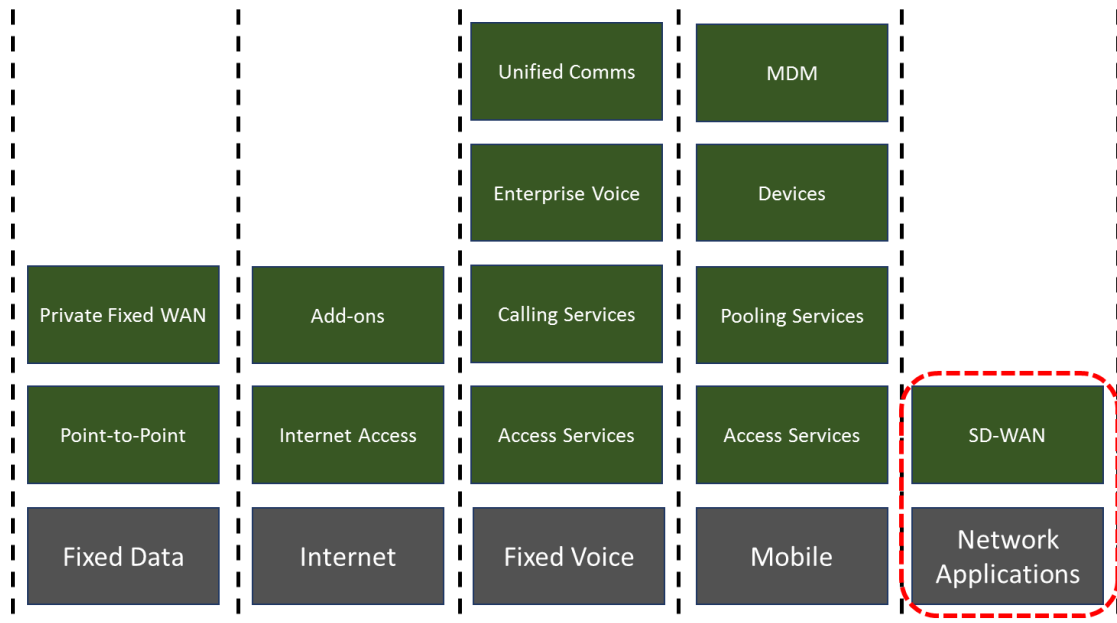


Figure 4 Current TPA Service Towers and Service Categories

Figure 5 below shows the building blocks of the Network Applications Service Tower. Permutations of these building blocks results in the configuration of the Service Categories.

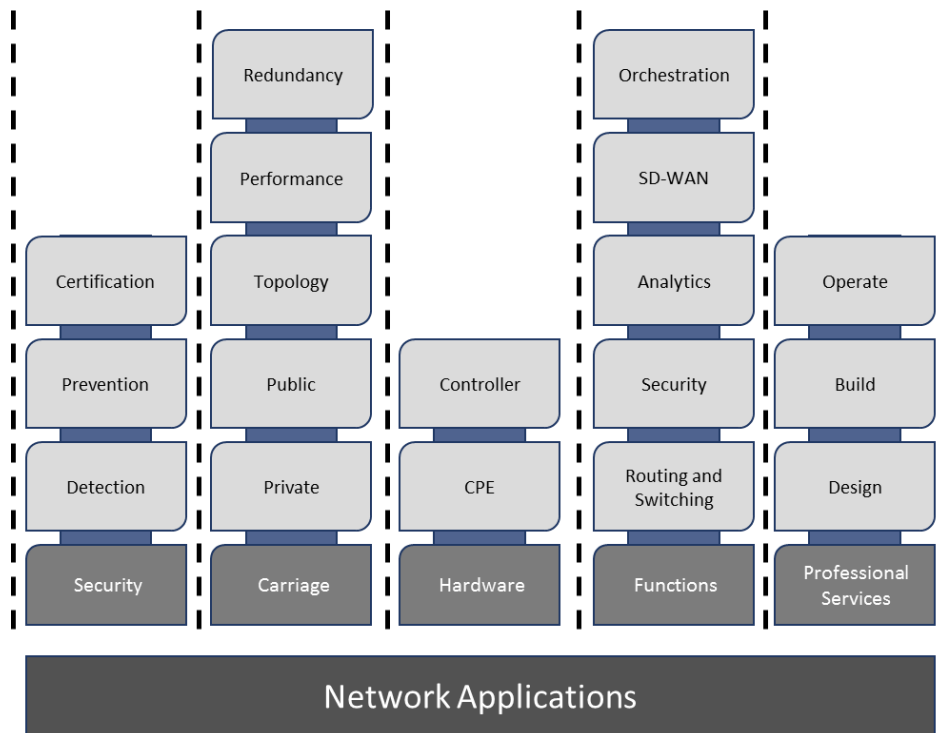


Figure 5 Network Applications Composition

3. Service Category Description – SD-WAN

Software Defined Wide Area Network (SD-WAN) is a Service Category under the Network Application Service Tower, a new service tower within the TPA framework. SD-WAN describes services that utilise overlay, or over-the-top, technologies to provide connectivity to one or more Customer locations. Since these services can sit on top of multiple, disparate services they can offer improved service delivery capabilities over traditional Fixed Data services.

SD-WAN Services are fundamentally modular, allowing Customers to construct the service that best fits their requirements. Although, as shown in *Service Type – SD-WANaaS* various combinations have been selected to build the SD-WANaaS service catalogue.

The building blocks, or modules, of SD-WAN are;

- Security
- Carriage (may be referred to as underlying carriage)
- Hardware
- Functions
- Professional Services

Within each module are components which can be included, or excluded, in various configurations to construct a set of unique SD-WAN Services, as illustrated in Figure 6 below.

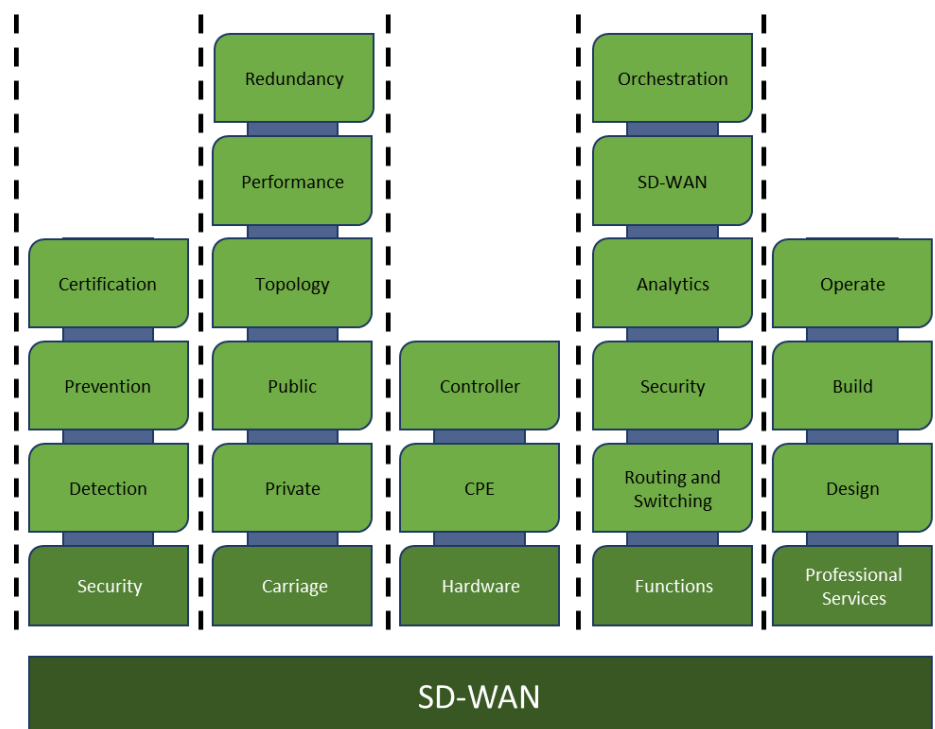


Figure 6 SD-WAN Modules and Components

3.1 Service Category Modules and Components

Due to the flexible nature of Network Applications, each of the comprising modules can have more than one option or configuration. Customers will define which modules and components apply to their services.

3.1.1 Security	
Overview	Security is the policies and practices adopted to protect the usability and integrity of the service. Given the centralised control and the use of publicly connected carriage, security is arguably the most important aspect of the service. Security covers the following areas; • Detection • Prevention • Certification
Variations	Figure 7 below shows the building blocks of security. Figure 7 Security Modules and Components

3.1.2 Carriage

Overview

Carriage, or underlying carriage in the context of SD-WANaaS, is the physical infrastructure, above which an overlay network or service is built. It is responsible for the delivery of packets across networks

The Underlying Carriage can vary in the following ways;

1. Capacity
2. Performance – latency, jitter, packet loss
3. Redundancy – single link, diverse links, diverse carriers, diverse mediums
4. Assurance type – Private Data Network (private networks such as MPLS), Public Data Network (4G, Internet, etc.)
5. Topology

The underlying carriage for an example SD-WANaaS service is shown in Figure 8 below. The black and purple represent the underlying carriage, while the green dotted line represents an overlay tunnel.

