

Australian Standard™

**Supervisory control and data  
acquisition (SCADA)—Generic  
telecommunications interface and  
protocol**

**Part 2: Fire alarm systems**



This Australian Standard was prepared by Committee IT/24, Supervisory Control and Data Acquisition (SCADA). It was approved on behalf of the Council of Standards Australia on 17 July 2000 and published on 25 September 2000.

---

The following interests are represented on Committee IT/24:

Association of Consulting Engineers Australia  
Australasian Fire Authorities Council  
Australasian Railway Association  
Australian Communications Authority  
Australian Electrical and Electronic Manufacturers Association  
Australian Gas Association  
Australian Information Industry Association  
Australian Pipeline Industry Association  
Australian Security Industry Association Limited  
Australian Telecommunications Users Group  
AUSTROADS  
Cable & Wireless Optus Limited  
CIGRE AP35  
Electricity Supply Association of Australia  
Fire Protection Association Australia  
Institution of Engineers Australia  
Telstra Corporation Limited  
Water Services Association of Australia

---

#### **Keeping Standards up-to-date**

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Australia web site at [www.standards.com.au](http://www.standards.com.au) and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Australian Standard*, has a full listing of revisions and amendments published each month.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at [mail@standards.com.au](mailto:mail@standards.com.au), or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

---

*This Standard was issued in draft form for comment as DR 99199.*

**STANDARDS AUSTRALIA**

---

**RECONFIRMATION**

**OF**

**AS 4418.2—2000**

**Supervisory control and data acquisition (SCADA)—Generic telecommunications  
and interface protocol  
Part 2: Fire alarm systems**

---

**RECONFIRMATION NOTICE**

Technical Committee EL-050 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 16 June 2016.

The following are represented on Technical Committee EL-050:

Australian Industry Group  
Chamber of Commerce and Industry Queensland  
Energy Networks Association  
Victoria University

## NOTES

Australian Standard™

**Supervisory control and data  
acquisition (SCADA)— Generic  
telecommunications interface and  
protocol**

**Part 2: Fire alarm systems**

Originated as AS 4418.2—1996.  
Second edition 2000.

**COPYRIGHT**

© Standards Australia International

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia International Ltd  
GPO Box 5420, Sydney, NSW 2001, Australia  
ISBN 0 7337 3557 6

## PREFACE

This Standard was prepared by the Standards Australia Committee IT/24 on Supervisory Control and Data Acquisition as a revision to AS 4418.2 — 1996.

The objective of this Standard is to provide fire equipment manufacturers and fire alarm monitoring organizations with a telecommunications protocol for connecting fire alarm systems to monitoring centres, in order to achieve system and equipment interoperability. Other industry groups may also find the requirements applicable. The objective of this revision is to enhance interoperability and to add additional features based on practical implementation of the Standard.

This Standard is consistent with requirements developed by IEC and published in IEC 60870, *Telecontrol equipment and systems*, the relevant Parts of which have been issued as Australian Standard, AS 60870 of the same name. This Part has been prepared as one of a possible series of Standards for SCADA applications. AS 4418.1 defines the general requirements, including security and addressing, for SCADA networks and this Part is a specific fire alarm monitoring application. The two Parts should be read in conjunction.

Other applications which could form further Parts of this series of Standards could cover areas such as systems for service utilities, transport and security.

Standards Australia/Standards New Zealand Committee FP/2 on Automatic Fire Detection, Warning and Intercom Systems has prepared a product Standard for alarm signalling equipment designed to utilize this telecommunications protocol, AS 4428.6 *Fire detection, warning, control and intercom systems—Control and indicating equipment Part 6: Alarm signalling equipment*. In addition, Committee FP/2 has prepared a Standard which specifies minimum alarm monitoring network performance parameters which network designers are able to use to ensure adequate performance of monitored fire alarm systems, AS 1670.3 *Fire detection, warning, control and intercom systems —Control and indicating equipment —System design, installation, and commissioning Part 3: Monitoring network performance*.

