

Technical Requirements				Mandatory/ Optional
Technical Section		Req n°	Req Description	
<b>Section 1: Casing</b>				
		1	The ONT MUST be either black or white (RAL 9010)	M
		2	The Ethernet port MUST be red	O
			The ONT MUST be equipped with 4 LED as on existing products :	
		3	<ul style="list-style-type: none"> <li>• Power</li> <li>• Optical</li> <li>• LAN</li> <li>• Alarm/update</li> </ul>	M
			The ONT SHOULD be equipped with 5 LED :	
		4	<ul style="list-style-type: none"> <li>• Power</li> <li>• Optical</li> <li>• LAN</li> <li>• Alarm</li> <li>• Update</li> </ul>	O
		5	The packaging MUST include a White (9010) Ethernet cable (2 meters).	M
		6	The color of Ethernet connectors SHOULD be Orange (151C)	O
<b>Section 2: Optical Layer requirements</b>				
		7	The G-PON ONT Data rate MUST comply with ITU-T G.984	M
			The G-PON ONT transmission MUST comply with ITU-T G.984 series with the following options	
		8	<ul style="list-style-type: none"> <li>• PMD performances compliant with class B+ (ITU-T G.984.2 amd1)</li> <li>• Upstream FEC so that the G-PON ONT enables optional activation to achieve class C+ performance according to the OLT requirements (ITU-T G.984.2 amd2)</li> </ul>	M
		9	The Full G-PON stack processing MUST include full PLOAM handling and framing as standardized in ITU-T G.984.3	M
			The optical filters enabling overlay capability with RF Video, optical monitoring and NG-PON generations MUST be supported :	
		10	<ul style="list-style-type: none"> <li>• The transmitter wavelength MUST be compliant with ITU-T G.984.5 amendment 1: 1290-1330nm</li> <li>• The G-PON ONT MUST include a wavelength blocking filter according to ITU-T G.984.5 to protect its diplex transmission against RF Video, monitoring via 1650nm OTDR and NG-PON systems</li> </ul>	M

11	The G-PON ONT supports auto-sensing between ITU-T G.984 and G.985 or G.986 on the optical interface	O
12	The G-PON ONT MUST be compatible with a SC/APC optical connector as PON interface as describe in CEI 61754-4, CEI 61755-2-2 and CEI 61755-3-2	M
13	Does the SFP G-PON ONT come with dust cover?	M
14	The ONT vendor MUST provide the optical datasheet of their module	O
<b>Section 3: Interoperability requirements</b>		
15	The G-PON ONT MUST comply with ITU-T standards G.988 and associated documents like amendments / appendices	M
16	The G-PON ONT MUST comply with all MEs used in BBF.247 certification	M
17	The G-PON ONT MUST comply with MEs given in annex 1 (list of G.988 MEs )	M
18	The G-PON ONT vendors MUST provide the list of ME supported by the ONT to Orange and its OLT vendors	M
19	The G-PON ONT MUST comply with the following Broadband Forum standards • TR-156 issue 3 : All Mandatory requirements and the following optional requirements have to be supported (R-49, R-95, R-114 to R-119, R-123)	M
20	The G-PON ONT MUST be BBF.247 issue 1 certified or BBF.247 issue 2 or issue 3 certified with the following profiles: • Profile A – N:1 VLAN Architecture • Profile B – 1:1 VLAN Architecture • Profile C – VBES VLAN Architecture • Profile D – Multicast Operations • All ONT/L2 devices under certification must support the Baseline Profile requirements	M
21	The G-PON ONT vendor MUST provide to Orange the test report of the BBF.247 certification written by the Independent Test Labs in charge of BBF.247 certification	M
22	The G-PON ONT MUST comply with the WT-280 Broadband Forum standard	M
23	The G-PON ONT MUST support OLT-G ME Is your G-PON ONT already deployed on the field?	M
24	If yes, please precise the volume of these deployed G-PON ONT and the OLT references they are connected to (HW & SW versions)?	M
<b>Section 4: Functional requirements</b>		
25	The GPON ONT MUST support 5 T-CONT (4 user operational T-CONT + 1 T-CONT for OMCI purpose) For each T-CONT, the GPON ONT MUST support any T-CONT type as defined in ITU-T G.984.3	M