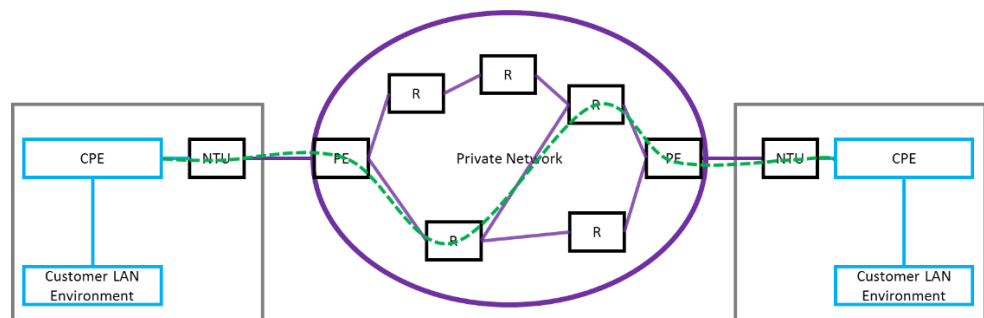


Figure 8 Underlay Network and Overlay Service

Customers may opt to consume an Overlay Network Service as a full package where underlying carriage is included. Alternatively, the Customer may opt to utilise their own underlying carriage (existing or otherwise) as part of the service.

The key feature of Underlying Carriage is that it is flexible in terms of its configuration. The Customer can choose from many permutations of multiple links and Private Data Network or Public Data Network carriage. It is expected that the Customer will choose the underlay configuration and bandwidth(s) to meet their requirements, however this service may evolve to have an option for the Customer to define applications and overlay characteristics and allow the Service Provider to choose the appropriate underlay configuration and bandwidth(s).

Variations

Figure 9 below shows the Module and Component breakdown of Carriage.

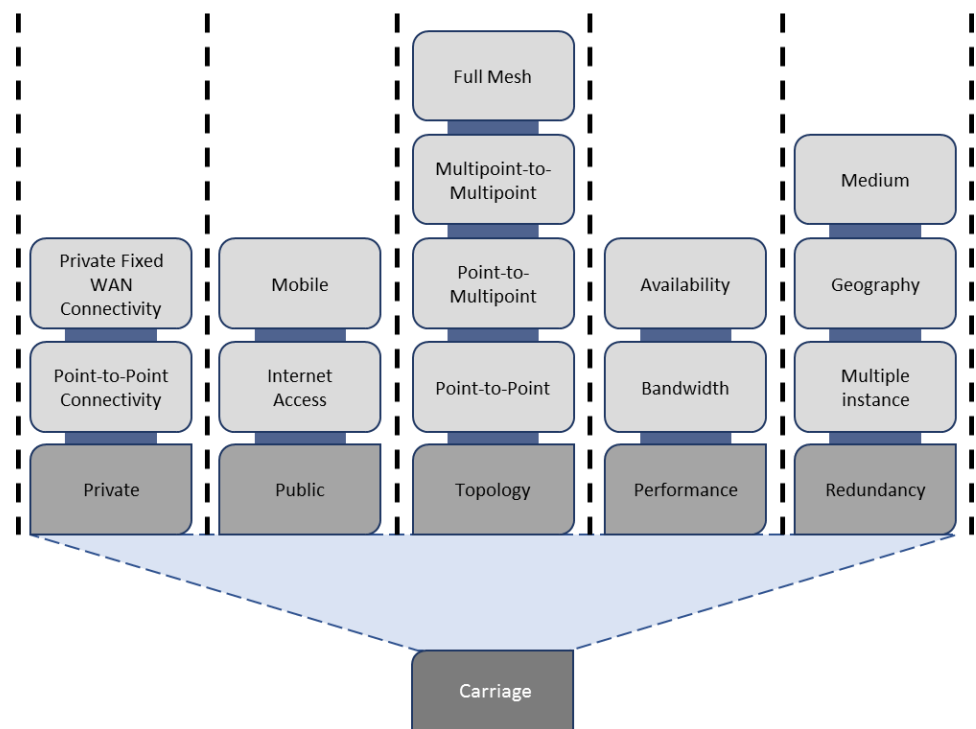


Figure 9 Carriage Modules and Components

For simplicity, the following example figures will show the underlying carriage configurations for a single location.

