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Technical Standard
of China Telecommunications Corporation
Q/CT 2271-2013

**Technical Specification for Interface between HGW
and ITMS+ of China Telecom**

中国电信家庭网关与增强型终端综合管理系统接口技术要求

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Foreword

This Standard is drafted according to the rules given in the GB/T 1.1-2009.

This Standard is compiled based on the *Technical Specification for Interface between HGW (e8) and Integrated Terminal Management System (ITMS) of China Telecom (V3.0)*.

This Standard is one of the HGW series of technical standards of China Telecom. The structure and names of this series of standards are estimated as follows:

- 1) *General Technical Specification for Home Gateway (e8) of China Telecom*
- 2) *Technical Specification for Home Gateway with Set-card Separation of China Telecom*
- 3) *Technical Specification for Interface between HGW and ITMS+ of China Telecom*
- 4) *Technical Specification for Integrated Terminal Management System Plus (ITMS+) of China Telecom*
- 5) *Technical Specification for the Terminal Management Interface in Home Network of China Telecom*
- 6) *Uniform Appearance Requirements Specification for Home Gateway of China Telecom*

This Standard defines the technical specification for relevant interfaces between home gateway (HGW) and integrated terminal management system plus (ITMS+), such as parameter model, service process, etc., mainly based on the HGW management requirements specified in the enterprise standard of China Telecom – *General Technical Specification for Home Gateway (e8) of China Telecom*, and combined with the experiment summarized during the HGW service operation of China Telecom in recent years as well as the demands for the development of network technologies (such as new HGW, IPv6, etc.), so as to realize the HGW management functions. With the development and improvement of the system of HGW technical standards of China Telecom, the relevant subsequent standards will also be formulated.

This Standard replaces the Q/CT 2271-2010 *Technical Specification for Interface between HGW (e8) and Integrated Terminal Management System (ITMS) of China Telecom (V3.0)*.

The Appendixes A, B, C, D, E and F of this Standard are normative appendixes.

Technical Specification for Interface between HGW and ITMS+ of China Telecom

1 Scope

This Standard specifies the requirements for the interfaces between HGW and ITMS+, including the basic RPC methods of interfaces, definition of interfaces' secure connection, device authentication, parameter monitoring, parameter configuration, software upgrading, and detailed process of interface calls and parameter values of test diagnostic modules.

This Standard applies to the development of the interfaces between HGW and ITMS, and provides basis for the interoperability test conducted to the HGW and ITMS by China Telecom.

2 Normative references

The provisions in the following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest versions apply to this Standard.

Q/CT 2270-2013 General Technical Specification for Home Gateway (e8) of China Telecom

2012 SX-053 Technical Specification for Home Gateway with Set-card Separation of China Telecom

RFC 1867 Form-based File Upload in HTML

RFC2616 Hypertext Transfer Protocol – HTTP/1.1

RFC2617 HTTP Authentication: Basic and Digest Access Authentication

RFC2246 The TLS Protocol, Version 1.0

SOAP1.1 Simple Object Access Protocol (SOAP) 1.1

SSL3.0 The SSL Protocol, Version 3.0

ILBC	internet Low Bitrate Codec	互联网低码率编解码
IMS	IP Multimedia Subsystem	互联网多媒体系统
IP	Internet Protocol	互联网协议
IPSec	Internet Protocol Security	互联网协议安全性
IPTV	Internet Protocol TV	网络协议电视
ITMS	Integrated Terminal Management System	终端综合管理系统
ITMS+	Integrated Terminal Management System Plus	增强型终端综合管理系统
OUI	Organizationally Unique Identifiers	组织唯一标识
L2TP	Layer 2 Tunneling Protocol	第二层隧道协议
LAN	Local Area Network	局域网
OUI	Organizationally Unique Identifier	组织唯一标示符
POSTS	Plain Old Telephone Service	模拟电话业务
PPPoE	PPP Over Ethernet	以太网上传送 PPP 协议
PPTP	Point to Point Tunneling Protocol	点对点隧道协议
PSTN	Public Switched Telephone Network	公共交换电话网络
PTM	Predictive Technology Model	预测技术模型
PVC	Permanent Virtual Circuit	永久虚电路
QoS	Quality of Service	服务质量
RA	Router Advertisement	路由器通告
RPC	Remote Procedure Call	远程过程调用
RSTP	Rapid Spanning Tree Protocol	快速生成树协议
RTP	Real-time Transport Protocol	实时传送协议
SCTP	Stream Control Transmission Protocol	流控制传输协议
SFU	Single Family Unit	单家庭单元
SIP	Session Initiation Protocol	初始会话协议
SLAAC	Stateless Address Autoconfiguration	无状态地址自动配置
SMAC	Source Mac Address	源物理地址
SNTP	Simple Network Time Protocol	简单网络时间协议
SOAP	Simple Object Access Protocol	简单对象访问协议
SPORT	Source Port	源端口
SSID	Service Set Identifier	服务集标志符
SSL	Security Socket Layer	加密套接字协议层
STB	Set Top Box	机顶盒
TCP	Transmission Control Protocol	传输控制协议
TLS	Transport Layer Security	安全传输层协议
TOS	Type of Service	服务类型
UDP	User Datagram Protocol	用户数据包协议
UPNP	Universal Plug and Play	即插即用
URL	Uniform Resource Locator	统一资源定位符
USB	Universal Serial BUS	通用串行总线
VDSL2	Second Generation Very-high-bit-rate Digital Subscriber Loop	第二代甚高速数字用户环路
VLAN	Virtual Local Area Network	虚拟局域网

- Interface security
- Registered authentication interface
- Parameter monitoring interface
- Parameter configuration interface
- Software upgrading interface
- Test diagnostic interface

These interface contents are respectively described as follows. For the involved RPC method revision and parameter models of service configuration related to the TR-069, SEE Appendixes A, B and C. For the TR-069 extended contents, SEE Appendix D. For the alarm information, SEE Appendix E. For the service process, SEE Appendix F.

5 Technical specification for interfaces

5.1 Framework of the interfaces between HGW and ITMS+

5.1.1 Description diagram for the interfaces between HGW and ITMS+

The interfaces (M) between HGW and ITMS+ shall include the following logic interfaces:

- Registered authentication interface (M1)
- Parameter monitoring interface (M2)
- Parameter configuration interface (M3)
- Software upgrading interface (M4)
- Test diagnostic interface (M5)

The positions of all the interfaces in the system are shown in Fig 2:

- c) ITMS+ initiates an empty Http Post request.
- d) ITMS+ initiates the GetParameterValues, and requires to check HGW's broadband account/password (can be omitted).
- e) HGW responds with the GetParameterValuesResponse along with the broadband account (can be omitted).
- f) According to the broadband account and OUI-SerialNumber matching, ITMS+ will automatically generate the bidirectional DIGEST authentication account based on certain algorithm, and will initiate the RPC of the SetParameterValues, so as to set new account on the HGW.
- g) HGW responds with the SetParameterValuesResponse.
- h) According to the broadband account and OUI-SerialNumber matching, ITMS+ will automatically generate the HGW's Telecom maintenance account based on certain algorithm, and will initiate the RPC of the SetParameterValues, so as to set new Telecom maintenance account on the HGW.
- i) HGW responds with the SetParameterValuesResponse.
- j) According to the broadband account and OUI-SerialNumber judgment, ITMS+ initiates the RPC of the SetParameterValues. According to the search results, SET the HGW's new broadband account and password as well as corresponding service configurations.
- k) HGW responds with the SetParameterValuesResponse (j/k and l/m are complementary procedures, if issuing parameters in the form of configuration files, j/k can be omitted).
- l) ITMS+ initiates the RPC of the Download, and requests HGW to download the initialized configuration files.
- m) HGW responds with the DownloadResponse (j/k and l/m are complementary procedures, if issuing configurations in the form of parameters without the need of software upgrading, l/m can be omitted).
- n) HGW downloads the configuration files according to the URL parameters provided in the Download.
- o) END Session. HGW initiates the Inform request again. At least CARRY the EventCode "TRANSFERCOMPLETE".
- p) ITMS+ responds with the InformResponse.

- d) USE user logical number and authentication code for authentication. After the authentication succeeds, ITMS+ binds the user information, equipment information and service information, and initiates the SetParameterValues to notify the HGW whether the binding succeeds.
- e) HGW responds with the SetParameterValuesResponse. If the binding succeeds, ITMS+ continues the following processes. If the binding fails, directly JUMP to the s instead.
- f) ITMS+ will automatically generate the bidirectional DIGEST authentication account based on certain algorithm, and will initiate the RPC of the SetParameterValues, so as to set new account on the HGW.
- g) HGW responds with the SetParameterValuesResponse.
- h) ITMS+ will automatically generate the HGW's Telecom maintenance account based on certain algorithm, and will initiate the RPC of the SetParameterValues, so as to set new Telecom maintenance account on the HGW.
- i) HGW responds with the SetParameterValuesResponse.
- j) According to the broadband account, binding equipment information and relevant service information, ITMS+ initiates the RPC of the SetParameterValues. SET the service configurations corresponding to the HGW.
- k) HGW responds with the SetParameterValuesResponse (j/k and l/m are complementary procedures, if issuing parameters in the form of configuration files, j/k can be omitted).
- l) ITMS+ initiates the RPC of the Download, and requests HGW to download the initialized configuration files.
- m) HGW responds with the DownloadResponse (j/k and l/m are complementary procedures, if issuing configurations in the form of parameters without the need of software upgrading, l/m can be omitted).
- n) HGW downloads the configuration files according to the URL parameters provided in the Download.
- o) END Session. HGW initiates the Inform request again. At least CARRY the EventCode "TRANSFERCOMPLETE".
- p) ITMS+ responds with the InformResponse.
- q) HGW initiates the TransferComplete request, start and end time of report

download, and success or failure information.

r) ITMS+ responds with the TransferCompleteResponse.

s) END.

5.4.3.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode is “X CT-COM BIND”.
- 2nd Inform: EventCode shall at least include “7 TRANSFERCOMPLETE”.
- SetParameterValues: REFER to the description given in the Section A.3.2.1 of the Appendix A in the TR-069. The specific parameter settings change along with different HGW types and services developed by the users. The parameter settings shall include:

– Authentication user information:

Table 8 Authentication User Information

Parameter name
InternetGatewayDevice.X_CT-COM_UserInfo.Status

– Authentication account:

Table 9 Authentication Account

Parameter name
InternetGatewayDevice.ManagementServer.Username
InternetGatewayDevice.ManagementServer.Password
InternetGatewayDevice.ManagementServer.ConnectionRequestUsername
InternetGatewayDevice.ManagementServer.ConnectionRequestPassword

– Telecom maintenance account:

Table 10 Telecom Maintenance Account

Parameter name
InternetGatewayDevice.DeviceInfo.X_CT-COM_TeleComAccount.Password

– Broadband account:

Table 11 Broadband Account

Parameter name
InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}. WANPPPOConnection.{i}.Username
InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.

- d) ITMS+ calls the RPC methods for the GetParameterValues, and requires to obtain the HGW's specific parameters.
- e) HGW responds with the GetParameterValuesResponse.
- f) END.

5.5.3.4 Interface interactive contents

- Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069.
- GetParameterValues: REFER to the description given in the Section A.3.2.2 of the Appendix A in the TR-069.

5.5.4 Parameter variation reporting interface

5.5.4.1 Interface scene description

ITMS+ obtains the specific parameters of some HGW.

5.5.4.2 RPC methods for the interface call

Table 15 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
SetParameterAttributesResponse	SetParameterAttributes

5.5.4.3 Interface timing

For the timing of the parameter variation reporting interface, SEE Fig 13.

i) END.

5.5.4.4 Interface interactive contents

- Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. "EventCode" shall at least include "VALUE CHANGE".
- SetParameterAttributes: REFER to the description given in the Section A.3.2.4 of the Appendix A in the TR-069.

5.6 HGW and parameter configuration interface module (M3)

5.6.1 Description diagram for the interface M3

The parameter configuration interface includes the following ten sub-interface processes. SEE Fig 14.

- Parameter attribute reporting
- Writable attribute configuration for the LAN-side users
- Parameter/instance configuration (SetParameter)
- Instance deletion configuration
- Parameter configuration (configuration files)
- Configuration file uploading
- Log file uploading
- Configuration of the Telecom maintenance account
- Equipment alarm
- Equipment status monitoring

e) HGW responds with the GetParameterAttributesResponse.

f) END.

5.6.3.4 Interface interactive contents

- Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. "EventCode" shall at least include "CONNECTIONREQUEST".
- SetParameterAttributes: REFER to the description given in the Section A.3.2.4 of the Appendix A in the TR-069.

5.6.4 Parameter instance configuration interface (SetParameterValues)

5.6.4.1 Interface scene description

ITMS+ adds the parameters related to a certain instance and configuration of the HGW.

5.6.4.2 RPC methods for the interface call

Table 18 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
AddObjectResponse	AddObject
SetParameterValuesResponse	SetParameterValues

5.6.4.3 Interface timing

For the timing of the interface using the SetParameterValues for parameter instance configuration, SEE Fig 17.

- b) ITMS+ responds with the InformResponse.
- c) HGW initiates an empty HTTP Post request.
- d) ITMS+ calls the RPC methods for the DeleteObject, so as to delete an instance for the HGW.
- e) HGW responds with the DeleteObjectResponse.
- f) END.

5.6.5.4 Interface interactive contents

- Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode includes “CONNECTIONREQUEST”, etc.
- DeleteObject: REFER to the description given in the Section A.3.2.7 of the Appendix A in the TR-069.

5.6.6 Parameter instance configuration interface (configuration files)

5.6.6.1 Interface scene description

ITMS+ issues parameter configurations in the form of configuration files.

5.6.6.2 RPC methods for the interface call

Table 20 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
DownloadResponse	Download
TransferComplete	TransferCompleteResponse

5.6.6.3 Interface timing

For the timing of the interface using configuration files for parameter instance configuration, SEE Fig 19.

- i) HGW initiates the TransferComplete request, so as to notify the download results and start/end time.
- j) ITMS+ responds with the TransferCompleteResponse.
- k) END.

5.6.6.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include "CONNECTIONREQUEST", etc.
- 2nd Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall at least include "TRANSFERCOMPLETE".
- Download: REFER to the description given in the Section A.3.2.8 of the Appendix A in the TR-069. TAKE the FileType value as "Vendor Configuration File".

