

# NEW PROFIBUS FUNCTIONS

---

## 1. INTRODUCTION

Since the introduction of PROFIBUS with our controllers, there have been no major modifications. In the light of experience gained since then, and in response to customer demand, it has become necessary to expand slightly the initial functions by introducing:

2. **A timeout function**
3. **Read / write object indicators**
4. **DB transfer**
5. **Multicast mode**
6. **Extending and shifting index ranges for objects**
7. **Unsolicited Status service**
8. **Event Notification service**

To use the new functions it is necessary to work at least with the following versions:

Profibusconfigurator	Included in PG4 V2.0
PCD2.Mxx	FW V007
PCD4.M445	FW V00D
PCD6.M300	FW V002

## 2. TIMEOUT FUNCTION

### 2.1 PURPOSE

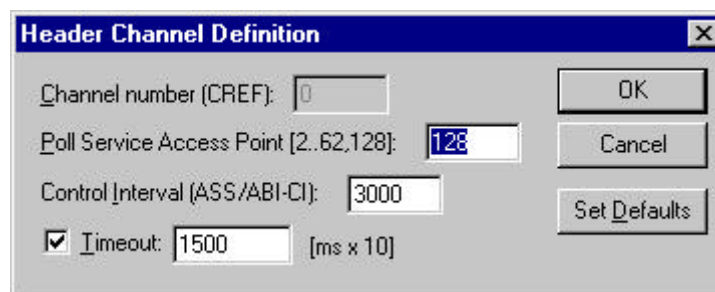
When a PROFIBUS instruction is being processed, i.e. between sending the request and receiving the response, no other communication command is allowed. The disadvantage of such a system is that a channel is blocked if no response is returned. Until now, the solution proposed for getting round this problem is to activate monitoring of the link ( $ACI \neq 0$ ). This operates by cyclically checking that the partner is still present and, if not, by cancelling all commands and closing the channel. Most of the time, this solution is satisfactory, for if any command is left without a response, it is because the channel has been interrupted and link monitoring will detect this. Unfortunately, in certain circumstances some systems (e.g. monitoring systems) lose messages at the level of the upper layers (ALI) without affecting the link. In situations like this, it is necessary to integrate a timeout function into our FW to avoid blocking any PROFIBUS communications channel.

### 2.2 DESCRIPTION

If the function "Timeout" under "Header" in the "channels list" is select then the following function will be executed:

Whenever an STXM/SRXM instruction is transmitted on a PROFIBUS channel, a counter starts up. If no response has been returned when the counter reaches a pre-defined value, the service is cancelled and the channel closed.

The duration of the timeout is the same indicated on each PROFIBUS channel.



If not activated, no imeout is active.

#### Adaptation in the user program

When a timeout is elapsed, the service in progress is cancelled ( $TBSY = 0$ ), the relevant communications channel is closed ( $XBSY = 0$ ) and diagnostics will indicate an error ( $TDIA = 1$  and bit 21 "no response" will be sent to the diagnostics register).

### 3. READ / WRITE OBJECT INDICATORS

#### PURPOSE

The intention is to use indicators to offer, on the server side, a simple way of knowing if an object has been written or read.

The idea is to offer the possibility of associating a write indicator (flag or output) and a read indicator with each object. During assignment, these indicators are zeroed. Afterwards, whenever from the server side an object is written or read, the firmware sets the relevant indicator to 1. Resetting to zero will be via the user program.

The user has the possibility to define the read and write indicator for each object in the configurator. To do this, he has to select the dialogue box, "object definition" "Advanced":

The screenshot shows a dialog box titled "Object Advanced". It is divided into two main sections: "Read Indicator" and "Write Indicator".

**Read Indicator section:**

- Radio buttons:  None,  Flag,  Output
- Text boxes: "Address [0..8191]:" (empty), "Name:" (empty)

**Write Indicator section:**

- Radio buttons:  None,  Flag,  Output
- Text boxes: "Address [0..8191]:" (value: 1), "Name:" (value: W\_ind\_101)

On the right side of the dialog, there are two buttons: "OK" and "Cancel".

## 4. DB TRANSFER

To link DBs to PROIBUS objects, the customer has to select the type: "Octet-string (4)".

With this type only the Medias "DB" can be chosen.

