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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –  
Testing for NGN networks

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**Test scenarios and catalogue for testing fixed  
broadband access networks using a model  
network – Part I**

Recommendation ITU-T Q.3906.1



ITU-T Q-SERIES RECOMMENDATIONS

**SWITCHING AND SIGNALLING**

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4, 5, 6, R1 AND R2	Q.120–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.799
Q3 INTERFACE	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1699
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
SPECIFICATIONS OF SIGNALLING RELATED TO BEARER INDEPENDENT CALL CONTROL (BICC)	Q.1900–Q.1999
BROADBAND ISDN	Q.2000–Q.2999
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR THE NGN	Q.3000–Q.3999
General	Q.3000–Q.3029
Network signalling and control functional architecture	Q.3030–Q.3099
Network data organization within the NGN	Q.3100–Q.3129
Bearer control signalling	Q.3130–Q.3179
Signalling and control requirements and protocols to support attachment in NGN environments	Q.3200–Q.3249
Resource control protocols	Q.3300–Q.3369
Service and session control protocols	Q.3400–Q.3499
Service and session control protocols – supplementary services	Q.3600–Q.3649
NGN applications	Q.3700–Q.3849
<b>Testing for NGN networks</b>	<b>Q.3900–Q.3999</b>

*For further details, please refer to the list of ITU-T Recommendations.*

## Recommendation ITU-T Q.3906.1

### Test scenarios and catalogue for testing fixed broadband access networks using a model network – Part I

#### Summary

Recommendation ITU-T Q.3906.1 describes main requirements to broadband testing on fixed networks. It could be useful as a basic Recommendation for interoperability testing on fixed broadband networks based on model networks.

This Recommendation describes the principle of testing and describes the detailed procedures for testing and the expected results.

#### History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T Q.3906.1	2010-10-14	11

#### Keywords

Model networks, next generation networks (NGN), public switched telephone network (PSTN), testing.

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## Table of Contents

	<b>Page</b>
1 Scope .....	1
2 References.....	1
3 Definitions .....	1
3.1 Terms defined elsewhere.....	1
4 Abbreviations and acronyms .....	1
5 Conventions .....	3
6 General requirements for testing BBA networks.....	3
6.1 Testing scheme .....	3
6.2 Testing program.....	4
6.3 Methods of testing .....	11



# Recommendation ITU-T Q.3906.1

## Test scenarios and catalogue for testing fixed broadband access networks using a model network – Part I

### 1 Scope

This Recommendation defines the list of checks to be performed during the functionality and interoperability testing of fixed broadband access (BBA) networks for PPPoE technology in operator and model networks.

The Recommendation defines the tasks for testing BBA networks and provides a list of tests for a model network, while indicating the reason for choosing a type of network for specified test groups.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T Q.3900] Recommendation ITU-T Q.3900 (2006), *Methods of testing and model network architecture for NGN technical means testing as applied to public telecommunication networks.*
- [ITU-T Q.3901] Recommendation ITU-T Q.3901 (2008), *Testing topology for networks and services based on NGN technical means.*
- [ITU-T Q.3903] Recommendation ITU-T Q.3903 (2008), *Formalized presentation of testing results.*
- [ITU-T Y.2012] Recommendation ITU-T Y.2012 (2006), *Functional requirements and architecture of the NGN release 1.*

### 3 Definitions

#### 3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

**3.1.1 model network** [ITU-T Q.3900]: A network which simulates the capabilities similar to those available in present telecommunication networks, has a similar architecture and functionality and uses the same telecommunication technical means.

**3.1.2 NGN technical means** [ITU-T Q.3900]: The NGN basic equipment which serves as a basis for building new generation network solutions, including for application in public telecommunication networks.

### 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

- ABG-FE Access Border Gateway Functional Entity
- ADSL Asymmetric Digital Subscriber Line

AG	Access Gateway
AGC	Access Gateway Controller
AGC-FE	Access Gateway Control Functional Entity
AN	Access Node
ARP	Address Resolution Protocol
AS	Applications Server
AS-FE	Application Support Functional Entity
ATM	Asynchronous Transfer Mode
BBA	Broadband Access
BGC-FE	Breakout Gateway Control Functional Entity
BRAS	Broadband Remote Access Server
DHCP	Dynamic Host Configuration Protocol
DSLAM	Digital Subscriber Line Access Multiplexer
EAS	Ethernet Aggregation Switch
HG	Home Gateway
IBC-FE	Interconnection Border gateway Control Functional Entity
IBG-FE	Interconnection Border Gateway Functional Entity
ICMP	Internet Control Message Protocol
I-CSC-FE	Interrogating Call Session Control Functional Entity
IP	Internet Protocol
ISDN	Integrated Services Digital Network
KB	Knowledge Base
LID	Light-Weight Identity protocol
MAC	Media Access Control
MG	Media Gateway
MGC	Media Gateway Controller
MGC-FE	Media Gateway Controller Functional Entity
MGCP	Media Gateway Control Protocol
MSAN	Multi-Service Access Node
NGN	Next Generation Network
NIT	Network Integration/Interconnection Testing
OLT	Optical Line Terminal
P-CSC-FE	Proxy Call Session Control Functional Entity
PON	Passive Optical Network
PPPoE	Point-to-Point Protocol over Ethernet
PS	Proxy-Server (SIP)
PSTN	Public Switched Telephone Network



PVC	Permanent Virtual Circuit
QoS	Quality of Service
S-CSC-FE	Serving Call Session Control Functional Entity
SCTP	Stream Control Transmission Protocol
SG	Signalling gateway
SG-FE	Signalling Gateway Functional Entity
SIP	Session Initiation Protocol
SNMP	Simple Network Management Protocol
SMTP	Simple Mail Transfer Protocol
SP	Signalling Point
SS7	Signalling System 7
SSH	Secure Shell
STP	Signalling Transfer Point
TCP	Transmission Control Protocol
TE	Terminal Equipment
TLS	Transport Layer Security
TM	Technical Means
UDP	User Datagram Protocol
UNI	User Network Interface
URI	Uniform Resource Identifier
VDSL	Very-high data rate Digital Subscriber Line
VLAN	Virtual Local Area Network

## **5 Conventions**

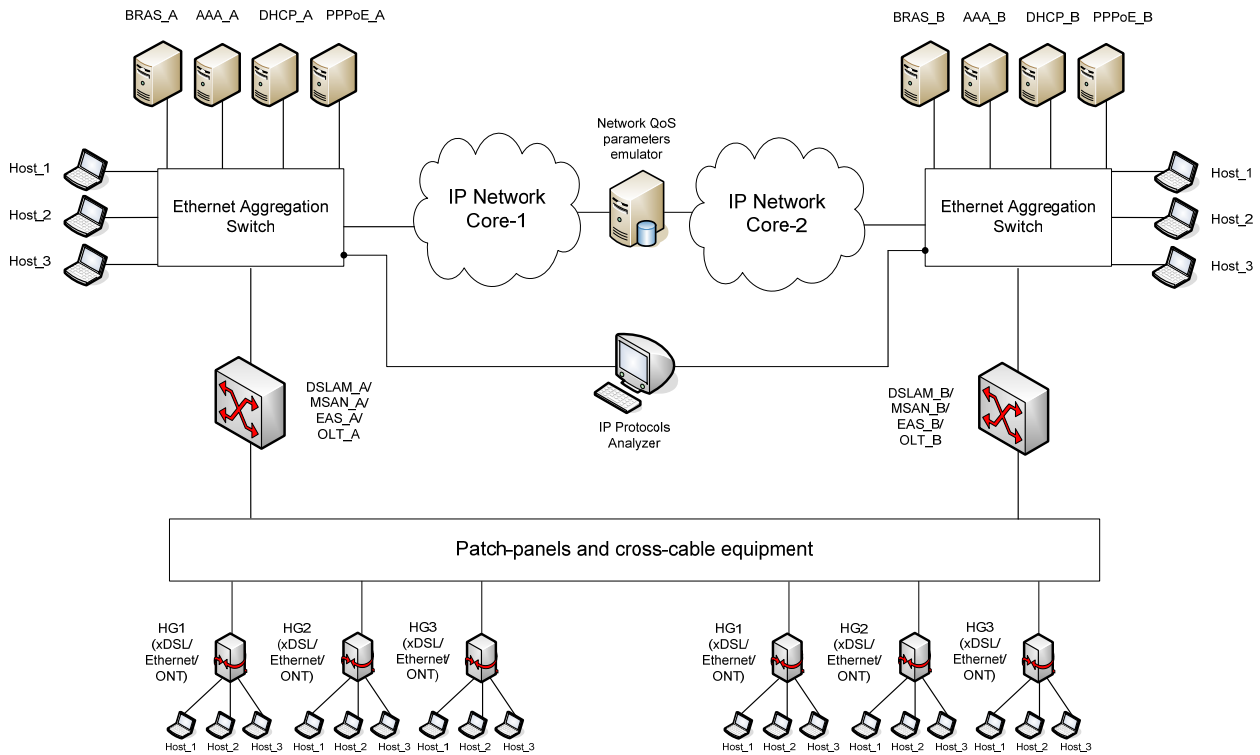
None.

## **6 General requirements for testing BBA networks**

There are several testing stages in the functional and interoperability testing of broadband access (BBA) networks and technical means (TM). These stages include the functional testing of the BBA networks and interoperability testing of the BBA TM. The results of each of these tests shall be delivered to the global database in a format that conforms to [ITU-T Q.3903].

### **6.1 Testing scheme**

Tests are executed on the model network described in [ITU-T Q.3900]. The generalized testing scheme is shown in Figure 1.



**Figure 1 – General scheme for BBA network testing**

## 6.2 Testing program

### 6.2.1 Programme for testing the basic functionality of the BBA network

Table 1 shows the program of basic functional testing for BBA networks and indicates information about the functions tested for each group of tests.

**Table 1 – Programme of basic functionality testing for BBA networks**

#	Group of tests	Functional element of BBA network under test	Functionality checked	NGN function defined in [ITU-T Y.2012]	Test identifier
1	VLAN tags processing functionality checking	DSLAM/MSAN	S-VLAN (S-VID) identifiers assignment to Ethernet frames, transmitted in upstream direction in terms of Multi PVC model used in UNI interface	T2	DSLAM_VLAN_01
			S-VLAN (S-VID) identifiers assignment to Ethernet frames, transmitted in upstream direction in terms of Single PVC/Untagged model used in UNI interface	T2	DSLAM_VLAN_02

**Table 1 – Programme of basic functionality testing for BBA networks**

#	Group of tests	Functional element of BBA network under test	Functionality checked	NGN function defined in [ITU-T Y.2012]	Test identifier
			S-VLAN (S-VID) identifiers assignment to Ethernet frames, transmitted in upstream direction in terms of Single PVC/VLAN tagged model used in UNI interface	T2	DSLAM_VLAN_03
			VLAN (S-Tag/C-Tag) tag pair assignment to Ethernet frames, transmitted in upstream direction	T2	DSLAM_VLAN_04
			TLS user port configuration, assuring transparent transmission of initial IEEE 802.1Q tags via communication network, as assigned by a user	T2	DSLAM_VLAN_05
			Configuration of a list of Ethernet frame types transmitted in upstream direction for a determined user port	T2	DSLAM_VLAN_06
		EAS	S-VLAN (S-VID) identifiers assignment to Ethernet frames, transmitted in upstream direction in terms of Untagged UNI architecture use on access stratum	T2	EAS_VLAN_01
			S-VLAN (S-VID) identifiers assignment to Ethernet frames, transmitted in upstream direction in terms of VLAN tagged UNI architecture use on access stratum	T2	EAS_VLAN_02
			VLAN (S-Tag/C-Tag) tag pair assignment to Ethernet frames, transmitted in upstream direction	T2	EAS_VLAN_03

**Table 1 – Programme of basic functionality testing for BBA networks**

#	Group of tests	Functional element of BBA network under test	Functionality checked	NGN function defined in [ITU-T Y.2012]	Test identifier
			TLS user port configuration, assuring transparent transmission of initial IEEE 802.1Q tags via communication network, as assigned by a user	T2	EAS_VLAN_04
			Configuration of a list of Ethernet frame types transmitted in upstream direction for a specific user port	T2	EAS_VLAN_05
		BRAS	S-Tag tags assignment to unmarked Ethernet frames, transmitted downstream	T5	BRAS_VLAN_01
			S-Tag/C-Tag (QinQ) tag pair assignment to unmarked Ethernet frames, transmitted downstream	T5	BRAS_VLAN_02
2	QoS control functionality checking	DSLAM/MSAN	Priority bit marking in Ethernet frames, transmitted in upstream direction without IEEE 802.1Q tags assigned by user equipment	T2	DSLAM_QOS_01
			Priority bit marking in Ethernet frames, transmitted in upstream direction with IEEE 802.1Q tags assigned by customer equipment	T2	DSLAM_QOS_02

**Table 1 – Programme of basic functionality testing for BBA networks**

#	Group of tests	Functional element of BBA network under test	Functionality checked	NGN function defined in [ITU-T Y.2012]	Test identifier
		EAS	Priority bit marking in Ethernet frames, transmitted in upstream direction without IEEE 802.1Q tags assigned by customer equipment	T2	EAS_QOS_01
			Priority bit marking in Ethernet frames, transmitted in upstream direction with 802.1Q tags assigned by customer equipment	T2	EAS_QOS_02
3	Security protection functionality checking	DSLAM/MSAN	Broadcast message blocking both in upstream and downstream directions	T2	DSLAM_SEC_01
			Limiting the number of MAC-addresses of sources connected to one user port	T2	DSLAM_SEC_02
			Ethernet frame filtering on the basis of MAC-source addresses and MAC-destination addresses	T2	DSLAM_SEC_03
			Detecting replicated MAC-user addresses and resorting to a relevant mechanism of such situation remedy	T2	DSLAM_SEC_04
		EAS	Broadcast messages blocking both in upstream and downstream directions	T2	EAS_SEC_01
			Limiting the number of MAC-addresses of sources connected to one user port	T2	EAS_SEC_02
			Ethernet frame filtering on the basis of MAC-source addresses and MAC-destination addresses	T2	EAS_SEC_03

**Table 1 – Programme of basic functionality testing for BBA networks**

#	Group of tests	Functional element of BBA network under test	Functionality checked	NGN function defined in [ITU-T Y.2012]	Test identifier
			Detecting replicated MAC-user addresses and resorting to a relevant mechanism of such situation remedy	T2	EAS_SEC_04
		BRAS	Preventing malicious user attacks due to IP-source address spoofing	T5	BRAS_SEC_01
4	Subscriber line identification functionality checking	DSLAM/MSAN	Functioning as a second-level DHCP Relay Agent and ensuring identification of DHCP subscriber connection points using data option (option 82) of DHCP protocol	T4	DSLAM_LID_01
			Functioning as a PPPoE Intermediate Agent ensuring identification of subscriber lines	T4	DSLAM_LID_02
		EAS	Functioning as a second-level DHCP Relay Agent and ensuring identification of DHCP subscriber connection points using data option (option 82) of DHCP protocol	T4	EAS_LID_01
			Functioning as a PPPoE Intermediate Agent ensuring identification of customer equipment	T4	EAS_LID_02
5	Statistics acquisition, monitoring and control functionality checking	DSLAM/MSAN	Remote monitoring using communication network control system including SNMP protocol	T2	DSLAM_MNG_01
		EAS	Remote monitoring using communication network control system including SNMP protocol	T2	EAS_MNG_01

**Table 1 – Programme of basic functionality testing for BBA networks**

#	Group of tests	Functional element of BBA network under test	Functionality checked	NGN function defined in [ITU-T Y.2012]	Test identifier
		BRAS	Remote monitoring checking with the use of communication network control system including SNMP protocol	T5	BRAS_MNG_01
6	Multicast mode support functionality checking	DSLAM/MSAN	Simultaneous connection of several users to one multicast group without subsequent load increase on the DSLAM/MSAN network interfaces	T2	DSLAM_MC_01
			Limiting the total number of multicast groups to which a user can be connected at a time	T2	DSLAM_MC_02
			Limiting the list of multicast groups available to a specific user	T2	DSLAM_MC_03
		EAS	Simultaneous connection of several users to one multicast group without subsequent load increase on EAS network interfaces	T2	EAS_MC_01
			Limiting the total number of multicast groups to which a user can be connected at the same time	T2	EAS_MC_02
			Limiting the total number of multicast groups to which a user can be connected at the same time	T2	EAS_MC_03
		BRAS	Limiting the total number of multicast groups transmitted within S-VLAN (MC-VLAN)	T5	BRAS_MC_01
			Grownup statistics for multicast traffic for each MC-VLAN and for each multicast group	T5	BRAS_MC_02

**Table 1 – Programme of basic functionality testing for BBA networks**

#	Group of tests	Functional element of BBA network under test	Functionality checked	NGN function defined in [ITU-T Y.2012]	Test identifier
7	Access policy control and account	BRAS	Establishing PPPoE user sessions	T5	BRAS_ACC_01
			Establishing IPoE (DHCP) user sessions	T5	BRAS_ACC_02
			Functioning as a LNS server during termination of L2TP user tunnels	T5	BRAS_ACC_03
			Account of rendered broadband access services for users initiating PPPoE sessions	T5	BRAS_ACC_04
			Disconnecting a user upon expiration of established quota of received data volume	T5	BRAS_ACC_05
			Limiting a bandwidth that is assigned to a user for data receiving/transmission	T5	BRAS_ACC_06

### 6.2.2 Programme for testing BBA TM interoperability

Table 2 shows the programme for testing the interoperability of the BBA TM of the different vendors that compose the BBA network under test, instructions for the tests, purpose of the tests and lists the corresponding tests.

**Table 2 – Program of interoperability testing for BBA TM**

#	Group of tests	Purpose	Test identifier
1	Interoperability testing of AN (access nodes) and BRAS of different vendors	DSLAM/MSAN/EAS/OLT access nodes equipment is compatible with BRAS equipment from different vendors including processing of DHCP option 82 and PPPoE TAG which are installed with the use of AN equipment	AN-BRAS_COMP_01 AN-BRAS_COMP_02 AN-BRAS_COMP_03
2	Interoperability testing of AN equipment and home gateway equipment from different vendors	Equipment installed in user premises (home gateways, business routers, modems) is fully compatible with DSLAM/MSAN/OLT access nodes equipment from different vendors	DSL_COMP_01



## 6.3 Methods of testing

### 6.3.1 Methods of base functionality testing

#### 6.3.1.1 Check of DSLAM/MSAN equipment functionality

##### 6.3.1.1.1 Check of functions of VLAN tag processing

<b>Test number</b>	DSLAM_VLAN_01
<b>Test name</b>	Multi PVC
<b>Test purpose</b>	<p>Check if the DSLAM/MSAN has the possibility to transport the S VLAN (S VID) identifier on Ethernet, which is transferred upstream using the UNI interface Multi PVC model</p> <p>NOTE – The test is produced in case of use of ATM transport on UNI interface.</p>
<b>Initial condition</b>	<ol style="list-style-type: none"><li>1) Prepare in KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li><li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li><li>3) For carrying out the tests, the two customer ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the customer side, the home gateway has to be connected via user network interfaces (HG1 and HG2, accordingly).</li><li>4) A.1 and A.2 hosts are connected to home gateway HG1.</li><li>5) B.1 and B.2 hosts are connected to home gateway HG2.</li><li>6) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation</li><li>7) A.1 and B.1 hosts use PPPoE sessions.</li><li>8) A.2 and B.2 hosts use IPoE sessions.</li><li>9) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</li><li>10) IP-addresses for A.1 and B.1 hosts are assigned dynamically using PPPoE server or are configured manually.</li><li>11) For termination of PPPoE sessions from A.1 and B.1 hosts the external router has to be connected to the Ethernet switch.</li><li>12) IP-addresses for hosts A.2, B.2, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.</li><li>13) IP-addresses from one IP subnetwork are used on the hosts A.2, B.2 and X.2.</li><li>14) Two virtual connections are configured on HG1 and HG2 equipment:<ol style="list-style-type: none"><li>15) PVC X1/Y1 for PPPoE traffic connected to A.1 and B.1 hosts, accordingly;</li><li>16) PVC X2/X2 for IPoE traffic connected to A.2 and B.2 hosts, accordingly.</li></ol></li><li>17) Multi PVC (X1/Y1 and X2/Y2) on UNI interfaces are configured on the DSLAM/MSAN equipment.</li><li>18) On the DSLAM/MSAN equipment there is configured the possibility to assign "S VID" =1 for Ethernet frames which are transferred upstream from HG1 equipment on virtual connection PVC X1/Y1.</li><li>19) On the DSLAM/MSAN equipment there is configured the possibility to assign "S VID" =2 for Ethernet frames which are transferred upstream from HG1 equipment on virtual connection PVC X1/Y1.</li></ol>

	<p>20) On the DSLAM/MSAN equipment there is configured the possibility to assign "S VID" =3 for Ethernet frames which are transferred upstream from any user equipment on virtual connection PVC X2/Y2.</p> <p>21) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols ICMP    ARP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) Perform traffic exchange between hosts A.2 and X.2.</li> <li>4) Perform traffic exchange between hosts B.2 and X.2.</li> <li>5) Save the captures of traces in separate files ([Vendor]-DSLAM_VLAN_01.txt) and put the file into the corresponding section of the KB.</li> <li>6) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The DSLAM/MSAN equipment has assigned the identifier "S VID" =1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1.</li> <li>2) The DSLAM/MSAN equipment has assigned the identifier "S VID" =2 for Ethernet frames which are transferred upstream and related to PPPoE session of host B.1.</li> <li>3) The DSLAM/MSAN equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host A.2.</li> <li>4) The DSLAM/MSAN equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host B.2.</li> <li>5) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	

<b>Test number</b>	DSLAM_VLAN_02
<b>Test name</b>	Configuration of S-VLAN for Single PVC/Untagged architecture (model N:1+1:1)
<b>Test purpose</b>	Check if the DSLAM/MSAN has the possibility to assign the S VLAN (S-VID) identifier to the Ethernet frames, which are transferred upstream using the Single PVC/Untagged model on UNI interface

<p><b>Initial condition</b></p>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two customer ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the customer side the home gateway has to be connected via user network interfaces (HG1 and HG2, accordingly).</li> <li>4) A.1 and A.2 hosts are connected to home gateway HG1.</li> <li>5) B.1 and B.2 hosts are connected to home gateway HG2.</li> <li>6) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> <li>7) A.1 and B.1 hosts use PPPoE sessions.</li> <li>8) A.2 and B.2 hosts use IPoE sessions.</li> <li>9) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>10) IP-addresses for A.1 and B.1 hosts are assigned dynamically using PPPoE server or are configured manually.</li> <li>11) For termination of PPPoE sessions from A.1 and B.1 hosts, the external router has to be connected to the Ethernet switch.</li> <li>12) IP-addresses for hosts A.2, B.2, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>13) IP-addresses from one IP subnetwork are used on the hosts A.2, B.2 and X.2.</li> <li>14) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>15) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.</li> <li>16) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>17) On the DSLAM/MSAN equipment there is configured the possibility to assign "S VID" =1 for Ethernet frames which are transferred upstream depending on value of Ethertype field and user port number. Following options are configured: <ol style="list-style-type: none"> <li>18) assignment of "S-VID"=1 to Ethernet frames which are transferred from HG1 equipment (user port No. 1) with the Ethertype value 0x8863 or 0x8864;</li> <li>19) assignment of "S-VID"=2 to Ethernet frames which are transferred from HG2 equipment (user port No. 2) with the Ethertype value 0x8863 or 0x8864;</li> <li>20) assignment of "S-VID"=3 frames to Ethernet transferred from HG1 and HG2 equipment (any user port) with the Ethertype value 0x0800.</li> </ol> </li> <li>21) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols ICMP    ARP.</li> </ol>
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<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) Perform traffic exchange between hosts A.2 and X.2.</li> <li>4) Perform traffic exchange between hosts B.2 and X.2.</li> <li>5) Save the captures of traces in separate files ([Vendor]-DSLAM_VLAN_02.txt) and put the file into the corresponding section of the KB.</li> <li>6) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The DSLAM/MSAN equipment has assigned the identifier "S VID" =1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1.</li> <li>2) The DSLAM/MSAN equipment has assigned the identifier "S VID" =2 for Ethernet frames which are transferred upstream and related to PPPoE session of host B.1.</li> <li>3) The DSLAM/MSAN equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host A.2.</li> <li>4) The DSLAM/MSAN equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host B.2.</li> <li>5) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: .xxxx (PPPoE)) and Host A.2 (IP: .xxxx (DHCP)) are connected to HG1 (modem xDSL). Host B.1 (IP: .xxxx (PPPoE)) and Host B.2 (IP: .xxxx (DHCP)) are connected to HG2 (modem xDSL). Both HG1 and HG2 are connected to the DSLAM via PVC 0/35 (Ethernet: PPP, IP) on Port 1 and Port 2 respectively. The DSLAM is connected to an Ethernet switch via S-VID 1 (PPPoEUser 1), S-VID 2 (PPPoEUser 2), and S-VID 3 (IPoEUser 1, 2). Host X.1 (IP: .xxxx (DHCP)) and Host X.2 (IP: .xxxx (DHCP)) are connected to the Ethernet switch. A Server DHCP is also connected to the Ethernet switch. A Protocol analyzer is connected to the DSLAM. A red X over a router icon indicates PPPoE Termination and DHCP relay agent.</p>