26	The G-PON ONT support all G.988 ME which are described in BBF.247	M
27	The G-PON ONT MUST comply with MEs given in annex 1 (list of G.988 MEs )	M
28	<p>The G-PON ONT vendor commits to provide the following documentation to Orange and its selected OLT vendors :</p> <ul style="list-style-type: none"> <li>• Standard OMCI layer precise description including all OMCI MEs and all attributes implemented in the system</li> <li>• Standard PLOAM layer precise description including all PLOAM messages implemented in the system</li> <li>• All relevant features/mechanisms/messages/behaviors description</li> </ul>	M
29	The G-PON ONT vendor MUST provide a two years vision on the certified equipment roadmap including a one year commitment	M
30	The ONT vendor MUST provide 32 samples of ONT FOC (Free of Charge ) to each of the OLT vendors selected by Orange.	M
31	The ONT vendor MUST provide 32 samples of ONT FOC (Free of charge) to Orange Labs in order to allow the interoperability validation in Orange Labs.	M
32	In case of software evolution, the supplier MUST pass the certification	M
33	The G-PON ONT MUST provision the Cardholder ME for ethernet interface with the following parameters for the attribute "Managed entity id" its value MUST be 0x0101 for the 'plug in type"; the value is 47 or 24 and 34 see table 9.1.5-1 [ITU-T G.988 (2012)] (47 is the recommended value for the PPTP Ethernet UNI interface)	M
34	The G-PON ONT MUST support Status Reporting DBA	M
35	The G-PON ONT MUST support downstream AES for OMCI and unicast user GEMport	M
36	The G-PON ONT MUST support several GEM ports associated to a single T-CONT with the following configuration: all GEM port share the same queue (See [ITU-T G.988 2012] annex II section II.1.2)	M
37	In upstream direction, The G-PON ONT MUST support 4PQs	M
38	In upstream direction, The GPON ONT SHOULD preferably support at least 8 PQs	M
39	Each PQ (upstream and downstream) MUST support the association with many GEMports	M
40	In downstream direction, The ONT MUST support 8 ME "Priority Queue" (see annexe 3)	M
41	<p>In downstream direction, the range of attribute "Manage entity id" for the ME "Priority queue" MUST be 0x0000 to 0x0007 for ONT with 8PQ in the downstream. (see annexe 3)</p> <ul style="list-style-type: none"> <li>• The lower priority queue has the ME Manage entity id value 0x0000</li> <li>• The highest priority queue has the ME Manage entity id value 0x0007</li> <li>• Strict priority is applied between priority queue</li> </ul>	M

42	<p>In downstream direction, the G-PON ONT MUST support strict priority based on pbit value at the U interface (pbit 7 has the highest priority and pbit 0 the lowest) if the attribute "Priority queue pointer for downstream" of ME GEMport network CTP has a null value (0) (i.e. the attribute point to the priority queue with the Manage entity id value 0x0000) (see annexe 3 and [ITU-T G.988 2012] section 9.2.3 and 9.2.10)</p>	M
43	<p>In downstream direction, the G-PON ONT MUST support strict priority based on pbit value at the U interface (pbit 7 has the highest priority and pbit 0 the lowest) if the attribute "Priority queue pointer for downstream" of ME GEMport network CTP has an unknow priority queue Manage Entity ID for the ONT but sent by the OLT (see annexe 3)</p>	O
44	The G-PON ONT MUST support at least 8 simultaneously active VLAN per U interface	M
45	The G-PON ONT MUST support at least 16 user GEMPort + 1 OMCI GEMport	M
46	The G-PON ONT SHOULD support at least 32 user GEMPort + 1 OMCI GEMport (i.e. 4 GEMport per VLAN)	O
47	The ONT MUST support at least 32 entries in the Extended VLAN tagging operation table including the auto created default entries	M
48	<p>The ONT vendor MUST provide the maximum number of entries in the Extended VLAN tagging operation table, including the auto created default entries</p> <p>After one of the following case the ONT MUST perform a MIB Reset:</p> <ul style="list-style-type: none"> <li>• Electrical power off/on</li> <li>• Electrical cable disconnection</li> <li>• Software reboot (via OMCI)</li> </ul>	M
50	The ONT vendor MUST indicate the maximum number of connected devices (No limitation of the MAC address table)	M
51	The G-PON ONT MUST not by default perform MAC filtering or learning unless requested by the OLT	M
52	The "white list" table entries of IPv4 and IPv6 Multicast for the G-PON ONT MUST be at least 1024 wide	M
53	<p>The ONT support the following IPv6 Multicast features:</p> <ul style="list-style-type: none"> <li>• MLD v2 transparent snooping</li> <li>• Immediate leave support</li> <li>• The ONT MUST support Multicast Admission Control and Multicast Access Control functions, as defined in TR-156</li> </ul>	M

54	The ONT MUST support all possible code point values (0 to 8) for the downstream mode attribute of the Extended VLAN tagging operation configuration data ME [ITU-T G.988 2012] (see annex 3 for recommended implementation)	M
55	The ONT MUST support "Upstream IGMP TCI" and "Upstream IGMP tag control" attributes for the ME "Multicast Operation Profile" [ITU-T G.988 2012] (see annex 3 for recommended implementation)	M
56	The ONT MUST support the "Downstream IGMP and multicast TCI" attribute for the ME "Multicast Operation Profile" [ITU-T G.988 2012] (see annex 3 for recommended implementation)	M
57	The ONT SHOULD support ONT power managment [Annex E of the ITU-G-984.3 (2014)]	O
58	The ONT vendor MUST indicate if the buffer occupancy is managed in : - bytes - packets - other	O
59	The ONT vendor MUST indicate the size of the buffer for each queue. - bytes - numbers of packets maximun size in bytes of the packet	O
60	The ONT vendor MUST indicate the type of buffer (eg shared buffer pool, one queue per PQ, ...)	O
<b>Section 5: OAM requirements</b>		
61	The ONT must be compliant with all alarms and all notifications signals which are described in chapter 11 Alarms and performance monitoring [ITU-T G.984.3 Jan 2014]	M
62	The ONT must report on OMCI message to the OLT when it rejects the configuration requested by the OLT, in accordance with section A3 of ITU-T G.988 ver. 2012. The ONT rejects if the current configuration is beyond the actual capabilities of the ONT or if the software of ONT is abnormal. The ONT MUST report software status in accordance with ITU-T G.988 version 2012, its appendix I.3 and the message format as specified in section A.3.	M
63	- Software download is acheived with success or fail - Activation of the new ONT Software is acheived with success or fail - Commit of the new ONT Software is achieved with success or fail	M
64	The ONT must accept any request for performing one remote ONT reset	M
65	The ONT must have one remote debug entity in accordance with clause 9.1.12 and Appendix I.2.8 which permits to send vendor-specific debug commands to the ONT and receive vendor-specific replies back for processing on the OLT [ITU-T G.988 Oct 2012]	M

