PROFIBUS DP

PROFIBUS DP the fastest field bus system

PC versus PLC

What a PC based system needs to support on PROFIBUS?

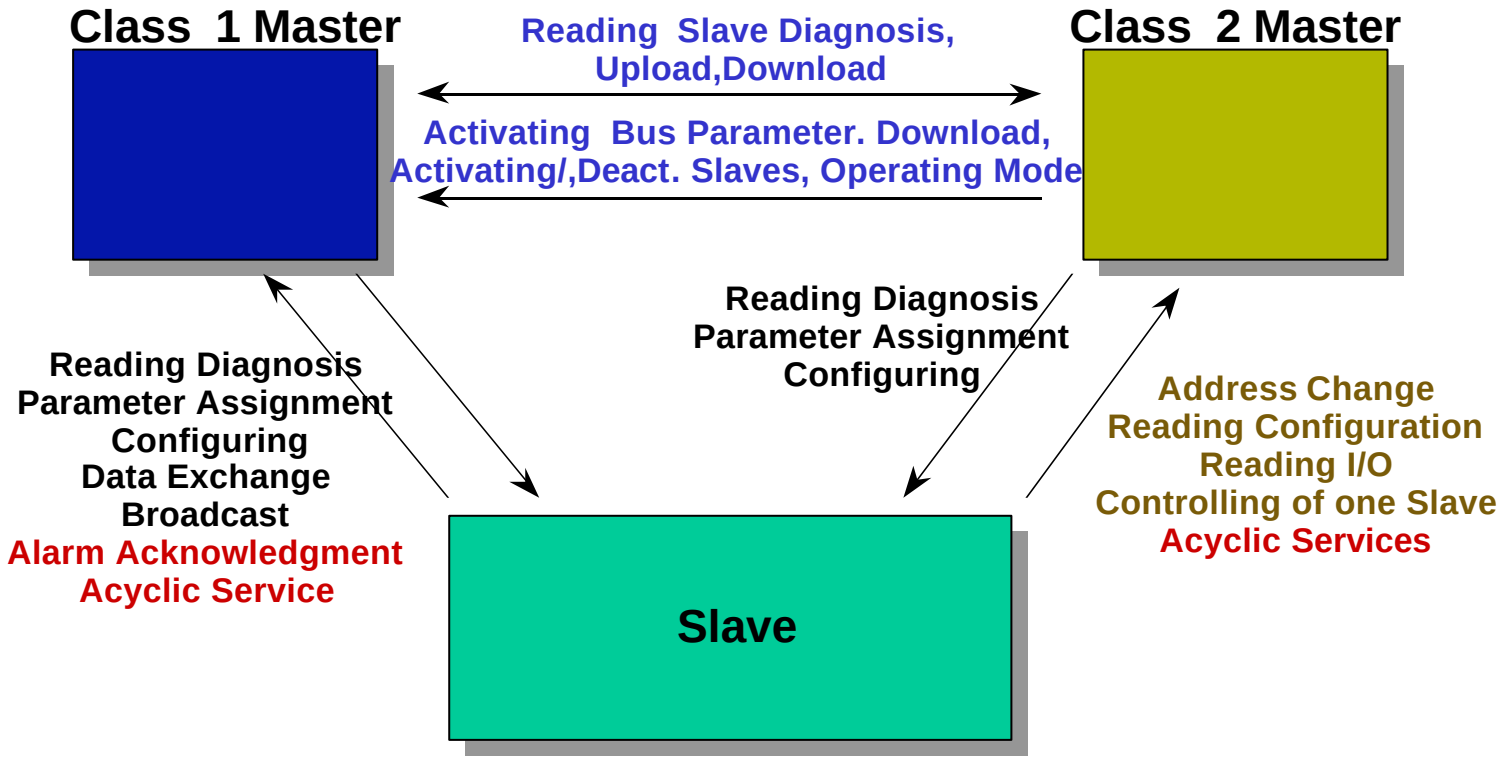
- detailed diagnostic
- sync and freeze
- fail safe
- data formats and data consistency
- DP extended functions
- deterministic (repeatable cycles)
- control over the network and the application

DP details

- class 1 master -
  - central controller which exchanges data with the connected I/O devices (slaves)
  - determines the baudrate
  - handles the Token
  - several class1 masters are permitted, typical devices are PLC, PC
- class 2 master -
  - diagnostic and startup tool, typically a configuration tool
  - can control one slave at a time
- slave station -
  - passive station which acknowledges messages or answers per request

DP details

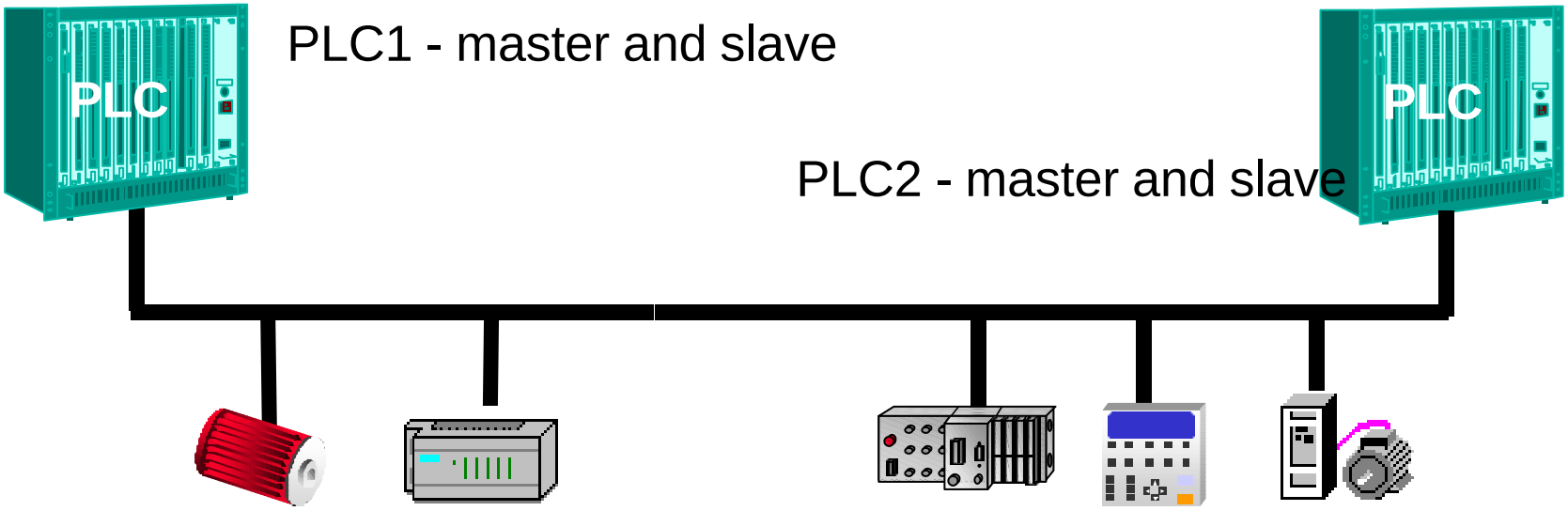
- master- master, master- slave communication



a device can consist of multiple functions, e.g... class1 and class2, class1 and slave

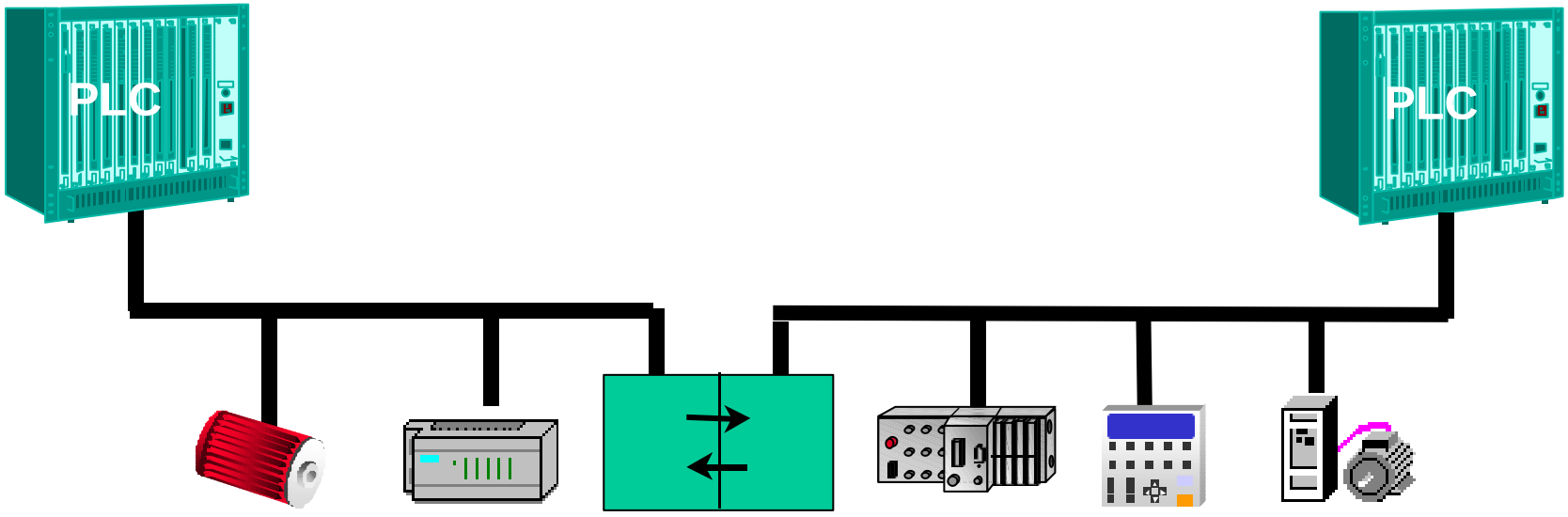
DP details

- A device can consist of multiple functions, e.g.. class1 and class2, class1 and slave, which allows:
  - a simple master master communication via the master - slave combination
  - whenever one master has the token the other PLC can be a slave to this master



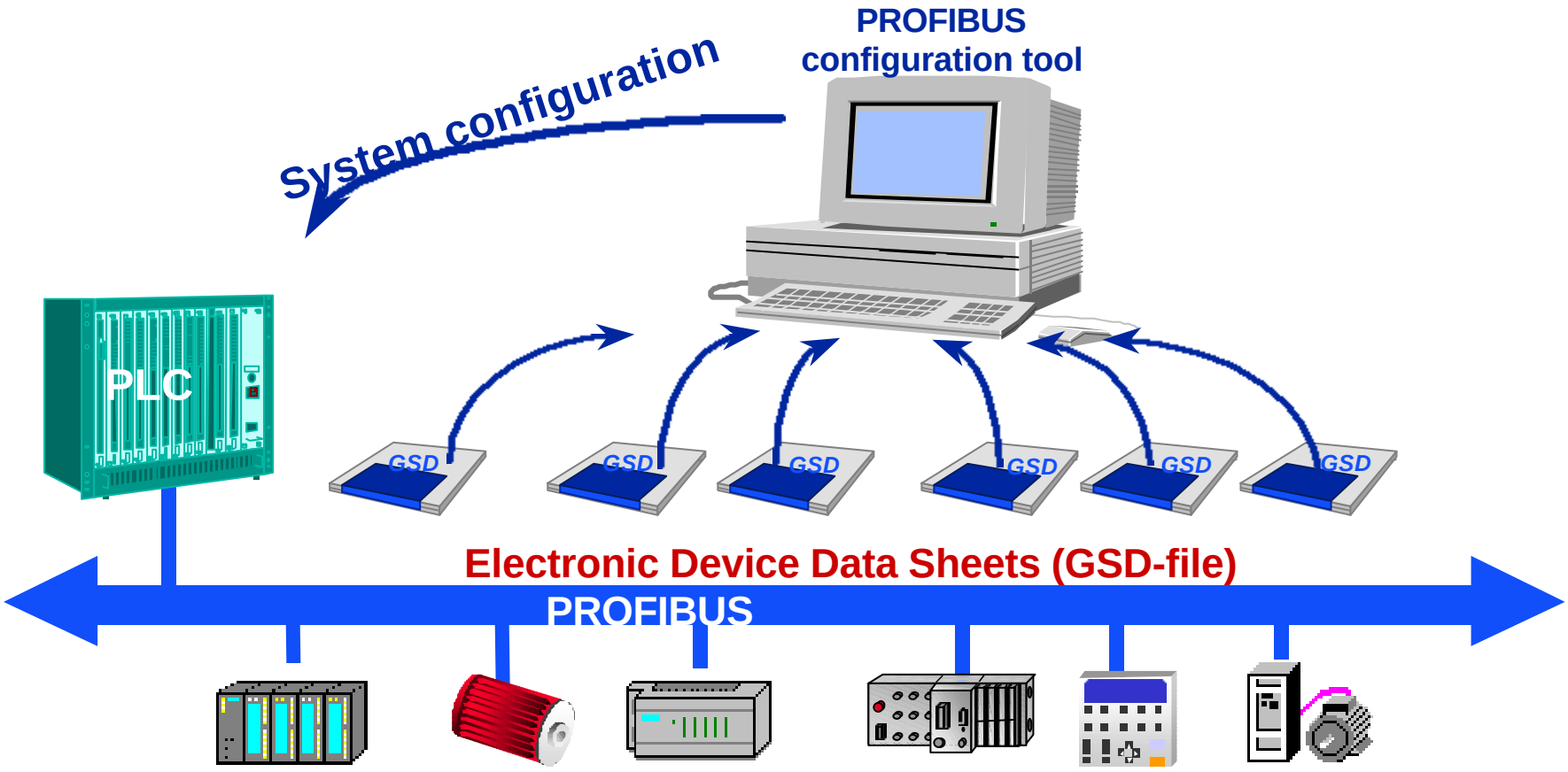
DP details

- Master - Master communication by using a DP-DP gateway
  - combination of two mono master systems
  - simple data exchange between the two masters up to 244 byte



Interoperability

- Open Configuration permits Plug and Play



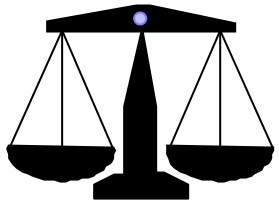
device description

- GSD file
  - each slave or master class 1 device on PROFIBUS DP needs to have a device description file, the characteristic of each PROFIBUS-DP device is described in the GSD-File
  - the GSD-file contains all device specific parameters e.g..:
    - Supported Baudrate
    - Supported Message Length
    - Number of input / output data
    - Meaning of diagnostic messages
    - Options for modular devices e.g.. which are available
  - text file (ASCII-format)
  - each configuration tool relates to the GSD information

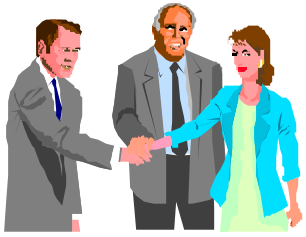
device description

- GSD-Files are created by the device vendors
- the PROFIBUS Trade Organization provides an GSD-Editor which makes it very easy to create GSD-Files
- the GSD-Editor contains a GSD-Checker which guarantees the conformance of the GSD-Files to the PROFIBUS standard
- a library of GSD-Files will be provided at the PROFIBUS web page: http://www.profibus.com

DP compared



Government - defines general rules
PTA - defines school relevant rules → Configuration tool
Parents - define kid related rules



Principal - responsible for the general rules and school specific rules → Master

Teacher with Anna and Frank → modular device

device description

#Profibus_DP	(M)
:<PRM-Text_Def_List>	(O)
PrmText = 펠 .. EndPrmTExt	
;<Ext-User_Prm_Data_Def_List>	(O)
ExtUserPrmData = 펠 EndExtUserPrmData	
;<Unit_Definition_List>	(M)
GSD_Revision=1 Vendor_Name= 펠 .. 펠 .	
;Slave specific data	(M)
Freeze_mode_supported= 펠 .. 펠	
;User_Prm_data	
펠 .	
;Unit_diagnostic	
펠 ..	
;<Module_Definition_List	(M)
Module = 펠 . EndModule	

Parameter text (O)

ext. user parameter data (O)

mandatory general data (M)

generic slave data (M)

device related slave data (O)

I/O definition (M)

