INTERNATIONAL STANDARD

IEC 60839-7-3

First edition
2001-03

Alarm systems –

Part 7-3:
Message formats and protocols for serial data interfaces in alarm transmission systems – Common data link layer protocol

Systèmes d'alarme –

Partie 7-3:
Formats de message et protocoles pour les interfaces de données série dans les systèmes de transmission d'alarme – Protocole de la couche commune de liaison de données

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ALARM SYSTEMS –

Part 7-3: Message formats and protocols for serial data interfaces in alarm transmission systems – Common data link layer protocol

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
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6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60839-7-3 has been prepared by IEC technical committee 79: Alarm systems.

The text of this standard is based on the following documents:

FDIS	Report on voting
79/200/FDIS	79/210/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annex A forms an integral part of this standard.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this standard may be issued at a later date.

IEC 60839-7-3 forms one of a number of related parts presented under the general title: Alarm systems – Part 7: Message formats and protocols for serial data interfaces in alarm transmission systems:

IEC 60839-7-1:	General
IEC 60839-7-2:	Common application layer protocol
IEC 60839-7-3:	Common data link layer protocol
IEC 60839-7-4:	Common transport layer protocol
IEC 60839-7-5:	Alarm system interfaces employing a two-wire configuration in accordance with ISO/IEC 8482
IEC 60839-7-6:	Alarm system interfaces employing ITU-T Recommendation V.24/V.28 signals
IEC 60839-7-7:	Alarm system interfaces for plug-in alarm system transceivers
IEC 60839-7-11:	Serial protocol for use by digital communicator systems using ITU-T Recommendation V.23 signalling at interfaces with the PSTN
IEC 60839-7-12:	PTT interfaces for dedicated communications using ITU-T Recommendation V.23 signalling
IEC 60839-7-20:	Terminal interfaces employing ITU-T Recommendation V.24/V.28 signalling

ALARM SYSTEMS –

Part 7-3: Message formats and protocols for serial data interfaces in alarm transmission systems – Common data link layer protocol

1 Scope

This part of IEC 60839 specifies the data link layer message structure, formats and transmission procedures which should be used at standard serial data interfaces in alarm transmission systems where the transmission network employed does not offer a standard protocol. This is necessary in order to ensure compatibility of equipment from different suppliers.

The standard applies equally to the transmission of alarms and other messages to/from intrusion, fire, access control and social alarm systems, and to the transmission of information to/from other similar systems.

The protocol is based on a simple poll response algorithm, with a single MASTER and one or more SLAVEs. The protocol defined allows for point-point and point-multipoint operation. Multipoint to multipoint operation is not supported, however the structure does support the transmission of messages from one SLAVE to another, using the MASTER as a simple router.

The structure follows the OSI recommendations for a layered protocol to allow flexibility in the use of the physical layer.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60839. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60839 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60839-5-1, *Alarm systems – Part 5: Requirements for alarm transmission systems – Section 1: General requirements for systems*

IEC 60839-7-1, *Alarm systems – Part 7-1: Message formats and protocols for serial data interfaces in alarm transmission systems – General*

3 Definitions

For the purpose of this part of IEC 60839, the definitions in IEC 60839-7-1 apply.

4 Abbreviations

The abbreviations in IEC 60839-7-1 apply.

5 General

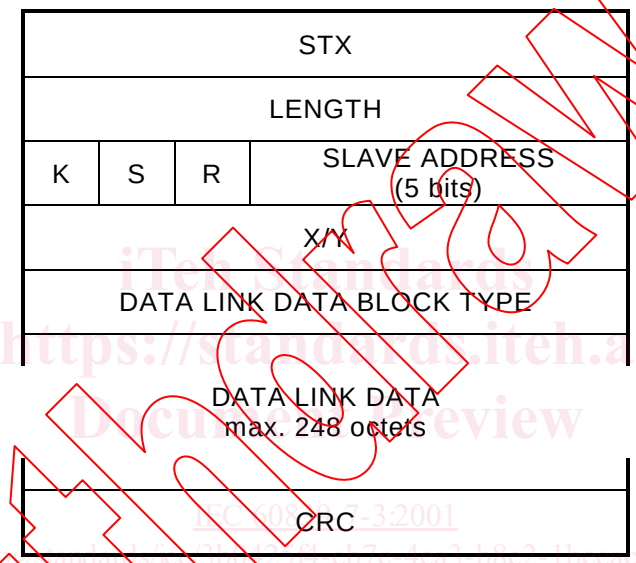
The basic protocol employed is a poll-response, with a single MASTER. Where there is more than a single SLAVE, the MASTER will normally poll each slave in turn.

Messages requiring transmission shall be formatted into one or more data link data blocks, which shall be transmitted in order to the intended destination.

Each transmitted data link data block shall be explicitly acknowledged before the transmission of a subsequent block.

6 Data link data block

The data link shall transmit messages with the following structure:



The STX octet shall be 02 HEX.

The message LENGTH shall be the number of octets following the LENGTH octet up to (and including) the CRC.

The bit K (bit 7 of 3rd octet) shall be set (=1) to specify a message in which the data link layer authentication (DLLA) function is active, and unset (=0) where it is not.

The bit R (bit 5 of 3rd octet) is reserved and should be unset (=0).

