INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.131
Appendix II
(09/99)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

International telephone connections and circuits – General characteristics of the 4-wire chain formed by the international circuits and national extension circuits

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Control of talker echo

Appendix II: Relation between echo disturbances under single talk and double talk conditions (evaluated for one-way transmission time of 100 ms)

ITU-T Recommendation G.131 – Appendix II

(Previously CCITT Recommendation)

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
General definitions	G.100–G.109
General Recommendations on the transmission quality for an entire international telephone connection	G.110–G.119
General characteristics of national systems forming part of international connections	G.120–G.129
General characteristics of the 4-wire chain formed by the international circuits and national extension circuits	**G.130–G.139**
General characteristics of the 4-wire chain of international circuits; international transit	G.140–G.149
General characteristics of international telephone circuits and national extension circuits	G.150–G.159
Apparatus associated with long-distance telephone circuits	G.160–G.169
Transmission plan aspects of special circuits and connections using the international telephone connection network	G.170–G.179
Protection and restoration of transmission systems	G.180–G.189
Software tools for transmission systems	G.190–G.199
INTERNATIONAL ANALOGUE CARRIER SYSTEM	
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TESTING EQUIPMENTS	
TRANSMISSION MEDIA CHARACTERISTICS	G.600–G.699
DIGITAL TRANSMISSION SYSTEMS	
TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION G.131

CONTROL OF TALKER ECHO

APPENDIX II

Relation between echo disturbances under single talk and double talk conditions (evaluated for one-way transmission time of 100 ms)

Source

Appendix II to ITU-T Recommendation G.131 was prepared by ITU-T Study Group 12 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 30 September 1999.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The 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 Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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 term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration, ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

INTELLECTUAL PROPERTY RIGHTS

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As of the date of approval of this Recommendation, the ITU had not 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.

CONTENTS

Recommendation G.131

CONTROL OF TALKER ECHO

APPENDIX II

Relation between echo disturbances under single talk and double talk conditions (evaluated for one-way transmission time of 100 ms)

(Geneva, 1999)

II.1 Introduction

The telephone situation using a handset was reproduced in a third party listening test (LOT). The listening examples were generated by a computer simulation considering two double talk periods:

- sequence 1: a long double talk (a whole sentence); and
- sequence 2: a short double talk represented by a single word.

The structure of the listening examples can be subdivided into three periods:

- period A: listening to the far end speech (male voice);
- period B: double talk period (sequence 1 or sequence 2, female voice);
- period C: listening again to the far end speech.

In addition to the double talk conditions these two sequences were also judged under single talk conditions (no far end speech was present). The test conditions were as follows:

- average speech level on both sides of the connection was adjusted to –4.7 dB_{Pa};
- simulated characteristics of a standard German handset (FEAP 7);
- the connection was simulated by different TELR values;
- TELRs representing the "acceptable curve" and "limiting case" were included;
- variable TELRs in combination with a one-way transmission time of 100 ms were included;
- 24 naive subjects were used as test persons;
- the parameters overall quality and echo were judged on a 5-point scale.

The different TELRs were adjusted by a digital attenuation in the (simulated) echo path. This does not influence the loudness of the far end speech under double talk conditions. If variations of TELRs are simulated by a variable sensitivity in the sending direction of a far end terminal, the loudness of far end speech is affected too. Consequently the masking effect during double talk would be lower and would influence the echo judgement. This influence was excluded.

II.2 Echo assessment for the test conditions according to Recommendation G.131

The results can given through the following Figures II.1 and II.2.