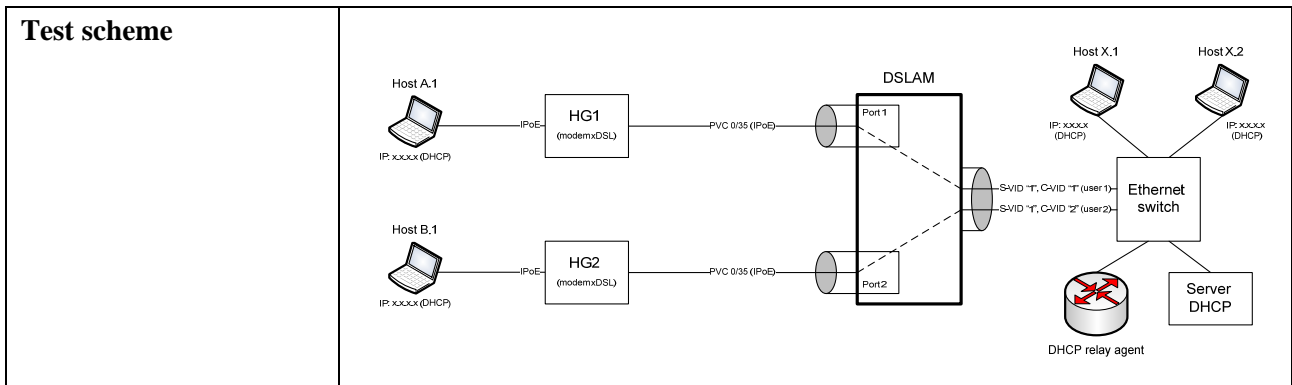
<b>Test number</b>	DSLAM_VLAN_03
<b>Test name</b>	Configuration of S-VLAN for Single PVC/VLAN tagged architecture (model N:1+1:1)
<b>Test purpose</b>	Check if the DSLAM/MSAN has the possibility to assign the S VLAN (S VID) identifier to the Ethernet frames, which are transferred upstream using the Single PVC/VLAN tagged model on UNI interface
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the user side the home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) A.1 and A.2 hosts are connected to home gateway HG1.</li> <li>5) B.1 and B.2 hosts are connected to home gateway HG2.</li> </ol>

- 6) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.
- 7) A.1 and B.1 hosts use PPPoE sessions.
- 8) A.2 and B.2 hosts use IPoE sessions.
- 9) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).
- 10) IP-addresses for A.1 and B.1 hosts are assigned dynamically using PPPoE server or are configured manually.
- 11) For termination of PPPoE sessions from A.1 and B.1 hosts external router has to be connected to the Ethernet switch.
- 12) IP-addresses for hosts A.2, B.2, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.
- 13) IP-addresses from one IP subnetwork are used on the hosts A.2, B.2 and X.2.
- 14) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.
- 15) HG1 equipment supports function of VLAN tags assignment according to IEEE 802.1Q standard. HG1 equipment is configured as follows: there is assigned VLAN tag "C-VID"=1 for PPPoE sessions connected with host A.1, and VLAN tag "C-VID"=2 for IPoE sessions connected with host A.2.
- 16) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.
- 17) HG2 equipment supports function of VLAN tags assignment according to IEEE 802.1Q standard. HG2 equipment is configured as follows: there is assigned "C-VID"=1 for PPPoE sessions connected with host B.1, and "C-VID"=2 for IPoE sessions connected with host B.2.
- 18) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.
- 19) The possibility of use VLAN identifiers for users' ports No. 1 and No. 2 is configured on the DSLAM/MSAN equipment. The VLAN Membership List is configured on the DSLAM/MSAN equipment including list of C-VID values resolved for each of users ports. For users ports No. 1 and No. 2 there should be resolved values "C-VID"=1 and "C-VID"=2.
- 20) On the DSLAM/MSAN equipment there is a possibility to assign S VID identifiers for Ethernet frames which are transferred upstream depending on value of VLAN identifier in initial IEEE 802.1Q tag and user port number. The following configuration of VLAN translation table should be done:
  - assignment of "S-VID"=1 to Ethernet frames which are transferred from HG1 equipment (user port No. 1) and have "C-VID"=1 in IEEE 802.1Q tag;
  - assignment of "S-VID"=2 to Ethernet frames which are transferred from HG2 equipment (user port No. 2) and have "C-VID"=1 in IEEE 802.1Q tag;
  - assignment of "S-VID"=3 to Ethernet frames which are transferred from HG2 equipment (any user port) and have "C-VID"=2 in IEEE 802.1Q tag.
- 21) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP || ARP.

<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) Perform traffic exchange between hosts A.2 and X.2.</li> <li>4) Perform traffic exchange between hosts B.2 and X.2.</li> <li>5) Save the captures of traces in separate files ([Vendor]-DSLAM_VLAN_03.txt) and put the file into the corresponding section of the KB.</li> <li>6) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The DSLAM/MSAN equipment has assigned the identifier "S VID" =1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1.</li> <li>2) The DSLAM/MSAN equipment has assigned the identifier "S VID" =2 for Ethernet frames which are transferred upstream and related to PPPoE session of host B.1.</li> <li>3) The DSLAM/MSAN equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host A.2.</li> <li>4) The DSLAM/MSAN equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host B.2.</li> <li>5) The DSLAM/MSAN equipment deletes the Ethernet frames which contain C-VID identifiers in IEEE 802.1Q tag not matching VLAN Membership List.</li> <li>6) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, Host A.1 and Host A.2 are connected to Home Gateway HG1 (modem DSL) via PPPoE and IPoE respectively. Host B.1 and Host B.2 are connected to Home Gateway HG2 (modem DSL) via PPPoE and IPoE respectively. HG1 and HG2 are connected to the DSLAM equipment at Port 1 and Port 2. The DSLAM is configured with S-VID 1 (PPPoE User 1), S-VID 2 (PPPoE User 2), and S-VID 3 (IPoE User 1, 2). The DSLAM is connected to an Ethernet switch. Host X.1 and Host X.2 are connected to the Ethernet switch via DHCP. A Server DHCP and a PPPoE Termination/DHCP relay agent are also connected to the Ethernet switch.</p>

<b>Test number</b>	DSLAM_VLAN_04
<b>Test name</b>	Configuration of S-VLAN/C-VLAN stack (QinQ)
<b>Test purpose</b>	Check if the DSLAM/MSAN has the possibility to assign the VLAN tag pair (S-Tag/C-Tag) to the Ethernet frame, which are transferred upstream
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the user side, the home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> </ol>

	<p>6) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</p> <p>7) A.1 and B.1 hosts use IPoE sessions.</p> <p>8) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</p> <p>9) IP-addresses for hosts A.1, B.1, X.1 and X.2 are assigned dynamically with the allocated DHCP server, or are configured manually.</p> <p>10) IP-addresses from one IP subnetwork are used on the hosts A.1, B.1 and X.2.</p> <p>11) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</p> <p>12) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.</p> <p>13) One virtual channel (PVC X1/Y1) used for the transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</p> <p>14) On the DSLAM/MSAN equipment there is configured the possibility to assign VLAN tag pair (S-Tag/C-Tag) for Ethernet frames which are transferred upstream. The S-VID value identifies DSLAM/MSAN equipment (i.e., value S VID is identical for all users ports). C-VID value identifies number of user port on which Ethernet frame has arrived. The following configuration should be done:</p> <ul style="list-style-type: none"> <li>– assignment of "S-VID"=1, "C-VID"=1 to Ethernet frames which are transferred from HG1 equipment (user port No. 1);</li> <li>– assignment of "S-VID"=1, "C-VID"=2 to Ethernet frames which are transferred from HG1 equipment (user port No. 2)</li> </ul> <p>15) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP  ARP.</p>
<p><b>Test procedure</b></p>	<p>1) Perform traffic exchange between hosts A.1 and X.1.</p> <p>2) Perform traffic exchange between hosts B.1 and X.2.</p> <p>3) Save the captures of traces in separate files ([Vendor]-DSLAM_VLAN_04.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<p><b>Expected result</b></p>	<p>1) The DSLAM/MSAN equipment has assigned the identifier "S-VID"=1, "C-VID"=1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1.</p> <p>2) The DSLAM/MSAN equipment has assigned the identifier "S-VID"=1, "C-VID"=2 for Ethernet frames which are transferred upstream and related to PPPoE session of host B.1.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>



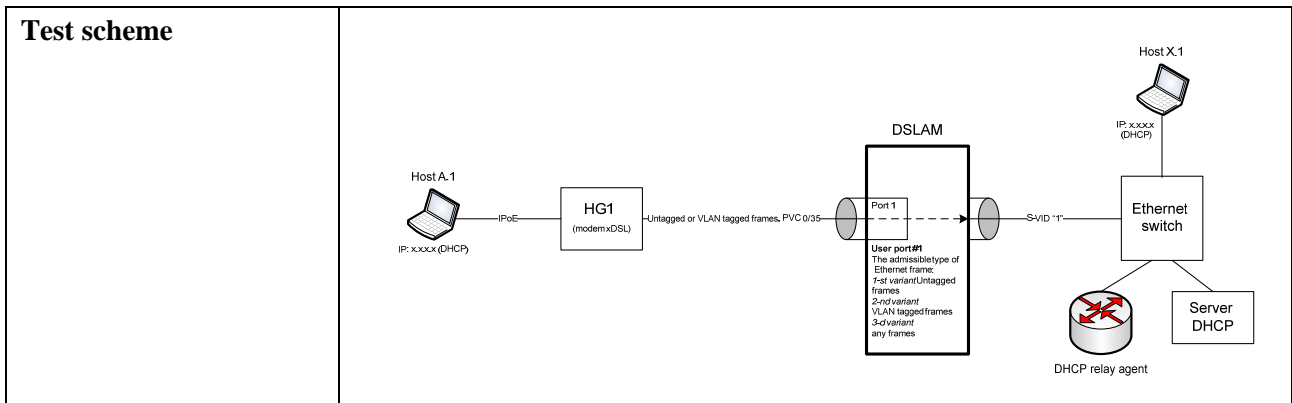
<p><b>Test number</b></p>	<p>DSLAM_VLAN_05</p>
<p><b>Test name</b></p>	<p>Configuration of TLS user port</p>
<p><b>Test purpose</b></p>	<p>Check if the DSLAM/MSAN has the possibility of TLS user port configuration providing transparent transfer of initial IEEE 802.1Q tags set by users over the network.</p>
<p><b>Initial condition</b></p>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On the user side to the network termination of given user line there should be a connection from home gateway (business) (HG1 equipment).</li> <li>4) Hosts A.1 and A.2 are connected to HG1 equipment.</li> <li>5) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> <li>6) Host A.1 uses PPPoE sessions.</li> <li>7) Host A.2 uses IPoE sessions.</li> <li>8) HG1 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>9) IP-address for host A.1 is assigned dynamically with allocated PPPoE server or are configured manually.</li> <li>10) For termination of PPPoE sessions from host A.1 external router has to be connected to the Ethernet switch.</li> <li>11) IP-addresses for hosts A.2, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>12) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>13) HG1 equipment supports function of VLAN tags assignment according to IEEE 802.1Q standard. HG1 equipment is configured as follows: there is assigned VLAN tag "C-VID"=111 for PPPoE sessions connected with host A.1, and VLAN tag "C-VID"=222 for IPoE sessions connected with host A.2.</li> <li>14) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>15) User port No. 1 of DSLAM/MSAN equipment is configured as TLS port providing transparent transfer of VLAN tags assigned on user equipment.</li> </ol>



	<p>16) VLAN Membership List is configured on the DSLAM/MSAN equipment for user port No. 1. The VLAN Membership List should contain the list of C-VID identifiers which have not been related to TLS traffic transferred through user port No. 1 in an upstream direction. This list should contain "C-VID"=111. All Ethernet frames transferred upstream through user port No. 1 and not having "C-VID"=111, should be processed as TLS traffic.</p> <p>17) On the DSLAM/MSAN equipment should be configured the VLAN translation table according to which the Ethernet frames transferred upstream and having initial identifier "C-VID"=111 (matching VLAN Membership List) should get "S-VID"=1 identifier. Initial identifier C-VID in this case should be deleted.</p> <p>18) On the DSLAM/MSAN equipment there is a possibility to assign TLS "S-VID"=100 identifier for Ethernet frames which are transferred upstream through user port No. 1 and having initial IEEE 802.1Q tag, not matching VLAN Membership List. Thus initial IEEE 802.1Q tag, received from the user, remains as enclosed C-Tag.</p> <p>19) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<p><b>Test procedure</b></p>	<p>1) Perform traffic exchange between hosts A.1 and X.1.  2) Perform traffic exchange between hosts A.2 and X.2.  3) Save the captures of traces in separate files ([Vendor]-DSLAM_VLAN_05.txt) and put the file into the corresponding section of the KB.  4) Fill in a daily report form with the testing results and save it in the KB.</p>
<p><b>Expected result</b></p>	<p>1) The DSLAM/MSAN equipment has assigned the identifier "S VID" =1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1. Thus initial IEEE 802.1Q tag (including "C-VID"=111), received from the user, has been deleted.</p> <p>2) The DSLAM/MSAN equipment has assigned the identifier "S VID" =100 for Ethernet frames which are transferred upstream and related to IpoE session of host A.2. Thus initial IEEE 802.1Q tag (including "C-VID"=222), received from the user, has remained as an enclosed C-Tag (having "C-VID"=222).</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<p><b>Test scheme</b></p>	

<b>Test number</b>	DSLAM_VLAN_06
<b>Test name</b>	Configuration of admissible list of Ethernet frame types
<b>Test purpose</b>	Check if the DSLAM/MSAN has the possibility of admissible list of Ethernet frame types configuration for certain user port (for the upstream transfer)
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p> <p>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) have to be used. On the user side the home gateway equipment (HG1 equipment) has to be connected to network termination of the given user line.</p> <p>4) Host A.1 is connected to HG1 equipment.</p> <p>5) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</p> <p>6) Host A.1 uses IPoE sessions.</p> <p>7) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</p> <p>8) IP-addresses for hosts A.1 and X.1 are assigned dynamically with the allocated DHCP server or are configured manually.</p> <p>9) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</p> <p>10) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</p> <p>11) On the DSLAM/MSAN equipment there is a possibility to assign "S-VID"=1 identifiers to any Ethernet frames transferred upstream through user port No. 1.</p> <p>12) Further adjustment of equipment should be provided according to one of the following configurations:</p> <p><b>Configuration 1</b>  On HG1 equipment there should be a disconnected function of VLAN tags assignment for Ethernet frames transferred upstream. Host A.1 also should not assign VLAN tags for Ethernet frames transferred upstream.  On the DSLAM/MSAN equipment during configuration of admissible Ethernet frames types list there should be specified value: "untagged or priority tagged frames" for user port No. 1.</p> <p><b>Configuration 2</b>  Configuration of HG1 equipment is the same as in Configuration 1.  On the DSLAM/MSAN equipment during configuration of admissible Ethernet frames types list there should be specified value: "VLAN tagged frames" for user port No. 1.</p> <p><b>Configuration 3</b>  Configuration of HG1 equipment is the same as in Configuration 1.  On the DSLAM/MSAN equipment during configuration of admissible Ethernet frames types list there should be specified value: "admit all" for user port No. 1.</p>

	<p>Configuration 4  Activate on HG1 equipment function of VLAN tags assignment to Ethernet frames transferred upstream. HG1 equipment should be configured to assign VLAN "C-VID"=1 identifier for IPoE sessions related with host A.1  On the DSLAM/MSAN equipment during configuration of admissible Ethernet frames types list there should be specified value: "untagged or priority tagged frames" for user port No. 1.</p> <p>Configuration 5  Configuration of HG1 equipment is same as in Configuration 4.  On the DSLAM/MSAN equipment during configuration of admissible Ethernet frames types list there should be specified value: "VLAN tagged frames" for user port No. 1.</p> <p>Configuration 6  Configuration of HG1 equipment is same as in Configuration 4.  On the DSLAM/MSAN equipment during configuration of admissible Ethernet frames types list there should be specified value: "admit all" for user port No. 1.</p> <p>13) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Using Configuration 1 perform on host A.1 command ping for host X.1.</li> <li>2) Using Configuration 2 perform on host A.1 command ping for host X.1.</li> <li>3) Using Configuration 3 perform on host A.1 command ping for host X.1.</li> <li>4) Using Configuration 4 perform on host A.1 command ping for host X.1.</li> <li>5) Using Configuration 5 perform on host A.1 command ping for host X.1.</li> <li>6) Using Configuration 6 perform on host A.1 command ping for host X.1.</li> <li>7) Save the captures of traces in separate files ([Vendor]-DSLAM_VLAN_06.txt) and put the file into the corresponding section of the KB.</li> <li>8) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Successful performance of command ping according to step 1 of test procedure.</li> <li>2) Unsuccessful performance of command ping according to step 2 of test procedure.</li> <li>3) Successful performance of command ping according to step 3 of test procedure.</li> <li>4) Unsuccessful performance of command ping according to step 4 of test procedure.</li> <li>5) Successful performance of command ping according to step 5 of test procedure.</li> <li>6) Successful performance of command ping according to step 6 of test procedure.</li> <li>7) The daily report form has been saved in the corresponding section of KB.</li> </ol>



### 6.3.1.1.2 Check of QoS functions

<b>Test number</b>	DSLAM_QOS_01
<b>Test name</b>	Marks of priority bits during processing of Ethernet frames which are not containing VLAN tags
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of priority bits marking in Ethernet frames which are transferred upstream and not containing IEEE 802.1Q tags, assigned by user equipment
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the user side the home gateways equipment should be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> <li>7) A.1 and B.1 hosts use IPoE sessions.</li> <li>8) HG1 and HG2 equipment work in the bridge mode (the function of local DHCP server is disconnected).</li> <li>9) IP-addresses for hosts A.1, B.1 and X.1 are assigned dynamically with the allocated DHCP server, or are configured manually.</li> <li>10) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>11) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.</li> <li>12) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>13) A.1 and B.1 hosts should have possibility of priority assignment to Ethernet frames. A.1 and B.1 hosts should establish priority "6" for all transferred Ethernet frames.</li> </ol>

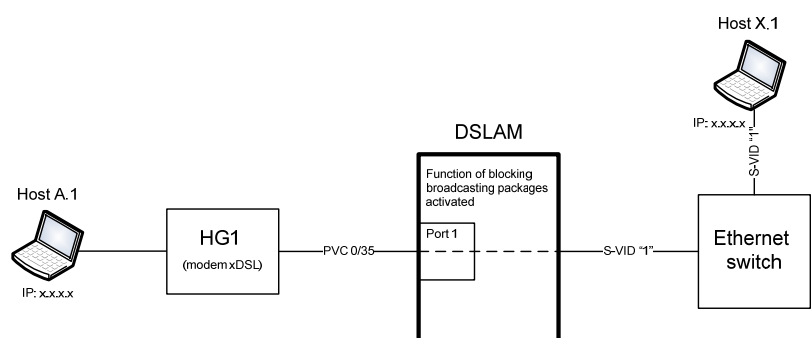
	<p>14) HG1 and HG2 equipment should provide transparent translation of Ethernet frames priorities values configured on A.1 and B.1 hosts, accordingly. On HG1 equipment and HG2 there is disconnected the function of IEEE 802.1Q tags assignment to Ethernet frames transferred upstream.</p> <p>15) On the DSLAM/MSAN equipment there should be configured possibility of S-Tag assignment, including identifier "S-VID"=1, to Ethernet frames transferred upstream through any of users ports. In this case the general VLAN (N:1) should be configured for all users ports.</p> <p>16) On the DSLAM/MSAN equipment there should be configured user port No. 1 with the possibility of copying the priority value of Ethernet frame received from HG1 equipment, into the value of S-Tag priority.</p> <p>17) On the DSLAM/MSAN equipment there should be configured user port No. 2 with the possibility to identify the value of S-Tag priority for Ethernet frames transferred upstream through given port on basis of "Ingress to Egress" policy. In this case as criteria for definition of S-Tag priority the following parameters should be used:</p> <ul style="list-style-type: none"> <li>- value of user port number (physical or logic);</li> <li>- value of Ethertype field in the Ethernet frame;</li> <li>- value of initial Ethernet frame priority received from HG2 equipment.</li> </ul> <p>18) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) During traffic exchange between hosts B.1 and X.1 perform transfer of ARP message from host B.1 (for this purpose it is necessary to clear contents of ARP table on host B.1).</li> <li>4) Save the captures of traces in separate files ([Vendor]-DSLAM_QOS_01.txt) and put the file into the corresponding section of the KB.</li> <li>5) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) S-Tag priority for Ethernet frames transferred upstream through user port No. 1 equals to "6".</li> <li>2) S-Tag priority for Ethernet frames transferred upstream through user port No. 2 has been established according to policy defined on the DSLAM/MSAN equipment for the given port.</li> <li>3) Policy for different S-Tag definition criteria has been correctly performed.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. On the left, Host A.1 (IP: xxx.x) and Host B.1 (IP: xxx.x) are connected via IPoE to HG1 and HG2 (modem xDSL). Both HG1 and HG2 connect to a central DSLAM. Host X.1 (IP: xxx.x) is connected to an Ethernet switch. The Ethernet switch is also connected to a Server DHCP and a DHCP relay agent. The DSLAM has two ports: Port 1, labeled 'Copying of value of priority', and Port 2, labeled 'Applying of policy: Ingress to Egress'. An S-Tag (S-VID '1'+priority) is shown being sent from the DSLAM to the Ethernet switch.</p>

<b>Test number</b>	DSLAM_QOS_02
<b>Test name</b>	Marks of priority bits during processing of Ethernet frames containing VLAN tags
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of priority bits marking in Ethernet frames which are transferred upstream and containing IEEE 802.1Q tags, assigned by user equipment
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the user side home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> <li>7) A.1 and B.1 hosts use IPoE sessions.</li> <li>8) HG1 and HG2 equipment work in the bridge mode (the function of local DHCP server is disconnected).</li> <li>9) IP-addresses for hosts A.1, B.1 and X.1 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>10) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>11) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.</li> <li>12) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>13) HG1 equipment should support the function of VLAN tags assignment according to IEEE 802.1Q standard. HG1 equipment is configured to assign IEEE 802.1Q tag, including "C-VID" =1 and priority value equal to "6" for all frames transferred.</li> <li>14) HG2 equipment should support the function of VLAN tags assignment according to IEEE 802.1Q standard. HG2 equipment is configured to assign IEEE 802.1Q tag, including "C-VID" =1 and priority value equal to "6" for all frames transferred.</li> <li>15) On the DSLAM/MSAN equipment should be configured the possibility of IEEE 802.1Q tags usage on users ports No. 1 and No. 2. The VLAN Membership List is configured on the DSLAM/MSAN equipment including list of C-VID values resolved for each of users ports. For users ports No. 1 and No. 2 there should be resolved value "C-VID" =1.</li> <li>16) On the DSLAM/MSAN equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through any of users ports. In this case, the general S-VLAN (N:1) should be configured for all users ports.</li> <li>17) On the DSLAM/MSAN equipment there should be configured user port No. 1 with the possibility of copying the priority value from IEEE 802.1Q tag, received from HG1 equipment, into the S-Tag priority value.</li> </ol>

	<p>18) On the DSLAM/MSAN equipment should be configured user port No. 2 with the possibility to identify the value of S-Tag priority for Ethernet frames transferred upstream through given port on basis of "Ingress to Egress" policy. In this case as criteria for definition of S-Tag priority the following parameters should be used:</p> <ul style="list-style-type: none"> <li>– value of user port number (physical);</li> <li>– C-VID value in the initial Ethernet frame;</li> <li>– C-Tag priority value in the initial Ethernet frame.</li> </ul> <p>19) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) Save the captures of traces in separate files ([Vendor]-DSLAM_QOS_02.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) S-Tag priority for Ethernet frames transferred upstream through user port No. 1 equals to "6".</li> <li>2) S-Tag priority for Ethernet frames transferred upstream through user port No. 2 has been established according to policy defined on the DSLAM/MSAN equipment for the given port.</li> <li>3) Policy for different S-Tag definition criteria has been correctly performed.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	

