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Technical Specification

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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
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Foreword

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

The present document is part 3 of a multi-part deliverable covering the end-to-end Quality of Service in TIPHON Systems, as identified below:

TR 102 024-1: "General aspects of Quality of Service (QoS)";

TS 102 024-2: "Definition of Speech Quality of Service (QoS) Classes";

TS 102 024-3: "Signalling and Control of end-to-end Quality of Service (QoS) in a multi-media environment";

TS 102 024-4: "Quality of Service Management";

TS 102 024-5: "Quality of Service (QoS) measurement methodologies";

TR 102 024-6: "Actual measurements of network and terminal characteristics and Performance parameters in TIPHON networks and their influence on voice quality";

TR 102 024-7: "Design Guide for elements of a TIPHON connection from an end-to-end speech transmission performance point of view";

TS 102 024-9: "Call performance Classification (Voice)";

TS 102 024-10: "QoS Requirements for TIPHON Terminals".

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1 Scope

The present document, "TIPHON signalling and control of end-to-end Quality of Service (QoS)", specifies procedures for the control of end-to-end QoS within and between domains. TS 101 882 (see bibliography) specifies the TIPHON meta-protocols and object definitions required by these control procedures.

Additional annexes to the present document define profiles for mapping a number of existing candidates protocols to the specified TIPHON meta-protocols.

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.

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[1] ETSI TS 101 321: "Telecommunications and Internet Protocol; Harmonization Over Networks (TIPHON); Open Settlement Protocol (OSP) for Inter-Domain pricing, authorization, and usage exchange".

[2] 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)".

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

[4] ETSI TS 102 024-2: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; End-to-end Quality of Service in TIPHON Systems; Part 2: Definition of Speech Quality of Service (QoS) Classes".

[5] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".

[6] ITU-T Recommendation Z.100 (1996): "Specification and description language (SDL) with corrigendum 1".

[7] ITU-T Recommendation X.680: "Information technology; Open Systems Interconnection; Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[8] ITU-T Recommendation H.323 (2000): "Audiovisual and multimedia systems; Infrastructure of audiovisual services; Services and terminal equipment for audiovisual services; Packet-based multimedia communications systems".

[9] ITU-T Recommendation H.225.0 (2000): "Audiovisual and multimedia systems; Infrastructure of audiovisual services; Transmission multiplexing and synchronization; Call signalling protocols and media stream packetization for packet-based multimedia communication systems".

[10] ITU-T Recommendation H.245 (2001): "Audiovisual and multimedia systems; Infrastructure of audiovisual services - Communication procedures; Control protocol for multimedia communication".

[11] IETF RFC 1890: "RTP Profile for Audio and Video Conferences with Minimal Control".

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[12] IETF RFC 2327: "SDP: Session Description Protocol".

[13] IETF RFC 2748: "The COPS (Common Open Policy Service) Protocol".

[14] IETF RFC 2806: "URLs for Telephone Calls".

[15] IETF RFC 3261: "SIP: Session Initiation Protocol".

3 Definitions and abbreviations

3.1 Definitions

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

name: unique identifier by which a user, access or terminal is known within a TIPHON system

TIPHON system: system that complies with the mandatory requirements identified in the TIPHON specifications

3.2 Abbreviations

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

ASN.1	Abstract Syntax Notation 1
COPS	Common Open Policy Service
OSP	Open Settlement Protocol
QFE	QoS Functional Entity
QoS	Quality of Service
RSVP	resource ReSerVation Protocol
RTP/AVP	Real-Time Protocol Audio-Video Profile
SCN	Switched Circuit Network
SDL	Specification and Description Language
SDP	Session Description Protocol
SIP	Session Initiation Protocol

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4 End-to-end QoS Signalling functional requirements

4.1 Description

4.1.1 General description

End-to-end QoS Signalling is used within a TIPHON network to ensure that a caller is provided with an end-to-end connection having at least the QoS class subscribed to or a lower QoS class if this is acceptable to the user. A QoS level may either be requested explicitly by the user on a call-by-call basis or may be predefined as part of the user's subscription. Additionally, the caller may be able to take specific actions if the QoS moves outside the accepted level during an established call.

The user may use any of the following methods to request a specific end-to-end QoS at call establishment:

1) By subscription:

   The agreement between the user and the user's service provider identifies the QoS level to be requested for any call. The QoS level may be fixed or variable based upon such parameters as time-of-day and call destination. This method requires no signalling between the user and the service provider at call setup time.