5.6.7 Configuration file uploading interface

5.6.7.1 Interface scene description

ITMS+ requests HGW to upload specific configuration files.

5.6.7.2 RPC methods for the interface call

Table 21 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
UploadResponse	Upload
TransferComplete	TransferCompleteResponse

5.6.7.3 Interface timing

For the timing of the configuration file uploading interface, SEE Fig 20.

j) ITMS+ responds with the TransferCompleteResponse.

k) END.

5.6.7.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include "CONNECTIONREQUEST".
- 2nd Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall at least include "TRANSFERCOMPLETE".
- Upload: REFER to the description given in the Section A.4.1.5 of the Appendix A in the TR-069.

5.6.8 Log file uploading interface

5.6.8.1 Interface scene description

ITMS+ requests HGW to upload the log files.

5.6.8.2 RPC methods for the interface call

Table 22 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
UploadResponse	Upload
TransferComplete	TransferCompleteResponse

5.6.8.3 Interface timing

For the timing of the log file uploading interface, SEE Fig 21.

j) ITMS+ responds with the TransferCompleteResponse.

k) END.

5.6.8.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include "CONNECTIONREQUEST".
- 2nd Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall at least include "TRANSFERCOMPLETE".
- Upload: REFER to the description given in the Section A.4.1.5 of the Appendix A in the TR-069.

5.6.9 Configured Telecom maintenance account interface

5.6.9.1 Interface scene description

Telecom maintenance personnel provide on-site maintenance for the HGW faults. After the maintenance, USE special operations on the HGW interface to inform ITMS+.

5.6.9.2 RPC methods for the interface call

Table 23 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
SetParameterValuesResponse	SetParameterValues

5.6.9.3 Interface timing

For the timing of the configured Telecom maintenance account interface, SEE Fig 22.

Fig 27 Diagram for the Interfaces of the HGW and Software Upgrading Module

- a) The terminal responds with the RPC methods for the Download.
- b) USE the Download method to obtain the returned value. If the parameter in the returned value has "Status=0", it will indicate that it is allowed to download without rebooting and the application download succeeds. Directly JUMP to f.
- c) USE the Download method to obtain the returned value. If the parameter in the returned value has "Status=1", the subsequent procedures will be necessary for ensuring successful download.
- d) In the case of conforming to the c, DOWNLOAD if it is unnecessary to reboot the HGW. After the application succeeds, USE the RPC methods for the TransferComplete to inform ITMS+ of the specific information in this download process. END. JUMP to f.
- e) In the case of conforming to the c, REBOOT the HGW if necessary. SEND the Inform TRANSFERCOMPLETE afterwards, so as to inform ITMS+ that this download is completed. CALL the RPC methods for the TransferComplete to inform ITMS+ of the specific information in the download process. JUMP to f.
- f) END Download.

- g) If Status=1, and there is no need of rebooting when downloading the HGW and enabling new software, ENTER the following processes:
- h) HGW initiates the TransferComplete RPC, and reports the details of download and application success as well as upgrading.
- 1) If ITMS+ responds to the TransferComplete for validation, JUMP to i.
- i) If Status=1, and it is necessary for rebooting when downloading the HGW and enabling new software, ENTER the following processes:
- 1) REBOOT the HGW. SEND the Inform request. EventCodes are BOOT and TRANSFERCOMPLETE. REPORT the download and application success.
- 2) ITMS+ responds to the Inform request.
- 3) HGW initiates the TransferComplete RPC, and reports the details of download and application success as well as upgrading.
- 4) ITMS+ responds with the TransferCompleteResponse for validation. JUMP to i.
- j) END.

5.7.2.4 Interface interactive contents

- Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069.
- Download: REFER to the description given in the Section A.3.2.8 of the Appendix A in the TR-069.
- TransferComplete: REFER to the description given in the Section A.3.3.2 of the Appendix A in the TR-069.

5.7.3 Software version query interface

5.7.3.1 Interface scene description

ITMS+ designates HGW to report the software versions. HGW normally reports the software versions.

5.7.3.2 RPC methods for the interface call

Table 27 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse

specific parameter value:

Table 28 Parameter Value in the GetParameterValues

Parameter name
InternetGatewayDevice.DeviceInfo.SoftwareVersion

5.7.4 Software upgrading configuration backup interface

5.7.4.1 Interface scene description

ITMS+ requests HGW to upgrade, to back up the HGW's configuration files before upgrading, and to restore the HGW's configuration backup after upgrading.

5.7.4.2 RPC methods for the interface call

Table 29 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
GetParameterValuesResponse	GetParameterValues
SetParameterValuesResponse	SetParameterValues
DownloadResponse	Download
UploadResponse	Upload
TransferComplete	TransferCompleteResponse

5.7.4.3 Interface timing

Way 1: For the interface timing obtained by uploading and downloading the configuration files, SEE Fig 30.

- c) HGW initiates an empty HTTP Post request.
- d) ITMS+ initiates the Upload RPC call to the HGW.
- e) HGW responds with the corresponding UploadResponse.
- f) UPLOAD the configuration files in the file server.
- g) SEND the Inform request. EventCode is TRANSFERCOMPLETE. REPORT the upload success.
- h) ITMS+ responds with the InformResponse.
- i) HGW initiates the TransferComplete RPC, and reports the details of upload success and uploading.
- j) ITMS+ responds with the TransferCompleteResponse for validation.
- k) DOWNLOAD and UPGRADE the software. The process is the same with that defined in the Section 5.7.2. There is no need to End Session at last.
- l) HGW sends an empty HTTP Post.
- m) ITMS+ requests HGW to download the configuration files.
- n) HGW responds with the DownloadResponse.
- o) HGW downloads the files in the file server.
- p) SEND the Inform request. EventCode is TRANSFERCOMPLETE. REPORT the download success.
- q) ITMS+ responds with the InformResponse.
- r) HGW initiates the TransferComplete RPC, and reports the details of download success and downloading.
- s) ITMS+ responds with the TransferCompleteResponse for validation.
- t) END.

Way 2: For the interface timing obtained by parameter query and setting, SEE Fig 31.

i) END.

5.7.4.4 Interface interactive contents

- Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069.
- Download: REFER to the description given in the Section A.3.2.8 of the Appendix A in the TR-069. When downloading the configuration files, the parameter is "3 Vendor Configuration File".
- TransferComplete: REFER to the description given in the Section A.3.3.2 of the Appendix A in the TR-069.
- Upload: REFER to the description given in the Section A.3.4.1.5 of the Appendix A in the TR-069.
- GetParameterAttributes: REFER to the description given in the Section A.3.2.5 of the Appendix A in the TR-069.
- SetParameterValues: REFER to the description given in the Section A.3.2.1 of the Appendix A in the TR-069.

5.8 HGW and test diagnostic interface module (M5)

5.8.1 Description diagram for the interface M5

The test diagnostic interface includes six sub-interface processes (as shown in Fig 32):

- PING test
- ATMF5Loop test
- Equipment reboot
- Factory reset
- DSL test
- IAD module test (for the E8-C terminals only)

- h) ITMS+ responds with the InformResponse.
- i) HGW initiates an empty HTTP Post request.
- j) ITMS+ initiates the GetParameterValues RPC, and looks up the PING test results.
- k) HGW responds with the GetParameterValuesResponse, and returns back to the PING test results.
- l) END.