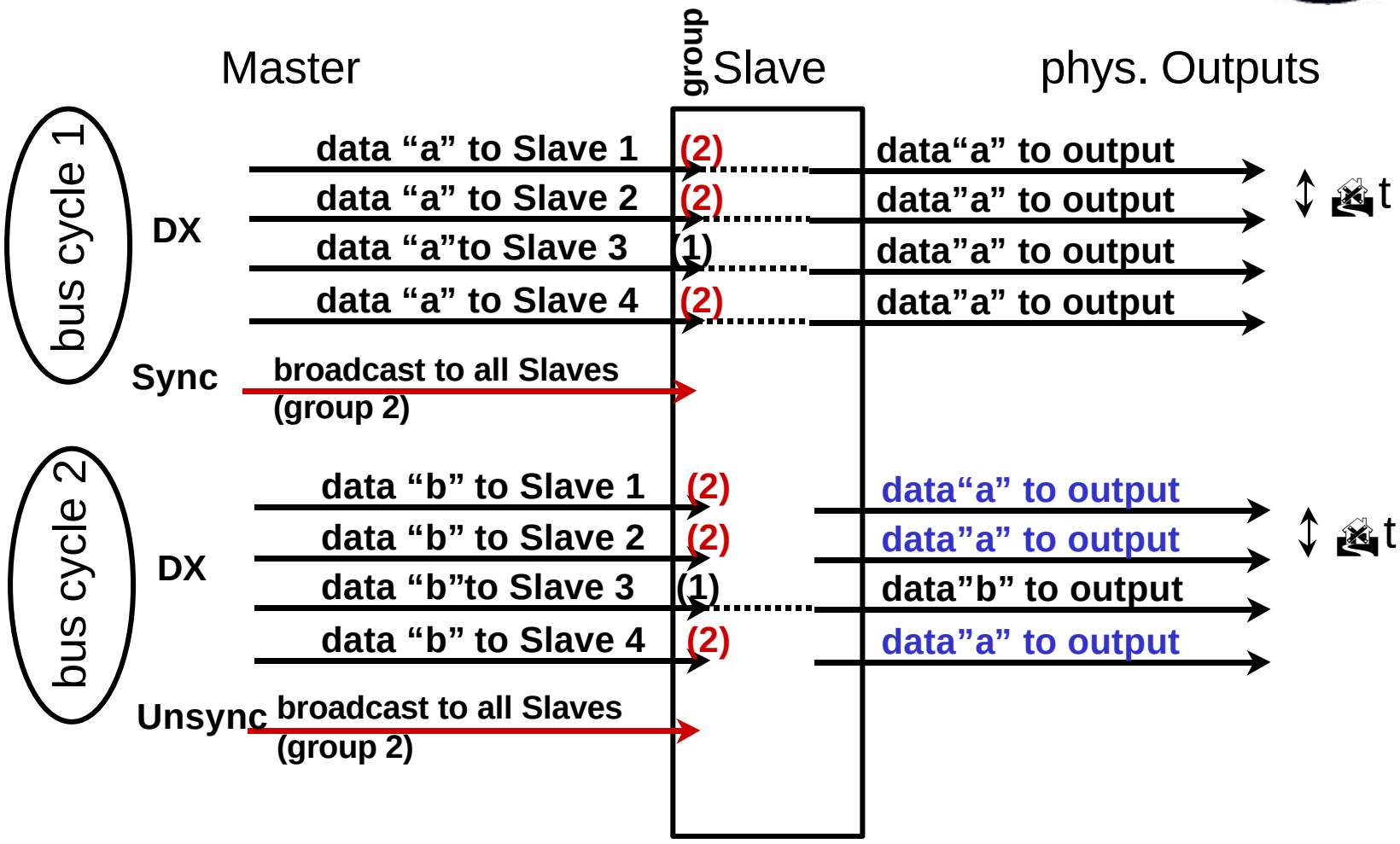
Device details

generic slave data

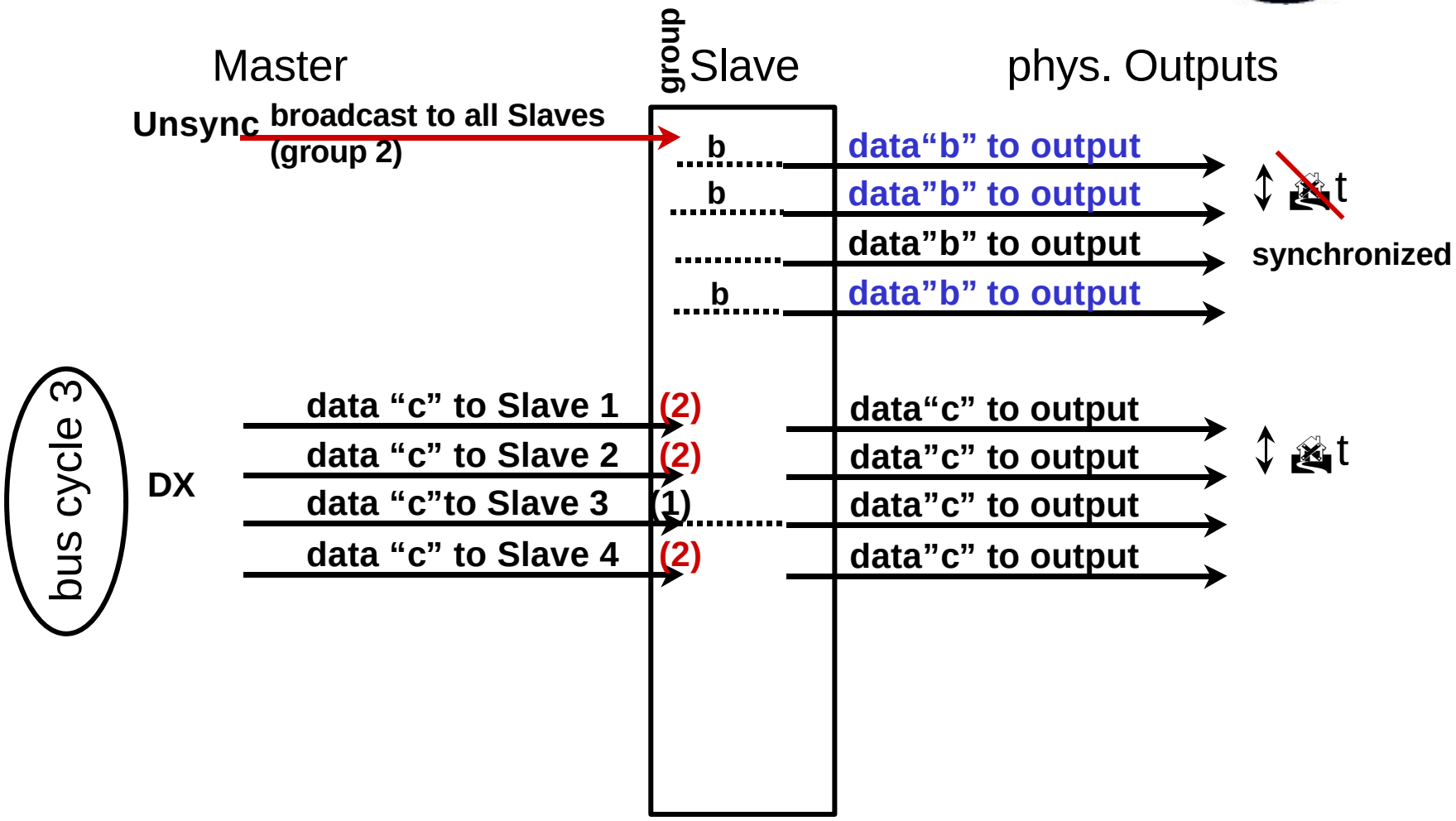
Freeze_Mode_supp=1	synchronization of Input data snap shot of Inputs
Sync_Mode_supp=1	synchronization of output data e.g. drives start at the same moment

- A master should support Sync and Freeze functions
- Sync and Freeze is application driven
- The application interface needs to offer a capability for the user to activate this commands on application demand
- Sync and Freeze commands are related to groups

Sync and Freeze



Sync and Freeze



GSD details

generic slave data

Fail_Safe=1

- 1 means slave supports fail safe function
indicates the behavior of the slave in case of a failure (interrupted communication, watchdog expired, the fail state is usually for outputs, in case of a fail safe device the device is either keeping the last value or is switching to a defined dummy value

Parameterize: ET 200M (IM153-1) #3 <>

	Parameter Name	Value
17	Lim:hold last value	No
17	Lim:dummy value output	Yes
17	Lim:diagnostic alarm enable	Yes
18	Lim:dummy value channel 0	1
18	Lim:dummy value channel 1	0
18	Lim:dummy value channel 2	1
18	Lim:dummy value channel 3	0
18	Lim:dummy value channel 4	1

OK
Cancel
Select...
Hex...
Delete
Help

make sure your selected PC interface supports this function

DP Master modes

- Each Master system has to have the following modes (based on the standard)
- Off-line
  - initial status, no communication
- Stop
  - Token exchange
  - FDL requests
  - class 2 communication
  - no communication between the Master and Slaves

DP Master modes

- **Clear**
  - **Master parameterizes and configures the Slaves**
  - **switch to data exchange (with outputs = “0”)**
- **Operate**
  - **regular application driven communication**
- **a Master needs to allow the interface to control the different modes**

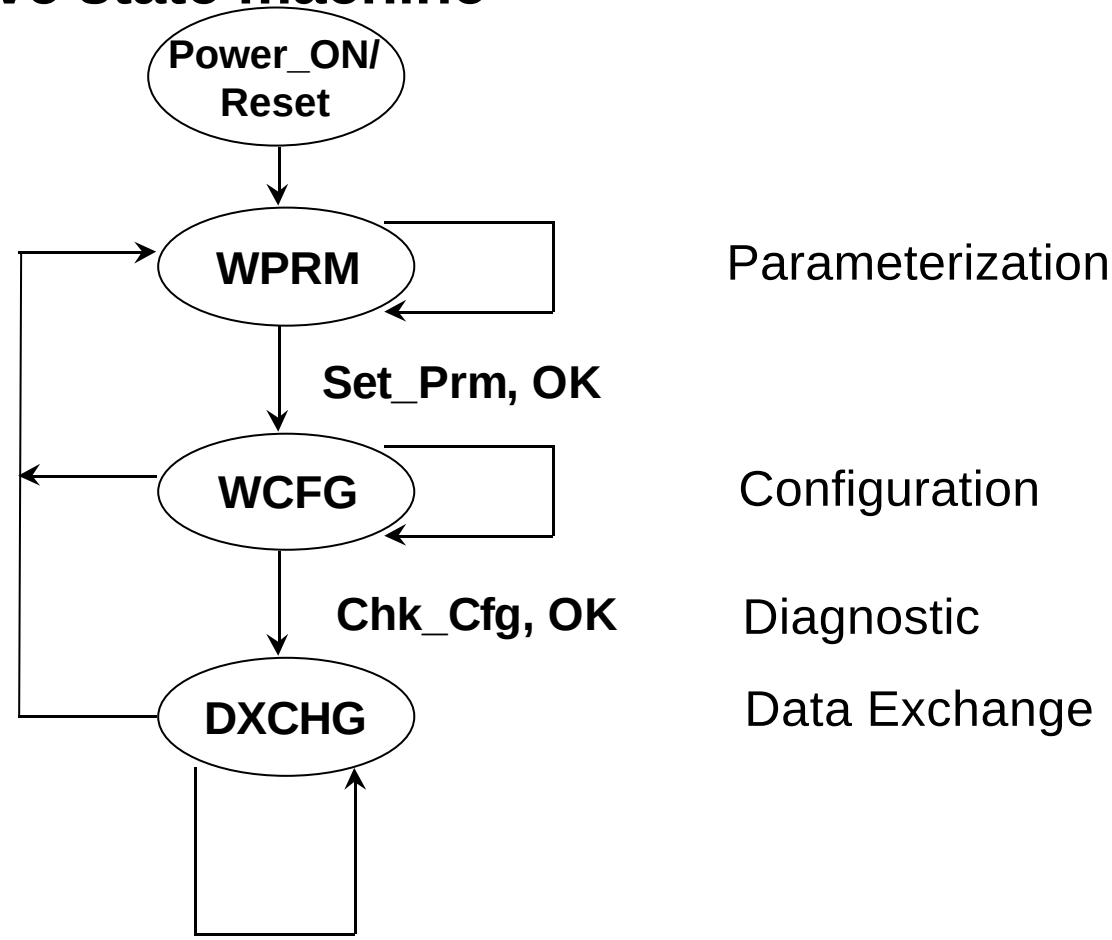
Master control

- **Application control:**
  - **Watchdog between master interface and application**
- **Bus control:**
  - **AUTOCLEAR - in case of failures on the bus**
  - **or application driven**

DP - Master / Slave

Interactions

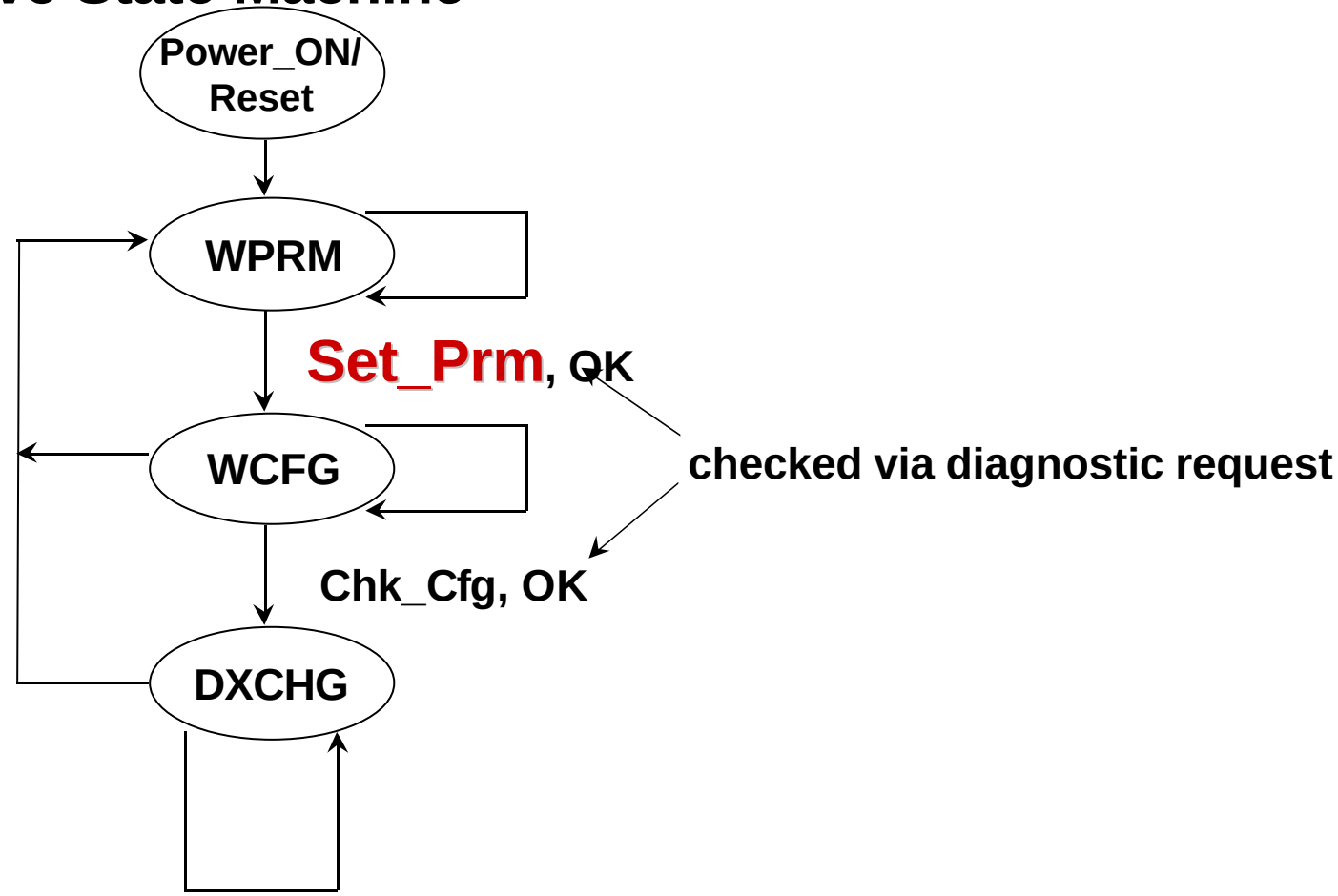
- Slave state machine



DP - Master / Slave

Interactions

- Slave State Machine



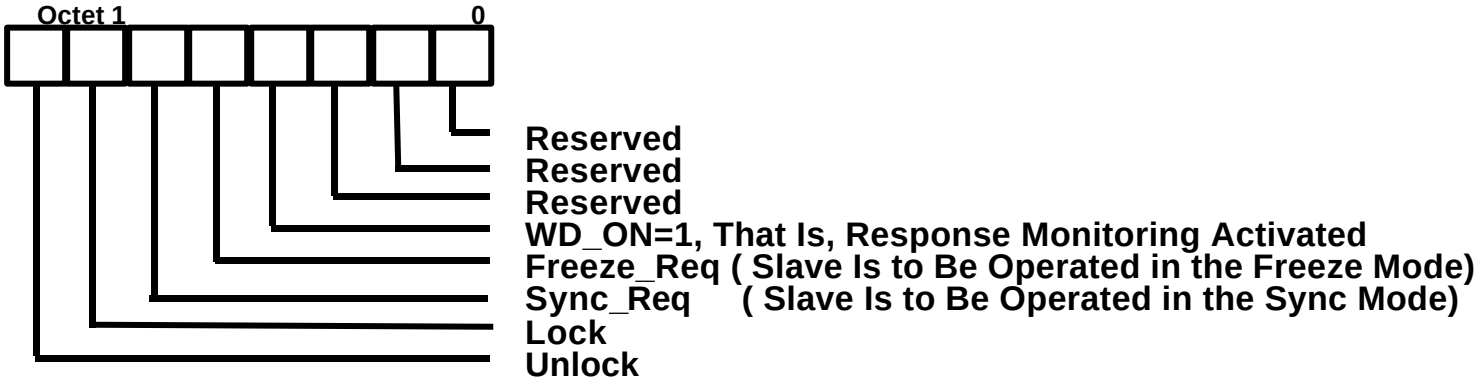
Parameterization

- **Parameterization**
  - **parameterization will be sent once after Power On or Reset**
  - **first 7 bytes are mandatory for every Slave**
  - **mandatory parameterization consists of:**
    - **Response Monitoring Time**
    - **T_{SDR} Time for Master/Slave Timing**
    - **Freeze / Sync Mode**
    - **Lock or Unlock Slave for This Master**
    - **Assignment of Group Allocation(Group Ident Number)**
    - **Master Address**
    - **Ident Number**
  - **Slave response with short acknowledge as confirmation**