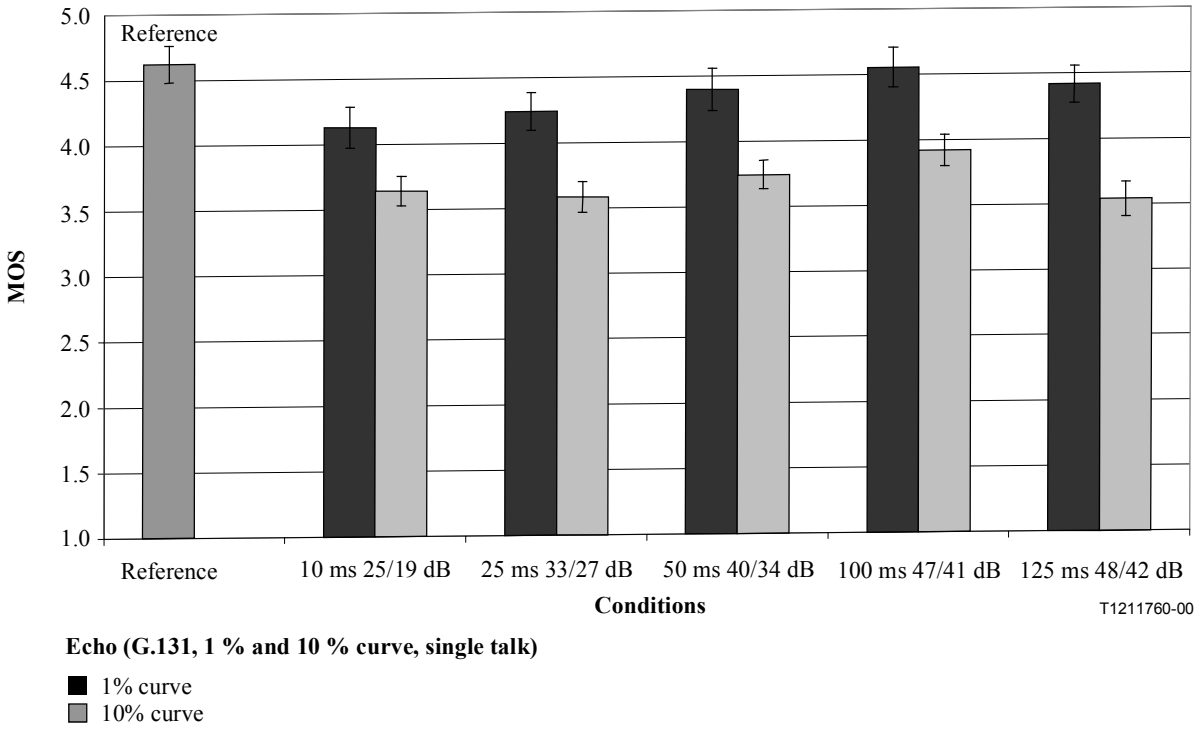

Figure II.1/G.131 – Results under single talk conditions

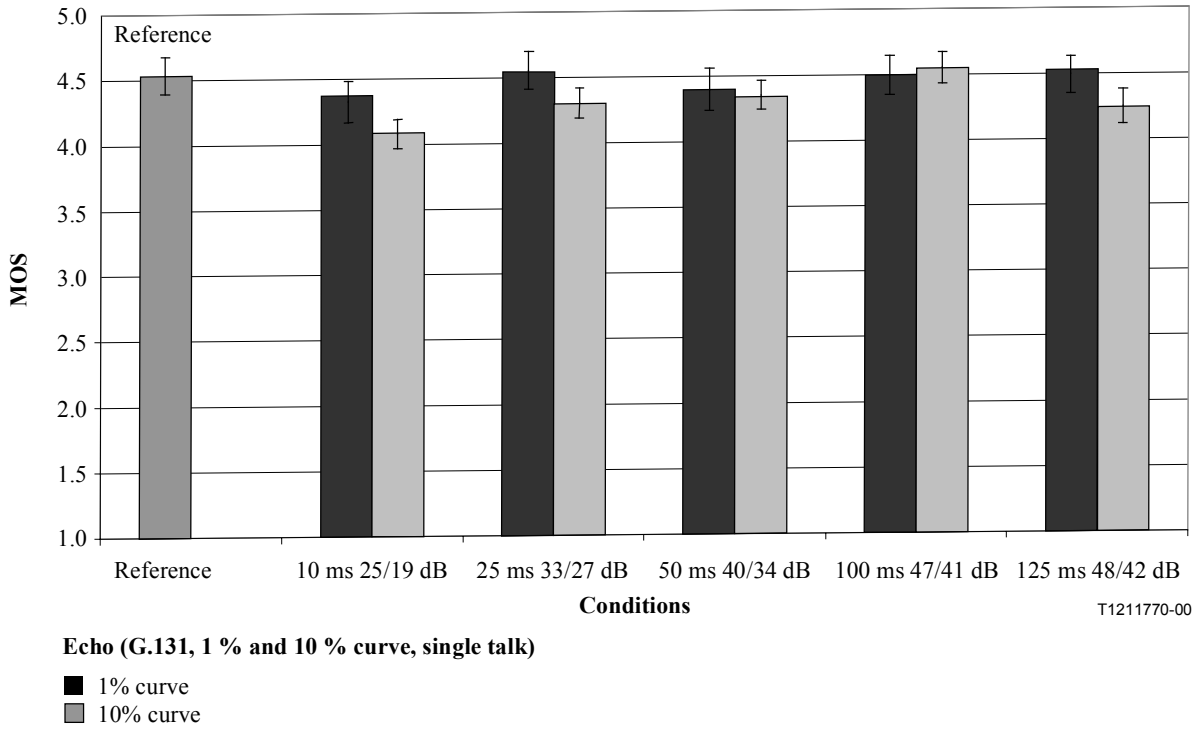

Figure II.2/G.131 – Results under double talk conditions

The ratings from Figures II.1 and II.2 are given again in the following Table II.1.