5.8.2.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include “6 CONNECTIONREQUEST”.
- 2nd Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall at least include “8 DIAGNOSTICS COMPLETE”.
- SetParameterValues: REFER to the description given in the Section A.3.2.1 of the Appendix A in the TR-069. The specific requested parameters are as follows:

Table 31 Specific Parameters of the SetParameterValues

Parameter name
InternetGatewayDevice.IPPingDiagnostics.DiagnosticsState
InternetGatewayDevice.IPPingDiagnostics.Interface
InternetGatewayDevice.IPPingDiagnostics.Host
InternetGatewayDevice.IPPingDiagnostics.NumberOfRepetitions
InternetGatewayDevice.IPPingDiagnostics.Timeout
InternetGatewayDevice.IPPingDiagnostics.DataBlockSize
InternetGatewayDevice.IPPingDiagnostics.DSCP

- GetParameterValues: REFER to the description given in the Section A.3.2.2 of the Appendix A in the TR-069. The specific response parameters are as follows:

Table 32 Specific Parameters of the GetParameterValues

Parameter name
InternetGatewayDevice.IPPingDiagnostics.SuccessCount
InternetGatewayDevice.IPPingDiagnostics.FailureCount
InternetGatewayDevice.IPPingDiagnostics.AverageResponseTime
InternetGatewayDevice.IPPingDiagnostics.MinimumResponseTime

Fig 34 Flow Chart of the ATMF5Loop Test Interface

- a) HGW initiates the Inform request, including the EventCode "CONNECTIONREQUEST".
- b) ITMS+ responds with the InformResponse.
- c) HGW initiates an empty HTTP Post request.
- d) ITMS+ calls the RPC methods for the SetParameterValues, requests HGW to conduct the ATMF5Loop test, and configures the parameters of the Loop test.
- e) HGW responds with the SetParameterValuesResponse.
- f) END Session. START to conduct the Loop test.
- g) HGW initiates the Inform request. EventCode is "DIAGNOSTICS COMPLETE".
- h) ITMS+ responds with the InformResponse.
- i) HGW initiates an empty HTTP Post request.
- j) ITMS+ initiates the GetParameterValues RPC, and looks up the ATMF5Loop test results.
- k) HGW responds with the GetParameterValuesResponse, and returns back to the Loop test results.
- l) END.

5.8.3.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include "6 CONNECTIONREQUEST".
- 2nd Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall at least include "8 DIAGNOSTICS COMPLETE".
- SetParameterValues: REFER to the description given in the Section A.3.2.1 of the Appendix A in the TR-069. The specific requested parameters are as follows:

Table 34 Specific Parameters of the SetParameterValues

Parameter name

f) HGW initiates the Inform request. EventCode is “BOOTSTRAP”.

5.8.5.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include “CONNECTIONREQUEST”, etc.
- 2nd Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include “BOOTSTRAP”, etc.
- FactoryReset: REFER to the description given in the Section A.4.1.6 of the Appendix A in the TR-069.

5.8.6 DSL test interface

5.8.6.1 Interface scene description

ITMS+ designates the specific HGW to conduct the DSL connectivity test.

5.8.6.2 RPC methods for the interface call

Table 38 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
SetParameterValuesResponse	SetParameterValues
GetParameterValuesResponse	GetParameterValues

5.8.6.3 Interface timing

For the timing of the DSL test interface, SEE Fig 37.

InternetGatewayDevice.WANDevice.{i}.WANDSLDiagnostics.SNRpsds
InternetGatewayDevice.WANDevice.{i}.WANDSLDiagnostics.BITSpsds
InternetGatewayDevice.WANDevice.{i}.WANDSLDiagnostics.GAINSpds

5.8.7 IAD module test interface

5.8.7.1 Interface scene description

ITMS+ conducts the IAD module registration test to the HGW.

5.8.7.2 RPC methods for the interface call

Table 41 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse
SetParameterValuesResponse	SetParameterValues
GetParameterValuesResponse	GetParameterValues

5.8.7.3 Interface timing

For the timing of the IAD module test interface, SEE Fig 38.

- f) END Session. START to conduct the IAD test.
- g) HGW initiates the Inform request. EventCode is "DIAGNOSTICS COMPLETE".
- h) ITMS+ responds with the InformResponse.
- i) HGW initiates an empty HTTP Post request.
- j) ITMS+ initiates the GetParameterValues RPC, and looks up the IAD test results.
- k) HGW responds with the GetParameterValuesResponse, and returns back to the IAD test results.
- l) END.

5.8.7.4 Interface interactive contents

- 1st Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall include "CONNECTIONREQUEST".
- 2nd Inform: REFER to the description given in the Section A.3.3.1 of the Appendix A in the TR-069. EventCode shall at least include "DIAGNOSTICS COMPLETE".
- SetParameterValues: REFER to the description given in the Section A.3.2.1 of the Appendix A in the TR-069. The specific requested parameters are as follows:

Table 42 Specific Parameters of the SetParameterValues

Parameter name
InternetGatewayDevice.Services.VoiceService.{i}.VoiceProfile.{i}.X_CT-COM_IAD-Diagnostics.IADDiagnosticsState
InternetGatewayDevice.Services.VoiceService.{i}.VoiceProfile.{i}.X_CT-COM_IADDiagnostics.TestServer

- GetParameterValues: REFER to the description given in the Section A.3.2.2 of the Appendix A in the TR-069. The specific response parameters are as follows:

Table 43 Specific Parameters of the GetParameterValues

Parameter name
InternetGatewayDevice.Services.VoiceService.{i}.VoiceProfile.{i}.X_CT-COM_IADDiagnostics.RegistResult

COM BIND”, including the card serial number, logical ID, etc. (As long as the registration does not succeed, HGW shall automatically report the X CT-COM BIND message after being electrified each time)

- b) ITMS+ authenticates the HGW (USE the card serial number and logical ID to match with the north-oriented work order). RETURN to the InformResponse (If the authentication succeeds, ISSUE the card’s read-write control key. SEE Procedure d. Otherwise, RETURN to the “Authentication Failure”).
 - 1) ITMS+ reads the “InternetGatewayDevice.X_CT-COM_UserInfo.UserName”;
 - 2) ITMS+ reads the “InternetGatewayDevice.Deviceinfo.X_CT-COM_Cardmanage.CardNo”.
- c) ITMS+ initiates an empty Http Post request.
- d) If the authentication succeeds, ITMS+ will accomplish the binding of the card’s serial number, logical ID, user information, equipment information and service information, will initiate the SetParameterValues, and will issue the parameter “InternetGatewayDevice.X_CT-COM_UserInfo.Status=0” to the terminal, so as to inform the terminal of the authentication success. The terminal will automatically reset the parameter “InternetGatewayDevice.X_CT-COM_UserInfo.Times” to zero. ISSUE the read-write control key to the HGW. HGW authenticates the machine card according to the read-write control key afterwards. After the authentication, RESPOND with the SetParameterValuesResponse (If the machine card authentication fails, the terminal will return to set the “Read-write Control Key Failure”. For the error code, SEE the Section D.2 of the Appendix D).
- e) If the binding succeeds, ITMS+ will wait HGW to report the event “X CT-COM CARDNOTIFY”, and will continue the following processes. If the binding fails, END the process instead.
- f) ITMS+ will automatically generate the bidirectional DIGEST authentication account based on certain algorithm, and will initiate the RPC of the SetParameterValues, so as to set new account on the HGW.
- g) HGW responds with the SetParameterValuesResponse (f/g is optional).
- h) ITMS+ will automatically generate the HGW’s Telecom maintenance account based on certain algorithm, and will initiate the RPC of the SetParameterValues, so as to set new Telecom maintenance account on the HGW.
- i) HGW responds with the SetParameterValuesResponse (h/i is optional).

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}. WANPPPConnection.{i}.Password

– HGW card parameters:

Table 50 HGW Card Parameters

Parameter name
InternetGatewayDevice.DeviceInfo.X_CT-COM_CardKey

- Download: REFER to the description given in the Section A.3.2.8 of the Appendix A in the TR-069. The FileType properties are as follows:
 - Software upgrading “1 Firmware Upgrade Image”
 - Configuration file “3 Vendor Configuration File”
- TransferComplete: REFER to the description given in the Section A.3.3.2 of the Appendix A in the TR-069.

5.9.3 Authentication interface of the non-first connected equipment

5.9.3.1 Interface scene description

TURN off the power supply of the HGW with set-card separation. HGW initiates registration to the ITMS+. ITMS+ can discover and authenticate the HGW.

5.9.3.2 RPC methods for the interface call

Table 51 RPC Methods for the Interface Call

HGW	ITMS+
Inform	InformResponse

5.9.3.3 Interface timing

For the timing of the interface of the HGW with set-card separation which is not registered for the first time, SEE Fig 41.

Appendix A

(Informative)

Definition of RPC methods

Except the RPC methods defined by this Appendix, REFER to the TR-069 for other RPC methods.

A.1 Inform

ESTABLISH the connection with the ITMS+ at any time. HGW shall call the Inform method to initialize a transfer sequence. The call parameters and response parameters of this method are respectively defined in Tables A.1 and A.2.

EXTEND the following parameters based on the provisions specified in the Section A.3 of the TR-069:

Table A.1 Inform Parameters

Serial No.	Parameter name	Parameter type/length	Parameter description
1	X_OUI_AssocDevice	X_OUI_DeviceInfoStruct[]	China Telecom extended parameters carry the identifiable information of the home network devices connected onto the HGW at present, so as to facilitate ITMS+'s relevant parameter settings to the HGW. HGW can use the DHCP Option field to discover the home network device information.

Table A.2 InformResponse Parameters

SEE the Section A.3 of the TR-069.

Table A.3 EventStruct Definition

SEE the Section A.3 of the TR-069.

Table A.4 DeviceIdStruct Definition

SEE the Section A.3 of the TR-069.

Table A.5 EventStruct Definition [Translator note: the title of the Table A.5 is totally the same with that of the Table A.3, which is very doubtful.]

Appendix B

(Normative)

Description on RPC XML Schema

B.1 XML Schema file header

SEE the Section A.6 of the TR-069.

B.2 SOAP packet header

SEE the Section A.6 of the TR-069.

B.3 SOAP error code

SEE the Section A.6 of the TR-069.

B.4 Definition of the RPC parameter type

MethodList

SEE the Section A.6 of the TR-069.

FaultStruct

SEE the Section A.6 of the TR-069.

DeviceIdStruct

SEE the Section A.6 of the TR-069.

X_OUI_DeviceInfoStruct

ParameterNames

SEE the Section A.6 of the TR-069.

ParameterKeyType

SEE the Section A.6 of the TR-069.

AccessList

SEE the Section A.6 of the TR-069.

SetParameterAttributesStruct

SEE the Section A.6 of the TR-069.

ParameterAttributeList

SEE the Section A.6 of the TR-069.

TransferList

SEE the Section A.6 of the TR-069.

VoucherList

SEE the Section A.6 of the TR-069.

OptionStruct

SEE the Section A.6 of the TR-069.

OptionList

SEE the Section A.6 of the TR-069.

ArgStruct

SEE the Section A.6 of the TR-069.

CommandKeyType

SEE the Section A.6 of the TR-069.

ObjectNameType

SEE the Section A.6 of the TR-069.

B.5 Request/response of the RPC methods

GetRPCMethods

SEE the Section A.6 of the TR-069.

SetParameterValues

SEE the Section A.6 of the TR-069.

GetParameterValues

SEE the Section A.6 of the TR-069.

GetParameterNames

SEE the Section A.6 of the TR-069.

SetParameterAttributes

SEE the Section A.6 of the TR-069.

GetParameterAttributes

SEE the Section A.6 of the TR-069.

AddObject

SEE the Section A.6 of the TR-069.

DeleteObject

SEE the Section A.6 of the TR-069.

Download

SEE the Section A.6 of the TR-069.

Reboot

SEE the Section A.6 of the TR-069.

GetQueuedTransfers

SEE the Section A.6 of the TR-069.

ScheduleInform

SEE the Section A.6 of the TR-069.

SetVouchers

The service configuration templates shall follow the parameter templates specified by the TR-098, TR-104 and TR-142 protocols. The sections requiring extension are mainly described as follows.

The extended parameters in the following lists shall use different parameter templates according to different requirements and functions of various types of HGW.

C.2.1 Basic configuration templates

C.2.1.1 WLAN connection

Name ¹	Type	Writing ²	Description
InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANPPPConnection.{i}.	object	W	
X_CT-COM_LanInterface	string	W	For the LAN-side node index list bound with this WAN connection, including the Ethernet port, wireless SSID, etc., USE commas for separation. For instance, "InternetGatewayDevice.LANDevice.1.LANEthernetInterfaceConfig.2,Internet GatewayDevice.LANDevice.1.WLAN Configuration.1".
X_CT-COM_ServiceList	string	W	SPECIFY the service list born in this WAN connection. USE commas for separation. Current definition: "TR069", "INTERNET", "VOIP", "OTHER". In principle, only this WAN connection of the internet access is allowed to correspond to the "INTERNET" attribute. All the other WAN connections, except those of the "TR069" and "VOIP", use the "OTHER" identification (except the PPPoE agent). It is forbidden to make local modifications to the TR-069's WAN connections.
X_CT-COM_LanInterface-DHCPEnable	boolean	W	Whether to enable the DHCP Server function of this WAN connection. Default value: true. Note: When setting up the WAN connection of the "OTHER" attribute, this parameter shall automatically set as

¹ The parameter full names are formed by jointing the parameter names displayed in yellow headers with the subsequent parameter names.

² "W" = Writable, and "-" = read-only. For the "object", "W" indicates that this object instance can be remotely increased or deleted.

Appendix F

(Normative)

Details of the interactive convention between HGW and ITMS+

F.1 Technical details for the initial configuration of the HGW TR-069 parameter tree

- a) The instance for the exit-factory configuration of the LAN-side Ethernet parameters:

InternetGatewayDevice.LANDevice.i.LANEthernetInterfaceConfig.1

InternetGatewayDevice.LANDevice.1.LANEthernetInterfaceConfig.2

InternetGatewayDevice.LANDevice.1.LANEthernetInterfaceConfig.3

InternetGatewayDevice.LANDevice.1.LANEthernetInterfaceConfig.4

(ADD the correspondence with the Ethernet physical port)

- b) Exit-factory configuration of the LAN-side wireless parameters:

InternetGatewayDevice.LANDevice.1.WLANConfiguration.1

- c) Exit-factory configuration of the VOIP service parameters:

VoiceService.1.VoiceProfile.1.

