# Smart3G – pn5732P Ethernet PLC

## **User Guide**

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For more information please visit the product web page: <u>www.vitalsystem.com/smart3g</u>

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## **Smart-3G - Ethernet Programmable Controller**

The *Smart-3G* - *Ethernet Programmable Controller* provides networked 24volts Digital I/O for MDR Powered Roller Conveyor systems, as well as general purpose Fast Local/Remote Machine I/O. These Devices are fully programmable via Ladder Logic for any type of control application, and can act as a programmable master device, or a slaved Remote I/O device. The modules communicate over Ethernet to master or peer devices using *Ethernet/IP*, *Modbus/TCP* and *S3G-Master/Slave* protocols. For *MDR* systems, interlocking messaging bits e.g., upstream, downstream, merge, divert, etc are handled by the firmware for simplified Ladder Logic Programming.

Custom PC Application can also be developed using free sample source code for C and .Net applications.



# **<u>1. Module Description</u>**

# **2. Electrical Specs**

CPU Input Power	18-30Volt DC, 500mA
I/O Voltage	18-30Volt DC
Total Max I/O Current	3 Amps
I/О Туре	PNP (Sourcing)
Output Current	500 mA Per Output
Input Voltage Range	030Volts
Input Threshold Voltage	4 Volts. (Logic Low: 04v, Logic High: 4.1v30v)
Network	Ethernet 100MB/S
Ethernet Switch	2 Ports. (Always use Port 1 when single port is required)

## 3. Operating Modes

The *Smart-3G* controller has two main operating modes:

- Remote I/O controller
- Programmable Logic Controller

## 3.1 Remote I/O controller Mode

Using the *SuperLogic* configuration window, if the **Remote I/O** check box is **ON**, the device allows an external master to control the I/O directly over Ethernet. Any of the three protocols can be used to control the I/O this way. This mode is active be default from factory. The controller does not execute any user downloaded ladder logic program.

The CPU Led blinks in the following two patterns:

- <u>When a Master Is Online</u>: One second On/Off cycle with 2% duty cycle. (very short blips)
- <u>When Master Is Not Online</u>: One second On/Off cycle with 50% duty cycle

### **3.2 Programmable Logic controller Mode**

If the **Remote I/O** check box is **OFF**, the device executes the downloaded user ladder logic program to control the I/O. In this mode, any Master device can still connect to the device, but the outputs will remain in the Ladder Logic program control. The master can write to Control Word file which the device can pick up and take appropriate actions as defined by the user ladder logic program.

In this mode, the CPU Led blinks in the following patterns:

- <u>Ladder Logic Run Mode</u>: Heart-beat blink mode (blip-blip, blip-blip, blip-blip...)
- <u>Ladder Logic Stopped</u>: One second On/Off cycle with 50% duty cycle.

The ladder logic program controls the local I/O as well as access and control the I/O on remote *Smart-3G* devices using the *S3G-Master/Slave* protocol. The remote I/O appears as local I/O and is accessed the same way as the local I/O. You can control up to eight remote *Smart-3G* devices from a single master *Smart-3G* device, providing a total of 72 inputs and 72 outputs.

## 4. Network Configuration and Protocols

## 4.1 IP Address

The Device IP address is configured partly by the rotary switches and partly by the *SuperLogic* software configuration window. The default IP address is set to 192.168.0.1. With the rotary switches, the address range for the device is 192.168.0.1 thru 192.168.0.99. The first three digits of IP address can be changed using the software configuration tool. In addition to the IP address, the default Gateway and Address Mask can also be changed by the configuration software.

## **4.2 Ethernet/IP Protocol**

Configuration Parameters					
Device Type	Generic				
Name	Any user defined name				
Data Format	SINT (byte)				
IP Addr	Device IP Address				
Input	112, Size 12 Bytes (Produce Data)				
Output	111, Size 8 Bytes (4 Bytes in case of RSLogix)				
Config	113, Size 0				

### Input/Produce Message Format

<u>Size</u>: 12 Bytes (4 byte header and 8 byte data); <u>Type</u>: SINT(8bit) <u>Byte 0</u> = 1 Header 4 Bytes (always set to 1) <u>Byte 1</u> = 0 <u>Byte 2</u> = 0 <u>Byte 3</u> = 0 <u>Byte 4</u> = Input States, 8 bits <u>Byte 5</u> = Output Enable Bit, 1 bit <u>Byte 6</u> = Output States, 8 bits <u>Byte 7</u> = 0 <u>Byte 8, 9</u> = Contents of Control Word 1 (CW:1) <u>Byte 10, 11</u> = Contents of Control Word 2 (CW:2)

Data to Ethernet/IP Master is read from *Smart-3G* Internal control words file CW:1 and CW:2, 16bit integers.

