

SERVICE SCHEDULE 4

du ETHERNET SERVICE WITH MULTI-CLASS & SINGLE-CLASS OF SERVICE

The following terms and conditions apply when du provides the Ethernet Service to the Customer.

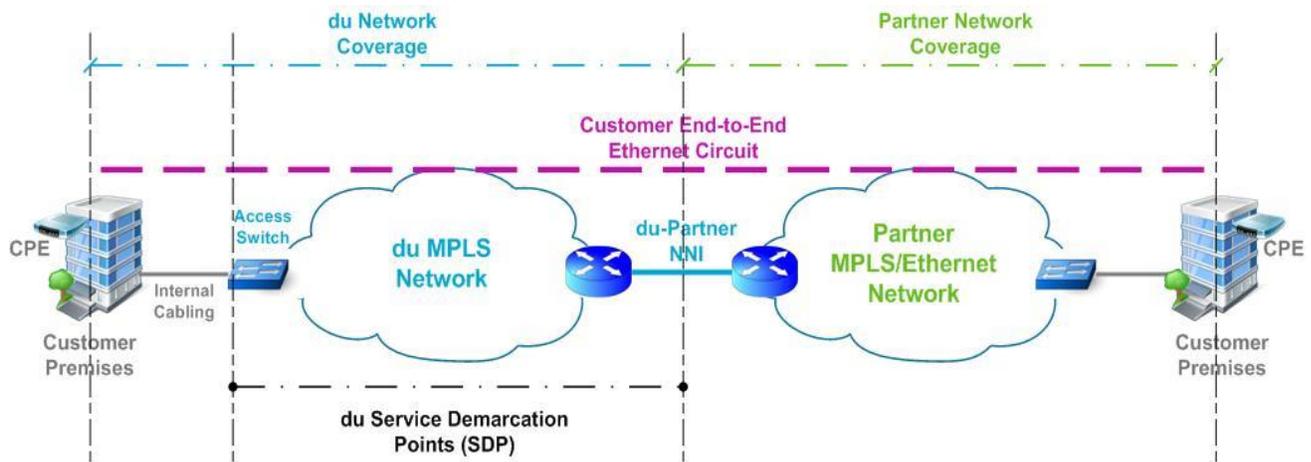
1 INTRODUCTION

The Ethernet Service is a layer 2 MPLS based connectivity service which enables the creation of a MPLS based single next generation wide area network (WAN) to enable the transportation of telecommunications traffic over du's network. As at the date of this Service Schedule, the Ethernet Service is only available On-net.

The Service Demarcation Point (SDP) of the Ethernet Service is the access switch where an access port will be provided to the End User.

Below is a [diagram 1](#) illustrating the Ethernet Service (including the SDP):

Diagram 1



2 TERMINOLOGY DEFINITIONS

2.1 In this Service Schedule, the following terms have the following meanings:

"**Best Effort**" has the meaning given to it in [Table 3.1](#) of this Service Schedule.

"**CBWFQ**" (Class-Based Weighted Fair Queuing) means a network router queuing method that allows traffic to share bandwidth allocation equally, after being grouped by classes.

"**CE**" means Customer Equipment and refers to equipment that is owned and managed by the Customer.

"**CHARGES**" means the Installation Charges, Monthly Charges, and any Termination Charges or Cancellation Charges payable in respect of a Service (as set out in a Service Schedule or Service Order), and any other charges payable by the Customer to the Supplier in accordance with the terms and conditions;

"**CIR**" or "**Committed Information Rate**" means the maximum guaranteed bandwidth allocation for traffic arriving at or departing from the SDP.

"**Circuit**" means a point-to-point transmission channel provided by du for the Customer's use for the conveyance of voice and data traffic between the du Network Termination Points.

"**Dual Access**" means the Customer's equipment is connected to du's access network via two links from two access devices.

"**Dual International (Int'l) Backhaul**" means that the Service comprises two separate links across the international backhaul part of du's Network.

"**Ethernet Service**" means the Ethernet over MPLS service as described in this Service Schedule.

"**Exceed Drop**" means that the traffic exceeding the CIR and/or Burst will be dropped;

"**IP**" means internet protocol.

"**Jitter**" means the delay variation experienced by test packets when sent across the Supplier Network at regular time intervals. The Jitter value is the difference between the shortest transit time and the longest transit time in milliseconds.

"**Latency**" or "**Round Trip Time**" means the time it takes a given network packet to travel from source to destination and back.

"**MPLS**" means multi-protocol label switching.

