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Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON);
Requirements Definition Study; Real time aspects of a resolution service

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Technical Report

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Requirements Definition Study; Real time aspects of a resolution service

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Foreword

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

TIPHON Resolution Capability (TRC) is a centralized resolution mechanism for inter-service provider call routing in TIPHON compliant networks. Its main function is to map an E.164 number to a unique service provider name called a Home Network Name (HNN). This HNN can be further resolved into network address(es) of the next-hop service provider network elements by the local resolution capability of the current service provider (which is outside of TRC). In this way, TRC allows call signalling to be routed hop-by-hop, through multiple service provider networks, to the terminating service provider network, where call signalling is routed to the destination terminal identified by the E.164 number.

At the heart of TRC is the database that stores the mapping from an E.164 number to an HNN of a service provider. There are two different parts of the TRC database operations: administrative and real-time. The administrative part deals with the required processes and procedures for administering E.164 numbers and service provider data, while the real-time part allows the originating service provider to query the database to determine the HNN of the home service provider serving the E.164 number.

It should be noted that although the TRC was originally developed to support an international UPT service, the concepts and technology infrastructure are equally applicable to other TIPHON applications, including national variants. The present document has been written to describe a generic resolution framework from which different scenarios can be derived. In some cases, specific features may need to be added to make it suitable for particular applications.

NOTE: For certain numbering ranges/types of service, a centralized resolution mechanism of the type offered by TRC is not a mandatory feature of TIPHON compliant networks. In those network scenarios, routing between originating and terminating networks may be carried out on a hop-by-hop basis, using a resolution function embedded in each of the networks traversed.

1 Scope

The present document describes the requirements and definitions for the administrative and real-time aspects of the TIPHON Resolution Capability (TRC).

TIPHON Resolution Capability (TRC) is a centralized resolution mechanism for inter-service provider call routing in TIPHON compliant networks. In terms of the general framework given in TR 101 326, the TRC is an objective service resolution. Its main function is to map an E.164 number to a unique service provider name called a Home Network Name (HNN). The administrative part deals with the required processes and procedures for administering E.164 numbers and service provider data, while the real-time part allows the originating service provider to query the database to determine the HNN of the home service provider serving the E.164 number. It should be noted that although the TRC was originally developed to support an International UPT service, the concepts and technology infrastructure are equally applicable to other TIPHON applications, including national variants.

The present document provides the basis for the Resolution Service capability in TS 101 878. At the same time, the present document can also be used as a stand-alone document.

2 References

For the purposes of this Technical Report (TR), the following references apply:

- [1] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".
- [2] ITU-T Recommendation E.168: "Application of E.164 numbering plan for UPT".
- [3] ITU-T Recommendation Q.1290: "Glossary of terms used in the definition of intelligent networks".
- [4] ETSI TS 101 314: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Network architecture and reference configurations; TIPHON Release 2".
<https://standards.iteh.ai/catalog/standards/sist/c07a07fc-6116-496a-b19d-9e7d788e8b0/sist-tp-tr-101-886-v1.1.1-2004>
- [5] ETSI TR 101 326: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); the procedure for determining IP addresses for routing packets on interconnected IP networks that support public telephony".
- [6] ETSI TS 101 878: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Service Capability Definition; Service Capabilities for a simple call".

3 Definitions and abbreviations

3.1 Definitions

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

Administrative Reference DataBase (ARDB): centralized database used for storing the master copy of E.164 number to HNN mapping that will be periodically downloaded to RTDBs for real-time query

NOTE: Service providers can create, update and delete records of E.164 number to HNN mapping in this database. It also contains the participating service provider profiles, which can be created, updated and deleted by the TRC administrators. There is logically exactly one ARDB per TRC.

availability: probability that a system can perform the required function at a given instant of time

NOTE: It is estimated by the ratio of actual service time to scheduled service time, and is expressed as percentage, or equivalently, as average downtime per year.

database sizing: storage capacity of a database system, usually measured as the number of records with respect to a specific record size

home network: network that supports the service to which a customer subscribes

Home Network Name (HNN): unique identifier/name for a service provider

NOTE: An HNN may be further resolved to a routable network address of the service provider by means outside of TRC.

home service provider of an E.164 number: service provider that provides the telephony services to the subscriber of the E.164 number

Number Allocation Authority (NAA): national or international organization being responsible for issuing telephone numbers to service providers and/or individual subscribers

query response time: between the last bit of query entering the database and the last bit of response going out of the database

NOTE: In other words, query response time only concerns the database query processing time, excluding the transmission delay incurred by the network between the querying entity and the database.

