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Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Abstract Architecture and Reference Points Definition; Network Architecture and Reference Points

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Technical Specification

**Telecommunications and Internet Protocol
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Foreword

This Technical Specification (TS) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

Introduction

The present document describes the network architecture and the reference configurations that are necessary for the support of services and service capabilities defined for TIPHON Release 4. The TIPHON Release 4 definition and the corresponding relationship between the core deliverables is described in TR 101 301 V4.1.1 [1].

The present document builds upon the concepts embodied in TIPHON Release 3 [8]. These concepts which are applicable to network configurations based on the range of functional and entities within the IP network, as described in the present document that are necessary to support the four scenarios of TIPHON Release 4.

1   Scope

The present document defines the TIPHON network architecture and the reference configurations that are necessary for:

- the delivery of telephone calls, which originate and terminate in IP networks;

- the delivery of telephone calls which originate in an Internet Protocol (IP) network and are delivered to Switched Circuit Networks (SCN);

- the delivery of telephone calls which originate in SCNs and are delivered in an IP network; and

- the delivery of telephone calls which originate in SCNs, routed through IP networks and delivered to SCN.

These four scenarios are part of TIPHON Release 4.

The architecture includes provision of information and facilities which are incidental to the delivery of telephone calls described above. The present document builds upon the concepts embodied in the TIPHON Release 3 network architecture and reference configurations described in TR 101 877 [8]. The present document is applicable to equipment fulfilling the roles of the functional groups identified in TS 101 878 [2]; Terminal functional group, network functional group and Gateway functional group, and also to entities within the IP network that are necessary to support the four scenarios of TIPHON Release 4.

2   References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1]   ETSI TR 101 301: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Release Definition; TIPHON Release 3 Definition".

[2]   ETSI TS 101 878: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Service Capability Definition; Service Capabilities for a simple call".

[3]   ETSI TS 101 329-2: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; End-to-end Quality of Service in TIPHON Systems; Part 2: Definition of Speech Quality of Service (QoS) Classes".

[4]   ETSI TS 101 871 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Application Specific Access Profile (ASAP); DECT Multimedia Access Profile (DMAP); Profile requirement list and profile specific Implementation Conformance Statement (ICS) proforma".

[5]   ETSI TR 101 303: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Requirements definition study; Introduction to service and network management".

[6]   ETSI TR 101 311: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Service Independent requirements definition; Transport Plane".

[7]   Void.

[8]   ETSI TR 101 877: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Requirements Definition Study; Scope and Requirements for a Simple call".

[9]   Void.

[10]   ETSI TS 101 303: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Service Independent Requirements Definition; Service and Network Management Framework; Part 1: Overview and Introduction".

[11]   ITU-T Recommendation M.3010: "Principles for a Telecommunications management network".

[12]   ITU Recommendations M.3200: "TMN management services and telecommunications managed areas: overview".

[13]   ITU Recommendations M.3400: "TMN Management Functions".

[14]   GB910: "Telecom Operations Map".

[15]   GB921 June 1: "enhanced Telecom Operations Map (eTOM): The Business Process Framework-for the Information and Communications Services Industry".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the following terms and definitions apply:

administrative domain: collection of physical or functional entities under the control of a single administration

aggregate bearer: logical association of functional entities in an IP telephony application and transport network which creates one or more concurrent end to end media flows and which is not limited to the duration of a single call

Aggregate Bearer Admission Control (ABAC) function: functional entity that determines whether or not a flow is to be admitted as part of an established aggregate bearer

Aggregate Bearer Measurement (ABM) function: function that determines the capacity used and remaining in an aggregate bearer as a result of measuring the actual media flows after taking into account what flows were requested

application data: media or signalling information content

bearer: logical association of functional entities in an IP telephony application and transport network which creates an end to end media flow for no longer than the duration of a call

domain: collection of physical or functional entities within an administrative domain which share a consistent set of policies and common technologies

Domain IDentifier (DID): globally unique identifier of a domain. Domain identifiers may be mapped to the IP Telephony Administrative Domain (ITAD) Numbers, registered by IANA and used by the TRIP Protocol

end-user: entity using the services of an IP telephony service provider or transport network operator

end-user domain: collection of physical or functional entities under the control of an end-user which share a consistent set of policies and common technologies

functional entity: entity in a system that performs a specific set of functions

Functional Group (FG): collection of functional entities within a domain.