"**MTU**" means Maximum Transmission Unit.

"**Network Termination Point**" means the points at which the du Network terminates on the Customer-facing side of the du distribution frame as specified in the Service Order.

"**Single Access**" means the Customer Equipment is only connected via one link on du's access Network.

"**Supplier Network**" means the telecommunications network operated by du.

"**WRED**" (Weighted Random Early Detection) means a queue management algorithm with congestion avoidance capabilities. It is an extension to random early detection (RED) where a single queue may have several different queue thresholds. Each queue threshold is associated to a particular traffic class.

2.2 Capitalized words and phrases not otherwise defined in this Service Schedule have the meanings set out in the Standard Terms and Conditions.

3 AVAILABLE CLASSES OF SERVICE

3.1 There are three categories of service classes available for the Ethernet Service as defined in clause 3.2 below. Each category allows the Customer to select a number of options from the traffic classifications set out in [Table 3.1](#) below:

3.2 The following classes of service are available for the Ethernet Service:

- a. Non-QoS unmanaged service ("Non-QoS");
- b. Single-class QoS unmanaged service ("Single-class QoS"); and
- c. Multi-class QoS managed service (carrier partner managed) ("Multi-class QoS").

Table 3.1

Traffic classification	Application	Description
Real time	Residential voice Business voice Voice signalling	Priority queuing (LLQ) CIR policing ≤ 70%, Exceed Drop Voice is classified by TCP/UDP ports
Business critical	Business critical Business video	Guaranteed bandwidth allocation (CBWFQ) WRED congestion avoidance
Business-data	Business data	Guaranteed bandwidth allocation (CBWFQ) WRED congestion avoidance
Business-standard	Business standard	Guaranteed bandwidth allocation (CBWFQ) WRED congestion avoidance
Best Effort	Internet and Non-QoS Traffic	No guaranteed bandwidth allocation WRED congestion avoidance

3.3 **Non-QoS**

If the Customer elects the Non-QoS, the Ethernet Service will be provided on a Best Effort basis (as defined in [Table 3.1](#) above). There is no bandwidth allocation guarantee and packet drops may occur during congestion caused by network failure.

3.4 **Single-class QoS**

If the Customer elects the Single-class QoS, the Customer may select one of the following two traffic classifications set out in [Table 3.4](#).

Table 3.4

Package No.	Real Time (Voice)	Business-Critical (Video)	Business-Data	Business-Standard
9	100%			
10		100%		
11			100%	
12				100%

3.5 **Multi-Class QoS**

The Multi-class QoS is available provided that the Customer meets the following pre-requisites:

- a. the Customer must install and manage the CE to control the End User traffic; and
- b. real time class must be classified using voice TCP/UDP ports, ("Multi-class QoS Pre-requisites").

3.6 Subject to the Customer meeting the Multi-class QoS Pre-requisites, the Customer may elect one of the packages set out at [Table 3.6](#), which are available for the Multi-class QoS.

Table 3.6

Package No.	Real Time (Voice)	Business-Critical (Video)	Business-Data	Business-Standard	Best Effort
1	70%	20%	10%		
2	50%	30%	20%		
3	20%	60%	20%		
4		80%		20%	
5		50%	30%	20%	
6			80%	20%	
7			60%	30%	10%
8			50%	50%	

4 INDICATIVE PERFORMANCE METRICS

- 4.1 The performance metrics specified in [Table 4.1](#) below (“Performance Metrics”) are indicative only and only apply to On-Net traffic. The Performance Metrics do not comprise binding Service Levels and are not binding.

Table 4.1

Class of Service	Packet Loss	Latency (milliseconds (ms))	Jitter
Real time	< 0.001%	< 30ms	< 10ms
Business-Critical	< 0.001%	< 60ms	< 25ms
Business-Data	< 0.1%	< 80ms	< 30ms
Business-Standard	< 0.1%	< 100ms	-
Best Effort	< 1%	< 150ms	-

5 SERVICE PARAMETERS

5.1 Ethernet Service bandwidth

The bandwidth allocation will be specified in the Service Order. The following bandwidth allocations are currently available for the Ethernet Service and du may notify the Customer if any further bandwidth allocations become available:

- 64Kb; 128Kb; 256Kb; 512Kb; 1Mb;
- 2Mb to 10Mb with increments of 2Mb;
- 10Mb to 50Mb with increments of 5Mb;
- 50MB to 100Mb with increments of 10Mb;
- 100Mb to 1Gb with increments of 100Mb; and
- 10Gb

5.2 Access interfaces supported (Customer facing ports)

The Ethernet Service supports the following interfaces and du may notify the Customer if any further interfaces are supported:

- 100BaseT – RJ45 (802.3u)
- 1000BaseT – RJ45 (802.3ab)
- 1000BaseSX – LC (802.3z)
- 1000BaseLX – LC (802.3z).