Redundancy and Assurance Type Configurations

1. Single carriage; 1x private network uplink

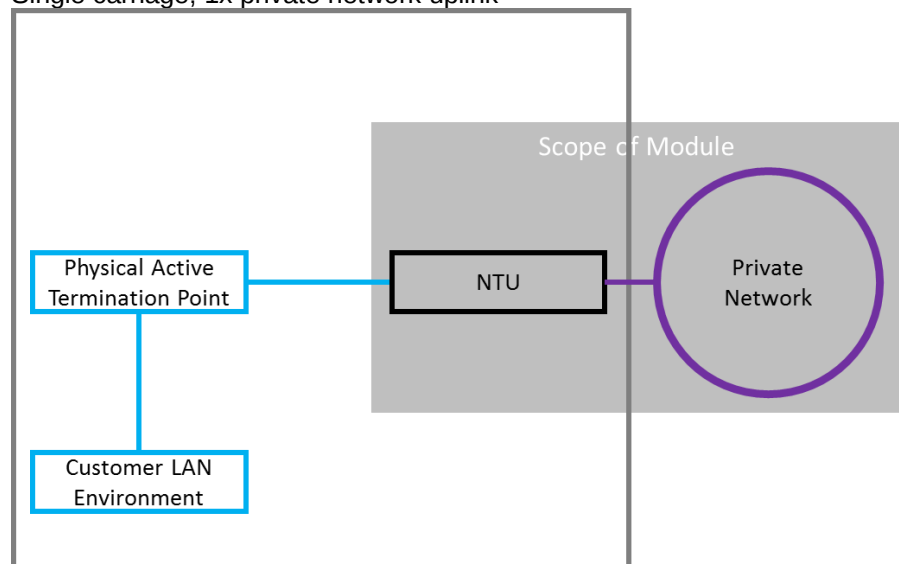


Figure 10 Single Private Data Network Carriage

2. Single carriage; 1x Internet uplink

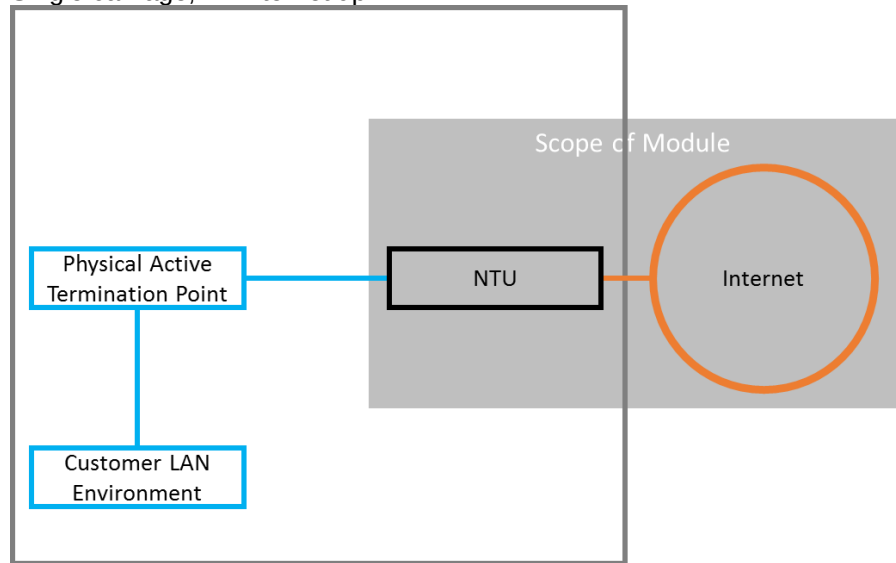


Figure 11 Single Public Data Network Carriage

3. Dual carriage; 1x private network & 1x Internet uplinks

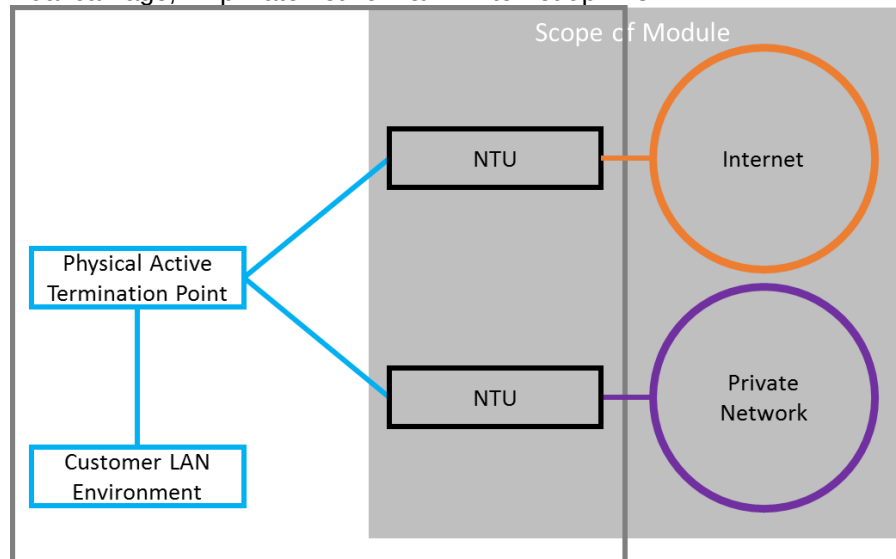


Figure 12 Dual Carriage - Private Data Network and Public Data Network

4. Dual carriage; 2x private network uplinks

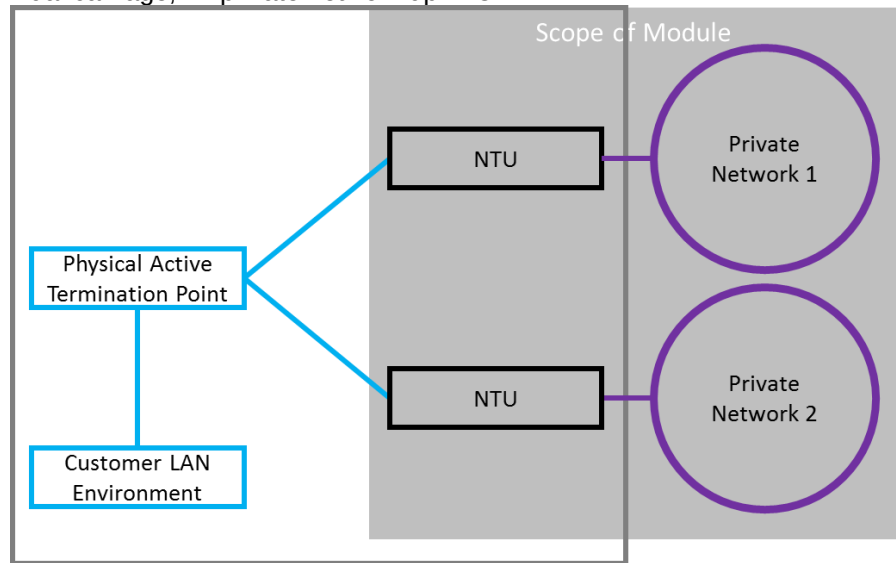


Figure 13 Dual Private Data Network Carriage

5. Dual carriage; 2x Internet uplinks

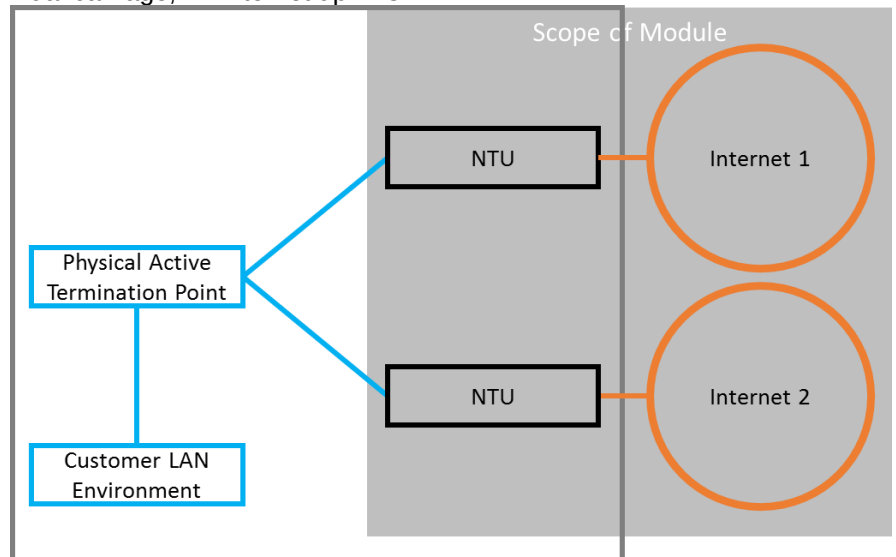


Figure 14 Dual Public Data Network Carriage

6. Multi-carriage; n x private network & n x Internet uplinks

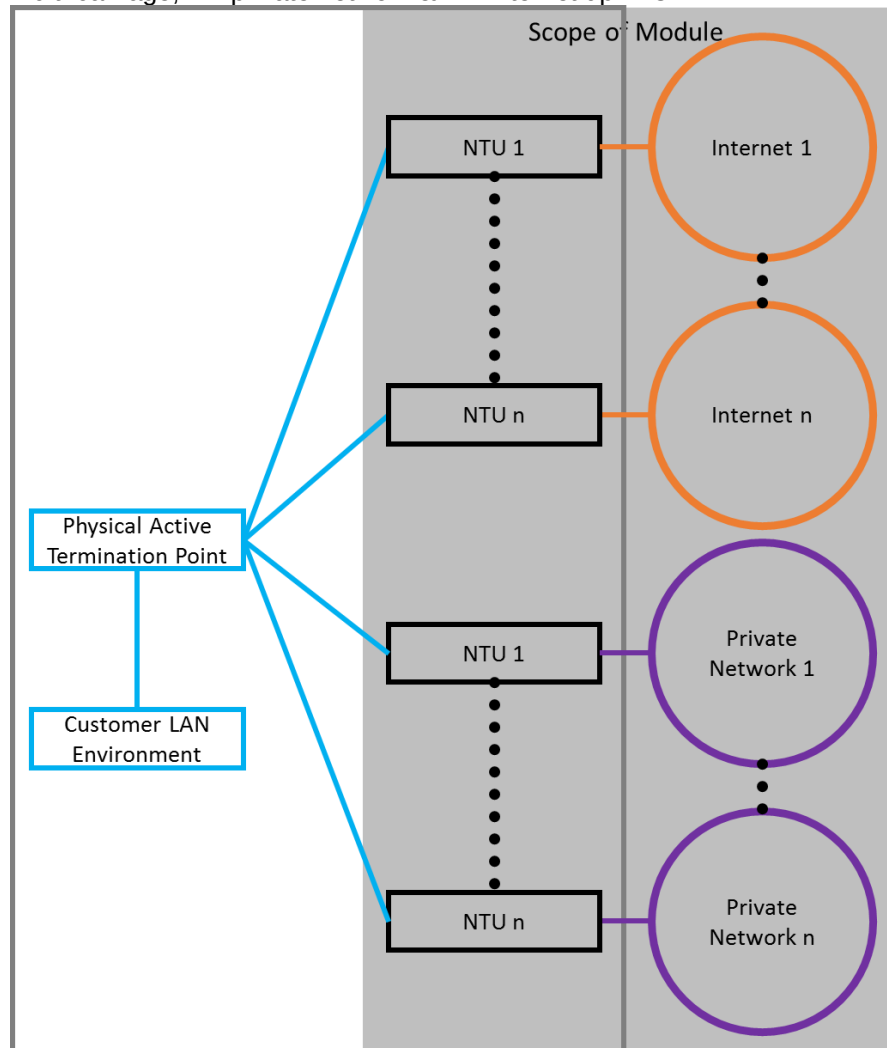


Figure 15 Multi-carriage

Underlying Carriage Source

There are two variants for the sourcing of underlying carriage;

1. Bring your own (BYO); whereby the Customer uses existing or new carriage that they sourced as the underlay
2. Provider sourced; this is where the Customer requires the Provider to source the underlay carriage whether it be from the Provider's own network or from a 3rd party.

3.1.3 Hardware - CPE

Overview

An active termination point (as referenced in Figure 18, Figure 19 and Figure 20 below) for SD-WANaaS is referred to as a CPE (Customer Premises Equipment). This device is typically located at a Customer's site and has two main roles;

1. The router to interface between the customer LAN environment and WAN uplink(s);
2. The logical termination point(s) for the overlay network.

Figure 16 below shows the building blocks of the Hardware module, with the CPE component highlighted.

