

VIRTUAL UNBUNDLING LOCAL ACCESS

Annex C1

VULA Technical Characteristics

GO p.l.c.

This Reference offer for Virtual Unbundled Access to the FTTP network and collocation related facilities is published in accordance with the Malta Communications MCA Final Decision Market 4 – Wholesale Unbundled Infrastructure Access Market dated 6th March 2013 in line with Regulation 12(2) of the Electronic Communications Network and Services (General) Regulations (Chapter 399.28 of the Laws of Malta).

Undertakings are advised that the Malta Communications Authority may impose changes to this Reference Offer in accordance with its powers under Regulation 12(4) of the Electronic Communications Network and Services (General) Regulations (Chapter 399.28 of the Laws of Malta)

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1 Introduction

This document describes the technical aspects of GO's VULA offer. The information is being provided on the basis of GO's knowledge at the time of publication and is subject to change.

1.1 General

GO will offer the Service to the OAO, providing active wholesale access over Ethernet using a PON-based network with interconnection occurring at layer 2.

1.2 General Principles

GO will provide an 'always on' connection on a VULA FTTP Connection. This connection will be able to carry data communication signals after commissioning.

The service will consist of:

- Physical network connectivity between the end user premises and the GO point of handover to OAO network.
- A Service-VLAN per service per OLT per OAO.

1.3 HD Interface Description

The identified interface option and location for the connection will be the Interface Panel owned and provided by GO. The interface is the LCAPC connector on the patch panel.

1.4 Backhaul

The OAO may at its own discretion connect at the HP either by patching to the port on the GO installed patch-panel inside the OAO rack within GO's Exchange Building/ s or opt for a wholesale Ethernet connection from the HP to the OAO's remote site.

2 Technical Aspects

GO will provide VULA FTTP Connections over Ethernet using PON technology. Wholesale access will be provided using a layer 2 Ethernet solution.

2.1. Handover Point

The HP/ 's is/ are at the core level and is/ are connected to GO's metro Ethernet network. The traffic shall be L2 P2P metro Ethernet services. Each OAO will be connected via a 10G link set on the following profile:

Interface speed	Committed	Burst
10Gbps	1Gbps	10Gbps

The provided 10G interface will be based on 10GBASE-LR Module supporting a link length of around 10 kilometres (dependent on attenuation) on standard single-mode fibre (SMF, G.652).

Based on the OAO forecasts as specified in Annex E1, GO shall be responsible for maintaining its network dimensioning so that any congestion detected in the back-haul links is resolved in a timely manner.

Currently there is no resiliency between the active access nodes and the core elements and manual intervention would be required whenever a fault occurs. The core node at the Exchange Building/ s is carrier grade equipped with full resiliency providing high availability. Should there be a capacity issue on the hand-over link due to increase in demand an additional interface can be activated within ninety (90) days from ordering. In addition the equipment room at the Exchange Building/ s is equipped with dual generators and redundant UPS / AC units.

Starting from first physical connection between GO and the OAO, the following illustrative list of tests will be carried out:

Redundant and resiliency tests - depend on hardware and software failover mechanisms agreed;

Service/Configuration Tests - to ensure provisioned service to agreed SLA;

Ramp Tests - can be used to measure agreed SLA parameters at each step;

Burst Tests - to ensure agreed SLA under burst conditions;

Performance Tests - after services validated, this testing validates performance over time;

Loopback or Bidirectional testing to measure agreed SLAs independently in each direction;

A more detailed testing protocol will be agreed with the OAO at least one month prior to the expected start of testing.

2.2 FTTP Connection

For unicast transmission, GO's present model envisages an S-VLAN per Service per OLT per OAO. Since the service is layer 2, the only limitation regarding scalability is the number of VLANs and maximum capacity of the aggregated connection at the HP. Each service level would be bandwidth limited so that it is not possible for any service provider to transmit excessive traffic that might disrupt other services.

The handover point at the User side will be set to untrusted since such action will affect not just the OAO QoS providing the User service but also that of customers of GO and other OAO.