5.3 Maximum Transmission Unit (MTU)

The Ethernet Service supports a MTU size of 1552 bytes. The standard MTU size setting is 1500 bytes. The Customer must specify the specific MTU size in the Service Order.

5.4 QinQ (IEEE 802.1ad)

du’s security policy does not allow trunk mode on Customer facing ports. However QinQ, is supported by the Ethernet Service and which accepts a Customer trunk interface and transparently passes any number of Customer VLANs. If the Customer requires QinQ, this must be specified on the Service Order.

6 CHARGES

- 6.1 The Customer must pay du the Installation Charge and the Monthly Charge for providing the Ethernet Service. The Installation Charge and the Monthly Charge are specified in the relevant Service Order.
- 6.2 The Installation Charge and Monthly Charge will be invoiced in accordance with the Standard Terms and Conditions for the amounts detailed in the Service Order.
- 6.3 In addition, if the Customer requests that du provision the Ethernet Service beyond the du Network Termination Points, du may invoice the Customer additional charges in relation to such provisioning.
- 6.4 Installation Charges may be invoiced by du to the Customer on a cost incurred basis.
- 6.5 Cancellation Charges may be invoiced by du to the Customer on a cost incurred basis or as otherwise calculated in accordance with clause 6.6.
- 6.6 If all or part of a Service is cancelled or the Service details are significantly modified, including without limitation a change in the du Network Termination Points or capacity, prior to the Target Service Commencement Date, du may charge the Customer a Cancellation Charge to cover the reasonable costs incurred by du as a result of such cancellation or modification. The applicable Cancellation Charge will be in accordance with [Table 6.6](#) below:

Table 6.6

Number of full Working Days before Target Service Commencement Date	Cancellation Charge as % of Installation Charge
0 to 1 days	100%
2 to 5 days	90%
6 to 10 days	70%
11 to 20 days	50%
21 to 30 days	25%
more than 30 days	0%

7 QOS OR DSCP MARKING POLICY AND CONDITIONS

- 7.1 The Customer must comply with:
 - a. the Multi-Class QoS pre-requisites if applicable; and
 - b. the Type of Service (DSCP) Marking Designation;
- 7.2 If the Customer fails to comply with the requirements in clause 7.1 of this Service Schedule the Ethernet Service may be degraded and performance impacted. If the Customer repeatedly fails to comply with the requirements in clause 7.1, du may discontinue the Ethernet Service.

8 ADDITIONAL TERMS AND CONDITIONS

Customer may allow its end-users to provision Voice over Internet Protocol (“Voice”) or Video over Internet Protocol (“Video”) (Voice and Video over Internet Protocol are collectively referred to as “VoIP”) utilizing the Ethernet “L2 VPN” Service.

- 8.1 VoIP Classes of Service: When VoIP traffic is transmitted over the Ethernet “L2MPLS VPN Service, such traffic is restricted to transmission via the following Classes of Service (“CoS”), and service parameters, as applicable:
- a. The EF (Real Time) CoS is dedicated for the transmission of Voice traffic. Video or Data traffic is not permitted over the EF (Real Time) CoS.
 - b. In addition to transmission over the EF CoS referenced above, Voice traffic may be also be transmitted over any other CoS including Non-CoS (Best Effort). However, guaranteed throughput for Voice traffic is only available over EF (Real Time) CoS.
 - c. Video traffic may be transmitted over any CoS including Non-CoS Best Effort except EF (Real Time) CoS. However, guaranteed throughput for Video traffic is only available over AF31 (Business Critical) CoS.
- 8.2 Customer Responsibilities: Customer shall comply, and shall ensure that its end-users comply, with the following terms and conditions:
- a. Transmission of VoIP traffic shall be permitted only over a private circuit, consisting of a closed loop circuit, interconnecting the various offices of customer or its affiliates (“Closed User Group”);
 - b. VoIP traffic on the Closed User Group network shall not break-out to, or break-in from, the Public Switched Telephone Network (PSTN) system; and
 - c. VoIP traffic over the Closed User Group shall be transmitted unencrypted using an audio or video codec (encoder or decoder, as applicable) that is included on a Supplier-approved list, determined solely at Supplier’s discretion.