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Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Description of Technical Issues

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Technical Report

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Contents

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SIST-TP TR 101 300 V2.1.1:2004
https://standards.iteh.ai/catalog/standards/sist/2b50798e-64d4-477f-a15f-
sist-tp-tr-101-300-v2-1-1-2004

SIST-TP TR 101 300 V2.1.1:2004

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Foreword

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

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SIST-TP TR 101 300 V2.1.1:2004

1 Scope

The present document provides an introduction to the technical issues relating to the work items defined in the terms of reference of ETSI Project TIPHON [1] and offered with respect to the reference scenarios:

Scenario 0: communication between 2 or more Internet Protocol (IP) network based users in which the call signalling and traffic are wholly contained within the IP network (in one or more domains).

Scenario 1: communication between IP network based users and Switched Circuit Network (SCN) based users in which the call setup is originated by the IP network user.

Scenario 2: communication between IP network based users and SCN-based users in which the call setup is originated by the SCN based user.

Scenario 3: communication between SCN based users using IP based networks for the connection/trunking between the involved users.

Scenario 4: communication between IP network based users using SCNs for the connection/trunking between the involved users.

TIPHON shall primarily consider, but not be restricted to, the interaction of H.323 terminals on IP networks with telephone terminals on SCNs.

The TIPHON project shall develop standards, and profiles of existing standards, for each of the above profiles. New standards shall be developed only where no existing standards exist. Where existing standards exist in ETSI, ITU or elsewhere ETSI Project TIPHON shall work with the standards bodies in developing and promoting profiles of those standards. These standards shall include an Open Settlement Protocol.

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The TIPHON project shall not specify any new bearer services. However the TIPHON project deliverables shall be able to request certain QoS constraints that may restrict the ability of any particular bearer service to support TIPHON teleservices (particularly with respect to QoS and bandwidth).

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The present document is structured as follows:

- clause 4 provides an overview of the TIPHON project work area; and
- clause 5 introduces and describes the reference scenarios of the TIPHON project.

The present document will not provide solutions for the technical issues that are identified therein.

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] Terms of Reference ETSI Project TIPHON; http://www.etsi.org/tiphon

[2] ITU T Recommendation I.112: "Vocabulary of terms for ISDNs".

[3] ITU T Recommendation I.210: "Principles of telecommunication services supported by an ISDN and the means to describe them".

SIST-TP TR 101 300 V2.1.1:2004

[4] ITU T Recommendation E.164: "The international public telecommunication numbering plan".

3 Definitions and abbreviations

3.1 Definitions

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

bearer service: type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces. See ITU-T Recommendation I. 112 [2], subclause 2.2 definition 202

NOTE 1: The ISDN connection type used to support a bearer service may be identical to that used to support other types of telecommunication service.

demand service, demand telecommunication service: type of telecommunication service in which the communication path is established almost immediately, in response to a user request effected by means of user-network signaling

E.164 number: number conforming to the numbering plan and structure specified in ITU-T Recommendation E.164 [4]

H.323 terminal: entity which provides audio and optionally video and data communications capability in point-to-point or multipoint conferences in packet-based networks

Integrated Services Digital Network (ISDN): see ITU-T Recommendation I.112 [2], subclause 2.3 definition 308

IP number: number conforming to the structure of addresses in IP networks

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ISDN number: number conforming to the numbering plan and structure specified in ITU-T Recommendation E.164 [4]

service, telecommunication service: that which is offered by an Administration or ROA to its customers in order to satisfy a specific telecommunication requirement

SIST-TP TR 101 300 V2.1.1:2004
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NOTE 2: Bearer service and teleservice are types of telecommunication service. Other types of telecommunication service may be identified in the future.

supplementary service: see ITU-T Recommendation I.210 [3], subclause 2.4

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. The SCN may be a public network or a private network

teleaction service [telemetry service]: type of telecommunication service that uses short messages, requiring a very low transmission rate, between the user and the network

NOTE 3: Examples of teleaction services are: telealarm, telecommand, telealerting.

teleservice (telecommunication service): type of telecommunication service that provides the complete capability, including terminal equipment functions, for communication between users according to protocols established by agreement between Administrations and/or RPAs. See ITU-T Recommendation I.112 [2], subclause 2.2

TIPHON compliant system: system that complies with the mandatory requirements identified in the TIPHON requirements documents together with compliance to the parts of the TIPHON specifications in which these requirements are embodied:

- TR 101 306 (for compliance with TIPHON phase 1);
- TR 101 307 (for compliance with TIPHON phase 2); and
- TR 101 308 (for compliance with TIPHON phase 3.