The screenshot shows the 'Object Definition' dialog box with the following fields and values:

- Index: 111
- Name: auto\_val
- Group: Standard
- Type: Octet-String (4) (selected)
- Byte count [4]: 4
- Event:  Event
- Register Address: [empty]
- Register Name: [empty]
- Mapped On:
  - Media: DB
  - Address: 4000
  - Name: switch\_ima
  - Count [1..255]: 8

## 5. MULTICAST MODE

### 5.1 PURPOSE

The aim is to send information to several (multicast) or all (broadcast) stations on a network in a single operation. With SAIA PCD it's now possible to send a multicast message to several stations. Working in this mode demands the definition of a new service and a new type of link.

### 5.2 NEW SERVICE

This new service, equivalent to "Write", is called "Info Report".

The screenshot shows the 'Advanced Channel Definition' dialog box. It contains the following fields and controls:

- Fms features supported:**
  - Request:**
    - Read
    - Info Report
    - Write
    - Event Notification
    - Unsolicited Status (highlighted)
  - Response:**
    - Get DV
    - Read
    - Info Report
    - Unsolicited Status
    - Write
    - Event Notification
- Maximum service counters:**
  - Send confirmed (SCC) [1..15]: 1
  - Receive confirmed (RCC) [1..15]: 1
  - Send acknowledged (SAC) [1..15]: 1
  - Receive acknowledged (RAC) [1..15]: 1
- Maximum PDU length:**
  - High priority message:**
    - Received [0,3..242]: 0
    - Sent [0,3..242]: 0
  - Low priority message:**
    - Received [0,3..242]: 0
    - Sent [0,3..242]: 241
- Acyclic/Cyclic control interval (ACI/CCI):** 0
- Buttons: OK, Cancel, Set Defaults, Access rights...

Only services that do not need an answer can be used for the multicast mode. Therefore following services can be used with multicast mode:

- Info Report
- Unsolicited Status
- Event Notification

The introduction of a second write service in client mode, when only the STXM command exists at IL level, is subject to certain rules.

Therefore, when there is an STXM command on channel type:

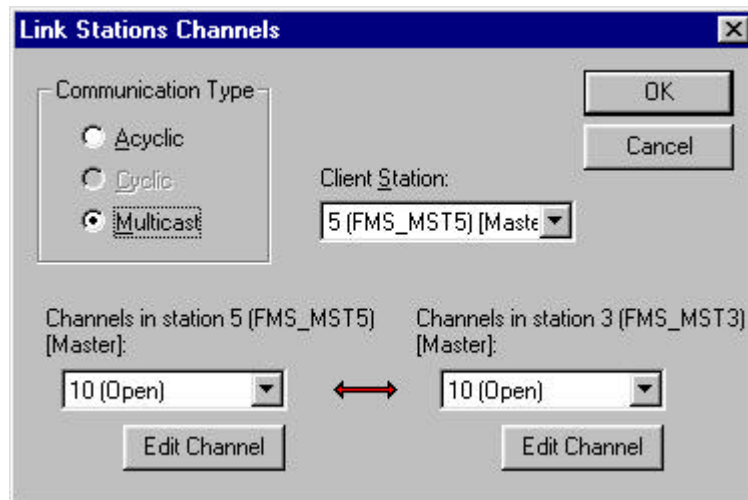
- MMAC, MSAC, MSCY, a "Write" will always be sent.
- MULTICAST, an "Info. Report" will always be sent.

In addition, the "Inf. Report" service will be sent:

- with high priority if possible (PDU length high prio. > 0)
- with low priority otherwise (PDU length high prio. = 0)

### 5.3 NEW TYPE OF LINK

A multicast channel links a client station (always a master) to server stations (either master or slave) and enables the same information to be sent simultaneously to several stations.



### 5.4 Adaptation in the user program

A multicast link does not allow the opening of a communications channel. Therefore the instruction SCON is not allowed on a multicast link. On a multicast link only the SASI and STXM instructions are allowed. The XBSY flag is set high after the execution of the SASI instruction.

## **6. EXTENDING AND SHIFTING INDEX RANGES FOR OBJECTS.**

### **Aim**

Until now, the index range available for objects of the PCD2 was 100 to 199 and that of the PCD4/PCD6.M3 was 100 to 499.

**The following now applies for PCD2, PCD4 and PCD6.M3..:**

Object address range:	100 .. 16383
Number of objects:	depending on space in memory, approx. 1250 .. 2500

## 7. UNSOLICITED STATUS

### 7.1 Aim

At communication start-up, the FMS profile defines a precise sequence before data can be exchanged [(BA profile, version 2.0, paragraph 7.2: Start-up phase). This sequence is divided into three phases: the first phase opens the channel, the second phase exchanges status information and the last is for data exchange. The services of phases 1 and 3 are already provided by the PCD, however the "Unsolicited Status" service for phase 2 had to be newly introduced].