66	The ONT must have the ability to starts remote logs, without site visit, which permits to the ONT vendor to find the root cause of fault / bad behavior which have one service affecting.	M
67	One limited remote maintenance and troubleshooting, for the operator use , should be performed into ONT without any site visit.	O
68	The ONT vendor should deliver a document describing how the operator can perform remonte maintenance and troubleshooting.	O
	The Optical line data at ONT level must be in accordance with the following performance items which are described in Table IV.1 [ITU-T G.984.2 Amd.2 (03/2008)]	
69	<ul style="list-style-type: none"> <li>• ONT transmit power;</li> <li>• ONT receive power.</li> </ul> All the above parameters should be monitored continuously in real time.	M
	The G-PON ONT supports the optical power parameter monitoring enhanced accuracy as defined below:	
70	<ul style="list-style-type: none"> <li>• ONT Transmit Power accuracy : +/- 3 dB</li> <li>• ONT receive power accuracy : +/- 3 dB</li> <li>• ONT receive power repeatability : +/- 0,5 dB</li> </ul>	M
	The G-PON ONT supports the optical power parameter monitoring enhanced accuracy as defined below:	
71	<ul style="list-style-type: none"> <li>• ONT Transmit Power accuracy : +/- 1,5 dB</li> <li>• ONT receive power accuracy : +/- 1,5 dB</li> <li>• ONT receive power repeatability : +/- 0,3 dB</li> </ul>	M
	The Optical line data at ONT level must be in accordance with the following performance items which are described in Table IV.1 [ITU-T G.984.2 Amd.2 (03/2008)]	
72	<ul style="list-style-type: none"> <li>• ONT Transceiver temperature ;</li> <li>• ONT Transceiver voltage ;</li> <li>• ONT Laser bias current ;</li> </ul> All the above parameters should be monitored continuously in real time.	M
73	The ONT must respect strictly the clause 9 and I.4 [ITU-T G.988 Oct 2012] for the Performance Monitoring	M
74	The ONT must permit to the OLT to deliver the PON fibre distance measurement from the OLT to a ONT. The estimate should be approximately $\pm 1\%$ accurate as it is mentionned in clause 10.3.6 [ITU-T G.984.3 Jan 2014]	M

75	The following Managed Entities and all associated attributes described in ITU-T G.988 Section 9.1.1 ONT-G MUST be implemented	M
76	<p>The following Managed Entities and all associated attributes described in ITU-T G.988 Section 9.5.1 Physical path termination point Ethernet UNI MUST be implemented</p> <ul style="list-style-type: none"> <li>• The configuration status of the Ethernet UNI must be indicated.</li> <li>• The alarm LAN-LOS which translates No carrier at the Ethernet UNI must be supported</li> </ul> <p>In section 9.5.1, the ONT can send vendor-specific alarms.</p> <p>What are Vendor-specific alarms that the ONT can report ?</p>	M
77		O
78	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.3.30: Ethernet frame performance monitoring history data upstream</b> MUST be implemented	M
79	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.3.31: Ethernet frame performance monitoring history data downstream</b> MUST be implemented	M
80	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.5.2: Ethernet performance monitoring history data</b> MUST be implemented	M
81	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.5.3: Ethernet performance monitoring history data 2</b> MUST be implemented	M
82	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.5.4: Ethernet performance monitoring history data 3</b> MUST be implemented	M
83	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.2.9: FEC performance monitoring history data</b> MUST be implemented	M
84	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.2.13: GEM port network CTP performance monitoring history data</b> MUST be implemented	M
85	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.2.8: GAL Ethernet performance monitoring history data</b> MUST be implemented	O
86	<p>The ONT should implemented Multicast GEM port performance monitoring history data as described below:</p> <ul style="list-style-type: none"> <li>• GEM Multicast Received Bloks</li> <li>• GEM Multicast Received Fragments</li> <li>• GEM Multicast Fragments Lost</li> </ul>	M
87	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.3.29: Multicast subscriber monitor</b> MUST be implemented	M
88	The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.12.16 BBF TR069 Management server</b> MUST be implemented	O