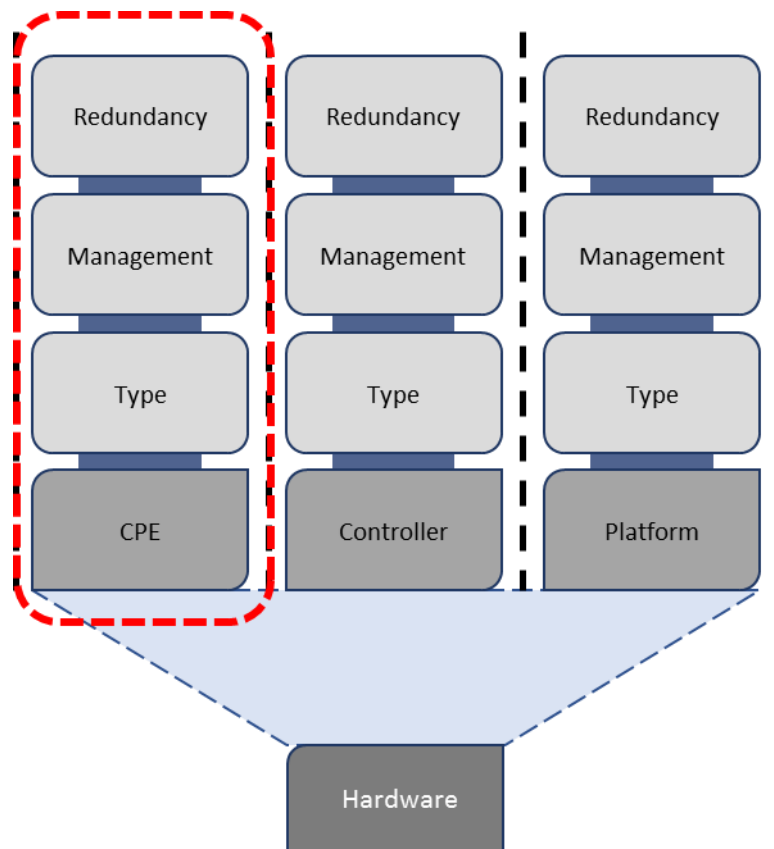


Figure 16 Hardware Components and Elements

There are three main variants for the CPE component; physical CPE, virtualised CPE and cloud-based CPE, as illustrated in Figure 17 below.

Variations

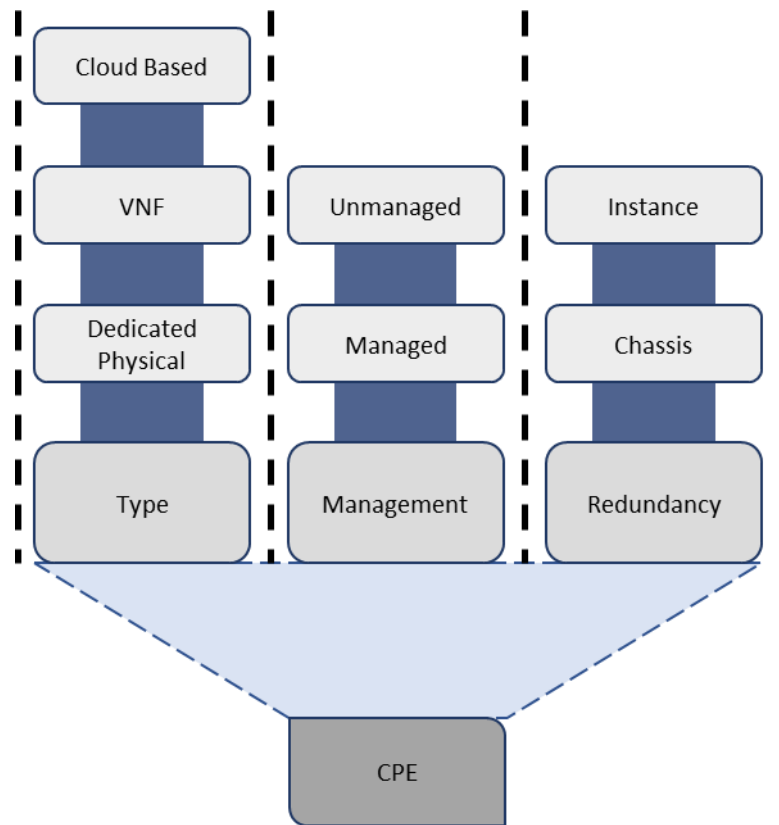


Figure 17 CPE Elements

1. **Physical CPE**- a device that is dedicated to performing the networking functionality

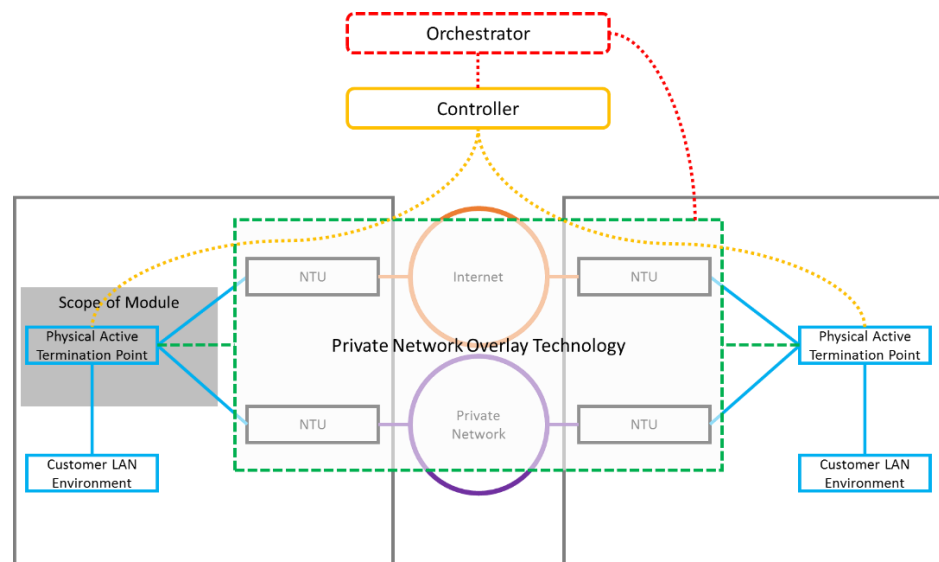


Figure 18 Physical CPE

2. **Virtualised CPE**- a virtualised instance of CPE that is hosted on a device that can host one or more virtual network functions

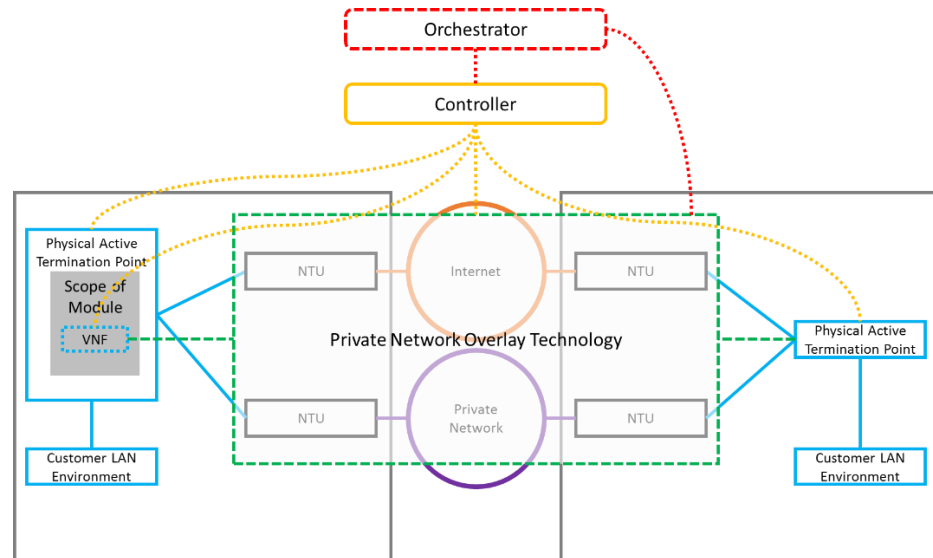


Figure 19 Virtualised CPE

3. **Cloud-based CPE**- a special case of a virtualised CPE that is hosted in a cloud environment. It is typically used to facilitate direct access to a Customer's cloud environment.

