JAVNA SPECIFIKACIJA za korištenje vlastite terminalne opreme

SADRŽAJ

1. Uvod

Od 1. siječnja 2024. HT d.d. svojim krajnjim korisnicima omogućava da se **koriste vlastitom terminalnom opremom za korištenje usluge širokopojasnog pristupa internetu.** Ovim dokumentom „**Javna specifikacija za korištenje vlastite terminalne opreme**“ definiraju se tehnički podaci i postavke neophodne za spajanje vlastite opreme korisnika u skladu s PRAVILNIKOM O NAČINU I UVJETIMA OBAVLJANJA DJELATNOSTI ELEKTRONIČKIH KOMUNIKACIJSKIH MREŽA I USLUGA.

Pojedinačne korisničke podatke za realizaciju predmetne usluge, uključujući lozinke, HT će dostaviti pri njezinoj realizaciji nakon autorizacije.

2. Tehničke karakteristike opreme krajnjih korisnika neophodne za instalaciju

Tehnička oprema, potrebna da bi se krajnji korisnici mogli koristiti njome za realizaciju usluga, mora zadovoljavati određene tehničke karakteristike kako bi se osigurala interoperabilnost korisničke opreme i instalirane HT-ove opreme u mreži s obzirom na različite prijenosne tehnologije i razine usluga.
U nastavku su navedene predmetne tehničke karakteristike koje mora zadovoljavati svaki komad tehničke opreme kako bi usluga radila kako je to definirano.

3.1 xDSL CPE/HGW SUČELJE

	WAN - xDSL requirements
Ref.	Description
1.	General requirements
2.	The device must provide Forward Error Correction (FEC) at the physical DSL link.
3.	The xDSL interface of the device must fundamentally satisfy the requirements of actual DSL standards.
4.	The device must first try to sync at VDSL2 mode and then in ADSL2+ mode at all times.
5.	The device must provide an internal VDSL2 Modem according to ITUT Recommendation G.993.2 Annex B (Region B: Europe)
6.	To provide interoperability between VTU-C (VDSL Transceiver Unit – Central) and VTU-R (VDSL Transceiver Unit – Remote), Handshake Procedures for Digital Subscriber Line transceivers must be supported in VDSL device according to ITU-T Recommendation G.994.1.
7.	In the VDSL2 device PTM must be used as basic encapsulation method for data transmission. The PTM layer must be implemented according to ITU-T Recommendation G.993.2.
8.	VDSL2 device must provide PBO (Power Back-off) functionality according to ITU-T Recommendation G.993.2.
9.	VDSL2 device must provide Power Management functionality according to ITU-T Recommendation G.993.2.
10.	The VDSL2 device must support "Self-FEXT cancellation (vectoring) for use with VDSL2 transceivers" as specified in ITU-T G.993.5 Recommendation.
11.	The VDSL2 device must support "Improved impulse noise protection for DSL transceivers, as specified in ITU-T G.998.4 Recommendation.
12.	The VDSL2 device must support "On-line Reconfiguration" (OLR) mechanism, as specified in ITU-T G.993.2 Recommendation.
13.	The VDSL2 device should support 2pairs Ethernet-based multi-pair bonding via VDSL interface, is implemented in ITU-T Recommendation G.998.2.
14.	The device must support configurable ADSL/ADSL2/ADSL2+ operation mode.
15.	The device must support automatic ADSL/ADSL2/ADSL2+ fallback operation, including automatic fallback from PTM to ATM mode

