TECHNICAL SPECIFICATION

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CEN/TS 15525

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English Version

Postal Services - Standard Interfaces - Interface between Machine Control and Bar Code Printers

Services postaux - Interfaces standard - Interface entre machine de supervision et imprimantes de codes à barres

Postalische Dienstleistungen - Standardschnittstellen - Schnittstelle zwischen Betriebssystem von Sortiermaschinen und Barcodedruckern

This Technical Specification (CEN/TS) was approved by CEN on 23 October 2006 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36   B-1050 Brussels

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Foreword

This document (CEN/TS 15525:2006) has been prepared by Technical Committee CEN/TC 331 "Postal Services", the secretariat of which is held by NEN, in collaboration with UPU.

NOTE   This document has been prepared by experts coming from CEN/TC 331 and UPU, under the frame of the Memorandum of Understanding between UPU and CEN.

The UPU's contribution to the specification was made, by the UPU Standards Board[1] and its subgroups, in accordance with the rules given in Part V of the "General information on UPU standards".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this CEN Technical Specification: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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[1]   The UPU's Standards Board develops and maintains a growing number of standards to improve the exchange of postal-related information between posts, and promotes the compatibility of UPU and international postal initiatives. It works closely with posts, customers, suppliers and other partners, including various international organizations. The Standards Board ensures that coherent standards are developed in areas such as electronic data interchange (EDI), mail encoding, postal forms and meters. UPU standards are published in accordance with the rules given in Part VII of the General information on UPU standards, which can be freely downloaded from the UPU world-wide web site (www.upu.int).

Introduction

Automated postal sorting systems frequently use printers to print bar codes, cancellation and other marks and human readable data on the items processed through them. Bar codes are used to control further processing steps and to support item tracking and performance monitoring; cancellation marks to prevent the re-use of postage stamps, record data and the location of processing and to convey advertising or other messages and human readable text is used to support a provision of instructions, such as forwarding addresses to delivery agents and manual sorting staff and providing back-up in the event of unreadability of bar codes.

In order to print bar codes, images or text on items, an interface between sorter and printer is needed for transferring information, providing sorter speed information and to control the start of printing. This interface has traditionally been different for each printer supplier and even for different models of printer. This has resulted in the need for sorting equipment suppliers to develop printer- or even project-specific interface solutions to fulfil the requirements of individual postal operators for the printer brand they want to use. This has several disadvantages. Such specific interface solutions are typically not integrated into the sorting system supplier's product line and often result in:

— substantial duplication, with each participating supplier being required to undertake separate development;

— system integration being complex and time consuming (and therefore expensive);

— long-term dependence on the original supplier(s), due to the impossibility of contracting modification of the interface to third parties;

— high maintenance costs, at least once the initially agreed maintenance period is over;

— early obsolescence, due to lack of support for long-term maintenance;

— inability to upgrade equipment and/or to replace worn out or obsolete equipment;

— poor transferability between projects.

The above issues are not limited to the sorting systems interface with printers, but apply also to interfaces with other system components, including bar code readers, image capture devices, OCR sub-systems, etc. Their impact is also growing because, to optimise performance, postal operators increasingly require sorting systems which integrate equipment from different suppliers. In the past this has led to project specific interfaces being negotiated between one postal operator and one or multiple suppliers. These project-specific interfaces were developed by the suppliers and maintained for an agreed period of time.

Some suppliers have sought to address these problems by defining supplier-specific "open interfaces" that apply across a range of products, but these still have the disadvantage of being in product use by only one supplier. This led to an initiative, on the part of a group of suppliers and postal operators, to develop a range of "open standard interfaces" which, following their implementation by suppliers, could support the construction of systems using components from different suppliers.

This standard, which covers the interface between the control unit of a postal sorting system and a printer connected to that system, is the first of these open standard interfaces. Like the similar specifications that are

expected to be developed in the future[2], it is expected – subject to its adoption as a tendering requirement by postal operators – to lead to improved economics and performance of postal automation systems through:

— long term reductions in costs, with higher initial product development and system acquisition costs being more than offset by reductions in project-specific developments, integration and maintenance costs;

— simpler, faster, system integration, particularly in cases in which equipment from different suppliers is involved;

— longer term, lower cost, maintainability and increased longevity of systems;

— increased competition between suppliers, resulting in both enhanced products and lower costs;

— reduced dependence on individual supplier(s).

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2)   A second specification, covering the interface between the control unit of the image processing subsystem of a sorter and an image enhancement subsystem, such as an address interpretation system, is already under development; others are expected to follow as and when the need is identified and the resources for development become available. Each will be developed by a separate ad-hoc project group working under the auspices of CEN/TC 331 *Postal services* and/or the UPU Standards Board.

1 Scope

This document specifies the electrical, data and timing interface between the control unit of a postal sorting system and an ink jet printer connected to that system. It further specifies an ancillary interface to the printer, which can be used for the support of remote diagnostics and other service functions.

NOTE 1   This specification can equally be applied to the interfacing of printers to sequencing systems and combined sorting and sequencing systems. It was primarily developed for application to ink jet printers, but could be applied to printers with similar functionality that make use of other printing technologies.

At the physical level, the specification is based on the use of a combination of a standard 100 Mbps Ethernet connection for the transfer of data and patch cables for signalling. At a logical level, data is transferred using messages transmitted across the Ethernet connection using three TCP/IP sockets, with the execution of time-critical functions being controlled through the use of signals on a TIA/EIA-422 interface.

NOTE 2   Several printers can be connected to a single sorting system. In this case, the printers can optionally share access to a single Ethernet network, but each requires its own patch cables. This standard does not support the connection of a single printer to multiple sorting system control units.