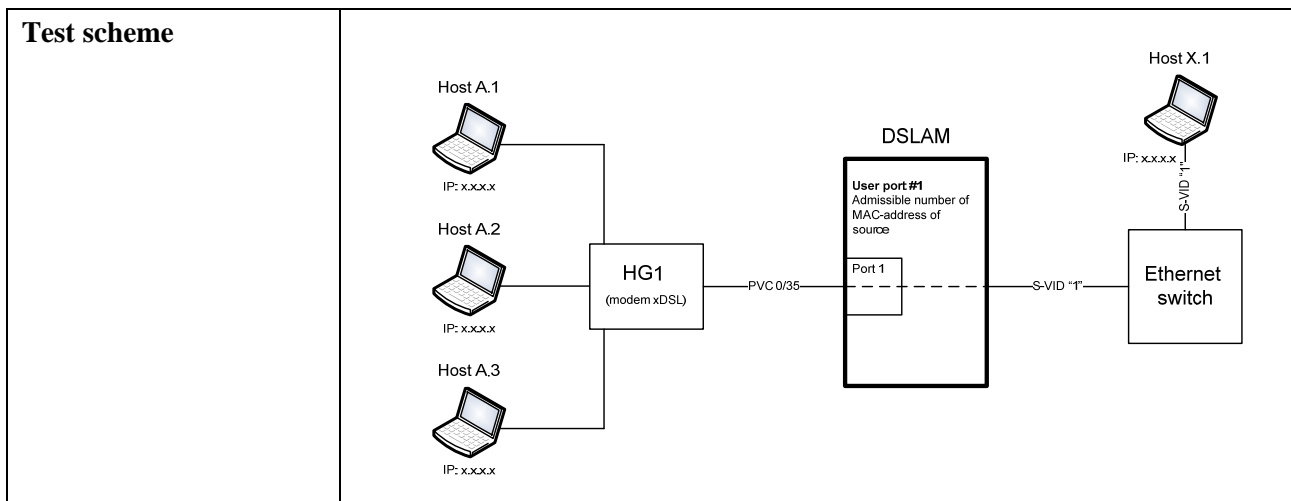
### 6.3.1.1.3 Check of security functions

<b>Test number</b>	DSLAM_SEC_01
<b>Test name</b>	Blocking of broadcasting packages
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of blocking upstream and downstream broadcast messages
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect the equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On the user side, the equipment of a home gateway (HG1 equipment) should be connected to network termination of a user line.</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> </ol>

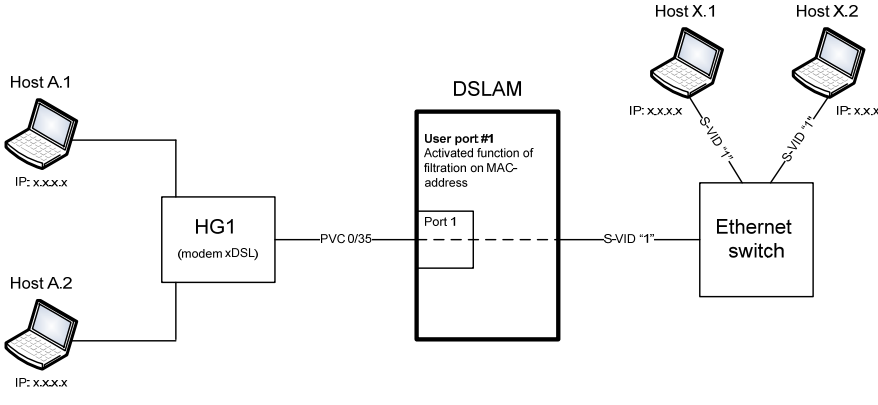
	<p>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</p> <p>7) IP-addresses for hosts A.1 and X.1 are configured manually (statically) and should be from one IP subnetwork.</p> <p>8) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</p> <p>9) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</p> <p>10) On the DSLAM/MSAN equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through user port No. 1.</p> <p>11) On the DSLAM/MSAN equipment there should be configured blocking of broadcasting packages in an upstream direction for user port No. 1.</p> <p>12) On the DSLAM/MSAN equipment there should be configured blocking of broadcasting packages in downstream for "S-VID" =1.</p> <p>13) Before beginning of carrying out of test procedure it is necessary to clear contents of ARP tables on hosts A.1 and X.1.</p>
<p><b>Test procedure</b></p>	<p>1) Perform on host A.1 command ping for host X.1.</p> <p>2) Perform on host X.1 command ping for host A.1.</p> <p>3) Save the captures of traces in separate files ([Vendor]-DSLAM_SEC_01.txt) and put the file into the corresponding section of the KB</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<p><b>Expected result</b></p>	<p>1) Command ping, performed on host A.1 for host X.1 has not passed (broadcasting ARP message transferred by host A.1 has been blocked on the DSLAM/MSAN equipment).</p> <p>2) Command ping, performed on host X.1 for host A.1 has not passed (broadcasting ARP message transferred by host X.1 has been blocked on the DSLAM/MSAN equipment).</p> <p>3) In ARP tables on hosts A.1 and X.1 there are no dynamic records.</p> <p>4) There is a possibility of broadcasting packages blocking function configuration on the DSLAM/MSAN equipment in a downstream. Configuration of the given function is made on VLAN basis.</p> <p>5) The daily report form has been saved in the corresponding section of KB.</p>
<p><b>Test scheme</b></p>	 <p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: x.x.x.x) is connected to HG1 (modem xDSL). HG1 is connected to DSLAM via PVC 0/35. The DSLAM has Port 1 connected to an Ethernet switch via S-VID '1'. The Ethernet switch is connected to Host X.1 (IP: x.x.x.x) via S-VID '1'. A box within the DSLAM indicates that the 'Function of blocking broadcasting packages activated'.</p>



<b>Test number</b>	DSLAM_SEC_02
<b>Test name</b>	Restriction of the MAC-addresses table size
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of restriction of sources MAC-addresses number connected with one user port
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On party of user home gateway equipment (HG1 equipment) should be connected to network termination of a user line.</li> <li>4) Hosts A.1, A.2 and A.3 are connected to home gateway HG1.</li> <li>5) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> <li>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>7) IP-addresses for hosts A.1, A.2, A.3 and X.1 are configured manually (statically) and should be from one IP subnetwork.</li> <li>8) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>9) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>10) On the DSLAM/MSAN equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through user port No. 1.</li> <li>11) On the DSLAM/MSAN equipment should be configured the maximum number of MAC-addresses of the sources resolved for user port No. 1 equals to 2.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform consecutive connections of hosts A.1, A.2 and A.3.</li> <li>2) During connection of each host (A.1, A.2, A.3) perform from this host continuous command ping for host X.1.</li> <li>3) Save the captures of traces in separate files ([Vendor]-DSLAM_SEC_02.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Successful performance of commands ping from A.1 and A.2 hosts.</li> <li>2) Unsuccessful performance of commands ping from host A.3.</li> <li>3) There is a possibility of maximum resolved MAC-addresses number of sources configuration independently for each users ports.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>

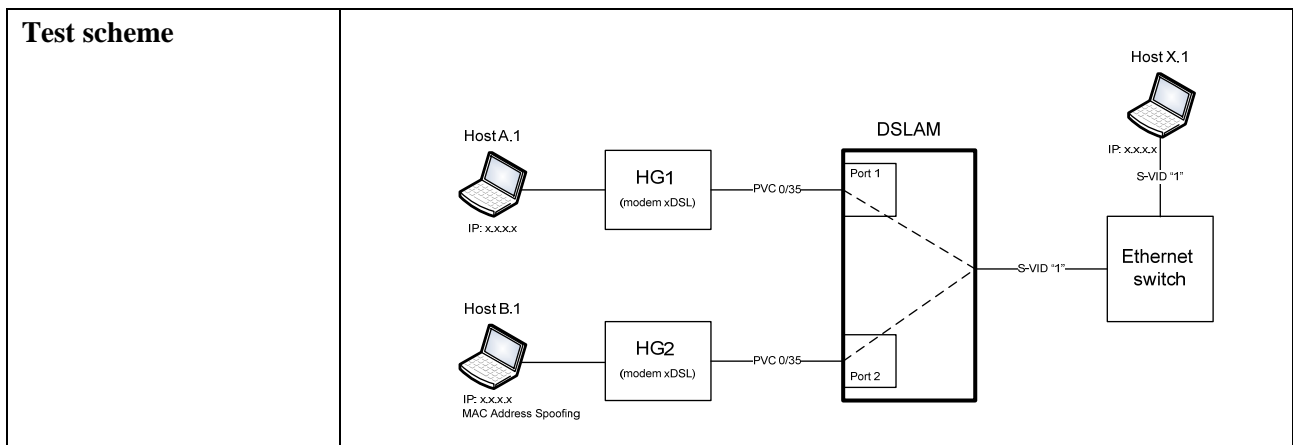


<p><b>Test number</b></p>	<p>DSLAM_SEC_03</p>
<p><b>Test name</b></p>	<p>Filtration on MAC-addresses basis</p>
<p><b>Test purpose</b></p>	<p>Check if the DSLAM/MSAN equipment has the possibility of Ethernet frames filtration on sources MAC-addresses basis and MAC-addresses of destinations.</p>
<p><b>Initial condition</b></p>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>4) A.1 and A.2 hosts are connected to home gateway HG1.</li> <li>5) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> <li>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>7) IP-addresses for hosts A.1, A.2, X.1 and X.2 are configured manually (statically) and should be from one IP subnetwork. Hosts A.1/A.2 should have the possibility to exchange traffic with hosts X.1/X.2 without router.</li> <li>8) One virtual channel (PVC X1/Y1) used for the transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>9) One virtual channel (PVC X1/Y1) used for the transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>10) On the DSLAM/MSAN equipment there should be configured S-Tag assignment possibility, including the identifier "S-VID"=1, to Ethernet frames transferred upstream through user port No. 1.</li> <li>11) On the DSLAM/MSAN equipment there should be activated function of Ethernet frames filtration for user port No. 1 MAC-addresses. For the given user port there should be configured barring for access from source with MAC-address of host A.2, and also an barring for access to destination with MAC-address of host X.2.</li> </ol>

<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform on host A.1 command ping for host X.1.</li> <li>2) Perform on host A.1 command ping for host X.2.</li> <li>3) Perform on host A.2 command ping for host X.1.</li> <li>4) Save the captures of traces in separate files ([Vendor]-DSLAM_SEC_03.txt) and put the file into the corresponding section of the KB.</li> <li>5) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Successful performance of command ping on host A.1 for host X.1.</li> <li>2) Unsuccessful performance of command ping on host A.1 for host X.2.</li> <li>3) Unsuccessful performance of command ping on host A.2 for host X.1.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	 <p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: x.x.x.x) and Host A.2 (IP: x.x.x.x) are connected to a Home Gateway (HG1, modem xDSL). HG1 is connected to a DSLAM via PVC 0/35. The DSLAM has a User port #1 with the function 'Activated function of filtration on MAC-address'. The DSLAM is connected to an Ethernet switch via S-VID '1'. The Ethernet switch is connected to Host X.1 (IP: x.x.x.x) and Host X.2 (IP: x.x.x.x) via S-VID '1'.</p>

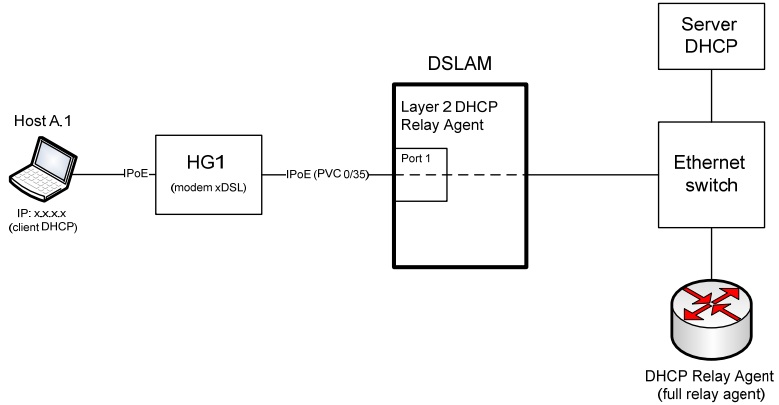
<b>Test number</b>	DSLAM_SEC_04
<b>Test name</b>	Determination of duplicated users MAC-addresses
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of detecting the duplicated users MAC-addresses and the subsequent mechanism for resolution of the given situation
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the user side home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) Configure for host B.1 MAC-address similar to that is used by host A.1.</li> <li>7) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation.</li> <li>8) HG1 and HG2 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>9) IP-addresses for hosts A.1, B.1 and X.1 are configured manually (statically) and should be from one IP subnetwork.</li> <li>10) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> </ol>

	<p>11) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.</p> <p>12) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</p> <p>13) On the DSLAM/MSAN equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through users ports No. 1 and No. 2.</p> <p>14) Further adjustment of equipment should be provided according to one of the following configurations.</p> <p>Configuration 1 In case of detection of duplicated MAC-addresses work of all users having identical MAC-addresses is permitted.</p> <p>Configuration 2 In case of detection of duplicated MAC addresses, one of the users with duplicated MAC addresses is blocked.</p> <p>Configuration 3 In case of detection of duplicated MAC-addresses refusal of service should be given to both users with the duplicated MAC-addresses.</p>
<b>Test procedure</b>	<p>1) Perform on A.1 and B.1 hosts continuous command ping for host X.1 (configuration 1).</p> <p>2) Perform on A.1 and B.1 hosts continuous command ping for host X.1 (configuration 2).</p> <p>3) Perform on A.1 and B.1 hosts continuous command ping for host X.1 (configuration 3).</p> <p>4) Save the captures of traces in separate files ([Vendor]-DSLAM_SEC_04.txt) and put the file into the corresponding section of the KB.</p> <p>5) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) In case of configuration 1:</p> <ul style="list-style-type: none"> <li>– command ping, performed on host A.1 in direction to host X.1, passes;</li> <li>– command ping, performed on host B.1 in direction to host X.1, passes.</li> </ul> <p>2) In case of a configuration 2:</p> <ul style="list-style-type: none"> <li>– command ping, performed on host A.1 in direction to host X.1, passes;</li> <li>– command ping, performed on host B.1 in direction to host X.1, does not pass.</li> </ul> <p>3) In case of configuration 3:</p> <ul style="list-style-type: none"> <li>– command ping, performed on host A.1 in direction to host X.1, does not pass;</li> <li>– command ping, performed on host B.1 in direction to host X.1, does not pass.</li> </ul> <p>4) The daily report form has been saved in the corresponding section of KB.</p>

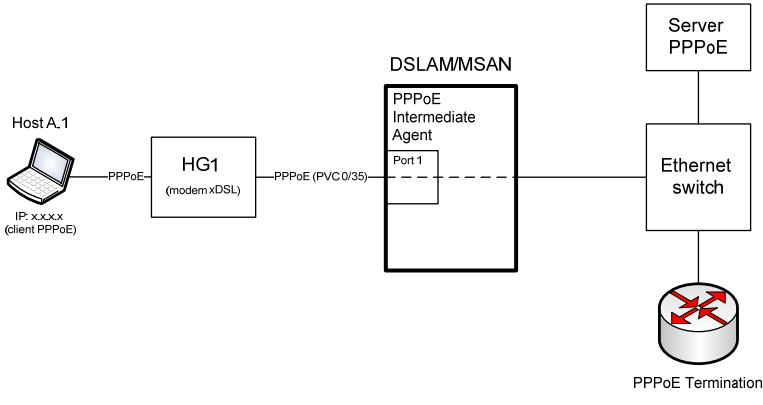


#### 6.3.1.1.4 Check of functions of identification of subscriber lines

<b>Test number</b>	DSLAM_LID_01
<b>Test name</b>	Support of DHCP Option 82
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of functioning as DHCP Relay Agent second level and maintenance of DHCP clients identification connection points using an information option (an option 82)
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>6) Host A.1 uses IPoE sessions. IP-address for host A.1 is defined dynamically using allocated DHCP server connected to the Ethernet switch. DHCP server supports option 82.</li> <li>7) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>8) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>9) Router providing functionality (full) of DHCP Relay Agent should be connected to the Ethernet switch equipment.</li> <li>10) DSLAM/MSAN equipment works as DHCP Relay Agent second level.</li> <li>11) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: bootp.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate on host A.1 an establishment of IPoE session (provide transfer of broadcasting DHCP request from host A.1).</li> <li>2) Save the captures of traces in separate files ([Vendor]-DSLAM_LID_01.txt) and put the file into the corresponding section of the KB.</li> <li>3) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>

<b>Expected result</b>	<p>1) Using information option of DHCP protocol (option 82) DSLAM/MSAN equipment has definitely identified to which client initiating DHCP request user line is connected within network of broadband access.</p> <p>2) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	 <p>The diagram illustrates the test setup. Host A.1 (client DHCP) is connected to HG1 (modem xDSL) via IPoE. HG1 is connected to DSLAM (Layer 2 DHCP Relay Agent) via IPoE (PVC 0/35). DSLAM is connected to Ethernet switch via Port 1. Ethernet switch is connected to Server DHCP and a DHCP Relay Agent (full relay agent) which is crossed out with a red X.</p>

<b>Test number</b>	DSLAM_LID_02
<b>Test name</b>	PPPoE functions Intermediate Agent support
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of functioning as PPPoE Intermediate Agent for maintenance of user lines identification
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>4) One virtual channel (PVC X1/Y1) used for the transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>5) One virtual channel (PVC X1/Y1) used for the transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>6) Host A.1 is connected to home gateway HG1.</li> <li>7) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>8) Host A.1 uses PPPoE sessions. IP-address for host A.1 is defined dynamically using allocated PPPoE server connected to the Ethernet switch.</li> <li>9) Router providing functionality of PPPoE sessions termination is connected to the Ethernet switch equipment.</li> <li>10) DSLAM/MSAN equipment works as PPPoE Intermediate Agent.</li> <li>11) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: pppoed.</li> </ol>

<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate on host A.1 establishment of PPPoE session (to provide PPPoE Discovery message transfer from host A.1).</li> <li>2) Save the captures of traces in separate files ([Vendor]-DSLAM_LID_02.txt) and put the file into the corresponding section of the KB.</li> <li>3) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The DSLAM/MSAN equipment adds PPPoE-TAG tag into the PPPoE Discovery packages (PADI, PADR) transferred upstream.</li> <li>2) The given tag allows to definitely identify user line on which package PPPoE, and also specify user who has transferred the given message: <ul style="list-style-type: none"> <li>– "Agent Circuit ID" option should identify definitely DSLAM/MSAN equipment within network of user's access, and also logic port of DSLAM/MSAN equipment through which package PPPoE has been received;</li> <li>– "Agent Remote ID" option should identify definitely user connected with corresponding logic port of DSLAM/MSAN equipment through whom PPPoE package has been received.</li> </ul> </li> <li>3) The DSLAM/MSAN equipment has not changed the initial MAC-addresses of source and destination in the PPPoE Discovery packages transferred upstream.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	 <p>The diagram illustrates the test scheme. On the left, Host A.1 (labeled with IP: x.x.x.x and client PPPoE) is connected to HG1 (modem xDSL) via PPPoE. HG1 is connected to the DSLAM/MSAN (PPPoE Intermediate Agent, Port 1) via PPPoE (PVC 0/35). The DSLAM/MSAN is connected to an Ethernet switch. The Ethernet switch is connected to a Server PPPoE and a PPPoE Termination device (represented by a cylinder with a red 'X').</p>

### 6.3.1.1.5 Check of functions of management, monitoring and statistics gathering

<b>Test number</b>	DSLAM_MNG_01
<b>Test name</b>	Equipment monitoring by SNMP protocol
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility for remote monitoring by means of control system using SNMP protocol
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user's ports on the DSLAM/MSAN equipment (two user lines) have to be used. On the user side home gateways equipment should be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> </ol>

	<p>6) HG1 and HG2 equipment work in a bridged mode (function of local DHCP server is disconnected).</p> <p>7) IP-addresses for A.1 and B.1 hosts are configured manually.</p> <p>8) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</p> <p>9) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.</p> <p>10) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</p> <p>11) Host which functions as remote workstation of the control system is connected to the Ethernet switch. On the given host SNMP software is established. IP-address for specified host should be configured manually and there should be from the same subnetwork, as IP-address of DSLAM/MSAN equipment used for interaction with control system.</p> <p>12) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: SNMP.</p>
<p><b>Test procedure</b></p>	<p>1) Initiate remote monitoring of DSLAM/MSAN equipment on host, carrying out functions of workstation of a control system.</p> <p>2) Provide appearance of emergency and other non-standard situations on the DSLAM/MSAN equipment. Also it is necessary to simulate problems with powering (transition to the reserve block, return to mainframe), problems with interfaces (refusal of physical/channel level), connection of remote users to DSLAM/MSAN equipment on Telnet/SSH/SNMP, change of equipment configuration on Telnet/SSH/SNMP and other events.</p> <p>3) Save the captures of traces in separate files ([Vendor]-DSLAM_MNG_01.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<p><b>Expected result</b></p>	<p>1) During the process of monitoring, DSLAM/MSAN equipment gives the adequate information on condition of interfaces, operative memory and central processor.</p> <p>2) The DSLAM/MSAN equipment provides transfer of adequate SNMP traps/informs messages in case of emergencies occurrence.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<p><b>Test scheme</b></p>	<p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: xxx.x) is connected to HG1 (modem xDSL). Below it, Host B.1 (IP: xxx.x) is connected to HG2 (modem xDSL). Both HG1 and HG2 are connected to a central DSLAM block via PVC 0/35. The DSLAM has two ports, Port 1 and Port 2. Port 1 is connected to HG1, and Port 2 is connected to HG2. To the right of the DSLAM is an Ethernet switch. The Ethernet switch is connected to the DSLAM and to a Remote CLI (IP: xxx.x). A dashed arrow labeled 'SNMP' points from the Remote CLI to the DSLAM, indicating the monitoring connection.</p>

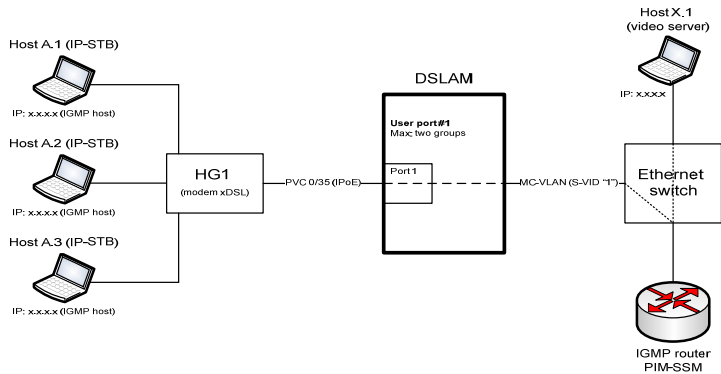


### 6.3.1.1.6 Check of functions of Multicast mode support

<b>Test number</b>	DSLAM_MC_01
<b>Test name</b>	Connection of several users to one multicasting group
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility to simultaneously connect several users to one multicasting group without subsequent load increase at network interfaces of DSLAM/MSAN equipment
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, three user ports on the DSLAM/MSAN equipment (three user lines) have to be used. On the user side, home gateway equipment has to be connected to network terminations of user lines (HG1 equipment, HG2 and HG3, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) Host C.1 is connected to home gateway HG3.</li> <li>7) HG1 equipment, HG2 and HG3 work in the bridged mode (function of local DHCP server is disconnected).</li> <li>8) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</li> <li>9) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG2 equipment.</li> <li>10) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG3 equipment.</li> <li>11) On hosts A.1, B.1 and C.1, IP STB software should be used. Hosts A.1, B.1 and C.1 are IGMP hosts. IP-addresses for hosts A.1, B.1 and C.1 are configured manually.</li> <li>12) Hosts A.1, B.1 and C.1 use IPoE sessions.</li> <li>13) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation. Host X.1 performs functionality of video server, being video traffic source. IP-address for host X.1 should be configured manually.</li> <li>14) Router equipment which functions as an IGMP router should be connected to the Ethernet switch equipment. For routing of multicasting traffic PIM-SSM protocol is used.</li> <li>15) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>16) DSLAM/MSAN equipment during processing of IGMP messages, works in the transparent IGMP Snooping mode.</li> <li>17) On the DSLAM/MSAN equipment should be configured uniform multicasting VLAN, intended for carrying out of traffic related with IP-STB equipment of all users. On the DSLAM/MSAN equipment should be configured the possibility of "S-VID"=1 identifiers assignment to the Ethernet frames transferred upstream from users IP-STB equipment.</li> <li>18) Perform on the analyser of IP protocols for the corresponding interface, and set the following filter on protocols: IGMP.</li> </ol>

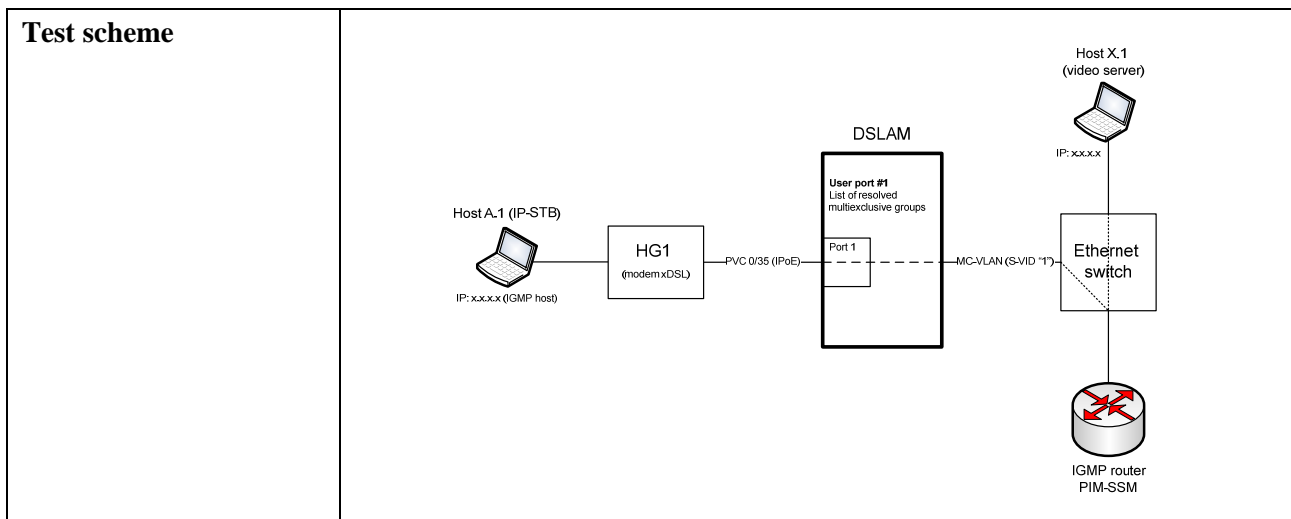
<b>Test procedure</b>	<p>1) Hosts A.1, B.1 and C.1 should initiate IPoE sessions, transfer IGMP Membership Report messages and, thus, should consistently connect to the same multicasting group (observe one video channel).</p> <p>2) Save the captures of traces in separate files ([Vendor]-DSLAM_MC_01.txt) and put the file into the corresponding section of the KB.</p> <p>3) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) All users have connections to the same multicasting group (observe one video channel).</p> <p>2) During consecutive connections of hosts B.1 and C.1, there is no additional load on network interfaces of DSLAM/MSAN equipment.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, three hosts (Host A.1, Host B.1, and Host C.1) are shown as IP-STBs with IP addresses x.x.x.x. Each host is connected to a home gateway (HG1, HG2, and HG3) via IPoE. Each HG is connected to a DSLAM (modem xDSL) via PVC0/35 (IPoE) on Port 1, Port 2, and Port 3 respectively. The DSLAM is connected to an Ethernet switch via MC-VLANs-VID 1. The Ethernet switch is also connected to an IGMP router PIM-SSM. Host X.1 (video server) is connected to the Ethernet switch via IP:xx.xx.</p>

<b>Test number</b>	DSLAM_MC_02
<b>Test name</b>	Restriction of channel numbers which are simultaneously observed by the user
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of multicasting groups total number restriction to which one user simultaneously can be connected
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p> <p>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On the user side, home gateway equipment (HG1 equipment) should be connected to network termination of user line.</p> <p>4) Hosts A.1, A.2 and A.3 are connected to home gateway HG1.</p> <p>5) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected). HG1 equipment should support the IGMP Snooping function.</p> <p>6) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on HG1 equipment.</p> <p>7) On hosts A.1, A.2 and A.3 IP STB software should be used. Hosts A.1, A.2 and A.3 are IGMP hosts. IP-addresses for hosts A.1, A.2 and A.3 are configured manually.</p> <p>8) Hosts A.1, A.2 and A.3 use IPoE sessions.</p>

	<p>9) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation. Host X.1 performs functionality of video server, being video traffic source. IP-address for host X.1 should be configured manually.</p> <p>10) Router equipment performing functions of an IGMP router should be connected to the Ethernet switch equipment. For routing of multicasting traffic PIM SSM protocol is used.</p> <p>11) One virtual channel (PVC X1/Y1) used for transfer of all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</p> <p>12) DSLAM/MSAN equipment during processing of IGMP messages works in the transparent IGMP Snooping mode.</p> <p>13) On the DSLAM/MSAN equipment should be configured uniform multicasting VLAN, intended for carrying out of traffic related with IP-STB equipment of all users. On the DSLAM/MSAN equipment there should be configured a possibility of "S-VID"=1 identifiers assignment to the Ethernet frames transferred upstream from IP-STB equipment of users.</p> <p>14) On the DSLAM/MSAN equipment there should be configured for user port No. 1 restriction on total number of multicasting groups to which the given user can be connected. Maximum number of multicasting groups for the given user should be equal to 2.</p> <p>15) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: IGMP.</p>
<b>Test procedure</b>	<p>1) Hosts A.1, A.2 and A.3 should consistently initiate IPE sessions and transfer IGMP Membership Report messages, trying to be connected to various multicasting groups.</p> <p>2) Save the captures of traces in separate files ([Vendor]-DSLAM_MC_02.txt) and put the file into the corresponding section of the KB.</p> <p>3) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) A.1 and A.2 hosts are successfully connected to various multicasting groups.</p> <p>2) Host A.3 has no connections to new multicasting group.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	 <p>The diagram illustrates the test scheme. On the left, three hosts (Host A.1, A.2, and A.3) are connected to a modem (HG1). Each host is labeled as an IP-STB with IP: .x.x.x (IGMP host). The modem (HG1) is connected to a DSLAM (User port#1, Max: two groups) via a PVC 0/35 (PoE). The DSLAM is connected to an Ethernet switch via an MC-VLAN (S-VID=1). The Ethernet switch is connected to Host X.1 (video server) and an IGMP router (PIM-SSM).</p>

<b>Test number</b>	DSLAM_MC_03
<b>Test name</b>	Restriction of the multicasting groups list accessible to the user
<b>Test purpose</b>	Check if the DSLAM/MSAN equipment has the possibility of restriction of the multicasting groups list accessible to the specified user

<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On the user side, home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>6) On HG1 equipment, one virtual channel (PVC X1/Y1) for carrying out of all traffic types (in case of ATM transport use on UNI interface) is configured.</li> <li>7) On host A.1, IP-STB software should be used. Host A.1 should be IGMP host. IP-address for host A.1 should be configured manually.</li> <li>8) Host A.1 uses IPoE sessions.</li> <li>9) Host X.1 is connected to the Ethernet switch which has implemented functions of the DSLAM/MSAN traffic aggregation. Host X.1 performs functionality of video server, being video traffic source. IP-address for host X.1 should be configured manually.</li> <li>10) Router equipment performing functions of an IGMP router should be connected to the Ethernet switch equipment. For routing of multicasting traffic PIM-SSM protocol is used.</li> <li>11) One virtual channel (PVC X1/Y1) used to transfer all types of traffic (in case of ATM transport use on UNI interface) is configured on the DSLAM/MSAN equipment.</li> <li>12) DSLAM/MSAN equipment during processing of IGMP messages functions in the transparent IGMP Snooping mode.</li> <li>13) On the DSLAM/MSAN equipment should be configured uniform multicasting VLAN, intended for carrying out of traffic related with IP-STB equipment of all users. On the DSLAM/MSAN equipment there should be configured the possibility of "S-VID"=1 identifiers assignment to the Ethernet frames transferred upstream from IP-STB equipment of users.</li> <li>14) On the DSLAM/MSAN equipment there should be configured for user port No. 1 the multicasting groups list accessible to user.</li> <li>15) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: IGMP.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Host A.1 should initiate IPoE session and transfer IGMP Membership Report messages, trying to be consistently connected to various multicasting groups, matching the list of resolved groups, and not matching the given list.</li> <li>2) Save the captures of traces in separate files ([Vendor]-DSLAM_MC_03.txt) and put the file into the corresponding section of the KB.</li> <li>3) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Host A.1 has been successfully connected to various multicasting groups matching list of groups, resolved for user port No. 1.</li> <li>2) Host A.1 has no connections to any of multicasting groups which are not matching the list of groups, resolved for user port No. 1.</li> <li>3) The daily report form has been saved in the corresponding section of KB.</li> </ol>



### 6.3.1.2 Check of EAS equipment functionality

#### 6.3.1.2.1 Check of functions of VLAN tags processing

<b>Test number</b>	EAS_VLAN_01
<b>Test name</b>	Configuration of S-VLAN for Untagged architecture (model N:1+1:1)
<b>Test purpose</b>	Check if the EAS has the possibility to assign the S VLAN (S-VID) identifier to the Ethernet frames,, which are transferred upstream using the Untagged model on UNI interface
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the EAS equipment (two user lines) have to be used. On the user side, the home gateway equipment has to be connected to the network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) A.1 and A.2 hosts are connected to the home gateway equipment HG1.</li> <li>5) B.1 and B.2 hosts are connected to the home gateway equipment HG2.</li> <li>6) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>7) A.1 and B.1 hosts use PPPoE sessions.</li> <li>8) A.2 and B.2 hosts use IPoE sessions.</li> <li>9) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>10) IP-addresses for A.1 and B.1 hosts are assigned dynamically using PPPoE server or are configured manually.</li> <li>11) For termination of PPPoE sessions from A.1 and B.1 hosts the external router should be connected to the Ethernet switch equipment.</li> <li>12) IP-addresses for hosts A.2, B.2, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>13) On hosts A.2, B.2 and X.2 used IP-address from one IP subnetwork.</li> </ol>

	<p>14) On the EAS equipment possibility of assignment of identifiers S-VID to Ethernet frames transferred upstream, depending on value of field Ethertype and number of port of the user is configured. Following options are configured:</p> <ul style="list-style-type: none"> <li>– assignment of "S-VID"=1 to Ethernet frames which are transferred from HG1 equipment (user port No. 1) with the Ethertype value 0x8863 or 0x8864;</li> <li>– assignment of "S-VID"=2 to Ethernet frames which are transferred from HG2 equipment (user port No. 2) with the Ethertype value 0x8863 or 0x8864;</li> <li>– assignment of "S-VID"=3 frames to Ethernet transferred from HG1 and HG2 equipment (any user port) with the Ethertype value 0x0800.</li> </ul> <p>15) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) Perform traffic exchange between hosts A.2 and X.2.</li> <li>4) Perform traffic exchange between hosts B.2 and X.2.</li> <li>5) Save the captures of traces in separate files ([Vendor]-EAS_VLAN_01.txt) and put the file into the corresponding section of the KB.</li> <li>6) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The EAS equipment has assigned the identifier "S VID" =1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1.</li> <li>2) The EAS equipment has assigned the identifier "S VID" =2 for Ethernet frames which are transferred upstream and related to PPPoE session of host B.1.</li> <li>3) The EAS equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IpoE session of host A.2.</li> <li>4) The EAS equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IpoE session of host B.2.</li> <li>5) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. On the left, Host A.1 (IP: .x.xxx (PPPoE)) and Host A.2 (IP: .xxx.x (DHCP)) are connected to HG1 (Ethernet WAN). Host B.1 (IP: .x.xxx (PPPoE)) and Host B.2 (IP: .xxx.x (DHCP)) are connected to HG2 (Ethernet WAN). Both HG1 and HG2 connect to the EAS equipment via Ethernet WAN interfaces (Port 1 and Port 2). The EAS equipment is connected to an Ethernet switch through three S-VIDs: S-VID '1' (PPPoE/User 1), S-VID '2' (PPPoE/User 2), and S-VID '3' (IPoE/User 1, 2). Host X.1 (IP: .x.xxx (DHCP)) and Host X.2 (IP: .xxx.x (DHCP)) are connected to the Ethernet switch. A Server DHCP is also connected to the switch. A Protocol analyzer is connected to the EAS equipment. A legend indicates PPPoE Termination and DHCP relay agent.</p>

<b>Test number</b>	EAS_VLAN_02
<b>Test name</b>	Configuration of S-VLAN for VLAN tagged architecture (model N:1+1:1)
<b>Test purpose</b>	Check if the EAS has the possibility to assign the S VLAN (S VID) identifier to the Ethernet frames, which are transferred upstream using the VLAN tagged model on UNI interface

<p><b>Initial condition</b></p>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the EAS equipment (two user lines) have to be used. On the user side the home gateways equipment should be connected to the network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) A.1 and A.2 hosts are connected to the home gateway equipment HG1.</li> <li>5) B.1 and B.2 hosts are connected to the home gateway equipment HG2.</li> <li>6) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>7) A.1 and B.1 hosts use PPPoE sessions.</li> <li>8) A.2 and B.2 hosts use IPoE sessions.</li> <li>9) HG1 and HG2 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>10) IP-addresses for A.1 and B.1 hosts are assigned dynamically using PPPoE server or are configured manually.</li> <li>11) For termination of PPPoE sessions from A.1 and B.1 hosts, the external router should be connected to the Ethernet switch equipment.</li> <li>12) IP-addresses for hosts A.2, B.2, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>13) On hosts A.2, B.2 and X.2 are used IP-addresses from one IP subnetwork.</li> <li>14) HG1 equipment supports the function of VLAN tags assignment according to IEEE 802.1Q standard. HG1 equipment is configured as follows: there is assigned VLAN tag "C-VID"=1 for PPPoE sessions connected with host A.1, and VLAN tag "C-VID"=2 for IPoE sessions connected with host A.2.</li> <li>15) HG2 equipment supports function of VLAN tags assignment according to IEEE 802.1Q standard. HG2 equipment is configured as follows: there is assigned "C-VID"=1 for PPPoE sessions connected with host B.1, and "C-VID"=2 for IPoE sessions connected with host B.2.</li> <li>16) The possibility of use VLAN identifiers for users' ports No. 1 and No. 2 is configured on the EAS equipment. The VLAN Membership List is configured on the EAS equipment including list of C-VID values resolved for each of users ports. For users ports No. 1 and No. 2 there should be resolved values "C-VID"=1 and "C-VID"=2.</li> <li>17) On the EAS equipment there is a possibility to assign S VID identifiers for Ethernet frames which are transferred upstream depending on value of VLAN identifier in initial IEEE 802.1Q tag and user port number. The following configuration of VLAN translation table should be done: <ul style="list-style-type: none"> <li>– assignment of "S-VID"=1 to Ethernet frames which are transferred from HG1 equipment (user port No. 1) and have "C-VID"=1 in IEEE 802.1Q tag;</li> <li>– assignment of "S-VID"=2 to Ethernet frames which are transferred from HG2 equipment (user port No. 2) and have "C-VID"=1 in IEEE 802.1Q tag;</li> <li>– assignment of "S-VID"=3 to Ethernet frames which are transferred from HG2 equipment (any user port) and have "C-VID"=2 in IEEE 802.1Q tag.</li> </ul> </li> <li>18) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</li> </ol>
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<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) Perform traffic exchange between hosts A.2 and X.2.</li> <li>4) Perform traffic exchange between hosts B.2 and X.2.</li> <li>5) Save the captures of traces in separate files ([Vendor]-EAS_VLAN_02.txt) and put the file into the corresponding section of the KB.</li> <li>6) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The EAS equipment has assigned the identifier "S VID" =1 for Ethernet frames which are transferred upstream and related to the PPPoE session of host A.1.</li> <li>2) The EAS equipment has assigned the identifier "S VID" =2 for Ethernet frames which are transferred upstream and related to the PPPoE session of host B.1.</li> <li>3) The EAS equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host A.2.</li> <li>4) The EAS equipment has assigned the identifier "S VID" =3 for Ethernet frames which are transferred upstream and related to IPoE session of host B.2.</li> <li>5) The EAS equipment deletes the Ethernet frames which contain C-VID identifiers in IEEE 802.1Q tag not matching VLAN Membership List.</li> <li>6) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: .xxxx (PPPoE)) and Host A.2 (IP: .xxxx (DHCP)) are connected to HG1 (Ethernet WAN). Host B.1 (IP: .xxxx (PPPoE)) and Host B.2 (IP: .xxxx (DHCP)) are connected to HG2 (Ethernet WAN). HG1 and HG2 connect to EAS equipment via Port 1 and Port 2, respectively, using 802.1Q Tag C/VID '1' (PPPoE) and '2' (IPoE). The EAS equipment connects to an Ethernet switch via S-VID '1' (PPPoE/User 1), S-VID '2' (PPPoE/User 2), and S-VID '3' (IPoE/User 1, 2). Host X.1 (IP: .xxxx (DHCP)) and Host X.2 (IP: .xxxx (DHCP)) are connected to the Ethernet switch. A Sever DHCP and a PPPoE Termination/DHCP relay agent are also shown.</p>

<b>Test number</b>	EAS_VLAN_03
<b>Test name</b>	Configuration of S-VLAN/C-VLAN stack (QinQ)
<b>Test purpose</b>	Check if the EAS has the possibility to assign the VLAN tag pair (S-Tag/C-Tag) to the Ethernet frame, which are transferred upstream
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the EAS equipment (two user lines) have to be used. On the user side the home gateways equipment should be connected to the network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>7) A.1 and B.1 hosts use IPoE sessions.</li> </ol>



	<p>8) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</p> <p>9) IP-addresses for hosts A.1, B.1, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.</p> <p>10) IP-addresses from one IP subnetwork are used on the hosts A.1, B.1 and X.2.</p> <p>11) On the EAS equipment there is configured the possibility to assign VLAN tag pair (S-Tag/C-Tag) for Ethernet frames which are transferred upstream. The S-VID value identifies EAS equipment (i.e., value S VID is identical for all users ports). C-VID value identifies number of user port on which Ethernet frame has arrived. The following configuration should be done:</p> <ul style="list-style-type: none"> <li>– assignment of "S-VID"=1, "C-VID"=1 to Ethernet frames which are transferred from HG1 equipment (user port No. 1);</li> <li>– assignment of "S-VID"=1, "C-VID"=2 to Ethernet frames which are transferred from HG1 equipment (user port No. 2)</li> </ul> <p>12) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.2.</li> <li>3) Save the captures of traces in separate files ([Vendor]-EAS_VLAN_03.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The EAS equipment has assigned the identifier "S-VID"=1, "C-VID"=1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1.</li> <li>2) The EAS equipment has assigned the identifier "S-VID"=1, "C-VID"=2 for Ethernet frames which are transferred upstream and related to PPPoE session of host B.1.</li> <li>3) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: xxxxx (DHCP)) and Host B.1 (IP: xxxxx (DHCP)) are connected via IPoE to HG1 (Ethernet WAN) and HG2 (Ethernet WAN) respectively. Both HG1 and HG2 are connected via IPoE to EAS equipment, specifically to Port 1 and Port 2. The EAS equipment is connected to an Ethernet switch. Host X.1 (IP: xxxxx (DHCP)) and Host X.2 (IP: xxxxx (DHCP)) are also connected to the Ethernet switch. A DHCP relay agent (represented by a red X) and a Server DHCP are also connected to the Ethernet switch.</p>

<b>Test number</b>	EAS_VLAN_04
<b>Test name</b>	Configuration of TLS user port
<b>Test purpose</b>	Check if the EAS has the possibility of TLS user port configuration providing transparent transfer of initial IEEE 802.1Q tags set by users over the network.

<p><b>Initial condition</b></p>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the EAS equipment (one user line) have to be used. On the user side to the network termination of given user line there should be a connection from home gateway (business) (HG1 equipment).</li> <li>4) Hosts A.1 and A.2 are connected to HG1 equipment.</li> <li>5) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>6) Host A.1 uses PPPoE sessions.</li> <li>7) Host A.2 uses IPoE sessions.</li> <li>8) HG1 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>9) IP-address for host A.1 is assigned dynamically with allocated PPPoE server or are configured manually.</li> <li>10) For termination of PPPoE sessions from host A.1, the external router should be connected to the Ethernet switch equipment.</li> <li>11) IP-addresses for hosts A.2, X.1 and X.2 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>12) HG1 equipment supports function of VLAN tags assignment according to IEEE 802.1Q standard. HG1 equipment is configured as follows: there is assigned VLAN tag "C-VID"=111 for PPPoE sessions connected with host A.1, and VLAN tag "C-VID"=222 for IPoE sessions connected with host A.2.</li> <li>13) User port No. 1 of EAS equipment is configured as TLS port providing transparent transfer of VLAN tags assigned on user equipment.</li> <li>14) VLAN Membership List is configured on the EAS equipment for user port No. 1. The VLAN Membership List should contain the list of C-VID identifiers which have not been related to TLS traffic transferred through user port No. 1 in an upstream direction. This list should contain "C-VID"=111. All Ethernet frames transferred upstream through user port No. 1 and not having "C-VID"=111, should be processed as TLS traffic.</li> <li>15) On the EAS equipment should be configured the VLAN translation table according to which the Ethernet frames transferred upstream and having initial identifier "C-VID"=111 (matching VLAN Membership List) should get "S-VID"=1 identifier. Initial identifier C-VID in this case should be deleted.</li> <li>16) On the EAS equipment there is a possibility to assign TLS "S-VID"=100 identifier for Ethernet frames which are transferred upstream through user port No. 1 and having initial IEEE 802.1Q tag, not matching VLAN Membership List. Thus initial IEEE 802.1Q tag, received from the user, remains as enclosed C-Tag.</li> <li>17) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</li> </ol>
<p><b>Test procedure</b></p>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts A.2 and X.2.</li> <li>3) Save the captures of traces in separate files ([Vendor]-EAS_VLAN_04.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>

<b>Expected result</b>	<p>1) The EAS equipment has assigned the identifier "S VID" =1 for Ethernet frames which are transferred upstream and related to PPPoE session of host A.1. Thus initial IEEE 802.1Q tag (including "C-VID"=111), received from the user, has been deleted.</p> <p>2) The EAS equipment has assigned the identifier "S VID" =100 for Ethernet frames which are transferred upstream and related to IpoE session of host A.2. Thus initial IEEE 802.1Q tag (including "C-VID"=222), received from the user, has remained as an enclosed C-Tag (having "C-VID"=222).</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	

<b>Test number</b>	EAS_VLAN_05
<b>Test name</b>	Configuration of admissible list of Ethernet frame types
<b>Test purpose</b>	Check if the EAS has the possibility of admissible list of Ethernet frame types configuration for certain user port (for the upstream transfer).
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the EAS equipment (one user line) has to be used. On the user side the equipment of a home gateway (HG1 equipment) should be connected to the network termination of the given user line.</li> <li>4) Host A.1 is connected to HG1 equipment.</li> <li>5) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>6) Host A.1 uses IpoE sessions.</li> <li>7) HG1 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>8) IP-addresses for hosts A.1 and X.1 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>9) On the EAS equipment there is a possibility to assign "S-VID"=1 identifiers to any Ethernet frames transferred upstream through user port No. 1.</li> <li>10) Further adjustment of equipment should be provided according to one of the following configurations.</li> </ol> <p>Configuration 1</p> <p>On HG1 equipment there should be a disconnected function of VLAN tags assignment for Ethernet frames transferred upstream. Host A.1 also should not assign VLAN tags for Ethernet frames transferred upstream.</p>

	<p>On the EAS equipment during configuration of admissible Ethernet frames types list there should be specified value: "untagged or priority tagged frames" for user port No. 1.</p> <p>Configuration 2 Configuration of HG1 equipment is same as in Configuration 1. On the EAS equipment during configuration of admissible Ethernet frames types list there should be specified value: "VLAN tagged frames" for user port No. 1.</p> <p>Configuration 3 Configuration of HG1 equipment is the same as in Configuration 1. On the EAS equipment during configuration of admissible Ethernet frames types list there should be specified value: "admit all" for user port No. 1.</p> <p>Configuration 4 Activate on HG1 equipment function of VLAN tags assignment to Ethernet frames transferred upstream. HG1 equipment should be configured to assign VLAN "C-VID"=1 identifier for IPoE sessions related with host A.1 On the EAS equipment during configuration of admissible Ethernet frames types list there should be specified value: "untagged or priority tagged frames" for user port No. 1.</p> <p>Configuration 5 Configuration of HG1 equipment is same as in Configuration 4. On the EAS equipment during configuration of admissible Ethernet frames types list there should be specified value: "VLAN tagged frames" for user port No. 1.</p> <p>Configuration 6 Configuration of HG1 equipment is the same as in Configuration 4. On the EAS equipment during configuration of admissible Ethernet frames types list there should be specified value: "admit all" for user port No. 1.</p> <p>11) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Using Configuration 1 perform on host A.1 command ping for host X.1.</li> <li>2) Using Configuration 2 perform on host A.1 command ping for host X.1.</li> <li>3) Using Configuration 3 perform on host A.1 command ping for host X.1.</li> <li>4) Using Configuration 4 perform on host A.1 command ping for host X.1.</li> <li>5) Using Configuration 5 perform on host A.1 command ping for host X.1.</li> <li>6) Using Configuration 6 perform on host A.1 command ping for host X.1.</li> <li>7) Save the captures of traces in separate files ([Vendor]-EAS_VLAN_05.txt) and put the file into the corresponding section of the KB.</li> <li>8) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>

<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Successful performance of command ping according to step 1 of test procedure.</li> <li>2) Unsuccessful performance of command ping according to step 2 of test procedure.</li> <li>3) Successful performance of command ping according to step 3 of test procedure.</li> <li>4) Unsuccessful performance of command ping according to step 4 of test procedure.</li> <li>5) Successful performance of command ping according to step 5 of test procedure.</li> <li>6) Successful performance of command ping according to step 6 of test procedure.</li> <li>7) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	

### 6.3.1.2.2 Check of QoS functions

<b>Test number</b>	EAS_QOS_01
<b>Test name</b>	Marks of priority bits during processing of Ethernet frames which are not containing VLAN tags
<b>Test purpose</b>	Check if the EAS equipment has the possibility of priority bits marking in Ethernet frames which are transferred upstream and not containing IEEE 802.1Q tags, assigned by user equipment
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the EAS equipment (two user lines) has to be used. On the user side the home gateway equipment has to be connected to the network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>7) A.1 and B.1 hosts use IPoE sessions.</li> <li>8) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>9) IP-addresses for hosts A.1, B.1 and X.1 are assigned dynamically with the allocated DHCP server or are configured manually.</li> </ol>

	<p>10) A.1 and B.1 hosts should have possibility of priority assignment to Ethernet frames. A.1 and B.1 hosts should establish priority "6" for all transferred Ethernet frames.</p> <p>11) HG1 and HG2 equipment should provide transparent translation of Ethernet frames priorities values configured on A.1 and B.1 hosts, accordingly. On HG1 equipment and HG2 there is disconnected the function of IEEE 802.1Q tags assignment to Ethernet frames transferred upstream.</p> <p>12) On the EAS equipment there should be configured possibility of S-Tag assignment, including identifier "S-VID"=1, to Ethernet frames transferred upstream through any of users ports. In this case the general VLAN (N:1) should be configured for all users ports.</p> <p>13) On the EAS equipment there should be configured user port No. 1 with the possibility of copying the priority value of Ethernet frame received from HG1 equipment, into the value of S-Tag priority.</p> <p>14) On the EAS equipment should be configured user port No. 2 with the possibility to identify the value of S-Tag priority for Ethernet frames transferred upstream through given port on basis of "Ingress to Egress" policy. In this case as criteria for definition of S-Tag priority the following parameters should be used:</p> <ul style="list-style-type: none"> <li>– value of user port number (physical or logic);</li> <li>– value of Ethertype field in the Ethernet frame;</li> <li>– value of initial Ethernet frame priority received from HG2 equipment.</li> </ul> <p>15) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</p>
<p><b>Test procedure</b></p>	<p>1) Perform traffic exchange between hosts A.1 and X.1.</p> <p>2) Perform traffic exchange between hosts B.1 and X.1.</p> <p>3) During traffic exchange between hosts B.1 and X.1 perform transfer of ARP message from host B.1 (for this purpose it is necessary to clear contents of ARP table on host B.1).</p> <p>4) Save the captures of traces in separate files ([Vendor]-EAS_QOS_01.txt) and put the file into the corresponding section of the KB.</p> <p>5) Fill in a daily report form with the testing results and save it in the KB.</p>
<p><b>Expected result</b></p>	<p>1) S-Tag priority for Ethernet frames transferred upstream through user port No. 1 equals to "6".</p> <p>2) S-Tag priority for Ethernet frames transferred upstream through user port No. 2 has been established according to policy defined on the EAS equipment for the given port.</p> <p>3) Policy for different S-Tag definition criteria has been correctly performed.</p> <p>4) The daily report form has been saved in the corresponding section of KB.</p>
<p><b>Test scheme</b></p>	<p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: xxxxx (DHCP)) and Host B.1 (IP: xxxxx (DHCP)) are connected to HG1 (Ethernet WAN) and HG2 (Ethernet WAN) respectively. Both HG1 and HG2 send 'Priority tagged frames/No VLAN tag' to the EAS (Ethernet Access Switch) via Port 1 and Port 2. Port 1 performs 'Copying of value of priority'. Port 2 performs 'Applying of policy: Ingress to Egress'. The EAS sends 'S-Tag (S/VID *1+priority)' to an Ethernet switch. The Ethernet switch is connected to Host X.1 (IP: xxxxx (DHCP)), a Server DHCP, and a DHCP relay agent.</p>

<b>Test number</b>	EAS_QOS_02
<b>Test name</b>	Marks of priority bits during processing of Ethernet frames containing VLAN tags
<b>Test purpose</b>	Check if the EAS equipment has the possibility of priority bits marking in Ethernet frames which are transferred upstream and containing IEEE 802.1Q tags, assigned by user equipment
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the EAS equipment (two user lines) has to be used. On the user side the home gateway equipment has to be connected to the network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>7) A.1 and B.1 hosts use IPoE sessions.</li> <li>8) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>9) IP-addresses for hosts A.1, B.1 and X.1 are assigned dynamically with the allocated DHCP server or are configured manually.</li> <li>10) HG1 equipment should support the function of VLAN tags assignment according to IEEE 802.1Q standard. HG1 equipment is configured to assign IEEE 802.1Q tag, including "C-VID" =1 and priority value equal to "6" for all frames transferred.</li> <li>11) HG2 equipment should support the function of VLAN tags assignment according to IEEE 802.1Q standard. HG2 equipment is configured to assign IEEE 802.1Q tag, including "C-VID" =1 and priority value equal to "6" for all frames transferred.</li> <li>12) On the EAS equipment should be configured the possibility of IEEE 802.1Q tags usage on users ports No. 1 and No. 2. The VLAN Membership List is configured on the EAS equipment including list of C-VID values resolved for each of users ports. For users ports No. 1 and No. 2 there should be resolved value "C-VID" =1.</li> <li>13) On the EAS equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through any of users ports. In this case, the general S-VLAN (N:1) should be configured for all users ports.</li> <li>14) On the EAS equipment there should be configured user port No. 1 with the possibility of copying the priority value from IEEE 802.1Q tag, received from HG1 equipment, into the S-Tag priority value.</li> <li>15) On the EAS equipment should be configured user port No. 2 with the possibility to identify the value of S-Tag priority for Ethernet frames transferred upstream through given port on basis of "Ingress to Egress" policy. In this case as criteria for definition of S-Tag priority the following parameters should be used: <ul style="list-style-type: none"> <li>– value of user's port number (physical);</li> <li>– C-VID value in the initial Ethernet frame;</li> <li>– C-Tag priority value in the initial Ethernet frame.</li> </ul> </li> <li>16) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ICMP    ARP.</li> </ol>

<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.1.</li> <li>3) Save the captures of traces in separate files ([Vendor]-EAS_QOS_02.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) S-Tag priority for Ethernet frames transferred upstream through user port No. 1 equals to "6".</li> <li>2) S-Tag priority for Ethernet frames transferred upstream through user port No. 2 has been established according to policy defined on the EAS equipment for the given port.</li> <li>3) Policy for different S-Tag definition criteria has been correctly performed.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. Host A.1 (IP: xxx.x (DHCP)) and Host B.1 (IP: xxx.x (DHCP)) are connected via PoE to HG1 (Ethernet WAN) and HG2 (modem xDSL) respectively. Both HG1 and HG2 connect to the EAS equipment. Port 1 of EAS performs 'Copying of value of priority 802.1Q Tag' and Port 2 performs 'Applying of policy: Ingress to Egress'. The EAS equipment connects to an Ethernet switch, which is connected to Host X.1 (IP: xxx.x (DHCP)), a Server DHCP, and a DHCP relay agent.</p>

### 6.3.1.2.3 Check of security functions

<b>Test number</b>	EAS_SEC_01
<b>Test name</b>	Blocking of broadcasting packages
<b>Test purpose</b>	Check if the EAS equipment has the possibility of blocking upstream and downstream broadcast messages
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the EAS equipment (one user lines) has to be used. On the user side the home gateway equipment has to be connected to the network terminations of user lines (HG1 equipment).</li> <li>4) Host A.1 is connected to home getaway HG1.</li> <li>5) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>6) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>7) IP-addresses for hosts A.1 and X.1 are configured manually (statically) and should be from one IP subnetwork.</li> <li>8) On the EAS equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through user port No. 1.</li> <li>9) On the EAS equipment there should be configured blocking of broadcasting packages in an upstream direction for user port No. 1.</li> <li>10) On the EAS equipment there should be configured blocking of broadcasting packages in downstream for "S-VID" =1.</li> </ol>



	11) Before beginning of carrying out of test procedure it is necessary to clear contents of ARP tables on hosts A.1 and X.1.
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform on host A.1 command ping for host X.1.</li> <li>2) Perform on host X.1 command ping for host A.1.</li> <li>3) Save the captures of traces in separate files ([Vendor]-EAS_SEC_01.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Command ping, performed on host A.1 for host X.1 has not passed (broadcasting ARP message transferred by host A.1 has been blocked on the EAS equipment).</li> <li>2) Command ping, performed on host X.1 for host A.1 has not passed (broadcasting ARP message transferred by host X.1 has been blocked on the EAS equipment).</li> <li>3) In ARP tables on hosts A.1 and X.1 there are no dynamic records.</li> <li>4) There is a possibility of broadcasting packages blocking function configuration on the EAS equipment in a downstream. Configuration of the given function is made on VLAN basis.</li> <li>5) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. On the left, Host A.1 (IP: x.xxx) is connected to HG1 (Ethernet WAN). HG1 is connected via Ethernet to the EAS equipment at Port 1. The EAS equipment has a function of blocking broadcasting packages activated. The EAS is connected via S-VLAN '1' to an Ethernet switch, which is then connected to Host X.1 (IP: x.xxx).</p>

<b>Test number</b>	EAS_SEC_02
<b>Test name</b>	Restriction of the MAC-addresses table size
<b>Test purpose</b>	Check if the EAS equipment has the possibility of restriction of sources MAC-addresses number connected with one user port
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the EAS equipment (one user line) has to be used. On the user side the equipment of a home gateway (HG1 equipment) should be connected to the network termination of a user line.</li> <li>4) Hosts A.1, A.2 and A.3 are connected to home gateway HG1.</li> <li>5) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> <li>6) HG1 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>7) IP-addresses for hosts A.1, A.2, A.3 and X.1 are configured manually (statically) and should be from one IP subnetwork.</li> </ol>

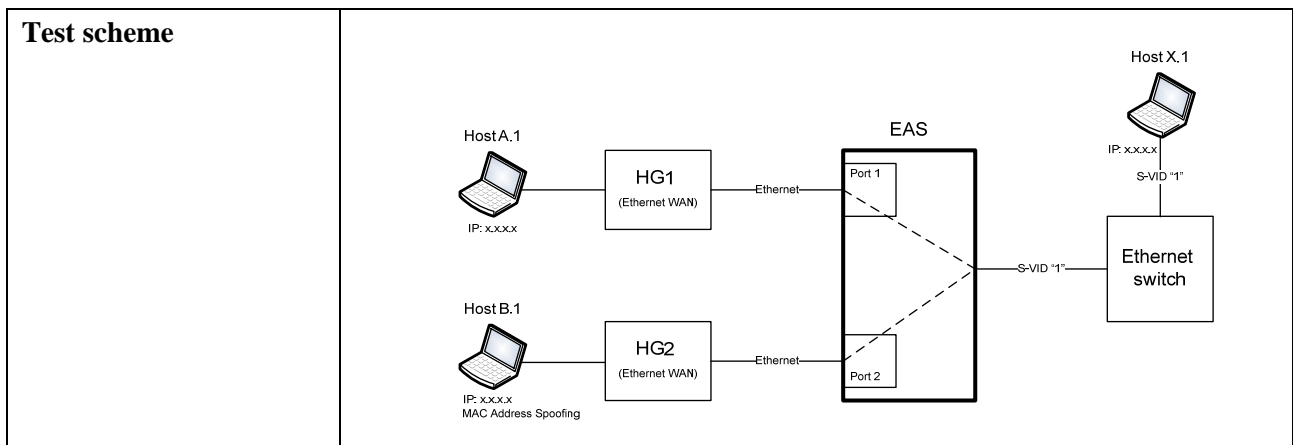
	<p>8) On the EAS equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through user port No. 1.</p> <p>9) On the EAS equipment should be configured the maximum number of MAC-addresses of the sources resolved for user port No. 1 equals to 2.</p>
<b>Test procedure</b>	<p>1) Perform consecutive connections of hosts A.1, A.2 and A.3.</p> <p>2) During connection of each host (A.1, A.2, A.3) perform from this host continuous command ping for host X.1.</p> <p>3) Save the captures of traces in separate files ([Vendor]-EAS_SEC_02.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) Successful performance of commands ping from A.1 and A.2 hosts.</p> <p>2) Unsuccessful performance of commands ping from host A.3.</p> <p>3) There is a possibility of maximum resolved MAC-addresses number of sources configuration independently for each users ports.</p> <p>4) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. On the left, three hosts (Host A.1, Host A.2, and Host A.3) are connected to a Home Gateway (HG1) labeled '(Ethernet WAN)'. Each host has an IP address of 'x.xxx'. The HG1 is connected to the EAS (Ethernet Access System) equipment via an 'Ethernet' link. The EAS equipment has a 'User port #1' with an 'Admissible number of MAC-address of source' and a 'Port 1'. The EAS is connected to an 'Ethernet switch' via an 'S-VID "1"' link. The Ethernet switch is connected to Host X.1, which has an IP address of 'x.xxx' and is also connected to the switch via an 'S-VID "1"' link.</p>

<b>Test number</b>	EAS_SEC_03
<b>Test name</b>	Filtration on MAC-addresses basis
<b>Test purpose</b>	Check if the EAS equipment has the possibility to filter Ethernet frames based on source and destination MAC-addresses.
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p> <p>3) For carrying out the tests, one user port on the EAS equipment (one user line) has to be used. On the user side, the equipment of a home gateway (HG1 equipment) should be connected to the network termination of a user line.</p> <p>4) A.1 and A.2 hosts are connected to home gateway HG1.</p> <p>5) X.1 and X.2 hosts are connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</p> <p>6) HG1 equipment work in the bridge mode (function of local DHCP server is disconnected).</p> <p>7) IP-addresses for hosts A.1, A.2, X.1 and X.2 are configured manually (statically) and should be from one IP subnetwork. Hosts A.1/A.2 should have possibility to exchange traffic with hosts X.1/X.2 without router.</p>

	<p>8) On the EAS equipment there should be configured S-Tag assignment possibility, including the identifier "S-VID"=1, to Ethernet frames transferred upstream through user port No. 1.</p> <p>9) On the EAS equipment there should be activated function of Ethernet frames filtration for user port No. 1 MAC-addresses. For the given user port there should be configured barring for access from source with MAC-address of host A.2, and also barring for access to destination with MAC-address of host X.2.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform on host A.1 a command ping for host X.1.</li> <li>2) Perform on host A.1 a command ping for host X.2.</li> <li>3) Perform on host A.2 a command ping for host X.1.</li> <li>4) Save the captures of traces in separate files ([Vendor]-EAS_SEC_03.txt) and put the file into the corresponding section of the KB.</li> <li>5) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Successful performance of command ping on host A.1 for host X.1.</li> <li>2) Unsuccessful performance of command ping on host A.1 for host X.2.</li> <li>3) Unsuccessful performance of command ping on host A.2 for host X.1.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. On the left, Host A.1 (IP: x.x.x.x) and Host A.2 (IP: x.x.x.x) are connected to a Home Gateway (HG1) labeled '(Ethernet WAN)'. HG1 is connected via an 'Ethernet' link to the 'User port #1' of the EAS (Ethernet Access System) equipment. The EAS equipment has a box labeled 'User port #1' with the text 'Activatet function of filtration on MAC-address' and 'Port 1'. The EAS is connected to an 'Ethernet switch' via an 'S-VID "1"' link. The Ethernet switch is connected to Host X.1 (IP: x.x.x.x) and Host X.2 (IP: x.x.x.x) via 'S-VID "1"' links.</p>

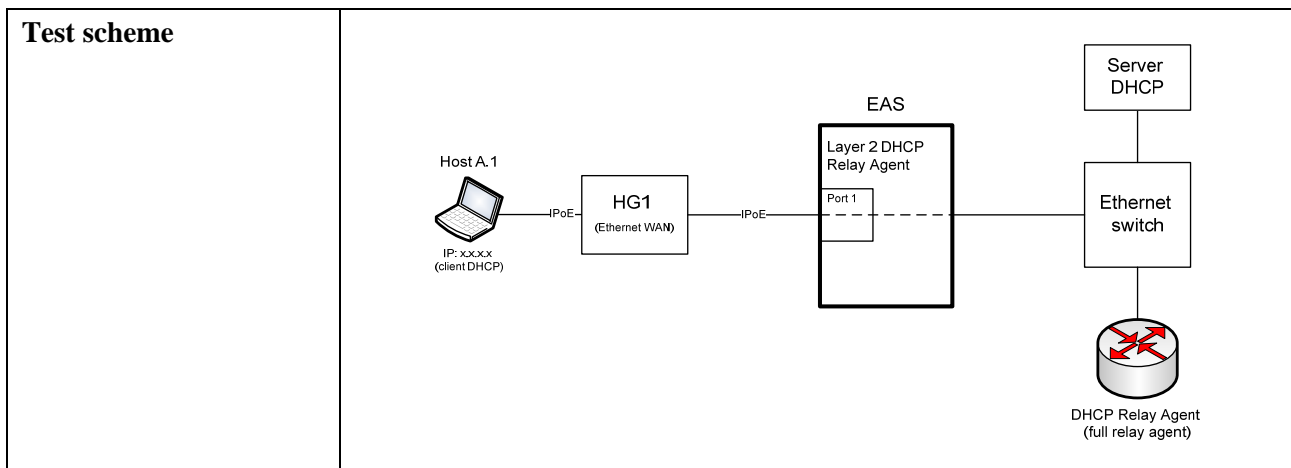
<b>Test number</b>	EAS_SEC_04
<b>Test name</b>	Determination of duplicated users MAC-addresses
<b>Test purpose</b>	Check if the EAS equipment has the possibility of detecting duplicated user MAC-addresses and the subsequent mechanism for resolution of the given situation
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user ports on the EAS equipment (two user lines) has to be used. On user side home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home getaway HG1.</li> <li>5) Host B.1 is connected to home getaway HG2.</li> <li>6) Configure for host B.1 MAC-address similar to that is used by host A.1.</li> <li>7) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation.</li> </ol>

	<p>8) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</p> <p>9) IP-addresses for hosts A.1, B.1 and X.1 are configured manually (statically) and should be from one IP subnetwork.</p> <p>10) On the EAS equipment there should be configured S-Tag assignment possibility, including identifier "S-VID" =1, to Ethernet frames transferred upstream through users ports No. 1 and No. 2.</p> <p>11) Further adjustment of equipment should be provided according to one of the following configurations.</p> <p>Configuration 1 In case of detection of duplicated MAC-addresses work of all users having identical MAC-addresses is permitted.</p> <p>Configuration 2 In case of detection duplicated MAC addresses one of users with duplicated MAC addresses is blocked.</p> <p>Configuration 3 In case of detection of duplicated MAC-addresses refusal in service should be given to both users with the duplicated MAC-addresses.</p>
<b>Test procedure</b>	<p>1) Perform on A.1 and B.1 hosts continuous command ping for host X.1 (configuration 1).</p> <p>2) Perform on A.1 and B.1 hosts continuous command ping for host X.1 (configuration 2).</p> <p>3) Perform on A.1 and B.1 hosts continuous command ping for host X.1 (configuration 3).</p> <p>4) Save the captures of traces in separate files ([Vendor]-EAS_SEC_04.txt) and put the file into the corresponding section of the KB.</p> <p>5) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) In case of configuration 1:</p> <ul style="list-style-type: none"> <li>– command ping, performed on host A.1 in direction to host X.1, passes;</li> <li>– command ping, performed on host B.1 in direction to host X.1, passes.</li> </ul> <p>2) In case of a configuration 2:</p> <ul style="list-style-type: none"> <li>– command ping, performed on host A.1 in direction to host X.1, passes;</li> <li>– command ping, performed on host B.1 in direction to host X.1, does not pass.</li> </ul> <p>3) In case of configuration 3:</p> <ul style="list-style-type: none"> <li>– command ping, performed on host A.1 in direction to host X.1, does not pass;</li> <li>– command ping, performed on host B.1 in direction to host X.1, does not pass.</li> </ul> <p>4) The daily report form has been saved in the corresponding section of KB.</p>



#### 6.3.1.2.4 Check of functions of identification of subscriber lines

<b>Test number</b>	EAS_LID_01
<b>Test name</b>	Support of DHCP Option 82
<b>Test purpose</b>	Check if the EAS equipment has the possibility of functioning as DHCP Relay Agent second level and maintenance of DHCP clients identification connection points using an information option (option 82)
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the DSLAM/MSAN equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) HG1 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>6) Host A.1 uses IPoE sessions. IP-address for host A.1 is defined dynamically using allocated DHCP server connected to the Ethernet switch. DHCP server supports option 82.</li> <li>7) Router providing functionality (full) of DHCP Relay Agent should be connected to the Ethernet switch equipment.</li> <li>8) EAS equipment works as DHCP Relay Agent second level.</li> <li>9) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: bootp.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate on host A.1 an establishment of IPoE session (provide transfer of broadcasting DHCP request from host A.1).</li> <li>2) Save the captures of traces in separate files ([Vendor]-EAS_LID_01.txt) and put the file into the corresponding section of the KB.</li> <li>3) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Using information option of DHCP protocol (option 82) EAS equipment has definitely identified to which client initiating DHCP request user line is connected within network of broadband access.</li> <li>2) The daily report form has been saved in the corresponding section of KB.</li> </ol>



<b>Test number</b>	EAS_LID_02
<b>Test name</b>	PPPoE functions Intermediate Agent support
<b>Test purpose</b>	Check if the EAS equipment has the possibility of functioning as PPPoE Intermediate Agent for maintenance of user line identification
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the EAS equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>6) Host A.1 uses PPPoE sessions. IP-address for host A.1 is defined dynamically using allocated PPPoE server connected to the Ethernet switch.</li> <li>7) Router providing functionality of PPPoE sessions termination is connected to the Ethernet switch equipment.</li> <li>8) EAS equipment works as PPPoE Intermediate Agent.</li> <li>9) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: pppoe.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate on host A.1 an establishment of PPPoE session (perform PPPoE Discovery message transfer from host A.1).</li> <li>2) Save the captures of traces in separate files ([Vendor]-EAS_LID_02.txt) and put the file into the corresponding section of the KB.</li> <li>3) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The EAS equipment adds PPPoE-TAG tag into the PPPoE Discovery packages (PADI, PADR) transferred upstream.</li> <li>2) The given tag allows to definitely identify user line on which package PPPoE, and also specify user who has transferred the given message: <ul style="list-style-type: none"> <li>– "Agent Circuit ID" option should identify definitely EAS equipment within network of user's access, and also logic port of EAS equipment through which package PPPoE has been received;</li> <li>– "Agent Remote ID" option should identify definitely user connected with corresponding logic port of EAS equipment through whom PPPoE package has been received.</li> </ul> </li> </ol>

	<p>3) The EAS equipment has not changed the initial MAC-addresses of source and destination in the PPPoE Discovery packages transferred upstream.</p> <p>4) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. On the left, Host A.1 (IP: x.xxx, client PPPoE) is connected to HG1 (Ethernet WAN) via PPPoE. HG1 is connected to the EAS equipment (PPPoE Intermediate Agent, Port 1) via PPPoE. The EAS equipment is connected to an Ethernet switch. The Ethernet switch is connected to a Server PPPoE and a PPPoE Termination device (represented by a cylinder with a red 'X').</p>

### 6.3.1.2.5 Check of functions of management, monitoring and statistics gathering

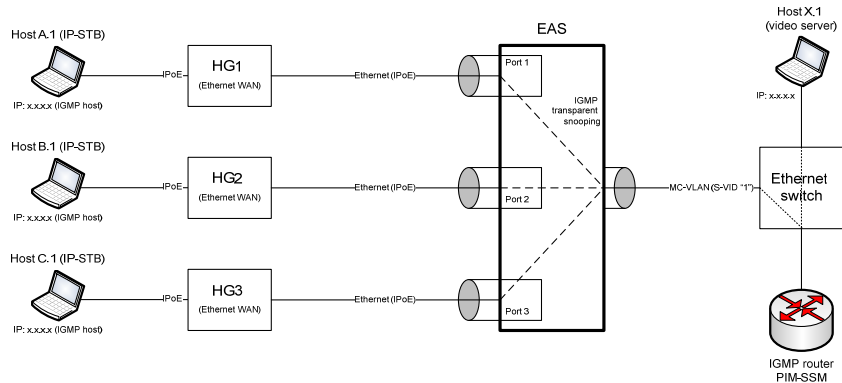
<b>Test number</b>	EAS_MNG_01
<b>Test name</b>	Equipment monitoring by SNMP protocol
<b>Test purpose</b>	Check if the EAS equipment has the possibility for remote monitoring by means of control system using SNMP protocol
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, two user's ports on the EAS equipment (two user lines) has to be used. On the user side home gateways equipment should be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) Host B.1 is connected to home gateway HG2.</li> <li>6) HG1 and HG2 equipment work in a bridged mode (function of local DHCP server is disconnected).</li> <li>7) IP-addresses for A.1 and B.1 hosts are configured manually.</li> <li>8) Host which performs functions of remote workstation of control system is connected to the Ethernet switch. On the given host SNMP software is established. IP-address for specified host should be configured manually and there should be from the same subnetwork, as IP-address of EAS equipment used for interaction with control system.</li> <li>9) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: SNMP.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate remote monitoring of EAS equipment on host, carrying out functions of workstation of a control system.</li> <li>2) Provide appearance of emergency and other non-standard situations on the EAS equipment. Also it is necessary to simulate problems with powering (transition to the reserve block, return to mainframe), problems with interfaces (refusal of physical / channel level), connection of remote users to EAS equipment on Telnet/SSH/SNMP, change of equipment configuration on Telnet/SSH/SNMP and other events.</li> </ol>

	<p>3) Save the captures of traces in separate files ([Vendor]-EAS_MNG_01.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) During the process of monitoring EAS equipment gives the adequate information on condition of interfaces, operative memory and central processor.</p> <p>2) The EAS equipment provides transfer of adequate SNMP traps/informs messages in case of emergencies occurrence.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	

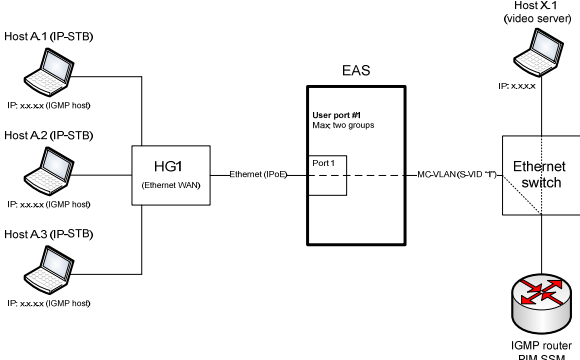
### 6.3.1.2.6 Check of functions of Multicast mode support

<b>Test number</b>	EAS_MC_01
<b>Test name</b>	Connection of several users to one multicasting group
<b>Test purpose</b>	Check if the EAS equipment has the possibility of simultaneous connection of several users to one multicasting group without subsequent load increase at network interfaces of EAS equipment
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p> <p>3) For carrying out the tests, three user ports on the EAS equipment (three user lines) has to be used. On the user side home gateway equipment has to be connected to network terminations of user lines (HG1 equipment, HG2 and HG3, accordingly).</p> <p>4) Host A.1 is connected to home gateway HG1.</p> <p>5) Host B.1 is connected to home gateway HG2.</p> <p>6) Host C.1 is connected to home gateway HG3.</p> <p>7) HG1 equipment, HG2 and HG3 work in the bridged mode (function of local DHCP server is disconnected).</p> <p>8) On hosts A.1, B.1 and C.1 IP STB software should be used. Hosts A.1, B.1 and C.1 are IGMP hosts. IP-addresses for hosts A.1, B.1 and C.1 are configured manually.</p> <p>9) Hosts A.1, B.1 and C.1 use IPoE sessions.</p> <p>10) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation. Host X.1 performs functionality of video server, being video traffic source. IP-address for host X.1 should be configured manually.</p>

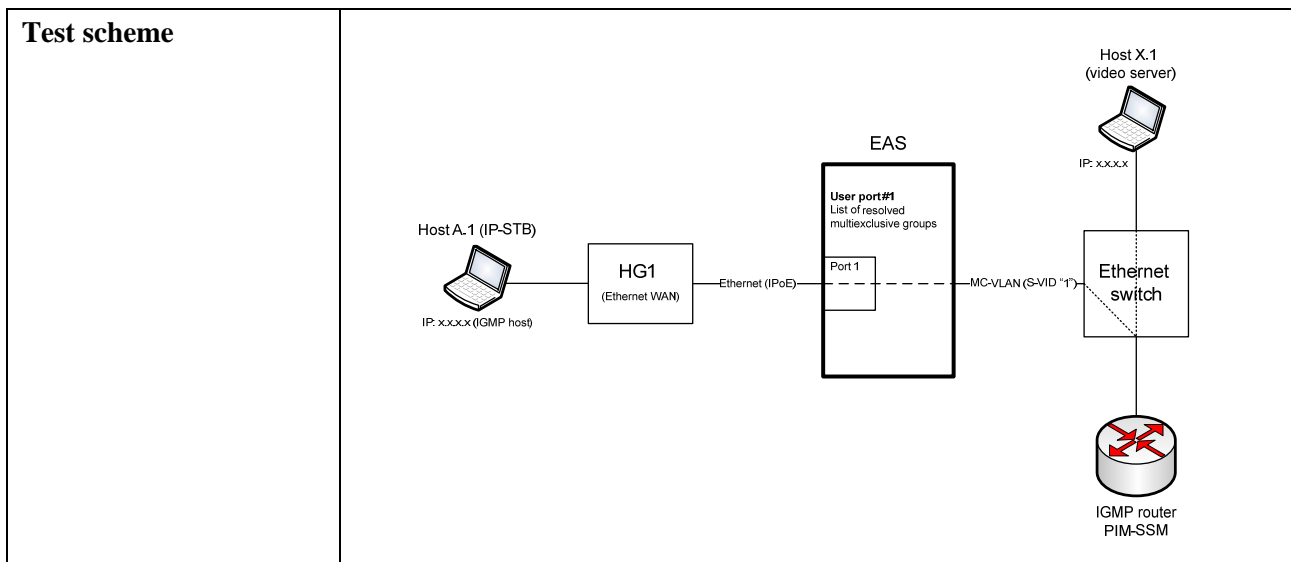


	<p>11) Router equipment performing functions of IGMP router should be connected to the Ethernet switch equipment. For routing of multicasting traffic PIM-SSM protocol is used.</p> <p>12) EAS equipment during processing of IGMP messages works in the transparent IGMP Snooping mode.</p> <p>13) On the EAS equipment should be configured uniform multicasting VLAN, intended for carrying out of traffic related with IP-STB equipment of all users. On the EAS equipment should be configured the possibility of "S-VID"=1 identifiers assignment to the Ethernet frames transferred upstream from users IP-STB equipment.</p> <p>14) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: IGMP.</p>
<b>Test procedure</b>	<p>1) Hosts A.1, B.1 and C.1 should initiate IPoE sessions, transfer IGMP Membership Report messages and, thus, should consistently connect to the same multicasting group (observe one video channel).</p> <p>2) Save the captures of traces in separate files ([Vendor]-EAS_MC_01.txt) and put the file into the corresponding section of the KB.</p> <p>3) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) All users have connections to the same multicasting group (observe one video channel).</p> <p>2) During consecutive connections of hosts B.1 and C.1 there is no additional load on network interfaces of EAS equipment.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	 <p>The diagram illustrates the test setup. On the left, three hosts (Host A.1, Host B.1, and Host C.1) are shown, each connected via IPoE to a corresponding Home Gateway (HG1, HG2, and HG3). These gateways are connected to the EAS equipment through Ethernet (IPoE) ports (Port 1, Port 2, and Port 3). The EAS equipment is configured for IGMP transparent snooping. It connects to an Ethernet switch via MC-VLAN(S-VID=1), which is then connected to Host X.1 (video server) and an IGMP router (PIM-SSM).</p>

<b>Test number</b>	EAS_MC_02
<b>Test name</b>	Restriction of channels number which are simultaneously observed by the user
<b>Test purpose</b>	Check if the EAS equipment has the possibility of multicasting groups total number restriction to which one user simultaneously can be connected
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p> <p>3) For carrying out the tests, one user port on the EAS equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</p> <p>4) Hosts A.1, A.2 and A.3 are connected to home gateway HG1.</p>

	<p>5) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected). HG1 equipment should support the IGMP Snooping function.</p> <p>6) On hosts A.1, A.2 and A.3 IP STB software should be used. Hosts A.1, A.2 and A.3 are IGMP hosts. IP-addresses for hosts A.1, A.2 and A.3 are configured manually.</p> <p>7) Hosts A.1, A.2 and A.3 use IPoE sessions.</p> <p>8) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation. Host X.1 performs functionality of video server, being video traffic source. IP-address for host X.1 should be configured manually.</p> <p>9) Router equipment which performs functions of IGMP router should be connected to the Ethernet switch equipment. For routing of multicasting traffic PIM SSM protocol is used.</p> <p>10) EAS equipment during processing of IGMP messages functions in the transparent IGMP Snooping mode.</p> <p>11) On the EAS equipment should be configured uniform multicasting VLAN, intended for carrying out of traffic related with IP-STB equipment of all users. On the EAS equipment there should be configured a possibility of "S-VID"=1 identifiers assignment to the Ethernet frames transferred upstream from IP-STB equipment of users.</p> <p>12) On the EAS equipment there should be configured for user port No. 1 restriction on total number of multicasting groups to which the given user can be connected. Maximum number of multicasting groups for the given user should be equal to 2.</p> <p>13) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: IGMP.</p>
<b>Test procedure</b>	<p>1) Hosts A.1, A.2 and A.3 should consistently initiate IPoE sessions and transfer IGMP Membership Report messages, trying to be connected to various multicasting groups.</p> <p>2) Save the captures of traces in separate files ([Vendor]-EAS_MC_02.txt) and put the file into the corresponding section of the KB.</p> <p>3) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) A.1 and A.2 hosts are successfully connected to various multicasting groups.</p> <p>2) Host A.3 has no connections to new multicasting group.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	 <p>The diagram illustrates the test scheme. On the left, three hosts (Host A.1, A.2, and A.3) are labeled as IP-STB and IGMP hosts. They are connected to a box labeled 'HG1 (Ethernet WAN)'. A line labeled 'Ethernet (IPoE)' connects HG1 to a box labeled 'EAS'. Inside the EAS box, 'User port #1' and 'Mac two groups' are noted. A dashed line labeled 'MC-VLAN (S-VID "1")' connects EAS to an 'Ethernet switch'. The Ethernet switch is connected to 'Host X.1 (video server)' and an 'IGMP router (PIM-SSM)'.</p>

<b>Test number</b>	EAS_MC_03
<b>Test name</b>	Restriction of the multicasting groups list accessible to the user
<b>Test purpose</b>	Check if the EAS equipment has the possibility of restriction of the multicasting groups list accessible to the specified user
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) For carrying out the tests, one user port on the EAS equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>4) Host A.1 is connected to home gateway HG1.</li> <li>5) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>6) On host A.1 IP-STB software should be used. Host A.1 should be IGMP host. IP-address for host A.1 should be configured manually.</li> <li>7) Host A.1 uses IPoE sessions.</li> <li>8) Host X.1 is connected to the Ethernet switch which has implemented functions of the EAS traffic aggregation. Host X.1 performs functionality of video server, being video traffic source. IP-address for host X.1 should be configured manually.</li> </ol>
	<ol style="list-style-type: none"> <li>9) Router equipment which performs functions of IGMP router should be connected to the Ethernet switch equipment. For routing of multicasting traffic PIM-SSM protocol is used.</li> <li>10) EAS equipment during processing of IGMP messages functions in the transparent IGMP Snooping mode.</li> <li>11) On the EAS equipment should be configured uniform multicasting VLAN, intended for carrying out of traffic related with IP-STB equipment of all users. On the EAS equipment there should be configured the possibility of "S-VID"=1 identifiers assignment to the Ethernet frames transferred upstream from IP-STB equipment of users.</li> <li>12) On the EAS equipment there should be configured for user port No. 1 the multicasting groups list accessible to user.</li> <li>13) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: IGMP.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Host A.1 should initiate IPoE session and transfer IGMP Membership Report messages, trying to be consistently connected to various multicasting groups, matching the list of resolved groups, and not matching the given list.</li> <li>2) Save the captures of traces in separate files ([Vendor]-EAS_MC_03.txt) and put the file into the corresponding section of the KB.</li> <li>3) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Host A.1 has been successfully connected to various multicasting groups matching list of groups, resolved for user port No. 1.</li> <li>2) Host A.1 has no connections to any of multicasting groups which are not matching the list of groups, resolved for user port No. 1.</li> <li>3) The daily report form has been saved in the corresponding section of KB.</li> </ol>



### 6.3.1.3 Check of functionality of BRAS equipment

#### 6.3.1.3.1 Check of functions of VLAN tags processing

<b>Test number</b>	BRAS_VLAN_01
<b>Test name</b>	Assignment of the S-Tag tag to the Ethernet frames transferred downstream
<b>Test purpose</b>	Check if the BRAS equipment can assign the S-Tag to the unmarked Ethernet frames transferred downstream
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet Switch performs aggregation of traffic from access nodes. For carrying out of tests one access node have to be used. As access node DSLAM/MSAN/EAS equipment can be used.</li> <li>4) For carrying out the tests, two user's ports on the DSLAM/MSAN/EAS equipment (two user lines) has to be used. On the user side home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>5) HG1 and HG2 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>6) A.1 and A.2 hosts are connected to home gateway HG1.</li> <li>7) B.1 and B.2 hosts are connected to the home gateway equipment HG2.</li> <li>8) A.1 and B.1 hosts use PPPoE sessions.</li> <li>9) A.2 and B.2 hosts use IPoE sessions.</li> <li>10) IP-addresses for A.1 and B.1 hosts are assigned dynamically using PPPoE server or are configured manually. For termination of PPPoE sessions from A.1 and B.1 hosts BRAS equipment is used.</li> <li>11) IP-addresses for A.2 and B.2 hosts are assigned dynamically with the allocated DHCP server or are configured manually. In case of dynamic assignment of IP-addresses for A.2 and B.2 hosts BRAS equipment works as DHCP Relay Agent.</li> <li>12) X.1 and X.2 hosts are connected to the Ethernet switch equipment. IP-addresses for X.1 and X.2 hosts are configured manually.</li> </ol>

- 13) In the case when for carrying out of test there is DSLAM/MSAN equipment used on HG1, HG2 equipment and DSLAM/MSAN one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.
- 14) Further adjustment of equipment should be provided according to one of the following configurations.

*Configuration 1 (1:1 VLAN)*

BRAS equipment should be configured to enable the assignment of S-VLAN tags to unmarked Ethernet frames transferred downstream. Following options should be configured:

- assignment "S-VID"=1 Ethernet frames connected with PPPoE session of host A.1 (user's port No. 1 on the access node equipment);
- assignment "S-VID"=2 Ethernet frames connected with IPoE session of host A.2 (user's port No. 1 on the access node equipment);
- assignment "S-VID"=3 Ethernet frames connected with PPPoE session of host B.1 (user's port No. 2 on the access node equipment);
- assignment "S-VID"=4 Ethernet frames connected with IPoE session of host B.2 (user's port No. 2 on the access node equipment).

S-VLAN options for DSLAM/MSAN/EAS equipment, and also on the Ethernet switch equipment are configured according to S-VLAN options for BRAS equipment.

*Configuration 2 (VLAN on the user)*

BRAS equipment should be configured to enable assignment of S-VLAN tags to unmarked Ethernet frames transferred downstream. Following options should be configured:

- assignment "S-VID"=1 Ethernet frames connected with all sessions (PPPoE/IPoE) of HG1 equipment (user port No. 1 on the access node equipment);
- assignment "S-VID"=2 Ethernet frames connected with all sessions (PPPoE/IPoE) of HG2 equipment (user port No. 2 on the access node equipment).

S-VLAN options for DSLAM/MSAN/EAS equipment, and also on Ethernet switch equipment, are configured according to S-VLAN options for BRAS equipment.

*Configuration 3 (VLAN on service)*

BRAS equipment should be configured to enable assignment of S-VLAN tags to unmarked Ethernet frames transferred downstream. Following options should be configured:

- assignment "S-VID"=1 Ethernet frames connected with PPPoE sessions of all users, connected to DSLAM/MSAN/EAS equipment;
- assignment "S-VID"=2 Ethernet frames connected with IPoE sessions of all users, connected to DSLAM/MSAN/EAS equipment.

S-VLAN options for DSLAM/MSAN/EAS equipment, and also on the Ethernet switch equipment, are configured according to S-VLAN options for BRAS equipment.

- 15) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: pppoe || bootp || ICMP.

<p><b>Test procedure</b></p>	<ol style="list-style-type: none"> <li>1) For configuration 1 perform traffic exchange between hosts A.1 and X.1, A.2 and X.2, B.1 and X.1, B.2 and X.2.</li> <li>2) For configuration 2 perform traffic exchange between hosts A.1 and X.1, A.2 and X.2, B.1 and X.1, B.2 and X.2.</li> <li>3) For configuration 3 perform traffic exchange between hosts A.1 and X.1, A.2 and X.2, B.1 and X.1, B.2 and X.2.</li> <li>4) Save the captures of traces in separate files ([Vendor]-BRAS_VLAN_01.txt) and put the file into the corresponding section of the KB.</li> <li>5) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<p><b>Expected result</b></p>	<ol style="list-style-type: none"> <li>1) During use of configuration 1 BRAS equipment performs assignment of S-VLAN identifiers as follows: <ul style="list-style-type: none"> <li>– assignment of identifier "S-VID"=1 Ethernet frames transferred downstream and connected with PPPoE session of host A.1;</li> <li>– assignment of identifier "S-VID"=2 Ethernet frames transferred downstream and connected with IPoE session of host A.2;</li> <li>– assignment of identifier "S-VID"=3 Ethernet frames transferred downstream and connected with PPPoE session of host B.1;</li> <li>– assignment of identifier "S-VID"=4 Ethernet frames transferred downstream and connected with IPoE session of host B.2.</li> </ul> </li> <li>2) During use of configuration 2 BRAS equipment performs assignment of S-VLAN identifiers as follows: <ul style="list-style-type: none"> <li>– assignment of identifier "S-VID"=1 Ethernet frames transferred downstream and connected with all PPPoE/IPoE sessions of HG1 equipment (passing through user's port No. 1 DSLAM/MSAN/EAS equipment);</li> <li>– assignment of identifier "S-VID"=2 Ethernet frames transferred downstream and connected with all PPPoE/IPoE sessions of HG2 equipment (passing through user's port No. 2 DSLAM/MSAN/EAS equipment).</li> </ul> </li> <li>3) BRAS equipment performs assignment of S-VLAN identifiers as follows: <ul style="list-style-type: none"> <li>– assignment of identifier "S-VID"=1 Ethernet frames transferred downstream and connected with PPPoE sessions of all users, connected to DSLAM/MSAN/EAS equipment;</li> <li>– assignment of identifier "S-VID"=2 Ethernet frames transferred downstream and connected with IPoE sessions of all users, connected to DSLAM/MSAN/EAS equipment.</li> </ul> </li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<p><b>Test scheme</b></p>	<p>The diagram illustrates the test scheme. On the left, four hosts (Host A.1, Host A.2, Host B.1, Host B.2) are connected to two home gateways (HG1 and HG2). Host A.1 and Host B.1 use PPPoE, while Host A.2 and Host B.2 use IPoE. HG1 and HG2 are connected to the DSLAM/MSAN/EAS equipment via Ethernet (PPP, IP). The DSLAM/MSAN/EAS has two ports, Port 1 and Port 2. Port 1 is connected to Host A.1 and Host B.1, while Port 2 is connected to Host A.2 and Host B.2. The DSLAM/MSAN/EAS is connected to an Ethernet switch (S-VLAN bridge) via S-VLANs. The Ethernet switch is connected to a BRAS device via S-VLANs. Hosts X.1 and X.2 are connected to the Ethernet switch. A protocol analyzer is connected to the BRAS device. The BRAS device performs PPPoE Termination and IPoE.</p>

<b>Test number</b>	BRAS_VLAN_02
<b>Test name</b>	Configuration of S-VLAN/C-VLAN stack (QinQ)
<b>Test purpose</b>	Check if the BRAS has the possibility of assigning the VLAN tag pair (S-Tag/C-Tag) to the Ethernet frame, which is transferred upstream
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet Switch performs aggregation of the traffic from access nodes.</li> <li>4) For carrying out the tests, one access node has to be used. As access node DSLAM/MSAN/EAS equipment can be used.</li> <li>5) For carrying out the tests, two user's ports on the DSLAM/MSAN/EAS equipment (two user lines) has to be used. On the user side the home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>6) HG1 and HG2 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>7) Host A.1 is connected to the home gateway equipment HG1.</li> <li>8) Host B.1 is connected to the home gateway equipment HG2.</li> <li>9) A.1 and B.1 hosts use IPoE sessions.</li> <li>10) IP-addresses for A.1 and B.1 hosts are assigned dynamically with the allocated DHCP server or are configured manually. In case of dynamic assignment of IP-addresses for A.2 and B.2 hosts BRAS equipment works as DHCP Relay Agent.</li> <li>11) X.1 and X.2 hosts are connected to the Ethernet switch equipment. IP-addresses for X.1 and X.2 hosts are configured manually.</li> <li>12) In the case when for carrying out of test there is DSLAM/MSAN equipment used, on HG1, HG2 equipment and DSLAM/MSAN one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</li> <li>13) BRAS equipment should be configured S-VLAN/C VLAN pair assignment to unmarked Ethernet frames transferred downstream. Following options should be configured: <ul style="list-style-type: none"> <li>– assignment "S-VID"=1, "C-VID"=1 Ethernet frames connected with all PPPoE sessions/IPoE of HG1 equipment (the identifier "S-VID"=1 is the general for all users connected to DSLAM/MSAN/EAS equipment; identifier "C-VID" =1 characterizes the concrete user – user's port No. 1 on the DSLAM/MSAN/EAS equipment);</li> <li>– assignment "S-VID"=1, "C-VID"=2 Ethernet frames connected with all PPPoE sessions/IPoE of HG2 equipment (the identifier "S-VID"=1 is the general for all users connected to DSLAM/MSAN/EAS equipment; identifier "C-VID"=2 characterizes concrete user – user's port No. 2 on the DSLAM/MSAN/EAS equipment).</li> </ul> </li> <li>14) S-VLAN/C-VLAN options for DSLAM/MSAN/EAS equipment are configured according to S-VLAN/C-VLAN options for BRAS equipment.</li> <li>15) Ethernet switch S-VLAN options are configured according to S-VLAN options for BRAS equipment and DSLAM/MSAN/EAS equipment.</li> <li>16) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: bootp    ICMP.</li> </ol>

<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Perform traffic exchange between hosts A.1 and X.1.</li> <li>2) Perform traffic exchange between hosts B.1 and X.2.</li> <li>3) Save the captures of traces in separate files ([Vendor]-BRAS_VLAN_02.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) The BRAS equipment has assigned the identifier "S-VID"=1, "C-VID"=1 for Ethernet frames which are transferred upstream and related to IPoE session of host A.1.</li> <li>2) The BRAS equipment has assigned the identifier "S-VID"=1, "C-VID"=2 for Ethernet frames which are transferred upstream and related to IPoE session of host B.1.</li> <li>3) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	

