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Technical Specification

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

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Reference

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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 2 of a multi-part deliverable covering End-to-end Quality of Service in TIPHON systems, as identified below:

- TR 101 329-1: "General aspects of Quality of Service (QoS)";
- TS 101 329-2: "Definition of speech Quality of Service (QoS) classes";**
- TS 101 329-3: "Signalling and control of end-to-end Quality of Service (QoS)";
- TS 101 329-5: "Quality of Service (QoS) measurement methodologies";
- TR 101 329-6: "Actual measurements of network and terminal characteristics and performance parameters in TIPHON networks and their influence on voice quality";
- TR 101 329-7: "Design guide for elements of a TIPHON connection from an end-to-end speech transmission performance point of view".

Quality of Service aspects of TIPHON Release 4 and 5 Systems will be covered in TS 102 024 and TS 102 025 respectively (see Bibliography), and more comprehensive versions of the Release 3 documents listed above will be published as part of Release 4 and 5 as work progresses.

Introduction

The present document forms one of a series of technical specifications and technical reports produced by TIPHON Working Group 5 addressing Quality of Service (QoS) in TIPHON Systems.. The structure of this work is illustrated in figure 1.

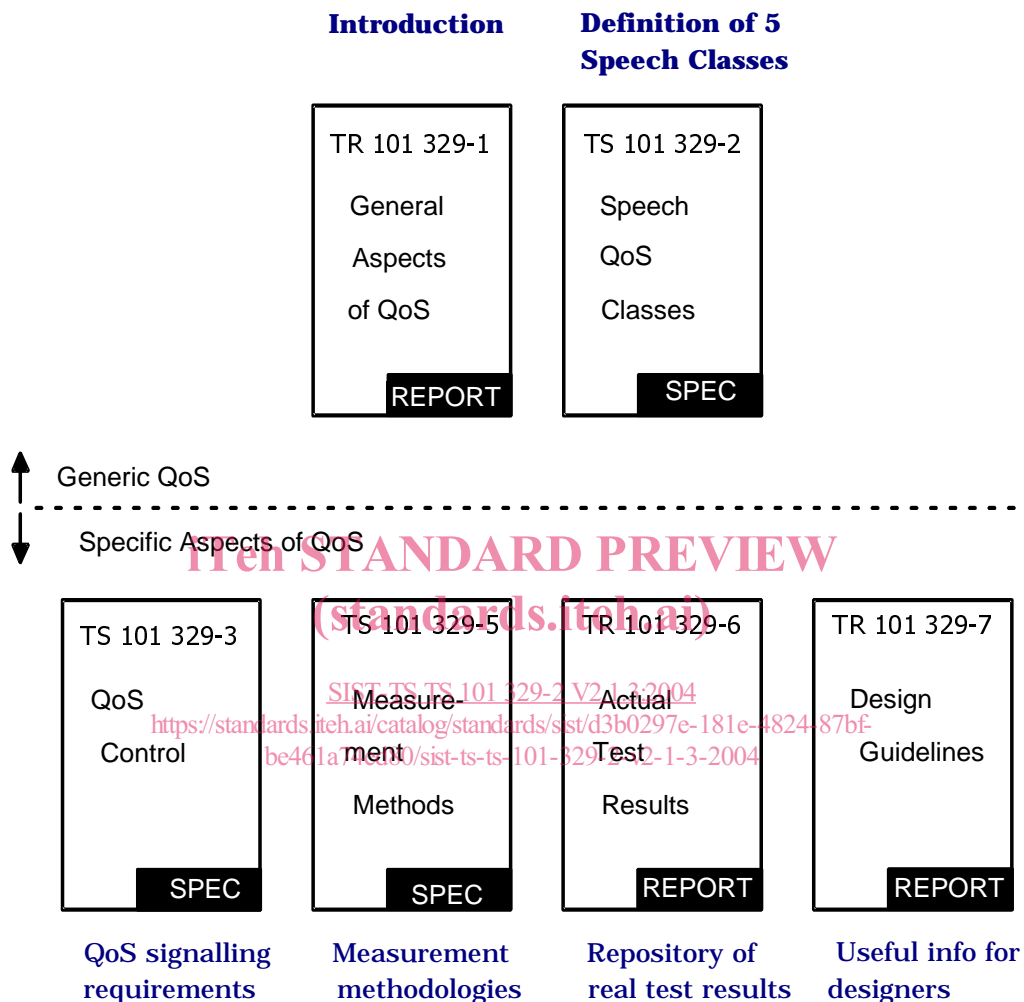


Figure 1: Structure of TIPHON QoS Documentation for Release 3

1 Scope

The present document defines five classes of Quality of Service for characterizing the speech performance of TIPHON compliant IP voice telephony networks.