16.	The VDSL2 device must be able to correctly work with MSAN with different maximum, minimum and target SNR marging configuration
17.	The VDSL2 device must support DELT loop diagnostic
18.	G 993.2 VDSL2 device must operating in Europe regional annexes
19.	G 993.2 VDSL2 device must suport US0 types B, M and NUS0
20.	The device should support VDSL2 AnnexQ as specified in ITU G-993.2
21.	In case of vectoring and AnnexQ the device must fully interwork at least with the following MSAN boards: - Huawei VCMM (vect), VCPM (vect), SDMM (vect + AnnexQ) and SDPM (vect + AnnexQ) - Nokia NDLT-G (vect), NDLT-F (vect) and NDLT-J (vect + AnnexQ)
22.	Profile requirements
23.	The device must support the 8a, 8b, 8c, 8d VDSL2 profiles.
24.	The device must support the 12a, 12b VDSL2 profile.
25.	The device must support the 17a VDSL2 profile.
26.	The device must meet the maximum aggregate upstream transmit power requirements specified in ITU-T Recommendation G.993.2.
27.	The device should support the 35b VDSL2 profile.
28.	Band plan requirements
29.	The device must support band plan 998 implemented according to ITU-T Recommendation G.993.2 Annex B.
30.	The device must support band plan 998ADE17 implemented according to ITU-T Recommendation G.993.2 Annex B.
31.	The device must support band plan 997 implemented according to ITU-T Recommendation G.993.2 Annex B.
32.	The device should support band plan 998ADE35 implemented according to ITU-T Recommendation G.993.2 Annex B.
33.	PSD mask
34.	Operating with all PSD profile in 998 band plan the device must support the Upstream Limit PSD masks for band plan 998 according to ITU-T Recommendation G.993.2 Annex B.
35.	Operating with all PSD profile in 997 band plan the device must support the Upstream Limit PSD masks for band plan 998 in ITU-T Recommendation G.993.2 Annex B.
36.	VDSL2 device should provide carrier MASK functionality all the VDSL2 band defined in ITU-T G.993.2
37.	Bit rate single line VDSL
38.	Operating in 12a mode the device should support minimum bi-directional net data rate 68 Mbps.
39.	Operating in 17a mode the device must support minimum bi-directional net data rate 100 Mbps.
40.	Operating in 35b mode the device should support minimum bi-directional net data rate 300 Mbps.
41.	The device must support rate adaptivity at initialization.
42.	The device must support SRA
43.	LCL
44.	Operating in VDSL2 mode, the LCL at the U-R interface must be greater than 38 dB over the 120 kHz up to 12000 kHz frequency range, according to the ITU-T Recommendation G.993.2 Annex B.
45.	Micro interruptions
46.	According to ETSI TS 101 388 v1.3.1, the VDSL2 transceiver must not be reset by a micro interruption event of duration t=10ms, which must occur at an event frequency of 0,2 Hz.
47.	Performance
48.	Performance of line transmission device (BER) must be 10-7 or better in normal operation.
49.	The Bidder must provide performance test reports of their VDSL2 equipment if any available.
50.	VDSL2 modem performance must provide at least 30 Mbps data rate (physical layer) at 1000 m distance
51.	Access protocols
52.	The device must support bridging of untagged and 802.1q tagged Ethernet frames between its LAN and WAN interfaces.
53.	The device must support bridging PPPoE over the encapsulated Ethernet as defined in IETF RFC 2516.
54.	The device must be able to bridge IP over Ethernet.
55.	Interfaces
56.	The physical layer of the WAN interface must be compliant with ITU-T recommendation G.993.2.
57.	The connector must be RJ11 female and must conform to MSZ 25021:1999 (Terminal Equipment (TE). Attachment requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) of TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signaling) standard.
58.	Management requirements
59.	The device must indicate near and far-end loss of power (Dying Gasp) as it is specified in ITU-T Recommendation G.993.2 chapter 11.3.3 Power-related primitives.
60.	Multiple VLAN
61.	The device must support to handle of at least 8 VLANs at the same time.