Parameterization

Mandatory Parameterization

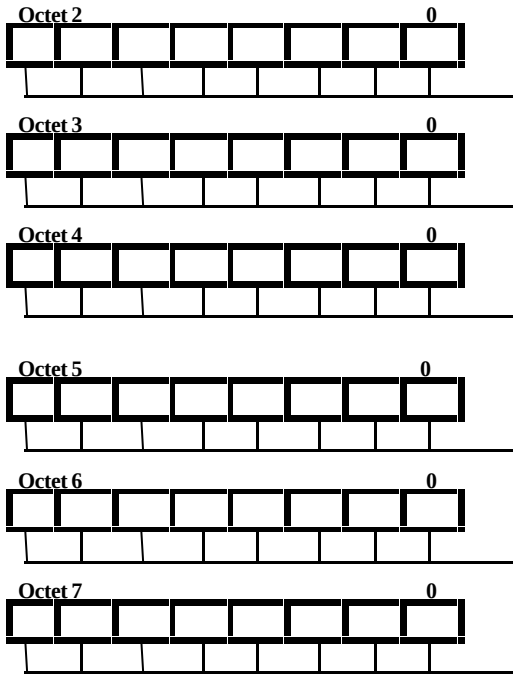
SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	DU..	FCS	ED
68H	x	x	x	8x	8x	x	61/3D	62/3E	X ..	x	16H



Lock	Unlock	Meaning
0	0	Min TSDR and Slave-Specific Diameters Are Allowed to Be Overwritten
0	1	DP-Slave Is Enabled for Other Masters
1	0	DP-Slave Is Disabled for Other Masters; All Parameters Are Picked Up
1	1	DP- Slave Is Enabled for Other Masters

Parameterization

Mandatory Parameterization(Cont'd)



WD_Fact_1

WD_Fact_2 **TWD (s) = 10ms * WD_Fact_1 * WD_Fact_2**

TSDR

Ident Number high

Ident Number low

Group_Ident

Parameterization

- device related parameterization
  - each device can use Octets 8 - 244 for device/module-related information
  - can include startup information
  - can be used for adjusting values or levels (takes the place of DIP switches)

Parameterization

GSD information

PrmText=1	text reference 1, used for the configuration tool
Text(0)="disable" Text(1)="enable"	value means disable, value means enable
ExtUserPrmData=1 "Diag Alarm" Bit(5) 1 0-1	data reference 1, 1=default, range 0-1
Max_User_Prm_Data_Len=171 Ext_User_Prm_Data_Const(0)= \ 0x40,0x60,0x00	maximum user prm data with default of 3 bytes
Ext_User_Prm_Data_Ref(1)=1	byte 1 relates to data reference 1

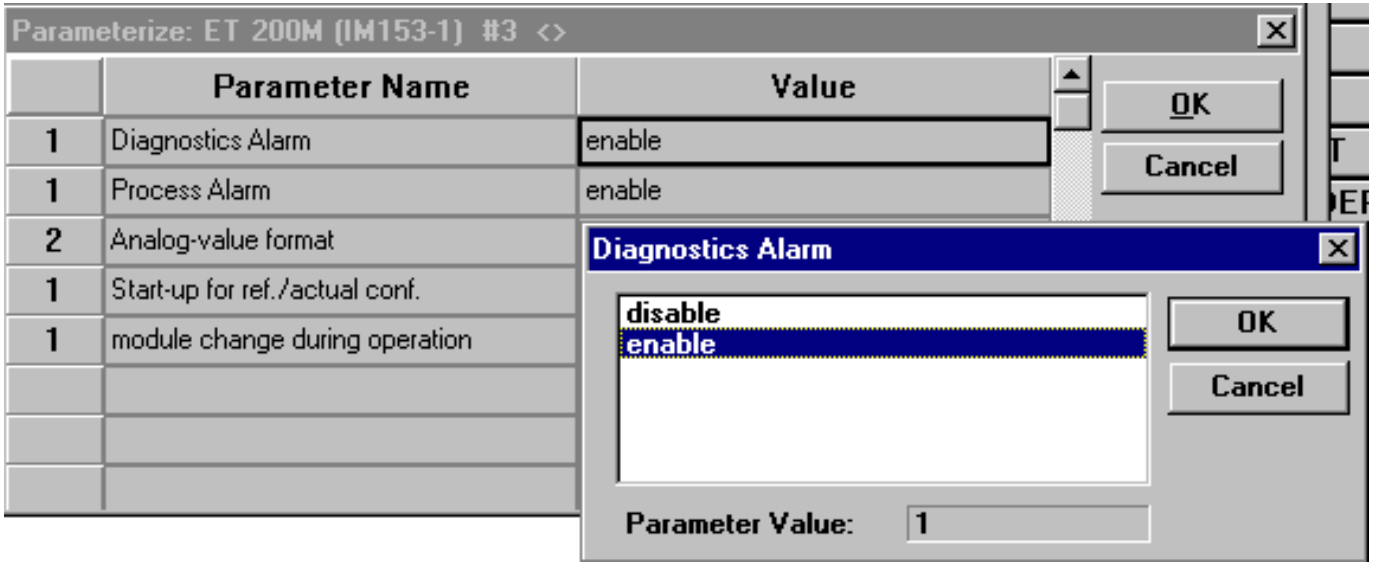
Parameterization

GSD information

- GSD file parameterization information
  - just device related information

```
;Text Definition 1 for User_Prm_Data
Prmtext=1
Text(0)="disable"
Text(1)="enable"
Endprmtext
; <Ext-User-Prm-Data-Def-List>
Extuserprmdata=1 "Diagnostics Alarm"
Bit(5) 1 0-1
Prm_Text_Ref=1
Endextuserprmdata
; Userprmdata: Length and Preset:
Max_User_Prm_Data_Len=171
Ext_User_Prm_Data_Const(0)= \
0X40,0x60,0x00
Ext_User_Prm_Data_Ref(1)=1
```

Parameterization



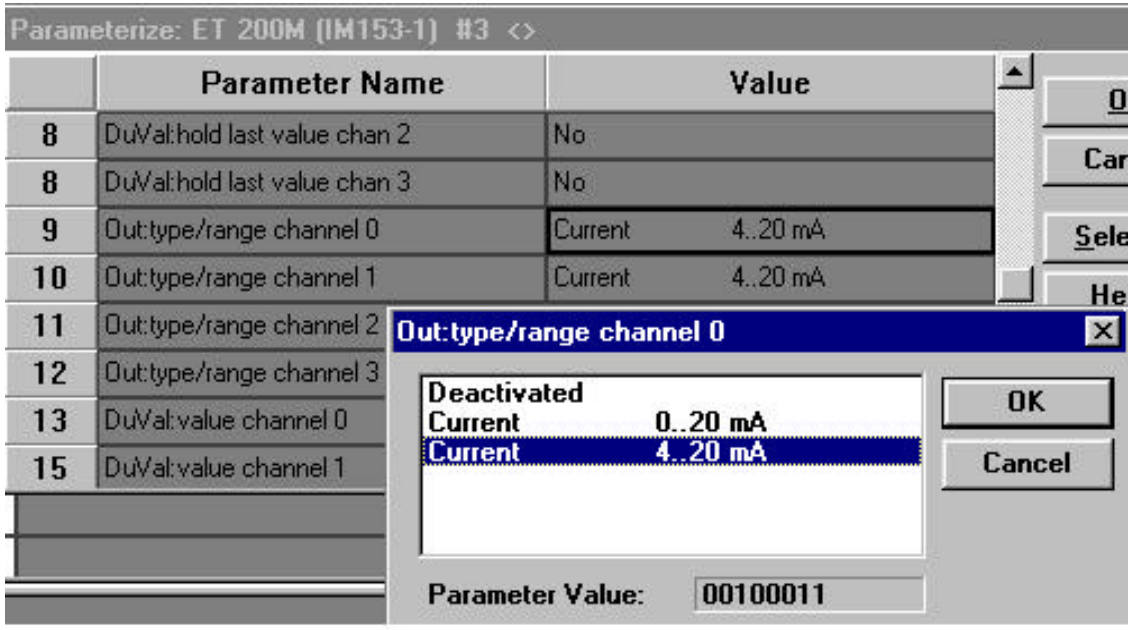
Parameterization

GSD information

- GSD file parameterization information
  - module related information

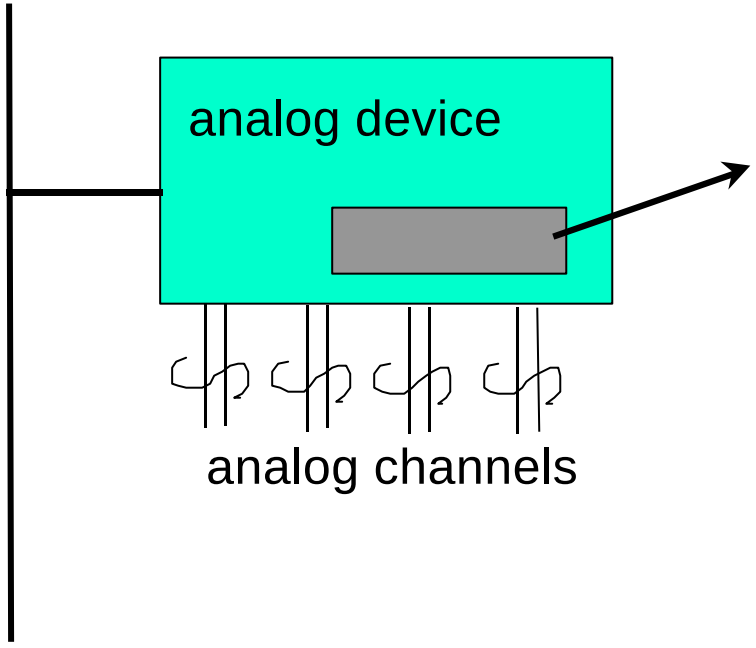
```
PrmText=9
Text(0)="Deactivated"
Text(34)="Current                0..20 mA"
Text(35)="Current                4..20 mA"
EndPrmText
ExtUserPrmData=207 "Out:type/range channel 0"
BitArea(0-7) 35 000-035
Prm_Text_Ref=9
EndExtUserPrmData
Module="6ES7 332-5RD00-0AB0        2AO" 0x83,0x41,0x00,0x25,0xD8
Ext_Module_Prm_Data_Len=21
Ext_User_Prm_Data_Const(0)= \
0x15,0x5F,0x04,0x00,0x10,0x00,0x00,0x00,0x00,0x19,0x19,0x00,0x00,0x00,0x00,\
0x00,0x00,0x00,0x00,0x00,0x00
Ext_User_Prm_Data_Ref(9)=207
EndModule
```

Parameterization

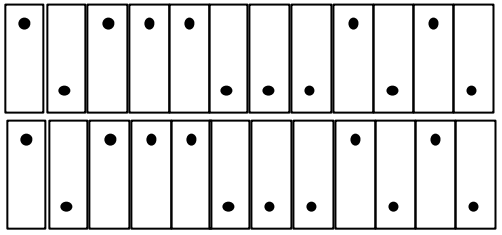


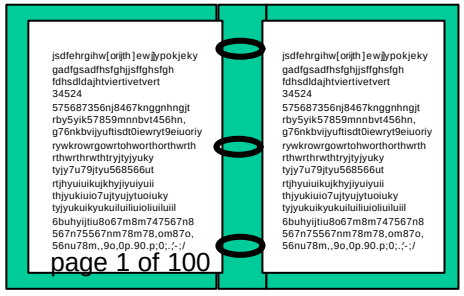
Parameterization

- conventional way



DIP switches to determine the function per channel

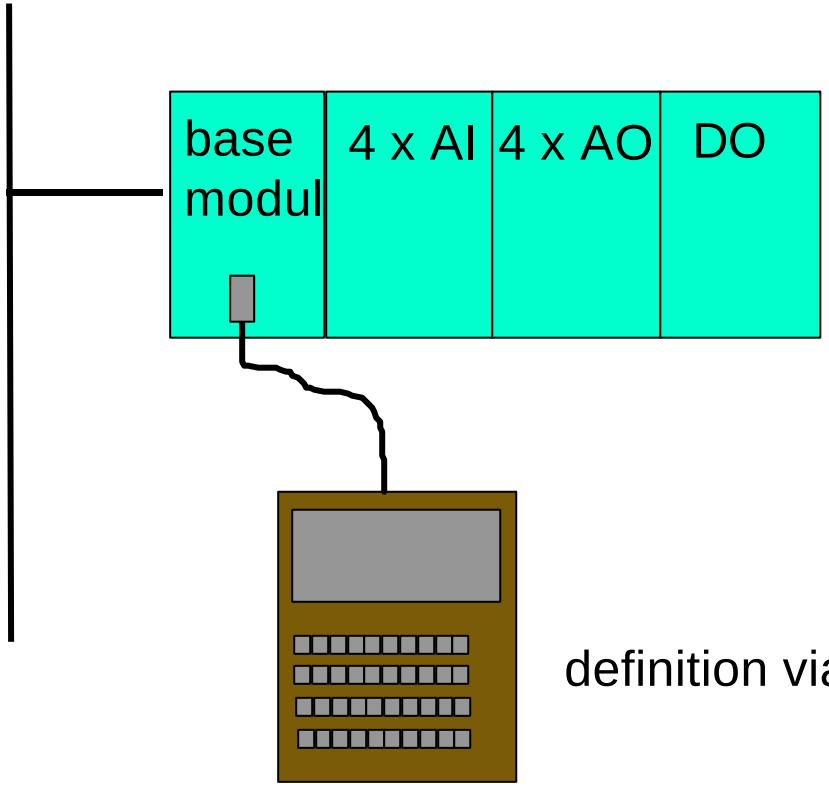


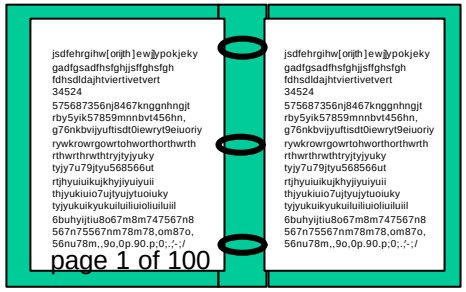


DIP switches are used, the user needs to open the device, needs tools to set the DIP switches and has to study a manual in order to set the DIP switches for the proper functions.

Parameterization

- conventional way with smarter devices



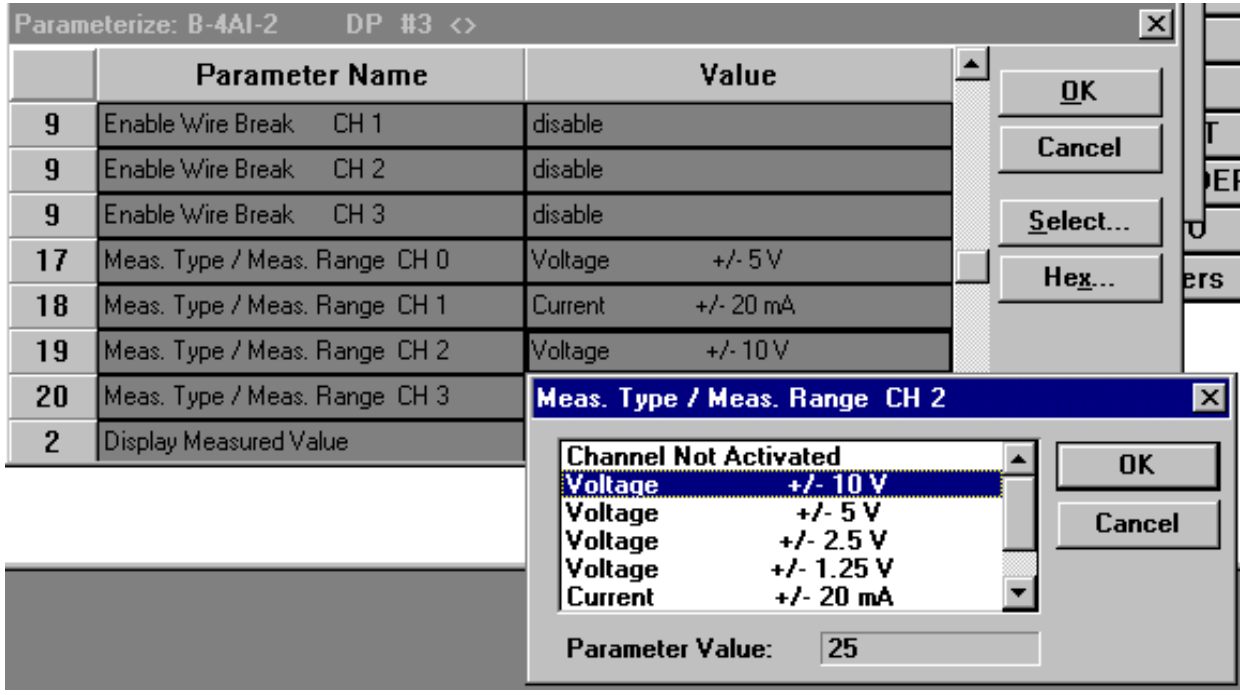


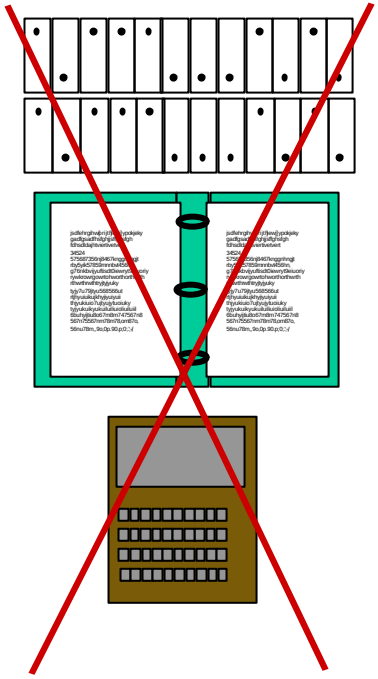
definition via Handheld terminal

The handheld is still an additional tool you have to understand.

