



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

P.501

Amendment 1
(05/2004)

SERIES P: TELEPHONE TRANSMISSION QUALITY,
TELEPHONE INSTALLATIONS, LOCAL LINE
NETWORKS

Objective measuring apparatus

Test signals for use in telephony

Amendment 1: New annexes A and B

ITU-T Recommendation P.501 (2000) – Amendment 1

ITU-T P-SERIES RECOMMENDATIONS

TELEPHONE TRANSMISSION QUALITY, TELEPHONE INSTALLATIONS, LOCAL LINE NETWORKS

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ITU-T Recommendation P.501

Test signals for use in telephony

Amendment 1

New annexes A and B

Summary

Annex A proposes two test signals (a pn-sequence with a low crest factor and a logarithmically distributed multi-sine wave) for the measurement of Terminal Coupling Loss (TCL).

Annex B provides speech files and noise sequences to be used in combination with objective speech quality evaluation methods. This speech material does not replace the speech material found in Supplement 23.

Source

Amendment 1 (2004) to ITU-T Recommendation P.501 (2000) was approved on 14 May 2004 by ITU-T Study Group 12 (2001-2004) under the ITU-T Recommendation A.8 procedure.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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Electronic attachment: Speech files and noise sequences for Annex B

ITU-T Recommendation P.501

Test signals for use in telephony

Amendment 1

New annexes A and B

Annex A

Test signals for TCL tests

For the measurement of TCL, a pn-sequence with a low crest factor and a logarithmically distributed multi sine wave are equally well applicable. Both provide TCL measurements with high dynamic range, typically >58 dB.

For non linear and/or time variant systems it must be ensured that the equipment under test is under "steady state conditions". Depending on the task e.g., echo cancellers should be fully converged. This can be achieved by using training sequences e.g., using artificial voice (as described in ITU-T Rec. P.50), CS-signals (as described in 5.2.1 and in ITU-T Rec. G.168), or other speech like test signal before inserting the actual test signal.

PN-based test signal

The actual test signal is a pn-sequence according to ITU-T Rec. P.501 with a length of 4096 points (for the 48 kHz a sampling rate) and a crest factor of 6 dB. The duration of the test signal is 1 second. The test signal level is –3 dBm0.

Sinusoidal-based test signal

When using a logarithmically spaced multi-sine test signal, it is defined as:

$$s(t) = \sum_i \left[\left[A + \mu_{AM} \cos(2\pi t \times f_{AM}) \right] \times \cos(2\pi t \times f_{0i}) \right]$$

with:

$$A = 0,5$$

$$f_{AM} = 4 \text{ Hz},$$

$$\mu_{AM} = 0.5$$

$$f_{0i} = 250\text{Hz} \times 2^{(i/3)},$$

$$i = 1..12$$

The test signal level is adjusted to –3 dBm0.

Annex B

Speech files and noise sequences

B.1 General

The signals provided on the CD-ROM attached to this Annex are recorded at various locations by different parties who kindly provided the sequences. All sequences are stored as *.wave files, no calibration for the individual signals is provided. For signals where the original signal level is known, this is indicated in the signal description. In general, the user of the test signals has to find a suitable digital amplification in order to achieve the required signal level for his application – for the test sentences as well as for the noise sequences. General guidance on speech signal levels can be found in ITU-T Recs P.800 [1] and P.79 [2], further guidance and tools for speech processing can be found in ITU-T Rec. G.191 [3].

B.2 Description of the recording procedure used for speech signals

The following general guideline was given for the recording of the tests sentences:

"ITU-T SG12 wishes to extend the ITU-T Rec. P.501 and include speech files for various languages to be used in combination with objective speech quality evaluation methods. It is the purpose to have a comprehensive set of speech sentences which can be used worldwide and which help to give comparable results when used in conjunction with ITU-T recommended objective speech quality evaluation procedures. It is not the aim to replace the speech material found in Supplement 23. This speech material which is only available under special NDA conditions due to commercial issues cannot be used for the purposed described.