This document defines all messages that may be transferred via each of the TCP/IP sockets, specifies printer behaviour on receipt of these messages and defines how the timing of this behaviour is controlled by the TIA/EIA-422 signals.

The specification supports the use of the printer to print bar codes, human readable text and/or images on mail items whilst these are being transported past the print head[3]. It provides explicit support for Bar/No Bar (BNB), Bar/Half Bar (BHB) and four state bar codes, but allows full user control over the specification of bar patterns to support more complex bar coding formats.

NOTE 3   Printers that comply with the specification are required to support printing of the three above mentioned bar coding formats, character printing and two images; support for additional formats and a greater number of images is optional and, in particular, can depend on the available printer memory

The different TCP/IP sockets have different functions that may be fulfilled by different subsystems referred to as sorter control, print control and remote service. Where these are implemented as distinct subsystems, they will need to intercommunicate. The interfaces between them nevertheless fall outside the scope of this specification and are not covered herein.

EXAMPLE   Before initialisation, during printer OFF mode and if a fatal error is reported by the printer, print control should desist from sending print instructions to the printer. It therefore needs to be kept aware of printer status. Similarly, print control might need to forward print error information to sorter control. Use of the control and service sockets also needs to be coordinated, since new initialisation messages or new software downloaded from remote service will overwrite initialisation settings and software from sorter control, and vice versa.

This specification does not address the physical construction of printers or their mechanical integration into sorting systems, neither does it specify electrical power connections to the printer.

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[3]   No explicit limit is placed on the transport speed. However, the specification was drawn up in the context of existing equipment with transport speeds that are typically in the range 2,0 m/s to 4,0 m/s. Its applicability outside of this range requires further study, in particular to determine, for higher speeds, whether the 500 KHz timing signal referred to in 7.2 remains adequate.

This document includes three annexes and a bibliography. Annex A is normative; Annexes B and C are informative.

2   Normative references

The following referenced documents are indispensable for the application of this document. For dated references, or references to a version number, only the edition cited applies. For undated references and where there is no reference to a version number, the latest edition of the referenced document (including any amendments) applies.

ISO standards

NOTE 1   ISO standards are available from national standards institutes or from the International Organization for Standardization (ISO):

1, rue de Varembé, Case postale 56, 1211 Genève 20, SWITZERLAND
Tel: +41 22 749 0111; Fax: +41 22 733 3430; www.iso.ch

ISO/IEC 10646, *Information technology - Universal Multiple-Octet Coded Character Set (UCS)*

NOTE 2   ISO/IEC 10646 is technically equivalent to UNICODE 4.0.0 [5]

UPU standards

NOTE 3   UPU standards are available on subscription from the UPU International Bureau:

Weltpoststrasse 4, Case postale 13, 3000 Berne 15, SWITZERLAND
Tel: +41 31 350 3111; Fax: +41 31 350 3110; www.upu.int

UPU Standards glossary

IEEE specifications

NOTE 4   IEEE specifications are available on-line from IEEE:

IEEE Corporate Office, 3 Park Avenue - 17th Floor, New York, NY 10016-5997, U.S.A.
Tel: +1 212 419 7900; Fax: +1 212 752 4929; shop.ieee.org/ieeestore

IEEE 802.3:2002, *Information Technology - Telecommunication & Information Exchange Between Systems - LAN/MAN - Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*

NOTE 5   Commonly referred to as the Ethernet standard.

TIA/EIA specifications

NOTE 6   TIA/EIA specifications can be ordered online from Global Engineering Documents: http://global.ihs.com

TIA/EIA-422-B-94 (R2000), *Electrical Characteristics of Balanced Voltage Digital Interface Circuits*

NOTE 7   Commonly referred to as RS-422.

TIA/EIA-568-B-1, *Commercial building telecommunications cabling standards - Part 1: General requirements*

TIA/EIA-568-B-2, *Commercial building telecommunications cabling standards – Part 2: Balanced twisted-pair cabling components*

Internet RFCs

NOTE 8 Internet RFCs (Requests for Comment) are available from the Internet Engineering Task Force:

c/o Corporation for National Research Initiatives,
1895 Preston White Drive, Suite 100, Reston, VA 20191-5434, U.S.A.
Tel: +1 703 620 8990; Fax: +1 703 620 9071; www.ietf.org

RFC 791, *Internet Protocol – DARPA Internet programme – Protocol specification*

NOTE 9 Commonly referred to as IP or, in combination with TCP, as TCP/IP.

RFC 793, *Transmission Control Protocol – DARPA Internet programme – Protocol specification*

NOTE 10 Commonly referred to as TCP or, in combination with IP, as TCP/IP.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the UPU Standards glossary and the following apply.

3.1
big endian
method of storing byte oriented data in which the most significant byte of the data is stored in the memory location with the lowest memory address

3.2
mail entity
mail item or collection of mail items which is constrained to form a physical unit

NOTE   In this standard mail entity is used in the sense of a single item on which is printed.

EXAMPLE 1   a single letter, a single parcel, a collection of letters in a tray, a roller cage containing a collection of trays, several pallets containing trays that are loaded onto a vehicle or an airplane.

3.3
UNICODE
universal character encoding, maintained by the Unicode Consortium (http://www.unicode.org/), that provides the basis for processing, storage and interchange of text data in any language

NOTE   This standard uses UNICODE version 4.0.0 [5] subset UTF-8 and stores strings as big endian (see 3.1).

3.4
sequencing
process in which one or more input streams of mail entities are merged into a single output stream in which the sequence of individual entities has operational significance for further processing

EXAMPLE 2   The organisation of a group of mail entities that are to be delivered by a delivery agent during a single delivery round into the sequence in which the agent will pass their delivery points.

NOTE   Sorting and sequencing can be combined into a single process. In this case, each output stream resulting from sorting is sequenced.