Parameterization

with PROFIBUS





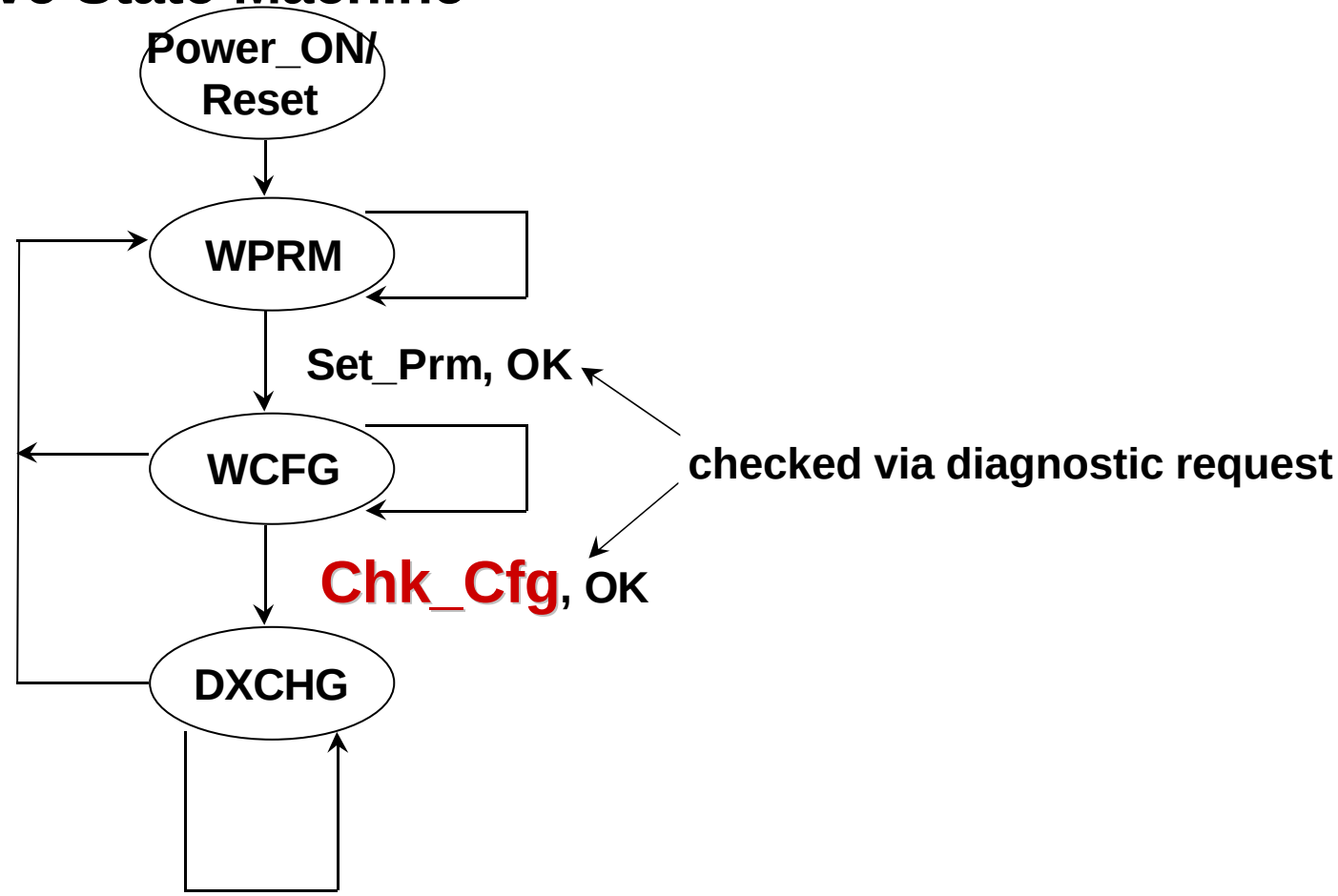
you get rid of the DIP switches or the handheld, the additional documentation and the endcustomer is defining every function in <u>one</u> tool.

!! the configuration tool of your selected master board needs to support this function

DP - Master / Slave

Interactions

- Slave State Machine



Configuration

- Configuration
  - Configuration will be sent once after power on or reset
    - Master sends configurations to Slaves
      - any device-specific configuration
      - I/O configuration
  - Slave response with short acknowledge as confirmation
    - acknowledge configuration(Short Ack, E5h)
    - check configuration information for validity

Configuration

Configuration

SD	LE	LEr	SD	DA	SA	FC	DSAP	SSAP	DU..	FCS	ED
68H	x	x	x	8x	8x	x	62/3E	62/3E	x ..	x	16H

7	6	5	4	3	2	1	0

Identifier Byte

Length of Data
00 1 Byte or Word ….
15 16 Bytes or Words

Input/Output
00 Special Format
01 Input
10 Output
11 Input-Output

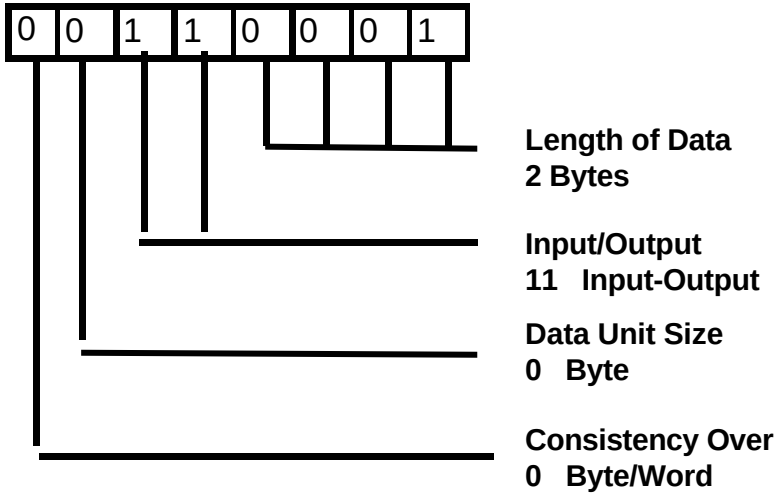
Data Unit Size
0 Byte
1 Word

Consistency Over
0 Byte/Word
1 Whole Length

1. simple format

Configuration

- simple format configuration
  - max. 16 discrete Input/16 discrete Output in one format



Configuration

Configuration

SD	LE	LEr	SD	DA	SA	FC	DSAP	SSAP	DU..	FCS	ED
68H	x	x	x	8x	8x	x	62/3E	62/3E	x ..	x	16H

2. special format

7	6	5	4	3	2	1	0

Special Identifier Byte

Length of Vendor Specific Data
0 No Data
1-14 No. Of Bytes of Vendor Specific Data
15 No Data

Fixed
00 Special Format

Input/Output
00 No I/O
01 One Length Byte for Inputs Follows
10 One Length Byte for Outputs Follows
11 One Length Byte for Outputs and Inputs

7	6	5	4	3	2	1	0

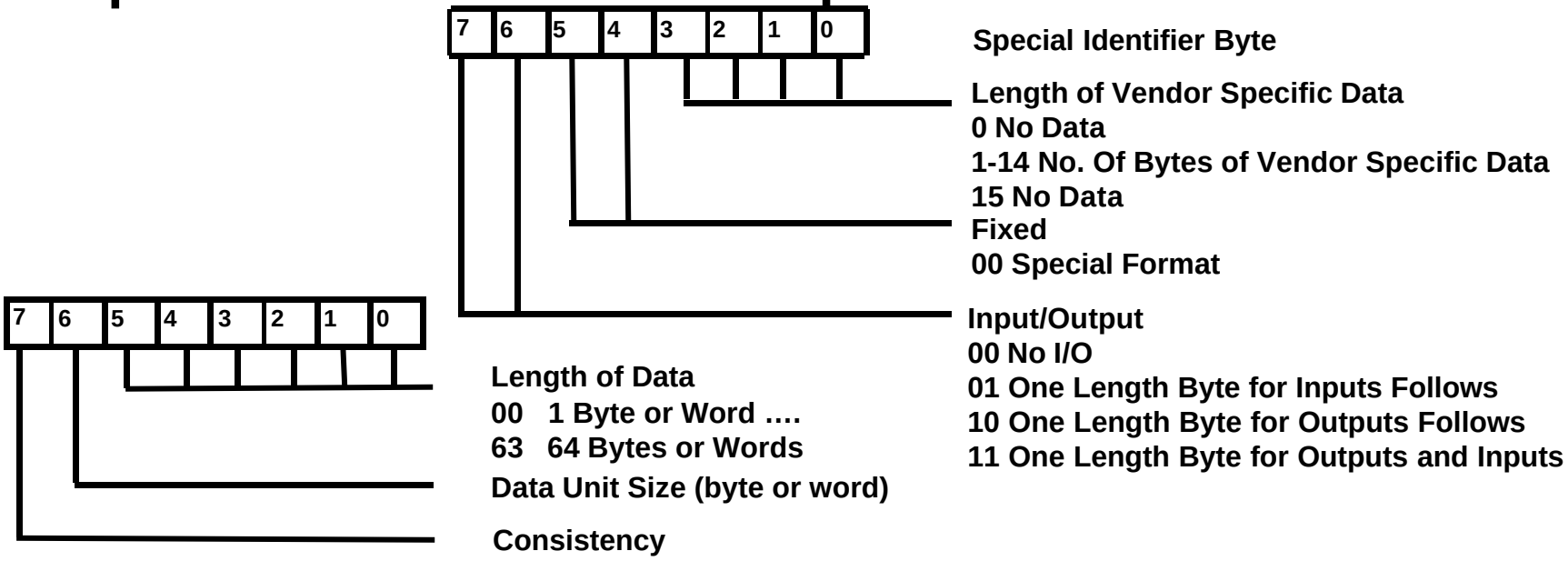
Length of Data
00 1 Byte or Word ….
63 64 Bytes or Words

Data Unit Size (byte or word)

Consistency

Configuration

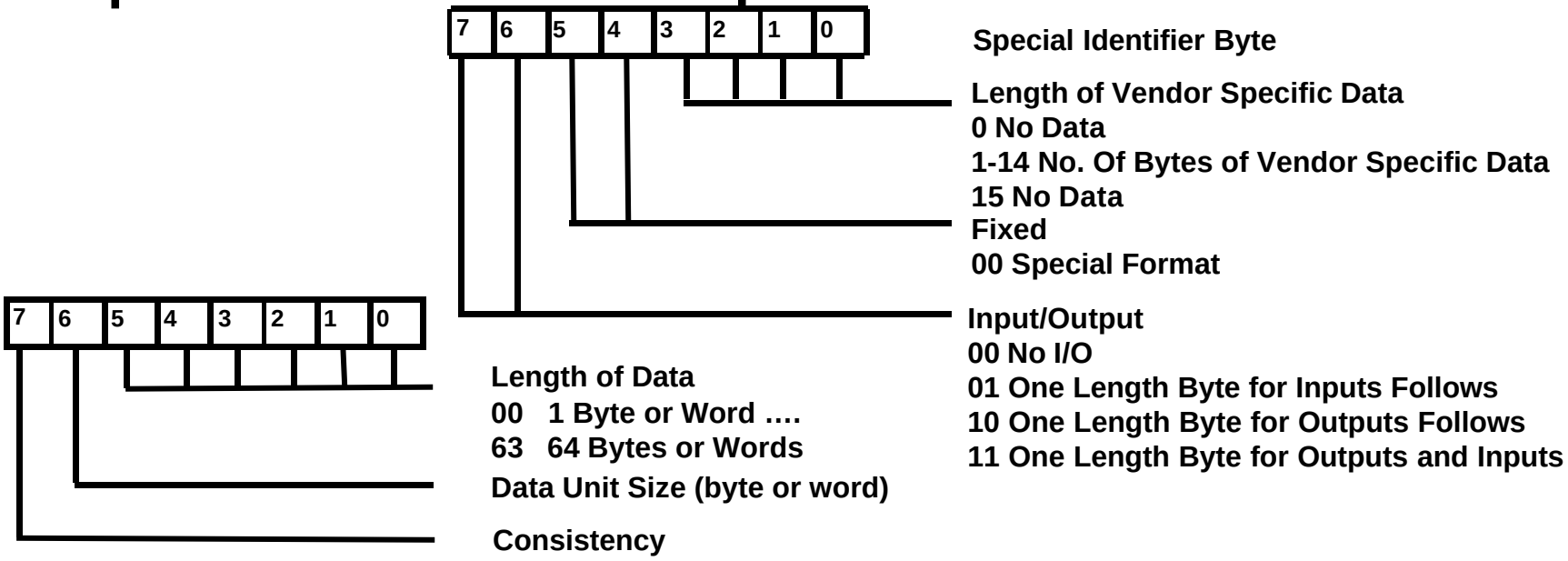
- special format - no vendor specific information



1	1	0	0	0	0	0	0	•Output & Input Description Bytes Follow, •No Vendor-Specific Information
1	1	0	0	0	0	0	1	•2 Word Outputs, Consistent Over Whole
1	1	0	0	0	0	1	1	•4 Word Inputs, Consistent Over Whole

Configuration

- special format - vendor specific information



1	0	0	0	0	0	0	1	•Output with 1 vendor specific byte
1	1	0	0	0	0	0	1	•2 Word Outputs, Consistent Over Whole
x	x	x	x	x	x	x	x	•Device specific

Configuration

GSD information

Module=뱬ext” 0x04,0x00,0x00,0xAD,0xC4	module definition, text will be displayed configuration definition (e.g. only information)
Module=뭎ext 0x22 EndModule	module definition, text will be displayed defines simple format with 3 output bytes
Module=뱬ext” 0x43,0x41,0x00,0x15,0xC3 Ext_Module_Prm_Data_Len=1 Ext_User_Prm_Data_Const(0)= \ 0x15 Ext_User_Prm_Data_Ref(2)=237	module definition, text will be displayed defines special format, 2 byte input and 3 byte additional information including module related parameterization

Configuration

GSD information

- GSD file configuration information
  - simple configuration information

Module = "1 Byte DI " 0x10

EndModule

Module = "2 Byte DO" 0x21

EndModule

Module = "3 Byte DX" 0x32

EndModule

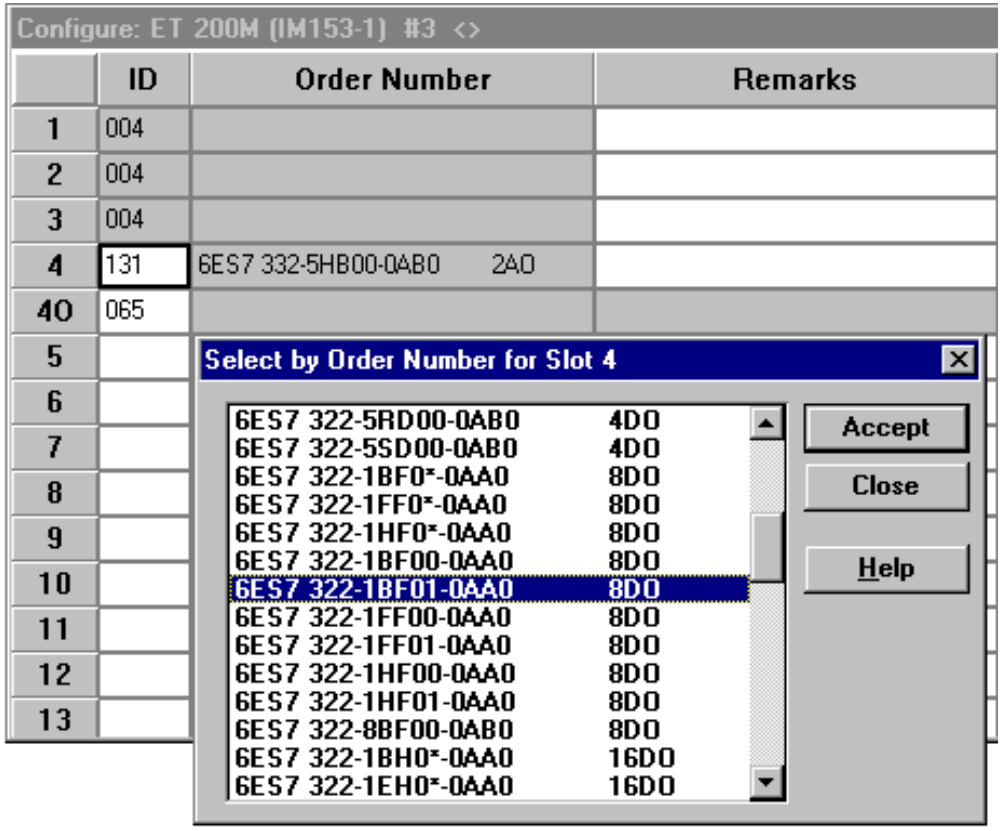
Configuration

GSD information

- GSD file configuration information
  - special configuration information with module related parameterization

```
Module="6ES7 322-8BF00-0AB0      8DO" 0x83,0x00,0x00,0x2F,0xC8
Ext_Module_Prm_Data_Len=21
Ext_User_Prm_Data_Const(0)= \
0x15,0x5F,0x04,0x00,0x10,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,\
0x00,0x00,0x00,0x00,0x00,0x00
Ext_User_Prm_Data_Ref(2)=28
Ext_User_Prm_Data_Ref(6)=29
Ext_User_Prm_Data_Ref(7)=30
Ext_User_Prm_Data_Ref(8)=31
Ext_User_Prm_Data_Ref(9)=32
Ext_User_Prm_Data_Ref(10)=33
Ext_User_Prm_Data_Ref(11)=34
```

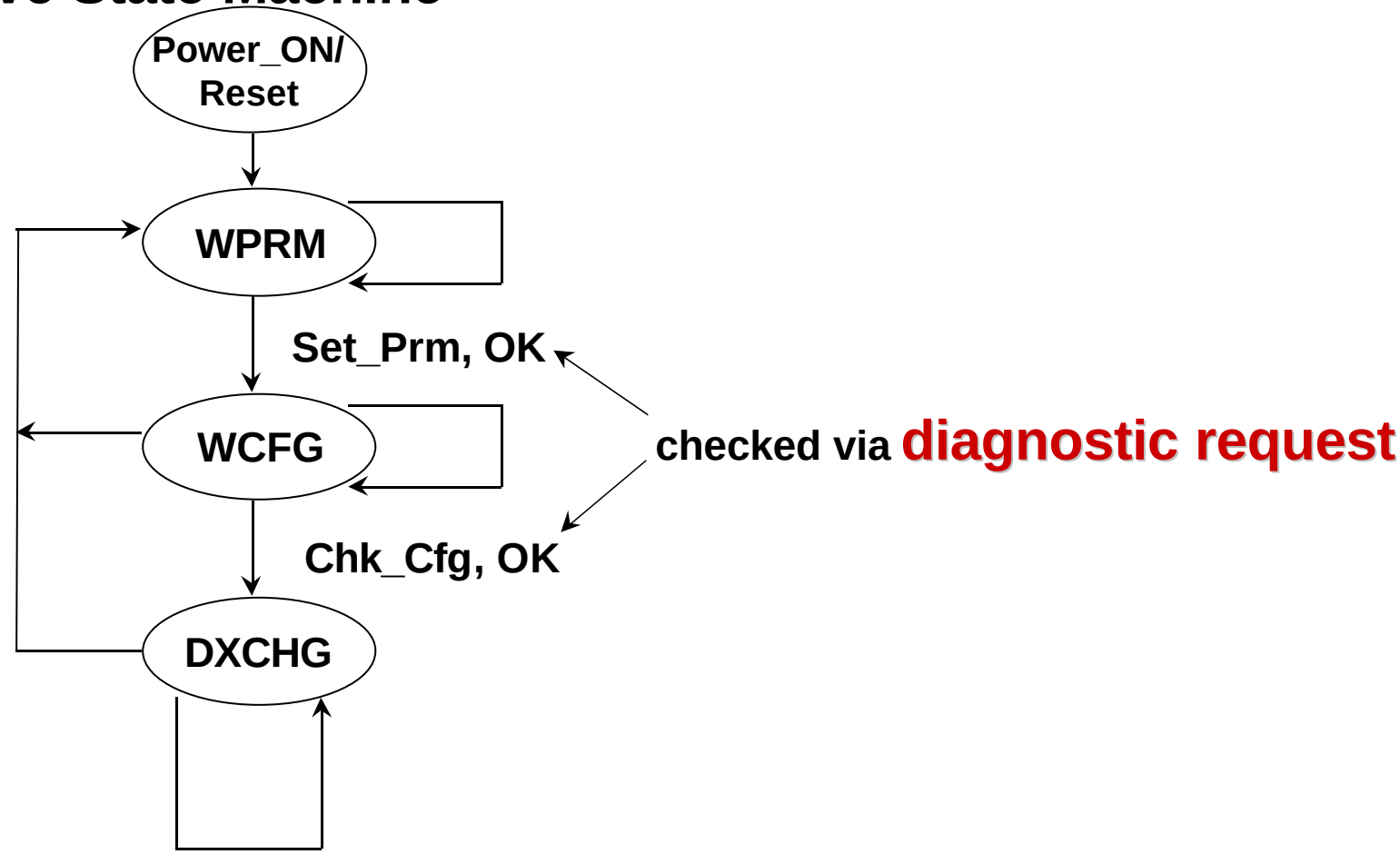
Configuration



DP - Master / Slave

Interactions

- Slave State Machine



Diagnostics

- Diagnostics
  - diagnostic will be sent twice after power on or reset (at the beginning and after the configuration is sent) and per slave request
  - first 6 bytes are mandatory for every slave
  - slave replies with diagnostic information
    - Lock,Sync, Freeze Enabled
    - Parameter Faults
    - Configuration Faults
    - Master Address
    - Profibus ID
    - Device Diagnostics

Diagnostics

- diagnostic data structure
  - diagnostic data is high-priority data
  - system-wide diagnostic data is standardized (octets 1-6)
  - user-specific diagnostic data may also be defined using octets 7... 244
  - user-specific diagnostic data is broken down into:
    - device-related diagnosis
    - identification-related diagnosis
    - channel-related diagnosis
  - external diagnosis or status information possible starting with octet 7

Diagnostics

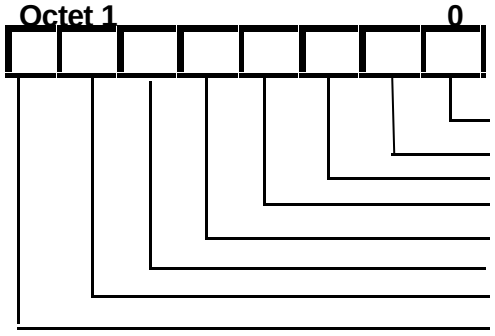
diagnostic request/reply structure

Request

SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	FCS	ED
68H	x	x	x	8x	8x	x	60/3C	62/3E	x	16H

Reply

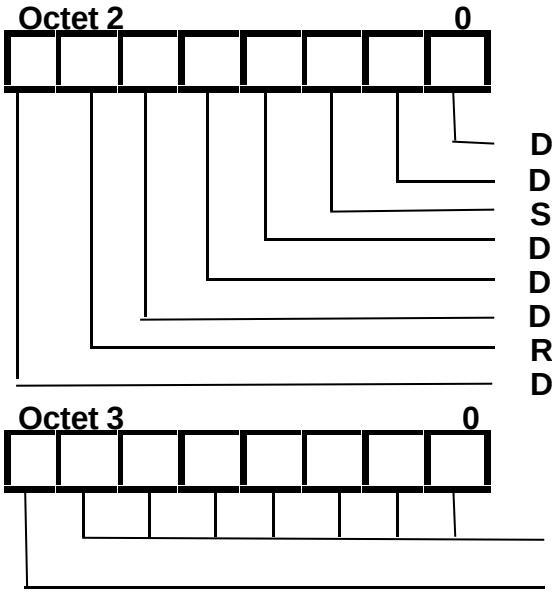
SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	DU..	FCS	ED
68H	x	x	x	8x	8x	x	62/3E	60/3C	X ..	x	16H



Diag.Station_Non_Exist Set by Master
Diag.Station_Not_Ready Slave Not Ready for Data Exchange
Diag.Cfg_Fault Configuration Information Does Not Agree
Diag.Ext_Diag Slave Has Extended Diagnostic Data(High Priority)
Diag.Not Supported Slave Does Not Support Requested Function
Diag.Invalid_Slave_Response Set by Master
Diag.Prm_Fault Wrong Parameter Assignment (Ident Number Etc.)
Diag.Master_Lock Set by Master. Slave Parameterized by Another Master

Diagnostics

diagnostic data structure



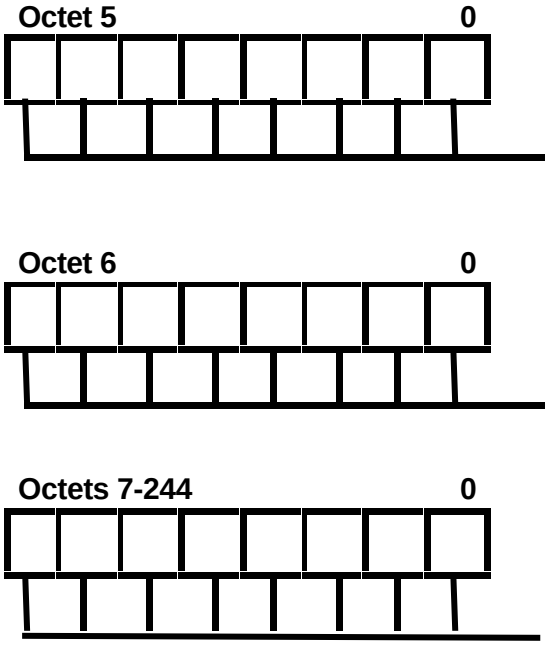
Diag. Prm_Req Slave Needs to be Parameterized
Diag. Stat_Diag Static Diagnosis - Slave Cannot Provide Valid Data
Set to 1
Diag.WD_ON/OFF Response Monitoring Active/Inactive
Diag. Freeze_Mode Received Freeze Command
Diag.Sync_Mode Received Sync Command
Reserved
Diag.Deactivated Set by Master

Reserved
Diag.Ext_Overflow Too Much Extended Diag. Data

Diag.Master_Add Master Address After Parameter Assignment
(FFh Until Parameterization)

Diagnostics

- diagnostic data structure(cont'd)



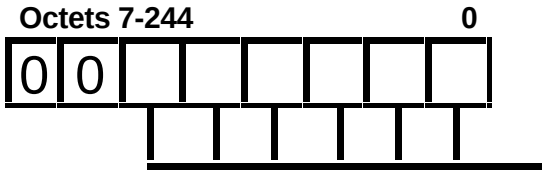
Ident Number High

Ident Number Low

Extended Diagnostic Data

Diagnostic

- **device-related diagnosis**



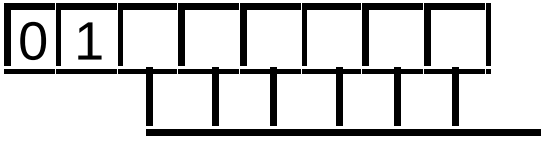
length in bytes, including header

- **vendor needs to define the diagnosis**
- **diagnosis needs to be described in the GSD file**
- **up to 62 bytes can be defined**

in order to display this information the interface needs to refer to the GSD file

Diagnostic

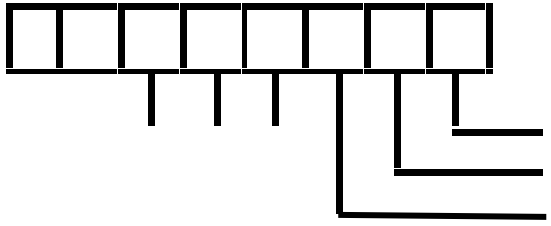
- **identifier related diagnostic**



length in bytes, including header

- **is based on a modular system, each module has one identifier (configuration byte)**
- **defect or wrong module can be easily detect**

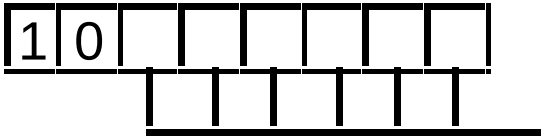
based on the standard, therefore no additional description necessary



identifier byte 0 (module 1) has diagnostic
identifier byte 1 (module 2) has diagnostic
identifier byte 2 (module 3) has diagnostic

Diagnostic

- channel related diagnostic



identifier number

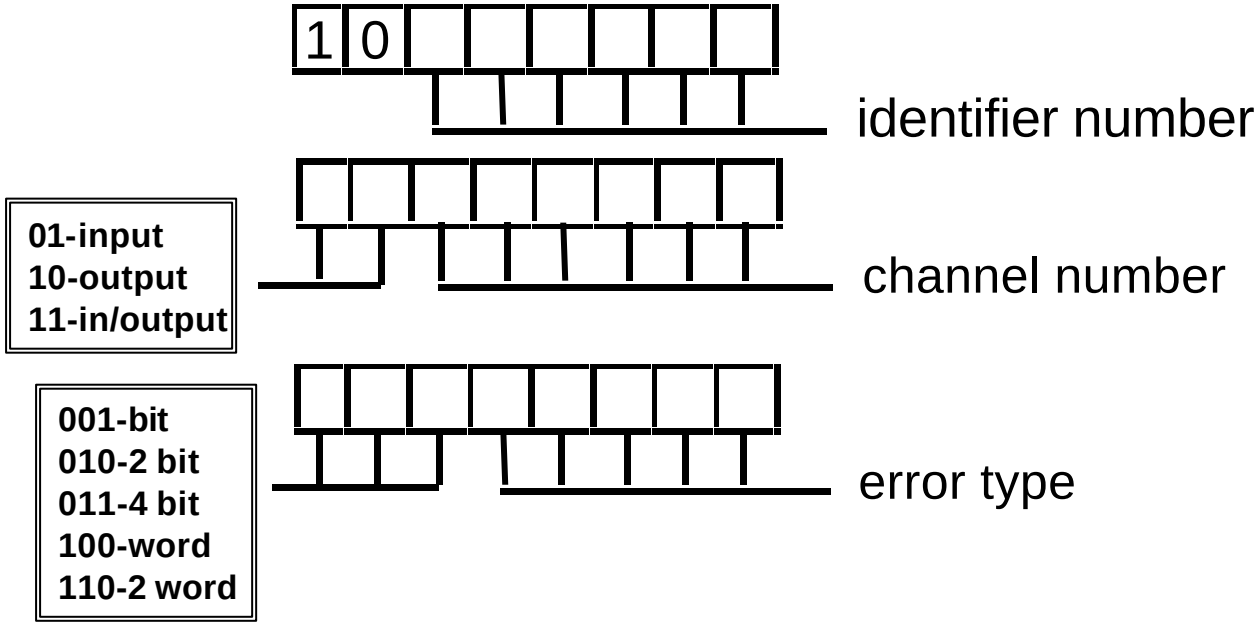
- pre defined failure types
- additional device specific definition possible
- definition per module and per channel

no additional information necessary for pre defined failure types, device related failure types refer to the GSD file

1-short circuit
2-under voltage
3-over voltage
4-overload
5-over temperature
6-wire break
7-upper limit exceeded
8-lower limit exceeded
9-error
10-15 reserved
16-31 device related

Diagnostic

- **channel related diagnostic**



1	0	0	0	0	0	0	1	**channel related, identifier 1**
1	0	0	0	0	0	1	0	**channel 2 (output) has diagnostic**
0	0	1	0	0	1	1	0	**broken wire, bit organized**

Diagnostic

GSD information

```
Unit_Diag_Bit(086)="failure channel 7"
Unit_Diag_Bit(087)="failure channel 8"
Unit_Diag_Bit(090)="channel 1 - short circuit to P"
Unit_Diag_Bit(091)="channel 1 - short circuit to M"
Unit_Diag_Bit(092)="channel 1 - broken wire"
Module="6ES7 322-8BF00-0AB0       8DO" 0x83,0x00,0x00,0x2F,0xC8
Ext_Module_Prm_Data_Len=21
Ext_User_Prm_Data_Const(0)= \
0x15,0x5F,0x04,0x00,0x10,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,\
0x00,0x00,0x00,0x00,0x00,0x00
Ext_User_Prm_Data_Ref(2)=28
Ext_User_Prm_Data_Ref(6)=29
Channel_Diag(16)=“over load channel 1”
EndModule
```

Diagnostic

COM PROFIBUS slave diagnostics view

```
0 :  00  0C  00  01  80  1D  43  10  00  14
10:  01  05  00  0D  1F  00  00  72  08  08
20:  05  08  00  10  00  00  00  00  00
```

Standard-specific diagnostics

PNO number of the slave: 32797 (0x801D)
Slave parameterized by DP master no.: 1
Response monitoring activated

