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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Broadband, triple-play and advanced multimedia
services – Advanced multimedia services and applications

A generic home network architecture with support for multimedia services

Recommendation ITU-T H.622

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Recommendation ITU-T H.622

A generic home network architecture with support for multimedia services

Summary

Recommendation ITU-T H.622 describes the architectural framework of a home network that supports multimedia services. Definitions of home network elements such as access gateway, domains, terminals and interfaces are introduced with explanations. This Recommendation also provides a comparison with related documents.

Source

Recommendation ITU-T H.622 was approved on 13 June 2008 by ITU-T Study Group 16 (2005-2008) under Recommendation ITU-T A.8 procedure.

Keywords

Access gateway, domain, home network, terminal.

FOREWORD

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Introduction

The home network is recognized as an important element of multimedia services. Considering the configuration of typical broadband services, the home network has two major roles; an extension of the access network and a transmission medium for data distribution among home devices. A fundamental difference can be found between these two roles. As an extension of the access network, the home network should provide characteristics similar to those of the access network, quality of service (QoS) for example. The home network also inter-connects consumer electronic devices in the same home. For this purpose, this part of the home network may not need to work with the functional entities in the network or service provider.

To clarify these two different roles of the home network, Recommendation ITU-T H.622 introduces the concept of primary and secondary domains. The primary domain is defined as that part of the home network that works as an extension of the access NW, while the secondary domain is defined as the rest of the home network. Primary and secondary terminals are introduced in the same way. Some key features of the home network such as QoS and management that are defined in other documents are described in this context.

Since the home network includes various technical areas from physical data transmission to multimedia capability, it is difficult for any single document to cover all issues. This Recommendation and Recommendation ITU-T G.9970, which is an accompanying Recommendation, share the same layered model that consists of transport and application models. This Recommendation mostly focuses on the issues related to the application model. For better understanding of the home network, users of this Recommendation are encouraged to consider Recommendation ITU-T G.9970.

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Recommendation ITU-T H.622

A generic home network architecture with support for multimedia services

1 Scope

This Recommendation describes a generic home network architecture that is applicable to, including but not limited to, fibre-to-the-home (FTTH), xDSL and cable television (CATV). The architecture is designed to support a wide range of multimedia services such as Internet Protocol television (IPTV), IP-telephony and video telephony as well as legacy services, if needed. The goal of the architecture is to define functionalities and interfaces that support these services with the demanded level of quality of service (QoS), security and management capability in the home network domain based on [ITU-T J.190].

The home network specific to each access network can be defined based on functional entities and interfaces defined in this Recommendation.

This Recommendation uses the transmission functionality and demarcation point between the access network and the home network defined in [b-ITU-T G.9970] that contains more details about these aspects. Users of this Recommendation are encouraged to consider both Recommendations for complete understanding of the generic home network architecture.

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 H.610] | Recommendation ITU-T H.610 (2003), <i>Full service VDSL – System architecture and customer premises equipment</i> . |
| [ITU-T J.190] | Recommendation ITU-T J.190 (2002), <i>Architecture of MediaHomeNet that supports cable-based services</i> . |
| [ITU-T X.1111] | Recommendation ITU-T X.1111 (2007), <i>Framework of security technologies for home network</i> . |
| [ATIS 0800002] | ATIS 0800002 (2006), <i>IPTV Architecture Requirements</i> .
< https://www.atis.org/docstore/default.aspx > |
| [DSL TR-094] | DSL Forum TR-094 (2004), <i>Multi-Service Delivery Framework for Home Networks</i> .
< http://www.broadband-forum.org/technical/download/TR-094.pdf > |
| [HGI] | HGI (2006), <i>Home Gateway Technical Requirements: Release 1</i> .
< http://www.homegatewayinitiative.org/publis/HGI_V1.0.pdf > |

3 Definitions

This Recommendation defines the following term:

3.1 home network: A home network is the collection of elements that process, manage, transport and store information, thus enabling the connection and integration of multiple computing, control, monitoring, communication and entertainment devices in the home.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AGAF	Access Gateway Application layer Function
AGTF	Access Gateway Transport layer Function
AGW	Access Gateway
AN	Access Network
ASG	Application Service Gateway
ASP	Application Service Provider
AV	Audio Visual
B-NT	Broadband Network Termination
CM	Cable Modem
CODEC	COder-DECoder
DHCP	Dynamic Host Configuration Protocol
DNG	Delivery Network Gateway
DNGF	Delivery Network Gateway Function
DRM	Digital Rights Management
DSCP	Differentiated Services Code Point
EPG	Electronic Programme Guide
EUT	End User Terminal
FPD	Functional Processing Device
FPD/T	Functional Processing Device and Terminal
GW	Gateway
HA	Home Access
HB	Home Bridge
HC	Home Client
HD	Home Decoder
HE	Head-End
HN	Home Network
HNS	Home Network Segment
IGMP	Internet Group Management Protocol
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol

IPI	Internet Protocol Infrastructure
ISP	Internet Service Provider
ITF	IPTV Terminal Function
LC	Layer-1/2 Converter
MLD	Multicast Listener Discovery
NAT	Network Address Translation
NID	Network Interface Device
NSIS	Next Steps In Signalling
NT	Network Termination
ONT	Optical Network Termination
PC	Personal Computer
PLC	Power Line Communications
PS	Plain old telephone service Splitter
QoS	Quality of Service
RG	Residential Gateway
RQoS	Relative Quality of Service
RSVP	Resource ReserVation Protocol
SM	Service Module
STB	Set-Top Box
TCP	Transmission Control Protocol
ToS	Type of Service
TTL	Time To Live
TV	Television set
UPnP	Universal Plug and Play
VLAN	Virtual Local Area Network
VTP/D	VDSL Termination Processing or VDSL Termination Processing and Decoding
XSP	Service Provider
xTU-R	xDSL remote terminal unit

5 Conventions

In this Recommendation:

- The keywords "**is required to**" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this Recommendation is to be claimed.
- The keywords "**is prohibited from**" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this Recommendation is to be claimed.

- The keywords "**is recommended**" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.
- The keywords "**is not recommended**" indicate a requirement which is not recommended but which is not specifically prohibited. Thus, conformance with this Recommendation can still be claimed even if this requirement is present.
- The keywords "**can optionally**" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

6 Model of the home network

6.1 Concept of layered model

The home network is an integrated technology ranging from physical transmission to service support. It is difficult to encompass all the aspects of a home network in a single architectural model. This Recommendation adopts a layered model as shown in Figure 6-1.

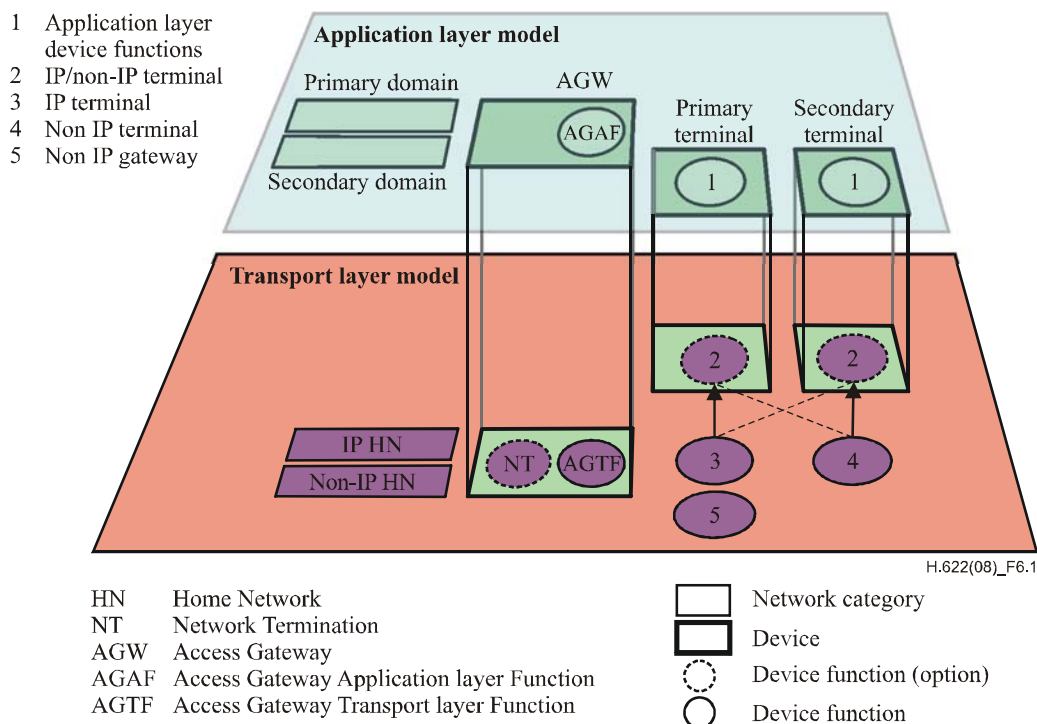


Figure 6-1 – The conceptual diagram of layered model

The layered function architecture includes two layers: transport function layer and application function layer. The detailed descriptions are presented as follows:

