



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Y.2022

(08/2011)

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

Next Generation Networks – Frameworks and functional
architecture models

Functional architecture for the support of host- based ID/locator separation in NGN

CAUTION !

PREPUBLISHED RECOMMENDATION

This prepublication is an unedited version of a recently approved Recommendation. It will be replaced by the published version after editing. Therefore, there will be differences between this prepublication and the published version.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU [had/had not] received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2011

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Recommendation ITU-T Y.2022

Functional architecture for the support of host-based ID/locator separation in NGN

Summary

This Recommendation describes the functional architecture for the support of host-based ID/locator separation in NGN. ID/locator separation in NGN consists in decoupling the semantic of IP addresses into the semantics of identifiers (node IDs) and locators (LOCs) as described in [ITU-T Y.2015].

This Recommendation defines the functional entities and the related reference points, based on the framework architecture provided in [ITU-T Y.2012].

This Recommendation covers only the host-based case of ID/locator separation (the separation of node ID and locator is done in the User Equipment and not in the network).

Keywords

NGN, functional architecture, ID/LOC Mapping

TABLE of CONTENTS

Page

1	Scope.....	3
2	References.....	3
3	Definitions	4
3.1	Terms defined elsewhere.....	4
3.2	Terms defined in this Recommendation	5
4	Abbreviations and acronyms	5
5	Conventions	6
6	Overview and architecture of ID/LOC separation in the NGN.....	6
6.1	Overview of ID/LOC separation in the NGN	6
6.2	Architecture overview.....	7
7	Functional architecture	7
7.1	High level functions.....	8
7.1.1	Service control functions (SCF).....	8
7.1.2	Network attachment control functions (NACF).....	8
7.1.3	ID/LOC mapping control functions (ILCF)	9
7.1.4	ID/LOC mapping functions (ILMF).....	9
7.2	Functional entities	9
7.2.1	ID/LOC mapping functional entity (ILM-FE).....	9
7.2.2	ID/LOC mapping storage functional entity (ILMS-FE).....	9
7.3	Reference points.....	9
7.3.1	Reference point S1 between SCF and ILMS-FE.....	11
7.3.2	Reference point S2 between TLM-FE and ILMS-FE	11
7.3.3	Reference point S3 between UE and ILMS-FE	11
8	Procedures of ID/LOC split in NGN	12
8.1	Attachment procedure	12
8.1.1	ID/LOC mapping update initiated by the UE	12
8.1.2	ID/LOC mapping initiated by the network.....	13
8.2	Communication establishment using node ID.....	14
8.3	Communication establishment for multi-homing	15
8.4	Communication update when the LOC is changed.....	16
8.5	Detachment procedures.....	17
8.5.1	Detachment procedure initiated by the UE	17
8.5.2	Detachment procedure initiated by the network	18
9	Security considerations.....	19
	Bibliography.....	20

Recommendation ITU-T Y.2022

Functional architecture for the support of host-based ID/locator separation in NGN

1 Scope

This Recommendation describes the functional architecture for the support of host - based node identifier (ID) and node locator (ID/locator) separation in NGN, based on the requirements provided in [ITU-T Y.2015].

This Recommendation addresses the following aspects:

- Functional architecture model for ID/locator separation in NGN;
- Identification of functions including the definition of functional entities and reference points;
- Description of relevant procedures and interactions with other components of the NGN functional architecture as defined in [ITU-T Y.2012].

This Recommendation covers only the host-based case of ID/locator separation and the separation of node ID and locator is done in the user equipment (UE) and not in the network.

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 X.509] Recommendation ITU-T X.509 (2005) | *ISO/IEC 9594-8:2005, Information technology – Open Systems Interconnection – The Directory: Public – Key and attribute certificate frameworks.*
- [ITU-T Y.2001] Recommendation ITU-T Y.2001 (2004), *Next Generation Networks – Frameworks and functional architecture models.*
- [ITU-T Y.2012] Recommendation ITU-T Y.2012 (2010), *Functional requirements and architecture for the NGN.*
- [ITU-T Y.2014] Recommendation ITU-T Y.2014 (2010), *Network attachment control functions in next generation networks*
- [ITU-T Y.2015] Recommendation ITU-T Y.2015 (2009), *General requirements for ID/locator separation in NGN.*
- [ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1.*
- [ITU-T Y.2720] Recommendation ITU-T Y.2720 (2009), *NGN Identity management framework.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 address [ITU-T Y.2015]: An address is the identifier for a specific termination point and is used for routing to this termination point.