The launch of a new OAO will require a lead time of a maximum of six months from the signature date of the VULA agreement, including the time required for GO to procure and install the necessary network components in its network¹.

2.3 Description of the S-VLAN

Table 1 describes the Ethernet characteristics facing the User CPE.

The maximum number of VLANs per ONT (distributed among the Ethernet ports or all on one port) is 8.

The maximum number of MAC addresses per Ethernet port UNI is 8.

¹ GO's experience on its own network is that this is a challenging process that requires extensive deployment effort. The duration of this process depends among other on the complexity of the required functionality and on the technical preparedness of the OAO.

Service	Internet Access	Video	Voice
Bandwidth Downstream	As per GO wholesale profiles	50Mbps	256kbps
Bandwidth Upstream	As per GO wholesale profiles	256kbps	256kbps
Maximum Transmission unit (MTU)	1500 bytes	1500 bytes	1500 bytes
VLAN Tags	VLAN 2	VLAN 4	VLAN 3
Expected Jitter (Access part only)	12 ms	12 ms	12 ms
Expected Packet Loss (access part only)	< 0.5%	< 0.5%	< 0.5%
Typical Round Trip Delay (Access part only)	12 ms	12 ms	12 ms
CPE Authentication	Not Applicable	Not Applicable	Not Applicable
DHCP Option 82	Supported	Supported	Supported
PPPoE Relay Tag	Supported	Supported	Supported
IGMP snooping	Not Applicable	Supported	Not Applicable
Ethernet 10BaseT	Auto	Auto	Auto
Ethernet 100BaseT	Auto	Auto	Auto
Ethernet 1000BaseT	Auto	Auto	Auto

Table 1 Description of the Ethernet characteristics facing the User CPE

2.4 Transparency

The service will not be transparent to:

- 802.3x PAUSE
 - Local link flow control protocol
- Slow Protocols - Set of protocols that includes LACP and 802.3ah OAM
- 802.1X Authentication
 - Authentication protocol
- Physical layer signalling such as auto-negotiation
- Layer 2 control protocols

This list is not exhaustive as there could be other features to which the VULA FTTP Connection is not transparent.

2.5 Quality of Service

GO's model for QoS is based on S-VLAN prioritisation. There shall be four different S-VLANs, namely Residential Internet, Business Internet, video and voice.

Specifically, Service-VLANs are prioritised in the following order:

Service	Priority*	Queue Strategy	Weight/ Priority
Voice	1	Strict Priority	0 / 8
Video	2	Strict Priority	0 / 7
Business Internet	3	Weighted Round Robin	66 / 6
Residential Internet	4	Weighted Round Robin	34 / 6

This model is designed to assure fair bandwidth allocation to all services on the same GPON.

Subject that the OAO does not exceed the VULA FTTP Connection bandwidth capacity towards GO, the downstream traffic can be shaped through policing by the OAO, enabling the offering of different contention ratios. Upstream traffic will be controlled using a GPON allocation method common to GO and the OAO.



2.6 Bandwidth Profiles

GO will offer wholesale profiles that will allow access to its network on a non-discriminatory basis. The wholesale profiles will thus give OAOs access to the same profiles enjoyed by GO's retail arm. Such profiles are described in Annex B2.

2.7 The ONT

The demarcation point of GO's network inside the User premises shall be the Ethernet interface on the ONT. GO will provide, install activate and operate the ONT. The ONT will have one Ethernet port. End-users requiring services from more than one retail provider may be equipped with a multiple Ethernet port ONT.

The ONTs currently used by GO are specified at Appendix 1 of this Annex. These are subject to change without advance notice due to supplier or technology of GO network requirements. GO shall however endeavour to do its best to communicate in advance any changes to the ONT within 30 days, especially if such changes are triggered by GO network requirements.

Based on ONTs currently in use, the OAO may connect its own gateway or Set Top Box to the Ethernet port provided it is 802.1Q compliant.



Appendix 1 – List of GO's ONTs

- Alcatel-Lucent 7342 Intelligent Service Access Manager (ISAM) Indoor Optical Network Terminal (ONT) I-o10G-U.