- The **transport model** describes how the network links clients together and transfers the data packets across the network. The transport model corresponds to three layers: network, data link and physical. That is to say, the functions of physical connection, data link connection and choice of packet switching are realized in this model.
- The **application model** describes the features that allow users to interact with the networks, including defining data formats, designing services and designing interfaces. There are

many services at present, such as TV gaming, TV education and linear TV. Providing more multimedia services may help drive the widespread adoption of multimedia capabilities, so it is necessary to design more types of services. The data formats of different services vary widely, so data format identification is an important component of the application function model.

6.2 Transport model of the home network

As shown in Figure 6-2, the home network is composed of IP home network segments using IP and non-IP home network segments using the specific technologies or protocols designed for short-range communication. The gateway between the access network and IP home network segment is called the access GW, while that between the IP home network segment and non-IP home network segment is called the non-IP GW. The terminal may be wireless or wired.

Refer to [b-ITU-T G.9970] for details of the transport model.

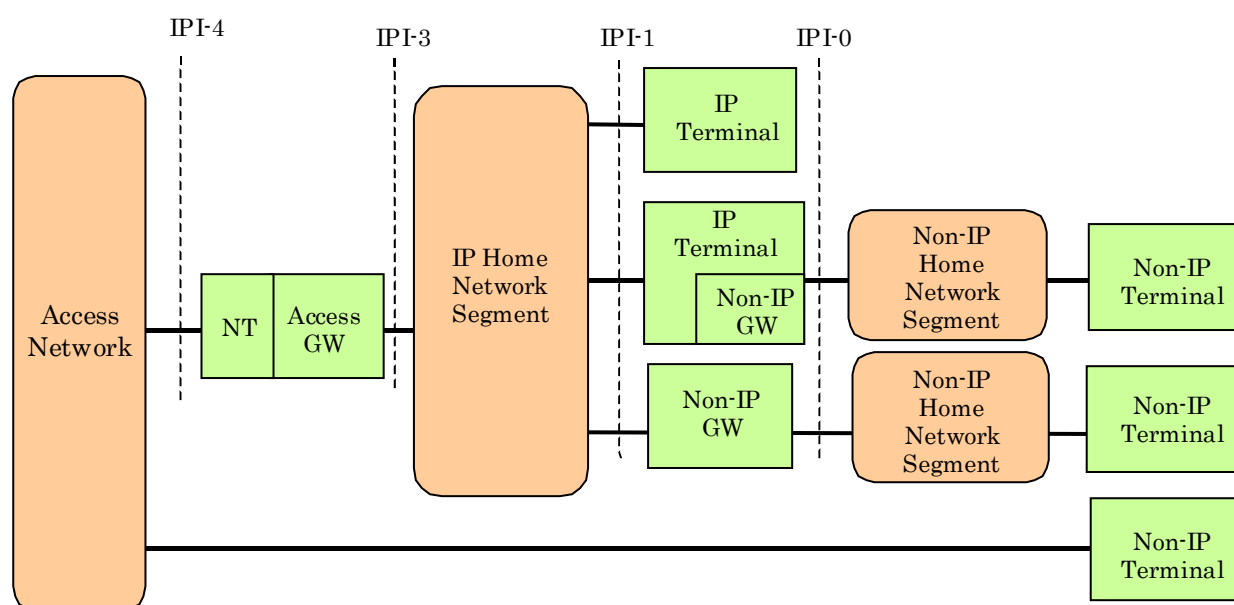


Figure 6-2 – Transport model of the home network

NOTE – The interface "B" between the NT and AGTF is presented in [b-ITU-T G.9970].

6.3 Application model of the home network

6.3.1 Home network service functional structure

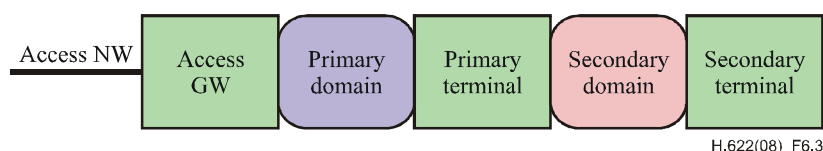


Figure 6-3 – Application model of the home network

For multimedia services on the broadband access network, the service is presented at the terminal device. Usually, this device lies within the home network. Considering that typical multimedia services require network management features such as QoS and security, the same or similar level