The term 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

## CONTENTS

|                                                                              | <i>Page</i> |
|------------------------------------------------------------------------------|-------------|
| SECTION 1 SCOPE AND GENERAL                                                  |             |
| 1.1 SCOPE .....                                                              | 4           |
| 1.2 APPLICATION .....                                                        | 4           |
| 1.3 REFERENCED AND RELATED DOCUMENTS .....                                   | 4           |
| 1.4 DEFINITIONS .....                                                        | 5           |
| SECTION 2 PROTOCOL STRUCTURE                                                 |             |
| 2.1 GENERAL .....                                                            | 6           |
| SECTION 3 PHYSICAL LAYER                                                     |             |
| 3.1 SELECTIONS FROM ISO AND ITU-T STANDARDS .....                            | 7           |
| SECTION 4 LINK LAYER                                                         |             |
| 4.1 TRANSMISSION FRAME FORMAT .....                                          | 8           |
| 4.2 LINK TRANSMISSION PROCEDURES .....                                       | 9           |
| SECTION 5 STRUCTURE OF APPLICATION DATA                                      |             |
| 5.1 GENERAL .....                                                            | 11          |
| SECTION 6 DEFINITION AND CODING OF APPLICATION INFORMATION<br>ELEMENTS       |             |
| 6.1 GENERAL .....                                                            | 13          |
| 6.2 TYPE IDENTIFICATION (Figure 6.1) .....                                   | 13          |
| 6.3 VARIABLE STRUCTURE QUALIFIER (Figure 6.2) .....                          | 15          |
| 6.4 CAUSE OF TRANSMISSION (Figure 6.3) .....                                 | 16          |
| 6.5 ADDRESS OF ALARM SYSTEM DATA TERMINAL EQUIPMENT (Figure 6.4) .....       | 18          |
| 6.6 INFORMATION OBJECT ADDRESS (Figure 6.5) .....                            | 18          |
| 6.7 INFORMATION ELEMENTS .....                                               | 19          |
| SECTION 7 DEFINITION AND PRESENTATION OF SPECIFIC ASDUs                      |             |
| 7.1 GENERAL .....                                                            | 28          |
| 7.2 ASDUs FOR PROCESS INFORMATION IN MONITOR DIRECTION .....                 | 28          |
| 7.3 ASDUs FOR PROCESS INFORMATION IN CONTROL DIRECTION .....                 | 30          |
| 7.4 ASDUs FOR SYSTEM INFORMATION IN MONITOR DIRECTION .....                  | 33          |
| 7.5 ASDUs FOR SYSTEM INFORMATION IN CONTROL DIRECTION .....                  | 36          |
| 7.6 ASDUs FOR FILE TRANSFER .....                                            | 41          |
| SECTION 8 BASIC APPLICATION FUNCTIONS                                        |             |
| 8.1 SELECTIONS FROM AS 60870.5.5 .....                                       | 45          |
| SECTION 9 TRANSMISSION PROCEDURES                                            |             |
| 9.1 GENERAL .....                                                            | 46          |
| 9.2 FAS EVENT .....                                                          | 46          |
| 9.3 DTE POWER ON .....                                                       | 47          |
| 9.4 ASE EVENT .....                                                          | 48          |
| 9.5 LINK INTEGRITY CHECKING .....                                            | 49          |
| 9.6 NOTIFICATION OF LINK FAILURE .....                                       | 49          |
| APPENDIX A ALARM SYSTEM DATA TERMINAL EQUIPMENT (DTE)<br>FUNCTIONALITY ..... | 50          |

## STANDARDS AUSTRALIA

## Australian Standard

**Supervisory control and data acquisition (SCADA)—Generic telecommunications interface and protocol****Part 2: Fire alarm systems**

## SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE**

The purpose of this Standard is to standardize the monitoring of fire alarm systems installed in remote premises, and connected to a monitoring centre.

**1.2 APPLICATION**

The protocol defined in this Standard is for connection-oriented networks. If a connectionless protocol is required, ITU-T Rec.X.400 addressing shall be used. Supervisory control and data acquisition (SCADA) networks for fire alarm monitoring applications shall comply with the relevant parts of AS 4418.1 and this Standard.

Whilst this Standard specifies many features and a high degree of functionality, smaller lower technology systems can still be accommodated. Most responses from a controlled station allow a particular message from an individual controlled station to not be implemented. This can be used by manufacturers to enable the production of partially functional, yet fully compliant, alarm system DTE. In addition, the text area available for the description of the location of the actuating devices may be used to describe the area of coverage of an individual alarm zone circuit, thus permitting the connection of collective control and indicating equipment (CIE). In this case, references to actuating devices should be read as alarm zone circuits.