VoiceService.1.VoiceProfile.1.Line.1.

VoiceService.1.VoiceProfile.1.Line.1.Codec.List.{i}. (DETERMINE the number of specific instances according to the codec number)

VoiceService.1.VoiceProfile.1.Line.2.Codec.List.{i}. (DETERMINE the number of specific instances according to the codec number)

- d) Exit-factory configuration of the QOS parameters:

InternetGatewayDevice.X_CT-COM_UplinkQoS.PriorityQueue.1.

InternetGatewayDevice.X_CT-COM_UplinkQoS.PriorityQueue.2.

InternetGatewayDevice.X_CT-COM_UplinkQoS.PriorityQueue.3.

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Enable=true

F.3 Establishment process of ADSL uplink routing IPv4 connection

a) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSL
LinkConfig.LinkType=EoA

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSL
LinkConfig.DestinationAddress=PVC

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSL
LinkConfig.Enable=true

d) SET the relevant parameters of WANPPPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Username=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_ServiceList=(service binding)

rnetLinkConfig.X_CT-COM_Mode=

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANethe
rnetLinkConfig.X_CT-COM_VLANIDMark=Set the VLANID

d) SET the relevant parameters of WANPPPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Username=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Enable=true

F.6 Reboot principle of the interactive process of HGW and ITMS+

- In the interactive process of HGW and ITMS+, it is not allowed to automatically reboot in principle (except the software upgrading and configuration file download).
- In principle, there is no need to reboot all the TR-069 parameter configurations. If requiring reboot, GIVE a clear notification to the ITMS+.
- When issuing parameters, if it is necessary to take effect after rebooting, USE Status (if the value equals to 1, it will be necessary to reboot; if the value equals to 0, it will be unnecessary to reboot) to notify the ITMS+. ITMS+ initiates the reboot command to the HGW according to specific strategies.
- During the service issuing, ITMS+ shall abide by the principle of rebooting after issuing all the services, under the circumstance of no correlation among service parameters.

F.7 HGW's Inform message reporting & parameter list expansion

When reporting the HGW's Inform message, besides reporting the specified

conversation.

F.9 ITMS+'s exception processing flow

ITMS+ is required to support the exception processing mechanism. In the interactive process of HGW and ITMS+, when the parameter issuing is abnormal, ENTER the exception processing flow. PREREAD and PREDETERMINE the relevant service parameters of the terminal according to different service logics. DETERMINE whether the terminal has been configured with relevant service parameters. The specific operating steps are as follows:

- a) ITMS+ receives electronic work orders via the north-oriented interface, and binds the service information, user information and equipment information.
- b) ITMS+ uses the issuing strategy to issue parameters to the HGW via the south-oriented interface.
- c) If the issuing is abnormal, ITMS+ switches to the exception processing flow 1.
- d) ITMS+ reads the HGW-related parameters according to the service logics, and makes contrast with the parameters to be issued from the north-oriented work orders. If they are the same, do NOT issue the parameters. If they are different, ISSUE the parameters to the HGW.
- e) After processing according to the Step 4, if the issuing exception still exists, SWITCH to the exception processing flow 2.
- f) ISSUE the factory reset request to the HGW. ITMS+ unbinds itself with the service information, user information and equipment information.
- g) After turning on the power supply again, HGW realizes the connection and registration processes conducted to the ITMS+ for the first time.
- h) ITMS+ realizes the rebinding, and issues all the current service work orders to the HGW side.

F.10 Process for HGW remote upgrading conducted by the ITMS+

ITMS+ is required to have the mechanism of remote cutover processing flow (remote version upgrading, and remote configuration file upgrading) conducted to the HGW. The specific procedures are listed as follows:

- a) ITMS+ performs the remote HGW upgrading.
- b) ITMS+ issues the factory reset request to the HGW, and unbinds itself with the service information, user information and equipment information.

- c) After turning on the power supply again, HGW realizes the connection and registration processes conducted to the ITMS+ for the first time.
- d) ITMS+ realizes the rebinding, and issues all the current service work orders to the HGW side.

F.11 Logic judgment of the platform service issuing

When issuing service parameters to the HGW, the platform shall have the capability of judging whether the service parameters conform to the correct logic. If the service parameters are unreasonable, MARK on the electronic work orders, or NOTIFY the ITMS+ administrator by other means. Next, TAKE some examples to explain some logic errors of the service parameters:

- a) Repeat binding error of the LAN interface and WAN connection;

BIND the same LAN interface with different WAN connections (particularly REFER to the fact that it is allowed to bind different PVCs or the same PVC with the same LAN interface)

- b) BIND the same service flow with different WAN connections:

Particularly REFER to binding the service flow (such as VOIP, TR069, etc.) with different WAN connections.

- c) Establishment of the same key parameter object:

- WAN connection establishment of the same PVC;
- Port mapping establishment of the same external and internal ports.

- d) Logic errors of the relevant parameters of the specific services:

During the DHCP address pool allocation of different types of equipment, the maximum allocated IP address is less than the minimum allocated IP address. The allocated address pools of different types of equipment cross the boundary of each other.

F.12 VOIP service issuing process

- a) VOIP service opening based on the SIP:

- 1) SET the relevant VOIP service parameters, including all the parameters specified under the “VoiceService.{i}.VoiceProfile.{i}.SIP.”, “VoiceService.{i}.VoiceProfile.{i}.NumberingPlan.”, “VoiceService.{i}.VoiceProfile.{i}.Line.{i}.SIP.”, and “VoiceService.{i}.VoiceProfile.{i}.Line.{i}.Codec.List.{i}.” in the Section

PCConnection.{i}.PortMapping.ExternalPort = External port

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANPP
PCConnection.{i}.PortMapping.InternalPort = Internal port

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANPP
PCConnection.{i}.PortMapping.PortMappingProtocol = TCP

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANPP
PCConnection.{i}.PortMapping.InternalClient = Equipment address under
the gateway

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANPP
PCConnection.{i}.PortMapping.PortMappingEnabled = true

Note: The value of
"InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANPPConnection.{i}.Port
MappingNumberOfEntries" shall be the number of the PortMapping instances under the
"InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANPPConnection.{i}".

F.15 Example for the QOS exit-factory configuration template

a) TR069 + VOIP + IPTV + INTERNET

1) Queue:

Tr069: Q1; VOIP: Q2; IPTV: Q3; INTERNET: Q4

Priority: Tr069 > VOIP > IPTV > INTERNET

2) Classification rules:

Tr069: USE the internal APP for classification.

TR069: USE the internal APP for classification.

