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Next Generation Networks

High-level architecture of future packet-based networks

ITU-T Recommendation Y.2611

GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

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

ITU-T Recommendation Y.2611

High-level architecture of future packet-based networks

Summary

ITU-T Recommendation Y.2611 specifies a high-level architecture for future packet-based networks (FPBNs). This Recommendation also specifies the relationship between an FPBN and the NGN strata and the interfaces in an FPBN.

In order to be able to provide a full suite of services (examples of which include data, video and voice telephony services) to their customers, operators may need to utilize both connectionless packet switched (cl-ps) and connection-oriented packet-switched (co-ps) transport modes. This is because each mode is well suited to the transport of some services and not so well suited to the transport of others.

FPBNs provide the topmost layer(s) of the transport stratum as defined in ITU-T Recommendation Y.2011. The services mentioned above form part of the service stratum as defined in ITU-T Recommendation Y.2011.

Source

ITU-T Recommendation Y.2611 was approved on 14 December 2006 by ITU-T Study Group 13 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation Y.2611

High-level architecture of future packet-based networks

1 Scope

This architecture for an FPBN addresses both connectionless packet switched (cl-ps) and connection-oriented packet switched (co-ps) layer networks. Connection-oriented circuit switched (co-cs) layer networks used to provide the lower layer(s) of the transport stratum are outside of the scope of this Recommendation. The definition and specification of specific services is left to other NGN Recommendations and is outside of the scope of an FPBN and this Recommendation.

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 G.805] ITU-T Recommendation G.805 (2000), *Generic functional architecture of transport networks*.
- [ITU-T G.809] ITU-T Recommendation G.809 (2003), *Functional architecture of connectionless layer networks*.
- [ITU-T X.200] ITU-T Recommendation X.200 (1994), *Information technology – Open Systems Interconnection – Basic Reference Model: The basic model*.
- [ITU-T X.800] ITU-T Recommendation X.800 (1991), *Security architecture for Open Systems Interconnection for CCITT applications*.
- [ITU-T Y.1710] ITU-T Recommendation Y.1710 (2002), *Requirements for Operation & Maintenance functionality for MPLS networks*.
- [ITU-T Y.1711] ITU-T Recommendation Y.1711 (2004), *Operation & Maintenance mechanism for MPLS networks*.
- [ITU-T Y.2001] ITU-T Recommendation Y.2001 (2004), *General overview of NGN*.
- [ITU-T Y.2011] ITU-T Recommendation Y.2011 (2004), *General principles and general reference model for Next Generation Networks*.
- [ITU-T Y.2111] ITU-T Recommendation Y.2111 (2006), *Resource and admission control functions in Next Generation Networks*.
- [ITU-T Y.2601] ITU-T Recommendation Y.2601 (2006), *Fundamental characteristics and requirements of future packet-based networks*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 address: See [ITU-T Y.2601].

- 3.1.2 authentication:** See [ITU-T X.800].
- 3.1.3 client/server relationship:** See [ITU-T G.805].
- 3.1.4 connection:** See [ITU-T G.805].
- 3.1.5 flow:** See [ITU-T G.809].
- 3.1.6 identifier:** See [ITU-T Y.2601].
- 3.1.7 trail:** See [ITU-T G.805].

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 availability: A measure of the capability of a given entity (for example, a layer network, connection, flow, etc.) to maintain connectivity with the associated performance criteria that have been guaranteed by the entity.

3.2.2 name: A name is the identifier of an entity (e.g., subscriber, network element) that may be resolved/translated into an address.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ATM	Asynchronous Transport Mode
cl-ps	connectionless packet switched
CPE	Customer Premises Equipment
co-cs	connection-oriented circuit switched
co-ps	connection-oriented packet switched
CV	Connectivity Verification
E-NNI	External Network-to-Network Interface
FPBN	Future Packet-Based Network
FT_Sk	Flow Termination Sink
FT_So	Flow Termination Source
HRX	Hypothetical Reference Connection
I-NNI	Internal Network-to-Network Interface
IP	Internet Protocol
L2TP	Layer 2 Tunnelling Protocol
MPLS	Multi-Protocol Label Switching
MTNM	Multi-Technology Network Management
MTOSI	Multi-Technology Operations Systems Interface
NGN	Next Generation Network
NMS	Network Management System
NNI	Network-to-Network Interface
OAM	Operations, Administration and Maintenance
OSI BRM	Open Systems Interconnection Basic Reference Model

OSS	Operations Support System
PM	Performance Management
PPP	Point-to-Point Protocol
PSTN	Public Switched Telephone Network
p-t-mp	point-to-multipoint
p-t-p	point-to-point
QoS	Quality of Service
RACF	Resource and Admission Control Functions
RPT	Reference Point Type
SDH	Synchronous Digital Hierarchy
SLA	Service Level Agreement
TCP	Termination Connection Point
TFP	Termination Flow Point
TMF	TeleManagement Forum
TN	Transport Network
TT_Sk	Trail Termination Sink
TT_So	Trail Termination Source
UNI	User-to-Network Interface
VC-4	Virtual Container Level 4

5 Conventions

None

6 High-level architecture of future packet-based networks

6.1 FPBN architecture

A future packet-based network (FPBN) is composed of packet-based path layer networks (as defined in [ITU-T G.805] and [ITU-T G.809]) in the transport stratum (the functionality is similar to layers 2 and 3 in [ITU-T X.200]). An overview of [ITU-T G.805] and [ITU-T G.809], and the relationships to the open systems interconnection basic reference model (OSI BRM), is provided in Appendix I. The transport stratum is depicted in Figure 1 of [ITU-T Y.2011]. Each layer network 'system' in an FPBN consists of a user plane, a control plane and a management plane and each of the planes within a layer network will have its own traffic forwarding component which may belong to the same layer network (if the planes are not isolated from each other) or different layer networks (if the planes are isolated from each other).

It is a requirement identified in clauses 6 and 7.8 of [ITU-T Y.2601] that an FPBN is expected to:

- a) *completely secure the internal control and management plane traffic from external attack and ensure that it remains secure and stable under situations of extreme stress (clause 6);*
- b) *provide mechanisms to protect the control plane communications from security threats (clause 7.8).*

An identical requirement also exists for protecting the FPBN management plane from security threats. The user, control, and management planes (of each layer network) should be segregated