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2) By the use of a standardized TIPHON QoS Class:

The user indicates at each call establishment which of the TIPHON QoS Classes (standardized in TS 102 024-2 [4]) is to be requested for the call. The TIPHON QoS Classes are identified as:

- Class 1 Best effort;
- Class 2A Acceptable;
- Class 2M Medium;
- Class 2H High;
- Class 3 Best (broadband);

3) By the use of a non-standardized QoS Class:

The user indicates at each call establishment which non-standardized QoS class is to be requested for the call. The QoS class may represent any combination of QoS parameters previously agreed between the user and the service provider.

4.2 Procedures

4.2.1 Provision and withdrawal

End-to-end QoS Signalling shall be provided on a per-name, per application basis to all subscribers to the simple call within a TIPHON system.

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When establishing a call, a user shall be able to select at least one of the options identified in table 1.

Table 1: QoS option

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Option	Value
QoS class	- Predefined by user and service provider (TIPHON or non-TIPHON class) - TIPHON Best - QoS Class 3 (see note 1) - TIPHON High - QoS Class 2H (see note 1) - TIPHON Medium - QoS Class 2M (see note 1) - TIPHON Acceptable - QoS Class 2A (see note 1) - TIPHON Best effort - QoS Class 1 (see note 1) - Non-TIPHON QoS Class (see note 2)
NOTE 1: This value shall be as defined in TS 102 024-2 [4]. NOTE 2: This may be any value agreed between the user and the service provider to indicate a specific QoS	

4.2.2 Normal procedures

4.2.2.1 Activation, deactivation and interrogation

QoS Signalling shall be permanently activated.

4.2.2.2 Invocation and operation

When establishing a simple call, the calling user (or an agent within the user's network) may request a TIPHON standardized QoS class or a non-standardized QoS class, to be applied to the call in order to achieve a required end-to-end QoS.

If the end-to-end QoS requested by the calling user is available, communication using that QoS shall be established following the simple call procedures specified in TS 101 878 [3].

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4.2.3 Exceptional procedures

4.2.3.1 Invocation and operation

If it is not possible to offer the requested end-to-end QoS at call establishment, the calling user shall be informed and may take one of the following actions:

- terminate the call attempt;
- request a lower QoS;
- proceed with the call at the QoS available between the caller and the called user.

If, during an established call, the end-to-end QoS perceived by the calling user falls below an acceptable level the following practical options are available:

- terminate the call;
- continue with the call at the inferior QoS level.

4.3 Interactions with other TIPHON service capabilities

This clause specifies interactions with other TIPHON services for which standards were available at the time of publication of the present document.

4.3.1 Registration service capabilities

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4.3.1.1 Terminal transport service registration

No interaction.

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4.3.1.2 User service registration

No interaction.

NOTE: The QOS to be used for subsequent calls by the registered user may form part of the information supplied at registration.

4.3.2 Call connectivity service capabilities

4.3.2.1 Simple call establishment

No interactions.

4.3.2.2 Calling user identity generation

No interactions.

4.3.2.3 Calling user identity conveyance

No interactions.

4.3.2.4 Calling user identity delivery

No interactions.

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4.3.2.5 Call rejection

No interactions.

4.3.2.6 Number portability

4.3.2.6.1 Number portability - All call query

No interactions.

4.3.2.6.2 Number portability - Query on release

No interactions.

4.3.2.6.3 Number portability - Pivot routing (Drop back)

QoS Signalling shall be terminated prior to the invocation of the pivot routing service capability and then re-invoked after the drop back has occurred.

4.3.2.7 Emergency calls

4.3.2.7.1 Emergency Calling Service (ECS)

No interactions.

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4.3.2.7.2 Authorized emergency priority calls

Insufficient QoS availability shall not cause the rejection of an authorized emergency priority call.

4.3.2.8 Bearer connectivity

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4.3.2.8.1 Bearer creation

No interactions.

4.3.2.8.2 Bearer negotiation

The user's requested QoS should be one of the parameters used in bearer negotiation.

4.3.2.8.3 Bearer re-negotiation

The user's requested QoS should be one of the parameters used in bearer re-negotiation.

4.3.2.8.4 Media path optimization

The selection of an optimum path which is different from that selected at call establishment shall not cause an adverse effect on the perceived QoS of the call.

4.3.2.9 Event recording

No interactions.

4.3.2.10 Third party authorization

When a call is established using third party authorization, the requested QoS shall be that of the original calling user, not that of the third party.

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4.3.2.11 Overlap sending

No interactions.