89	<p>The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.3.32 Ethernet frame extended PM (32bits)</b> MUST be implemented</p> <ul style="list-style-type: none"> <li>• (11) Physical path termination point Ethernet UNI in upstream for all Pbits</li> <li>• (11) Physical path termination point Ethernet UNI in downstream for all Pbits</li> <li>• (11) Physical path termination point Ethernet UNI in upstream for all VID</li> <li>• (11) Physical path termination point Ethernet UNI in downstream for all VID</li> <li>• (266) GEM interworking termination point up in upstream for all GEMport</li> <li>• (266) GEM interworking termination point up in downstream for all GEMport</li> </ul> <p>The following Managed Entities and all associated attributes described in ITU-T G.988 <b>Section 9.3.34 Ethernet frame extended PM 64-Bit [ITU-T G.988 amd1 2014]</b> MUST be implemented</p> <ul style="list-style-type: none"> <li>• (11) Physical path termination point Ethernet UNI in upstream for all Pbits</li> <li>• (11) Physical path termination point Ethernet UNI in downstream for all Pbits</li> <li>• (11) Physical path termination point Ethernet UNI in upstream for all VID</li> <li>• (11) Physical path termination point Ethernet UNI in downstream for all VID</li> <li>• (266) GEM interworking termination point up in upstream for all GEMport</li> <li>• (266) GEM interworking termination point up in downstream for all GEMport</li> </ul> <p>The G-PON ONT MUST support the exchanges of the alarms &amp; PM counters between ONT &amp; OLT with the rules defined in the recommendations ITU-T G.988, including appendix 1 &amp; 2</p> <p>The G-PON ONT counters MUST be accurate within <math>\pm 1</math> frame</p> <p>The ONT MUST allow to read the type and status for each U interface</p> <p>The ONT MUST send event notification for operational status changes on the U interface</p> <p>The U Ethernet interface type MUST be configurable by:</p> <ul style="list-style-type: none"> <li>• Ethernet synchronization mode</li> <li>• Ethernet synchronization speed</li> </ul> <p>The ONT vendor MUST provide information about the GPON and LSW chipsets models.</p>	M
<b>Section 6: Provisionning and management requirements</b>		
97	The G-PON ONT MUST fully support the provisionning using OMCI through the network	M
98	The G-PON ONT MUST support authentication through Reg-Id and Serial Number methods according to TR-156	M
99	The G-PON ONT MUST support the switch between Reg-Id and Serial Number authentication methods	M
100	The G-PON ONT MUST support permanent Reg Id	M
101	The Reg-ID MUST not contain any space character	M



102	The G-PON ONT vendor MUST documents all the limitations concerning the Reg-ID (minimun/maximum length and characters set allowed)	M
103	The G-PON ONT vendor MUST provide the procedure to change Reg-ID	M
104	The G-PON ONT MUST support entering the Reg-ID via a computer connected to the Gateway which is connected to the G-PON ONT via its Ethernet LAN port as defined in BBF TR-155	O
105	The G-PON ONT MUST support entering the Reg-ID via a computer directly connected to its Ethernet LAN port based on http and the adress to join the page MUST be 192.168.4.254	M
106	If you have http interface, what kind of information is provided with this interface?	O
107	This management IP adress MUST NOT be 192.168.1.1	M
108	This management IP adress MUST NOT change whatever software, hardware upgrade during ONT life cycle.	M
109	<p>The G-PON ONT must report through its status LEDs the following information :</p> <ul style="list-style-type: none"> <li>• ONT on/off</li> <li>• ONT in ranging and synchronization process</li> <li>• ONT ranged and password authenticated</li> <li>• ONT is under software upgrade</li> <li>• ONT software upgrade failed</li> <li>• ONT received G-PON Optical signal (active only upon G-PON downstream frame recognition)</li> <li>• ONT LOS/LOF</li> <li>• Eth Link on/off</li> <li>• Eth link is up and there is activity of receiving and transmitting data</li> </ul>	M
110	The G-PON ONT MUST support the Dying Gasp	M
111	The G-PON ONT MUST not transmit data in GEMport and T-CONT before all PLOAM and OMCI configuration have been completed and grant allocated.	M
112	<p>The G-PON ONT MUST never have rogue behavior (during activation, reboot, MIB synchro, LOS, reboot after software download)</p> <p>The G-PON ONT MUST boot/reboot and the services be back up in less than 60 seconds, for :</p> <ul style="list-style-type: none"> <li>• Electrical power off/on</li> <li>• Electrical cable disconnection</li> <li>• Software reboot (via OMCI)</li> </ul>	M
<b>Section 7: Firmware upgrade requirements</b>		
114	The G-PON ONT MUST support the ONT software upgrade using OMCI/OMCC	M
115	The G-PON ONT software upgrade MUST comply with G.988 and its appendix I.3	M