#### Output/Consume Message Format

#### Using Allen Bradley RSLogix:

<u>Size</u>: 4 Data Bytes <u>Type</u>: SINT(8bit)

**NOTE**: **Allen Bradley RSLogix** does not use Header bits when mapping outputs, so output size should be set to 4.

<u>Byte 0, 1</u>  $\longrightarrow$  Control Word 9 (or directly to the Output pins) <u>Byte 2, 3</u>  $\longrightarrow$  Control Word 10

Data from Ethernet/IP Master controller is saved in <u>CW:9</u> and <u>CW:10</u> in *Smart-3G* internal control words file.

If **Remote I/O** check-box is checked in *SuperLogic* configuration window, Byte 0 is mapped to outputs for direct master PLC control:

<u>Byte 0</u> ---- Outputs 1...8 (bits 0...7 are mapped to Outputs 1...8).

#### Using 3GScan Software Library for Windows and Linux:

The output size is set to 8 bytes.

Byte 0= 1Header 4 Bytes (Always set to 1)Byte 1= 0Byte 2= 0Byte 3= 0Byte 4, 5Control Word 9 (or directly to Outputs)Byte 6, 7Control Word 10

If **Remote I/O** check-box is checked in *SuperLogic* configuration window, Byte 4 is mapped to outputs for direct PC software control:

<u>Byte 4</u> — Outputs 1...8 (bits 0...7 are mapped to Outputs 1...8).

## **Ethernet/IP Configuration Example**

Below is an example of a typical Ethernet/IP Master configuration using a 10ms polling interval and a 5 second connection timeout.

Add Class1 Connection		×
Originator->Target (0->T) Connection Parameters Connection Point 100 Connection Tag Data Size (bytes) 12 V Run/Idle Header Target->Originator (T->0) Connection Parameters Connection Point 101 Connection Tag Data Size (bytes) 4 Run/Idle Header Configuration Configuration Instance: 1 Module Configuration Data - Each byte is a 2 char hex value, separated by a space (i.e. 0a 26 f9).	Connection Rate O->T Packet Rate (ms): T->O Packet Rate (ms): O->T Production Inhibit T T->O Production Inhibit T Connection Type O->T Tranport Type: T->O Tranport Type: Transport Trigger: Timeout Multiplier: T->O Priority: O->T Priority: Keep TCP connectio	10         Image: Point To Point         Multicast         V         Scheduled         V         Scheduled         Image: Point To Point To Point         Scheduled         Image: Point To Point To Point         Image: Point To Point To Point To Point         Image: Point To Point To Point To Point         Image: Point To Point To Point To Point To Point To Point         Image: Point To Point To Point To Point To Point To Point To Po
		OK Cancel

### 4.3 Modbus / TCP Protocol

Inputs and Outputs are access via Modbus Discrete Inputs (1..8) and Coils (11-18), as well as via holding registers.

Modbus/TCP protocol can read the entire Control Words file CW: 1...54 via *Modbus Holding Registers*. Writes (or Output-Holding) are only allowed to Registers 9, 10, 23 and 24.

Modbus Slave address is ignored.

Reading Modbus Holding Register 1 through 54 will read Control Words 1 thru 54 in the card.

Writing to Modbus Holding Register 9 and 10 will write to Control Words 9 and 10 in the card. Can be used for any general purpose.

The following special condition applies to Register 23 and 24:								
<u>Read Holding Reg 23</u> =	Read 8 Inputs (bits 07) and new barcode bit (bit 15)							
<u>Read Holding Reg 24</u> =	Read 8 Outputs (bits 07) and I/O Power State (bit 15)							
<u>Write Holding Reg 23</u> =	Write to CW:23							
<u>Write Holding Reg 24</u> =	Write to CW:24, or Write to output pins if Remote I/O Checkbox is on.							
The following Discrete Inputs and Coils will also read/write to the device's IO.								

Discrete Inputs 1-8Reads Inputs 1-8Coils 11-18=Read/Write to Outputs 1-8 (Write only available in Remote I/O mode)

#### Ignition SCADA/HMI Setup via Modbus/TCP

The following example setup will let you read/write inputs and outputs on the Smart3G card. You can also use Modbus registers to read/write control words in case you are running the card in Ladder Logic mode.

Navigate to the OPC UA->Device Connections page on the Ignition Config tab, and select Create new Device:

♠	SYSTEM	Config > Opcua > Devices						
Home	Overview							
du	Backup/Restore	Name	Тупе	Description	Enabled	Status		
Status	Ignition Exchange	Hume	()pc	Description	Enabled	Status		
•	Licensing	No Devices						
Config	Modules	-> Create and	Deules					
	Projects	- Create nev	v Device					
	Redundancy							
	Gateway Settings							

#### Select Modbus TCP:

#### Modbus TCP

Connect to devices that implement the Modbus TCP protocol.

