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Harmonizacija telekomunikacij in internetnega protokola prek omrežij (TIPHON), 4. izdaja - Profil H.248/MEGACO za referenčno točko I3 pri TIPHON - Krmiljenje funkcije medsebojnega povezovanja (ICF) prek referenčne točke I3

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; H.248/MEGACO Profile for TIPHON reference point I3; InterConnect Function (ICF) control over reference point I3

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Technical Specification

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; H.248/MEGACO Profile for TIPHON reference point I3; InterConnect Function (ICF) control over reference point I3

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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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 defines technology mappings of the meta-protocol to reference points in the transport plane. It specifies the technology mappings to reference point I3 as defined in TS 101 882 [2].

1 Scope

The present document describes a mapping of the meta-protocol for reference point I3, as described in annex D of TS 101 882 [2], to the ITU-T Recommendation H.248 [1]/IETF MEGACO protocol, to produce an interoperable profile (subset) of H.248/MEGACO augmented by the TPC Extension package defined in TS 101 332 [5].

It may be used for the control of equipment within an IP network such as Firewalls, Address Translators, Middleboxes and also other network edge devices.

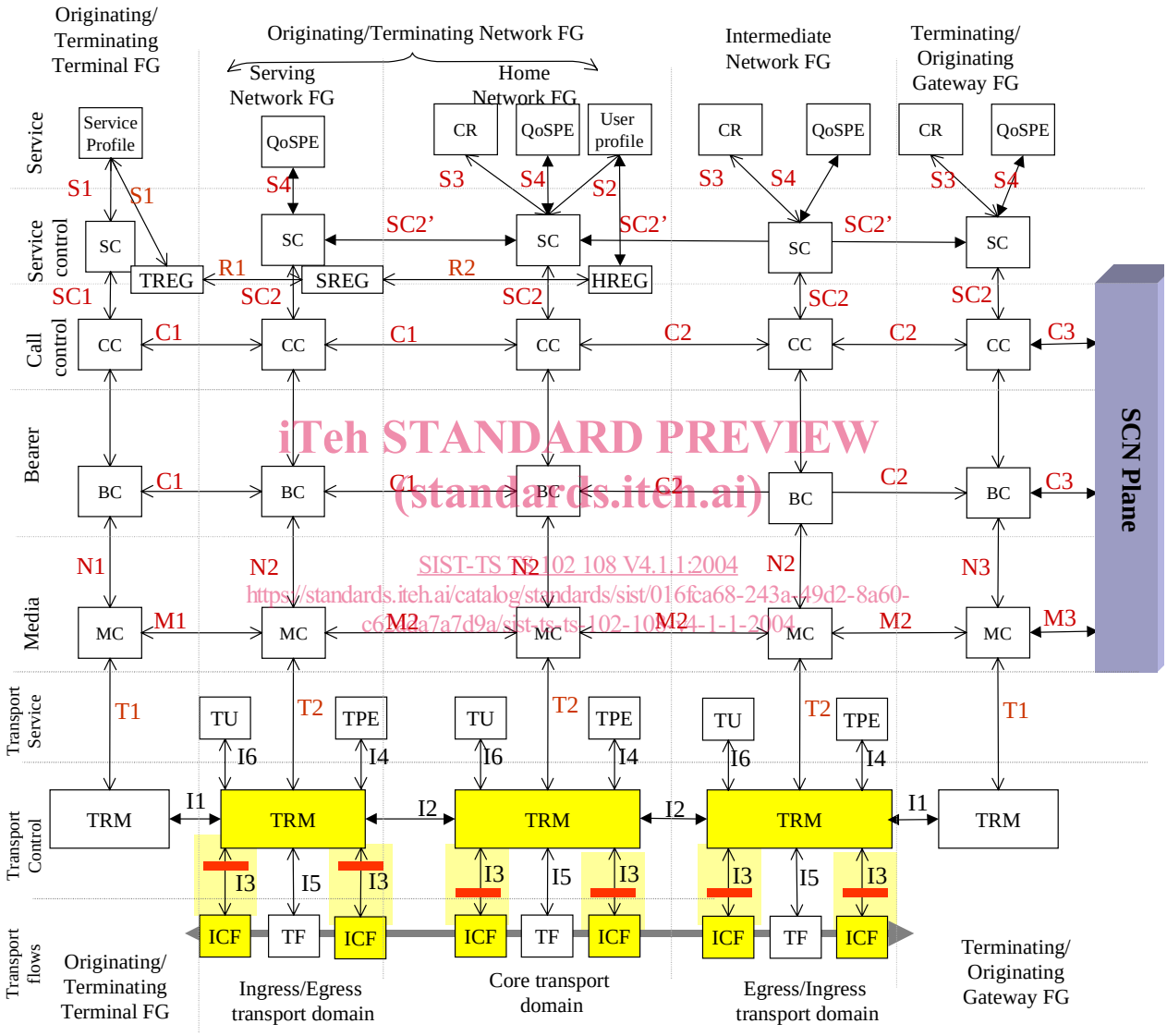


Figure 1a: TIPHON architecture with reference point I3 highlighted

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.

[1] ITU-T Recommendation H.248 (2000): "Gateway control protocol".

[2] ETSI TS 101 882: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Protocol Framework Definition; General (meta-protocol)".

[3] ETSI TS 101 314: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; Abstract Architecture and Reference Points Definition; Network Architecture and Reference Points".

[4] IETF RFC 2327 (April 1998): "SDP Session Description Protocol".

[5] ETSI TS 101 332: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Interface Protocol Requirements Definition; TIPHON Extended H.248/MEGACO Package (EMP) Specification; ICF Control over Reference Point".

[6] IETF RFC 2205: "Resource ReSerVation Protocol (RSVP) - Version 1 Functional Specification".

[7] ETSI TS 101 329-3: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; End-to-end Quality of Service in TIPHON systems; Part 3: Signalling and control of end-to-end Quality of Service (QoS)".

3 Definitions and abbreviations

3.1 Definitions

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

charging: process of determining the amount of money a user shall pay for usage of a certain service

flow: single data stream, identified by a set of characteristic values (source address, source port, destination address, destination port, protocol number)

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

functional group: 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.

IP endpoint: device that originates or terminates the IP based part of a call

NOTE: Endpoints include H.323 clients, and IP telephony gateways.

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

middlebox: firewall or NAT device which is coupled to a MIDCOM server, which offers the firewall/NAT services to clients

network: telecommunications network that provides telecommunications services

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

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.

TIPHON compliant: entity 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

3.2 Abbreviations

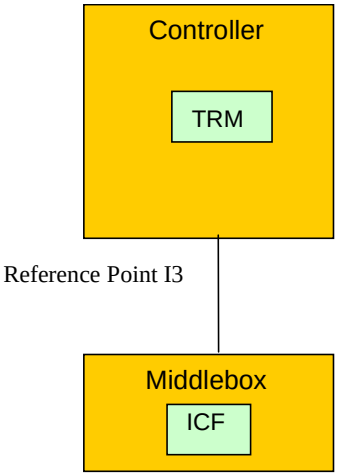
For the purposes of the present document, the following abbreviations apply:

EMP	Extended Megaco Package
GK	GateKeeper
ICF	InterConnect Function
IP	Internet Protocol
MC	Media Control
MB	MiddleBox
QoS	Quality of Service
RAS	Registration Admission and Status
RSVP	Resource reseVation Set-up Protocol
RTCP	RealTime Conferencing Protocol
RTP	RealTime transfer Protocol
SCN	Switched Circuit Networks
SDL	Specification and Description Language
TOS	Type Of Service
TRM	Transport Resource Manager

4 Scope of the H.248 ICF profile

The present document describes a profile of H.248 that mandates certain optional parts of the protocol and does not mandate certain other options. Here the H.248 protocol is used to convey only flow properties to edge devices (ICFs) in the transport plane. Used solely for this purpose, H.248/MEGACO, reduces to a small sub-set of the full protocol.

4.1 Use of the H.248 ICF profile



NOTE: This profile of H.248/MEGACO is used to control Middlebox devices in the transport plane. For the purposes of the present document a Middlebox is defined as a physical implementation of an InterConnect Function (ICF) TS 101 314 [3] and TS 101 329-3 [7]. A controller is defined as an implementation of control functionality. The control relationship between a Middlebox and its controller is shown in figure 1b.

Figure 1b: Entities involved in Control over the I3 Reference point

4.2 Functionality supported by the Profile

The I3 reference point controls the ICF functions in a transport domain and will be under the control of the operator or administrator of that domain. Instructions from the TRM (here the controller) to the ICF will relate to admission control in the case of firewalls, network addresses in the case of Address Translators or control signals for QoS mechanisms such as RSVP or DiffSDerv.

