

**Telecommunications and Internet Protocol  
Harmonization Over Networks (TIPHON) Release 4;  
End-to-end Quality of Service in TIPHON systems;  
Part 6: Actual measurements of network and terminal  
characteristics and performance parameters in  
TIPHON networks and their influence on voice quality**

---



---

Reference

DTR/TIPHON-05013R4

---

Keywords

IP, network, performance, QoS, quality, speech,  
terminal, voice, VoIP

**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  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, send your comment to:

[editor@etsi.org](mailto:editor@etsi.org)

---

**Copyright Notification**

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2003.  
All rights reserved.

**DECT**<sup>TM</sup>, **PLUGTESTS**<sup>TM</sup> and **UMTS**<sup>TM</sup> are Trade Marks of ETSI registered for the benefit of its Members.  
**TIPHON**<sup>TM</sup> and the **TIPHON logo** are Trade Marks currently being registered by ETSI for the benefit of its Members.  
**3GPP**<sup>TM</sup> is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

---

# Contents

Intellectual Property Rights .....	4
Foreword.....	4
Introduction .....	4
1 Scope .....	5
2 References .....	5
3 List of Measurement Results .....	5
<b>Annex A (informative): Bibliography .....</b>	<b>6</b>
History .....	7

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://webapp.etsi.org/IPR/home.asp>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

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

The present document is part 6 of a multi-part deliverable covering 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";
  - 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";
  - Part 8: Void;
  - TS 102 024-9: "Call performance Classification (Voice)";
  - Part 10: To be published as part of release 5 (see note) "QoS Requirements for TIPHON Terminals";
  - Part 11: To be published as part of release 5 (see note) "Domain by domain performance planning guidelines for end-to-end QoS objectives associated with TIPHON speech QoS classes";
  - TS 102 024-12: "IP Telephony Service Availability".
- NOTE: Quality of Service aspects of TIPHON Release 5 systems will be covered in TS 102 025 (see bibliography), and more comprehensive versions of the Release 4 documents listed above will be published as part of Release 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.

# 1 Scope

The present document applies to IP networks that provide voice telephony in accordance with any of the TIPHON Scenarios.

The objective with the present document is to collect all results of various VoIP speech transmission quality tests and related information.

The measurement descriptions are provided in order to explain the motivation for the measurement and to detail the test setup to the necessary extent.

In order to avoid duplication of work, the present document points to the appropriate documents where the measurement results have been published, originally.

# 2 References

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

- [1] ETSI TR 101 329-6 (V2.1.1): "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 3; End-to-end Quality of Service in TIPHON systems; Part 6: Actual measurements of network and terminal characteristics and performance parameters in TIPHON networks and their influence on voice quality".
- [2] ETSI TR 102 251: "Speech Processing, Transmission and Quality Aspects (STQ); Anonymous Test Report from 2nd Speech Quality Test Event 2002".

# 3 List of Measurement Results

The first version of the present document, published as TR 101 329-6 [1] in TIPHON Release 3 has covered measurement gained during the period 1999 to 2001; the conclusions from which have contributed to the other documents of the

TS/TR 101 329 series of ETSI deliverables. In addition the measurement results from the 2<sup>nd</sup> ETSI speech quality test in 2002 are available in TR 102 251.

The following list summarizes the measurement results available in already published ETSI documents:

- ETSI TR 101 329-6 [1].
- ETSI TR 102 251 [2].

#	Document	Source	Ref. [1]	Ref. [2]
1	Simulation Results of VoIP scenarios	Deutsche Telekom Berkom	X	
2	Appendix I to ITU-T Recommendation G.113	AT&T	X	
3	Speech Quality Test results of IP equipment in a LAN environment	Robert Bosch GmbH	X	
4	QoS Measurements of IP-Configurations	HEAD acoustics, Robert Bosch GmbH, T-Nova (Deutsche Telekom)	X	
5	Subjective Results on impairment effects of IP packet loss	Nortel Networks	X	
6	Subjective and Objective Speech Quality Evaluation on Speech Data recorded at the 1999 SuperOp Event in Hawaii	Rapporteur for Question 13 in ITU-T Study Group 12	X	
7	Anonymous Test report of ETSI Speech Quality Test Event 2000	Deutsche Telekom, T-Nova; HEAD acoustics	X	
8	Problems with the behaviour of jitter buffers and their influence on the end-to-end speech quality	KPN	X	
9	ETSI STQ; Anonymized Test Report from 2 <sup>nd</sup> Speech Quality Test Event 2002	Deutsche Telekom, T-Nova Berkom GmbH; HEAD acoustics		X

---

## Annex A (informative): Bibliography

ETSI TS 102 025 series: TIPHON Release 5 QoS documents

---

## History

<b>Document history</b>		
V1.1.1	July 2000	Publication as TR 101 329-6
V2.1.1	February 2002	Publication as TR 101 329-6
V4.1.1	September 2003	Publication