116	The ONT software type MUST be binary	M
117	The length size of the software name MUST be under 13 ASCII characters	M
118	The G-PON ONT MUST support a mechanism that will prevent the G-PON ONT failure in case of software update crash	M
119	The G-PON ONT MUST store the attribute "Version" of the ME ONT-G of the ITU-T G.988 recommendations This attribute "Version" represents the hardware version of the ONT.	M
120	The maximum string size of the attribute "Version" MUST be shorter or equal to 14 characters	M
121	The 5 first characters of the attribute "Version" MUST be the same as the software name	M
122	Version Name: VEND1XXXXXXXX : VEND1 is the name of the vendor and X up to 9 characters can ONLY be any ASCII arrangement of digits, letters or dot	M
123	The Version Name MUST be the same during all the life of the ONT (e.g. Software upgrade or downgrade MUST NOT change it)	M
124	The ONT software file MUST NOT include service configuration	M
125	Software File name MUST be shorter or equal to 13 characters	M
126	Software File name MUST be VEND1XXXXXXXX : VEND1 is the name of the vendor's 5 first letters and X up to 8 ASCII characters can ONLY be any arrangement of numbers, letters or dot	M
127	The ONT software file name MUST be the same as the reported Software Image Name (ME Software Image, attribute : Version)	M
128	The G-PON ONT MUST have two ONT software image memory slots	M
129	The G-PON ONT MUST support the ONT software download without services interruption	M
130	The G-PON ONT software size SHOULD be less than 7MB	O
131	The G-PON ONT software size MUST be less than 16MB	M
132	The Laser MUST not transmit power during a reboot phasis.	M
133	The maximum software download duration MUST take less than 1 min for 7MB maximum software size (OMCI data rate of 1024kbit/s)	M
134	The maximum software download duration MUST take less than 3 min for 16MB maximum software size (OMCI data rate of 1024kbit/s)	M
135	the ONT vendors must provide the current duration of software download (precise the size and the data transfer rate)	M
136	The G-PON ONT MUST take less than 60seconds to reboot and to have services up after ONT software activation	M

	The average time of cutt off to activate the new software should be less than 60 seconds.	
137	If no, the vendor must deliver the average time for its ONT to activate the new software and the time when the services are affecting	M
138	THE G-PON ONT Vendor MUST deliver 3 working ONT software files for the same ONT hardware version	M
<b>Section 8: Performance requirements</b>		
139	<p>The ONT MUST provide Giga Ethernet LAN port 802.3 compliant with a RJ45 connector.</p> <p>The Ethernet port MUST:</p> <ul style="list-style-type: none"> <li>• Support auto rate and duplex negotiation</li> <li>• Have also an auto MDI/MDI-X support to accept both standard straight through cable and cross-over cable</li> </ul>	M
140	In full power mode the Ethernet UNI of G-PON ONT MUST support at least a line rate of 1Gbit/s downstream and upstream	M
141	Provide G-PON ONT throughput evolution curves versus size frames (64, 128, 1024, 1518, 2000 bytes) ITU-T Y.1564	M
142	Provide the supported MTU (Maximum Transmission Unit) of the frame for each G-PON ONT type (SFP, simple, complex).	M
<b>Section 9: Environmental requirements</b>		
	<b>1. Declaration of conformity</b>	
143	The ONT and power supply MUST be CE marked 93/68 EU	M
	<b>2. EMC</b>	
144	The ONT and power supply MUST comply with European directive 2014/30/EU	M
145	The supplier MUST provide test report ETSI EN 300 386 for ONT and power supply.	M
146	The supplier MUST provide test report ETSI ES 201 468 level 2 for ONT and external power supply	M
	<b>3. Safety</b>	
147	The supplier MUST provide test report EN 60950-1 for ONT and power supply	M
	<b>4. Resistibility</b>	
148	The supplier MUST provide test report ITU-T K.21 enhanced levels for ONT and power supply	M
	<b>5. Power supply</b>	
149	The ONT and power supply MUST be compliant to Low Voltage Directive (LVD) 2014/35/EU	M
150	The supplier MUST provide test report ETSI EN 300 132-3 for ONT and power supply	M
151	The power supply MUST comply with ITU-T L.1001	M

152	The ONT and power supply MUST be compliant with enclosed Orange specifications for power supply unit	M
<b>6. Thermal/ Climatic</b>		
153	The supplier MUST provide test report ETSI EN 300 019-1-3.cl3.2 (V2.3.2) for ONT and power supply	M
<b>7. Mechanical</b>		
154	The supplier MUST provide test report ETSI EN 300 119 for ONT and power supply	M
<b>8. Acoustic</b>		
155	The supplier MUST provide test report ETS 300 753 for ONT and power supply	M
<b>Section 10: Eco conception / green</b>		
<b>1. Regulatory and environmental industry standards requirements</b>		
156	The supplier MUST indicate which industry standards related to environment it complies for this device and its accessories	M
157	The supplier MUST indicate: <ul style="list-style-type: none"><li>• All RoHS exemptions applied to the device (i.e. the EEE: Electrical and Electronic Equipment) , including its cables and its spare parts;</li><li>• Parts of the EEE containing substances restricted by RoHS Directive, which exceeds the RoHS threshold.</li></ul>	M
<b>2. Environmental policy and communication</b>		

The product supplier MUST perform a Life Cycle Assessment (LCA) on the final version of the product (including device, accessories, packaging) according to ISO 14040 and ISO 14044. Additionally the LCA should be performed according to ETSI TS 103 199 standard: "Environmental Engineering; Life Cycle Assessment (LCA) of ICT equipment, networks and services; General methodology and common requirements" and ITU L.1410 standard "Methodology for the assessment of the environmental impact of information and communication technology goods, networks and services"

The LCA report MUST be delivered to Orange on demand.

The functional unit shall be :

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- Annual ICT Goods use (per one year of ICT Good use), or
  - Total ICT Good use per lifetime of ICT Good.

The LCA report MUST provide following information on demand:

- Goal and scope : functional unit, reference flow, detailed system boundaries and related cut-off rules
- Modelling hypothesis: description of production, operation, use and End of Life scenarios. For instance, plants location, transportation distances, transportation means, electric consumption calculation hypothesis for the use scenario
- Complete inventory data set: average and generic inventory data sets used (modules' name and database release)

M

### 3. Material efficiency

Indicate if the substances listed below are contained in the product:

- Gold (CAS 7440-57-5)
- Tin (CAS 7440-31-5)
- Tantalum (CAS 7440-25-7)
- Tungsten (CAS 7440-33-7)
- Copper (CAS 7440-50-8)
- Silver (CAS 7440-22-4)
- Lithium (CAS 7439-93-2)
- Cobalt (CAS 7440-48-4)
- Silicon (CAS 7440-21-3)
- Graphite (CAS 7782-42-5)
- Antimony (CAS 7440-36-0)
- Germanium (CAS 7440-56-4)
- Bismuth (CAS 7440-69-9)
- Platinum (CAS 7440-06-4)
- Palladium (CAS 7440-05-3),
- Ruthenium (CAS 7440-18-8)
- Rhodium (CAS 7440-16-6)
- Osmium (CAS 7440-04-2)
- Iridium (CAS 7439-88-5)
- Rare earth elements (according to the IUPAC definition), such as neodymium (CAS 7440-00-8)
- Indium (CAS 7440-74-6)

- Note 1: Accessories, packaging items and power supply units are out of the scope of this measurement,

- Note 2: the threshold value for “contained / not contained” is set at 1000 ppm.

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#### 4. Product packaging

The packaging MUST be made of single wall corrugated board, with high percentage of recycled content (at least 50 %).

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The cardboard box SHALL not be varnished or coated.

The ink used for mandatory conformity marking (such as “CE”) and product reference marking MUST be vegetable based.

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#### 5. Energy efficiency

161	The ONT MUST be compliant with EC Regulation 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment, including	M
162	The ONT MUST comply with the latest published version of the European "Code of Conduct on Energy Consumption of Broadband Equipment"	M
163	The tier values to be taken into account are those including the year of the product launch date. The device MUST have a power on/off switch that upon asking for a power-down must first sent a "Dying gasp" message (see ITU-T G.984.3) before effectively turning off the device, enabling operators to differentiate an intentional power shutdown from a failure.	M
164	The ONT MUST adjust its power consumption to the actual needs following basic rules: <ul style="list-style-type: none"> <li>• Default initial power status of interfaces is "off", but for the management/provisioning enabling interface that should work at lowest consumption mode waiting for activation</li> <li>• Only logically provisioned interfaces or interfaces under test should be powered "on".</li> <li>• Power mode should be automatically adjusted to actual traffic load to be conveyed</li> </ul> The ONT MUST implement protocol managed power saving modes as described in (ITU-T G.984.3 (2014) and G.988) therein supporting low power modes on its PON interface with publishing its performances and requirements enabling to adjust the OLT timers (Taware, Tsleep ...).	M
165	The ONT MUST resume operation in the shortest delay when the user sends traffic to the UNI.	M
166	The ONT MUST be able to handle Dozing, Cyclic sleep and Watchful sleep modes as defined in G.983.4 (2014) without introducing any interoperability issue nor rogue behavior on the PON.	M
167	The ONT MUST implement EEE with LPI messages as defined in IEEE 802.3az on its GigE UNI.	M
168	In presence of battery back-up and when lifeline services are offered. Power shedding algorithm see ITU-T G.Sup45 and G.988 MUST extend the lifeline service duration by shutting down low priority UNI.	M
169	The Wi-Fi interfaces MUST go into a low power mode (e.g. power down RF chains in MIMO systems) when no user traffic is transmitted for a configurable period (e.g. 2 minutes). The Wi-Fi interface MUST be able to handle user traffic within 1 second by leaving the low power mode.	M
170	Firstly, the power of FXS interface MUST follow the VoIP provisioning. The FXS power chain MUST be in power down state when the user has not subscribed to VoIP service (and vice versa). Secondly, the FXS interface MUST detect a phone connected on FXS interface. If there is no connected phone, the FXS interface MUST be in power down state.	M