NOTE 4: Requirements indicated 'conditional' in the documentation should be considered mandatory if the condition applies.

SIST-TP TR 101 300 V2.1.1:2004

3.2 Abbreviations

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

DECT	Digital Enhanced Cordless Telecommunication
DTMF	Dual Tone Multiple Frequency
EP	ETSI Project
GSM	General System for Mobile communication
GSTN	General Switched Telephone Network
IETF	Internet Engineering Task Force
IMTC	International Multimedia Telecommunication Consortium
IWF	Interworking Function
IP	Internet Protocol
ISDN	Integrated Service Digital Network
MMI	Man Machine Interface
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RSVP	Resource Reservation Protocol
SCN	Switched Circuit Network
SDH	Synchronous Digital Hierarchy
SONET	Synchronous Optical NETwork
TETRA	Terrestrial Trunked Radio
TIA	Telecommunications Industry Association

4 Overview

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4.1 Introduction

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The provision of voiceband services on technologies other than circuit switching has been growing over recent years with much effort on the provision of such services on packet switching infrastructures using the Internet Protocol at layer 3 of the ISO/OSI stack. ETSI Project (EP)-TIPHON exists within ETSI to ensure that the requirements for quality of service, security, inter-domain settlement, and so forth, that arise from the abstraction of service from underlying technology applies equally to switched circuit technologies and to packet switching technologies.

There is a growing market for real-time voice communication and related voiceband communication over Internet Protocol (IP) based networks. The objective of this project is to support a market that combines telecommunications and Internet technologies to enable communication between Internet Protocol (IP) based networks and networks based upon circuit switching technology. These latter networks are referred to throughout the document as Switched Circuit Networks (SCNs) and encompass the generic 64kbit/s technologies of Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), Synchronous Digital Hierarchy/Synchronous Optical Network (SDH/SONET) as well as the current digital mobile and wireless technologies including, but not restricted to, Global System for Mobile communications (GSM), TIA/EIA-136, IS-95, PDC, Terrestrial Trunked Radio (TETRA) and Digital Enhanced Cordless Telephony (DECT).

The overall structure of TIPHON can be summarized in figure 1.

