



**SLOVENSKI STANDARD**  
**SIST EN 15430-1:2008**  
**01-marec-2008**

---

**Oprema za vzdrževalna dela zimske službe in službe za vzdrževanje cest - Zajem in prenos podatkov - 1. del: Zajem podatkov v vozilu**

Winter and road service area maintenance equipments - Data acquisition and transmission - Part 1: In vehicle data acquisition

Winterdienst- und Straßenbetriebsdienstausstattung - Datenerfassung und -übertragung - Teil 1: Datenerfassung im Fahrzeug

**iTeh STANDARD PREVIEW**

Matériels de viabilité hivernale et d'entretien des dépendances routieres - Acquisition et transmission des données - Partie 1: Acquisition des données véhiculaires

[SIST EN 15430-1:2008](https://standards.iteh.ai/catalog/standards/sist/51274c27-60d7-4e2e-9439-22176ad303d3/sist-en-15430-1-2008)

**Ta slovenski standard je istoveten z: EN 15430-1:2007**

---

**ICS:**

35.240.60

43.160

**SIST EN 15430-1:2008**

**en,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 15430-1:2008

<https://standards.iteh.ai/catalog/standards/sist/51274c27-60d7-4e2e-9439-22178ad303d3/sist-en-15430-1-2008>

ICS 43.160; 35.240.60

English Version

## Winter and road service area maintenance equipments - Data acquisition and transmission - Part 1: In vehicle data acquisition

Matériels de viabilité hivernale et d'entretien des dépendances routières - Acquisition et transmission des données - Partie 1 : Acquisition des données véhiculaires

Winterdienst- und Straßenbetriebsdienstausstattung - Datenerfassung und -übertragung - Teil 1: Datenerfassung im Fahrzeug

This European Standard was approved by CEN on 21 October 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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.

[SIST EN 15430-1:2008](https://standards.iteh.ai/catalog/standards/sist/51274c27-60d7-4e2e-9439-22178ad303d3/sist-en-15430-1-2008)

<https://standards.iteh.ai/catalog/standards/sist/51274c27-60d7-4e2e-9439-22178ad303d3/sist-en-15430-1-2008>



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

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

**Contents**

Foreword.....	3
Introduction .....	4
<b>1 Scope .....</b>	<b>6</b>
<b>2 Normative references.....</b>	<b>6</b>
<b>3 Terms and abbreviations .....</b>	<b>6</b>
<b>4 Communication between vehicle/equipment and board-computer .....</b>	<b>6</b>
4.1 General.....	6
4.2 Communication through RS232 .....	7
4.2.1 RS232 interface on vehicle/equipment “Data transmission handler” .....	7
4.2.2 RS232 interface on “Board-computer” .....	7
4.2.3 Communication protocol.....	8
<b>5 Definitions of variables, records and report.....</b>	<b>12</b>
5.1 General.....	12
5.2 Variable types.....	12
5.3 Recommended SLOTS for variable definitions.....	15
5.4 Definition of variables .....	18
5.4.1 General.....	18
5.4.2 General variables .....	18
5.4.3 General geographic position system variables .....	20
5.4.4 General vehicle and route variables.....	21
5.4.5 General road weather and road condition variables.....	21
5.4.6 Plough / Broom variables .....	22
5.4.7 Snow blower or cutter variables .....	23
5.4.8 Spreader / sprayer variables .....	23
5.4.9 Grass or branch cutting machine variables.....	26
5.4.10 Sweeper variables.....	27
5.4.11 Safety post cleaning machine variables.....	28
5.4.12 Boat plants cutter variables .....	29
5.5 Definition of records.....	29
5.5.1 General.....	29
5.5.2 Time synchronisation record (record code 0).....	30
5.5.3 Standard header record (record code 1).....	31
5.5.4 Standard footer record (record code 2).....	32
5.5.5 Trigger conditions for record code 3 and higher .....	32
5.5.6 Geographic position data record (record code 3).....	33
5.5.7 Vehicle and route data record (record code 4).....	34
5.5.8 Weather and road condition data record (record code 5) .....	35
5.5.9 Snowplough / broom data record (record code 6 / 7).....	36
5.5.10 Spreader / sprayer data record (record code 8).....	37
5.5.11 Snow blower / cutter data record (record code 9).....	39
5.5.12 Grass / branch cutter data record (record code 10).....	40
5.5.13 Sweeper data record (record code 11).....	42
5.5.14 Safety post cleaning machine data record (record code 12) .....	43
5.5.15 Boat plants cutter data record (record code 13).....	44
5.5.16 Free definable data record (record code 10000 and higher) .....	44
5.6 Report definition .....	45
Bibliography.....	47