NOTE: To assist manufacturers to detail the level of functionality available with individual alarm systems DTEs, Appendix A provides a simple tick-the-box information supplement to enable monitoring network providers and end users to make direct comparisons between equipment suppliers.

Whilst this Standard may be more easily implemented using dedicated point-to-point links, it may also be implemented using switched or packet networks as allowed in AS 60870-1-4.

**1.3 REFERENCED AND RELATED DOCUMENTS****1.3.1 Referenced documents**

The following documents are referred to in this Standard:

AS

|        |                                                                                                      |
|--------|------------------------------------------------------------------------------------------------------|
| 1670   | Fire detection, warning, control and intercom systems—System design, installation, and commissioning |
| 1670.3 | Part 3: Monitoring network performance                                                               |
| 2484   | Fire—Glossary of terms                                                                               |
| 2484.2 | Part 2: Fire protection and fire fighting equipment                                                  |
| 4418   | Supervisory control and data acquisition (SCADA)—Generic telecommunications interface and protocol   |
| 4418.1 | Part 1: General                                                                                      |

## AS

- 60870 Telecontrol equipment and systems
- 60870.1.3 Part 1: General considerations—Section 3: Glossary
- 60870.1.4 Part 1: General considerations—Section 4: Basic aspects of telecontrol data transmission and organization of Standards AS 60870.5 and IEC 60870-6
- 60870.5.1 Part 5: Transmission protocols—Section 1: Transmission frame formats
- 60870.5.2 Part 5: Transmission protocols—Section 2: Link transmission procedures
- 60870.5.3 Part 5: Transmission protocols—Section 3: General structure of application data
- 60870.5.4 Part 5: Transmission protocols—Section 4: Definition and coding of application information elements
- 60870.5.5 Part 5: Transmission protocols—Section 5: Basic application functions

## ISO

- 8482 Information technology—Telecommunications and information exchange between systems—Twisted pair multipoint interconnections

## ITU-T

- Rec.V.24 List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)
- Rec.V.28 Electrical characteristics for unbalanced double-current interchange circuits
- Rec.X.400 Message handling system and service overview

**1.3.2 Related documents**

Attention is drawn to the following related documents:

## AS

- 60870 Telecontrol equipment and systems
- 60870.1.1 Part 1: General considerations—Section 1: General principles
- 60870.1.2 Part 1: General considerations—Section 2: Guide for specifications
- 60870.2.1 Part 2: Operating conditions—Section 1: Power supply and electromagnetic compatibility
- 60870.3 Part 3: Interfaces (electrical characteristics)
- 60870.4 Part 4: Performance requirements

**1.4 DEFINITIONS**

For the purpose of this Standard, the definitions in AS 60870.1.3, AS 60870.5.4, AS 2484.2 and those below apply.

**1.4.1 Primary link**

The main communication link between the controlled and the controlling stations. In single path systems this would be the only link.

**1.4.2 Secondary link**

The alternative communication link between the controlled and the controlling stations in multipath systems.

## SECTION 2 PROTOCOL STRUCTURE

### 2.1 GENERAL

The IEC 60870-5 protocol is based on the three layer reference model ENHANCED PERFORMANCE ARCHITECTURE (EPA), as specified in AS 60870.5.3.

The physical layer uses ITU-T recommendations that provide binary symmetric and memoryless transmission on the required medium, in order to preserve the high level of data integrity of the defined block encoding method in the link layer.

The link layer consists of a number of link transmission procedures using explicit LINK PROTOCOL CONTROL INFORMATION (LPCI) that are capable of carrying APPLICATION SERVICE DATA UNITS (ASDUs) as link-user data. The link layer uses a selected frame format to provide the required integrity, efficiency and convenience of transmission.

The application user layer contains a number of 'application functions' that involve the transmission of ASDUs between source and destination.

The application layer of this Standard does not use explicit APPLICATION PROTOCOL CONTROL INFORMATION (APCI). This is implicit in the contents of the ASDU DATA UNIT IDENTIFIER field and in the type of link service used.

