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Interested committees:

Title: BS EN IEC 63455 Multimedia systems and equipment - Multimedia signal transmission - Dependable line code with error correction

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: IEC 63455 ED1	
DATE OF CIRCULATION: 2023-08-25	CLOSING DATE FOR VOTING: 2023-11-17
SUPERSEDES DOCUMENTS: 100/3735/NP, 100/3780/RVN	

IEC TA 18 : MULTIMEDIA HOME SYSTEMS AND APPLICATIONS FOR END-USER NETWORKS	
SECRETARIAT: Japan	SECRETARY: Mr Keisuke Koide
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
☐ SUBMITTED FOR CENELEC PARALLEL VOTING	☒ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:
Multimedia systems and equipment - Multimedia signal transmission - Dependable line code with error correction

PROPOSED STABILITY DATE: 2029

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MULTIMEDIA SYSTEMS AND EQUIPMENT – MULTIMEDIA SIGNAL
TRANSMISSION – DEPENDABLE LINE CODE WITH ERROR CORRECTION****FOREWORD**

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IEC 6XXXX has been prepared by Technical Area 18: Multimedia home systems and applications for end-user networks, of IEC technical committee 100: **Audio, video and multimedia systems and equipment**. It is an International Standard.

The text of this **International Standard** is based on the following documents:

Draft	Report on voting
100/XX/DTR	100/XX/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this **International Standard** is **English**.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at https://www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at <https://www.iec.ch/standardsdev/publications>.

89 The committee has decided that the contents of this document will remain unchanged until the
90 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
91 specific document. At this date, the document will be

- 92 • reconfirmed,
- 93 • withdrawn,
- 94 • replaced by a revised edition, or
- 95 • amended.

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INTRODUCTION

This document defines a line code with error correction to ensure dependable communication. Several complex machines, such as IoT devices, wearable devices, sensor networks, robotics, and spacecraft, have a growing demand for distributed processing. In addition, modernizing facilities such as factories, offices, schools, and homes creates a ubiquitous and multimedia computing environment. Unlike conventional PC applications for documentation and Internet applications that exchange texts without time constraints, these types of cooperative computing require reliable real-time responses to physical events occurring in the real world that may be noisy. For distributed nodes to cooperate in real-time, an interconnecting network shall realize dependable real-time communication without re-transmission in noisy environments. As a dependable line code with error correction for such reliable real-time communications, the 4b/10b provides an embedded clock, DC (direct current) balance, error detection, and error correction capabilities at a time.

Real-time means that the exactness of the system, including computation and communication, depends not only on the result but also on the time taken to achieve the result. In a narrow sense, real-time means that the time constraints, including deadlines or periods, shall be met.

A line code is the lowest-level communication protocol on a communication line. Most current line codes have typical functions, including the embedded clock, DC balance, and basic error detection. The 8b/10b line code[1] is a major example, which is used for USB 3.0[3], Serial ATA[4], and PCI Express 2.0[2]. However, no conventional line code has an error correction capability. In the case of the 8b/10b line code, when one bit of an encoded code (a 10b code) is inverted during communication, the multi-bits of the decoded code (the 8b code) are inverted. In other words, when a single-bit error occurs in an encoded 10-bit code, the decoded 8-bit code (a byte) is completely corrupted. When the decoder detects an error, the corrupted data is generally re-transmitted under an upper-level communication protocol. However, the re-transmission scheme is unsuitable for real-time communication because the WCRT cannot be obtained. Therefore, the forward error correction scheme against the bit error is required for real-time communication. However, even if one bit-error occurs in the encoded line code, multiple bits of the decoded code are inverted at the receiver, so it is difficult to use a bit-error correction code such as Hamming code or BCH code as an error correction code. To correct an error at the receiver side, it has been necessary to use a block-level error correction code such as RS (Reed Solomon) code in a large block unit at the subsequent stage. In this scheme, error correction can only be performed if all packets are received, and latency becomes long. Therefore, this scheme is also unsuitable for real-time communication. The line code with error correction is desirable for reliable and low-latency real-time communication.

The 4b/10b line code is designed so that the following functions necessary for dependable real-time communication, which could not be performed at a time by conventional line codes, can be achieved by a single line code.

- a) Embedded clock
- b) DC balance
- c) Error detection
- d) Error correction

The 4b/10b line code is designed for highly reliable digital communications among sensor networks, wearable devices, robots, etc. Even in extremely noisy environments where communication cannot be performed by a conventional line code, such as the 8b/10b line code, communication can be performed using the 4b/10b line code. Since communication errors can be corrected per hop by hop using the 4b/10b line code and error correction latency becomes short, the 4b/10b line code is suitable for reliable real-time communications.