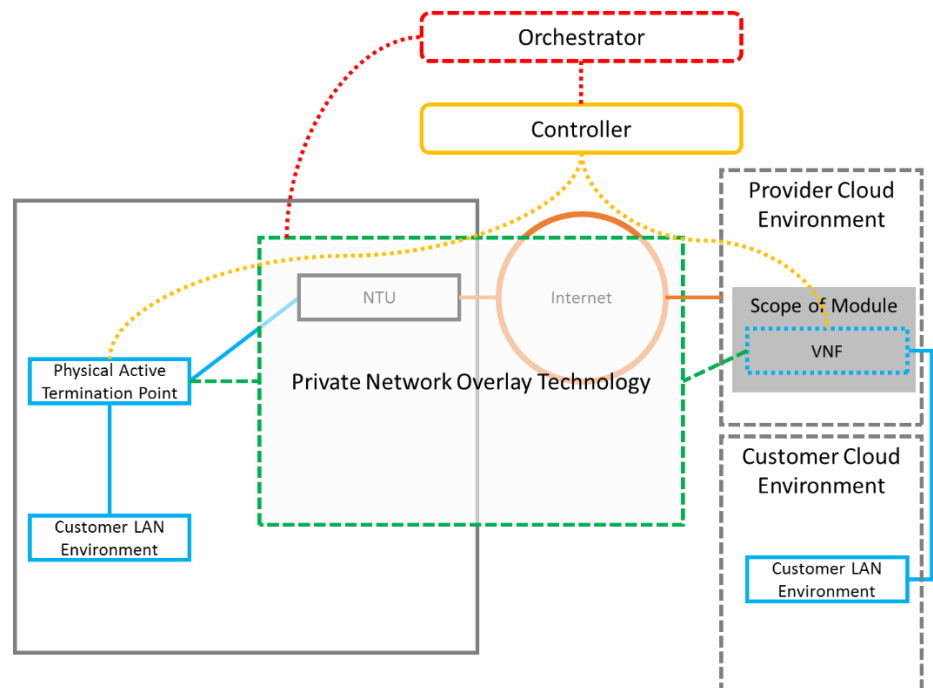


Figure 20 Cloud-based CPE

3.1.4 Hardware - Controller

Overview

The controller provides device management, be they physical or virtual. This includes, but is not limited to, provisioning (configuration and activation), address management, and policy management.

This is different to the Orchestration function, which relates to application layer services such as network and service orchestration. Figure 21 below shows the three levels of hierarchy involved in the control and orchestration of an Overlay Network Service environment.

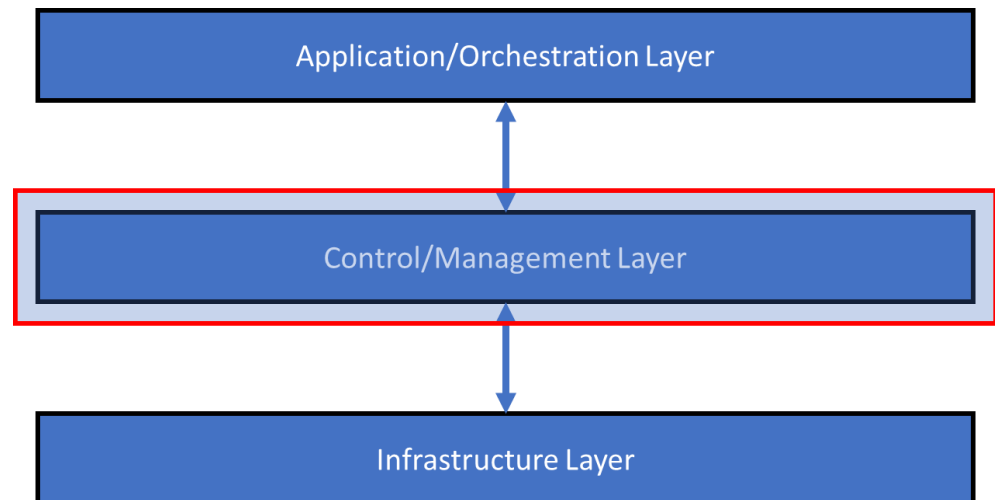


Figure 21 Hierarchy of Overlay Network Service Orchestration, Control and Management

Variations

Figure 22 below shows the building blocks of the Hardware module, with the Controller component highlighted.

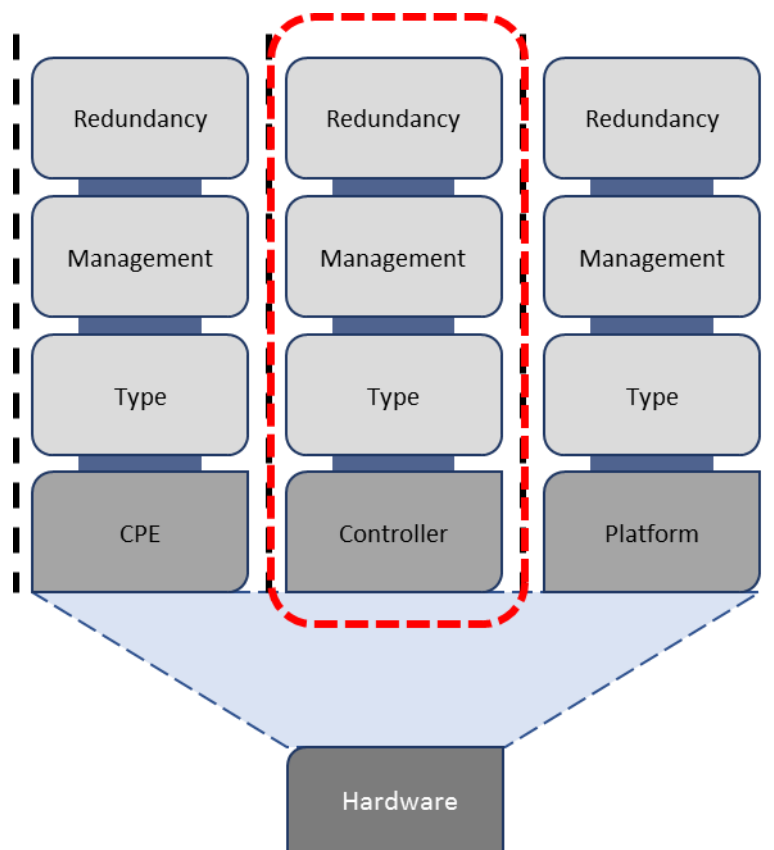
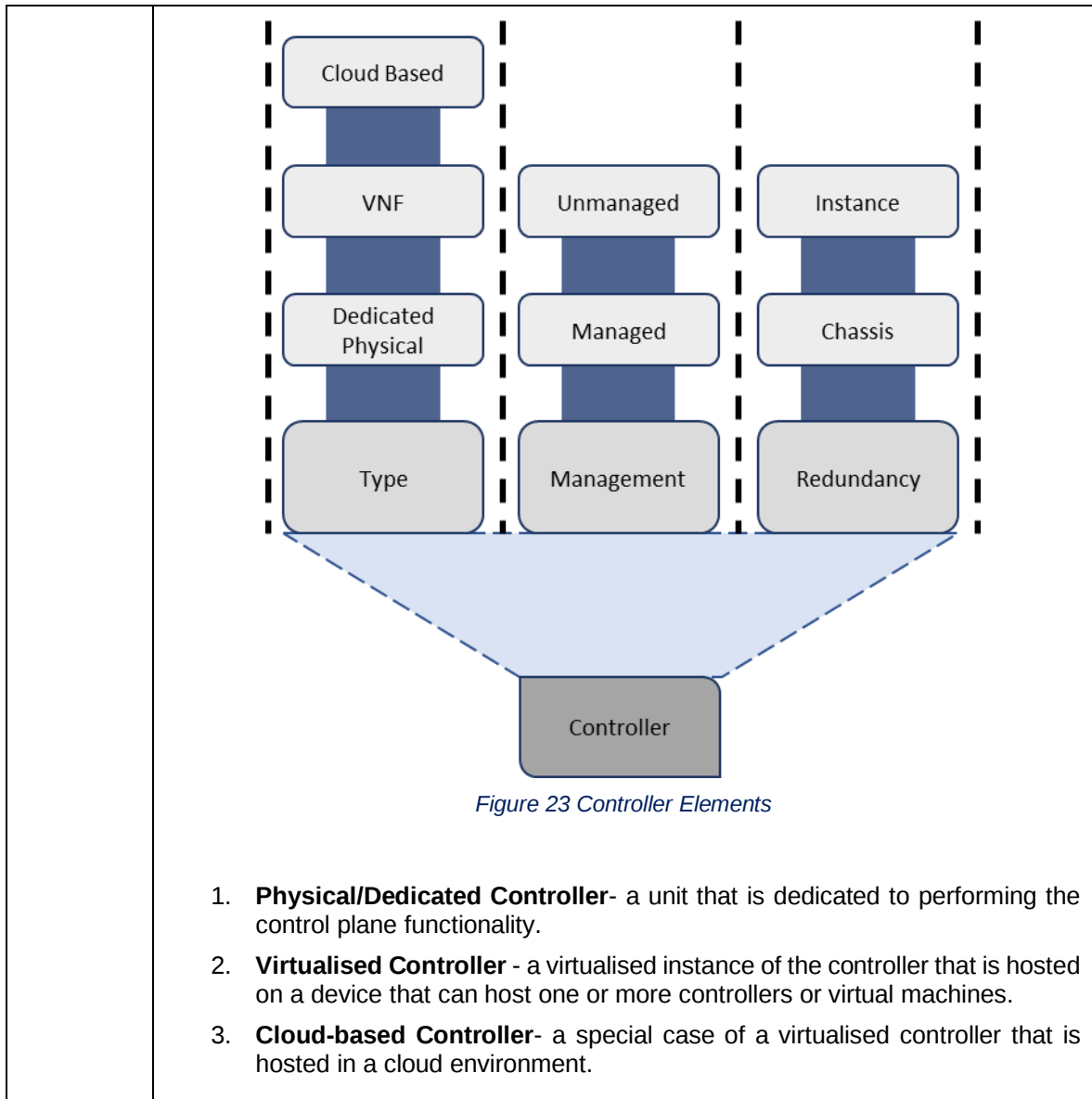
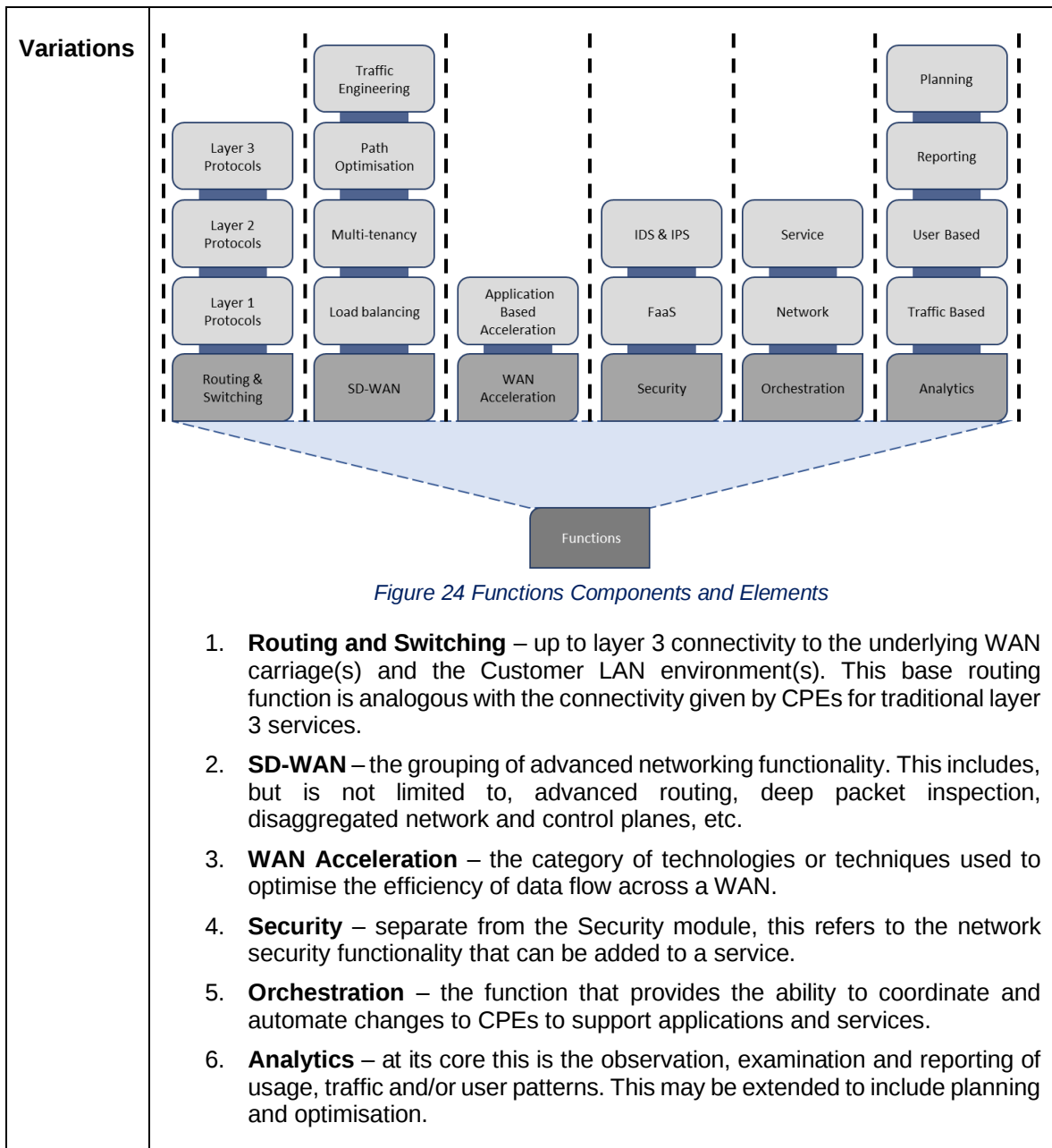