Figure 2.1 shows the EPA model and the selected standard definitions for this Standard.

|                                                              |                              |
|--------------------------------------------------------------|------------------------------|
| Selected application functions of<br>AS 60870.5.5            | <b>User Process</b>          |
| Selected application information elements<br>of AS 60870.5.4 | <b>Application (layer 7)</b> |
| Selected application service data units<br>of AS 60870.5.3   |                              |
| Selected link transmission procedures<br>of AS 60870.5.2     | <b>Link (layer 2)</b>        |
| Selected transmission frame formats<br>of AS 60870.5.1       |                              |
| Selected ITU-T recommendations                               | <b>Physical (layer 1)</b>    |

FIGURE 2.1 SELECTED STANDARDS FOR MONITORING FIRE ALARMS

## SECTION 3 PHYSICAL LAYER

### 3.1 SELECTIONS FROM ISO AND ITU-T STANDARDS

#### 3.1.1 General

The following fixed network configurations are supported:

- (a) Point-to-point.
- (b) Multiple point-to-point.
- (c) Dialled point-to-point.

The subset of the ITU-T Recs. V.24/V.28, defined in Clause 3.1.2, is valid.

NOTE: In this Standard the 'data circuit' is treated separately from the fire alarm system data terminal equipment (DTE) because it may be implemented by separate hardware. Consequentially, this Standard includes a full specification of the DTE/DCE (data circuit-terminating equipment) interface, but, only a requirement specification for suitable DCEs is given.

#### 3.1.2 Asynchronous V.24/V.28 DTE/DCE interface

This Standard specifies a subset of the ITU-T Rec. V.24, using the signal levels specified by Rec. V.28, shown in Table 3.1.

The minimum transmission speed shall be 2.4 kbit/s.

**TABLE 3.1**  
**SELECTIONS FROM V.24/V.28**

| Interchange circuit number | Interchange circuit name                   | From DCE | To DCE |
|----------------------------|--------------------------------------------|----------|--------|
| 102                        | Signal ground or common return             | —        | —      |
| 103                        | Transmitted data                           |          | x      |
| 104                        | Received data                              | x        |        |
| 105*                       | Request to send                            |          | x      |
| 106†                       | Ready for sending                          | x        |        |
| 107†                       | Data set ready                             | x        |        |
| 108*                       | Data terminal ready                        |          | x      |
| 109†                       | Data channel received line signal detector | x        |        |

\* May have constant potential.

† Not mandatory. It may be used to supervise the transmission circuit.

#### 3.1.3 Other compatible interfaces

Other interfaces such as ISO 8482 or interfaces to fibre optics and the like, shall be permitted by agreement between vendor and user.



## 4.2 LINK TRANSMISSION PROCEDURES

### 4.2.1 General

Only balanced transmission procedures as defined in AS 60870.5.2 shall be used. This means that the initiation of transmission procedures may be from either the controlling station or a controlled station.

The basic procedures use the SEND/CONFIRM service and the REQUEST/RESPOND service. Spontaneous transmissions have priority over cyclic transmissions.

The interface between link layer and the service user is not defined in this Standard.

### 4.2.2 Link LENGTH-field (see AS 60870.5.2 and Figure 4.1)

The maximum length of link frames shall be set at 255 octets. If required the maximum length for each direction may be different.

### 4.2.3 Link CONTROL-field (see AS 60870.5.2 and Figure 4.1)

The use of the single character ACK (E5), as allowed by AS 60870.5.1, is undefined by this Standard. For integrity purposes the fixed frame message with the control field set to ACK or NAK shall be used to avoid the possibility of data corruption or noise being mistaken for an ACK as shown in the following frame construction where LCT is the link control byte, AD0..3 is the address and SUM is the checksum of the control and address octets as specified by AS 60870.5.1. Station A shall be defined as the CONTROLLING STATION and station B as the CONTROLLED STATION or DTE as specified in AS 60870.5.2.

| 1 | 2   | 3   | 4   | 5   | 6   | 7   | 8 |
|---|-----|-----|-----|-----|-----|-----|---|
| 1 | LCT | AD0 | AD1 | AD2 | AD3 | SUM | 1 |
| 0 |     |     |     |     |     |     | 6 |

As an example, an acknowledge message from controlling station to DTE with address 0 will have the following hexadecimal content where further messages are acceptable:

10 80 00 00 00 00 90 16

Control field flags as specified in Table 4.1 shall be used.