The speech material for ITU-T Rec. P.501 should be limited to:

- 4 sentence pairs spoken by 4 different speakers (2 male and 2 female).
- The test sentences should be phonetically balanced.
- The duration should be about 8 seconds for each sentence.
- The recordings should be made in quiet and mostly no reverberant conditions. Studio conditions would be ideal.
- The recordings should be sufficiently undistorted and noise free. Care should be taken neither to overload the recording device nor to come close to the noise floor of the recording device. A signal to noise ratio of more then 50 dB is desirable.
- The microphone should be positioned at a distance of about 30-50 cm from the mouth in order to avoid any distortions from proximity effects."

B.3 Test sentences

All speech samples are processed such that the level measured using a speech level voltmeter according to ITU-T Rec. P.56 [4] are equal.

B.3.1 Chinese

- 1) 2003年中国国际通信设备技术展览会将于11月12日至16日在北京国际展览中心举行。此次展览会是今年亚洲地区规模最大的信息通信展览会。
- 2) 我国通信制造业已经开始在国内市场中与众多国际通信业巨头平起平坐，以华为、中兴、上海贝尔阿尔卡特、大唐电信为首的一批国内通信制造业正在逐步成熟。
- 3) 我国电信业经过几年的改革重组，初步形成了竞争格局。新的格局促使电信运营商积极寻找新的发展思路。品牌、业务、服务质量和企业形象成为了电信运营商今年最关注的事情。
- 4) 教育部体育卫生与艺术教育司司长杨贵仁分析指出，主要是学生体育锻炼不足，其中既有学校场地不足、时间安排以及体育锻炼活动内容安排上的问题，也有学生自身缺乏刻苦锻炼的毅力问题。
- 5) 为配合"全面建设小康社会"主题活动的开展，共青团北京市委与北京青年报社即日起联合举办"我的小康生活"主题有奖征文活动。征文题目可自拟，字数不限。
- 6) 怀柔区位于北京的东北部，地处燕山南麓，北与河北省赤城县、丰宁县、滦平县接壤。怀柔是北京的风景区、大花园，几乎全境无处无风景，是北京环境和绿化优异地区。
- 7) 中国政府在3G建设上采取了稳健务实的态度，在积极开展技术测试、支持自主知识产权标准的发展、利用各种渠道培育市场的同时，向后延迟发放牌照，等待最佳时机。
- 8) 面对当前业务需求转型的关键时刻，我们应充分发挥业务需求牵引和技术创新驱动的强大效能，以网络的长远发展和信息业的长期繁荣为立足点，果断推进网络演进，实现信息业的持续、稳定、健康发展。

B.3.2 English

Female 1:

You must go and do it at once.

There were several small outhouses.

Female 2:

They were all shouting and glaring.

Times keep changing you know.

Male 1:

He carried a bag of tennis balls.

The scheme was plotted out.

Male 2:

I have not told you of my plans.

He had four birthdays in this house.

B.3.3 English (American)

Female 1:

We need gray to keep our mood healthy.

Pack the records in a neat thin case.

Female 2:

The stamps of the tall glasses cracked and broke.

The wall phone rang loud and often.

Male 1:

The shells will bear of both jam or crackers.

A joy to every child is the swan boat.

Male 2:

Both brothers were the same size.

In some form or other we need fun.

B.3.4 French

Female 1:

La barque du pêcheur a été emportée par une tempête.

On entend les gazouillis d'un oiseau dans le jardin.

Female 2:

Le client s'attend à ce que vous fassiez une réduction.

Chaque fois que je me lève ma plaie me tire.

Male 1:

Vous avez du plaisir à jouer avec ceux qui ont un bon caractère.

Le chevrier a corné pour rassembler ses moutons.

Male 2:

Ma mère et moi faisons de courtes promenades.

La poupée fait la joie de cette très jeune fille.

B.3.5 German

Female 1:

Zarter Blumenduft erfüllt den Saal.

Wisch den Tisch doch später ab.

Female 2:

Mit einem Male kam die Sonne durch.

Das Telefon klingelt wieder.

Male 1:

Gegen Dummheit ist kein Kraut gewachsen.

Alles wurde wieder abgesagt.

Male 2:

Überquere die Strasse vorsichtig.