4.3 Service capabilities supported

TIPHON Release 4 service capabilities supported by the profile are basic bearer and QoS bearer set-up.

4.4 General note on compliance

Any options in the H.248 protocol not mentioned in the present document MAY be supported by the Middlebox or controller, however are outside the scope of the present document.

4.5 Error handling

General use of the error codes can be found in clause A.2.

If an H.248 information element is received (descriptor or parameter), which is not specified in this profile, the receiver shall ignore the information element and act as if the information element were not received.

If an unknown H.248 command or an information element not specified in this profile is received, the receiver shall ignore the command and send an appropriate error (443 - unsupported or unknown command or 444 - unsupported or unknown descriptor, 445 - unsupported or unknown property, 446 - unsupported or unknown parameter).

If an H.248 command with a mandatory information element missing is received, the receiver shall act as if the information element was received carrying the default values, or reject with the appropriate error message if there is no default value specified in the H.248 standard.

If an H.248 information element is received with syntactically invalid contents the receiver shall:

- if the information element is optional, ignore the information element; or
- if the information element is mandatory, act as if the information element was received correctly coded carrying the default values and reject/fail if there is no default value specified in the standard.

If an H.248 information element is received with a value not allowed within the context of the present document, the receiver shall:

- if the information element is optional, pass on, but otherwise ignore the information element; or
- if the information element is mandatory reject/fail.

NOTE: The security policy of an operator's network or the security policy implemented in a network element may override the error handling as described above.

4.6 Security

Security issues associated with the use of this profile are outside the scope of the present document. It is intended that they will be included in future releases of the present document.

5 Setting up of the controller-middlebox control interface

Clause 11 of ITU-T Recommendation H.248 [1] shall apply without restrictions. This may change in future releases of the present document.

6 Use of the profile for the establishment of transport flows

The basic messages of H.248 used in this profile are here defined as well as certain H.248 packages. This clause describes the messages used in the profile.

6.1 Process used

This clause provides the mapping of the flows in TS 101 882 [2] annex D, to H248 message flows. The parameter and error reason definitions in TS 101 882 [2] annex D are aligned to ensure interoperability of these values across the mappings of these reference points. In general each of the primitives defined on the T/I reference points in TS 101 882 [2] each map to one or more commands in H.248. General note on source filtering used in the scenarios SDP (see RFC 2327 [4]) specifies in clause B.2.1 a means for specifying unicast sessions. This provides the means to encode the originator MpoA. In clause B.2 it is shown how the recvonly and send only attribute are used for specifying the sender side behaviour of media flows.

6.2 Packages supported

The following packages shall be supported in this profile:

- Generic package (ITU-T Recommendation H.248 [1], clause E.1)
- Base Root package (ITU-T Recommendation H.248 [1], clause E.2)
- Network package (ITU-T Recommendation H.248 [1], clause E.11)
- EMP package TS 101 332 [5]
- If RTP statistics are to be supported, the RTP package (ITU-T Recommendation H.248 [1], clause E.12)

6.3 Required H.248/MEGACO messages and parameters

Annex A describes the codepoint mapping between H.248/MEGACO and the TIPHON meta-protocol TS 101 882 [2]. From this mapping follows that the following elements from H.248/MEGACO are to be supported.

6.3.1 Messages

- TransactionRequest.Add
- TransactionReply.Add
- TransactionRequest.Modify
- TransactionReply.Modify
- TransactionRequest.Subtract
- TransactionReply.Subtract

6.3.2 Parameters

- ContextId
- LocalDescriptor
- RemoteDescriptor
- TerminationID

6.3.3 Error values

- 411 – The transaction refers to an unknown ContextId
- 412 – No ContextIDs available
- 430 – Unknown TerminationID
- 432 – Out of TerminationIDs or No TerminationID available
- 432 – Put of terminationIDs or no terminationID available
- 433 – Termination ID is already in a contect
- 444 – Unsupported or unknown descriptor
- 510 – Insufficient resources
- 526 – Insufficient bandwidth

6.3.4 General notes on option use in H.248

The TIPHON semantics require that when multiple alternatives are returned by the Middlebox to the controller for a termination the Middlebox shall support whichever one the controller chooses. Failure to support parameters for a termination offered earlier is considered a fault.

H.248 does not have semantics as strict as those prescribed by TIPHON. To align the semantics, **ReserveGroup** needs to be set for all alternative transport flow descriptions that are requested from the Middlebox and that **ReserveValue** needs to be set for all request where the Middlebox is given the choice to provide flow descriptions.

The optional ModemDescriptor, MuxDescriptor. EventsDescriptor, DigitMapDescriptor, AuditDescriptor are not used in this profile.

A transaction level timer shall be provided.

The flows in TS 101 882 [2] use a **InvokingControllerReference**, is mapped to StreamID in H.248.

The contextID is a value that is local to the Middlebox-controller relationship and is not mapped to the meta protocol.

The TIPHON type **trReservedTransportReference** and **trEstablishedTransportReference** shall be mapped to the H.248 TerminationID.

Code point mapping for the **Local** and **Remote Descriptors** is provided in the annexes.

6.4 Default transport setup procedure

The transport plane allows reservation and allocation of resources for transport of a packet stream (e.g. to reserve processing capability in routers and on links between them). See TS 101 882 [2] for a full definition of the primitives involved .

NOTE: The following text is derived from the SDL in TS 101 882 [2]. Should there be discrepancies between TS 101 882 [2] and the present document, the text in TS 101 882 [2] shall take precedent.

The transport element shall establish the transport resources required to support the transport flows required. If so required, the transport elements shall establish a QoS controlled transport capability in accordance with the QoS parameters identified.

Step	TS 101 882 [2] Primitive	meaning
		MC layer decides it needs transport
1	**TransportReservationRequest**	asks the ICF/TRM to support it with a QoS-enabled transport stream and wants to know what parameters it can support there.
2	**TransportReservationConfirm**	the ICF/TRM acknowledges to the MC, providing the possible bearer characteristics for the MC to decide upon. The MC-entity hereby **commits** to provide the flows as identified in this message.
		The MC answers to BC….
3	**TransportEstablishementRequest**	the MC informs the ICF/TRM of the choice.
4	**TransportEstablishmentConfirm**	the ICF/TRM acknowledges the **establishment** of the transport flows.
5	**TransportReleaseRequest**	The ICF/TRM is requested to release the transport flows.
6	**TransportReleaseConfirm**	The ICF/TRM confirms the release of the transport flows.

6.5 Example flows for the use of this profile

Annexes C and D provide examples of the use of this profile for firewall control. The Middlebox can operate in several scenarios, these scenarios describe how the generic service offered over the T2 and I3 reference points can be used to achieve certain specific goals.

Annex C describes the following examples:

- C.1 Basic scenario;
- C.2 Basic scenario with address translation (the legacy mode);
- C.3 With address translation and with source delivery;
- C.4 Without address translation and with source filtering;
- C.5 With address translation and source filtering (the preferred TIPHON media mode);
- C.6 Explicit RTCP addressing;
- C.7 Signalling: Example flow for a H323 RAS control pin-hole.

Clause D.1 explains the option to mute the forward transport path until the call has been established.

6.6 QoS flows

The TIPHON semantics demand that a Middlebox provides QoS when the QoS parameters (maximum packet size, packet rate, delay budget, packet delay variation, packet loss) are set. The H.248 binary encoding supports the QoS parameters to be conveyed. Clause B.4 addresses the text encoding for this.

6.6.1 QoS on flows through the middlebox

If the QoS parameters (maximum packet size, packet rate, delay budget, packet delay variation, packet loss) are specified on the LocalDescriptors the middlebox is required to treat the incoming flow in accordance with the QoS parameters given.

6.6.1.1 QoS policing of incoming flows

If the MiddleBox (MB) is to police the rate of incoming packet flows. The Extended Megaco Package (EMP) value `tokenrate` shall be set to the meta-protocol value `packetRate`. If this value is set the middlebox shall exhibit the behaviour as specified by TS 101 332 [5], clause 4.1.2.

6.6.2 QoS on outgoing flows

Establishment of QoS on outgoing flows is (unfortunately) technology dependent.

6.6.2.1 ToS tagging of outgoing flows

If the middlebox supports this option, the controller shall set the ToS value as per clause B.3.1 on the RemoteDescriptor of the flow. The middlebox shall set this value on each of the outgoing packets of the flow.

6.6.2.2 RSVP

The RSVP flowspec values shall be derived from the QoS parameters (maximum packet size, packet rate, delay budget, packet delay variation, packet loss) when these values are specified on the RemoteDescriptors. The mapping between the TIPHON QoS values and the RSVP flowsspec shall be done in accordance with the RSVP specification (see RFC 2205 [6]).