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# **Revision Control**

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# **Acronyms and Abbreviations**

Term	Meaning		
ACT	System Activity		
AL	Application Layer		
API	Application Programming Interface		
СМ	Configuration Manager		
DCP	Discovery and Basic Configuration Protocol		
DS	Data Storage		
DSlot	Double Slot		
DU	Diagnosis Unit		
FAT	File Allocation Table		
FE	Functional Earth		
FOTA	Firmware Upgrade Over the Air		
FW	Firmware		
HCI	Human-Computer Interaction		
HW	Hardware		
IF	Interface		
IOLW	IO Link Wireless		
ISDU	Indexed Service Data Unit		
LQI	Link Quality Indicators		
ODE	On-request Data Exchange		
OPC UA	Open Platform Communication Unified Architecture		
OS	Operating System		
PDE	Process Data Exchange		
PDin	Process Data Input		
PDout	Process Data Output		
PER	Packet Error Rate		
Q	Queue		
RSSI	Received Signal Strength Indication		
SM	System Management		
SMI	Standardized Master Interface		
SSlot	Single Slot		
SW Software			
TBD To be determined			
VS	Vendor Specific		
W-Device	Wireless Device (for example, TigoBridge)		
W-Master	Wireless Master (for example, TigoGateway)		



# 1. Introduction

## 1.1. About

This User Manual describes the TigoGateway 1TE device.

TigoGateway 1TE is an industrial-grade IP20 IO-Link Wireless Master with Edge Computing functionality. It supports up to 8 IO-Link Wireless Devices simultaneously and includes interfaces to a variety of Industrial Ethernet and IIoT protocols. The IO-Link Wireless connectivity enables to control sensors and actuators wirelessly, with low latency and high reliability, deterministic and scalable performance.

The TigoGateway 1TE includes Edge computing capabilities, with a Linux OS that is used for a variety of advanced applications, and implementation of business logic (including the TigoEngine software installed on the Gateway). It allows to upload high-resolution OT generated data to the cloud with a secure connection.

The TigoGateway 1TE is Docker enabled.

## 1.2. Manual Structure

The sections of this User Manual build on one another from section numbers 1 to 10.

# 1.3. Typographical Conventions

Enumerations are shown in list form with bullet points:

- Entry 1
- Entry 2
- Entry 3

Instructional steps are shown in list form with numbering:

- 1. Step 1
- 2. Step 2
- 3. Step 3

Decimal numbers are shown without additional indicators and are not spelled out (for example, 123).

## 1.4. Symbols

The following symbols are used in this User Manual:

<b>(i)</b>	Note: This symbol indicates a general note.
Δ	Warning:

This symbol indicates a security notice which must be observed.

ntation.
r

### 1.5. Deviating Views

The product views and illustrations in this User Manual may deviate from the actual product.

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# 2. Safety and Requirements

# 2.1. General Note

Users of this manual must be qualified to use the device described. All safety messages, property damage messages, and valid legal regulations must be observed by users.



CoreTigo Ltd. assumes that users have the technical capabilities required.

# 2.2. Electrical Connection

Note:

The TigoGateway's products family shall be supplied by an isolated power source that meets the following requirements:

- Limited-Energy Circuit in accordance with UL/CSA 61010-1 or
- Limited Power Source (LPS) in accordance with (UL/CSA 60950-1 or EN 62368-1, Annex Q) or
- Class 2 supply source which complies with the National Electrical Code (NEC), NFPA 70, Clause 725.121 and Canadian Electrical Code (CEC), Part I, C22.1.

# 2.3. Intended Use

- The TigoGateway can be used to either acquire, 'or output', IO-Link field signals to sensors, actuators, and hubs, with such signals being sent and received to a higher-level control system. It is intended for use in operating temperatures of 0°C to 55°C. Its housing will protect it from damage caused by any buildup of moisture on surfaces which are in contact with the air. It is developed for any working environment requiring protection class IP20.
- The TigoGateway enclosure can never meet IP67 requirements.



#### Note:

The TigoGateway is intended for indoor use.



#### Warning:

Product applications other than those described in this User Manual are not permitted.