## Foreword

This document (EN 15430-1:2007) has been prepared by CEN/TC 337/WG 3 "Interface between tools and vehicle", the secretariat of which is held by UNI-CUNA, under the direction of Technical Committee CEN/TC 337 "Winter maintenance and road service area maintenance equipment", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard : Austria, Belgium, Bulgaria, 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.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 15430-1:2008

<https://standards.iteh.ai/catalog/standards/sist/51274c27-60d7-4e2e-9439-22178ad303d3/sist-en-15430-1-2008>

## Introduction

This protocol is meant to be used for data acquisition in fleet management applications in the field of municipal vehicles. The purpose of the protocol is to define how data of a vehicle or equipment is generated, stored and transferred to a board-computer system in the vehicle and from the board-computer to the software application in the office (refer to Figure 1). On the equipment or vehicle the data is generated by a “Data generator”. This data is stored, if present, into a buffer-memory. The “Data transmission handler” will send the data present in the buffer-memory to the “Board-computer” or “Data Acquisition System”. The buffer-memory is there to ensure that data does not get lost in case there is no transmission possible. The size or type of the buffer is not defined in this proposal. If there is no buffer or the buffer is too small to store new data, data will get lost.

To synchronise time-stamps of the vehicle/equipment with the Board-computer, a special record for time synchronisation is defined.

In this part the data acquisition and communication from vehicle/equipment to the Board-computer is defined.

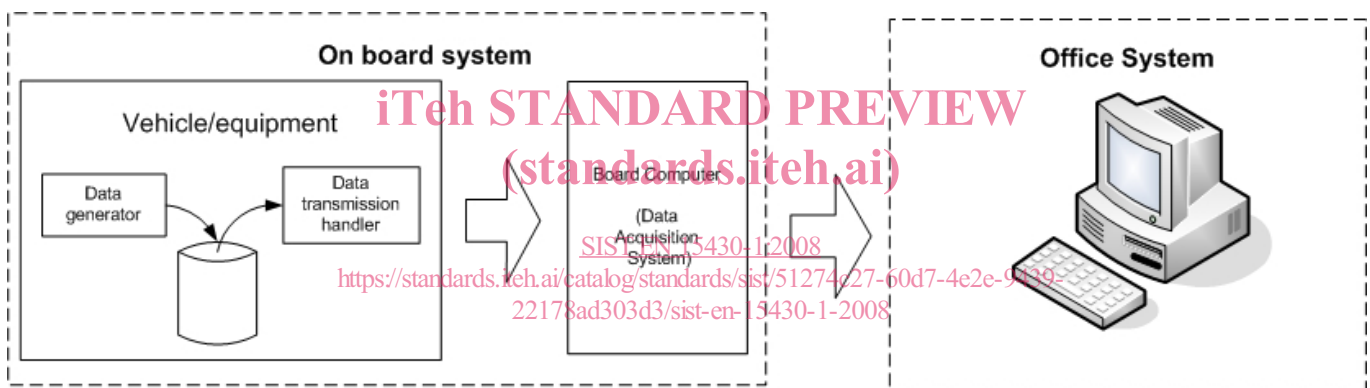
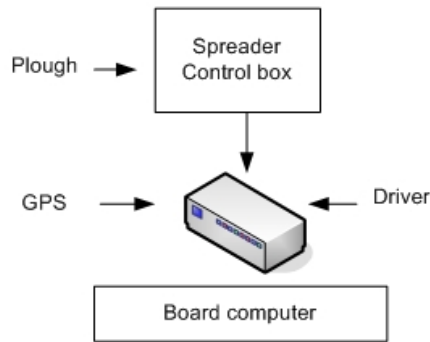


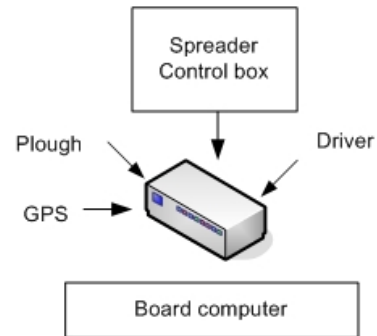
Figure 1 – Architecture

In general, the data is a semi-colon (“;”) separated ASCII text for separation of record codes and values of variables. CR+LF is used for separation of records (one record is one line of text).