**TABLE 4.1**  
**LINK CONTROL FIELD**

| Source               | Function code | Frame type and function                 | Used by messages                           |
|----------------------|---------------|-----------------------------------------|--------------------------------------------|
| Initiator<br>(PRM=1) | 0             | Send/Confirm: Reset of remote link      | Fixed length                               |
|                      | 1             | Send/Confirm: Reset of user process     | Fixed length                               |
|                      | 2             | Send/Confirm: Test function for link    | Fixed length                               |
|                      | 3             | Send/Confirm: User data                 | All ASDUs                                  |
|                      | 4             | Send/no reply: User data                | Not used                                   |
|                      | 9             | Request/respond: Request status of link | Fixed length                               |
| Responder<br>(PRM=0) | 0             | Confirm: ACK                            | Acknowledge                                |
|                      | 8             | Response: User data                     | Response ASDUs                             |
|                      | 1             | Confirm: NAK                            | Negative acknowledge of link message error |
|                      | 11            | Respond: Status of link                 | Fixed length                               |
|                      | 14            | Link service not functioning            | Fixed length                               |
|                      | 15            | Link service not implemented            | Fixed length                               |

Function codes that shall be used when sending an ASDU in the PRM=1 case are 3 and 4. Function code 3 shall be used for exchanges where there is no response required from the destination. Function code 4 shall be used for exchanges where a response of some kind is expected, for example a request ASDU and ASDUs that require an application layer acknowledge (ASDU 39).

For the responders, function codes 0, 1 and 8 shall be used.

#### **4.2.3.1** *Direction (DIR) flag*

The DIR flag shall be set by the message originating station. Station A to Station B transmission is defined as from the CMS to the ASE and for this the flag shall be set to 1. All transmissions from the ASE shall have the flag set to 0. The CMS may use this flag to determine that the transmission did come from an ASE and similarly the ASE may ignore transmission wrongly received from other ASE units.

#### **4.2.3.2** *Initiating/responding (PRM) flag*

The PRM flag shall be set to 1 in all messages transmitted by the station initiating the message exchange and conversely to 0 by the responding station. This shall be checked by each station in accordance with AS 60870.5.2 balanced transmission procedures.

#### **4.2.3.3** *Frame count bit (FCB)*

The FCB flag shall be alternately set to 0 and 1 for each message transmitted by a station as an indication of continuity. This shall be checked by each station in accordance with AS 60870.5.2 balanced transmission procedures to detect for lost message sequence.

#### **4.2.3.4** *Frame count validity (FCV)*

The FCV flag shall be used in accordance with AS 60870.5.2 balanced transmission procedures.

#### **4.2.3.5** *Data flow control (DFC)*

The DFC flag shall be set by the receiving station in accordance with AS 60870.5.2 balanced transmission procedures when it is too busy to process more messages. The transmitting station shall handle this in accordance with AS 60870.5.2 balanced transmission procedures.

#### **4.2.4** **Link ADDRESS-field (see AS 60870.5.2 and Figure 4.1)**

The address field A of the link shall be four octets as determined by a fixed system parameter. By default the link address shall be set to the DTE address. Different link addresses used shall be agreed between vendor and user.

Address A := UI32[1..32]<0..4 294 967 295>

#### **4.2.5** **Time out interval for repeated frame transmission**

The matched time out interval as described in AS 60870.5.2 shall be used. The time out interval ( $t_o$ ) shall be constant for each defined combination of transmission speeds, and set by a parameter in 10ms steps.

## SECTION 5      STRUCTURE OF APPLICATION DATA

### 5.1 GENERAL

The document AS 60870.5.3 describes the basic application data units in transmission frames of telecontrol systems. This Clause selects specific field elements out of this basic Standard and defines APPLICATION SERVICE DATA UNITS used in this Standard.

A LINK PROTOCOL DATA UNIT (LPDU) of this Standard shall contain no more than one APPLICATION SERVICE DATA UNIT (ASDU).

The ASDU shall be composed of a DATA UNIT IDENTIFIER and one, or more than one, INFORMATION OBJECTS (see Figure 5.1).