### 7.2 DESCRIPTION

The IL command to output "Unsolicited Status" is not available. A firmware mechanism will therefore ensure that this service is always executed automatically on initialization of a channel, provided that this service is actually supported. Consequently, during configuration it is necessary to ensure that, in the "Channel Definition Advanced" menu, the "Unsolicited Status" field has been selected. When this telegram is exchanged, the PCD always transmits the status "Restart".

When such a telegram is received, diagnostic flag 0 (RBSY) is set to 1.

It is left to the user to reset this flag.

Furthermore, the "Unsolicited Status" service is always transmitted:

- with high priority when this is possible (PDU length high prio. > 0)
- otherwise with low priority (PDU length High prio. = 0)

**Advanced Channel Definition**

Fms features supported:

Request:

- Read
- Info Report
- Unsolicited Status
- Write
- Event Notification

Response:

- Get OV
- Read
- Info Report
- Unsolicited Status
- Write
- Event Notification

Maximum service counters:

- Send confirmed (SCC) [1..15]: 1
- Receive confirmed (RCC) [1..15]: 1
- Send acknowledged (SAC) [1..15]: 1
- Receive acknowledged (RAC) [1..15]: 1

Maximum PDU length:

High priority message:

- Received [0,3..242]: 241
- Sent: [0,3..242]: 0

Low priority message:

- Received [31..242]: 241
- Sent [31..242]: 241

Acyclic/Cyclic control interval (ACI/CCI): 0

OK  
Cancel  
Set Defaults  
Access rights...



## 8. EVENT NOTIFICATION

### 8.1 AIM

All information regarding process data points are transmitted in the PROFIBUS network with the "Write" and "Read" services.

To prevent network overload, it is possible for stations to exchange only modified information (values, alarms and faults).

This takes place with "Event Notification"-type telegrams.

### 8.2 DESCRIPTION

The "Event Notification" service sends information to partner stations in exactly the same way as "Write" and "Information Report".

Introducing the "Event Notification" transmission service requires a special adjustment, since the IL instruction set only provides the STXM command.

The agreement for STXM is as follows:

- If the channel supports the "Event Notification" service, it will output one of these telegrams, assuming that the object for transmission has been defined as an "Event".
- A simple "Write" occurs when this service is supported, but the object for transmission has not been defined as an "Event".
- If the channel allows, an "Information Report" is output when a "Write" is not possible and the object has not been declared as an "Event".
- Moreover, the "Event Notification" and "Inf. Report" services are transmitted:
  - with high priority, if this is possible (PDU length high prio. > 0)
  - otherwise with low priority (PDU length High prio. = 0)

#### Adapting the configurator

As already mentioned, the object must be declared as an event if it is to be sent as an "Event Notification" with the STXM command. For this purpose, the user is provided with a new type for the variables. In the "Event" field of the "Object Definition" menu an additional "Event" switch has been provided:

- "Simple var / Array"
- "Event"

The default setting is "Simple var / Array". The user is free to preselect "Event". If "Event" is selected, then the register has to be defined. This register is used to define the event number.

**Object Definition**

Index:  Name:

Group:

Type:   
 DP-ED  
 DP-ED with clock  
 DP-M

Event

Event Register Address:   
 Register Name:

Mapped On

Media:   
 Address:  Name:   
 Count [1..255]:

OK  
 Cancel  
 Access...  
 Advanced...

**Advanced Channel Definition**

Fms features supported:

Request:

Read  Unsolicited Status  
 Info Report  Write  
 Event Notification

Response:

Get DV  Unsolicited Status  
 Read  Write  
 Info Report  Event Notification

Maximum service counters:

Send confirmed (SCC) [1..15]:   
 Receive confirmed (RCC) [1..15]:   
 Send acknowledged (SAC) [1..15]:   
 Receive acknowledged (RAC) [1..15]:

Maximum PDU length:

High priority message:  
 Received [0,3..242]:  Sent [0,3..242]:

Low priority message:  
 Received [31..242]:  Sent [31..242]:

Acyclic/Cyclic control interval (ACI/CCI):

OK  
 Cancel  
 Set Defaults  
 Access rights...