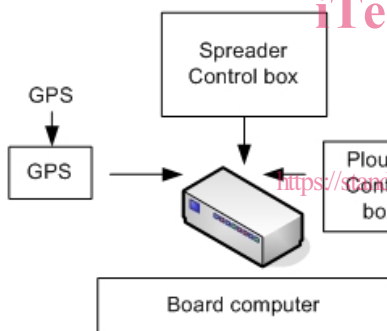
Examples of an on-board system configuration



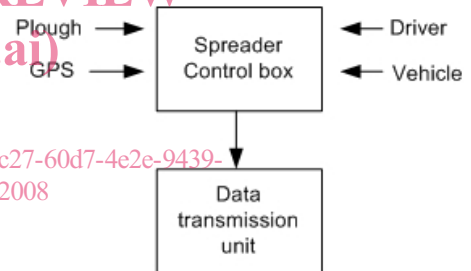
(a) Spreader control box generates spreader and plough data, acquired by board computer;



(b) Spreader control box generates spreader data, acquired by board computer; Board computer adds plough, GPS and driver data



(c) Spreader control box generates spreader data, plough control box generates plough data, GPS box generates GPS data, acquired by board computer



(d) Spreader control box generates spreader, plough, GPS, driver and vehicle data and sends this to the office through the data transmission unit ( spreader control box is board computer)

Figure 2 – Diagram of possible connections

## 1 Scope

This European Standard specifies a standardized protocol for downloading data from the equipment control box to an in-vehicle board computer to ensure interchangeability between a vehicle and different equipments that the same vehicle can carry.

It specifies the interface connection as well as variables, records and reports which permit standardized protocol to cover applications with the greatest possible variety of equipments for performing winter maintenance and road service area maintenance.

## 2 Normative references

ISO 8859-1, *Information technology - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1*

NMEA 0183, *Interface Standard*

TIA-232-F, *Interface between data terminal equipment and data circuit-terminating equipment employing serial binary data interchange (RS232)*

SAE J1939/71, *Recommended practice for serial control and communications vehicle network - Vehicle application layer*

## 3 Terms and abbreviations

ACK	Acknowledge (ASCII control code 06 <sub>h</sub> )
ASCII	American national Standard Code for Information Interchange
Bps	Bits per second
CRC-16	Cyclic Redundancy Code with 16 bits
CR	Carriage Return (ASCII control code 0D <sub>h</sub> )
EOT	End Of Transmission (ASCII control code 04 <sub>h</sub> )
h	Number before h is in hexadecimal notation
IEEE	Institute of Electrical and Electronics Engineers
LF	Line Feed (ASCII control code 0A <sub>h</sub> )
NAK	Negative acknowledge (ASCII control code 15 <sub>h</sub> )
SOH	Start Of Header (ASCII control code 01 <sub>h</sub> )
TBD	To Be Defined
↵	CR + LF (carriage return + line feed)

## 4 Communication between vehicle/equipment and board-computer

### 4.1 General

The data exchange between vehicle/equipment “Data transmission handler” and the “Board-computer” must follow at least one of the communication standards described in the present document version or future release. Until



now, only the RS232 standard (TIA-232-F) is defined as a communication standard so that means that at the present a compliant EN 15430 "Data transmission handler" has to supply a RS232 interface , if in the future other standard interfaces will be defined (e.g. CAN BUS, USB ...) a compliant EN 15430 future "Data transmission handler" will have to supply at least one of the communication standard until that time is defined.