- |     |   |   |
|-----|---|---|
| 171 | Between two phone calls, the FXS DSP MUST be in low power mode. For an incoming or outgoing call, the time to resume MUST be as short as possible: the user MUST be able to make outgoing calls or receive incoming calls with a maximum additional delay caused by the energy saving mechanisms of 1 second.                                     | M |
| 172 | A scheduling function MUST allow users to manage power consumption depending on their use case and optionally defining profiles for each time slots of the day and of the week.   | M |
| 173 | The external Power Supply MUST comply with the European "Code of Conduct on Energy Efficiency of External Power Supplies" version 5 (ref. [R20]). The values to be taken into account are those including the year of the product delivery date.  | M |
| 174 | The external power supplies of the ONT MUST be compliant with The EC Regulation N°278/2009 [R19] of 6 April 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies. | M |

#### 6. Product refurbishment

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|-----|--|---|
| 175 | The dismantling of the product MUST be practicable by a technician within 5 minutes AND without specific tools.<br>Note: use of cutting and dangerous tools such as knife or retractable blade utility knife is to be avoided        | M |
| 176 | Glue and welds MUST NEVER be used for assembling housing parts together.<br>Use of clips SHOULD be avoided for assembling housing parts together, if possible.   | M |
| 177 | In order to facilitate the device's dismantling and reassembly, all the electronic parts (printed board, antenna, connectors,) MUST be fixed to the electronic board. They MUST NOT disconnect and fall when dismantling the device. | M |
| 178 | The existing housing appearance, especially its color, MUST not be altered throughout the lifetime of the device, due to power heating of inside components and UV. For instance, housing should not turn yellow or discolored.      | M |

#### 7. End Of Life



179	<p>Are the base materials and additives (such as fillers, plasticizers and flame retardants) contained in plastic parts (i.e. plastics, rubbers and thermoplastic elastomers), whose weight is greater than 25 g, indicated through a marking in conformance with ISO 11469 and associated standards listed in table below ?</p> <ul style="list-style-type: none"> <li>• Component Type ISO Reference</li> <li>• Base material(s) Plastics ISO 1043 part 1</li> <li>• Rubbers ISO 1629</li> <li>• Thermoplastic elastomers ISO 18064</li> <li>• Fillers and reinforcing materials N/A ISO 1043 part 2</li> <li>• Plasticizers N/A ISO 1043 part 3</li> <li>• Flame retardants N/A ISO 1043 part 4</li> </ul> <p>This requirement applies to plastic parts of the whole product, that is to say plastics parts in the device, in its accessories, in its primary packaging</p>	M
180	<p>All plastic parts SHALL consist of one material or of easily separable materials or of compatible materials.</p> <p>No bi-injection, no metallic inlays in plastic parts.....</p> <p>Note: IEC 62075 Annex B provides a list of compatible polymers</p>	M
181	<p>The use of coating and surface finishes on plastics parts SHALL be avoided in covers/housing.</p>	M
182	<p>Provide estimation for extra cost if electrical cable insulation materials for signal cables (Ethernet e.g.) &amp; power cables are PVC free.</p>	M
<b>8. Quantitative requests</b>		
183	<p>For each proposed ONT, the vendor SHALL provide the power consumption (in Watt) in accordance with the standard profile defined in the last available release of BBCoC. (BBCoC v5 as of today).</p>	M
184	<p>To follow the ONT behavior in function to the Throughput (from 0 Mbit/s to the maximum), the vendor SHALL provide the curve of power consumption (in W) according to the throughput (in Mbit/s, with step equal to 10 Mbit/s up to 100Mbit/s, then a step of 100Mbit/s onwards to max throughput).</p> <p>The power consumption measurement will have to be performed in a stabilized environment (temperature of the chip must be stabilized) for each step.</p> <p>The technical environment must be the same as the previous request and will be indicated (external t°).</p>	M

For each proposed ONT, the vendor SHALL supply the energy consumptions according to the following profile with the following conditions. One value per customer profile and one average value thanks to the distribution of the two profiles.

- 2015: for the on-shelf ONTs, utilizing the current power and the existing sustainable solution(s).
- 2020: for the forecasted ONT, utilizing the power consumption on the next chipsets and with sleep mode functions implemented in the ONT.

185

	profile P1																							
Time (in hour)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Throughput> 10Mbit/s																								
TV & VoD																								
P2P																								
Throughput =< 10Mbit/s																								
	profile P2																							
Time (in hour)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Throughput> 10Mbit/s																								
TV & VoD																								
P2P																								
Throughput =< 10Mbit/s																								

Note 1 : blank slots in the chart are the periods eligible for sleep modes for a given service, and for the PON interface when the full column is left blank

Distribution of customers between the Profiles P1 ns P2 : 20% / 80%.

Note 2 : In the TCO calculated by Orange, these last figures transmitted by the supplier will be converted in € thanks to an estimation of the conversion ratio (in €/kWh) between 2015 and 2020.