The DATA UNIT IDENTIFIER shall have the same structure for all ASDUs. The INFORMATION OBJECTS of an ASDU shall be always of the same structure and type, which are defined in the TYPE IDENTIFICATION field.

The structure of the DATA UNIT IDENTIFIER shall be:

- (a) 1 Octet      TYPE IDENTIFICATION.
- (b) 1 Octet      VARIABLE STRUCTURE QUALIFIER.
- (c) 1 Octet      CAUSE OF TRANSMISSION.
- (d) 4 Octets     COMMON ADDRESS OF ASDU.

The size of the address of the controlled station data terminal equipment shall be determined by a fixed system parameter, in this case 4 octets. The address of the controlled station data terminal equipment shall be the station address.

There shall be no data field LENGTH OF ASDU. Each frame shall have only a single ASDU available. The LENGTH OF ASDU shall be determined by the frame length (as announced in the link protocol length field) minus a fixed integer specified by a system parameter (which is 5 in the case of a four octet link address).

TIME TAGS (if present) shall belong either to a single information object (TIME TAG OF INFORMATION OBJECT) or to the complete ASDU (COMMON TIME TAG OF ASDU).

Where the TIME TAG OF INFORMATION OBJECT is used, the TIME TAG OF INFORMATION OBJECT shall be set to the event time. Where the common time tag of ASDU is used, the COMMON TIME TAG OF ASDU shall be set to the time the ASDU is ready to be sent.

NOTE: The controlling station may use the COMMON TIME TAG OF ASDU to determine the current time stored in the controlled station. This may be used to determine if the controlling station should send a C\_CS\_NA\_1 Clock Synch command to the controlled station to correct the controlled station's clock.

The INFORMATION OBJECT shall consist of an INFORMATION OBJECT IDENTIFIER (if present), a SET OF INFORMATION ELEMENTS and a TIME TAG OF INFORMATION OBJECT (if present).

The INFORMATION OBJECT IDENTIFIER shall consist only of the INFORMATION OBJECT ADDRESS. In all cases, the COMMON ADDRESS OF ASDU together with the INFORMATION OBJECT ADDRESS distinguishes the complete SET OF INFORMATION ELEMENTS within a specific system. The combination of both addresses shall be unambiguous per system. The TYPE IDENTIFICATION shall not be part of a COMMON ADDRESS or an INFORMATION OBJECT ADDRESS.

The SET OF INFORMATION ELEMENTs shall be either a SINGLE INFORMATION ELEMENT, a COMBINATION OF ELEMENTs or a SEQUENCE OF INFORMATION ELEMENTs.

|                                     |                         |                                             |                                     |
|-------------------------------------|-------------------------|---------------------------------------------|-------------------------------------|
| APPLICATION<br>SERVICE<br>DATA UNIT | DATA UNIT<br>IDENTIFIER | TYPE IDENTIFICATION                         | DATA UNIT TYPE                      |
|                                     |                         | VARIABLE STRUCTURE<br>QUALIFIER             |                                     |
|                                     |                         | CAUSE OF TRANSMISSION                       | ADDRESS OF ALARM<br>SYSTEM DTE      |
|                                     |                         | COMMON ADDRESS OF ASDU                      |                                     |
|                                     |                         | COMMON ADDRESS OF ASDU                      |                                     |
|                                     |                         | COMMON ADDRESS OF ASDU                      |                                     |
|                                     |                         | COMMON ADDRESS OF ASDU                      |                                     |
|                                     |                         | INFORMATION OBJECT ADDRESS                  | INFORMATION OBJECT 1                |
|                                     |                         | INFORMATION OBJECT ADDRESS                  |                                     |
|                                     |                         | SET OF INFORMATION ELEMENTS                 | TIME TAG OF<br>INFORMATION OBJECT 1 |
|                                     |                         | TIME TAG<br>ms up to years (binary time ta) |                                     |
|                                     |                         |                                             | INFORMATION OBJECT n                |
|                                     |                         |                                             |                                     |
|                                     |                         | TIME TAG<br>ms up to years (binary time ta) | TIME TAG OF<br>INFORMATION OBJECT n |
|                                     |                         | TIME TAG<br>ms up to years (binary time tb) | COMMON TIME TAG OF<br>ASDU          |

FIGURE 5.1 STRUCTURE OF AN ASDU

|                         |    |                                                                                                          |
|-------------------------|----|----------------------------------------------------------------------------------------------------------|
| Data unit identifier    | := | CP56{TYPE IDENTIFICATION,VARIABLE STRUCTURE QUALIFIER,CAUSE OF TRANSMISSION,ADDRESS OF ALARM SYSTEM DTE} |
| INFORMATION OBJECT      | := | CP8i+8j+8ta{INFORMATION OBJECT ADDRESS, SET OF INFORMATION ELEMENTS,TIME TAG(optional)}                  |
| Variable parameter i    | := | 2 if INFORMATION OBJECT ADDRESS is present, 0 if INFORMATION OBJECT ADDRESS is not present               |
| Variable parameter j    | := | number of octets of SET OF INFORMATION ELEMENTS                                                          |
| Variable parameter ta   | := | 7 if TIME TAG OF INFORMATION OBJECT is present, 0 if TIME TAG OF INFORMATION OBJECT is not present       |
| COMMON TIME TAG OF ASDU | := | CP8tb{TIME TAG}                                                                                          |
| Variable parameter tb   | := | 7 if COMMON TIME TAG OF ASDU is present, 0 if COMMON TIME TAG OF ASDU is not present                     |

## SECTION 6 DEFINITION AND CODING OF APPLICATION INFORMATION ELEMENTS

### 6.1 GENERAL

The sizes and contents of individual information fields of ASDUs shall be specified according to the declaration rules for information elements defined in AS 60870.5.4.

### 6.2 TYPE IDENTIFICATION (Figure 6.1)

#### 6.2.1 General

Octet 1, TYPE IDENTIFICATION, shall define structure, type and format of the following INFORMATION OBJECT(s):

TYPE IDENTIFICATION shall be defined as: TYPE IDENTIFICATION := UI8[1..8]<0..255>

ASDUs with undefined values of TYPE IDENTIFICATION shall be acknowledged negatively and discarded by both controlling and controlled stations.

| Bit | 8              | 7 | 6 | 5 | 4 | 3 | 2 | 1              |
|-----|----------------|---|---|---|---|---|---|----------------|
|     | 2 <sup>7</sup> |   |   |   |   |   |   | 2 <sup>0</sup> |

FIGURE 6.1 TYPE IDENTIFICATION

#### 6.2.2 Definition of semantics of values of the type identification field

The value <0> shall not be used. The range of values (numbers) 1 to 127 shall be as defined in this Standard. The range of numbers 128 to 255 are not defined by this Standard. TYPE IDENTIFICATION numbers 128 to 255 may be defined independently of each other by users of this Standard. However full interoperability would then be obtained only when using ASDUs having TYPE IDENTIFICATION in the range 1 to 127.

Tables 6.1 to 6.5 show the definition of TYPE IDENTIFICATION numbers for process and system information in monitor and control direction.

TYPE IDENTIFICATION := UI8[1..8]<0..255>

<0> := not used

<1..127> := for standard definitions of this Standard (compatible range)

<128..255> := for special use (private range)

**TABLE 6.1**  
**SEMANTICS OF TYPE IDENTIFICATION — PROCESS INFORMATION IN**  
**MONITOR DIRECTION**

| TYPE IDENTIFICATION := UI8[1..8]<0..29> |    |                                             |
|-----------------------------------------|----|---------------------------------------------|
| <0>                                     | := | Not defined                                 |
| <1>                                     | := | Alarm system summary                        |
| <2>                                     | := | Status of an actuating device               |
| <3..29>                                 | := | Reserved for further compatible definitions |

**TABLE 6.2**  
**SEMANTICS OF TYPE IDENTIFICATION — PROCESS INFORMATION IN**  
**CONTROL DIRECTION**

| TYPE IDENTIFICATION := UI8[1..8]<30..39> |    |                                                    |
|------------------------------------------|----|----------------------------------------------------|
| CON <30>                                 | := | Local warning system                               |
| CON <31>                                 | := | Local warning bell                                 |
| CON <32>                                 | := | Reset actuating devices                            |
| CON <33>                                 | := | Isolate actuating devices in selected device range |
| <34..38>                                 | := | Reserved for further compatible definitions        |
| <39>                                     | := | ASDU Acknowledge                                   |

NOTE: ASDUs marked (CON) in control direction are confirmed application services and may be mirrored in monitor direction with different causes of transmission. These mirrored ASDUs are used for positive/negative acknowledgments (verifications). The causes of transmission are defined in Clause 6.4.

**TABLE 6.3**  
**SEMANTICS OF TYPE IDENTIFICATION—SYSTEM INFORMATION IN**  
**MONITOR DIRECTION**

| TYPE IDENTIFICATION := UI8[1..8]<40..59> |    |                                                             |
|------------------------------------------|----|-------------------------------------------------------------|
| <40>                                     | := | End of initialization                                       |
| <41>                                     | := | Manufacturer and product specification of alarm system DTE  |
| <42>                                     | := | Current system time of alarm system DTE                     |
| <43>                                     | := | Control and indicating equipment (CIE) device configuration |
| <44..59>                                 | := | Reserved for further compatible definitions                 |

**TABLE 6.4**  
**SEMANTICS OF TYPE IDENTIFICATION — SYSTEM INFORMATION IN**  
**CONTROL DIRECTION**

| TYPE IDENTIFICATION := UI8[1..8]<60..89> |                                                                            |           |
|------------------------------------------|----------------------------------------------------------------------------|-----------|
| CON <60>                                 | := Read manufacturer and product specification                             | C_RD_NA_1 |
| CON <61>                                 | := Read current time of alarm system DTE                                   | C_TI_NA_1 |
| CON <62>                                 | := Clock synchronization command                                           | C_CS_NA_1 |
| CON <63>                                 | := Delay acquisition time                                                  | C_CD_NA_1 |
| CON <64>                                 | := Reboot controlled station                                               | C_RP_NA_1 |
| CON <65>                                 | := Read CIE device configuration                                           | C_IC_NA_1 |
| CON <66>                                 | := Read alarm system status                                                | C_AS_NA_1 |
| CON <67>                                 | := Read selected actuating device status in a selected device number range | C_AS_NB_1 |
| CON <68>                                 | := Test command                                                            | C_TS_NA_1 |
| CON <69>                                 | := Terminate transactions                                                  | C_AS_NC_1 |
| <70..89>                                 | := reserved for further compatible definitions                             |           |

NOTE: ASDUs marked (CON) in control direction are confirmed application services and may be mirrored in monitor direction with different causes of transmission. These mirrored ASDUs are used for positive/negative acknowledgments (verifications). The causes of transmission are defined in Clause 6.4.

**TABLE 6.5**  
**SEMANTICS OF TYPE IDENTIFICATION - FILE TRANSFER**

| TYPE IDENTIFICATION := UI8[1..8]<90..127> |                                                         |           |
|-------------------------------------------|---------------------------------------------------------|-----------|
| <90>                                      | := File ready                                           | F_FR_NA_1 |
| <91>                                      | := Section ready                                        | F_SR_NA_1 |
| <92>                                      | := Call directory, select file, call file, call section | F_SC_NA_1 |
| <93>                                      | := Last section, last segment                           | F_LS_NA_1 |
| <94>                                      | := Ack file, ack section                                | F_AF_NA_1 |
| <95>                                      | := Segment                                              | F_SG_NA_1 |
| <96>                                      | := Directory                                            | F_DR_TA_1 |
| <97..127>                                 | := Reserved for further compatible definitions          |           |

### 6.3 VARIABLE STRUCTURE QUALIFIER (Figure 6.2)

#### 6.3.1 General

Octet 2 of the DATA UNIT IDENTIFIER of the ASDU shall define the VARIABLE STRUCTURE QUALIFIER which is specified in the following:

Variable structure qualifier shall be defined as —

Variable structure qualifier := CP8{number,SQ}

| Bit | 8  | 7              | 6 | 5 | 4 | 3 | 2 | 1              |
|-----|----|----------------|---|---|---|---|---|----------------|
|     | SQ | 2 <sup>6</sup> |   |   |   |   |   | 2 <sup>0</sup> |

FIGURE 6.2 VARIABLE STRUCTURE QUALIFIER