Figure 22 Hardware Components and Elements

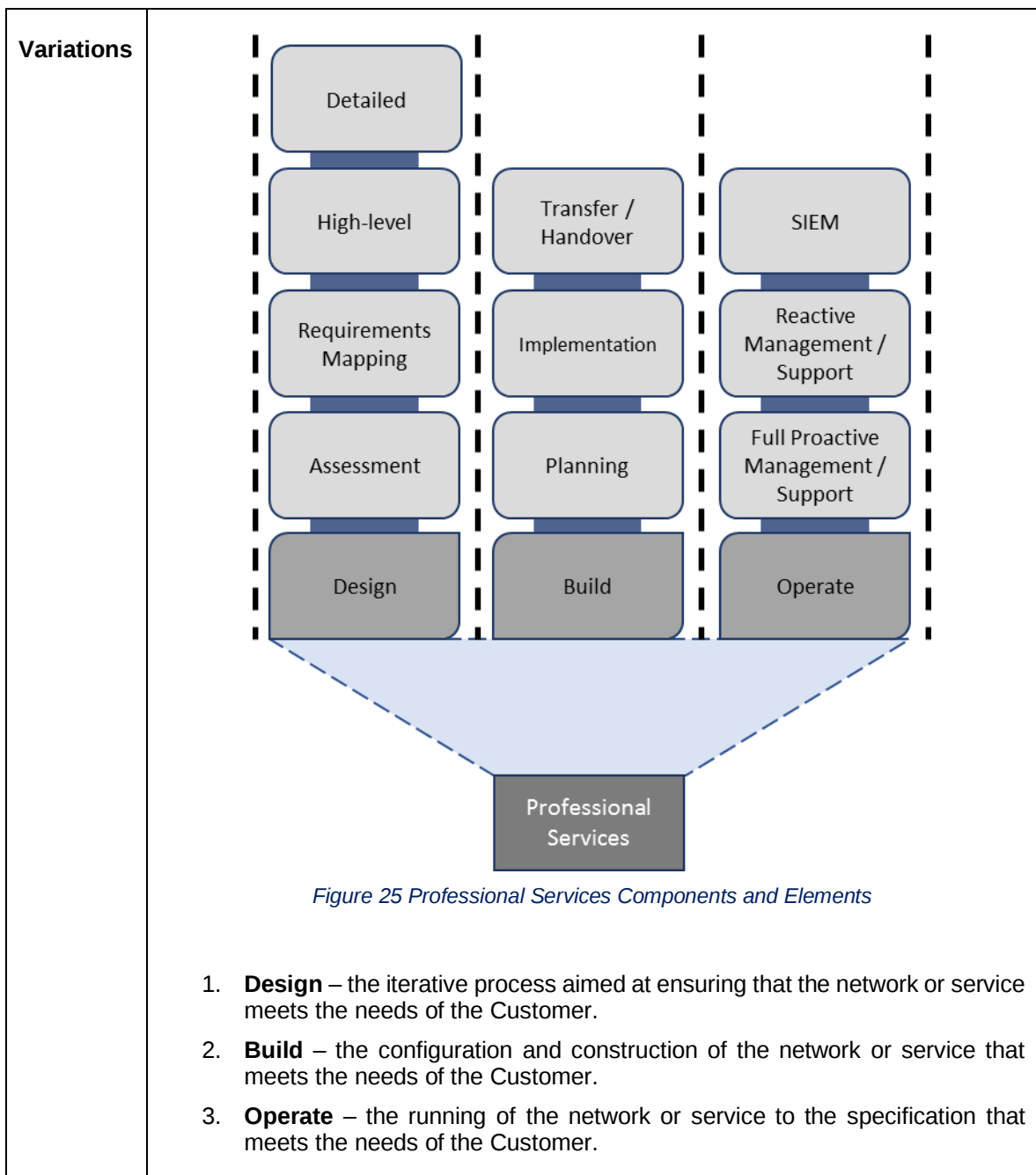
There are three main variants for the Controller component; physical controller, virtualised controller and cloud-based controller, as illustrated in Figure 23 below.



3.1.5 Functions	
Overview	Overlay Network Service functions refer to the base and over-the-top functions that Customers will be looking to employ to achieve their business outcomes. There are two types of Functions; Network Function and Service Function. Figure 24 below shows the Components and Elements of the Functions Module.