Table II.1/G.131 – Echo assessment in LOT

Conditions	MOS single talk	MOS double talk
Reference (infinite TELR)	4.62	4.60
"acceptable curve"	4.0-4.6	4.0-4.5
'limiting case"	3.5-4.0	4.0-4.5

II.3 Correlation between the results under single and double talk conditions

Variable TELRs in combination with a transmission time of 100 ms were judged under single and double talk conditions. The correlation between the MOS under both conditions is demonstrated graphically in Figure II.3 for the parameters' overall quality and echo. The echo level offset under double talk condition is given as a function of MOS under single talk condition. It indicates the possible echo level offset under double talk condition to still achieve the same rating compared to the single talk condition.

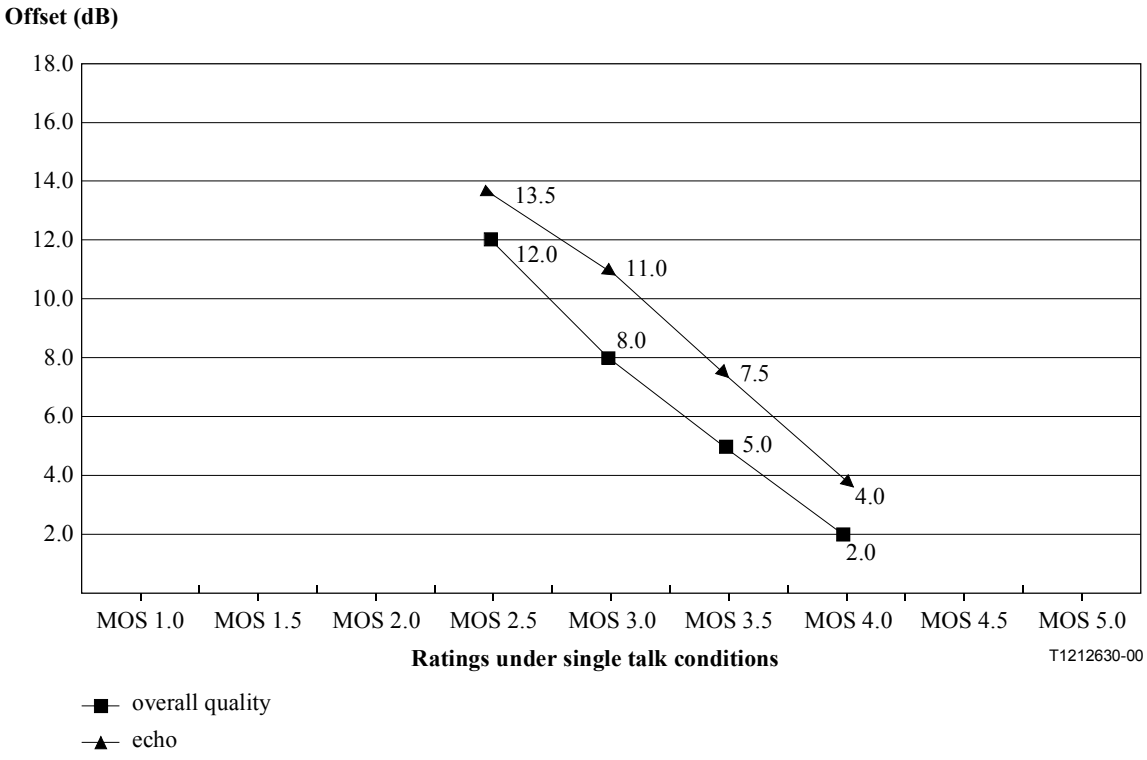

Figure II.3/G.131 – Echo level offset during double talk to achieve the same MOS values compared to the single talk condition (transmission time: 100 ms)

It can be assumed that a similar functional relation exists for other combinations of transmission time and TELR values although the exact curves might be slightly different.

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Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	**Transmission systems and media, digital systems and networks**
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems