Significance of GSD files

With PROFIBUS DP, the data exchange between a DP master and the connected DP slaves can be realized in numerous ways. PROFIBUS slaves can be adapted to the respective automation task with regard to behavior and specification.
To be able to generate the necessary configuration information (database of the DP master), the configuration tools (e.g. SIMATIC STEP 7/NCM PC) require the technical specifications of the connected DP slaves in a GSD file (**G**eneric **S**tation **D**escription). The GSD file is an ASCII file with a series of standardized key words which uniquely describes specific attributes of a certified DP slave device type. This ensures that different DP slaves of different manufacturers can communicate with each DP master complying with the standard.

GSD file for the slave module of CP 5614

It is also required to provide a GSD file for the slave module of CP561 which describes the specification adapted to the respective application.
The most important description characteristics include:

- Operation as standard (V0-DP slave) or
  operation as DP slave with additionally expanded functionality such as read/write data record, alarm handling (V1-DP slave)
- Specification as modular DP slave (number of modules and number of I/O data can be changed during configuring) or
  specification as non-modular DP slave (compact slave).
  In a compact slave, the number of modules and I/O data are predefined.
- Unique identification number for determining the respective device type.

The information listed below refers to the example GSD files (siem80b4.gsd for DP-V0 and siv180b4.gsd for DP-V1) for the DP slave module of CP 5614 of the Simatic NET CD. These GSD files are stored in the directory
LW:\Programme\SIEMENS\SIMATIC.NET\DP\DEMO_GSD during installation.

The PROFIBUS user organization identification numbers in these GSD files are Siemens-internal demo licenses and must only be used for testing.

The GSD files can be imported with Simatic NCM PC Manager or STEP 7. If these configuration tools are used, the DP slave module of CP 5614 is subsequently available as V0- or V1-DP slave in the DP slave selection catalog under “Additional Field Devices-> General”.
Own GSD files can be created by small modifications (e.g. with the GSD Editor). Preferably only specific parameters should be changed.

These GSD files (and the associated slave application) have to be certified by a certification authority (see Bibliographic references /1/).
Certification also includes the allocation of a **unique** PROFIBUS user organization identification number which is uniquely determined for this newly configured slave.

Assignment of GSD file and transfer parameters when calling DPS_open

With the DPS_open function, a DP slave application logs on to CP 5614 and additionally sets important DP slave parameters.

Some of these slave parameters have to correspond to the actual configuration information (database) in the DP master to ensure that the slave module of CP 5614 is included in the Profibus data transfer.

The table below shows which parameters have to correspond and from which source (key words in the GSD file or configuration) the data can be taken. The call parameters are described in detail in Chapter 4.2.2 (DP Base programming interface).

Call parameters in DPS_open	**Source of the information**
slave_mode : DPS_SM_V1_ENABLE bit (activating DP-V1 services)	**GSD file:** *Key-Word DPV1_Slave*: DPV1_Slave=1 -> DPS_SM_V1_ENABLE bit has to be set; DPV1_Slave=0 or key word does not exist -> DPS_SM_V1_ENABLE bit must not be set
station_addr (station address of the slave):	**Configuration** The value for the station_addr parameter has to correspond to the station address assigned to the slave module of CP 5614 during the configuration.
pno_ident_nr (identification number for the slave type)	**GSD file:** *Key-Word Ident_Number*. The value for the pno_ident_nr parameter has to be identical with the value of this key word. Example: Ident_Number=0x80b4 -> enter 0x80b4 in pno_ident_nr.
init_data, structure DPS_SIMPLE_S This partial structure of the DPS_INIT_DATA_S union is relevant if the DPS_SM_SIMPLE bit is set in the slave_mode parameter. It includes the default values for the user parameterization data (user_prm_data_len, user_prm_data) and the configuration data (cfg_data_len, cfg_data).	**Configuration** The values defined during configuring have to be entered. **GSD file:** If this information cannot be accessed via the configuration tool, it can be determined via the GSD file as described in the following: *Key-Word User_Prm_Data* determines the user parameterization data. Example: User_Prm_Data = 0x00, 0x00,0x00 Enter the value 3 in user_prm_data_len and enter 0x00,0x00,0x00 in the user_prm_data array (see also note 1). *Key-Word Modular_Station* and *Key-Word Module* determine the modular design and the number of I/O bytes of the DP slave (see also note 2)

	Examples of compact and modular slave: See below.
init_data, structure DPS_DYNAMIC_S This partial structure of the DPS_INIT_DATA_S union is relevant if the DPS_SM_DYNAMIC bit is set in the slave_mode parameter. It contains the default values for the default (“temporary”) configuration data (def_cfg_data_len, def_cfg_data).	As for DPS_SIMPLE_S

Note 1)
If the configuration tool offers the option of entering further user parameterization data (not listed in the GSD file), these data also have to be considered in user_prm_data_len, user_prm_data.

Note 2)
If the configuration tool offers further setting options, the general structure of the configuration data (detailed description in Chapter 4.7.3 of the DP Base programming interface) has to be considered. Examples of configuration data: See table 1 below.

Note: In the examples below, characters in bold-face type designate the parameters preferably to be changed.

Example 1: Compact station with predefined modules and DPV1 functionality

The key word module determines number and type of these modules.

```
;=======================================================
; GSD Example derived from CP5614 DPV1-Slave
; Not Modular DPV1-Slave
; GSD-File for CP5614 Sample AAAA SIEMENS AG
; MLFB  : 6GK1 561-4AA00
; Auto_Baud_supp, 12MBaud
; Version : 09/10/02
; File  : SIV1AAAA.GSD
;=======================================================
#Profibus_DP

;General parameters
GSD_Revision         = 3
Vendor_Name          = "My Company"
Model_Name           = "Mein CP5614 Sample V1"  ;Own name has to
                                                ;be entered
Revision             = "V1.1"
Ident_Number         = 0xAAAA                   ;assigned by
                                                ;certification authority
Protocol_Ident       = 0
Station_Type         = 0
Hardware_Release     = "HW_R"
Software_Release     = "SW_R"
9.6_supp             = 1
```

```
19.2_supp            = 1
45.45_supp           = 1
93.75_supp           = 1
187.5_supp           = 1
500_supp             = 1
1.5M_supp            = 1
3M_supp              = 1
6M_supp              = 1
12M_supp             = 1
MaxTsdr_9.6          = 60
MaxTsdr_19.2         = 60
MaxTsdr_45.45        = 250
MaxTsdr_93.75        = 60
MaxTsdr_187.5        = 60
MaxTsdr_500          = 100
MaxTsdr_1.5M         = 150
MaxTsdr_3M           = 250
MaxTsdr_6M           = 450
MaxTsdr_12M          = 800
Repeater_Ctrl_Sig    = 2
Implementation_Type  = "DPC31"
Bitmap_Device        = "SI9001PN"
Bitmap_Diag          = "SI9001PN"
Bitmap_SF            = "SI9001PN"

; Slave-Specification:

OrderNumber="6GK1 561-4AA00"

Freeze_Mode_supp      = 1
Sync_Mode_supp        = 1
Auto_Baud_supp        = 1
User_Prm_Data_Len     = 3
User_Prm_Data         = 0x00,0x00,0x00
Min_Slave_Intervall   = 1
Modular_Station       = 0


Module="CP5614 Slave-Modul" 0xAF,0x9F
0
EndModule


Fail_Safe             = 1
Max_Diag_Data_Len     = 244
Slave_Family          = 0


;Extensions

DPV1_Slave               = 1
C1_Read_Write_supp        = 1
C1_Max_Data_Len           = 240
C1_Response_Timeout       = 500
Diagnostic_Alarm_supp     = 1
Process_Alarm_supp        = 1
Pull_Plug_Alarm_supp      = 1
Status_Alarm_supp         = 1
Update_Alarm_supp         = 1
Manufacturer_Specific_Alarm_supp = 1
Alarm_Sequence_Mode_Count = 0
Alarm_Type_Mode_supp      = 1
Diagnostic_Alarm_required = 1
```

```
Process_Alarm_required    = 1
Pull_Plug_Alarm_required  = 1
Status_Alarm_required     = 1
Update_Alarm_required     = 1
Manufacturer_Specific_Alarm_required = 1
```

A slave configured in such a way is addressed from the software as described in the following:

```
DPR_DWORD user_handle=0;
DPR_WORD StationAddr=33;    // PROFIBUS address of the DP slave
DPS_INIT_DATA_T init_data;
DP_ERROR_T error;

init_data.simple user_prm_data_len    = 0;
init_data.simple user_prm_data        = NULL;
init_data.simple cfg_data_len         = 2;
init_data.simple.cfg_data[0]          = 0xaf;
init_data.simple.cfg_data[1]          = 0x9f;

if ( DPS_open (  "CP5614A2(PROFIBUS)",// in : cp_name
                 &user_handle,        // out : user_handle
                 DPS_SM_SIMPLE| DPS_SM_V1_ENABLE,
                                      // in : slave_mode
                 StationAddr,
                                      // in : station_addr
                 0,                   // in, not used : addr_change
                 0xAAAA,              // in : pno_ident_nr
                 0,                   // in, not used : user_wd
                 &init_data           // in : init_data
                 NULL,                // in, not used : max_data_len
                 DPS_BD_AUTO_DETECT,  // in : baud_rate
                 &error               // out : error
                 )

                 == DP_OK)
{ // OK. Further actions }
else
{ // Errorhandling }
```

Example 2: Modular DP slave

In a modular slave, the actual number and arrangement of the modules is only determined during the configuration.
The GSD file contains the description of the modules which can be selected during the configuration.
The example below shows 10 modules of a GSD file which are available during the configuration.

```
;=========================================================
; GSD-File  derived from CP5614 Sample 80b4   SIEMENS AG
; MLFB  : 6GK1 561-4AA00
; Auto_Baud_supp, 12MBaud
;
; Stand : 10.05.2000 mm
; File    : SIEMBBBB.GSD
;=========================================================
#Profibus_DP
; Unit-Definition-List:
```

```
GSD_Revision=1
Vendor_Name="My Company"
Model_Name="CP5614 Sample BBBB"        ;name has to be
                                       ;changed
Revision="V1.0"
Ident_Number=0xBBBB                    ;assigned by
                                       ;certification authority
Protocol_Ident=0
Station_Type=0
Hardware_Release="Axxx"
Software_Release="Zxxx"
9.6_supp = 1
19.2_supp = 1
45.45_supp = 1
93.75_supp = 1
187.5_supp = 1
500_supp = 1
1.5M_supp = 1
3M_supp = 1
6M_supp = 1
12M_supp = 1
MaxTsdr_9.6 = 60
MaxTsdr_19.2 = 60
MaxTsdr_45.45 = 250
MaxTsdr_93.75 = 60
MaxTsdr_187.5 = 60
MaxTsdr_500 = 100
MaxTsdr_1.5M = 150
MaxTsdr_3M = 250
MaxTsdr_6M = 450
MaxTsdr_12M = 800
Repeater_Ctrl_Sig = 2
Implementation_Type="DPC31"
Bitmap_Device="CP5614_N"
Bitmap_SF="CP5614_S"
;
; Slave-Specification:
OrderNumber="6GK1 561-4AA00"
;
Freeze_Mode_supp=1
Sync_Mode_supp = 1
Auto_Baud_supp = 1
Fail_Save = 1
Set_Slave_Add_supp = 0
Min_Slave_Intervall=1
Max_Diag_Data_Len=16
Slave_Family=0
User_Prm_Data_Len=3
User_Prm_Data = 0x00,0x00,0x00
;
Modular_Station = 1
Max_Module=32
Max_Input_Len=244
Max_Output_Len=244
Max_Data_Len=488
;
; Module-Definitions:
;
Module = "1 Byte Input" 0x10
EndModule
Module = "1 Byte Output" 0x20
EndModule
Module = "2 Byte Input" 0x11
EndModule
```

```
Module = "2 Byte Output" 0x21
EndModule
Module = "4 Byte Input" 0x13
EndModule
Module = "4 Byte Output" 0x23
EndModule
Module = "8 Byte Input" 0x17
EndModule
Module = "8 Byte Output" 0x27
EndModule
Module = "16 Byte Input" 0x1f
EndModule
Module = "16 Byte Output" 0x2f
EndModule
```

During configuring, three modules are assigned e.g. to the DP slave module of CP 5614 in the following sequence:
a) 2 Byte Input
b) 1 Byte Output
c) 16 Byte Output

A slave configured in such a way is addressed from the software as described in the following:

```
DPR_DWORD user_handle=0;
DPR_WORD StationAddr=12;    // PROFIBUS address of the DP slave
DPS_INIT_DATA_T init_data;
DP_ERROR_T error;

init_data.simple user_prm_data_len     = 0;
init_data.simple user_prm_data         = NULL;
init_data.simple cfg_data_len          = 3;
init_data.simple.cfg_data[0]           = 0x11;
init_data.simple.cfg_data[1]           = 0x20;
init_data.simple.cfg_data[2]           = 0x2F;

if ( DPS_open (  "CP5614A2(PROFIBUS)", // in : cp_name
                 &user_handle,         // out : user_handle
                 DPS_SM_SIMPLE,        // in : slave_mode
                 StationAddr,          // in : station_addr
                 0,                    // in, not used : addr_change
                 0xBBBB,               // in : pno_ident_nr
                 0,                    // in, not used : user_wd
                 &init_data            // in : init_data
                 NULL,                 // in, not used : max_data_len
                 DPS_BD_AUTO_DETECT,   // in : baud_rate
                 &error                // out : error
                 )

                 == DP_OK)
{ // OK. Further actions }
else
{ // Errorhandling }
```

Table 1: Examples of module configurations

Length(Input)	Cfg_Data
1 Byte Input	0x10
2 Byte Input	0x11
3 Byte Input	0x12
…	…
16 Byte Input	0x1f

17 Byte Input	0x40, 0x00
18 Byte Input	0x40, 0x01
…	…
64 Byte Input	0x40, 0x3f

Length(Output)	Cfg Data
1 Byte Output	0x20
2 Byte Output	0x21
3 Byte Output	0x22
…	…
16 Byte Output	0x2f
17 Byte Output	0x80, 0x00
18 Byte Output	0x80, 0x01
…	…
64 Byte Output	0x80, 0x3f

Length(Input)	Cfg Data
1 Word Input	0x50
2 Word Input	0x51
3 Word Input	0x52
…	…
16 Word Input	0x5f

17 Word Input	0x40, 0x40
18 Word Input	0x40, 0x41
…	…
64 Word Input	0x40, 0x7f

Length(Output)	Cfg Data
1 Word Output	0x60
2 Word Output	0x61
3 Word Output	0x62
…	…
16 Word Output	0x6f
17 Word Output	0x80, 0x40
18 Word Output	0x80, 0x41
…	…
64 Word Output	0x80, 0x7f

Bibliographic references

/1/	Certification Center ComDeC Würzburger Strasse 121 90766 Fürth Germany Phone : ++49 911 750 2074 Email comdec@fthw.siemens.de