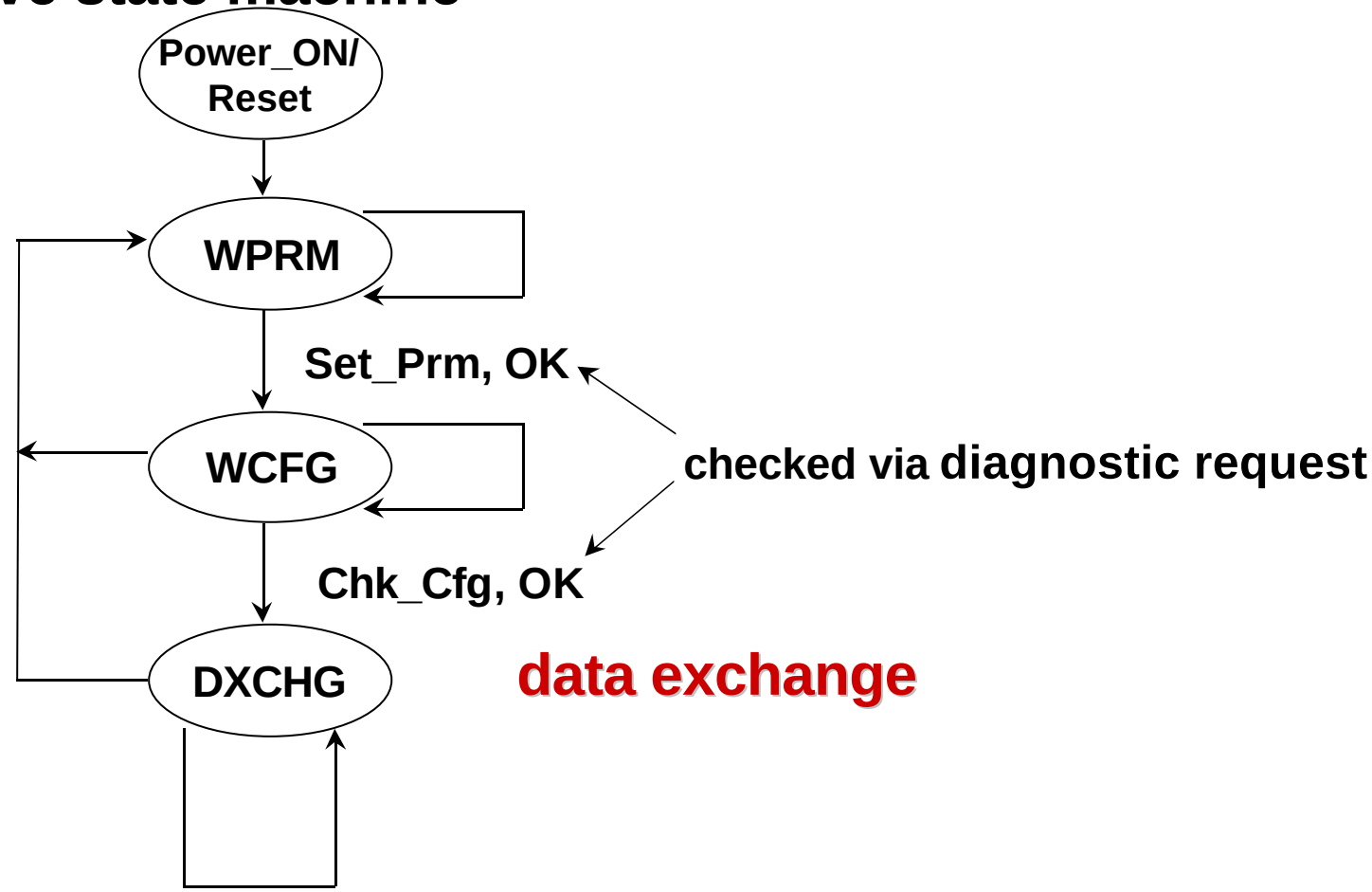
Device-specific diagnostics

channel 1 - short circuit to M
channel 3 - broken wire

; Unit Diagnostics
.....
Unit_Diag_Bit(106)="channel 2 - short circuit to P"
Unit_Diag_Bit(107)="channel 2 - short circuit to M"
Unit_Diag_Bit(108)="channel 2 - broken wire"
Unit_Diag_Bit(110)="channel 2 - load voltage missing"

Data Exchange

- Slave state machine



Data exchange

- first the master is sending a control telegram to signalize the change into operate mode

SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	DU..	DU..	FCS	ED
68H	x	x	68H	FF	FF	x	62/3E	58/3A	00	00	x	16H

- the control command is a broadcast telegram send to address 127, which will be received from every device
- this telegram will be send cyclic in an interval of 6 x Watchdog for control function
- operate mode means that application driven data are send to output devices

Data exchange

- data are send back and force

SD	LE	LER	SD	DA	SA	FC	DU	FCS	ED
68H	x	x	x	xx	xx	x	data	x	16H

Reply

SD	LE	LER	SD	DA	SA	FC	DU..	FCS	ED
68H	x	x	x	xx	xx	08	data	x	16H

length of data is determined through the configuration

- **till Slave response with high priority**

SD	LE	LER	SD	DA	SA	FC	DU	FCS	ED
68H	x	x	x	xx	xx	x	data	x	16H

ALARM

Reply

SD	LE	LER	SD	DA	SA	FC	DU..	FCS	ED
68H	x	x	x	xx	xx	0A	data	x	16H

- which indicates to the master that the Slave has diagnostic

Data exchange

- in the next bus cycle, the master is requesting diagnosis from the particular Slave

Request

SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	FCS	ED
68H	x	x	x	8x	8x	x	60/3C	62/3E	x	16H

Reply

SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	DU..	FCS	ED
68H	x	x	x	8x	8x	x	62/3E	60/3C	X ..	x	16H

- the following bus cycle is back to data exchange

SD	LE	LER	SD	DA	SA	FC	DU	FCS	ED
68H	x	x	x	xx	xx	x	data	x	16H

Reply

SD	LE	LER	SD	DA	SA	FC	DU..	FCS	ED
68H	x	x	x	xx	xx	08	data	x	16H

Data exchange

- in between the bus cycle control commands for sync and freeze can be send (per user demand)

SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	DU..	DU..	FCS	ED
68H	x	x	68H	FF	FF	x	62/3E	58/3A	xx	xx	x	16H

bit 0 - not used
bit 1 - clear
bit 2 - unfreeze
bit 3 - freeze
bit 4 - unsync
bit 5 - sync
bit 6 - not used
bit 7 - not used

group definition 0-8

Data exchange

- if a master detects a network problem (broken wire, programmer defines stop, Slave response with certain diagnosis, e.g..), the master state is switching from data exchange mode to clear mode

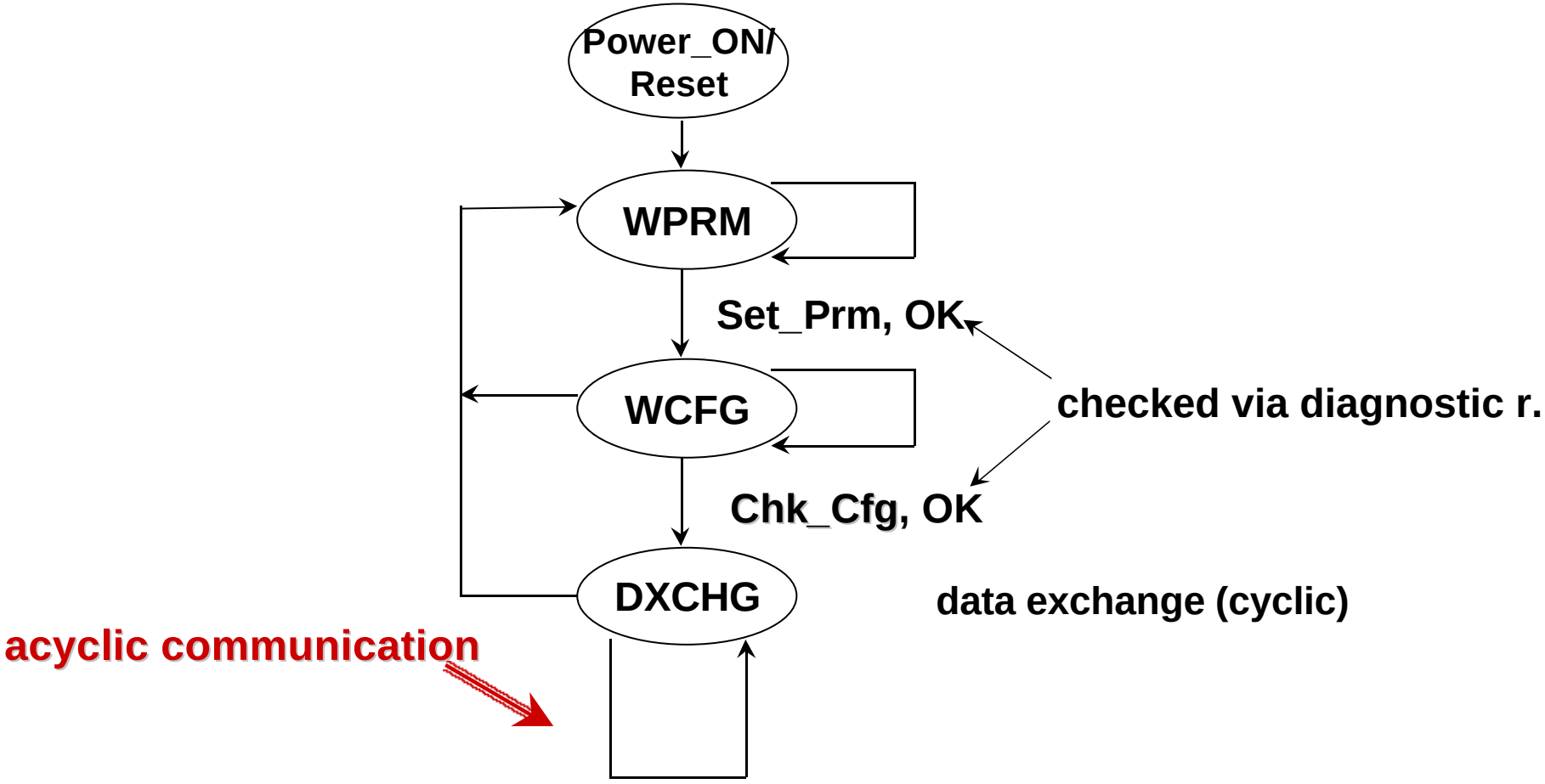
SD	LE	LER	SD	DA	SA	FC	DSAP	SSAP	DU..	DU..	FCS	ED
68H	x	x	68H	8x	8x	x	62/3E	58/3A	02	00	x	16H

- which is indicated through a control command
- in clear mode data with “0” are send to outputs or no data in case of a fail safe Slave
- clear state could be to one specific device or all devices, depending on the detected failure type

DP interactions

DP extension

- Slave State Machine



DP interactions

DP extended

- Why DP extended?
  - the requirements of the process industry are included
  - selecting and changing parameters of a field device from several DP-Masters, e.g.. CPU, PG or HMI Devices
    - provides for higher flexibility in operation
  - Interrupts from Field Devices, e.g. for diagnostics, have to be accepted by the DP-Master
    - allows for greater security
  - time stamping of events, e.g. for interrupts, accurate history of special events
  - additional data formats are necessary for transmitting data, e.g. floating-point-radix

DP extended

New extended PROFIBUS-DP-Standard

DP-Extension

- Additional acyclic messages between Master and Slave by reading and writing of data blocks
- Acknowledgment of field device interrupts
- Time synchronization for an exact time stamping
- Extension of data types, floating-point-radix

PROFIBUS-DP-Standard !

- every station that handles the DP-extensions must meet the previous PROFIBUS-DP-Standard-Functions!

DP extended

- the implementation of the DP-Extensions in the Master and/or the Slave is optional
- a Master or Slave can implement only a fraction of the DP-Extensions, e.g. read/write data
- every DP-Slave without DP-Extension runs with every DP-Master (with or without DP-Extension)
- every DP-Slave with DP-Extensions runs with every DP-Master with DP-Extensions without any restrictions. (Warning: Master can only offer a fraction of the Extensions!)
- a DP-Slave with DP-Extensions must operate with limited functionality with a DP-Master without the DP-Extensions

DP extended

- acyclic communication connections between Class 1 Master and Slave via Slave SAP 51
  - Read data set (DDLM_Read)
  - Write data set (DDLM_Write)
  - Acknowledge alarms (DDLM_Alarm_Ack)
  - only the master that parameterized and configured the slave can utilize the SAP 51 for these services also
  - alarm can only be acknowledged by the Class 1 Master via SAP 51 (access protection)

DP extended

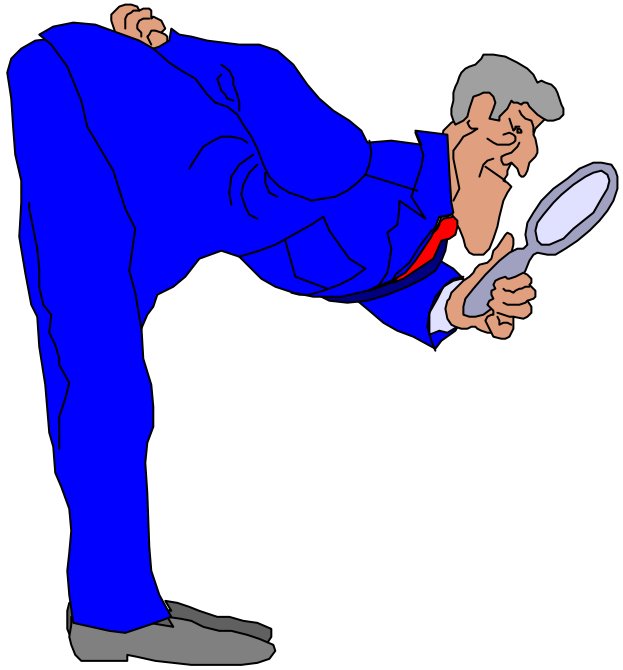
- acyclic communication relation between Class 2 Master and Slave via SAP 40 ... 50
  - Read data set (DDLM_Read)
  - Write data set (DDLM_Write)
  - Download /Upload of parameter (DDLM_Download / DDLM_Upload)
  - Activation of parameter sets (DDLM_Act_Param)
  - Start/End load sequences (DDLM_Start_Seq /End_Seq)

DP extension

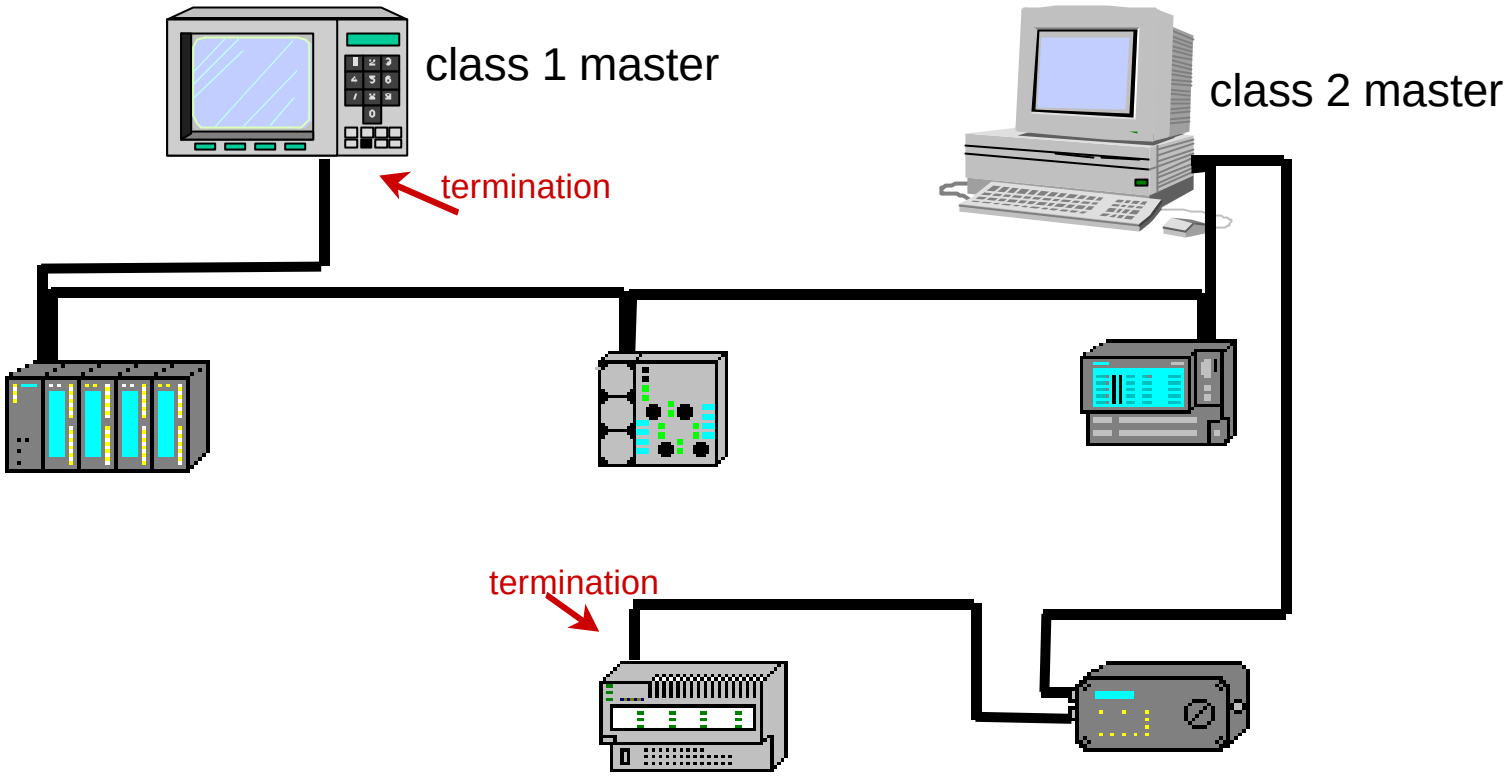
- additional data type definitions
  - Situation up to now: only 8 and 16 bit types are defined, in addition:
    - Integer (8,16,32 bits)
    - Unsigned (8,16,32 bits)
    - Floating Point (4 Octets, IEEE Std 754)
    - Visible String (ISO 646 and ISO 2375
    - Octet String
    - Date (ms,min,hours,dow,dom,months,years)
    - Time of day
  - are defined in the DP extensions (add on to the special configuration format)