The classes of service apply to all the defined TIPHON Scenarios and are specified in terms of the following parameters:

- "Overall transmission quality rating";
- "Listener speech quality" (one-way non-interactive speech quality); and
- "End-to-end delay".

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.

- iTech STANDARD PREVIEW
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- SIST-TS-TS-101-329-2-V2-1-3-2004
(EFR)-speech-transcoding-(GSM-06-60-version-7.0.2-Release-1998)
be461a74ed80/sist-ts-ts-101-329-2-v2-1-3-2004
- [1] ETSI EN 300 961: "Digital cellular telecommunications system (Phase 2+) (GSM); Full rate speech; Transcoding (GSM 06.10 version 7.0.2 Release 1998)".
 - [2] ETSI EN 300 726: "Digital cellular telecommunications system (Phase 2+) (GSM); Enhanced Full Rate (EFR) speech transcoding (GSM 06.60 version 7.0.2 Release 1998)".
 - [3] ETSI TS 101 329-5: "Telecommunications and Internet protocol Harmonization Over Networks (TIPHON) Release 3; Technology Compliance Specification; Part 5: Quality of Service (QoS) measurement methodologies".
 - [4] ITU-T Recommendation G.107: "The E-Model, a computational model for use in transmission planning".
 - [5] ITU-T Recommendation G.109: "Definition of categories of speech transmission quality".
 - [6] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
 - [7] ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".
 - [8] ITU-T Recommendation P.310: "Transmission characteristics for telephone-band (300-3 400 Hz) digital telephones".

3 Definitions and abbreviations

3.1 Definitions

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

codec: combined speech encoder and decoder

3.2 Abbreviations

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

EFR	Enhanced Full Rate
FR	Full Rate
GSM	Global System for Mobile communications
IP	Internet Protocol
ITU	International Telecommunication Union
ITU-T	ITU Telecommunication Standardization Sector (former CCITT)
PSTN	Public Switched Telephone Network
QoS	Quality of Service

4 Definition of TIPHON Speech QoS classes

Three classes of end-to-end speech QoS are defined for TIPHON systems. The following TIPHON speech QoS classes are defined from mouth-to-ear and therefore include both the network and the TIPHON terminal characteristics:

- **WIDEBAND:** This is a type of IP telephony service will provide a user experience better than the PSTN. It is expected that these systems will be implemented using wideband codecs (codecs encoding analogue signals with bandwidth in excess of 3,1 kHz) and QoS-engineered IP networks;
- **NARROWBAND:** This is a type of IP telephony service will provide a user experience similar to PSTN. It is expected that such systems would also be implemented over QoS-engineered IP networks:
 - **NARROWBAND/HIGH:** This quality is equivalent to recent ISDN services;
 - **NARROWBAND/MEDIUM:** This quality is equivalent to recent wireless mobile telephony services in good radio conditions, for instance GSM networks using EFR codecs [2], or systems using G.726 at 32 kbit/s [7] codecs;
 - **NARROWBAND/ACCEPTABLE:** This quality is equivalent to common wireless mobile telephony services, for instance GSM networks using FR codecs [1] or systems including a geostationary satellite.
- **BEST EFFORT:** This type of service will provide a usable communications service but will not provide guarantees of performance. There may be periods of significantly impaired speech quality, and large end-to-end delays which are likely to impact the overall conversational interactivity. It is expected such communications will operate over non QoS-engineered IP networks such as the public Internet.

The TIPHON speech QoS classes WIDEBAND and NARROWBAND will provide performance guarantees for 95 % of all connections. The BEST EFFORT class provides no speech performance guarantees.

5 TIPHON speech QoS performance metrics

Each of the classes defined in clause 4 is specified by three performance metrics:

- Overall Transmission Quality Rating (R);
- Listener Speech Quality (One-way non-interactive end-to-end Speech Quality); and
- End-to-end (mean one-way) Delay.

To comply with a specific speech QoS class a TIPHON system shall meet the limits of "Overall Transmission Quality Rating [R]" given in table 1. In addition the limits of "End-to-end Delay" and "Listener Speech Quality" given in tables 3 and 4 respectively shall be met in the very same class.

NOTE: The measurement of "Overall Transmission Quality Rating (R)", "Listener Speech Quality" and "End-to-end Delay" are described in TS 101 329-5 [3].