## 4.2 Communication through RS232

### 4.2.1 RS232 interface on vehicle/equipment "Data transmission handler"

- Connector: SUB-D 9p female
  - Pin 2 = Transmit Data
  - Pin 3 = Receive Data
  - Pin 5 = Signal Ground
- Baud rate: 1 200 Bps...115 200 Bps, default 9 600 Bps. Rate can be programmable (optional)  
Remark: the baud rate must be sufficient for a worst case amount of data to be send with retries.
- Data bits: 8
- Stop bits: 1
- Parity: No
- Data format: according to ISO 8859-1 (ASCII)
- Handshaking: by software with ACK, NAK ASCII control codes, refer to 4.2.3
- Transmission control by SOH and EOT ASCII control codes, refer to 4.2.3
- Data validity check: CRC-16/CCITT, refer to 4.2.3

### 4.2.2 RS232 interface on "Board-computer"

- Connector: SUB-D 9p male
  - Pin 2 = Receive Data
  - Pin 3 = Transmit Data
  - Pin 5 = Signal Ground
- Baud rate: 1 200 Bps...115 200 Bps, default 9 600 Bps. Rate *must* be programmable or automatically detected (autobaud)
- Data bits: 8
- Stop bits: 1
- Parity: No
- Data format: according to ISO 8859-1 (ASCII)
- Handshaking: by software with ACK, NAK ASCII control codes, refer to 4.2.3

- Transmission control by SOH and EOT ASCII control codes, refer to 4.2.3
- Data validity check: CRC-16/CCITT, refer to 4.2.3

### 4.2.3 Communication protocol

#### *Transmission of a record*

In this definition a message to be communicated consists of one record. Records are terminated by CR+LF (a record is one line of text). In general, a message is sent by the sender (e.g. the "Data transmission handler" of a spreader) and received by the receiver (e.g. the Board-computer). After power up, communication is always started by the vehicle/equipment "Data transmission handler" sending its first message (this is the time synchronisation record). Refer to Figure 4 for flow charts of the sender and receiver algorithms.

The receiver will check the validity of a message by testing if the CRC-16 value corresponds to the data in the message received. If the data is valid, the receiver sends an ACK. The sender can now send a new message. If the data is invalid, the receiver sends a NAK. Then, the sender will try to send the same message again for a maximum of 2 times. If the message still fails, the message is considered to be lost. Preferably, a notification is given to the user (operator) that data has been lost by the sender and/or the receiver.

Remark: The receiver sends an ACK or a NAK as a single character without other data. The ACK or NAK refers to the latest message sent by the sender. To avoid record synchronisation problems between sender and receiver, the sender must ignore any ACK or NAK received during the transmission of a message until the last byte is sent (EOT character). Also, the receiver is not allowed to send an ACK or NAK during the reception of a message until the last byte is received (EOT character). (standards.iteh.ai)

#### *Calculation of the CRC-16 value*

The CRC value is calculated according to the ITU<sup>1</sup> definition. The CRC value is calculated over all record bytes, starting with the record code, ending with CR+LF. The polynomial used is  $x^{16} + x^{12} + x^5 + x^0 = 11021_h$  (i.e. XOR mask 1021<sub>h</sub>) and initial value FFFF<sub>h</sub>.

The value is written in ASCII characters in hexadecimal code with capitals (0..9, A..F).

#### *Sender without receiving options for handshaking*

For old vehicle/equipment "Data transmission handlers", it may be impossible to receive data. In this case the sender cannot respond to an ACK or NAK, i.e. there is no handshaking feature. Hence, the sender will send a new message. This may cause in the result that data gets lost, e.g. in case the Board-computer was not started up yet or if transmission failed. It is up to the user to handle this problem (for example to connect power supply such that power-up is always at the same time for sender and transmitter).

#### *Synchronisation of communication*

To synchronise communication between sender and receiver, a message always starts with an SOH and ends with an EOT. If the receiver is not synchronised yet but the sender is already transmitting a message (e.g. when the Board-computer starts up while the spreader "Data transmission handler" is sending), all data before the first SOH will be ignored. If the receiver is synchronised but detects an SOH before an EOT, the previous, unfinished message is ignored.

#### *Time synchronisation between sender and receiver*

In general, the sender system time and the receiver system time are not equal. To synchronise messages to the system clock of the receiver, a time synchronisation record is introduced. This Time Sync record (refer to 5.5.2) contains the actual system time of the sender at the start of record transmission (with a maximum error of  $\pm 0,5$  s).