practical touch on

- practice confirms the theory



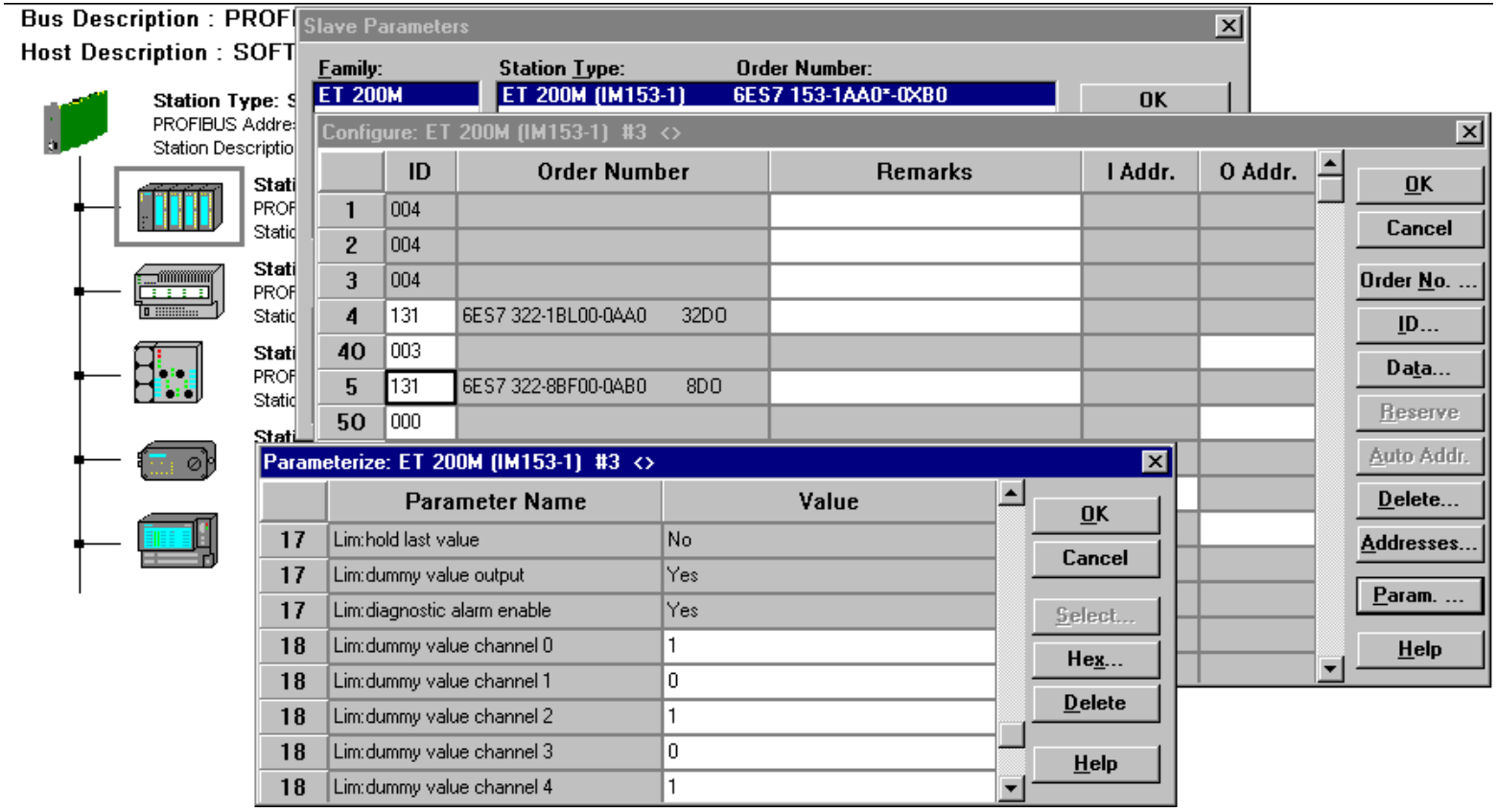
network setup



network setup

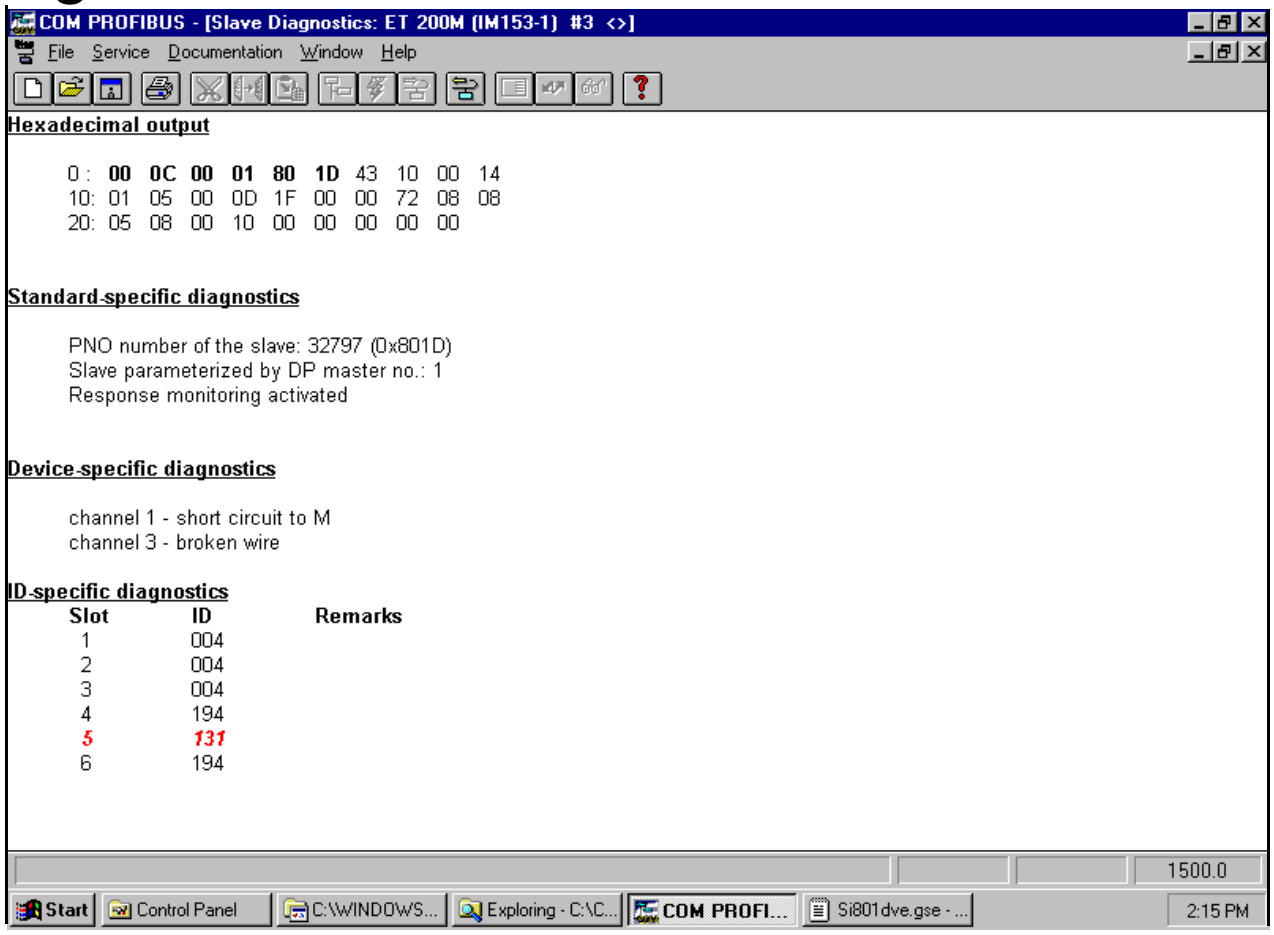
- select your devices
- setup your network (cabling, proper termination)
  - a-line green wire, b-line red wire
  - set termination “on” at the beginning and end of your segment
  - set your station addresses
- configure your system
  - select devices and station address
  - select specific functions
  - define baudrate
- load your master systems
- startup the network
- trouble shooting and diagnostic

network setup



network setup

diagnostic view

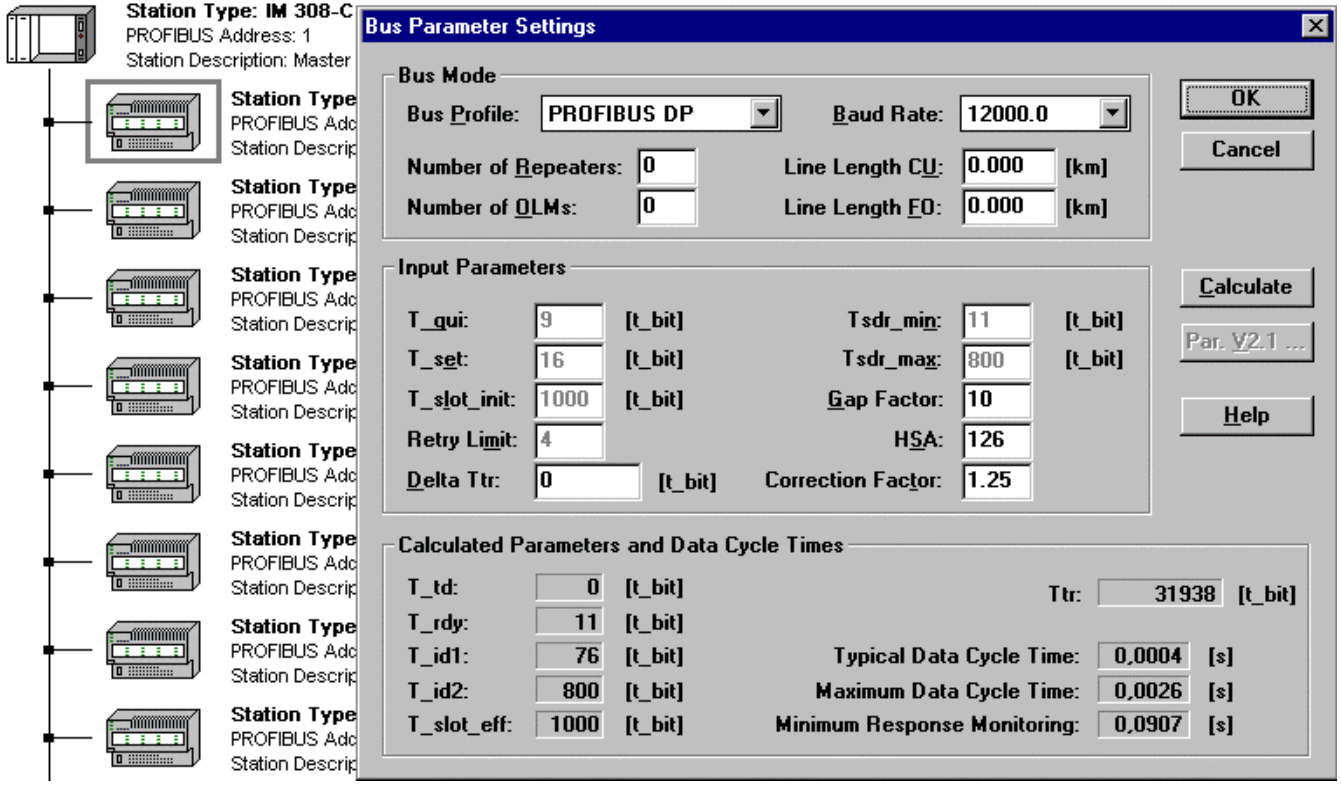


network setup

- diagnostic
  - missing station or wrong address
  - wrong configuration, wrong device
  - device related information
- fail safe
  - setup and behavior
- disconnection and replacement
- timing
- tools - bus monitor, master class 2

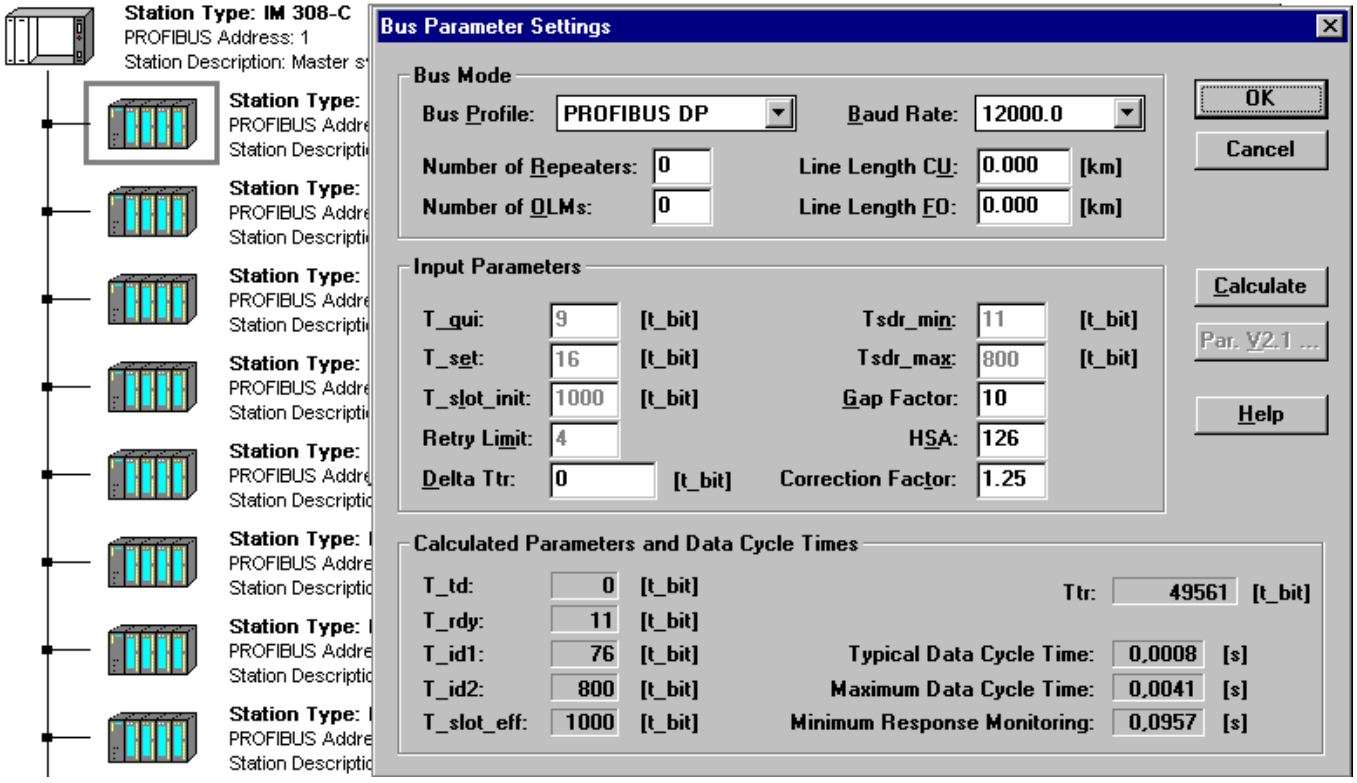
timing

- 10 stations with each 2byte I/O (160 In/ Output signals)
- bus cycle time 0.4ms