#### Enter a name and IP Address for the 3G card, and select Create New Device:

General	
Name	3G-50
Description	Smart3G IO Card
Enabled	✓ (default: true)

Connectivity	
Hostname	192.168.0.50 Hostname/IP address of the Modbus device.
Port	502 Port to connect to. (default: 502)
Local Address	Address of network adapter to connect from. (default: )
Communication Timeout	2000 Maximum amount of time to wait for a response. (default: 2,000)

□ Show advanced properties

**Create New Device** 

Select More->Address on the new device, and import the configuration at the following link:

https://vitalsystem.com/portal/plc/Ignition-3G-config.csv

#### www.VitalSystem.com

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Overview Backup/Restore Ignition Exchange	✓ Suc	cessfully created	new Device "3G-50"			
icensing	Name	Туре	Description	Enabled	Status	
Modules						
Projects	3G-50	Modbus TCP	Smart3G IO Card	true	Connected	More 👻 edit
Redundancy						
ateway Settings	→ Create	new Device				Addresses
						delete

The 3G device is now set up and the tags are available for use in your ignition projects. We have made a basic example view to monitor the IO states in the following project: https://vitalsystem.com/portal/plc/Ignition Smart3G Project.zip

You can import the project from the System->Projects page in the Ignition Config Window:

	atatem							
Home	Overview							
dit	Backup/Restore							
Status	Ignition Exchange					« < 1	of 1 > >>	
-	Licensing							
Config	Modules	Filter type to filter	<b>View</b> 20 <b>v</b>					
	Projects	Name   Description	Enabled	Inheritable	Parent project		Actions	
	Redundancy		There are no pro	piects matching the sear	ch criteria.		Accions	
	Gateway Settings		increate the pre	jeeo matering the sear	enenena			
		→ Create new project				« < 1	of 1 > >>	
	NETWORKING	A loss of any loss						
	Web Server	- Import project						
	Email Settings							

You can then open the project in the Ignition Designer and find the Smart3G example view at this location:



IN	1	2	3	4	5	6	7	8
ουτ	1	2		4			7	

## 4.4 S3G-Master/Slave Protocol

The *Smart-3G* controller allows expanding the local I/O on the *Smart-3G* device by using remote *Smart-3G* devices (configured as **Remote I/O**). Up to eight slave *Smart-3G* cards can be scanned by the master, providing a total of 72 inputs and 72 outputs. The ladder logic program controls the local I/O as well as access and control remote I/O of *Smart-3G* devices using the *S3G-Master/Slave* protocol.

The remote *Smart-3G* devices must have their **Remote I/O** check box turned **ON**, so they do not run their own ladder program. To enable scanning of remote *Smart-3G* device(s), enter the device id (last digit of the IP address) in Control Words 41 thru 48 inside the ladder logic program. The default value is 0, which disables the particular slot of the slave scanner.

The remote I/O is accessed as follows:

Remote Device	Address Control Word	Input File	Output File
#1	41	IN: 916	OUT: 916
#2	42	IN:1724	OUT:1724
#3	43	IN:2532	OUT:2532
#4	44	IN:3340	OUT:3340
#5	45	IN:4148	OUT:4148
#6	46	IN:4956	OUT:4956
#7	47	IN:5764	OUT:5764
#8	48	IN:6572	OUT:6572

For example, to scan device at 192.168.0.88, copy 88 to CW:41. The I/O of device 88 will appear in files IN:9..16 and OUT:9..16.

## **4.5 ProfiNET**

### **Simatic TIA Setup for Siemens**

### **Import XML Device Profile**

The Smart3G ProfiNET Device Profile can be imported into a ProfiNET project by selecting the XML device profile from Vital System Inc.

After successfully importing the Smart3G device profile, it should then be available in the project's Hardware Catalog.

Manage general station description files 🛛 🕹									
Source path: C:\Users\marc\Documents\Automation\TIA-Project1\AdditionalFiles\GSD									
Content of imported path									
File	Version	Langu	Status	Info					
GSDML-V2.3-Eth	V2.3	Englis	Alrea	pn5732 Smart					

🕶 🛅 Other fie	ld devices
👻 🧖 PROFI	NETIO
🕨 🚺 Dri	ives
🕨 🚺 En	coders
🕨 🚺 🗛	teway
🛨 🚺 1/0	
> 🚺	Phoenix Contact GmbH
	Vital System Inc
-	🛅 Ethernet PLC
	📘 Smart3G
✓ Informati	on
Device:	
	Smart3G
Article no.:	
Version:	(GSDML-V2.3-ETHERNE
Description:	
pn5732 Smart	3G Ethernet PLC

## **Ethernet Configuration for Profinet**

The Smart3G IP address is always specified on the device itself depending on the rotary switch selection.

**NOTE**: The IP Address of the Smart3G device cannot be configured via ProfiNET. It can, however, be configured from the Deploy3G or SuperLogic applications.

The Profinet device name must be set to the text "**<u>smart3g-xxx</u>**", where "<u>xxx</u>" is the last octet of the IP Address written in a 3-digit notation. This is also specified by the rotary switch selection.

