INTERNATIONAL TELECOMMUNICATION UNION

CCITT

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

Series G

Supplement 30
(11/1988)

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

TRANSMISSION PLAN ASPECTS OF LAND MOBILE TELEPHONY NETWORKS

Reedition of CCITT G Series Recommendation Supplement 30 published in the Blue Book, Fascicle III.1 (1988)

NOTES

1 CCITT G-series Recommendation Supplement 30 was published in Fascicle III.1 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Supplement No. 30

TRANSMISSION PLAN ASPECTS OF LAND MOBILE TELEPHONY NETWORKS

Draft Recommendation G.173

(This Supplement is proposed for study during the present study period with the aim to convert it into a Recommendation.)

1 General

This Recommendation is primarily concerned with the special planning aspects which pertain to analogue or digital land mobile systems. Such systems, due to technical or economic factors, will prevent a full compliance with the general characteristics of international telephone connections and circuits recommended by CCITT.

The scope of this Recommendation is thus to give guidelines and advice to Administrations as to what kind of precautions, measures and minimum requirements which are needed for a successful incorporation of such networks in the national PSTN.

The performance objectives of such systems may vary between different groups of customers. For normal customers the objective should be to reach a quality as close as possible to CCITT standards. For other groups of very disciplines customers other performance objectives might be acceptable.

2 Network configurations

Under study.

Under this headline Administrations should be advised to use 4-wire transmission to avoid problems when accessing inherently 4-wire mobile links.

3 Nominal transmission loss of mobile links

Under study.

Under this headline the problems with the application of loudness ratings and the correct loading of the radio channels should be discussed.

The recommended LR values in CCITT Recommendation G.121 are not directly applicable due to the fact that the background noise level is higher in a car than what is assumed in Recommendation G.121.

What is the design objective for the speech levels from the radio path and what levels should be delivered to the network?

4 Stability

Under study.

5 Echo

Under study.

Under this headline the need for echo control devices should be discussed.

6 Noise

Under study.

(Can the European group give indications of the inherent noise performance of the codec algorithms being considered?)

7 Delay

Under study.

8 Effects of errors in digital systems

Several coding methods, such as SBC, ATC, RELP and APC-AB with transmission bit rates 16 kbit/s have been proposed to achieve spectrum utilization efficiency and quality comparable with conventional analog FM systems. However, the application of such highly efficient speech coding methods to land mobile radio can lead to a significant degradation in quality because of transmission errors.

Mobile radio links are not always error-free. Burst errors occur frequently due to multipath fading. It has been reported that the average bit error rate (BER) performance of diversity reception is 10^{-2}-10^{-4} in the 10 to 20 dB range of the average carrier to noise power ratio (CNR), and burst error length reaches 20 to 100 bits in case of 16 kbit/s digital signal transmissions. Therefore, robustness against burst error is an important characteristic for speech coding applied to mobile communication. Speech CODECs in mobile radio links should involve error control techniques so as to provide robustness in multipath fading channels. Thus, the transmission bit rate includes redundancy bits for error control.

Concerning quality evaluations, it may be better to use the average CNR as the receiving level for comparisons among analogue and digital systems. This is because it can present the receiving level as a normalized unit for both analog FM and digital systems. In quality evaluations between digital systems, the average signal energy per bit to noise power density ratio (E_b/N_o) is suitable for the presentation of the receiving level. This is because it can describe the receiving level as a normalized unit for any transmission bit rate and receiving bandwidth.

9 Quantizing distortion

Under study.

10 Effect of transmission impairments on voiceband data performance

Under study.

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	
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	
Definitions and general considerations	G.210–G.219
General Recommendations	G.220–G.229
Translating equipment used on various carrier-transmission systems	G.230–G.239
Utilization of groups, supergroups, etc.	G.240–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	
Carrier telephone systems on unloaded symmetric cable pairs, providing groups or supergroups	G.320–G.329
Carrier systems on 2.6/9.5 mm coaxial cable pairs	G.330–G.339
Carrier systems on 1.2/4.4 mm coaxial cable pairs	G.340–G.349
Additional Recommendations on cable systems	G.350–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	
General Recommendations	G.400–G.419
Interconnection of radio-relay links with carrier systems on metallic lines	G.420–G.429
Hypothetical reference circuits	G.430–G.439
Circuit noise	G.440–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	
Radiotelephone circuits	G.450–G.469
Links with mobile stations	G.470–G.499
TESTING EQUIPMENTS	
TRANSMISSION MEDIA CHARACTERISTICS	
General	G.600–G.609
Symmetric cable pairs	G.610–G.619
Land coaxial cable pairs	G.620–G.629
Submarine cables	G.630–G.649
Optical fibre cables	G.650–G.659
Characteristics of optical components and subsystems	G.660–G.699

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

ITU-T RECOMMENDATIONS SERIES

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

Printed in Switzerland

Geneva, 2007