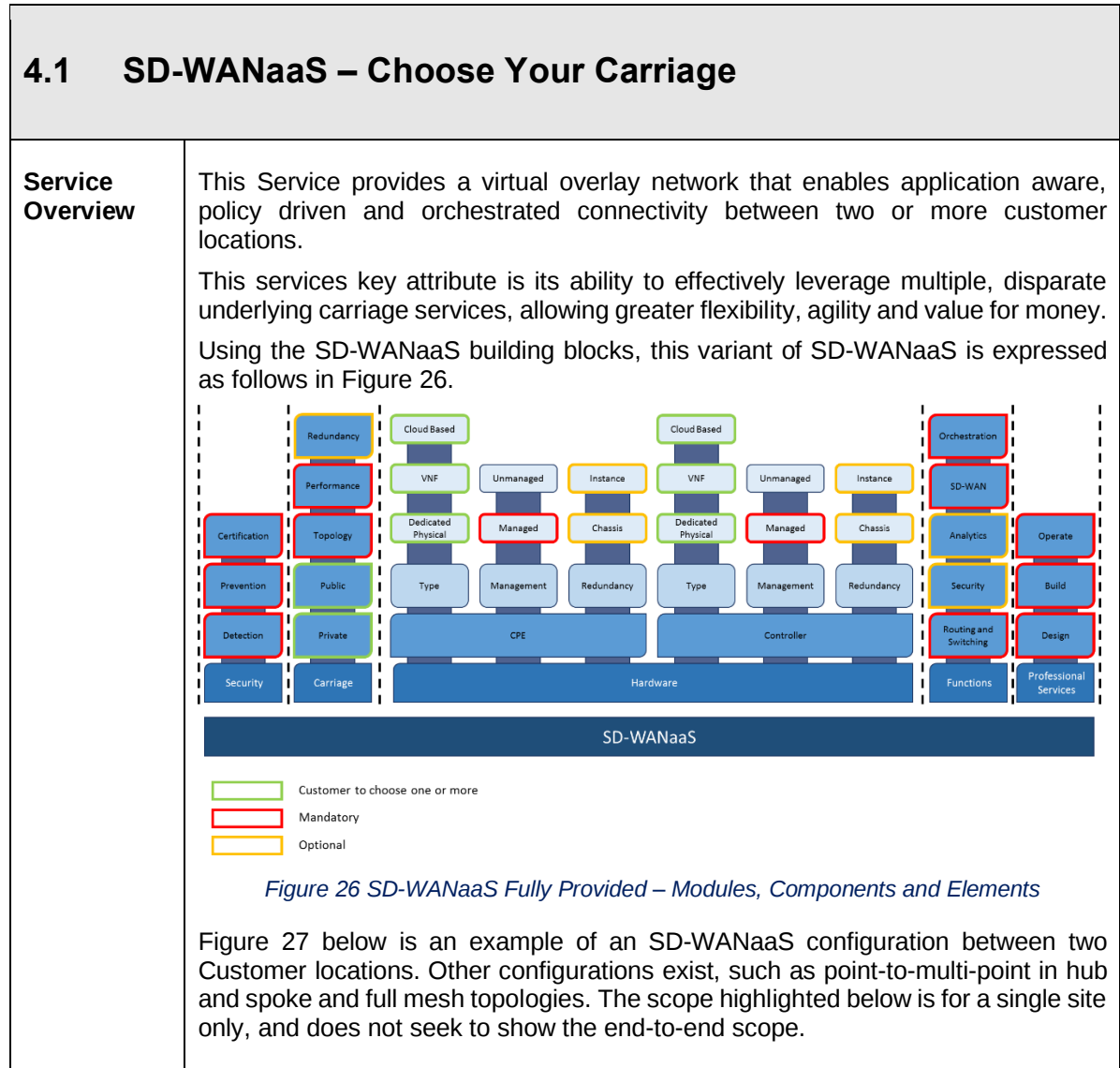


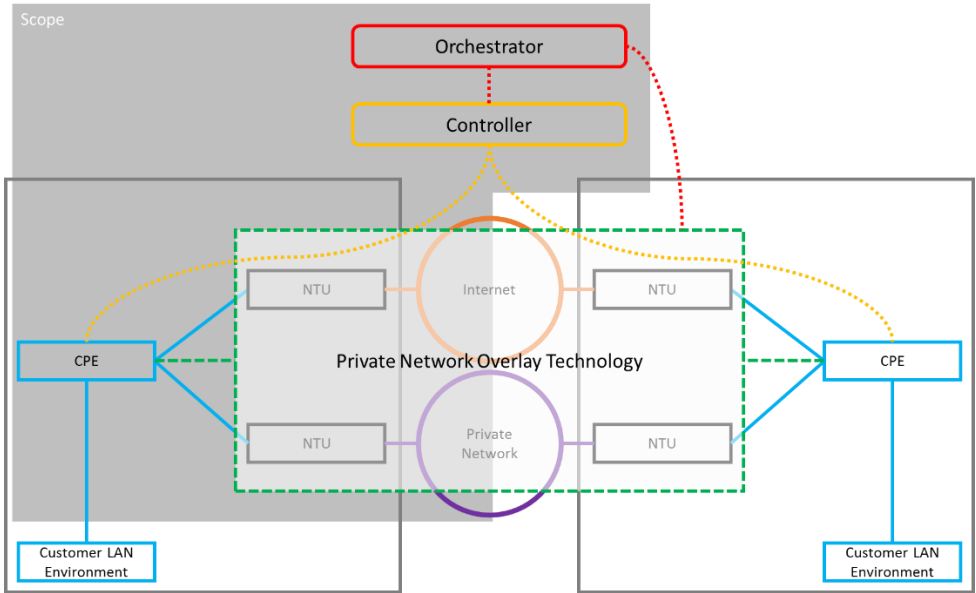
3.1.6 Professional Services	
Overview	Professional Services refers to the set of services that a Customer may require to start-up and run their service(s). At a high level, Professional Services is made up of the designing, building and operation of the Customer's Service(s). Figure 25 below shows the Components and Elements of the Professional Services Module.



4. Service Type – SD-WANaaS

SD-WANaaS is a Service Type within the SD-WAN Service Category. Although the modular style of Network Applications allows for there to be many variants of the service, the focus of this service category is SD-WAN as-a-Service i.e. where most, if not all components are provided to the Customer as a bundled service by a single Service Provider. However, there are options for carriage to be provided by a 3rd party (or the customer) where the SD-WAN provider manages the carriage for the customer.



	 <i>Figure 27: SD-WANaaS demarcation and scope</i> The service will also be delivered with Common Services as per the Common Services specification. Depending on the Service Management Level chosen by the Customer, the Service Provider is responsible for determining if there are any faults with the service and resolving them.
Base Service Deliverables	The Base Service will provide: • Underlying carriage; one or more underlying carriage for each location in the SD-WAN fabric. This component will be priced separately, leveraging the Fixed Data, Internet and Mobile Service Towers. Customers will choose their own underlying carriage which may be provided by the same entity that provides the SD-WAN overlay, or some other 3rd party (BYO). • CPE; physical or virtual (cloud-based or hosted on-premise) • Base Routing; base routing protocols to enable usage of the underlay network(s) and provide connectivity towards the Customer LAN environment • SD-WAN functionality; multiple carriage underlay, policy or application-based routing, WAN hardening, encryption • Orchestration; provisioning, configuration, operational management, reporting (network and service) • Professional Services; the design, build and operation of the service
Optional Service Deliverables	In addition to the Base Services, there may be optional features such as: • An option for self-service monitoring or management (configuration change) of the service. • A range of options for SD-WAN functions ○ Advanced security such as intrusion detection systems (IDS), intrusion prevention systems (IPS) and URL filtering ○ Deep packet inspection (DPI)

5. Price Book

5.1 Overview

For pricing, components can be grouped into three groups, as per below. Each group consist of components that are dependent on each other to be able to be priced. Unique variants within each group are constructed by choosing one of each of the elements.

Group #	Name	Pricing Components
1	SD-WANaaS - Overlay	Overlay availability # BYO Links Location
2	SD-WANaaS - CPE	CPE Type CPE Throughput
3	SD-WANaaS - Controller	Controller Type # of Supported NEs Controller Redundancy

Table 1 Price Book Groupings

It should be noted that if a component only has one option (e.g. Full Proactive Management under Service Management Level) then it will not be expressed in the Price Book.

5.2 Underlying Carriage

Note: Underlying carriage is not included in this Price Book.

Customers will choose the underlying carriage from the existing Service Towers of Fixed Data, Internet and/or Mobile.

Customers will be able to choose the underlying carriage from any Service Provider(s), regardless of the Service Provider providing the SD-WAN overlay. The costs associated with an SD-WAN overlay provider managing underlying carriage from other service providers is captured in "SD-WANaaS - Overlay".

5.3 Service Construction

To construct a unique service, or price point, customers will choose one possible option from each group, with the price for the full service being the sum of the prices for each option chosen, as per below:

$$\text{Service Price} = (\text{Overlay Cost}) + (\text{CPE Cost}) + (\text{Controller Cost})$$

Note that the overlay cost is \$0 where no BYO links are utilised.

SD-WANaaS will typically be consumed as a network, as opposed to a single service, and in most scenarios a Customer will only require the Controller to be defined once per network instance whereas the Overlay and CPE may need to be defined multiple times, dependent on the number of sites in a network. Therefore, the following equation describes the typical total cost for a network service excluding carriage (which is BYO in this example):

$$\text{Service Price} = (\text{Overlay Cost}_1 + \text{Overlay Cost}_2 + \text{Overlay Cost}_3 + \text{Overlay Cost}_4) \\ + (\text{CPE Cost}_1 + \text{CPE Cost}_2 + \text{CPE Cost}_3 + \text{CPE Cost}_4) + (\text{Controller Cost})$$

5.4 Response Scenarios

A single service can be made up of three parts: "SD-WANaaS - Overlay", "SD-WANaaS - CPE" and "SD-WANaaS - Controller". However, a respondent may not choose to price a service using all three parts, instead choosing to bundle the cost into one of the other parts. This choice is generally driven by the licencing arrangements for the underlying solution.

Below is an exhaustive list of valid scenarios:

5.4.1 Scenario 1 - Pricing responses in all three tabs

CPE, Controller and Overlay management are each priced separately. For a customer to 'price up' an SD-WANaaS offering for this scenario they need to choose a single line item from all three tabs.

5.4.2 Scenario 2 - Pricing Responses in "SD-WANaaS - Overlay" and "SD-WANaaS - CPE" only

CPE and Controller pricing is bundled together. The Overlay management is priced separately. For a customer to 'price up' an SD-WANaaS offering for this scenario they need to choose a single line item from each of these two tabs.

5.4.3 Scenario 3 - Pricing responses in "SD-WANaaS - CPE" and "SD-WANaaS - Controller" only

CPE and Controller are priced separately. The cost of Overlay management is not impacted by the mix of 3rd party provided, or respondent provided underlying carriage. For a customer to 'price up' an SD-WANaaS offering for this scenario they need to choose a single line item from each of these two tabs.

5.4.4 Scenario 4 - Pricing Responses in "SD-WANaaS - CPE" only

CPE and Controller pricing is bundled together. The cost of Overlay management is not impacted by the mix of 3rd party provided, or respondent provided underlying carriage. For a customer to 'price up' an SD-WANaaS offering for this scenario they need to choose a single line item from this tab only.

6. Glossary

Term or short form	Long-form	Definition
aaS	as-a-Service	An item, or grouping of items, made available to a customer as a service
Active Termination		Where the Service Provider provide a device that terminates the service at a site and enables end-to-end management.
ADSL	Asymmetric Digital Subscriber Line	
APN	Access Point Name	A gateway between a mobile network and another network, such as the Internet or a Private WAN.
bps or bit/s	Bits per second	
BYO	Bring your own	
CAB	Change Advisory Board	
Circuit		For data connections, a circuit a path that data transverses between two points. A circuit is a component of a Service.
CMS	Configuration Management System	
Contract Authority		The central entity that is accountable and responsible for the Head Agreements of the TPAs
CoS	Class of Service	
		TPA Release Version
CSI	Continual Service Improvement	
Customer		NSW Government Agency, or any organisation procuring services from the Service Catalogues.
CPE	Customer Premise Equipment	A device that is used by Service Providers to terminate services at a site.
Customer Termination Device		A Customer device that is connected to the Provider's equipment
DHCP	Dynamic Host Control Protocol	
DISS	Digital Information Security Strategy	
DoS (or DDoS)	Denial of service (or distributed denial of service)	An attack that attempts to make a service unavailable by overwhelming it with traffic from multiple sources.
DWDM	Dense Wavelength Division Multiplexing	
Error		A design flaw or malfunction that causes a failure of one or more IT services or other configuration items.
Event		A change of state that has significance for the management of a service.

Term or short form	Long-form	Definition
Gateway device		A layer 3 device at a site that acts as the site's router, to transmit packets to the WAN. Host devices have a gateway device configured, typically via DHCP.
Gbps or Gbit/s	Giga (billion) bits per second	
Grey Area Diagnostics		The process to proactively diagnose in-scope services and interconnections to help identify the cause of an incident or problem. The result is to identify that the cause of the incident or problem: - Is caused by in-scope services - Is not caused by in-scope services - Could be caused by in-scope services, and further diagnostics are required
ICT	Information and Communications Technology	
ICT Risk Management		Information Communication Technology (ICT). The NSW Digital Information Security Policy mandates a risk-based approach to securing information, based on the ISO 27001 standard. DFSI has implemented a framework in line with the policy, with ICT risks being managed through an Information Security Management System (ISMS).
Incident		An unplanned interruption to a service or a reduction in the Quality of a service. Failure of a configuration Item that has not yet impacted service is also an Incident.
IP	Internet Protocol	
IPSLA	Internet Protocol Service Level Agreement	Cisco IOS feature that allows for the collection of network performance information.
ISM	Information Security Management	
ISMS	Information Security Management System	
ISO	International Standards Organisation	
ITSM	IT Service Management	
IVR	Interactive Voice Response	
kbps or kbit/s	Kilo (thousand) bits per second	
Known Error		A Problem that has a documented root cause and workaround.
Location, Site		A Customer site or location is a place where services are to be delivered. Depending on the service, this may not necessarily be a physical building.
MACD	Move, Add, Change or Delete	

Term or short form	Long-form	Definition
MAN	Metropolitan Area Network	
Mbps or Mbit/s	Mega (million) bits per second	
MNO	Mobile Network Operator	Provider of wireless/mobile communications services that owns or controls all the elements necessary to sell and deliver services to an end user, e.g. radio spectrum, wireless network infrastructure, back haul, billing, customer care, provisioning systems and repair capabilities.
MVNO	Mobile Network Operator	Provider of wireless/mobile communications services that does not own the wireless network infrastructure over which it provides services to its customers. Instead they enter a business agreement with an MNO to obtain bulk access to network services at wholesale rates. They do have their own customer service, billing systems, marketing, and sales personnel.
MPLS	Multi-Protocol Label Switching	
MTU	Maximum Transmission Unit	
NBN	National Broadband Network	
NBN Co		The entity responsible for the design, build and operation of the NBN
NFV	Network Function Virtualisation	
NIVR	Network Interactive Voice Response	
OADM	Optical Add-Drop Multiplexer	
Operational Risk		Risks associated with business-as-usual activities at the Division / Business Unit / Related Entity level that is normally managed within that area, unless the level of risk requires a review by the DFSI Executive and/or Secretary.
OSS	Operational Support System	
OTT	Over-the-top	
Passive Termination		Where the Service provider provides a physical termination point which can't be monitored.
PE	Provider Edge	
Peering		The exchange of data directly between Content Providers and Customers, rather than via the Internet.
Performance		A measure of what is achieved or delivered by a system, person, team, process or service
POI	Point of Interconnect	
POP	Point of Presence	

Term or short form	Long-form	Definition
Priority		The value given to an Incident, Problem or Change to indicate its relative importance in order to ensure the timeframe within which action, such as Response and Resolution, is required.
Private Data Network		A network or networks that utilises private infrastructure to deliver physically or logically private services
Problem		A cause of one or more Incidents. The cause is not usually known at the time a Problem Record is created, and the Problem Management Process is responsible for further investigation.
Public Data Network		A network or networks that utilises publicly available, shared infrastructure such as mobile networks or the Internet
Public Holidays		All NSW public holidays as gazetted, except for Bank Holidays specific to only banks and financial institutions as per the Retail Act.
QoS	Quality of Service	
RACI	Responsible, Accountable, Contributor, Informed	
Resolver Group		Specialised groups that have the knowledge and skill to solve an Incident or Problem.
R-OADM	Reconfigurable Optical Add-Drop Multiplexer	
Root Cause		The underlying or original cause of an incident or problem.
RSP	Retail Service Provider	
Sandboxing		A security mechanism for separating untested or untrusted programs or code to mitigate system failures or software vulnerabilities from spreading.
Satellite		Satellite based connectivity to deliver NBN connectivity
SDN	Software Defined Network	
SD-WAN	Software Defined Wide Area Network	
SD-WANaaS	SD-WAN-as-a-Service	
Service Window		Service window is defined as the timeframe within which service availability and service management (incident response, incident resolve) are measured and managed.
Significant Event		This is an event that materially impacts a Customer, and is likely to be a P1 or P2.
SIP	Session Initiation Protocol.	
SLA	Service Level Agreement	

Term or short form	Long-form	Definition
SoR	Statement of Requirements	
TDM	Time Division Multiplexing	
TPA	Telecommunications Purchasing Arrangements	
User		A person who uses a service on a day-to-day basis.
VIP	People with critical roles within an organisation, and identified to Service Providers.	
VNF	Virtual Network Function	
VPN	Virtual Private Network	
WAN	Wide Area Network	
WoG or WofG	Who of government	All Clusters and Agencies within the NSW Government.

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