NOTE: In TIPHON systems functional groups are used to structure the necessary functionality to offer IP telephony services across domains

gateway functional group: functional group containing the functionality of a network functional group also the functionality necessary to connect calls to the SCN

> NOTE: Gateway functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

home network functional group: functional group, which is aware of the service application subscribed to by the end-user

> NOTE: Home network functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

intermediate (transit) network functional group: functional group connecting the serving network functional group to the home network functional group

> NOTE: The intermediate network functional grouping is only present when the serving network functional grouping and the home network functional grouping are not directly connected.

information flow: interaction between a communicating pair of functional entities

interconnection function: functional entity connecting two networks having differing administrative policy such as Quality of Service (QoS) or addressing policy but employing the same signalling protocol, and transport technology, at the point of interconnect

interface: shared boundary between two communicating systems, devices or equipment

IP network: packet transport network comprising one or more transport domains each employing the IP protocol

IP telephony: any telephony related service that is supported on a managed IP network

IP telephony service provider: service provider who offers IP telephony services

> NOTE: The same business entity may act as both a transport network operator and an IP telephony service provider.

network functional group: functional group containing the functionality required to establish a call between two terminals, a gateway and a terminal, or two gateways

> NOTE: Network functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

packet flow/transport flow: stream of packets of the same type identified by common address and port numbers

> NOTE: The stream may contain either signalling information or content description together with media information.

protocol: set of semantics, syntax and procedures, which govern the exchange of information across an interface

reference point: conceptual point at the conjunction of two communicating functional entities

service domain: collection of physical or functional entities offering IP telephony services under the control of an IP telephony service provider which share a consistent set of policies and common technologies

serving network functional group: functional group that enables terminal functional groups to connect to an IP telephony service provide

Switched Circuit Network (SCN): telecommunications network, e.g. Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), and General System for Mobile communications (GSM), that uses circuit-switched technologies for the support of voice calls

> NOTE: The SCN may be a public network or a private network.

terminal: endpoint within the user equipment on which signalling and media flows originate and/or terminate

terminal functional group: functional group representing all the IP telephony functionality within an end-user's terminal

> NOTE: Terminal functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

ticket: a ticket is obtained through the registration session, when used in a call it provides the terminal/user with a means to show a valid registration exists

transport domain: collection of transport resources sharing a common set of policies, QoS mechanisms and transport technologies under the control of a transport network operator

transport function: functional entity representing the collection of transport resources within a transport domain which are capable of control by a transport resource manager

transport network: collection of transport resources, which provide IP transport functionality

transport network operator: business entity operating a transport network

transport policy entity: functional entity that maintains the policies of a transport domain

Transport Resource Manager (TRM): functional entity that applies a set of policies and mechanisms to a set of transport resources to ensure that those resources are allocated such that they are sufficient to enable transport flows with QoS guarantees across the domain of control of the TRM

user equipment: equipment under the control of an end-user

user profile: service specific information about a user of a service application

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ABAC   Aggregate Bearer Admission Control
ABM   Aggregate Bearer Management
BC   Bearer Control
CC   Call Control
CR   Call Routing function
DID   Domain IDentifier
DiffServ Differentiated Services
DNS   Domain Name Service
DTMF   Dual Tone Multi Frequency
FCAPS   Fault, Configuration, Accounting, Performance and Security
FG   Functional Group
GSM   General System for Mobile communication
HREG   Home network REGistration function
IANA   Internet Assigned Numbers Authority
ICF   Interconnect Function
IP   Internet Protocol
IPTN   IP Telephony Network
IREG   Intermediate Network Registration function
ISDN   Integrated Service Digital Network
ITAD   IP Telephony Administrative Domain
MC   Media Control
MD   Mediation Device
MPLS   Multi-Protocol Label Switching
NE   Network Element
NEF   Network Element Function
OAM&P   Operation Adminstration Maintenance & Provision
OS   Operations System
OSF   Operations System Function
PSTN   Public Switched Telephony Network
QoS   Quality of Service

QoSM   Quality of Service Management
QoSP   Quality of Service Policy
SC   Service Control
SCN   Switched Circuit Networks
SpoA   Service point of Attachment
SREG   Service Network REGistration function
TA   Transport Accounting function
TOM   Telecommunications operations Map
TF   Transport Function
TP   Transport Policy
TREG   Terminal Registration function
TRIP   Telephony Routing over IP Protocol
TRM   Transport Resource Management
WS   Work Station
WSF   Work Station Function

4   Basic concepts

4.1   Functional planes

TR 101 877 [8] describes an environment for communications services that encompasses multiple domains of control and technology.

Figure 1 expands upon [8] by identifying the following functional planes, each containing a high level grouping of functionality:

- IP telephony application;
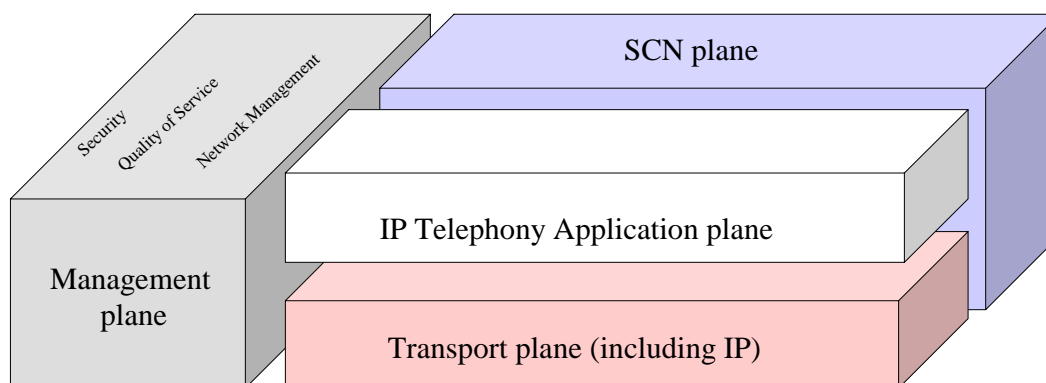
- IP transport;

- SCN;

- management.

Figure 1: Functional planes

The SCN plane contains the functionality relating to the SCN. Part of the SCN plane is a component of the service abstraction layer as defined in [8], and part of the SCN plane is a component of the transport abstraction layer as defined in [8]. Architectures for SCNs are defined elsewhere, therefore, details of this functional plane are not considered further in the present document.

The IP telephony application plane makes use of capabilities provided by the other functional planes and it contains functions to support telephony. The IP telephony application plane is a component of the service abstraction layer as defined in [8]. The IP telephony application plane contains functions and has information flows that support the service capabilities defined in [2].

The transport plane (including IP) contains the functionality relating to the underlying packet transport and services in general use, e.g. DNS. The IP transport plane is a component of the transport abstraction layer as defined in [8].

The management plane contains the management functionality relating to QoS, security and network management. The details of this functional plane are considered in [5].

4.2 Domains and functional groups

TS 101 878 [2] defines a number of concepts and terms that are used in the present document.

Domains are a collection of physical entities or functional entities under the control of a single administration which shares a consistent set of policies and compatible technologies.

TIPHON distinguishes three kinds of domains: end-user domains, service domains and transport domain.

The end-user domain is controlled by the end-user, the service domain is controlled by an IP telephony service provider and the transport domain is controlled by a transport network operator.

Functional groups are the constructs used in the present document to structure functionality necessary to offer IP telephony services across domains. The mapping between domains and functional groups is shown in [2].

NOTE: There may not be a one-to-one mapping between application level domains and transport level domains.

The following functional groups are identified in the end-user domain:

- **terminal functional group:** a functional group representing all the IP telephony functionality within a user's terminal. Terminal functional groups may be classified as originating or terminating based upon their location within the topology of a specified call;

- **terminal registration functional group:** a functional group representing the registration within the user's terminal.

The following functional groups are identified in the service domain:

- **network functional group:** a functional group containing the functionality required to establish a call between two terminals, a gateway and a terminal or two gateways. network functional groups may be classified as originating or terminating based upon their location within the topology of a specified call;

- **Gateway Functional Group:** a functional group containing the functionality of a network functional group. It also has the functionality necessary to connect calls between IP and SCN domains. Gateway functional groups may be classified as originating or terminating based upon their location within the topology of a specified call.

The network functional group represents all of the functionality of an application to support a call. In fixed network environments, the originating end-user always has a contract with the service provider controlling the service domain containing the originating network functional group. The terminating user has a contract with the service provider controlling the service domain containing the terminating network functional group. For mobility considerations this may not be the case.

Although the network functional groups may contain an application plane and a transport plane, no description is provided on how (and if) this domain is related to transport functional groups. No further description of this domain is given in this clause, although details of the functional groups in the transport domain are identified later in the present document.