Die drei Männer sind begeistert.

B.3.6 Italian

Female 1:

Non bisogna credere che sia vero tutto quello che dice la gente. Tu non conosci ancora gli uomini, non conosci il mondo.

Dopo tanto tempo non ricordo più dove ho messo quella bella foto, ma se aspetti un po' la cerco e te la prendo.

Female 2:

Questo tormento durerà ancora qualche ora. Forse un giorno poi tutto finirà e tu potrai tornare a casa nella tua terra.

Lucio era certo che sarebbe diventato una persona importante, un uomo politico o magari un ministro. Aveva a cuore il bene della società.

Male 1:

Non bisogna credere che sia vero tutto quello che dice la gente tu non conosci ancora gli uomini, non conosci il mondo.

Dopo tanto tempo non ricordo più dove ho messo quella bella foto ma se aspetti un po' la cerco e te la prendo.

Male 2:

Questo tormento durerà ancora qualche ora forse un giorno poi tutto finirà e tu potrai tornare a casa nella tua terra.

Lucio era certo che sarebbe diventato una persona importante, un uomo politico o magari un ministro, aveva a cuore il bene della società.

B.3.7 Japanese

Female 1, 2; Male 1,2:

Karewa ayuwo tsuru meijindesu.

Kodai ejiputode jusshiNhouga tsukurare mashita.

B.3.8 Spanish (American)

Female 1

No arroje basura a la calle.

Ellos quieren dos manzanas rojas.

Female 2

No cocinaban tan bien.

Mi afeitadora afeitó al ras.

Male 1

P – siéntate en la cama.

El libro trata sobre trampas.

Male 2

El trapeador se puso amarillo.

El fuego consumió el papel.

B.4 Noise sequences

Two types of noise sequences are provided on the CD_ROM:

- Noise sequences recorded binaurally using a freefield equalized artificial head according to ITU-T Rec. P.58.
- Noise sequences recorded monaurally with a single microphone.

B.4.1 Binaural noise recordings

Train

Noise on a railway station while a train is entering the station.

Average level (whole signal): 70 dB_{SPL}(A)

Traffic

Traffic noise recorded at a crossing.

Average level (whole signal): 70 dB_{SPL}(A)

Bus

Noise recorded in a Bus while driving.

Average level (whole signal): 66 dB_{SPL}(A)

Kids

Kids recorded while playing in a room.

Average level (whole signal): 78 dB_{SPL}(A)

Medium size car

Noise at constant driving conditions (100 km/h) in a medium size car.

Average level (whole signal): 67 dB_{SPL}(A)

Car_bin1_FFeq

Car interior noise, car driving (speed?), radio on (speech program)

Con_bin1_Ffeq

construction noise, impulse type noise (hammering), sawing noise

Met_bin1_Ffeq

Metro train arriving to the station.

Off_bin1_Ffeq

Office noise, fans, typing, phone ringing, noise from chair

Rai_bin1_FFfeq

Railway station, echoing surroundings, speech, shoes clacking

Res_bin1_FFfeq

Restaurant, babble, water, dishes

B.4.2 Monaural Noise Recordings

Cafeteria

Typical cafeteria noise.

In car

Noise inside a typical medium size car.

Street

Typical street noise.

Car_mono1_30s

Car interior noise, car driving (speed?), radio on (speech program)

Con_mono1_30s

Construction noise, impulse type noise (hammering), sawing noise

Met_mono1_30s

Metro train arriving to the station.

Off_mono1_30s

Office noise, fans, typing, phone ringing, noise from chair

Rai_mono1_30s

Railway station, echoing surroundings, speech, shoes clacking

Res_mono1_30s

Restaurant, babble, water, dishes

REFERENCES

- [1] ITU-T Recommendation P.800 (1996), *Methods for subjective determination of transmission quality*.
- [2] ITU-T Recommendation P.79 (1999), *Calculation of loudness ratings for telephone sets*.
- [3] ITU-T Recommendation G.191 (2000), *Software tools for speech and audio coding standardization*.
- [4] ITU-T Recommendation P.56 (1993), *Objective measurement of active speech level*.

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