Ethernet addresses					
Interface networked with	Interface networked with				
<b>5</b> 1 - 1					
Subnet:	PN/IE_1				
	Add new subnet				
IP protocol					
🗹 Use IP protocol					
	◯ Set IP address in the project				
	IP address: 192 . 168 . 2 . 1				
	Subnet mask: 255 . 255 . 0				
	Use router				
	Router address: 0 . 0 . 0 . 0				
	IP address is set directly at the device				
PROFINET					
	_				
	Generate PROFINET device name automatically				
PROFINET device name	smart3g-082				
Converted name:	smart3g-082				
Device number:	8				

## **Real Time Settings**

These settings control the Smart3G I/O polling rate, and the timeout duration. The polling rate can be set as low as 4 millisecond.

<ul> <li>Real time settings</li> </ul>		
> > IO cycle		
Update time		
O Automatic		ms
Can be set	128.000 💌	ms
Adapt update time when send	clock changes	
Watchdog time		
Accepted update cycles without IO data:	10	-
Watchdog time:	1280.000	ms

## Modules and I/O Data

Slot#	Subslot#	Module	Description
	1001	Digital I/O	Digital Inputs (1-byte or 8-bits)
1		2.8.001.70	Digital Outputs (1-byte or 8-bits)
-	1002	Status Bits	(16-bits); <b>Bit0</b> = <u>IO Power;</u> <b>Bit1</b> = <u>RemoteIO</u> ; <b>Bit2</b> = <u>Run Mode</u> ;
	1003 Control Bits		(16-bits); CB: <u>1 – 6; 9 – 12; 14 – 15; 18 – 19</u> ;
	1001	CW:01	Read-only Control Word (2-bytes or 16-bits)
	1002	CW:02	Read-only Control Word (2-bytes or 16-bits)
	1003	CW:03	Read-only Control Word (2-bytes or 16-bits)
2	1004	CW:04	Read-only Control Word (2-bytes or 16-bits)
	1005	CW:25	Read-only Control Word (2-bytes or 16-bits)
	1006	CW:26	Read-only Control Word (2-bytes or 16-bits)
	1007	CW:27	Read-only Control Word (2-bytes or 16-bits)
	1001	CW:09	Writable Control Word (2-bytes or 16-bits)
	1002	CW:10	Writable Control Word (2-bytes or 16-bits)
3	1003	CW:28	Writable Control Word (2-bytes or 16-bits)
	1004	CW:29	Writable Control Word (2-bytes or 16-bits)
	1005	CW:30	Writable Control Word (2-bytes or 16-bits)

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### SYCON Setup for Hilscher Profinet I/O Controller

1. Import the Smart3G XML Device Description.

F SYCON.net - [Untitle	ed.spj]	
File View Device	Network	Extras Help
🗅 🚅 🔛   😨    🗉	라 Add	Busline
netProject	를 Dele	te Last Busline
Project: Untitled	Start	Project Debug Mode
	Stop	Project Debug Mode
	🕣 Devi	ce Catalog
	Impo	ort Device Descriptions
	Print	t Project Data
I		
netProject - Import	t Device Des	scription X
Look in:	Device Desc	riptions 💌 🗢 🖻 📸 🕶
Quick access Desktop Libraries This PC	ML-V2.3-Et LC-Smart3 V3.55-2016 4.xml	sher GSDML-V2.3-Ph Contact-IL PN B
File na	ame:	GSDML-V2.3-EthemetPLC-Smart3G-PAC-V3.55  Open
Files o	of type:	PROFINET GSDML (*xml)

2. Add the Hilscher Profinet I/O Controller on the main bus line. This can be found in the Device Catalog under the "Master" section of "Profinet I/O".

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👺 SYCON.net - [Untitled.spj]									
File View Device Netwo	File View Device Network Extras Help								
□ 📽 🖬   🕲    발 발 🤅	⊇    5± @   <b>⊡</b> 1 ⊟2 t	∃ <sub>3</sub> ∰4							
netProject 🔺 🗙	netDevice								
⊡ Project: Untitled CIFX_RE_PNM[CIF	CIFX_RE_F	PNM[CIFX RE/PNM] <controller>( Connect Disconnect Download Upload Cut Copy Paste Network Scan Configuration</controller>	#1)	ET IO way / Stand-Alone Slave ter CIFX RE/PNM VOMX 100XX-RE/PNM VETX 100 RE/PNM VETX 500 RE/PNM VI 100XX-RE/PNM VI 100XX-RE/PNM VI TCIDTM Solvent Controller DTM 					

3. Add the Smart3G as a Profinet I/O Device on the Hilscher Controller's bus line. This can be found under the "Slave" section of "Profinet I/O". The Smart3G device can then be configured.

SYCON.net - [Untitled.spj]				
File View Device Netw	ork Extras Help			
□ 📽 🔛   😨    ≝ 🖆	📾    3: 💿   <b>3:</b> 3: 3: 3	4		
netProject 🔺 🗙	netDevice			
Project: Untitled	CIFX_RE_PNM[C	IFX RE/PNM] <controller>(#1) IG_5732[Smart3G 5732]<smart3g: Connect Disconnect Download Upload Cut Copy Paste Configuration Measured Value Simulation</smart3g: </controller>	<ul> <li>NXIO 100 RE/PNS V3.4.19 - V3.4.</li> <li>NXIO 100 RE/PNS V3.5.x</li> <li>NXIO 50 RE/PNS V3.1.x - V3.4.x</li> <li>NXIT 50-RE/PNS</li> <li>Smart3G 5732</li> <li>SERCOS III</li> <li>VARAN</li> <li>Fieldbus / Vendor / DTM Class / Fou</li> <li>Vendor: Hischer GmbH</li> <li>Version: V1.0009.2.9157</li> <li>Date: 2011-02-02</li> <li>Device: Smart3G 5732</li> <li>Info: Smart3G 5732</li> </ul>	19 - V3.4.x x - V3.4.x - V3.4.x - V3.4.x ass <u>Found</u> vice DTM

4. In the Smart3G configuration, modules can be added or removed as necessary. Refer to the <u>Profinet</u> <u>Modules</u> section for more information.

k netDevice -	Configuratio	on Sn	nart3G_57	32[Smart3	IG 5	5732] <smart3g></smart3g>			_	×
IO De Vende	evice: Sn or: Vit	nart3 tal Sy	G 5732 stem Inc				Device ID: Vendor ID:	0x5732 0x0324		FÓT
Navigation Area	a 🗖						Modules			
General General → Module Oescription Device l Module GSDML	on s nfo lnfo Viewer	+++++++++++++++++++++++++++++++++++++++	Slot 0 1 2 3	Sub Slot	! 平 平	Smart 3G 5732 Digital IO CW:09 CW:09 CW:10 CW:25 CW:25 CW:26 CW:26		Module		-
	- [		Add Modul	•	A	CW:22 CW:28	Remove			 ~

5. In the Hilscher Device Configuration, the firmware for "Profinet I/O Controller" will need to be downloaded to the device. Click on "Download" to set the active firmware.

netDevice - Configuration CIFX_     IO Device: CIFX RE/PN     Vendor: Hilscher Gm	RE_PNM[CIFX RE IM IbH	/PNM]< controller> (;	#1)	Device ID: Vendor ID:	0x0203 0x011E	- 🗆	×
IO Device: CIFX RE/PN Vendor: Hilscher Gr Navigation Area Settings Settings Settings Priver netX Driver Device Assignment Firmware Download Licensing Ethernet Devices Configuration Controller Network Settings Device Table IP Address Table Process Data Address Table FSU-/Port- Settings Stations Timing Controller Settings	IM IbH Name: Version: I	PROFINET-IO IO C 2.6 (build 10) Select Firmv Look in: Cuick access Desktop Desktop Libraries This PC Select Network	ontroller for CIFX vare File CIFX Name CIFX CifXdps.nxf Cifxerm.nxf Cifxerm.nxf Cifxeis.nxf Cifxeis.nxf Cifxeis.nxf Cifxeis.nxf Cifxerm.	Device ID: Vendor ID: Firmware Download Firmware Download Firmware PROFIBUS-DP Slave EtherCAT Master EtherCAT Slave EtherNet/IP Scanner EtherNet/IP Adapter PROFIBUS-MPI Messaging Open Modbus/TCP Messag POWERLINK Controlled No PROFINET-IO IO Controller PROFINET-IO IO Device SERCOS III Master firmware Files (*.rof.*.rom) C:\Users\Afnan\Desktop\Hilscher\Firm	0x0203 0x011E Hardw CIFX CIFX CIFX CIFX CIFX CIFX CIFX CIFX	/are	wse
			Firmware:	PROFINET-IO IO Controller V2.6 (build	10) for C	Dor	wnload

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6. After the successfully downloading the firmware, the Hilscher device will need to be set as the active device from the "Device Assignment" section.

retDevice - Configuration CIFX_RE_	PNM[CIFX RE/PNM]	<controller>(#1)</controller>				_		×
IO Device: CIFX RE/PNM Vendor: Hilscher GmbH					Device ID: Vendor ID:	0x0203 0x011E		FDT
Navigation Area				Device As	ssignment			
Settings	Scan progress: 1/1 De	evices (Current device: ·	-)				S	can
Device Assignment	Device selection:	suitable only						
Licensing	Device	Usedware Dart 0/	Clabo	Casial au	Deitore	Channel Dectored		- 44-
Ethernet Devices	CIFX 50-RE	Ethernet/Ethernet	n/a	29992	CIFX Device Dri	PROFINET-IO IO Contr	\cifX0_	Ch0

7. Configure the Network settings of the Hilscher Device. Ensure that the Profinet slaves and master are all on the same network.

netDevice - Configuration CIFX_RE	PNM[CIFX RE/PNM] <controller>(#1)</controller>	_	×
IO Device: CIFX RE/PNM Vendor: Hilscher GmbH	Device ID: 0x0203 Vendor ID: 0x011E		FDT
Navigation Area	Controller Network Settings		
Settings Driver	Name of station: controller		
netX Driver Device Assignment	Description: CIFX_RE_PNM		
Firmware Download			
Licensing Ethernet Devices	IP Settings		 
Configuration			
Controller Network Settings Device Table	IP address: 192 . 168 . 0 . 5		
IP Address Table Process Data	Network mask: 255 . 255 . 0		
Address Table FSU-/Port- Settings	Gateway address: 0 . 0 . 0 . 0		
Stations Timing			

 Set Process image storage format to Little Endian for compatibility with other applications. Also Watchdog time can be set to a high value (~2000 millisec) to avoid false disconnects when scanning very high number of devices.

netDevice - Configuration CIFX_RE,	PNM[CIFX RE/PNM] <controller>(#1)</controller>				-	×
IO Device: CIFX RE/PNM Vendor: Hilscher GmbH			Device ID: Vendor ID:	0x0203 0x011E		FDT
Navigation Area		Controller Sett	ings			
<ul> <li>Settings</li> <li>Driver netX Driver</li> <li>Device Assignment</li> <li>Firmware Download</li> <li>Licensing</li> <li>Ethernet Devices</li> <li>Configuration</li> <li>Controller Network Settings</li> <li>Device Table</li> <li>IP Address Table</li> <li>Process Data</li> </ul>	Start of bus communication	Module Alignment				
Address Table FSU-/Port- Settings Stations Timing	Port 1: AUTO  Port 1: AUTO Port 2: AUTO					

9. Set the Station Name for all Smart3G devices according to their set IP Address. See this <u>section</u> on how to set the proper station name.

netDevice - Configuration CIFX_RE_	PNM[CIFX RE/PNM] <controller>(#1)</controller>		- 🗆 X
IO Device: CIFX RE/PNM		Device ID:	0x0203
Vendor: Hilscher GmbH		Vendor ID:	0x011E
Navigation Area		Device Table	
<ul> <li>Settings</li> <li>Driver</li> <li>netX Driver</li> <li>Device Assignment</li> <li>Firmware Download</li> <li>Licensing</li> <li>Ethernet Devices</li> <li>Configuration</li> <li>Controller Network Settings</li> <li>Device Table</li> <li>IP Address Table</li> </ul>	Activate Index / Name of station	Device Description	Vendor
	smart3g-095	art3G 5732 Smart3G_5732	Vital System Inc

10. Set the IP Address for each Smart3G device to its set IP Address. Uncheck the "Inherit" setting to prevent the Hilscher device from setting the Smart3G IP Address.

netDevice - Configuration CIFX_RI	_PNM[CIFX RE/PNM] <controller>(#1)</controller>		- 0	×
IO Device: CIFX RE/PNM Vendor: Hilscher Gmb	De H Ve	vice ID: 0x0203 ndor ID: 0x011E		FDT
Navigation Area	IP Address Table	2		
<ul> <li>Settings</li> <li>Driver</li> <li>netX Driver</li> <li>Device Assignment</li> <li>Firmware Download</li> <li>Licensing</li> <li>Ethernet Devices</li> <li>Configuration</li> <li>Controller Network Settings</li> <li>Device Table</li> <li>Process Data</li> </ul>	Name of station     IP address     Inherit     Network mask     ▼       ▶ smart3g-095     192.168.0.95     255.255.255.0	Gateway addre 0.0.0.0	\$\$	

11. Configure the "Update Time" which controls the data exchange interval, and the "Watchdog Time" which controls the connection timeout.

netDevice - Configuration CIFX_RE	_PNM[CIFX RE/PNM]<	controller>(#1)			_		×
IO Device: CIFX RE/PNM Vendor: Hilscher GmbH	1		Device ID: Vendor ID:	0x0203 0x011E			FÓT
Navigation Area			Stations Timing				
Settings Triver Driver	Name of station:	smart3g-095 smart3g-095					-
Device Assignment Firmware Download	Updating time:	16 <b>v</b> ms	Watchdog t	ime: 48		ms	
Licensing Ethernet Devices							
Configuration Controller Network Settings							
IP Address Table Process Data							
Address Table FSU-/Port- Settings							
Stations Timing Controller Settings							

12. After hitting "OK", the configuration can then be downloaded to the Hilscher Device in order to initiate the Profinet Network operation.



# **5. Programming and Configuring Smart-3G Devices**

The Programming and configuration of Smart-3G devices is accomplished by the SuperLogic and Deploy3G PC software. SuperLogic software allows editing, downloading, monitoring/debugging of the ladder logic program. The configuration window in this program allows editing the IP address and other parameters of the device. Please refer to the SuperLogic Software manual for more detail.



**Deploy3G** PC software is used to program and configure systems with multiple Smart3G cards. It maintains a database of ladder programs and device configurations for the entire project.

ProjectConfiguration	Project Download					
New Project	Import Ladde	er Program	Ladder Program	Checksum	Progr	ram Size
Open Project	Export Ladde	er Program	345test	6485C	2188	1
Close Project	Download Ladde	erto Mismatch	]			
Save Project						
Create from Network	Download Config to	Mismatch Devices	]			
No Mismatch						
Cfg & CSum Mismatch						
CSum Mismatch						
Crg Mismalch	Active Project: <new pro<="" th=""><th>oject&gt;</th><th></th><th></th><th></th><th></th></new>	oject>				
And and and and and and and	_					Add Davias
Analyze						Add Device
Analyze						Add Device
2.168.2.10 192.168.0.213			Device	LadderProgram	CheckSum	RemotelO
2.168.2.10 192.168.0.213           REM         REM         R	EM REM	REM	Device	LadderProgram NOT ASSIGNED	CheckSum 0	RemotelO YES
2.168.2.10 192.168.0.213	EM REM	REM	Device 192.168.0.10 192.168.0.11	LadderProgram NOT ASSIGNED NOT ASSIGNED	CheckSum 0 0	RemotelO YES YES
2.168.2.10 192.168.0.213           REM         REM         R           0:0284         71.0284         72.284	EM REM D2B4 73 : C8160	REM 74 : C8160	Device 192.168.0.10 192.168.0.11 192.168.0.12	LadderProgram NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED	CheckSum 0 0 0	RemotelO YES YES YES
REM         REM         REM         R           0:0224         71:0284         72:0284         71:0284         72:vitility	EM REM D2B4 73 : C8160 v8.00	REM 74 : C8160 v8.00	Device 192.168.0.10 192.168.0.11 192.168.0.12 192.168.0.13	LadderProgram NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED	CheckSum 0 0 0 0	RemoteIO YES YES YES YES
REM         REM         REM         R           70: D284         71: D284         72: V         72: V	EM REM 10284 73: C8160 9.00 95.00	REM 74 : C8160 v8.00	Device 192.168.0.10 192.168.0.11 192.168.0.12 192.168.0.13 192.168.0.14	LadderProgram NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED	CheckSum 0 0 0 0 0	RemotelO YES YES YES YES YES YES
REM         REM         R           10:2.168.0.213         192.168.0.213         1           REM         REM         R           10:0.284         71:0.284         72:           v8.00         20:0.00         72:	EM REM 10284 73: C8160 8.00 v8.00 EM REM	REM 74: C8160 v8.00	Device 192.168.0.10 192.168.0.11 192.168.0.12 192.168.0.13 192.168.0.14 192.168.0.14	LadderProgram NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED NOT ASSIGNED	CheckSum 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	RemotelO YES YES YES YES YES YES YES
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## **Deploy/Superlogic Required Setup Steps**

In order to connect a Smart3G card to either Deploy3G or Superlogic, you must set the IP address of the computer's Ethernet Adapter to match the target network for the 3G cards. Here are step-by-step instructions on how to do this:

Click the Start menu. Next, click on the Control Panel option.



Click on the Network and Sharing Center option.



#### Smart-3G User's Guide

Click on **Change adapter settings** from the left side menu.



Right-click on the **Local Area Connection** icon, then select **Properties** (there may be multiple. Select the one that corresponds to your Smart3G device).

nize   Disable this network device Local Area Connection	Diagnose this connection	Rename this connection **	g • □ 0
Network Intel(#) PRO/1000 MT Network C	Disable Status Diagnose Bridge Connections Create Shortcut Delete Rename Properties		

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#### Smart-3G User's Guide

In the window that opens, click on Internet Protocol Version 4 (TCP/IPv4) (you may need to scroll down to find it). Next, click on the Properties button.

Local Area Connection Properties
Networking
Connect using:
PRO/1000 MT Network Connection
Configure This connection uses the from the sense of t
Install Uninstall Properties
Description Transmission Control Protocol/Internet Providence default wide area network protocol that providence default across diverse interconnected network
OK Cancel

#### Smart-3G User's Guide

In the window that opens, click the 'Use the following IP address' radio button. In the IP address and Subnet Mask boxes, enter your target network IP and subnet mask (Smart3G Default is 192.168.0.xxx and 255.255.0.0). Leave both the Gateway and DNS server settings blank.

rnet Protocol Version 4 (TCP/IPv4)	Propertie	s		? <mark>x</mark>
eneral				
You can get IP settings assigned autor this capability. Otherwise, you need to for the appropriate IP settings.	natically if ask your	your n netwoi	etwork : k admin	supports istrator
Obtain an IP address automatical	v			_
O Use the following IP address:				
IP address:	•		•	
Subnet mask:				
Default gateway:				
Obtain DNS server address auton	natically			
— O Use the following DNS server add	resses:			
Preferred DNS server:				
Alternate DNS server:			•	
Validate settings upon exit			Adva	anced
		OK		Cancel

Click OK to save the setting. After a few seconds, click scan in Deploy3G. Your Smart3G device should appear. If it does not appear, the Smart3G device may have an incorrect IP address. To fix this:

- 1. Confirm that there is only 1 Smart3G device on the network (these steps will affect the whole network)
- 2. Confirm that you have the above Adapter IP and Subnet settings set correctly.
- 3. In Deploy3G, right click the white area of the Network Devices box, and select Auto-Configure.
- 4. The Smart3G device should now be on the correct network, and should appear when you click scan.

# 6. Control Word File

The Control Word file is a 16-bit integer file. The ladder logic program can read and write any Control Word using the CW:n syntax, although some Control Words are read only as mentioned in the following table. *Device ID is the last digit of the IP address*. Modbus/TCP can read any control word and write is allowed to only certain control words. Ethernet/IP can read/write certain locations only.

File Index	Description
CW:1,2	Data is transmitted to master in Ethernet/IP or Profinet poll. Can be used to transmit status info to master.
CW:3,4,5	Reserved
CW:6	Merge Device ID (Read Only)
CW:7	Divert 1 Device ID (Read Only)
CW:8	Divert 2 Device ID (Read Only)
CW:9, 10	Profinet, Ethernet/IP or Modbus/TCP – Data Write from Master
CW:11	Local Device ID
CW:12	Downstream Device ID
CW:13	Upstream Device ID
CW:14	Master/Slave Protocol Scan List Status. Bits 07 indicate online status for each device. Bits 815 indicate Output Power Status.
CW:15	User Defined. This value is read from the SuperLogic Zone Count configuration parameter. (Read Only).
CW:16	Ladder Logic Transmit Message Destination Device ID
CW:1722	Ladder Logic Transmit Message Data. Each control word can have value of 0 thru 255.
	Special Definition for <i>Modbus/TCP Holding Register</i>
	Read CW:23 = Read 8 Inputs (Bit 07) and new serial port data bit (Bit 15)
CW:23. 24	Read CW:24 = Read 8 Outputs (Bit 07) and Output Enable Bit (Bit 15)
••••••	Write CW:23 = Write to CW:23
	Write CW:24 = Write to CW:24, or Write directly to output pins if Remote I/O Checkbox is checked.
CW:2530	Ladder Logic Receive Message Data. Each control word can have value of 0 thru 255.
CW:3140	Serial Data Received from Serial Port. Must be terminated by carriage return or Line feed.
CW:4148	Device IDs for remote (slave) <i>Smart-3G</i> controllers. Used to enable slave device scanning for the S3G Master/Slave protocol. Value of 0 disables scanning.
CW:4956	Input / Output data for slave devices for S3G protocol. Bit 07 are inputs and bits 815 are outputs. This data is also accessible using the IN/OUT file, eg IN:55, OUT:71 etc.

## 7. Control Bit File

The Control bit file is a binary file. This file is used to pass status and control data between the user ladder logic program and the firmware. Some locations of this file are read only.

File Index	Description
CB:1	Package Arriving from Merge Branch. (Input, Read Only)
CB:2	Merge Ready Status to Branch (Output, Read / Write)
CB:3	Package Available for Divert Branch 1. (Output, Read / Write)
CB:4	Divert Branch 1 is Ready (Input, Read Only)
CB:5	Package Available for Divert Branch 2. (Output, Read / Write)
CB:6	Divert Branch 2 is Ready (Input, Read Only)
CB:7	FIFO is Empty (Read Only)
CB:8	FIFO is FULL (Read Only)
CB:9	Output Power On (Read Only)
CB:10	New Barcode Received (Read / Write)
CB:11	Package Available Status to Downstream main line (Output, Read / Write)
CB:12	Ready to Take Packages from Upstream main line (Output, Read / Write)
CB:13	Reserved
CB:14	Slug(0) or Singulation(1). Set in the SuperLogic PC Software Configuration screen. (Read Only for Ladder program). This bit indicates how the packages are released. Implementation of release mode is done by the user ladder program. If release mode selection is not supported by the ladder program, this bit can be used for any other configuration selection.
CB:15	Barcode Overrun. This control bit activates when a new barcode is received while CB:10 is still in the active state. In this case, the newly scanned barcode is ignored. CB:10 must be deactivated in order to indicate that the current barcode scan may be overwritten with a newer scan.
CB:16	Reserved
CB:17	Reserved
CB:18	Package Available from Upstream main line. (Input, Read Only)
CB:19	Downstream main line is ready to take packages. (Input, Read Only)
CB:20	ProfiNET Active. This control bit is activated when a ProfiNET connection is currently online and actively transmitting I/O data.

# 8. Smart-3G Network Topology Examples







Master eNetPLC Scanning Slaved eNetPLC Devices



Multi-Master Scanning eNetPLC Sub Systems