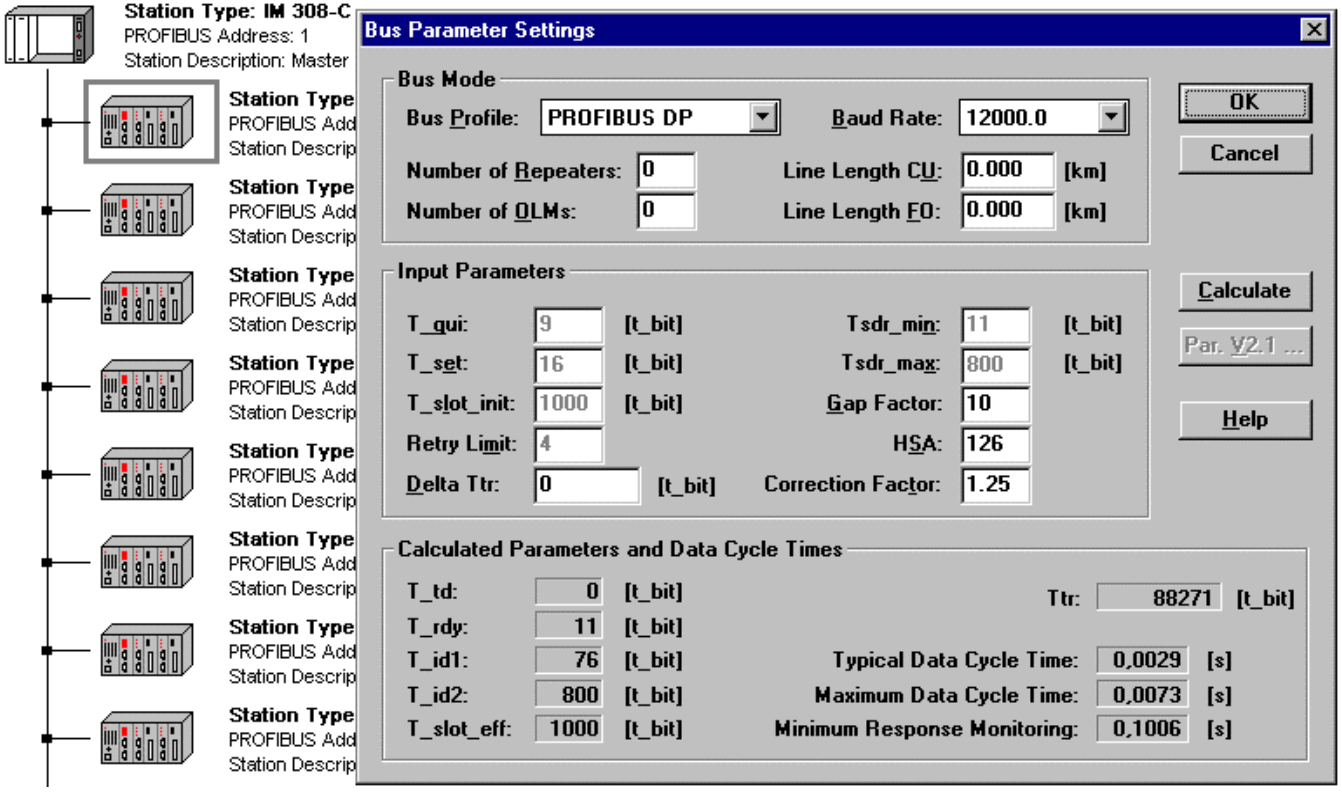
timing

- 10 stations with each 16byte I/O (1280 In/ Output signals)
- bus cycle time 0.8ms



timing

- 10 stations with 128 byte I/O (10240 In/ Output signals)
- bus cycle time 2.9ms



compare with other fieldbus systems

- extensive diagnostic possibilities
- failure and fail safe behavior
- sync and freeze broadcast
- deterministic
- extensions for acyclic communication
- speed
- safe and reliable setup
- easy configuration
- setup for your complete plant solution from cell to bit level

demo tool

- based on all our PC solutions (ISA, PCI, PCMCIA)
- available for download
- source code available
- every information is provided through the interface
- ! no additional source necessary !, except
- device related information is based on the GSD file
- demo tool could be used as presentation tool or development tool

configuration tool

- each master system needs to have a configuration tool
- the configuration tool is the brain of a master system

configuration tool

- a configuration tool needs to support:
  - support of GSD revision 1 files (DP extended functions)
  - support parameterization with text support
  - support normal and special configuration format
  - multi master functionality (including time calculation)
  - calculate repeater and fiber optic timing
  - information about bus cycle timing
  - define sync and freeze mode grouping
  - online functions
  - information about the configuration and bus parameter

binary file

- configuration and bus parameter information
  - detailed Slave information (configuration data, parameter data)
  - detailed bus parameter information
  - is available per request ($200)

Siemens interface

- Siemens PROFIBUS boards support
  - DP/ FDL
  - FMS
  - S7 communication
- interfacing is possible via
  - C-Interface
  - DDE
  - and OPC connection

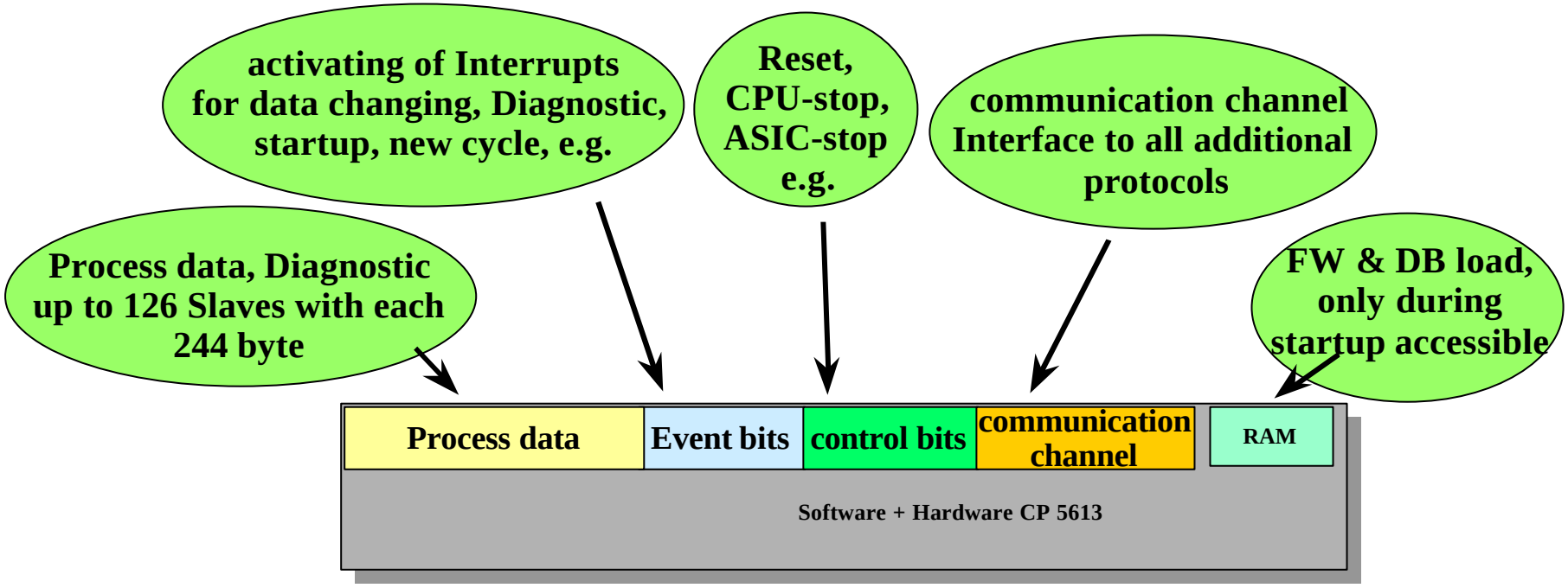
forecast

- configuration tool
  - 32 bit application
  - online function for NT
  - integrated bus monitor
  - full DP-V1 support (PA)

forecast CP 5613

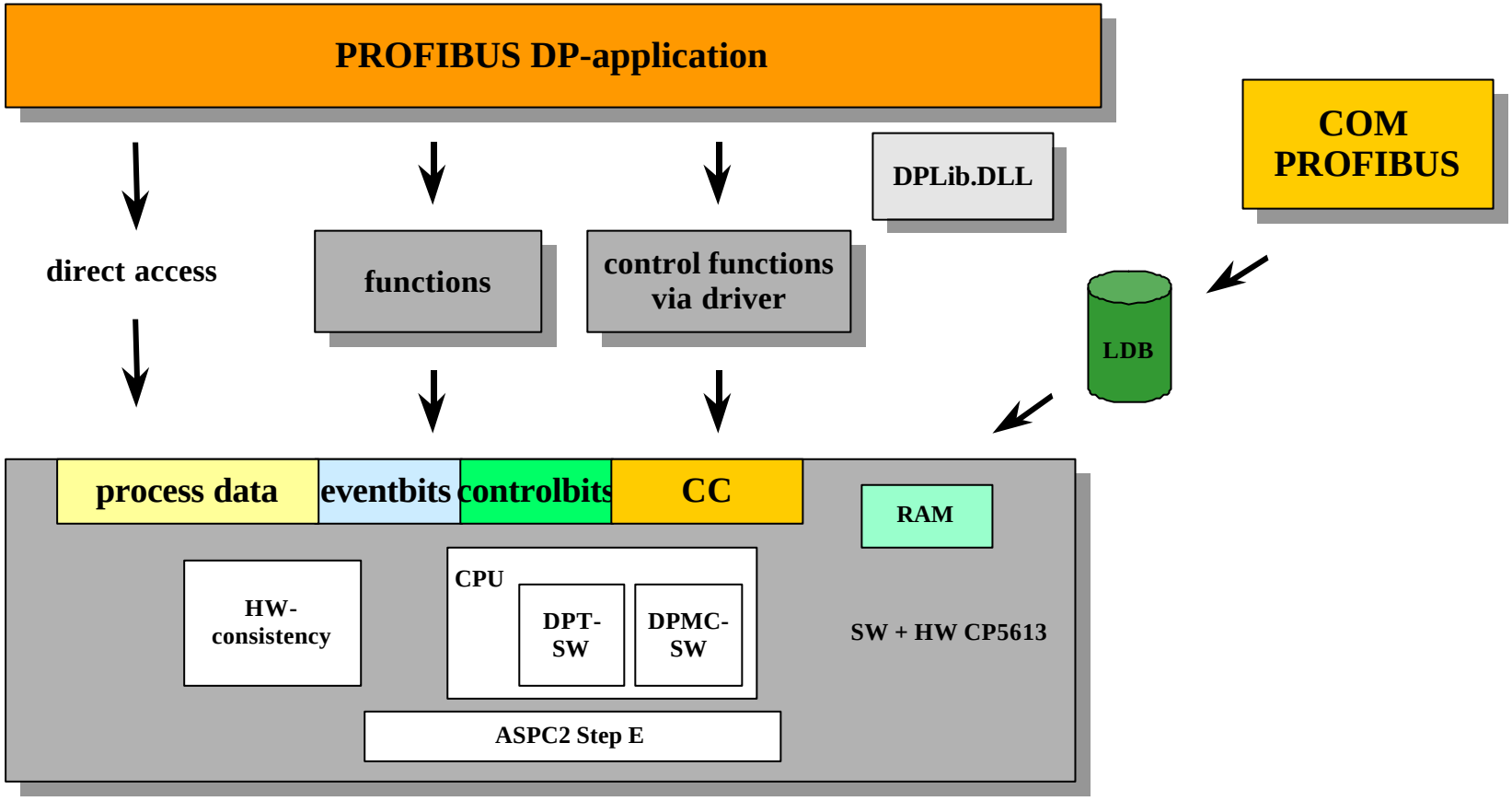
- Interface access
  - hardware access,
    via dual port ram (allows independent operating systems)
    dual port ram structure and access will be provided
  - support of standard operating systems e.g. NT ,
    via software driver
  - compatible driver to existing interfaces (allows investment today)
  - PCI - technology

forecast CP 5613



dual port ram interface

forecast CP 5613



forecast CP 5613

- functionality
  - integrated DP-Slave solution for parallel use
  - master class 1 and class 2 support (which allows visualizing and startup functionality)
  - fiber optic interface integrated
  - independent slave interface integrated

forecast CP 5613

- functionality
  - data consistency via the whole area
  - up to 126 slaves with 244 bytes I/O each
  - up to 4 boards in one PC (multi master functionality in one PC)
  - independent PROFIBUS interface which allows maximum speed for PROFIBUS and application driven reaction times
  - integrated diagnostic function for startup and service
    - provides information about Slaves and bus conditions

forecast CP 5613

- functionality
  - fastest solution - today data cycles of 1 ms are possible
  - the new solution allows data cycles less then 0.4ms independent of the application therefore the application defines update time
  - support of all functions described earlier
    - fail safe, sync and freeze, diagnostic, DP-V1, …..

forecast CP 5613

- definition of time or safety critical circumstances without using the application interface
  - allows the definition of up to four events
  - is done in Hardware, no application support necessary
  - e.g. end of conveyer line - Motor stop
  - Tank full - shut the valve

forecast CP 5613

- poll cycle can be defined (slave 1-3-5-6, 1-2-3-5-6)
  - allows prioritization of Slaves
  - important data are available at all time
  - slaves can be deactivated and activated per demand
  - definition is application driven
  - max. cycle delay needs in between the Watchdog definition

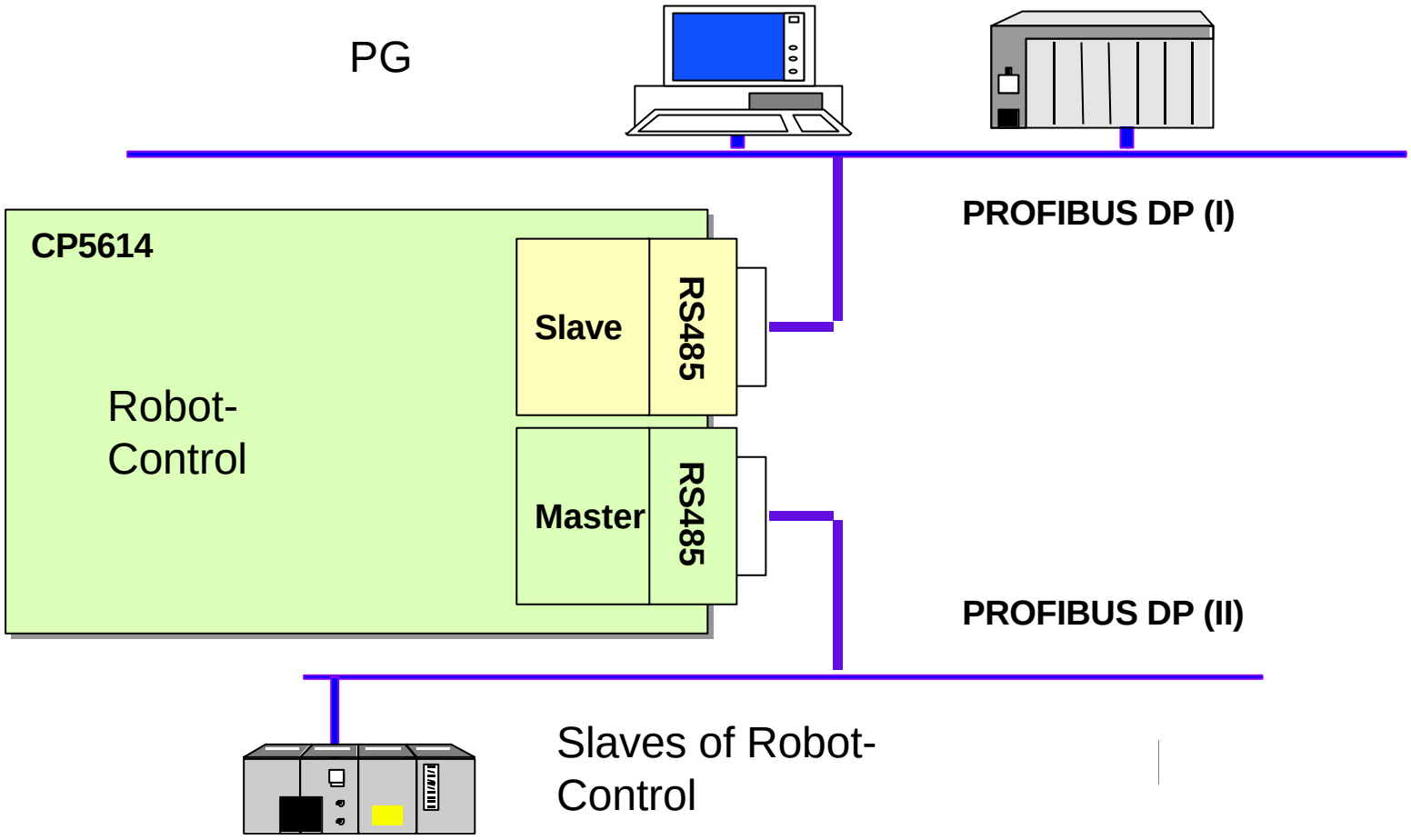
forecast CP 5613

- event filter mechanism, slave related/ groups
  - activating per slave and grouping is possible
  - event or interrupt is set per definition
  - indication could be:
    - change of specific data bits or bytes
    - diagnostic request
    - cycle start
    - cycle end

forecast CP 5614

- HW based on CP 5613
- SW Base is PROFIBUS-DP of CP 5613
- Two PROFIBUS Channels -> 1x DP-Master and 1x DP-Slave (both RS 485)
- Configuration with COM PROFIBUS
- Planned CP 5614 FO:
  - one RS 485, one fibre otic (HP-plug)
  - Software configuration for use of optical channel (master or slave)

forecast CP 5614



conclusion

- Ask your vendor if the interface supports:
  - fail safe function
  - sync and freeze mode
  - data up to 244 byte for each type of telegram
  - DP-V1 functions
  - class 2 functions
  - consistency
  - Slave parallel

Questions

- What information else do you need?