PROFINET® Object Model

Revision 1.0

Contents

PROFINET Introduction

PROFINET is the open Industrial Ethernet standard of PROFIBUS and PROFINET International (PI) for automation based on Industrial Ethernet and uses TCP/IP, UDP and IT standards.

PROFINET uses a real-time model for communications known as PROFINET IO, which is similar to PROFIBUS DP. PROFINET IO is generally referred to as just PROFINET.

PROFINET offers scalable communication for different applications in industrial automation:

- PROFINET RT (real time) offers a communication channel with optimized performance (1-128ms clock rate with jitter of ±10% or ±10ms, whichever is lower) that is suitable for most factory automation tasks
- PROFINET IRT (isochronous real time) employs special communication hardware to enable clock rates of less than 1-ms (down to 31.25µs) and a jitter precision of less than 1 µs. This channel is mainly of use for motion control applications.

PROFINET uses a view of distributed I/O similar to PROFIBUS DP. Controllers (e.g. PLCs) run an automation program, IO devices (e.g. absolute encoders) are remotely assigned field devices, and IO supervisors (e.g. programming devices) are used for commissioning and diagnostics.

The engineering of PROFINET is done similar to PROFIBUS. The fieldbuses (i.e. Ethernet topologies) are assigned to control systems during configuration. The IO device is configured in the actual system based on the contents of its GSDML file.

After completion of the engineering the installer loads the data for the expansion into the IO controller (PLC) and the IO controller assumes data exchange with the IO device.

An IO device is addressed within PROFINET (and also possibly by external IT components) through its IP address.

Process data will be exchanged between the Controller and the Device via cyclic messages at the desired speed. Data can also be queried acyclically from an IO Supervisor system.

PROFINET Object Model

Table 1 describes data types used in this object model.

Table 1. Data Types

Data Type	Description
USINT	Unsigned Short Integer (8-bit)
UINT	Unsigned Integer (16-bit)
UDINT	Unsigned Double Integer (32-bit)
SINT	Signed Integer (8-bit)
INT	Signed Integer (16-bit)
DINT	Signed Integer (32-bit)
STRING	Character String (1 byte per character)
SHORT STRING*nn*	Character String (1st byte is length; up to *nn* characters)
STRINGI	International String format
BYTE	Bit String (8-bits)
WORD	Bit String (16-bits)
DWORD	Bit String (32-bits)
REAL	IEEE 32-bit Single Precision Floating Point

Module Definition

The following tables contain the attribute, instance, data mapping, and common services information for the module definition.

Table 2. Module Information

Slot #	Name	CIP	Slot #	Name
1	Module 0x30 (Input) Controller + 8 Emitters See Below Table 3	SINT[212]	Varies	Get
1	*Module 0x31 (Input) Controller + 4 Emitters See Below Table 3 for bytes 0 to 115	SINT[116]	Varies	Get
1	Module 0x32 (Input) Controller + 2 Emitters See Below Table 3 for bytes 0 to 67	SINT[68]	Varies	Get
2	Module 0x40 (Output) Controller + 8 Emitters See Below Table 4	SINT[12]	Varies	Get
2	*Module 0x41 (Output) Controller + 4 Emitters See Below Table 4 for bytes 0 to 7	SINT[8]	Varies	Get
2	Module 0x42 (Output) Controller + 2 Emitters See Below Table 4 for bytes 0 to 5	SINT[6]	Varies	Get

* indicates the module to be used by default

Table 3. Input Slot Definition

Byte	Data Type	Description (Command – Field)	ASCII Response ('#' represents 0 for controller and 1-8 for emitters)
0-3	SINT[4]	Echo DataEch	Same value as Output Slot[0-3]
4	SINT	Get Controller Status – System Status System Status	"GCS <SystemStatus>:<AlarmIndex>:<MaxTemp>:<Temp>:<Volts>\r"
5	SINT	Get Controller Status – Alarm Index	"GCS <SystemStatus>:<AlarmIndex>:<MaxTemp>:<Temp>:<Volts>\r"
6-7	SINT[2]	Reserved	
8-11	REAL	Get Controller Status – MaxTempMax Temp	"GCS <SystemStatus>:<AlarmIndex>:<MaxTemp>:<Temp>:<Volts>\r"
12-15	REAL	Get Controller Status – TempTemp	"GCS <SystemStatus>:<AlarmIndex>:<MaxTemp>:<Temp>:<Volts>\r"
16-19	REAL	Get Controller Status – Volts	"GCS <SystemStatus>:<AlarmIndex>:<MaxTemp>:<Temp>:<Volts>\r"
20	SINT	Get Emitter 1 Status – Alarm Index	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
21	SINT	Get Emitter 1 Status – Fan Speed	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
22	SINT	Get Emitter 1 Status – LED State	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
23	SINT	Get Emitter 1 Status – Power Level	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
24-27	REAL	Get Emitter 1 Status – Max Temp	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
28-31	REAL	Get Emitter 1 Status – Temp	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
32-35	REAL	Get Emitter 1 Status – Max Current	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
36-39	REAL	Get Emitter 1 Status – Current	"GE#S <AlarmIdx>:<MaxTemp>:<Temp>:<MaxCurrent>:<Current>:<Interlock>:<LedState>:<PowerLevel>\r"
40-43	SINT[4]	Emitter 1 Reserved	
44-67	SINT[24]	Emitter 2	See Emitter 1
68-91	SINT[24]	Emitter 3	See Emitter 1
92-115	SINT[24]	Emitter 4	See Emitter 1
116-139	SINT[24]	Emitter 5	See Emitter 1
140-163	SINT[24]	Emitter 6	See Emitter 1
164-187	SINT[24]	Emitter 7	See Emitter 1
188-211	SINT[24]	Emitter 8	See Emitter 1