Real-Time DataBase (RTDB): database that contains a copy of the E.164 number to service provider HNN mapping from ARDB for real-time query by service providers

NOTE: RTDB is read-only by service providers, and its content is updated periodically by ARDB download. There can be more than one RTDB in a TRC, some of which may reside inside a service provider network.

resolution domain: group of service providers that agree to provide inter-carrier telephony services over a specific E.164 numbering range/type

NOTE: There shall be one TRC per resolution domain.

throughput: number of queries per second the database which is able to perform with respect to a certain load condition

TIPHON Resolution Capability (TRC): mapping function from E.164 numbers to HNNs

NOTE: Also refers to the set of network elements, protocols, and procedures necessary to provide such mapping.

Universal Personal Telecommunications (UPT): telecommunications service which enables uninterrupted access to telecommunications services while allowing personal mobility

UPT Number (UPTN): which uniquely and unambiguously identifies each UPT user

NOTE: It is used by a calling party to reach the UPT user. This number is independent of terminal, network or service used and shall conform to ITU-T Recommendation E.168 [2]. A UPT user may have more than one UPT number (for example, a business UPT number for business calls and a private UPT number for private calls), see ITU-T Recommendation E.168 [2].

3.2 Abbreviations

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

AD	Administrative Domain
AD-BES	Administrative Domain Back-End Service
ARDB	Administrative Reference DataBase
HNN	Home Network Name
IP	Internet Protocol
ITU-T	International Telecommunication Union - Telecommunications standardization sector
NAA	Number Allocation Authority
PIN	Personal Identification Number
PSTN	Public Switched Telephone Network
RTDB	Real-Time DataBase
SCN	Switched Circuit Network
SCP	Service Control Point

SOA	Service Order Activation
TRC	TIPHON Resolution Capability
UPT	Universal Personal Telecommunications
UPTN	UPT Number

4 Overview

The main purpose of the TIPHON Resolution Capability (TRC) is to provide a global, geographically independent service to telephony users in TIPHON compliant networks. Each user obtains a unique E.164 number during the provisioning process either from a Number Allocation Authority (NAA) or via the service provider where he/she first subscribes to the service. This globally unique E.164 number unambiguously identifies the subscriber. TRC enables personal mobility in that numbers are assigned to individuals and not to terminals; and they belong to individuals, not service providers. Hence, subscribers using TRC may change their service providers while keeping their E.164 numbers.

TRC is designed to operate within a resolution domain defined by the following characteristics:

- there is a group of service providers that agree to interconnect their networks together to provide cross-service provider telephony services to their subscribers. Each service provider constitutes an administrative domain, and is identified by one or more unique names called HNNs;
- each provider may have multiple networks and these networks may be heterogeneous, such as PSTN, wireless and IP networks. But all participating networks shall be TIPHON compliant;
- there is a specific E.164 numbering range/type that the group agrees to use for the intended telephony services. The numbering range/type is distributed among the service providers (this can be either in blocks of numbers or number by number like in International UPT). At any instant, an active E.164 number is served by exactly one service provider, called the home service provider of the subscriber. However, the association of an E.164 number and its home service provider cannot be derived directly from the number itself without querying the TRC.

A TRC is defined with respect to a resolution domain, which in turn is defined by the group of service providers and the E.164 numbering range/type for a specific telephony service. There is exactly one TRC for each resolution domain. In the case where the same group of service providers use different E.164 numbering ranges/types for different telephony services, they are considered as different resolution domains, and thus the corresponding TRCs are functionally different even though in some implementations they may be packaged together in one physical network element.

Unless otherwise stated explicitly, the present document only concerns requirements of TRC with respect to a single resolution domain. Requirements for services involving multiple TRCs are out of scope of the present document, but may be a subject for further study.

An example of a resolution domain is depicted by figure 1. For a given resolution domain, TRC serves as a centralized number resolution clearinghouse among all service providers for inter-domain call routing. Its main function is to map an E.164 number to the HNN of the home service provider of that number. However, since an HNN includes the identifier for a service provider, for call routing purposes another resolution function (routing resolution) may be needed to map the HNN to the network addresses of the service provider network. This is accomplished by the Administrative Domain-Back End System (AD-BES) of a service provider, which is outside the scope of TRC.