The bit S (bit 6 of 3rd octet) is a sequence bit, and shall initially be unset (=0). The bit shall be set (=1) in the INIT DLLA data link data block type and shall be toggled for each new message transmitted by the MASTER. A SLAVE shall always set the S bit equal to the corresponding bit in the incoming message.

The X/Y octet is set to X for messages transmitted from the MASTER, and to Y for messages transmitted from a SLAVE.

The CRC shall be a 2-octet cyclic redundancy check computed using the polynomial generator $X^{16}+X^{12}+X^5+1$.

NOTE This standard mostly refers to the communications between a MASTER and a single SLAVE. In practice, the MASTER will communicate with several SLAVEs, interspersing their messages on the common transmission medium. The values of X, Y and S are particular to an individual SLAVE and are not affected by intervening communications with other SLAVEs. For example, if the value of S used to poll one SLAVE is 1 then, irrespective of the number of other SLAVEs polled after that, the next poll to the original SLAVE will use S=0 (assuming the original poll was successful).

7 Basic transmission protocol

Unless otherwise stated the protocol between the MASTER and each SLAVE is independent of the communication with other SLAVEs.

The following applies to the communication with an individual SLAVE. Intervening communications with other SLAVEs is not shown.

Details of data link data block types are given in annex A.

7.1 Message time-out

Message time-out is defined as the maximum allowable time between the end of a message sent and the reception of the first octet of the corresponding response. The message time-out will be equal for all types of messages. The message time-out time is related to the transmission delay stated in table 1 of IEC 60839-5-1.

7.2 Restart time-out

Restart time-out is defined as the minimum time a potential MASTER shall see no activity on the network before it attempts to become MASTER itself. For each network a time-out value (in milliseconds) shall be calculated as follows:

Time-out = (ADD × 50 ms) + 3 000 ms

Where ADD is the network address of the node. A tolerance of +10 ms is allowed on this value.

7.3 Network addresses

Each node on the network shall be allocated a unique address.

The protocol does not include any features to detect or inhibit the multiple use of an address (except that this would cause a message clash and hence multiple message errors).

Valid addresses are in the range 01-1F HEX

NOTE 01-1F HEX = 0000 0001 - 0001 1111 binary system and 01-1F HEX = 1-31 decimal system.

7.4 MASTER initialization

Whilst there can only be one working MASTER on a network, it is possible for several items on a network to have the capability of being a MASTER. This allows the possibility of automatic reconfiguration in the event of failure of the MASTER (see 7.12.5).

Following power up, potential MASTERs should monitor the network for activity for a monitoring period of restart time-out in milliseconds. If any valid messages are detected (to or from any SLAVE), the monitoring period shall be restarted.

If a GENERAL POLL is received with the node's address it shall assume that another MASTER is active on the network, and shall respond in accordance with 7.5 (i.e. it shall become a SLAVE).

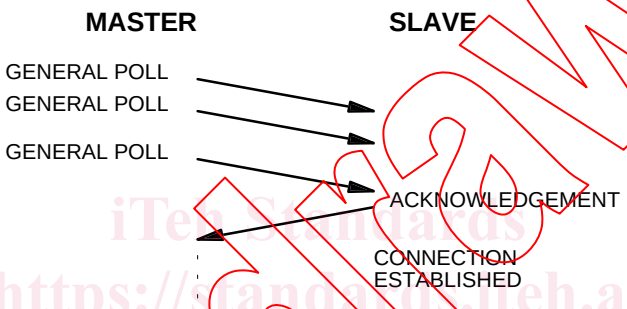
If no activity is detected, the node shall assume that it is the MASTER and commence polling each possible network address in accordance with 7.5.

If, prior to the successful initialization of at least one SLAVE, transmission errors are detected, then the node shall cease spontaneous transmission. It shall then restart its initialization but with a monitoring period of restart time-out in milliseconds.

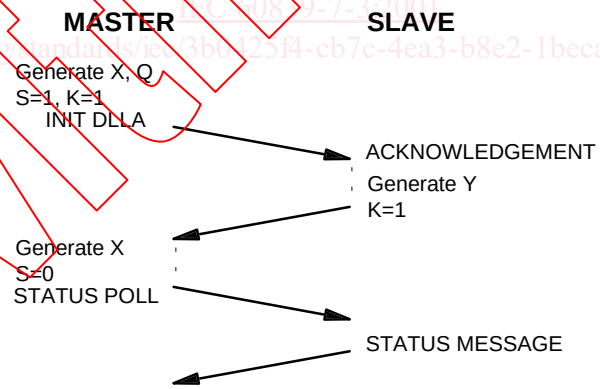
7.5 SLAVE initialization

The following sequence shall be used to initiate a new connection between a master and a slave. This mode should normally only be allowed when the MASTER is in a specified state, to prevent the substitution of alternate devices.

The MASTER shall issue a general poll to each of the SLAVEs to which it is not communicating, until it receives a reply. The general polls and the acknowledgement shall have the S and K bits unset (=0) and the X/Y octet shall be 00 HEX.



It shall then undertake the following initialization sequence:



Following the successful completion of the above sequence, the connection shall be in the normal state.

7.6 Data link layer authentication (DLLA) function

Prior to initialization the DLLA function is disabled and the value of the K bit and the X/Y octet are 0.

During initialization (of each SLAVE) the MASTER generates two random variables, X and Q and transmits these to the SLAVE as part of an INIT DLLA data link data block type.