IPTV: LANInterface

3) Specific template:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.AddressingType=DHCP

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.X_CT-COM_LanInterface=(the binding relationship with the LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.Enable=true

F.19 Establishment process of ADSL uplink Static IP mode

a) ADD the instance of InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSLLinkConfig.LinkType=EoA

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSLLinkConfig.DestinationAddress=PVC

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSLLinkConfig.Enable=true

d) SET the relevant parameters of WANIPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.AddressingType=Static

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.ExternalIPAddress = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.SubnetMask = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.DefaultGateway = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.DNSServers = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.X_CT-COM_LanInterface=(the binding relationship with the LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.Enable=true

F.20 Establishment process of LAN uplink Static IP mode

a) ADD the instance of InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANEthernetLinkConfig.X_CT-COM_Mode=

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANEthernetLinkConfig.X_CT-COM_VLANIDMark=Set the VLANID (optional)

d) SET the relevant parameters of WANIPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.AddressingType=Static

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.ExternalIPAddress = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.SubnetMask = "xxx.xxx.xxx.xxx"

d) After ITMS+ receives the EventCode “X CT-COM BIND”, USE the logical ID and north-oriented work orders for matching.

1) ITMS+ reads the InternetGatewayDevice.X_CT-COM_UserInfo.UserName;

2) ITMS+ reads the InternetGatewayDevice.X_CT-COM_UserInfo.UserId.

e) After the matching succeeds, and the platform accomplishes the binding of the user information, equipment information and service information, ISSUE the parameter “InternetGatewayDevice.X_CT-COM_UserInfo.Status=0” to the terminal, INFORM the terminal of the matching success, and ISSUE relevant services. The terminal automatically resets the parameter “InternetGatewayDevice.X_CT-COM_UserInfo.Times” to zero, and uses the interface to remind the user that the binding has been accomplished, and the services are issuing.

1) Before issuing the services, the platform issues:

InternetGatewayDevice.X_CT-COM_UserInfo.Result=0

InternetGatewayDevice.X_CT-COM_UserInfo.ServiceName=""

InternetGatewayDevice.X_CT-COM_UserInfo.ServiceNum=2 (TAKE the issuing of two services – broadband internet access and IPTV – as an example)

2) Before issuing the configurations of the broadband internet access, the platform shall first issue:

InternetGatewayDevice.X_CT-COM_UserInfo.ServiceName="INTERNET"

3) Before issuing the IPTV configurations, the platform shall first issue:

InternetGatewayDevice.X_CT-COM_UserInfo.ServiceName="IPTV"

4) After issuing the services, the platform issues:

InternetGatewayDevice.X_CT-COM_UserInfo.Result=1

f) If the matching fails, the platform issues the relevant parameter “InternetGatewayDevice.X_CT-COM_UserInfo.Status=1” to the terminal, so as to inform the terminal of the matching failure. The terminal automatically accumulates one to the “InternetGatewayDevice.X_CT-COM_UserInfo.Times”, and automatically judges the parameter “InternetGatewayDevice.X_CT-COM_UserInfo.Times”.

LAN side)

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.X_CT-COM_ServiceList=(service binding)
```

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.Enable=true
```

F.28 Establishment process of EPON uplink routing IPv4 connection

a) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

```
InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-  
COM_WANeponLinkConfig.Mode=
```

```
InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-  
COM_WANeponLinkConfig.VLANIDMark=
```

d) SET the relevant parameters of WANPPPConnection:

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.ConnectionType=IP_Routed
```

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.Username=(Account)
```

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.Password=(Account)
```

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the  
LAN side)
```

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.X_CT-COM_ServiceList=(service binding)
```

```
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP  
Connection.{i}.Enable=true
```

F.29 Establishment process of EPON uplink DHCPv4 mode

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-COM_WANeponLinkConfig.VLANIDMark=

d) SET the relevant parameters of WANIPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.AddressingType=Static

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.ExternalIPAddress = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.SubnetMask = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.DefaultGateway = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPConnection.{i}.DNSServers = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.X_CT-COM_LanInterface=(the binding relationship with the LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.Enable=true

F.31 Example for the ITMS+ service issuing template

- a) The user normally connects the HGW, and turns on the power supply.
- b) At the beginning of the service issuing, the platform first issues the parameter "InternetGatewayDevice.X_CT-COM_UserInfo.Result=0", so as to inform the terminal of starting issuing the service parameters.
- c) After the service issuing, the platform issues the parameter "InternetGatewayDevice.X_CT-COM_UserInfo.Result" to inform the terminal according to the issuing results, returns to the status according to the terminal afterwards, and selects whether to initiate the reboot operation command to the terminal.

a) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANVdslLinkConfig.Mode=

IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANVdslLinkConfig.VLANIDMark=

IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANVdslLinkConfig.Enable=true

d) SET the relevant parameters of WANPPPConnection:

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=IP_Routed

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Username=(Account)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_ServiceList=(service binding)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Enable=true

F.34 Establishment process of VDSL2 uplink DHCPv4 mode

a) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPC
onnection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

```
IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-  
COM_WANVdsILinkConfig.Mode=
```

```
IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-  
COM_WANVdsILinkConfig.VLANIDMark=
```

```
IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-  
COM_WANVdsILinkConfig.Enable=true
```

d) SET the relevant parameters of WANIPConnection:

```
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo  
nnection.{i}.ConnectionType=IP_Routed
```

```
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo  
nnection.{i}.AddressingType=DHCP
```

```
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo  
nnection.{i}.X_CT-COM_LanInterface=(the binding relationship with the LAN  
side)
```

```
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo  
nnection.{i}.X_CT-COM_ServiceList=(service binding)
```

```
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPC  
onnection.{i}.Enable=true
```

F.35 Establishment process of VDSL2 uplink Static IP mode

a) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPC
onnection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

```
IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-  
COM_WANVdsILinkConfig.Mode=
```

```
IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-  
COM_WANVdsILinkConfig.VLANIDMark=
```