4.4 Interworking considerations

When interworking with a Switched Circuit Network (SCN) where the only variable affecting QoS is the choice of bearer service, fixed QoS parameters shall be assumed based on the bearer service selected.

4.5 Overall behaviour

Figure 1 contains the dynamic description of end-to-end QoS Signalling using a Unified Modeling Language (UML) activity diagram. The activity diagram represents the behaviour of a TIPHON system in providing end-to-end QoS Signalling.

NOTE: The syntax and semantics of UML diagrams are defined by the Object Management Group (OMG).

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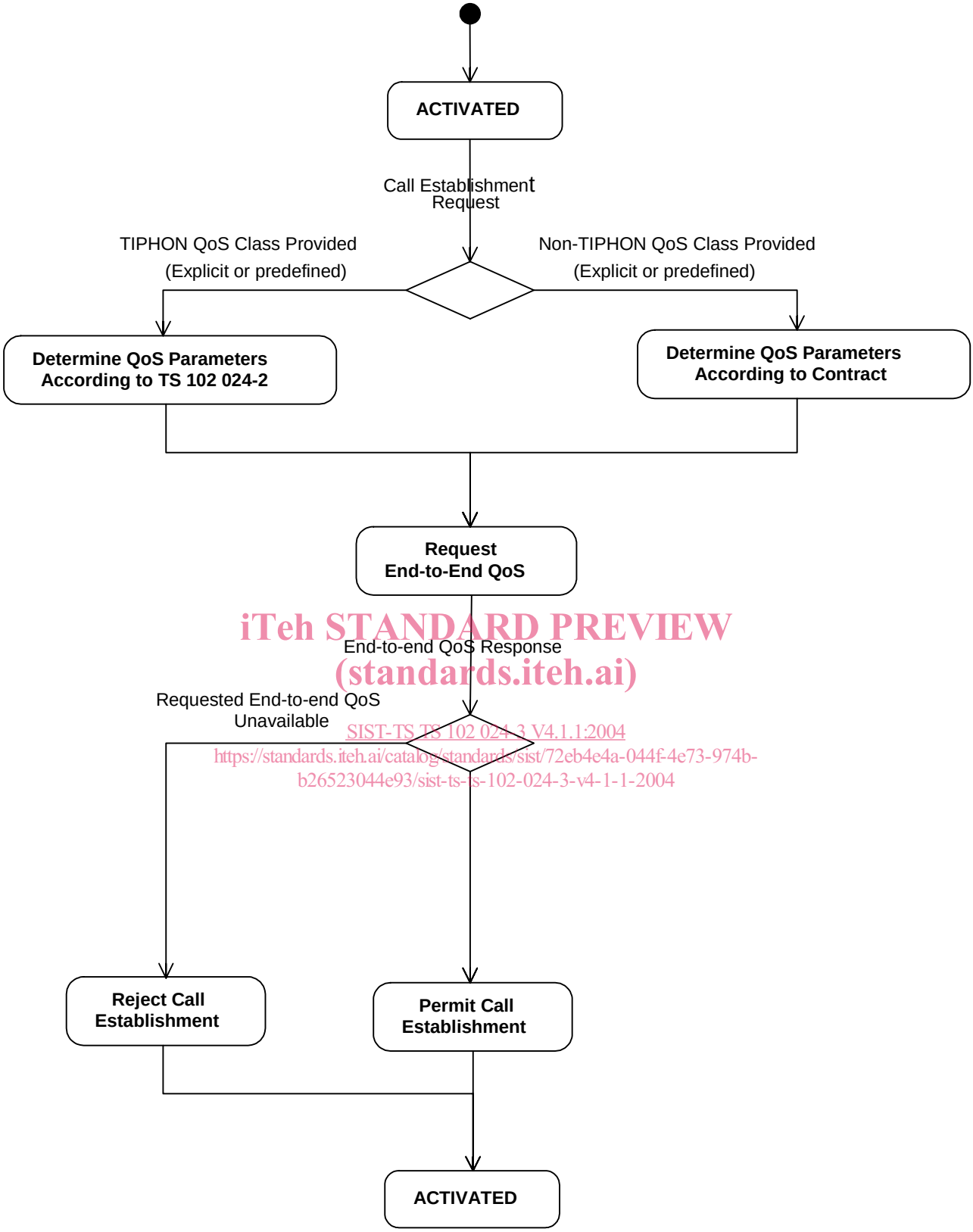

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Figure 1: Overall behaviour of end-to-end QoS Signalling at call establishment