3.1.2 credential [ITU-T Y.2720]: An identifiable object that can be used to authenticate the claimant is what it claims to be and to authorize the claimant's rights.

3.1.3 identifier [ITU-T Y.2091]: An identifier is a series of digits, characters and symbols or any other form of data used to identify subscriber(s), user(s), network element(s), function(s), network entity(ies) providing services/applications, or other entities (e.g. physical or logical objects). Identifiers can be used for registration or authorization. They can be either public to all networks, shared between a limited number of networks or private to a specific network (private IDs are normally not disclosed to third parties).

3.1.4 ID/LOC mapping [ITU-T Y.2015]: ID/LOC mapping is an association between a node ID and one or more LOCs.

NOTE 1 – A single node ID or several node IDs can be associated with many LOCs associated with a single terminal. The node ID to LOC mapping can have the one-to-one, one-to-many, or many-to-one relationship.

NOTE 2 – ID/LOC mapping is also called ID/LOC binding.

3.1.5 ID/LOC mapping function [ITU-T Y.2015]: An ID/LOC mapping function gets mapping information from an ID/LOC mapping storage function and uses the corresponding node ID and/or LOC in packet headers. The ID/LOC mapping function works in a close correlation with the transport user profile associated with the transport control function.

NOTE – ID/LOC mapping functions can be physically located in an NGN terminal, an access border gateway, or any other NGN components.

3.1.6 ID/LOC mapping storage function [ITU-T Y.2015]: An ID/LOC mapping storage function stores the mapping of NGN identifiers, node IDs and LOCs. This function also updates mapping information, as well as provides mapping information to other functions on request. The mapping storage function can be physically located in an NGN terminal or with other NGN components.

3.1.7 ID/LOC separation [ITU-T Y.2015]: ID/LOC separation is decoupling the semantic of IP address into the semantics of node IDs and LOCs. Distinct namespaces are used for node IDs and LOCs so that they can evolve independently. LOCs are associated with the IP layer whereas node IDs are associated with upper layers in such a way that ongoing communication sessions or services shall not be broken by changing LOCs due to mobility and multi-homing.

NOTE – In the context of this Recommendation, a completely new namespace for node IDs can optionally be created that would leave the IP address space more or less intact for LOCs, allowing routing technologies to be developed independently of end-host mobility and end-host multi-homing implications.

3.1.8 locator (LOC) [ITU-T Y.2015]: A locator is the network layer topological name for an interface or a set of interfaces. LOCs are carried in the IP address fields as packets traverse the network.

NOTE - IP addresses can gradually become pure LOCs. However, on the contrary, it cannot be said that a LOC is an IP address. An IP address may associate with the IP layer as well as upper layer

protocols (such as TCP and HTTP), whereas a LOC will associate with only the IP layer and be used in IP address fields.

3.1.9 node ID [ITU-T Y.2015]: A node ID is an identifier used at the transport and higher layers to identify the node as well as the endpoint of a communication session. A node ID is independent of the node location as well as the network to which the node is attached so that the node ID is not required to change even when the node changes its network connectivity by physically moving or simply activating another interface. The node IDs should be used at the transport and higher layers for replacing the conventional use of IP addresses at these layers. A node may have more than one node ID in use.

NOTE - Unless otherwise specified, the term “ID” used in this Recommendation represents a node ID, not an NGN identifier specified in this or any other Recommendations.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AM-FE	Access Management Functional Entity
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
GSC-FE	General Services Control Functional Entity
ID	Identifier
ILCF	ID/LOC mapping Control Functions
ILMF	ID/LOC Mapping Functions
ILM-FE	ID/LOC Mapping Functional Entity
ILMS-FE	ID/LOC Mapping Storage Functional Entity
IMS	IP Multimedia Subsystem
IP	Internet Protocol
LOC	Locator
NACF	Network Attachment Control Functions
NAC-FE	Network Access Configuration Functional Entity
NGN	Next Generation Networks
P-CSC-FE	Proxy Call Session Control Functional Entity
RACF	Resource and Admission Control Functions
SCF	Service Control Functions
TAA-FE	Transport Authentication and Authorization Functional Entity
TLM-FE	Transport Location Management Functional Entity
TUP-FE	Transport User Profile Functional Entity
UE	User Equipment