62.	The device must support any VLAN number between 1-4095
63.	Each VLAN connection must use different MAC address
64.	Special requirements for VDSL2 AnnexQ device
65.	All requirements listed in this chapter are valid for this device type as well.
66.	The device must support VDSL2 AnnexQ as specified in ITU G-993.2.
67.	The device must support band plan 998ADE35 implemented according to ITU-T Recommendation G.993.2 Annex B.
68.	The device must support backward compatibility to VDSL2 and VDSL2 vectoring mode (as defined in G.993.2 and G.993.5).
69.	The device should support VDSL2 2 pairs bonding mode upto 35b profile.
70.	Operating in 35b mode the device must support minimum bi-directional net data rate 300 Mbps.
71.	ADSL requirements
72.	General requirements
73.	The device must use Frequency Division Multiplexing (FDM) for separation of the upstream and downstream signals, as it is specified in ITU-T Recommendations G.992.1, G.992.3 and G.992.5.
74.	To provide interoperability between device and DSLAM/MSAN, Handshake Procedures for Digital Subscriber Line transceivers must be supported according to ITU-T Recommendation G.994.1.(2007-02)
75.	In ADSL mode ATM must be used as basic encapsulation method for data transmission. ATM Layer must be implemented according to ITU-T Recommendation G.992.1.
76.	The device must provide a synchronisation time of: ≤ 60 s with all ADSL modes.
77.	The device must include a high pass filter at its ADSL line input. The high pass filter must be implemented according to ITU-T Recommendation G.992.5.
78.	ADSL operation mode
79.	The device must support the following operating modes based on ITU-T Recommendation: G.992.1 Annex A and B, G.992.3 Annex A and B/J, G.992.5 Annex A and B/J and M.
80.	Bit rate
81.	Operating in ADSL mode, ADSL device must support downstream data rate from 32 kbit/s to 8 Mbit/s and upstream data rate from 32 kbit/s to 800 kbit/s.
82.	Operating in ADSL2 mode, ADSL2 device must support downstream data rate from 32 kbit/s to 10800 kbit/s and upstream data rate from 32 kbit/s to 1500 kbit/s.
83.	Operating in ADSL2+ mode, ADSL2+ device must support downstream data rate from 32 kbit/s to 24 Mbit/s, upstream data upstream data rate from 32 kbit/s to 2800 kbit/s (for those ADSL2+ modes where it is supported).
84.	If the line parameters are changing, rate adaptivity must be performed automatically.
85.	The device must support bit swap.
86.	Performance
87.	Operating in ADSL and ADSL2 mode, ADSL device must be able to operate on loop ranges and under noise conditions as it is defined in ETSI TS 101 388 v1.4.1 Chapter 5, Transmission performance objectives and test methods.
88.	Performance of line transmission device (BER) must be 10-7 or better in normal operation.
89.	The Bidder should provide performance test reports of their device(s) if any available.
90.	ADSL2+ modem performance must provide at least 4 Mbps data rate (physical layer) at 3000 m distance
91.	Interoperabilty
92.	The device must be interoperable with all type of DSLAM/MSAN used by HT.
93.	PSD masks
94.	The device must support the following PSD masks: Operating in ADSL mode, device must support the PSD masks defined in ETSI TS 101 388 v1.4.1, FDD ADSL over POTS and FDD ADSL over ISDN. Operating in ADSL2 mode, device must support the PSD mask defined in ITU-T Recommendation G.992.3, Annex A and Annex B and Annex J. Operating in ADSL2+ mode, device must support the PSD mask defined in ITU-T Recommendation G.992.5, Annex A and Annex B and Annex J.
95.	Micro interruptions
96.	According to ETSI TS 101 388 v1.3.1, the ADSL transceiver must not be reset by a micro interruption event of duration t = 10ms, which must occur at an event frequency of 0,2 Hz.
97.	Longitudinal Conversion Loss (LCL)
98.	Operating in ADSL and ADSL2 mode the LCL at the U-R interface must be greater than 40 dB over the 120 kHz up to 1104 kHz and 25kHz up to 1104 kHz frequency range, according to the DSL Forum Technical Report TR-067.
99.	Operating in ADSL2+ mode the LCL at the U-R interface must be greater than 40 dB over the 120 kHz up to 2208 kHz and 25kHz up to 2208 kHz frequency range, according to the ITU-T Recommendation G.992.5, Annex A and Annex B.4

100.	Operating in ADSL2 mode the LCL at the U-R interface should be greater than 40 dB over the 5 kHz to 1104 kHz frequency range, according to the ITU-T Recommendation G.992.3, Annex J.4.
101.	Operating in ADSL2+ mode the LCL at the U-R interface must be greater than 40 dB over the 5 kHz to 2208 kHz frequency range, according to the ITU-T Recommendation G.992.5, Annex J.4.
102.	ATM
103.	The device must support UBR, CBR and VBR-rt traffic class.
104.	The device must support VPI values from 0 to 127.
105.	The device must support VCI values from 32 to 127.
106.	The device must support LLC-SNAP encapsulation method according to IETF RFC2684.
107.	Multiple PVC
108.	The device must support to use of at least 8 PVCs at the same time.
109.	All supported PVCs should not require the same VPI value.
110.	Each PVC must use different MAC address
111.	DSL management requirements
112.	The device must store valid ATU-R Data register values as it is specified in ITU-T Recommendation G.992.1.
113.	The ATU-R Data register value of “serial number” must be unique for each device.
114.	Any DSLAM/MSAN used by any HT must be able to read the ATU-R Data register values of the device through the DSLAM/MSAN’s management
115.	The device must have “Dying Gasp” function as it is specified in ITU-T Recommendation G.992.1.

3.2 GPON/xgsPON-FIBER CPE/HGW SUČELJE

	WAN - ETH
Ref	Detailed description
116.	General requirements
117.	LAN/WAN port - WAN-port for connection of an external Ethernet Uplink Device (e.g. external DSL-modem, ONT).
118.	The device should provide separated 10/100/1000Base-T WAN port
119.	WAN ETH port must be configurable as "access' or "trunk".
120.	The device must be able to detect loss of connectivity on the primary WAN interface.
121.	The device must be able to detect the return of connectivity on the primary WAN interface and automatically revert to the primary interface.
122.	The device must provide IEEE 802.1Q for separating and tagging of traffic.
123.	The device must provide suport for minimum 8 different IEE 802.1Q vlans using VID's between 1-4095
124.	IEEE 802.1Q support/tagging must be configurable
125.	The device in Ethernet WAN scenario must support: • Internet traffic – 1 Gbps downstream and 500 Mbps upstream Internet traffic The device in Ethernet WAN scenario must simultaneously support: • 3 HD (High Definition Video) stream (~3X9Mbps on Ethernet layer) and 2 SD (Standard Definition Video) stream (~2x3,5Mbps on Ethernet layer) • 3 additional informational multicast streams (~256Kbps on Ethernet layer) • Internet traffic – 500 Mbps downstream and 250 Mbps upstream • up to 15 G.711(a-law) or 15 G.722 VoIP calls

3.3 GENERAL CPE/HGW

	ROUTER REQUIREMENTS
Ref	Detailed description
126.	General requirements
127.	The device must conform to Ethernet standard frame sizes at the WAN/LAN/WLAN ports.
128.	The Ethernet LAN ports should support an MTU of 9000 bytes (Jumbo Frames).
129.	The device must provide a non-blocking switch fabric in Full Duplex Mode.
130.	The device must provide port-by-port auto-negotiation .
131.	The device must provide auto-crossover.
132.	The device must support Ethernet (IEEE 802.3).
133.	The device must support IP Version 4.
134.	The device must support IP Version 6 defined in RFC 2460.
135.	The device must support IP over Ethernet (IPoE).
136.	The device must support PPP over Ethernet (PPPoE) as defined in IETF RFC 2516.
137.	The device must support concurrent PPPoE and IPoE connections to be created.
138.	The device must use different MAC addresses on different WAN connections automatically.
139.	There must not be any restriction on the number of clients connected to each LAN port of the device (routed or bridged-IPTV)
140.	The device must not forward packets from LAN/WLAN to the WAN side if the Destination Address contains: - IPv4 Link-Local addresses (IPV4LL) 169.254.0.0/16 acc. RFC3927 - IPv6 Link-Local addresses (IPV6LL) acc. RFC4862 - Loopback addresses 127.0.0.0/8 acc. RFC5735 - Broadcast to the 'all hosts' address acc. RFC919 - Directed Broadcast addresses acc. RFC2644 - Link-Local Multicast addresses 224.0.0.0/8 acc. RFC5771 and http://www.iana.org/assignments/multicast-addresses - Private addresses (IPv4) if HG acts as a 'public host' acc. RFC1918 (see also requirement <1463>)
141.	The device must support bridging and routing between WAN and LAN ports.
142.	The device must provide functionality to define static IP address for WAN ports
143.	The device must assure ≤2 ms latency for internal propagation of data-packets between any ingress-port and any egress-port of the HGW.
144.	PPPoE client
145.	The device must support PPPoE function as described in RFC2516
146.	The device must provide PPPoE with LCP:CHAP/LCP:PAP and IPv4-NCP:IPCP.
147.	The device must not retry to establish a failed PPPoE-session if the account credential was wrongly configured.
148.	The device must retry to establish a failed PPPoE-session if not the account credential was wrongly configured.
149.	PPPoE service must include “IP type” with 2 below options: a) Dynamic IP address b) Fixed IP address
150.	The device must have the functionality to connect via PPPoE in "always-on" mode all the time. In this mode the device must automatically re-establish any session after disconnection (except manual disconnection by User), lease expiration or loss and restoration of power.
151.	PPPoE username and password must support at least 100 characters. Symbols such as “–“(minus) and “_” (underscore) must be allowed in the username
152.	PPPoE password must support all alphanumeric characters plus all special characters
153.	The device must allow any particular PPP connection to be configurable for IPv4-only, IPv6-only, or both with Lw4o6.
154.	The HG must not tear down a shared (IPv4 and IPv6) PPP session if error conditions prevent only one IP stack (either IPv4 or IPv6) from working. The session must be torn down if error conditions apply to both stacks
155.	In case of "Dial-on demand" mode If the PPP session contains IPv4 and IPv6, then the device must terminate only the IPv4 session. This is done using IPCP commands.
156.	MTU size must be configurable with range 1492-1500 bytes.
157.	The CPE must implement RFC 4638 (“Accommodating a MTU / MRU greater than 1492 in the PPPoE session)
158.	NAT
159.	The device must support Network Address Port Translation (NAPT; also known as Port Address Translation) as defined in IETF RFCs 2663, 3022 and 3027.

160.	The NAT device must assure, that no spoofed addresses are forwarded into WAN.
161.	The device must provide NAT Loopback (sometimes also called 'hairpin NAT' or 'hairpinning')
162.	The device must support to disabling NAT/NAPT for each connection separately.
163.	NAT must support at least 3000 translations.
164.	DNS
165.	The device must relay DNS requests (A and AAAA record type) from LAN/WLAN to a remote DNS Server (configured via PPPoE, DHCPv4 or DHCPv6) if the requested information is not cached.
166.	The device must cache positive hits to a maximum of the individual TTL time value of the Master DNS Server responses.
167.	The device must store NXDomain answers with 'negative' TTL from the Master DNS Server.
168.	The device must flush its DNS cache after establishing a new PPPoE session or reboot but no any other case.
169.	The device must can store at least 256 cached records gets from DNS Servers.
170.	The device must reply to DNS requests from LAN/WLAN clients.
171.	The user must be able to activate and deactivate the DNS function per connection.
172.	The device must not reply to DNS requests from WAN.
173.	The device must assure ≤2 ms for self-induced DNS delay
174.	QoS
175.	The device must provide Layer 2 IEEE802.1D-2004 Annex G prioritising and marking traffic for at least 4 traffic classes
176.	The device must provide the ability to configure a minimum throughput value per traffic class.
177.	The device must provide automatic fragmentation to adjust its maximum fragment size according to the required maximum serialization delay (e.g. max. 2 ms).
178.	Packet Fragmentation (adaptive PMTU) Every packet-based network has a MTU size (maximum transmit unit) which that network can transmit. Depending on link speed and MTU size (default MTU value must be set to 1492 for PPPoE based services) there could be an impact on delay-sensitive real-time traffic without fragmentation . The device must support automatic fragmentation by methods like e.g. LFI (Link Fragmentation & Interleaving) to adjust its maximum fragment size according to the required maximum serialization delay (e.g. max. 10ms). VoIP packets must never be fragmented.
179.	The device must provide Path MTU Discovery.
180.	The device must support Low Latency Queuing (LLQ) for high priority traffic (e.g. VoIP).
181.	The traffic classification must be supported independent of the interface/port (WLAN/LAN).
182.	At least traffic shaping for the High Speed Internet connection must be supported on the WAN port.
183.	Requirements for Triple Play services
184.	The device must support IGMP v2 and v3 protocol.
185.	The device must provide full backward compatibility to IGMP v1.
186.	The IGMP version must be configurable at least via FW upgrade.
187.	The max latency for handling IGMP messages must below 3ms
188.	The device must support IGMP Snooping (the multicast traffic is sent only to host device that have joined to the multicast group)
189.	The device must support IGMP proxy in routed mode (IETF RFC 4605). This satisfies TR-101 R-191.
190.	When the device receives an IGMP membership query on a given WAN-facing IP interface, the IGMP Proxy-Routing function must only send a corresponding membership report on this specific interface. This satisfies TR-101 R-196.
191.	The device must provide IGMP throttling to avoid floods of IGMP messages into the WAN.
192.	The device must provide IGMP for both ASM and SSM mode.
193.	The device should support MLDv2 as defined in IETF RFC 3810.
194.	The device must support IGMP intermediate leave (fast leave) with explicit host tracking.
195.	The device must not filtering any traffic between STBs on the same LAN segment.
196.	Performance
197.	The device must support at least 50Mbit/s multicast traffic.
198.	The device must support at least 25 multicast groups.
199.	The device must support at least 8 concurrent VoIP streams. (1Mbit/s)
200.	NTP
201.	The device must support an NTP client according to RFC 5905 (published on June 2010, that obsoletes RFC 1305 (NTPv3)).

3.4 KOFIGURACIJA CPE/HGW (3PLAY)

ID		HT
202.	Connection parameters	
203.	WAN DSL	
204.	Auto detect DSL mode	Yes
205.	VDSL2 mode	VDSL2 + Vectoring
206.	ADSL2+ mode	ADSL2+ Annex B
207.	Sync order	VDSL2/ADSL2+ (Annex B)
208.	Rate adaptive	dynamic rate adaptation - 32 kbps increments
209.	Internet_ADSL Internet_VDSL	
210.	Connection Name	Internet_ADSL Internet_VDSL
211.	Enable	Yes
212.	Service Des	Internet
213.	VPI/VCI	0/33
214.	Encapsulation type	LLC
215.	Binding Intreface	LAN1~LAN4
216.	ATM QoS	UBR
217.	ATM PCR	-
218.	VLAN ID	1203
219.	VLAN priority	0
220.	Mode	Routing
221.	Connection type(if routing/PPPoE)	PPPoE
222.	PPP Username	user
223.	PPP Password	user
224.	PPP authentication	Auto
225.	Connection trigger	AlwaysOn
226.	DialOnDemand Idletime	-
227.	MTU	1492
228.	NAT Enable	Yes
229.	IP protocol version	IPv4
230.	IPv6	
231.	WAN PPPoE Passthrough	Yes
232.	Mode	NA
233.	Connection type(if routing/DHCP)	NA
234.	ETH MTU	NA
235.	NAT Enable	NA
236.	IP protocol version	NA
237.	VoIP_ADSL VoIP_VDSL	
238.	Connection Name	VoIP_ADSL VoIP_VDSL
239.	Enable	Yes
240.	Service Des	VOIP
241.	VPI/VCI	0/50
242.	Encapsulation type	LLC
243.	Binding Intreface	LAN1~LAN4
244.	ATM QoS	CBR
245.	ATM PCR	604 cps
246.	VLAN ID	1405
247.	VLAN priority	5
248.	Mode	NA
249.	Connection type(if routing/PPPoE)	NA
250.	PPP Username	NA
251.	PPP Password	NA
252.	PPP authentication	NA
253.	Connection trigger	NA

254.	DialOnDemand Idletime	NA
255.	MTU	NA
256.	NAT Enable	NA
257.	IP protocol version	NA
258.	WAN PPPoE Passthrough	NA
259.	Mode	Routing
260.	Connection type(if routing/DHCP)	DHCP
261.	ETH MTU	1500
262.	NAT Enable	No
263.	IP protocol version	IPv4
264.	IPTV_ADSL IPTV_VDSL	
265.	Connection Name	IPTV_ADSL IPTV_VDSL
266.	Enable	Yes
267.	Service Des	IPTV
268.	VPI/VCI	0/40
269.	Encapsulation type	LLC
270.	Binding Intreface	empty(any service any port)
271.	ATM QoS	VBR-nrt
272.	ATM PCR	PCR:1200 cps SCR:1100 cps MBS:3000 cells
273.	VLAN ID	1500
274.	VLAN priority	2
275.	Mode	NA
276.	Connection type(if routing/PPPoE)	NA
277.	PPP Username	NA
278.	PPP Password	NA
279.	PPP authentication	NA
280.	Connection trigger	NA
281.	DialOnDemand Idletime	NA
282.	MTU	NA
283.	NAT Enable	NA
284.	IP protocol version	NA
285.	WAN PPPoE Passthrough	NA
286.	Mode	IP_bridge
287.	Connection type(if routing/DHCP)	-
288.	ETH MTU	1500
289.	NAT Enable	-
290.	IP protocol version	-
291.	WAN GPON	
292.	Internet WAN>ONT	
293.	PTM VLAN	100
294.	PTM Priority	0
295.	Service type	PPPoE
296.	Connection trigger	Always On
297.	MTU	1492
298.	NAT	enabled
299.	Firewall	enabled
300.	IPv4	enabled
301.	IPv6	enabled
302.	Prefix delegation for IPv6	enabled
303.	Default route	
304.	VoIP WAN>ONT	
305.	PTM VLAN	101
306.	PTM Priority	5
307.	Service type	DHCP
308.	Connection trigger	-

