



INTERNATIONAL TELECOMMUNICATION UNION

CCITT

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

T.80

(09/92)

TERMINAL EQUIPMENT AND PROTOCOLS FOR TELEMATIC SERVICES

COMMON COMPONENTS FOR IMAGE COMPRESSION AND COMMUNICATION – BASIC PRINCIPLES



Recommendation T.80

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation T.80 was prepared by Study Group VIII and was approved under the Resolution No. 2 procedure on the 18th of September 1992.

CCITT NOTE

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

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INTRODUCTION

This Recommendation was prepared by CCITT SG VIII. The requirements, contained in clause 5, however, were forwarded to an informal CCITT-ISO/IEC "Joint Photographic Experts Group" (JPEG). The task of this Group was to develop a universal progressive/sequential compression algorithm for any type of colour model.

During the development phase extensive testing and comparison of various techniques showed, that although the original goal was technically feasible, the initial solution did not produce the best compression and image-quality results for all the image types addressed. Therefore it was decided that JPEG should develop a progressive/sequential continuous-tone color and gray scale image compression technique (described in Recommendation T.81), while a newly formed separate group, CCITT-ISO/IEC "Joint Bi-level Image Group" (JBIG) should develop a separate (but from a functionality point of view similar) progressive/sequential bi-level (limited multi-level) image-compression technique (described in Recommendation T.82). Thus, there are many commonalities between the two techniques (such as their functionality, the use of a joint entropy coder, etc.), but the two techniques are different from an algorithm point of view. Reference to the JPEG and JBIG developed algorithm are provided in clause 2, Normative references. Both techniques were jointly standardized by CCITT and ISO/IEC.



Recommendation T.80**COMMON COMPONENTS FOR IMAGE COMPRESSION
AND COMMUNICATION – BASIC PRINCIPLES***(1992)*

The CCITT,

considering

- (a) that the CCITT seeks the most efficient methods of coding, communication and storage of images;
- (b) that there is a growing interest in telematic services (such as facsimile, videotex, teleconferencing) and other CCITT applications to transmit images on telecommunication networks with varying speeds;
- (c) that there is a growing demand for multilevel (including gray-scale and continuous tone color) imagery;
- (d) that there is a trend to multifunctional terminals participating in more than one telematic services and/or other CCITT and/or data-processing applications;
- (e) that with the introduction of new telecommunication network technologies, such as ISDN, there is a growing tendency to provide multiple CCITT services and/or other applications on the same telecommunication network;
- (f) that there is an urgent demand for interworking among telematic services (and other CCITT applications) used for image-communication and/or image-storage;
- (g) that there is a strong convergence of image-processing, image-storage and image-communication techniques;
- (h) that there is strong tendency toward introducing “soft-copy” (i.e. screen oriented) image-communication services/applications;
- (i) that there is a need for harmonization of “soft-copy” (i.e. screen oriented) and “hard-copy” (i.e. print-oriented) image presentation modes, within the same, or among several CCITT services/applications,

recognizing

- (j) that while several established techniques (see Recommendations T.4 and T.6) for efficient coding of images containing black and white text and line-drawings exist in CCITT without using new image-compression techniques, the needs expressed above can only partially be satisfied, unless new image-compression techniques are provided,

unanimously recommends

that in addition to image-compression techniques defined in Recommendations T.4 and T.6 a new generation of image-compression techniques containing new or improved properties (including, but not limited to: gray-scale/colour, progressive/sequential image build-up, lossy/lossless compression, be defined according to the T.80-Series Recommendations.

1 Scope

The T.80-Series Recommendations are applicable to a wide range of CCITT applications which require use of compressed still images. Such images can range from bi-level to continuous-tone single-color and multi-color still digital image. It is applicable to a wide range of CCITT applications which require use of compressed images.

This Recommendation is the introduction to the T.80-Series Recommendations. Recommendations T.81 and T.82 describe the individual image compression techniques.

This Recommendation describes the basic principles of the requirements to be satisfied by the new compression techniques, the relation of those compression techniques to the individual CCITT applications and services.

This Recommendation does not specify the individual compression techniques to be used. Neither does it specify, for a given application, a complete representation of coded image data, nor specify an application that is using any of the new compression techniques.

2 Normative references

The following CCITT Recommendations and ISO/IEC International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and International Standards are subject to revision.

- [1] CCITT Recommendation T.81 (1992) | ISO/IEC 10918-1:1992, *Information technology – Digital compression and coding of continuous-tone still images - Part I: Requirements and guidelines*.
- [2] CCITT Recommendation T.82 (1992) | ISO/IEC 11544:1992, *Information technology – Coded Representation of Picture and Audio Information – Progressive Bi-level Image Compression*.

Informative references to other related CCITT Recommendations, ISO/IEC Standards and application oriented CCITT Recommendations are provided in the References clause.

3 Definitions

For the purposes of this Recommendation, the following definitions apply.

3.1 bi-level image

An image with two distinct levels of predefined colors (e.g. a typical facsimile image is a bi-level black-and-white image).

3.2 bit-plane

An array (or “plane”) of bi-level symbols constructed from an image by choosing a particular bit from each pixel.

3.3 byte

Eight bits of data.

3.4 coding process

A general term referring to an encoding process, a decoding process, or both.

3.5 color image

A bi-level or multi-level image containing more than one color component, defining the full color specification of that image.

3.6 color component

One of the two-dimensional arrays which comprise a color image. The meaning of the color component is defined by the respective color model used.