SIST-TP TR 101 300 V2.1.1:2004

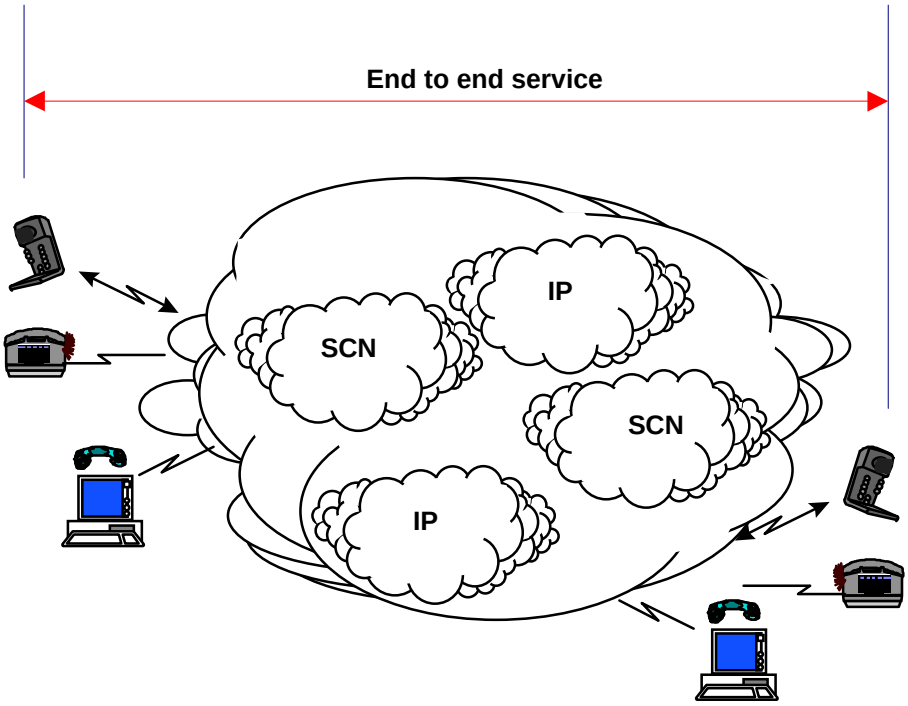

Figure 1: Overview of TIPHON problem domain

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The TIPHON problem domain can be drawn as a network of networks where the constituent networks may be based upon IP or Circuit Switching technologies. The TIPHON scenarios lie over these networks and establish a means of providing guaranteed end-to-end Quality of Service (QoS) and consistent inter-domain Security capabilities. In addition TIPHON ensures that service users and providers are able to call upon standardized inter-domain settlement protocols.

SIST-TP TR 101 300 V2.1.1:2004
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- Quality of service mechanisms may be defined within TIPHON to satisfy user requirements on the desired quality of audio and video transmissions.

- Security mechanisms may be defined within TIPHON to satisfy user requirements for privacy, authentication and accountability.

A TIPHON compliant system can then be defined as an upper layer network and transport function offering telephony service over a set of underlying lower layer networks.

Services in a TIPHON compliant system shall be treated in like manner to existing regulated speech services and shall therefore encompass provision of facilities that ensure compliance with national and regional regulations for privacy (including data protection), lawful interception, and accountability. In addition TIPHON standards shall be developed to meet the requirements arising from the provision of lifeline services which include availability, repudiation services and integrity services. Finally TIPHON standards shall be developed to ensure that national and international regulations (current and planned where practicable) for subscriber number and service portability are supported.

The following assumptions shall apply as guiding principles for TIPHON:

- TIPHON compliant terminals may be PC-like or telephone-like;

- the Man Machine Interface (MMI) of the terminal shall tend towards that of a telephone;

- operation of a TIPHON terminal shall tend towards that of a telephone (and shall therefore encompass single stage dialling, network type abstraction);

- subscribers may move their access technology yet retain the same grade of service and same QoS.

SIST-TP TR 101 300 V2.1.1:2004

4.2 Teleservices and Bearer Services in TIPHON

TIPHON compliant systems need only support ONE of the following teleservices in IP networks:

- point-to-point speech; and
- point-to-multipoint speech.

NOTE: For the purposes of the present document speech encompasses all voiceband services including G3 fax.

5 Reference scenarios

To better address the scope of the project the following reference scenarios are described:

Scenario 0: communication between 2 or more IP network based users in which the call signalling and traffic are wholly contained within the IP network (in one or more domains).

Scenario 1: communication where the source is on an IP network and the destination is on an SCN network.

Scenario 2: communication where the source is on an SCN network and the destination is on an IP network.

Scenario 3: communication where the source and destination are on different SCN networks where an IP transit network is used.

Scenario 4: communication where the source and destination are on different IP networks where an SCN transit network is used.

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NOTE 1: With the introduction of mobility as a service applied within (or enabled from) TIPHON it is possible for more than one of the above scenarios to apply in a call.

NOTE 2: Interworking functions (IWF) can be implemented separately from or integrated into the existing SCN or IP-based network in order to provide the required interoperability.

SIST-TP TR 101 300 V2.1.1:2004
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NOTE 3: The term "IP network" does not specifically denote the Internet.

NOTE 4: "SCN" represents the set of networks characterized as "circuit-switched" networks.

The diagrams in subclauses 5.1 through 5.5 demonstrate the reference scenarios to be examined by TIPHON.

The scenarios should be viewed with respect to the network technology applied to the origination, backbone (or transit), and termination network elements. This is shown diagrammatically in figure 2 and textually in table 1.