## Section 11: Security

### 1. Development

- 186 Web interfaces MUST be developed according to the OWASP development rules:  
[https://www.owasp.org/index.php/Category:OWASP\\_Top\\_Ten\\_Project](https://www.owasp.org/index.php/Category:OWASP_Top_Ten_Project)
- 187 All (native and web) developments MUST take into account the CWE/SANS Top 25 most dangerous software errors:  
<http://cwe.mitre.org/top25/index.html>
- 188 All development MUST be made separating a development branch for development and testing and a release branch to be deployed on production devices/platforms. The latest MUST NOT contain any debug tool used in the development process.

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189	All secrets and certificates used in production MUST be reserved for this mode (i.e. not used for validation)	M
190	Networks daemons shall be robust enough to resist fuzzing attacks. An efficient web server robustness test is Skipfish ( <a href="http://code.google.com/p/skipfish">http://code.google.com/p/skipfish</a> ).	M
191	CVEs shall be considered and patches shall be applied according to the severity of each CVE : minor vulnerabilities shall be patched in the next firmware release ; major breaches shall lead to a new firmware release. This requirement SHALL be applied during the whole life of the project and is under supplier responsibilities.	M
<b>2. Hardware</b>		
192	The console port could be physically accessible but MUST be fully deactivated on any production software, including firmware and bootloader.	M
193	The JTAG port SHALL be at least securely deactivated on production devices. Its reactivation SHALL either be impossible or necessitate a strong authentication (certificate-based, for instance).	M
<b>3. Boot &amp; Upgrade</b>		
194	The integrity of the Bootloader and Firmware SHALL be verified at boot time, after sleep mode, after upgrade and possibly at runtime.	M
195	The Bootloader SHALL only initialise the RAM and FLASH interfaces, copy the Firmware to RAM, check its integrity and launch it.	M
196	The boot sequence shall not be interrupted by any command or traffic injection on any port	M
197	By default, the boot sequence shall not display any sensitive data	M
<b>4. Software</b>		
197	The kernel version should be as recent as possible	O
198	The standard Unix file hierarchy shall be respected. Binaries, configuration files, log files SHALL be in the right folders with permissions. (see <a href="http://www.pathname.com/fhs/pub/fhs-2.3.html">http://www.pathname.com/fhs/pub/fhs-2.3.html</a> )	M
199	All configuration files MUST be stored in read-only areas, so that an attacker cannot alter them and make permanent changes to the ONT. By default, partitions shall be mounted as read-only.	M
200	By default, writable partitions (/tmp, etc.) MUST be mounted in noexec, nodev and nosuid modes. This shall prevent a malicious user from executing non-authorised code from those areas.	M
201	Prevent gathering of any configuration information without prior adequate authentication.	M
202	In order to limit the impact of a security flaw on a daemon, all daemons should run under a dedicated non-privileged user (one user per daemon)	M
203	If needed, access to system logs SHALL be secured (access control) and SHALL not include plain sensitive information.	O

204	Logs files SHALL not include sensitive information (operator or customer secret).	O
<b>5. Web administration</b>		
205	The Web GUI access MUST be protected by a robust password. Only a first status page is accessible without credentials. Unauthenticated actions on the web interface MUST be forbidden.	M
206	An anti-brute force mechanism for WebUI authentication SHALL be implemented (e.g. exponential delay between 2 tries after 5 unsuccessful tries).	M
207	User inputs shall never be trusted and have to be validated on the server side, in order to avoid code injection. This means that all user inputs have to be properly escaped (for XSS) and filtered (for injection) in order to prevent the box from executing malicious code.	M
<b>6. Sensitive information</b>		
208	Strong and up-to-date hashing algorithms and random salts shall be used for password storage (e.g. PBKDF2-SHA256).	M
209	To avoid brute-force and dictionary-based attacks, passwords shall comply with a basic password strength and complexity policy. For instance: at least 8 characters containing a mix of uppercase, lowercase, numbers and symbols. An anti brute force mechanism SHALL be implemented (e.g. exponential timer between 2 tries after 5 unsuccessful tries).	M
210	Sensitive data shall NEVER be stored in the /tmp or any other non-dedicated directory.	M
<b>7. Device management</b>		
211	Communication between the device and the device management platform MUST be mutually authenticated.	M
<b>8. System hardening</b>		
212	Every process MUST run with as few privileges as possible, in particular root rights MUST be avoided when not necessary. When no preexisting system user has the adequate rights to run a given group of processes, a new user with minimal privilege MUST be created and dedicated to that group.	M
213	Any executable not essential to product functionality, in particular superfluous or debug software that may be helpful to attackers (e.g. netcat), MUST NOT be present at all on the system.	M
214	It SHALL NOT be possible to interrupt the kernel boot process by any means (e.g. keyboard inputs).	M
215	Partitions SHALL be mounted with appropriate flags and SHALL at least respect the following rules : nodev: all partitions except device partitions (such as /dev or /devices) ; noexec : for all tmpfs (e.g /var or /tmp) ; nosuid : for partitions dedicated to non-root users	M
216	UID and GID 0 SHALL be dedicated to the root user.	M
217	Shell access MUST be forbidden on the system.	M
218	No debug flag SHALL be used during the compilation steps of the production software.	M

219 Production binaries SHALL be stripped (discarding all symbols from object files) before deployment.

M