<sup>1</sup> International Telecommunication Union.

The receiver must record its system time at the moment of reception of a message. In case of the reception of a Time Sync record, the receiver can calculate the difference between its own system clock and the system clock of the sender. Now, the receiver can time-synchronise every message received from the sender and thereby synchronise this data to other data generated by other sources. The board computer must contain a real time clock which runs even if the board computer has no power. The electronic system on the vehicle/equipment must have a real time clock which runs even when this system has no power, or, a software clock must be implemented made which starts at date 1-1-2000 and time 00:00:00 and is updated every second.

A Time Sync record, is sent by the sender

- as the first message starting the communication,
- after 10 s if the receiver does not respond to a message with an ACK or a NAK; after a successful transmission of this record, the latest message before the time synchronisation record is transmitted again,
- if the system clock of the sender is adjusted, reset or set to any value which would cause a jump in time.

*Loss of data*

Data will get lost in case of

- "Data transmission handler" without handshaking feature which is sending while reliable communication is not possible,
- overflow of the buffer-memory,
- 2 unsuccessful retransmissions after a NAK.

iTech STANDARD PREVIEW  
(standards.itech.ai)

In case the "Data transmission handler" supports handshaking, it is mandatory sending the header record as the first record of a report (note: the Time Sync record is not part of the report). i.e. the header record may not get lost.

<https://standards.itech.ai/catalog/standards/sist/51274c27-60d7-4e2e-9439-3d3/sist-en-15430-1-2008>

Example of a message is shown in graphical form:

Start (1 byte)	Data (codes + values, ";" separated) (x bytes)	CR+LF (2 bytes)	CRC-16 (4 bytes)	End (1 byte)
----------------	--	-----------------	------------------	--------------

Example in ASCII:

SOH	1;10;1602048;0441021;5;Abc;Equip1;;;	CR	LF	3230	EOT
-----	--------------------------------------	----	----	------	-----

Example in hexadecimal notation:

01	313B31303B313630323034383B303434313032313B353B4162633B4571756970313B3B3B	0D	0A	33 32 33 30	04
----	--	----	----	-------------	----

Communication example:

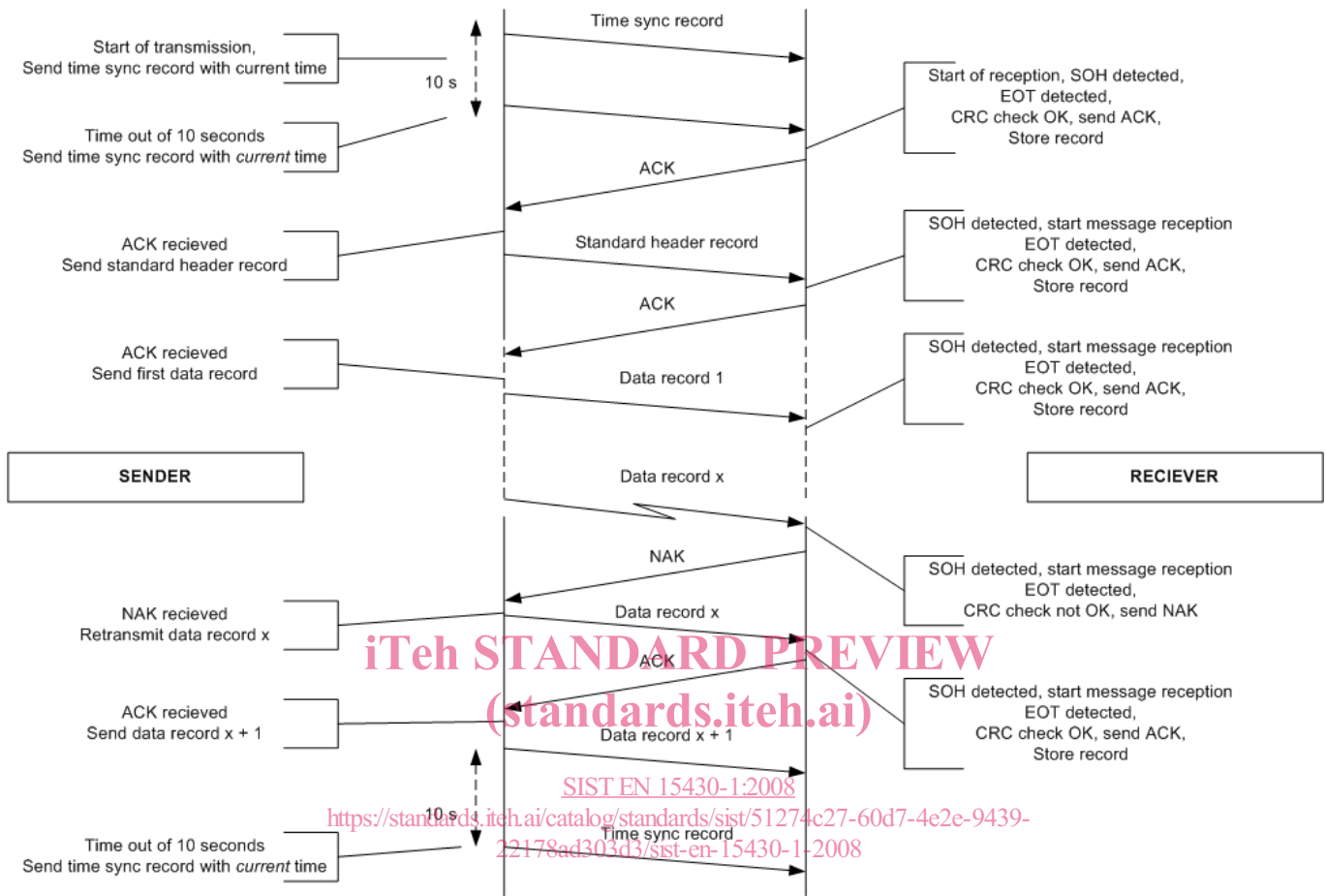
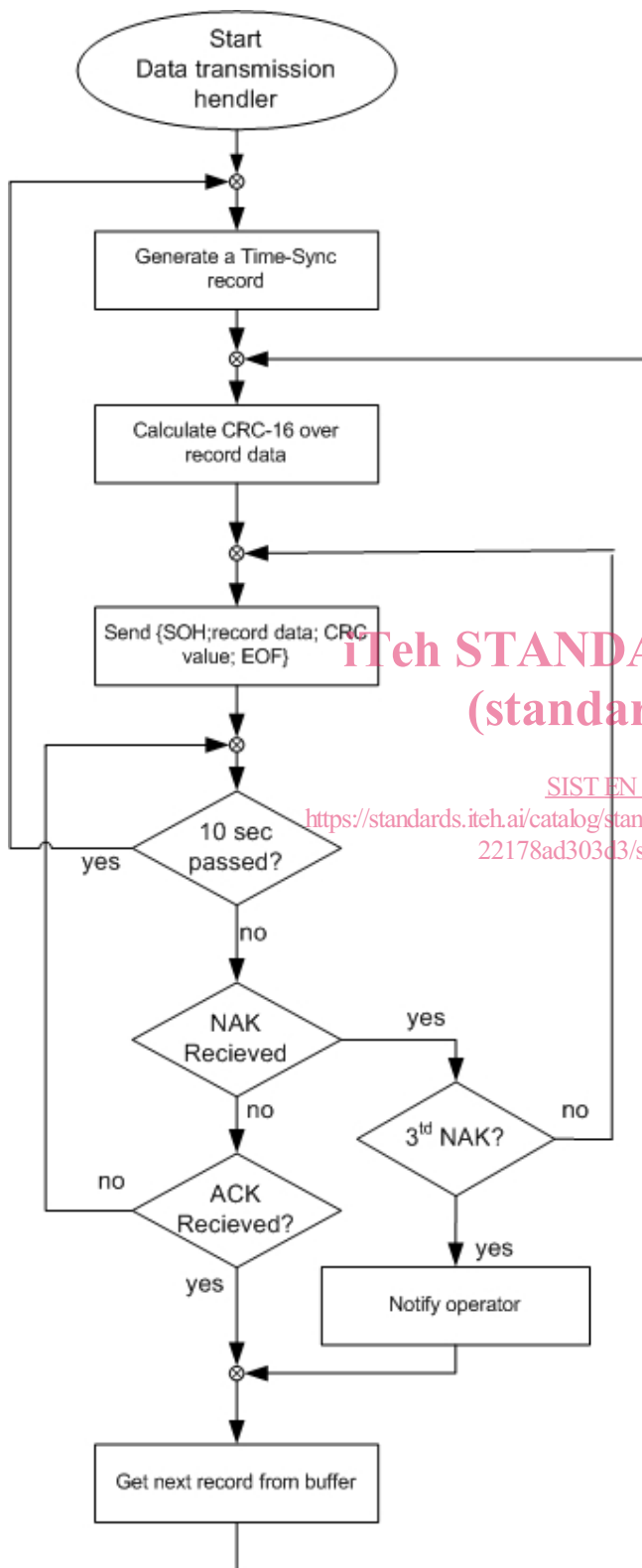


