



INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

# J.83

(04/97)

SERIES J: TRANSMISSION OF TELEVISION, SOUND  
PROGRAMME AND OTHER MULTIMEDIA SIGNALS

Digital transmission of television signals

---

**Digital multi-programme systems for television,  
sound and data services for cable distribution**

ITU-T Recommendation J.83

(Previously CCITT Recommendation)

LG Ex. 1009

LG Electronics Inc. v. ParkerVision, Inc.

IPR2022-00246

Page 00001

ITU-T J-SERIES RECOMMENDATIONS

TRANSMISSION OF TELEVISION, SOUND PROGRAMME AND OTHER MULTIMEDIA SIGNALS

General Recommendations	J.1–J.9
General Recommendations concerning sound-programme transmissions	J.10–J.19
Performance characteristics of sound-programme circuits	J.20–J.29
Characteristics of equipment and lines used for setting up sound-programme circuits	J.30–J.39
Characteristics of equipment for coding analogue sound-programme signals	J.40–J.49
Digital transmission of sound-programme signals	J.50–J.59
Characteristics of circuits for television transmissions	J.60–J.69
Systems for television transmission over metallic lines and interconnection with radio-relay links	J.70–J.79
<b>Digital transmission of television signals</b>	<b>J.80–J.89</b>
Specific Recommendations for television transmission	J.90–J.99
Transmission of signals with multiplexing of video, sound and data, and signals of new systems	J.100–J.109
Interactive services	J.110–J.119

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

## FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (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 (Geneva, October, 1997).

This second edition of ITU-T Recommendation J.83 was prepared by ITU-T Study Group 9 (1997-2000) and incorporates Amendment 1 and Amendment 2 approved under the WTSC Resolution No. 1 procedure on the 17th of October 1996 and the 22nd of April 1997 respectively.

---

### NOTE

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

© ITU 1997

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

# CONTENTS

	<i>Page</i>
1 Scope.....	1
2 References.....	1
3 Terms and definitions.....	1
4 Symbols and abbreviations.....	2
4.1 Symbols.....	2
4.2 Abbreviations.....	2
5 Digital multi-programme systems for cable distribution.....	3
Annex A – Digital multi-programme System A.....	5
A.1 Introduction.....	5
A.2 Cable system concept.....	5
A.3 MPEG-2 transport layer.....	7
A.4 Framing structure.....	7
A.5 Channel coding.....	8
A.6 Byte to symbol mapping.....	10
A.7 Modulation.....	11
A.8 Baseband filter characteristics.....	13
Annex B – Digital multi-programme System B.....	14
B.1 Introduction.....	14
B.2 Cable system concept.....	15
B.3 MPEG-2 transport layer.....	15
B.4 MPEG-2 transport framing.....	15
B.5 Forward error correction.....	20
B.6 Modulation and demodulation.....	33
Annex C – Digital multi-programme System C.....	35
C.1 Introduction.....	35
C.2 Cable system concept.....	35
C.3 MPEG-2 transport layer.....	37
C.4 Framing structure.....	37
C.5 Channel coding.....	38
C.6 Modulation.....	39
Annex D – Digital multi-programme System D.....	43
D.1 Introduction.....	43
D.2 Cable system concept.....	43
D.3 MPEG-2 transport layer.....	44
D.4 Framing structure.....	44
D.5 Channel coding.....	46
D.6 Modulation.....	51
D.7 16-VSB cable receiver.....	52
D.8 Other VSB modes.....	52
Appendix I – Bibliography.....	60

## SUMMARY

This Recommendation "Digital multi-programme systems for television, sound and data services for cable distribution" covers the definition of the framing structure, channel coding and modulation for digital multi-programme signals for television, sound and data services distributed by cable networks.

This Recommendation has four Annexes (A, B, C and D), that provide the specifications for the four digital television cable systems submitted to the ITU-T. This reflects the fact that standardization of digital cable television systems is being addressed for the first time by the ITU-T and that a number of systems had been developed and provisionally implemented when this standardization effort was undertaken by the ITU.

This Recommendation recommends that those implementing new digital multi-programme services on existing and future cable networks should use one of the systems whose framing structure, channel coding and modulation are specified in Annexes A, B, C and D.

## INTRODUCTION

The development of new digital technology is now reaching the point at which it is evident that they enable digital systems to offer significant advantages, in comparison with conventional analogue techniques, in terms of vision and sound quality, spectrum and power efficiency, service flexibility, multimedia convergence and potentially lower equipment costs. Moreover, the use of cable distribution for the delivery of video and audio signals to individual viewers and listeners is continually growing, and has already become the dominant form of distribution in many parts of the world. It is also evident that these potential benefits can best be achieved through the economies of scale resulting from the widespread use of digital systems designed to be easily implementable on existing infrastructure and which take advantage of the many possible synergies with related audiovisual systems.

Administrations and private operators planning the introduction of digital cable television services are encouraged to consider the use of one of the systems described in Annexes A, B, C and D, and to seek opportunities for further convergence, rather than developing a different system based on the same technologies.

This second edition of this Recommendation incorporates Amendment 1 and Amendment 2. These amendments brought the following changes with respect to the first edition of the Recommendation:

- a) In Annex B there is now a specification for 256-QAM;
- b) In Annex B, two distinct operating modes of interleaving capability are specified, called *level 1* and *level 2*. Level 1 is specified for 64-QAM transmission only and this mode already existed in the first edition of Annex B. Level 2 encompasses 64-QAM and 256-QAM transmission, and for both modulation schemes is capable of supporting variable interleaving.
- c) In the first edition of Annex D, 24 bits were identified which determined the VSB mode for the data in the frame and two such modes were defined: 16-VSB Cable and 8-VSB Terrestrial (trellis coded). In this second edition, three other VSB modes are defined, i.e. 2-VSB, 4-VSB and 8-VSB.

Table 1/J.83 has been updated to take account of these extensions. In addition, a new Appendix I containing a short Bibliography has been added.

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.