### 6.3.1.3.2 Check of security functions

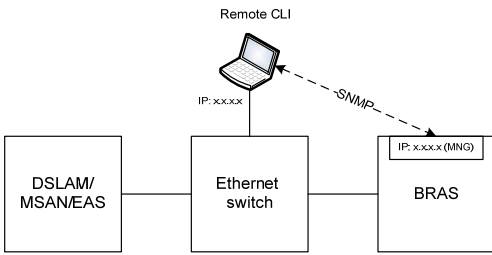
<b>Test number</b>	BRAS_SEC_01
<b>Test name</b>	Prevention of substitution of user's IP-address
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of prevention of attacks from outside the malicious users connected with substitution of the IP-address of a source (source IP spoofing)
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of the traffic from access nodes.</li> <li>4) For carrying out the tests, one access node has to be used. As access node DSLAM/MSAN/EAS equipment can be used.</li> <li>5) For carrying out the tests, one user port on the DSLAM/MSAN/EAS equipment (one user line) has to be used.</li> <li>6) On the user side the equipment of a home gateway (HG1 equipment) should be connected to the network termination of a user line. HG1 equipment work in the bridge mode (function of local DHCP server is disconnected).</li> <li>7) Host A.1 is connected to the home gateway equipment HG1. Host A.1 uses IPoE sessions.</li> <li>8) IP-address for host A.1 is assigned dynamically with allocated DHCP server. BRAS equipment works as DHCP Relay Agent. DHCP server is connected to the Ethernet switch.</li> </ol>



	<p>9) Host X.1 is connected to the Ethernet switch equipment. The IP-address for host X.1 should be configured manually.</p> <p>10) In the case when for carrying out of test there is DSLAM/MSAN equipment used, on HG1, HG2 equipment and DSLAM/MSAN one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</p> <p>11) On the DSLAM/MSAN/EAS equipment, BRAS equipment and Ethernet switch equipment should be configured S-VLAN with identifier "S-VID"=1.</p> <p>12) On the DSLAM/MSAN/EAS equipment function of blocking of broadcasting messages should be disconnected.</p> <p>13) Before beginning of the test host A.1 should establish IPoE session and using DHCP server should receive IP address.</p> <p>14) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: ARP    bootp    ICMP.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Clear contents of ARP table on host A.1.</li> <li>2) Clear contents of ARP table on BRAS equipment.</li> <li>3) Perform on host A.1 command ping for host X.1.</li> <li>4) Check-up records of ARP table on BRAS equipment.</li> <li>5) Break off IPoE session for host A.1.</li> <li>6) Perform repeated establishment of IPoE session for host A.1 (allocation of the IP address by means of DHCP).</li> <li>7) Save the captures of traces in separate files ([Vendor]-BRAS_SEC_01.txt) and put the file into the corresponding section of the KB.</li> <li>8) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) On termination of command ping passage in ARP table of BRAS equipment there is no record related with MAC-address of host A.1.</li> <li>2) After repeated establishment of IPoE connection in ARP table of BRAS equipment should be generated new dynamic record related with MAC-address of host A.1</li> <li>3) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	<p>The diagram illustrates the network topology for the test. Host A.1 (IP: xxx.xx) is connected to HG1. HG1 is connected to the DSLAM/MSAN/EAS equipment. The DSLAM/MSAN/EAS equipment has a Port 1 connected to the Ethernet switch via a dashed line labeled S-VID '1'. The Ethernet switch is connected to the BRAS equipment (DHCP Relay Agent) via a dashed line labeled S-VID '1'. Host X.1 (IP: xxx.xx) is connected to the Ethernet switch. A Server DHCP is also connected to the Ethernet switch.</p>

### 6.3.1.3.3 Check of functions of management, monitoring and statistics gathering

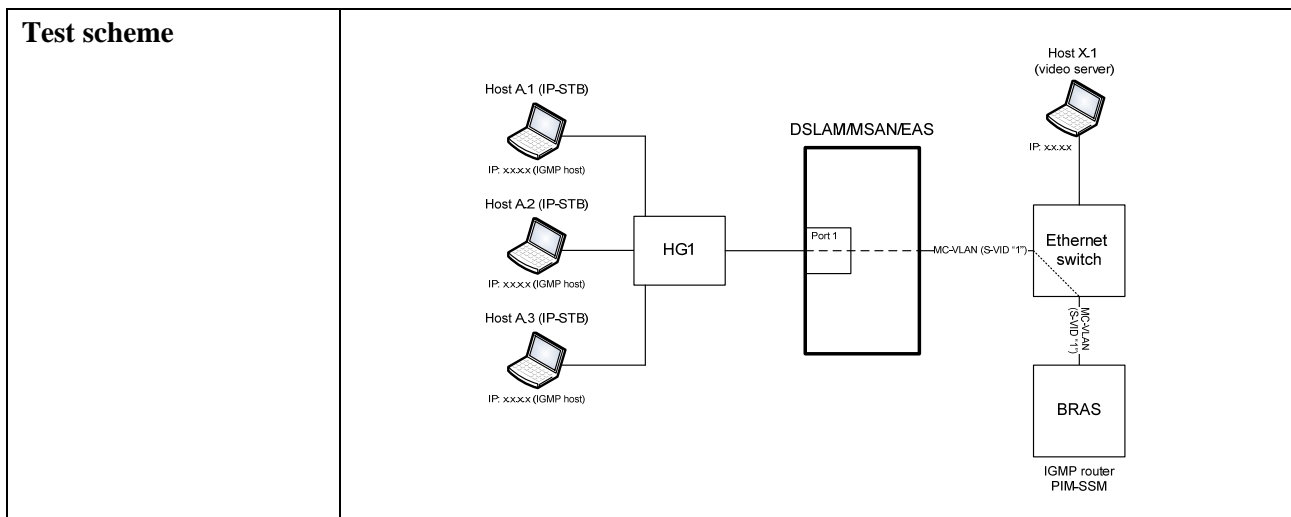
<b>Test number</b>	BRAS_MNG_01
<b>Test name</b>	Equipment monitoring by SNMP protocol
<b>Test purpose</b>	Check if the BRAS equipment has the possibility for remote monitoring by means of the control system using SNMP protocol

<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes.</li> <li>4) Host which performs functions of a remote workstation of control system is connected to the Ethernet switch. On the given host SNMP software is established. IP-address for specified host should be configured manually and should be from the same subnetwork, as the IP-address of BRAS equipment used for interaction with the control system.</li> <li>5) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: report SNMP.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate remote monitoring of BRAS equipment on host, carrying out functions of workstation of a control system.</li> <li>2) Provide appearance of emergency and other non-standard situations on the BRAS equipment. Also it is necessary to simulate problems with powering (transition to the reserve block, return to mainframe), problems with interfaces (refusal of physical / channel level), connection of remote users to BRAS equipment on Telnet/SSH/SNMP, change of equipment configuration on Telnet/SSH/SNMP and other events.</li> <li>3) Save the captures of traces in separate files ([Vendor]-BRAS_MNG_01.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) During the process of monitoring BRAS equipment gives the adequate information on condition of interfaces, operative memory and central processor.</li> <li>2) The BRAS equipment provides transfer of adequate SNMP traps/informs messages in case of emergencies occurrence.</li> <li>3) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	 <p>The diagram illustrates the test scheme. It shows a Remote CLI laptop with IP: xxx.xx connected to an Ethernet switch. The Ethernet switch is connected to a DSLAM/MSAN/EAS and a BRAS (IP: xxx.xx (MNG)). A dashed arrow labeled -SNMP- points from the BRAS to the Remote CLI.</p>

#### 6.3.1.3.4 Check of functions of Multicast mode support

<b>Test number</b>	BRAS_MC_01
<b>Test name</b>	Restriction of number of multicasting groups
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of restriction of total number of the multicasting groups transferred within S-VLAN (MC-VLAN)
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> </ol>

	<p>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes. For carrying out of tests one access node have to be used. As access node DSLAM/MSAN/EAS equipment can be used.</p> <p>4) For carrying out the tests one user port on the DSLAM/MSAN/EAS equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</p> <p>5) In the case when for carrying out of test there is DSLAM/MSAN equipment used on HG1, HG2 equipment and DSLAM/MSAN one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</p> <p>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected). HG1 equipment should support the IGMP Snooping function.</p> <p>7) Hosts A.1, A.2 and A.3 are connected to home getaway HG1. On hosts A.1, A.2 and A.3 IP STB software should be used. Hosts A.1, A.2 and A.3 are IGMP hosts (clients). IP-addresses for hosts A.1, A.2 and A.3 are configured manually. Hosts A.1, A.2 and A.3 use IPoE sessions.</p> <p>8) Host X.1 is connected to the Ethernet switch equipment. Host X.1 performs functionality of video server, being video traffic source. The IP-address for host X.1 should be configured manually.</p> <p>9) BRAS equipment works as IGMP router. For routing of the multicasting traffic report PIM SSM is used.</p> <p>10) DSLAM/MSAN/EAS equipment during processing of IGMP messages works in the mode of transparent IGMP Snooping. On the DSLAM/MSAN/EAS equipment function of restriction of number of multicasting groups accessible to users should disconnected.</p> <p>11) On BRAS equipment, DSLAM/MSAN/EAS equipment and Ethernet switch equipment the S-VLAN (MC-VLAN: "S-VID"=1) should be configured, intended for carrying out of multicasting traffic to all users connected to access node.</p> <p>12) On BRAS equipment for MC-VLAN ("S-VID"=1) should be configured restriction of total number of the multicasting groups transferred within MC-VLAN. Maximum number of multicasting groups for MC VLAN should equals to 2.</p> <p>13) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: IGMP.</p>
<b>Test procedure</b>	<p>1) Hosts A.1, A.2 and A.3 should consistently initiate IPoE sessions, transfer IGMP Membership Report messages and try to connect to various multicasting groups.</p> <p>2) Save the captures of traces in separate files ([Vendor]-BRAS_MC_01.txt) and put the file into the corresponding section of the KB.</p> <p>3) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) A.1 and A.2 hosts are successfully connected to various multicasting groups.</p> <p>2) Host A.3 has no connections to new multicasting group.</p> <p>3) There is a possibility of configuration on BRAS equipment of maximum bandwidth with which it is supposed to occupy within MC-VLAN by transfer of multicasting streams.</p> <p>4) The daily report form has been saved in the corresponding section of KB.</p>



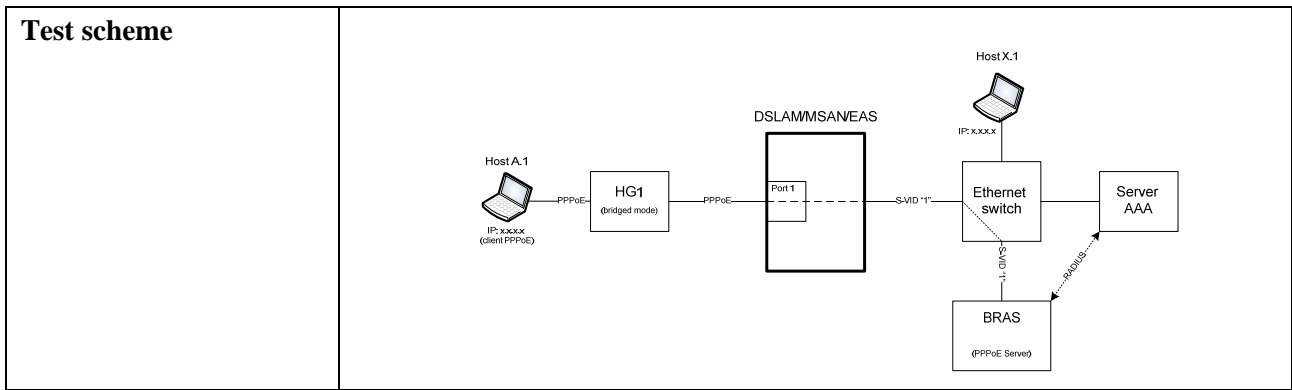
<b>Test number</b>	BRAS_MC_02
<b>Test name</b>	Providing statistics of multicasting traffic
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of providing statistics concerning multicasting traffic for each MC-VLAN and each multicasting group
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of the traffic from access nodes. For carrying out of tests one access node have to be used. As access node DSLAM/MSAN/EAS equipment can be used.</li> <li>4) For carrying out the tests three user ports on the DSLAM/MSAN/EAS equipment (three user lines) have to be used. On the user side home gateway equipment has to be connected to network terminations of user lines (HG1 equipment, HG2 and HG3, accordingly).</li> <li>5) In the case when for carrying out of test there is DSLAM/MSAN equipment used on HG1, HG2 and HG3 equipment and DSLAM/MSAN equipment one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</li> <li>6) HG1 equipment, HG2 and HG3 work in the bridge mode (function of local DHCP server is disconnected). HG1 equipment, HG2 and HG3 support function IGMP Snooping.</li> <li>7) Host A.1 is connected to home gateway HG1.</li> <li>8) Host B.1 is connected to home gateway HG2.</li> <li>9) Host C.1 is connected to home gateway HG3.</li> <li>10) On hosts A.1, B.1 and C.1 IP STB software should be used. Hosts A.1, B.1 and C.1 are IGMP hosts (clients). IP-addresses for hosts A.1, B.1 and C.1 are configured manually. Hosts A.1, B.1 and C.1 use IPoE sessions.</li> <li>11) Host X.1 is connected to Ethernet switch equipment. Host X.1 performs functionality of video server, being video traffic source. IP-address for host X.1 should be configured manually.</li> <li>12) BRAS equipment works as IGMP router. For routing of the multicasting traffic report PIM SSM is used.</li> <li>13) DSLAM/MSAN/EAS equipment processing of IGMP messages works in the transparent IGMP Snooping mode.</li> </ol>

	<p>14) On the DSLAM/MSAN/EAS equipment, and also on BRAS equipment function of restriction of admissible number of multicasting groups should be disconnected.</p> <p>15) On BRAS equipment, DSLAM/MSAN/EAS equipment and Ethernet switch equipment the S VLAN (MC-VLAN: "S-VID"=1) should be configured to enable the delivery of multicasting traffic to all users connected to access node.</p>
<b>Test procedure</b>	<p>1) Perform consecutive connection of each host (A.1, B.1 and C.1) to various multicasting groups.</p> <p>2) Perform periodic switching between multicasting groups on everyone each host (A.1, B.1 and C.1).</p> <p>3) Save the captures of traces in separate files ([Vendor]-BRAS_MC_02.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) During test procedure performance BRAS equipment gives adequate information related with the following statistics:</p> <ul style="list-style-type: none"> <li>– for each MC-VLAN: current number of active multicasting groups; total number of attempts for users joining to multicasting groups (including successful/unsuccessful); total number of messages related with switching-off from multicasting groups; total number of the transferred inquiries – Queries (including general queries/specific queries); total number of received incorrect messages IGMP;</li> <li>– for each multicasting group (within defined MC VLAN): present total number of active hosts.</li> </ul> <p>2) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, three hosts (Host A.1, Host B.1, and Host C.1) are connected to three hosts (HG1, HG2, and HG3). Each host is labeled as an IP-STB and an IGMP host with IP: x.x.x.x. These three hosts are connected to a central DSLAM/MSAN/EAS equipment block, which has three ports (Port 1, Port 2, and Port 3). The DSLAM/MSAN/EAS is connected to an Ethernet switch via MC-VLAN (SVID 1). The Ethernet switch is connected to a BRAS device via MC-VLAN (SVID 1). The BRAS is connected to an IGMP router (PIM-SSM). On the right, Host X.1 (video server) is also connected to the Ethernet switch.</p>

### 6.3.1.3.5 Accounting and management of access policy

<b>Test number</b>	BRAS_ACC_01
<b>Test name</b>	Establishment of PPPoE session
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of PPPoE user sessions establishment
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p>

	<p>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes. For carrying out of tests one access node have to be used. As access node DSLAM/MSAN/EAS equipment can be used.</p> <p>4) For carrying out the tests one user port on the DSLAM/MSAN/EAS equipment (one user line) has to be used. On the user side the equipment of a home gateway (HG1 equipment) should be connected to network termination of a user line.</p> <p>5) In the case when for carrying out of test there is DSLAM/MSAN equipment used on HG1 equipment and DSLAM/MSAN one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</p> <p>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</p> <p>7) Host A.1 is connected to the home gateway equipment HG1.</p> <p>8) Host A.1 uses PPPoE sessions. The IP-address for host A.1 is assigned dynamically.</p> <p>9) Host X.1 is connected to the Ethernet switch equipment. The IP-address for host X.1 should be configured manually.</p> <p>10) BRAS equipment is configured for termination of PPPoE sessions. BRAS equipment works as PPPoE server. BRAS equipment contain IP-addresses pool for dynamic assignment during establishment of users' sessions.</p> <p>11) Subscribers authentication performed on allocated AAA server.</p> <p>12) AAA Server (RADIUS server) is connected to the Ethernet switch equipment. On AAA server should be configured new user profile containing pair "user name"/"password". Given profile will be used during establishment of sessions on host A.1.</p> <p>13) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: pppoe  bootp  PPP  ICMP  RADIUS.</p>
<b>Test procedure</b>	<p>1) Initiate an establishment of PPPoE session on host A.1 (enter correct values of username and password).</p> <p>2) Perform data exchange between hosts A.1 and X.1.</p> <p>3) Save the captures of traces in separate files ([Vendor]-BRAS_ACC_01.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) Successful user authentication on host A.1 and subsequent establishment of PPPoE session. Host A.1 has received the IP-address from pool of addresses located on BRAS equipment.</p> <p>2) Correctness of PPPoE messages transferred by BRAS equipment in direction to host A.1.</p> <p>3) Correctness of RADIUS messages transferred by BRAS equipment in direction to AAA server.</p> <p>4) There is a data exchange possibility between hosts A.1 and X.1.</p> <p>5) The daily report form has been saved in the corresponding section of KB.</p>



<b>Test number</b>	BRAS_ACC_02
<b>Test name</b>	Establishment of IPoE session
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of establishment of user IPoE (DHCP) sessions
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes. For carrying out of tests one access node has to be used. As access node, DSLAM/MSAN/EAS equipment can be used.</li> <li>4) For carrying out the tests one user port on the DSLAM/MSAN/EAS equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</li> <li>5) If there is DSLAM/MSAN equipment used on HG1 equipment and DSLAM/MSAN, one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</li> <li>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>7) Host A.1 is connected to home gateway HG1.</li> <li>8) Host A.1 uses IPoE sessions. The IP-address for host A.1 is defined dynamically using allocated DHCP server connected to the Ethernet switch. DHCP server supports an option 82.</li> <li>9) DSLAM/MSAN/EAS equipment works as Layer 2 DHCP Relay Agent. DSLAM/MSAN/EAS equipment supports an option 82 during transfer of broadcasting DHCP messages from users.</li> <li>10) Host X.1 is connected to the Ethernet switch equipment. The IP-address for host X.1 should be configured manually.</li> <li>11) BRAS equipment is configured for termination of IPoE sessions. BRAS equipment works as quality (full) DHCP Relay Agent. BRAS equipment comprises IP-addresses pool for dynamic assignment during establishment of users sessions.</li> <li>12) On DHCP server should be configured new user profile where for user identification port number of access node (contains in DHCP option 82) is used.</li> <li>13) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: pppoe  bootp  PPP  ICMP  RADIUS.</li> </ol>

<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate establishment of IPoE session on host A.1 (perform transfer of DHCP broadcasting messages from host A.1).</li> <li>2) Perform data exchange between hosts A.1 and X.1.</li> <li>3) Save the captures of traces in separate files ([Vendor]-BRAS_ACC_02.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Successful establishment of IPoE session. Host A.1 has received IP-address from pool of addresses located on BRAS equipment.</li> <li>2) BRAS equipment correctly processes DHCP messages containing option 82 which are transferred from user side, and from DHCP server side.</li> <li>3) During reception of broadcasting DHCP messages from users BRAS equipment directs them to DHCP server in a unicast mode.</li> <li>4) There is a data exchange possibility between hosts A.1 and X.1.</li> <li>5) The daily report form has been saved in the corresponding section of KB.</li> </ol>
<b>Test scheme</b>	

<b>Test number</b>	BRAS_ACC_03
<b>Test name</b>	Establishment of L2TP tunnels
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of functioning as LNS server during termination of L2TP tunnels of users
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes. For carrying out of tests, one access node has to be used. As access node DSLAM/MSAN/EAS equipment can be used.</li> <li>4) For carrying out the tests one user port on the DSLAM/MSAN/EAS equipment (one user line) has to be used. On the user side equipment of a home gateway (HG1 equipment) should be connected to network termination of a user line.</li> <li>5) If there is DSLAM/MSAN equipment used on HG1 equipment and DSLAM/MSAN, one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</li> <li>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</li> <li>7) Host A.1 is connected to home gateway HG1.</li> </ol>



	<p>8) Host A.1 uses PPPoE sessions. IP-address for host A.1 is assigned dynamically.</p> <p>9) Host A.1 uses L2TP tunnel during interaction with BRAS equipment and transport of PPPoE messages.</p> <p>10) Host X.1 is connected to the Ethernet switch equipment. IP-address for host X.1 should be configured manually.</p> <p>11) BRAS equipment is configured for termination of PPPoE sessions. BRAS equipment works as PPPoE server.</p> <p>12) BRAS equipment works as LNS server during establishment of L2TP tunnels between BRAS and users.</p> <p>13) AAA Server (RADIUS server) is connected to the Ethernet switch equipment. On AAA server should be configured new user profile containing pair "user name"/"password". Given profile will be used during establishment of sessions on host A.1.</p> <p>14) Perform on the analyser of punctures IP the interface with filter on bootp  PPP  ICMP  L2TP.</p>
<b>Test procedure</b>	<p>1) Initiate an establishment of PPPoE session on host A.1 (enter correct values of username and password).</p> <p>2) Perform data exchange between hosts A.1 and X.1.</p> <p>3) Save the captures of traces in separate files ([Vendor]-BRAS_ACC_03.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) Successful user authentication on host A.1 and subsequent establishment of PPPoE session.</p> <p>2) There is data exchange between hosts A.1 and X.1.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the network topology for the test. Host A.1 (IP:xxxxx) is connected to HG1 (bridged mode) via PPPoE/L2TP. HG1 connects to DSLAM/MSAN/EAS (Port 1) via PPPoE/L2TP. DSLAM/MSAN/EAS connects to Ethernet switch via S/VID. Ethernet switch connects to BRAS (LNS PPPoE Server) via G1/1/0. Ethernet switch also connects to Server AAA. Host X.1 (IP:xxxxx) is connected to Ethernet switch via IP:xxxxx. Server AAA connects to BRAS via RADIUS.</p>

<b>Test number</b>	BRAS_ACC_04
<b>Test name</b>	Accounting of rendered services volume for PPPoE sessions
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of rendered broadband services volume accounting for users initiating PPPoE sessions
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p> <p>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes. For carrying out of tests one access node have to be used. DSLAM/MSAN/EAS can be used as access node.</p>

	<p>4) For carrying out the tests one user port on the DSLAM/MSAN/EAS equipment (one user line) has to be used. On the user side home gateway equipment (HG1 equipment) should be connected to network termination of user line.</p> <p>5) If there is DSLAM/MSAN equipment used on HG1 equipment and DSLAM/MSAN, one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</p> <p>6) HG1 equipment works in a bridged mode (function of local DHCP server is disconnected).</p> <p>7) Host A.1 is connected to home gateway HG1.</p> <p>8) Host A.1 uses PPPoE sessions. IP-address for host A.1 is assigned dynamically.</p> <p>9) Host X.1 is connected to the Ethernet switch equipment. IP-address for host X.1 should be configured manually. Host X.1 is configured as FTP-server. There are several files of various volume on the FTP-server.</p> <p>10) BRAS equipment is configured for termination of PPPoE sessions. BRAS equipment works as PPPoE server.</p> <p>11) Subscribers authentication performed on allocated AAA server.</p> <p>12) AAA server (RADIUS server) is connected to the Ethernet switch equipment. On AAA server should be configured new user profile containing pair "user name"/"password". Given profile will be used during establishment of sessions on host A.1.</p> <p>13) There should be configured on BRAS equipment periodical data transmission about volume of rendered services in direction to AAA server.</p> <p>14) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: RADIUS.</p>
<p><b>Test procedure</b></p>	<p>1) Initiate an establishment of PPPoE session on host A.1 (enter correct values of username and password).</p> <p>2) On host A.1 perform download of several files from FTP server.</p> <p>3) Save the captures of traces in separate files ([Vendor]-BRAS_ACC_04.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<p><b>Expected result</b></p>	<p>1) Correctness of RADIUS messages transferred by BRAS equipment in direction to AAA server. These messages should contain information about the volume of transferred data and should be transferred in beginning and in end of session, and also during all session through certain interval of time configured on BRAS equipment.</p> <p>2) Correctness of CDR records formed on AAA server.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<p><b>Test scheme</b></p>	<p>The diagram illustrates the network topology for the test. On the left, Host A.1 (client PPPoE) is connected to HG1 (bridged mode) via PPPoE. HG1 is connected to DSLAM/MSAN/EAS via PPPoE. DSLAM/MSAN/EAS is connected to Ethernet switch via S-VID '1'. Ethernet switch is connected to BRAS (PPPoE Server) via S-VID '1'. Ethernet switch is also connected to Host X.1 (FTP server) and Server AAA. BRAS is connected to Server AAA via RADIUS.</p>

<b>Test number</b>	BRAS_ACC_05
<b>Test name</b>	Switching-off of the user after the quota reached
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of switching-off the user after achievement of the configured quota of the received data volume
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes. For carrying out of tests one access node has to be used. DSLAM/MSAN/EAS equipment can be used as access node.</li> <li>4) For carrying out the tests two user ports on the DSLAM/MSAN/EAS equipment (two user lines) have to be used. On the user side home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>5) In the case when for carrying out of test there is DSLAM/MSAN equipment used on HG1, HG2 and DSLAM/MSAN one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</li> <li>6) HG1 and HG2 equipment work in a bridged mode (function of local DHCP server is disconnected).</li> <li>7) Host A.1 is connected to home gateway HG1.</li> <li>8) Host B.1 is connected to home gateway HG2.</li> <li>9) A.1 and B.1 hosts use PPPoE sessions. The IP-address for A.1 and B.1 hosts are assigned dynamically.</li> <li>10) Host X.1 is connected to the Ethernet switch equipment. IP-address for host X.1 should be configured manually. Host X.1 is configured as FTP-server. There are several files of various volume on the FTP-server .</li> <li>11) BRAS equipment is configured for termination of PPPoE sessions. BRAS equipment works as PPPoE server.</li> <li>12) Subscribers authentication performed on allocated AAA server.</li> <li>13) AAA server (RADIUS server) is connected to the Ethernet switch equipment. On AAA server should be configured new user profile containing pair "user name"/"password". Given profile will be used during establishment of sessions on A.1 and B.1 hosts.</li> <li>14) On AAA server for user of host A.1 there should be configured quota for as much as possible admissible volume of the received data. Establish the given quota equal to 10 Mb.</li> <li>15) On AAA server for user of host B.1 there should be configured possibility of unlimited volume data reception.</li> <li>16) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: RADIUS.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate an establishment of PPPoE sessions on A.1 and B.1 hosts.</li> <li>2) On host A.1 and B.1 perform download of several files from FTP server.</li> <li>3) Save the captures of traces in separate files ([Vendor]-BRAS_ACC_05.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>

<b>Expected result</b>	<p>1) User of host B.1 has possibility of reception of unlimited volume of data while session of user of host A.1 is broken off after reaching of configured quota.</p> <p>2) Correctness of RADIUS messages transferred by BRAS equipment in direction to AAA server and also PPPoE messages transferred by BRAS equipment in direction to host A.1 during interruption of the established session.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the test setup. On the left, Host A.1 (IP: xxx.x) and Host B.1 (IP: xxx.x) are connected via PPPoE to Home Gateways HG1 and HG2, which are in bridged mode. These gateways connect to the DSLAM/MSAN/EAS equipment at Port 1 and Port 2. The DSLAM/MSAN/EAS is connected to an Ethernet switch through S/VID '1' and S/VID '2'. The Ethernet switch is connected to Host X.1 (FTP server) and a BRAS (PPPoE Server). The BRAS is connected to Server AAA via RADIUS.</p>

<b>Test number</b>	BRAS_ACC_06
<b>Test name</b>	Restriction of bandwidth accessible to user
<b>Test purpose</b>	Check if the BRAS equipment has the possibility of user accessible bandwidth restriction for data reception/transmission
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) BRAS equipment is connected to the Ethernet switch equipment. Ethernet switch performs aggregation of traffic from access nodes. For carrying out of tests one access node have to be used. As access node DSLAM/MSAN/EAS equipment can be used.</li> <li>4) For carrying out the tests two user ports on the DSLAM/MSAN/EAS equipment (two user lines) have to be used. On the user side home gateway equipment has to be connected to network terminations of user lines (HG1 and HG2, accordingly).</li> <li>5) In the case when for carrying out of test there is DSLAM/MSAN equipment used on HG1, HG2 and DSLAM/MSAN one virtual channel (PVC X1/Y1) is configured for transfer of all types of the traffic.</li> <li>6) HG1 and HG2 equipment work in a bridged mode (function of DHCP local server is disconnected).</li> <li>7) Host A.1 is connected to home gateway HG1.</li> <li>8) Host B.1 is connected to home gateway HG2.</li> <li>9) A.1 and B.1 hosts use PPPoE sessions. IP-address for A.1 and B.1 hosts are assigned dynamically.</li> <li>10) Host X.1 is connected to the Ethernet switch equipment. IP-address for host X.1 should be configured manually. Host X.1 is configured as FTP-server. There are several files of various volume on the FTP-server.</li> <li>11) BRAS equipment is configured for termination of PPPoE sessions. BRAS equipment works as PPPoE server.</li> </ol>

	<p>12) Subscribers authentication performed on allocated AAA server.</p> <p>13) Server AAA (server RADIUS) is connected to Ethernet switch equipment. On AAA server should be configured new user profile containing pair "user name"/"password". Given profile will be used during establishment of sessions on A.1 and B.1 hosts.</p> <p>14) On AAA server for user of host A.1 there should be configured restrictions on an accessible bandwidth: 500 Kbit/with – DL, 100 Kbit/with – UL.</p> <p>15) On AAA server for user of host B.1 there should be configured restrictions on an accessible bandwidth: 5 Mbit/with – DL, 1 Mbit/with – UL.</p> <p>16) On the DSLAM/MSAN/EAS equipment should be configured for both users greatest possible bandwidth in both directions DL and UL.</p> <p>17) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: RADIUS.</p>
<b>Test procedure</b>	<p>1) Initiate establishment of PPPoE sessions on A.1 and B.1 hosts.</p> <p>2) On host A.1 and B.1 perform download of several files from FTP server.</p> <p>3) Save the captures of traces in separate files ([Vendor]-BRAS_ACC_06.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) Real downloading speed of files on A.1 and B.1 hosts corresponds to the values configured on BRAS equipment.</p> <p>2) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, Host A.1 (IP: xxxxx, client PPPoE) is connected to HG1 (bridged mode), which is connected to Port 1 of the DSLAM/MSAN/EAS equipment. Similarly, Host B.1 (IP: xxxxx, client PPPoE) is connected to HG2 (bridged mode), which is connected to Port 2 of the DSLAM/MSAN/EAS equipment. The DSLAM/MSAN/EAS equipment is connected to an Ethernet switch via S-VID '1' and S-VID '2'. The Ethernet switch is connected to Host X.1 (FTP server) and Server AAA. The Ethernet switch is also connected to BRAS (PPPoE Server).</p>

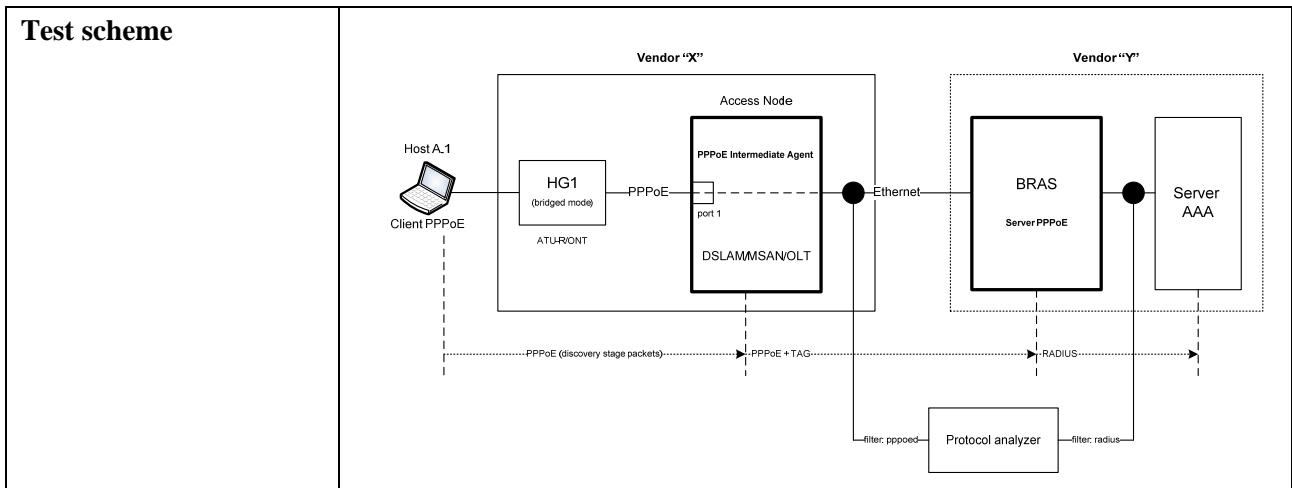
### 6.3.2 Methods of BBA TM interoperability testing

#### 6.3.2.1 Check of compatibility of the access node and BRAS equipment of various vendors

<b>Test number</b>	AN-BRAS_COMP_01
<b>Test name</b>	User's line identification on basis of DHCP option 82
<b>Test purpose</b>	Check if there is compatibility of access node equipment (DSLAM/MSAN/EAS/OLT) and BRAS equipment of various vendors considering maintenance of user line identification procedure on basis of information presented in DHCP messages (option 82)
<b>Initial condition</b>	<p>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</p> <p>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</p> <p>3) Vendor "X" represent access node equipment (e.g., DSLAM, MSAN, EAS and OLT PON).</p>

	<p>4) In the case when access node equipment is presented by DSLAM, MSAN or OLT PON, Vendor "X" should represent the home gateway equipment HG1.</p> <p>5) Vendor "Y" represent BRAS equipment and DHCP server equipment. DHCP server is external in relation to BRAS equipment and is connected by Ethernet interface (electric). DHCP server supports an option 82.</p> <p>6) For connection establishment between access node equipment of Vendor "X" and BRAS equipment of Vendor "Y" Ethernet interface (electric) is used. Mirroring of traffic from given interface is provided by Vendor "X".</p> <p>7) Vendor "Y" provides mirroring of traffic from Ethernet interface between BRAS equipment and DHCP server equipment.</p> <p>8) Host A.1 is DHCP client. Host A.1 is connected to home gateway HG1 (by Ethernet interface) if technology of access is xDSL or PON, or directly to access node if technology of access is Ethernet. HG1 equipment works in a bridged mode.</p> <p>9) Access node equipment works as Layer 2 DHCP relay agent, providing addition of an option 82 in all DHCP messages transferred by clients in direction to BRAS equipment. Function Layer 2 DHCP relay agent should be activated for that user's port of access node to which HG1 equipment/host A.1 is connected.</p> <p>10) BRAS equipment works as quality (full) DHCP relay agent.</p> <p>11) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: bootp  RADIUS.</p>
<p><b>Test procedure</b></p>	<p>1) Initiate establishment of IPoE session from host A.1.</p> <p>2) Save the captures of traces in separate files ([Vendor]-AN-BRAS_COMP_01.txt) and put the file into the corresponding section of the KB.</p> <p>3) Fill in a daily report form with the testing results and save it in the KB.</p>
<p><b>Expected result</b></p>	<p>1) Access node equipment during processing of DHCP messages provides additions of options 82 into these messages.</p> <p>2) BRAS equipment, having received within DHCP option 82 information related with user line identification, correctly broadcasts given information in direction to DHCP server.</p> <p>3) Successful establishment of IPoE session for host A.1.</p> <p>4) The daily report form has been saved in the corresponding section of KB.</p>
<p><b>Test scheme</b></p>	

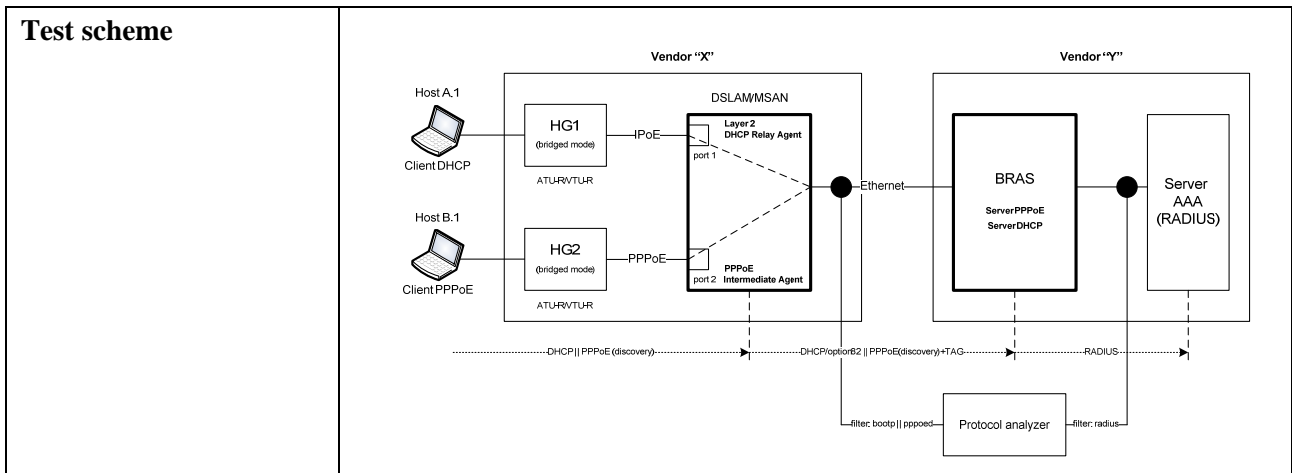
<b>Test number</b>	AN-BRAS_COMP_02
<b>Test name</b>	User line identification on basis of PPPoE tag
<b>Test purpose</b>	Check if there is compatibility of access node equipment (DSLAM/MSAN/EAS/OLT) and BRAS equipment of various vendors, considering maintenance of user line identification procedure on basis of information presented in PPPoE tag
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) Vendor "X" represent access node equipment (e.g., DSLAM, MSAN, OLT PON and home gateway equipment HG1).</li> <li>4) Vendor "Y" represent BRAS equipment and equipment of AAA server. AAA server is external in relation to BRAS equipment and is connected on Ethernet interface (electric). AAA server is RADIUS server.</li> <li>5) For connection establishment between access node equipment of Vendor "X" and BRAS equipment of Vendor "Y" Ethernet interface (electric) is used. Mirroring of traffic from given interface is provided by Vendor "X".</li> <li>6) Vendor "Y" provides mirroring of traffic from Ethernet interface between BRAS equipment and equipment of AAA server.</li> <li>7) Host A.1 is PPPoE client. Host A.1 is connected to home gateway HG1 (by Ethernet interface). HG1 equipment works in a bridged mode.</li> <li>8) Access node equipment works as PPPoE intermediate agent, providing addition PPPoE tag (0x0105 Vendor-Specific) in all PPPoE messages transferred by clients in direction to BRAS equipment during phase of connection establishment (discovery stage).</li> <li>9) BRAS equipment works as PPPoE server, terminating corresponding client sessions. BRAS equipment hands over information on user line identification received within PPPoE tag framework from access node, in direction to AAA server using RADIUS protocol.</li> <li>10) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: pppoed    RADIUS.</li> </ol>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate establishment of PPPoE session from host A.1.</li> <li>2) Save the captures of traces in separate files ([Vendor]-AN-BRAS_COMP_02.txt) and put the file into the corresponding section of the KB.</li> <li>3) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) On phase of connection establishment (discovery stage) access node equipment during processing of PPPoE discovery messages provides addition of PPPoE tag (0x0105 Vendor-Specific) into these messages.</li> <li>2) BRAS equipment, having received in PPPoE tag framework information related with user line identification, correctly broadcasts given information in direction to AAA server inside attribute of RADIUS Access-Request message.</li> <li>3) Successful establishment of PPPoE session for host A.1.</li> <li>4) The daily report form has been saved in the corresponding section of KB.</li> </ol>



<p><b>Test number</b></p>	<p>AN-BRAS_COMP_03</p>
<p><b>Test name</b></p>	<p>Information transfer about characteristics of DSL user lines</p>
<p><b>Test purpose</b></p>	<p>Check if there is compatibility of access node equipment (DSLAM/MSAN/EAS/OLT) and BRAS equipment of various vendors, considering maintenance of DSL user lines characteristics information transfer procedure</p>
<p><b>Initial condition</b></p>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) Vendor "X" represents the access node equipment (e.g., DSLAM/MSAN and also the home gateways equipment HG1 and HG). Vendor "X" provides two user lines ADSL/ADSL2/ADSL2 +/VDSL2 for connection of the home gateway equipment to access node equipment.</li> <li>4) Vendor "Y" provides BRAS equipment and the equipment of AAA server. AAA server is external in relation to BRAS equipment and is connected on Ethernet interface (electric). AAA server is RADIUS server. BRAS equipment supports functionality of PPPoE server, DHCP server (possibility of use of external DHCP server is supposed) and functionality of RADIUS client.</li> <li>5) For connection establishment between access node equipment of vendor "X" and BRAS equipment of vendor "Y" Ethernet interface (electric) is used. Mirroring of the traffic from the given interface is provided with vendor "X".</li> <li>6) Vendor "Y" provides mirroring of traffic from Ethernet interface between BRAS equipment and equipment of AAA server.</li> <li>7) Host A.1 is DHCP client. Host A.1 is connected to home gateway HG1 (by Ethernet interface). HG1 equipment works in a bridged mode.</li> <li>8) Host B.1 is PPPoE client. Host B.1 is connected to home gateway HG2 (by Ethernet interface). HG2 equipment works in a bridged mode.</li> <li>9) Access node equipment works as Layer 2 DHCP relay agent, providing addition of option 82 in all DHCP messages transferred by clients in direction to BRAS equipment. Function Layer 2 DHCP relay agent should be activated for that user's port of access node to which HG1 equipment/host A.1 is connected.</li> </ol>



	<p>10) During functioning as Layer 2 DHCP relay agent access node equipment should provide an information transfer about characteristics of user line, including actual speed of data transmission in user line (upstream/downstream actual data rate) and minimum speed of data transmission in user line (upstream/downstream minimum data rate). Information on characteristics of user line should be transferred in option 82 inside field vendor-specific sub-option.</p> <p>11) Access node equipment works as PPPoE intermediate agent, providing addition of PPPoE tag (0x0105 Vendor-Specific) in all PPPoE messages transferred by clients in direction to BRAS equipment during phase of connection establishment (discovery stage).</p> <p>12) During functioning as PPPoE intermediate agent, the access node equipment should provide information about characteristics of user line, including actual speed of data transmission in user line (upstream/downstream actual data rate) and minimum speed of data transmission in user line (upstream/downstream minimum data rate). Information on characteristics of user line should be transferred in additional fields of PPPoE tag expansion (Vendor-Specific).</p> <p>13) BRAS equipment performs reception of information on characteristics of user line transferred from access node inside DHCP option 82 or PPPoE tag, and provides transfer of given information to direction of AAA server inside Access-Request RADIUS message. Information transfer about characteristics of user line is performed inside RADIUS attributes 'Vendor Specific Attributes'.</p> <p>14) Perform on the analyser of IP protocols for the corresponding interface and set the following filter on protocols: pppoe  bootp  RADIUS.</p>
<b>Test procedure</b>	<ol style="list-style-type: none"> <li>1) Initiate establishment of IPoE session from host A.1.</li> <li>2) Initiate establishment of PPPoE session from host B.1.</li> <li>3) Save the captures of traces in separate files ([Vendor]-AN-BRAS_COMP_03.txt) and put the file into the corresponding section of the KB.</li> <li>4) Fill in a daily report form with the testing results and save it in the KB.</li> </ol>
<b>Expected result</b>	<ol style="list-style-type: none"> <li>1) Access node equipment provides information transfer about characteristics of user line within limits of option 82 DHCP.</li> <li>2) Access node equipment provides information transfer about characteristics of user line in frameworks PPPoE tag (Vendor-Specific).</li> <li>3) BRAS equipment, having received information on characteristics of user line inside DHCP option 82 or PPPoE tag, correctly broadcasts given information in direction to AAA server inside Access-Request RADIUS message.</li> <li>4) Successful establishment of IPoE and PPPoE sessions for A.1 and B.1 hosts, accordingly.</li> <li>5) The daily report form has been saved in the corresponding section of KB.</li> </ol>



### 6.3.2.2 Check of compatibility of the access node and home gateway equipment of various vendors

<b>Test number</b>	DSL_COMP_01
<b>Test name</b>	Check of compatibility of home gateway equipment and DSLAM/MSAN equipment
<b>Test purpose</b>	Check if there is a compatibility of home gateway DSL equipment (ATU R/VTU R) and access node equipment (DSLAM/MSAN) from various vendors
<b>Initial condition</b>	<ol style="list-style-type: none"> <li>1) Prepare in the KB the specified form to be filled-in (template of daily report) which should include the date, list of tests and achieved results.</li> <li>2) Connect equipment under test and measurement equipment in accordance with testing scheme.</li> <li>3) Vendor "X" provides access node equipment DSLAM/MSAN with support of cards ADSL2/ADSL2 +/VDSL2/SHDSL. Vendor "X" provides user line (twisted pair) for connection of home gateway DSL equipment to access node equipment.</li> <li>4) Vendor "Y" provides home gateway DSL equipment (ADSL2/ADSL2 +/VDSL2/SHDSL) – HG1.</li> <li>5) Vendor "X" provides specification of DSLAM/MSAN access node equipment in the following style:</li> </ol>

<b>General information on DSLAM/MSAN access node equipment</b>	
Name and product updating	_____
Version of hardware maintenance	_____
Software version	_____
Types of supported linear cards	_____
Supported standards DSL	_____
<b>Characteristics ADSL2/ADSL2+</b>	
Maximum supporting speed – downstream (Net Data Rate)	_____
Maximum supporting speed – upstream (Net Data Rate)	_____
<b>Characteristics VDSL2</b>	
Maximum supporting speed – downstream (Net Data Rate)	_____
Maximum supporting speed – upstream (Net Data Rate)	_____
<b>Characteristics SHDSL</b>	
Maximum supporting speed – downstream (Net Data Rate)	_____
Maximum supporting speed – upstream (Net Data Rate)	_____
6) Vendor "Y" provides specification of home gateway DSL equipment in the following style:	
<b>General information on home gateway DSL equipment</b>	
Name and product updating	_____
Supported standards DSL	_____
Version of hardware maintenance	_____
Software version	_____
Serial number	_____
<b>Characteristics ADSL2/ADSL2+/VDSL2/SHDSL</b>	
Maximum supporting speed – downstream (Net Data Rate)	_____
Maximum supporting speed – upstream (Net Data Rate)	_____
7) Home gateway equipment HG1 is connected to DSLAM/MSAN access node equipment on DSL interface taking into account specifications of equipment, provided by vendor "X" and vendor "Y".	
8) Host A.1 is connected to home gateway HG1 on Ethernet interface.	
9) Home gateway HG1 functions in the bridged mode.	
10) Host X.1 is connected on Ethernet interface directly to (uplink) DSLAM/MSAN equipment. Possibility of connection of host X.1 to DSLAM/MSAN equipment through Ethernet switch is assumed. In the last case Ethernet switch is given by vendor "X".	

	<p>11) IP addresses of hosts A.1 and X.1 are from the same IP subnetwork.</p> <p>12) Establish on hosts A.1 and X.1 IPerf utility, allowing testing of accessible throughput of data link. Further during start of IPerf utility as client part it is necessary to use host A.1, and as server part – host X.1.</p>
<b>Test procedure</b>	<p>1) Initiate establishment of DSL connection between home gateway equipment HG1 and access DSLAM/MSAN equipment.</p> <p>2) Perform traffic transfer by means of IPerf utility between hosts A.1 and X.1 in both directions (upstream/downstream) within 15 minutes.</p> <p>3) Save the captures of traces in separate files ([Vendor]-DSL_COMP_01.txt) and put the file into the corresponding section of the KB.</p> <p>4) Fill in a daily report form with the testing results and save it in the KB.</p>
<b>Expected result</b>	<p>1) Interval of time from moment of initiation of DSL connection on HG1 equipment till the moment of showtime condition does not exceed 60 seconds (train time <math>\leq 60s</math>).</p> <p>2) There is possibility of successful establishment of connection and data exchange between HG1 equipment and DSLAM/MSAN according to standards declared in specifications.</p> <p>3) The daily report form has been saved in the corresponding section of KB.</p>
<b>Test scheme</b>	<p>The diagram illustrates the test scheme. On the left, Host A.1 is connected via Ethernet to a Home Gateway (HG1) in bridged mode, labeled as Vendor 'Y'. The HG1 is also labeled with ATU-R/VTU-R. This HG1 is connected via DSL to a DSLAM/MSAN, labeled as Vendor 'X'. The DSLAM/MSAN contains two sub-components: ATU-C/VTU-C and FE/GE. The DSLAM/MSAN is connected via Ethernet to an Ethernet Switch, also labeled as Vendor 'X'. Finally, Host X.1 is connected via Ethernet to the Ethernet Switch. Below the main network path, a Simulator/Analyzer of traffic is connected via dotted lines to both Host A.1 and Host X.1.</p>



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