Table 4. Output Slot Definition

Byte	Data Type	Description (Command – Field)	ASCII Command – No Response Data ('#' represents 1-8 for emitters)
0	BYTE	Set Emitter LED State Bit 0: Emitter 1 … Bit 7: Emitter 8	SEO# 1 (where # = this byte) SEO# 0 (where # = ~byte)
1	SINT	Reset Unit	"RSTU\r"
2	SINT	Reset Alarms	"RSTA\r"
3	SINT	Reserved	
4	SINT	Set Emitter 1 Power Level – Power Level	"SEP1 <PowerLevel>\r"
5	SINT	Set Emitter 2 Power Level – Power Level	"SEP2 <PowerLevel>\r"
6	SINT	Set Emitter 3 Power Level – Power Level	"SEP3 <PowerLevel>\r"
7	SINT	Set Emitter 4 Power Level – Power Level	"SEP4 <PowerLevel>\r"
8	SINT	Set Emitter 5 Power Level – Power Level	"SEP5 <PowerLevel>\r"
9	SINT	Set Emitter 6 Power Level – Power Level	"SEP6 <PowerLevel>\r"
10	SINT	Set Emitter 7 Power Level – Power Level	"SEP7 <PowerLevel>\r"
11	SINT	Set Emitter 8 Power Level – Power Level	"SEP8 <PowerLevel>\r"

Controller Acyclic ObjectPROFINET® Object Model

The following tables contain the attribute and common services information for the controller acyclic object.

Table 5. Output Slot Definition

User Definable Address	Name	Data Type	Data Value	Access Rule	User Definable Address
0x8000	Controller Serial Number	SHORT STRING32	Varies	Get	"GCs <Serial Number>\r"
0x8001	Controller Information Max Emitters	SINT	Varies	Get	"GCI <MaxEmitters>:<Revision>:<UpTime>\r"
0x8002	Controller Information Revision	SHORT STRING32	Varies	Get	"GCI <MaxEmitters>:<Revision>:<UpTime>\r"
0x8003	Controller Information Up Time	REAL	Varies	Get	"GCI <MaxEmitters>:<Revision>:<UpTime>\r"

Emitter # Acyclic Object

The following tables contain the attribute and common services information for the Emitter # Acyclic Object.

Table 6. Emitter # Acyclic Object

User Definable Address	Name	Data Type	Data Value	Access	User Definable Address
0x8010	Emitter Serial Number	SHORT STRING32	Varies	Get	“GE#s <Serial Number>\r”
0x8011	Emitter Power Correction	SINT	50 - 120	Get	“GE#p <Power Correction>\r”
0x8012	Emitter Information Revision	SHORT STRING32	Varies	Get	“GE#I <Revision>:<UpTime>:<OnTime>\r”
0x8013	Emitter Information Up Time	REAL	Varies	Get	“GE#I <Revision>:<UpTime>:<OnTime>\r”
0x8014	Emitter Information on Time	REAL	Varies	Get	“GE#I <Revision>:<UpTime>:<OnTime>\r”
0x8020 – 0x8024	Emitter 2 (See Emitter 1)				
0x8030 – 0x8034	Emitter 3 (See Emitter 1)				
0x8040 – 0x8044	Emitter 4 (See Emitter 1)				
0x8050 – 0x8054	Emitter 5 (See Emitter 1)				
0x8060 – 0x8064	Emitter 6 (See Emitter 1)				
0x8070 – 0x8074	Emitter 7 (See Emitter 1)				
0x8080 – 0x8084	Emitter 8 (See Emitter 1)				

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