309.	MTU	1500
310.	NAT	disabled
311.	Firewall	disabled
312.	IPv4	enabled
313.	IPv6	disabled
314.	Prefix delegation for IPv6	disabled
315.	IPTV WAN>ONT	
316.	PTM VLAN	1500
317.	PTM Priority	2
318.	Service type	Bridged
319.	Connection trigger	-
320.	MTU	-
321.	NAT	-
322.	Firewall	-
323.	IPv4	-
324.	IPv6	-
325.	Prefix delegation for IPv6	-
326.	Remarking	
327.	DSCP Setting rule 1	VOICE
328.	Protocol:	SIP/RTP
329.	Egress Interface	VOICE
330.	DSCP remark	40
331.	802.1p remark	5
332.	DSCP Setting rule 2	IPTV
333.	Protocol:	ALL
334.	Egress Interface	IPTV
335.	DSCP remark	16
336.	802.1p remark	2
337.	Voice	
338.	Provider name	ims.t-com.hr
339.	sip server	
340.	SIP proxy server address/port	ims.t-com.hr/5060
341.	SIP registrar server address/port	ims.t-com.hr/5060
342.	useragent domain	ims.t-com.hr
343.	codec	
344.	Codec 1	G.711a
345.	ptime_1	20
346.	Codec 2	G729 AnnexB=No
347.	ptime_2	20
348.	Codec 3	G.711u
349.	ptime_3	20
350.	Codec 4	empty
351.	ptime_4	empty
352.	Codec 5	empty
353.	ptime_5	empty
354.	Codec 6	empty
355.	ptime_6	empty
356.	fax	
357.	Codec_1	G711A
358.	Codec_2	G711U
359.	Codec_3	T38
360.	Emergency Number	'100, 108, 112, 166, 197, 199, 1056, 116000, 1014, 13818
361.	Dynamic payload type	101
362.	Line	
363.	Username 1	+385xxxxxxxx@ims.t-com.hr
364.	Authorization username1	something1@ims.t-com.hr
365.	Password 1	empty
366.	Local port for SIP-UA1	5060

367.	Username 2	+385xxxxxxxx@ims.t-com.hr
368.	Authorization username2	something2@ims.t-com.hr
369.	Password 2	empty
370.	Local port for SIP-UA2	5060
371.	Session Timer "Min-SE"	90
372.	Session Times "Session Expires"	3600
373.	Register expire	3600
374.	RegisterBetweenServersInterval(T1)	60
375.	RegisterDetectInterval(T2)	60
376.	Register retrying interval(T3)	60
377.	SIP Options	Disabled
378.	DTMF mode	InBand
379.	Outbound proxy	NA
380.	other capabilities	
381.	The supplementary services activation/deactivation/query code	ativation: *XX# deativation: #XX# query: *#XX#
382.	interdigit delay (second)	5s
383.	3 party call	enable
384.	Call Hold	enable
385.	Call Waiting	enable
386.	Hot Line	enable
387.	SUBSCRIBE	disable
388.	DigitMap	empty
389.	subscriber line signaling	
390.	Flash time	25ms-150ms
391.	onhook time	>=250ms
392.	dial pulses	NA
393.	Cadence of ringing signal	'- signal duration: 1000 ms ± 10% - pause duration: 4000 ms ± 10%
394.	Tones	
395.	Dial Tone	'- frequency: 425 Hz ± 15 Hz - nominal level: -12 dBm ... -8 dBm - cadence (signal-pause): 200-300-700-800 ms ± 10 %
396.	Ringing Tone	- frequency: 425 Hz ± 15 Hz - nominal level: -12 dBm ... -8 dBm - cadence (signal-pause): 1000-4000 ms ± 10 %
397.	Busy Tone	- frequency: 425 Hz ± 15 Hz - nominal level: -12 dBm ... -8 dBm - cadence (signal-pause): 500-500 ms ± 10 %
398.	Congestion Tone	- frequency: 425 Hz ± 15 Hz - nominal level: -12 dBm ... -8 dBm - cadence (signal-pause): 240-240 ms ± 10 %
399.	„Network unavailable" Tone indicates, that the IP network is unavailable.	NA
400.	Call Waiting Tone	- frequency: 425 Hz ± 15 Hz - nominal level: -20 dBm ... -16 dBm - cadence (signal-pause): 200-600-200-8000 ms ± 10 %
401.	Special Dial Tone	- frequency: 425 Hz ± 15 Hz - nominal level: -12 ...- 8 dBm - cadence (signal-pause): 400-40 ms ± 10 %
402.	Stutter Tone (MWI):	NA
403.	Holding Tone:	NA
404.	Continuous Tone	NA
405.	Confirmation Tone	NA
406.	IGMP	
407.	IGMP Snooping Enable	Yes
408.	IGMP Proxy Enable	No

409.	IGMP Proxy interface(VPI/VCI)	Auto
410.	IGMP Version	V3
411.	IGMP additional functions	-

3. Konfiguracija tehničke opreme_ postavke

Uz tehničke karakteristike tehničke opreme navedene su i postavke kojima bi trebalo konfigurirati predmetnu tehničku opremu pojedinačno, što ovisi o prijenosnim tehnologijama na kojima se realizira širokopojasni pristup, ali i o samim uslugama.

Residential Default CPE Configuration (SHORT)

ADSL WAN Connection

Service	Connection name	Connection Type	VPI	VCI	CoS	PCR	UserName	PassWord	DHCP server(LAN)	NAT	LAN Ports	MTU	Authentication Type	Connection Trigger	PPPoE pass-through	IP version	IPv6 info get mode	Prefix Delegation	prefix delegation for allocation address
INTERNET	Internet_ADSL	PPPoE	0	33	UBR	/	blank	blank	Enabled	Enabled	ASAP	1492	Auto	Always On	Disabled	IPv4	/	/	/
VOIP	VOIP_ADSL	DHCP	0	50	CBR	604 cps	/	/	/	Enabled	FXS	1500	/	/	/	IPv4	/	/	/
IPTV	IPTV_ADSL	Bridge	0	40	nRT_VBR	PCR:1200 cps SCR:1100 cps MBS:3000 cells	/	/	/	/	ASAP	/	/	/	/	/	/	/	/

VDSL WAN Connection

Service	Connection	VLAN ID	IEEE 802.1P	Connection Type	DHCP server(LAN)	NAT	LAN Ports	Username	Password	MTU	Authentication Type	Connection Trigger	PPPoE pass-through	IP version	IPv6 info get mode	Prefix Delegation	prefix delegation for allocation address
INTERNET	Internet_VDSL	1203	0	PPP0E	Enabled	Enabled	ASAP	blank	blank	1492	Auto	Always On	Disabled	IPv4	/	/	/
VOIP	VOIP_VDSL	1405	5	DHCP	/	Enabled	FXS	/	/	1500	/	/	/	IPv4	/	/	/
IPTV	IPTV_VDSL	1500	2	Bridge	/	/	ASAP	/	/	/	/	/	/	/	/	/	/

ETH WAN Connection

Service	Connection name	VLAN ID	IEEE 802.1P	Connection Type	DHCP server(LAN)	NAT	LAN Ports	Username	Password	MTU	Authentication Type	Connection Trigger	PPPoE pass-through	IP version	IPv6 info get mode	Prefix Delegation	prefix delegation for allocation address
INTERNET	Internet_ETH	100	0	PPP0E	Enabled	Enabled	ASAP	blank	blank	1492	Auto	Always On	Disabled	IPv4	/	/	/
VOIP	VOIP_ETH	101	5	DHCP	/	Enabled	FXS	/	/	1500	/	/	/	IPv4	/	/	/
IPTV	IPTV_ETH	1500	2	Bridge	/	/	ASAP	/	/	/	/	/	/	/	/	/	/

Qos

		dot1p	IPPrec	DSCP		
	Internet	0	0	0		
	VoIP	5	5	40		
	IPTV	2	2	16		