Figure 3 – Flow diagram

Sender algorithm:



Receiver algorithm:

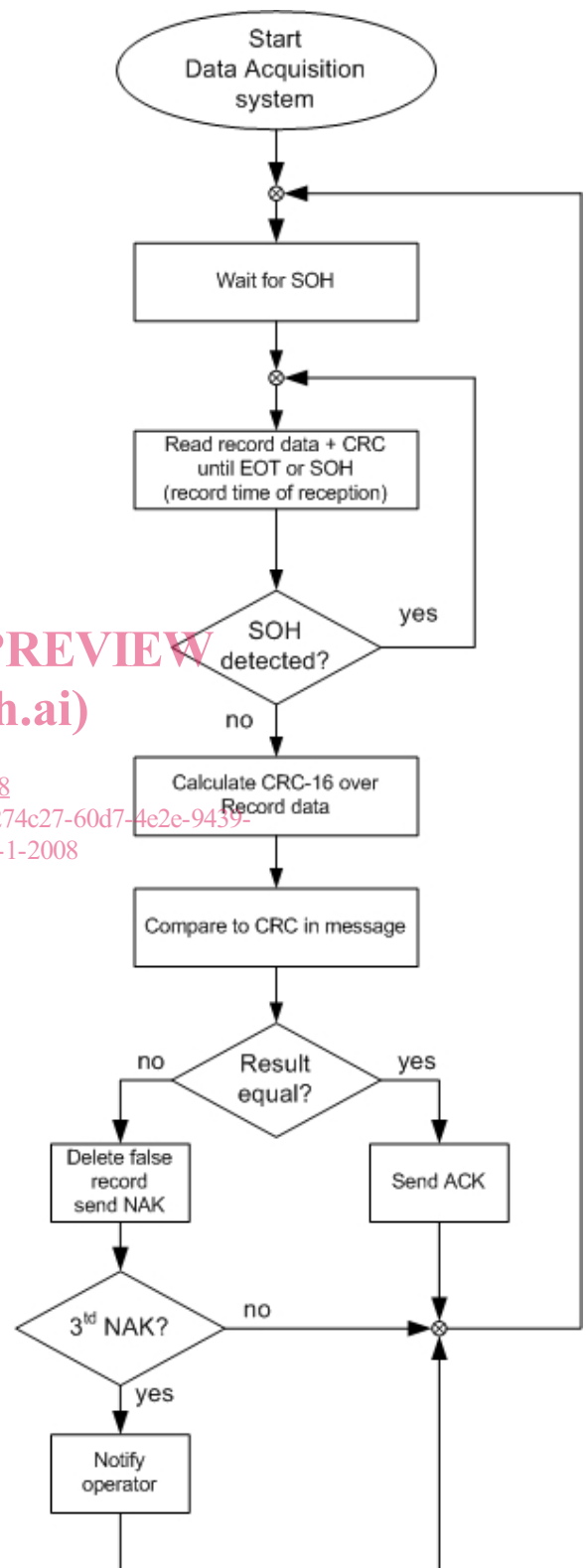


Figure 4 - Flow chart

STANDARD PREVIEW  
(standards.iteh.ai)  
SIST EN 15430-1:2008  
<https://standards.iteh.ai/catalog/standards/sist/51274c27-60d7-4e2e-9439-22178ad303d3/sist-en-15430-1-2008>