```
IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
```

COM_WANGponLinkConfig.VLANIDMark=

d) SET the relevant parameters of WANPPPConnection:

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=PPPoE_Bridged

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_ServiceList=(service binding)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Enable=true

F.37 Establishment process of GPON uplink routing IPv4 connection

a) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANGponLinkConfig.Mode=

IntemetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANGponLinkConfig.VLANIDMark=

d) SET the relevant parameters of WANPPPConnection:

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=IP_Routed

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Username=(Account)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

IntemetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the

b) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo
nnection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANGponLinkConfig.Mode=

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANGponLinkConfig.VLANIDMark=

d) SET the relevant parameters of WANIPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo
nnection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo
nnection.{i}.AddressingType=Static

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPC
onnection.{i}.ExternalIPAddress = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPC
onnection.{i}.SubnetMask = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPC
onnection.{i}.DefaultGateway = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.WANIPC
onnection.{i}.DNSServers = "xxx.xxx.xxx.xxx"

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo
nnection.{i}.X_CT-COM_LanInterface=(the binding relationship with the LAN
side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPCo
nnection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPC
onnection.{i}.Enable=true

F.40 Process of HGW's voice account reporting via the DHCP OPTION60/DHCPv6 OPTION16

a) TURN on the HGW's power supply for the first time. ITMS+ issues the
message (such as VOIP authentication account, etc.) to the HGW. USE

enough, WRITE "0" in the high-order position.

- 4) HGW generates the ciphertext $C = \text{EnCry}(R+TS+64\text{Bit}, \text{UserID})$. For instance, C is 128bit in length. UserID is 120bit (15 characters) in length. EnCry refers to the 3DES symmetric encryption algorithm. The ciphertext is generated after writing the 64-digit "0" after the R+TS to complement to 192bit.
- 5) HGW generates the key, expressed as "Key = Hash(R+Password+TS)". Where: Key is 128bit in length; Hash() refers to the Hash algorithm, which is hereby defined as MD5; R+Password+TS refers to direct Byte splicing.
- 6) HGW generates the sent message, expressed as "Message = O+R+TS+Key+C". USE "O" to describe the symmetric encryption algorithm 8bit in use.

O=1: indicating the above-described encryption algorithm;

O=other numbers: Reserve.

Note:

- 1) During the encryption, USE PKCS7 to pad the insufficient digits of the authentication username.

The PKCS#7 padding string is composed of a byte sequence. Each byte pads the length of this byte sequence.

The following examples demonstrate the working principle of these modes.

Each data is 8 bytes in length. Assume that the data length to be processed is not the integral multiple of 8, for instance, 9 bytes. Therefore, the number of bytes to be padded equals to 7. We write 7-byte "07" in the padding bit.

Data: FF FF FF FF FF FF FF FF

After using the PKCS7 for padding: FF FF FF FF FF FF FF FF 07 07 07 07 07 07 07.

Each data is 8 bytes in length. Assume that the data length to be processed is the integral multiple of 8, for instance, 8 bytes. Therefore, the number of bytes to be padded equals to 8. We write 8-byte "08" in the padding bit.

Data: FF FF FF FF FF FF FF FF

After using the PKCS7 for padding: FF FF FF FF FF FF FF FF 08 08 08 08 08 08 08.

- 2) When the username exceeds 7 bytes, there will be more than one cipher block. The connection mode between each block is ECB.

Connection.{i}.Username=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPMode=2

e) SET the relevant parameters of X_CT-COM_IPv6.IPv6Address.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.IPv6IPAddressOrigin=(Address acquisition method)

f) SET the relevant parameters of X_CT-COM_IPv6.IPv6Prefix.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6PrefixDelegationEnabled=true

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6PrefixOrigin=(Prefix acquisition method)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Enable=true

F.42 Establishment process of ADSL uplink DHCPv6 mode

a) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPC
onnection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSL
LinkConfig.LinkType=EoA

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSL
LinkConfig.DestinationAddress=PVC

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANDSL
LinkConfig.Enable=true

rnetLinkConfig.X_CT-COM_Mode=

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANethe
rnetLinkConfig.X_CT-COM_VLANIDMark=Set the VLANID

d) SET the relevant parameters of WANPPPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Username=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPMode=2

e) SET the relevant parameters of X_CT-COM_IPv6.IPv6Address.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6IPAddressOrigin=(Address acquisition
method)

f) SET the relevant parameters of X_CT-COM_IPv6.IPv6Prefix.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6PrefixDelegationEnabled=true

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6PrefixOrigin=(Prefix acquisition method)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Enable=true

F.44 Establishment process of LAN uplink DHCPv6 mode

a) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

F.45 Establishment process of EPON uplink IPv6 routing connection

a) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANEponLinkConfig.Mode=

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANEponLinkConfig.VLANIDMark=

d) SET the relevant parameters of WANPPPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Username=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPMode=2

e) SET the relevant parameters of X_CT-COM_IPv6.IPv6Address.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6IPAddressOrigin=(Address acquisition
method)

f) SET the relevant parameters of X_CT-COM_IPv6.IPv6Prefix.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP

method)

f) SET the relevant parameters of X_CT-COM_IPv6.IPv6Prefix.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6PrefixDelegationEnabled=true

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_IPv6PrefixOrigin=(Prefix acquisition method)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPC
onnection.{i}.Enable=true

F.47 Establishment process of VDSL2 uplink IPv6 routing connection

a) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of
InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.

c) SET the relevant parameters of WANConnectionDevice:

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANVdslLinkConfig.Mode=

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANVdslLinkConfig.VLANIDMark=

InternetGatewayDevice.WANDevice.{i}.WANConnectionDevice.{i}.X_CT-
COM_WANVdslLinkConfig.Enable=true

d) SET the relevant parameters of WANPPPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Username=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.Password=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPP
Connection.{i}.X_CT-COM_LanInterface=(the binding relationship with the
LAN side)

d) SET the relevant parameters of WANPPPConnection:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.ConnectionType=IP_Routed

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.Username=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.Password=(Account)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.X_CT-COM_LanInterface=(the binding relationship with the LAN side)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.X_CT-COM_ServiceList=(service binding)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.X_CT-COM_IPMode=2

e) SET the relevant parameters of X_CT-COM_IPv6.IPv6Address.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.X_CT-COM_IPv6IPAddressOrigin=(Address acquisition method)

f) SET the relevant parameters of X_CT-COM_IPv6.IPv6Prefix.:

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.X_CT-COM_IPv6PrefixDelegationEnabled=true

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.X_CT-COM_IPv6PrefixOrigin=(Prefix acquisition method)

InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANPPPConnection.{i}.Enable=true

F.50 Establishment process of GPON uplink DHCPv6 mode

a) ADD the instance of InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.

b) ADD the instance of InternetGatewayDevice.WANDevice.1.WANConnectionDevice.{i}.WANIPConnection.{i}.

number of the interface supported by the HGW. ITMS+ configures the HGW according to the template defined in this version of interface specification.

- c) If InternetGatewayDevice.DeviceInfo.X_CT-COM_InterfaceVersion=4.0, ITMS+ can read the parameter of the WAN connection index "InternetGatewayDevice.WANDevice.{i}.X_CT-COM_WANIndex".
- d) According to this index parameter, FIND the corresponding WAN connection. ISSUE the configuration template corresponding to the interface specification (Version 4.0), so as to accomplish the service configuration.

F.52 LAN-side configuration process of the IPv6 HGW

- a) InternetGatewayDevice.LANDevice.{i}.X_CT-COM_IPv6Config.IPv6DNSConfigType=WANConnection
- b) InternetGatewayDevice.LANDevice.{i}.X_CT-COM_IPv6Config.IPv6DNSWANConnection=

F.53 Relevant process supplement of the HGW with set-card separation

- a) During the first authentication, the EventCode reported in the Inform is X CT-COM BIND.
- b) During the non-first authentication, the EventCode reported in the Inform is 1 Boot.
- c) During the remote factory reset, the EventCode reported in the Inform is 0 BOOTSTRAP (there is no need to report the X CT-COM BIND). ITMS+ has to re-issue the service configurations before the remote factory reset.
- d) When the EventCode includes X CT-COM BIND, 1 BOOT or 0 BOOTSTRAP, the number of Inform messages shall include CardNo, logical ID, and other parameters.
- e) When there are two or more EventCodes within the range of X CT-COM BIND, 0 BOOTSTRAP and 1 BOOT, REPORT the EventCodes in one Inform as required, so as to reduce the number of the interactions between platform and HGW.
- f) When using ITMS+ to directly modify some node parameter, it is unnecessary for the terminal to report the event of carding writing success.
- g) Supplementary card replacement process: The ITMS+ platform shall determine whether it is necessary to replace the card during this operation, according to the logical ID, card serial number, and equipment serial number included in the X CT-COM BIND message reported by the terminal. In the meantime, LOOK up the work order for card replacement (new logical ID and new card serial number). If no work orders for card replacement have been

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