# 2.4. Personnel Qualification

The product may only be mounted, configured, operated, or demounted by qualified personnel with skills in the following area:

- Safety and health at work
- Mounting and connecting of electrical equipment
- Measurement and analysis of electrical functions and systems
- Evaluation of the safety of electrical systems and equipment.



#### Warning:

CoreTigo Ltd. does not assume any warranty or liability for damage caused to the product due to non-compliance with security measures or incorrect installation of the product.



# 2.5. Power Drop for Write/Delete Access in File System

The **File Allocation Table (FAT)** file system in the netX firmware is subject to certain operational limitations. Specifically, write and delete access in the file system (for the purpose of firmware update, configuration, download, and so forth) may destroy the FAT if access cannot be completed during power drops.

Without such a proper FAT, firmware might not be found nor started. Hence, it is important to verify that the power supply of the device does not drop during write and delete access in the file system.

# 2.6. Information and Data Security

Users are expected to follow all safety measures regarding information and data security relevant to devices used.

If a TigoGateway is connected to a public network, safeguard its data integrity by doing one of the following:

- Install it behind a firewall (recommended).
- Make the TigoGateway accessible only through a secure connection (for example, an encrypted VPN connection).

## 2.7. Regulatory Notices

### 2.7.1. Class A Warnings – Industrial Use

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

### 2.7.2. FCC Warning

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Contains FCC ID: 2ATSM-TGRFCM1.

### 2.7.3. ISED Warning

CoreTigo Ltd. does not endorse any changes made to the device by the user of any kind. Any change or modification may void the user's right to use the device.

CoreTigo Ltd. n'approuve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

### 2.7.4. Interference Statement

This device complies with Part 15 of the FCC Rules and Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- 1. This device may not cause interference.
- 2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes

1. L'appareil ne doit pas produire de brouillage, et



2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## 2.7.5. Wireless Notice

This device complies with FCC/ISED radiation exposure limits set forth and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the ISED radio frequency (RF) Exposure rules. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The distance between user and device should be no less than 20cm.

This radio transmitter [26463-TIGOGW] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

- Antenna Part Number: TLW2.5A-SMA-Male
- Manufacturer: CoreTigo Ltd.
- Peak Gain: 1.6 dBi

Le présent appareil est conforme à l'exposition aux radiations FCC / ISED définies pour un environnement non contrôlé et répond aux directives d'exposition de la fréquence de la FCC radiofréquence (RF) et RSS- 102 de Peak Gain (1.6 dBi). La distance entre l'utilisation et l'appareil ne doit pas être inférieure à 20 cm.

# 2.8. Requirements

### 2.8.1. Hardware

Installation of the product requires the following hardware:

- TigoGateway IO-Link Wireless Master
- 24 V DC SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) Power Supply
- RJ45 Plug Adapter
- CAT5 Ethernet Cable with RJ45 Connectors
- PROFINET Supported PLC (not mandatory)



Note:

The abovementioned components are provided by CoreTigo Ltd. upon purchase.

• PC or Notebook with a minimum of 1 additional Ethernet Port and Internet Access/PLC

### 2.8.2. Software

Three software tools enable the installation, setup, maintenance and control of the TigoGateway, in addition to a viable internet browser:

- <u>TigoEngine</u> IO-Link Wireless configuration tool
- Linux Cockpit Linux OS web-based management system
- <u>Docker</u> Containers management tool



# 3. Getting Started

# 3.1. **Product Description**

TigoGateway 1TE is an industrial-grade IP20 IO-Link Wireless Master with Edge Computing functionality.

TigoGateway 1TE supports up to 8 IO-Link Wireless Devices per track, and includes interfaces to a variety of Industrial Ethernet and IIoT protocols. The IO-Link Wireless connectivity enables the control of sensors and actuators wirelessly, with low latency and high reliability, deterministic and scalable performance.

Key functionalities include:

- Interfaces to a variety of Industrial Ethernet protocols and other communication protocols such as OPC UA, HTTP and REST API
- PLC control of sensors and actuators under deterministic constraints
- Edge processor running an Embedded Linux OS that can be used for On-Prem application (including the TigoEngine software which is preinstalled on the TigoGateway)
- Uploading of high resolution OT data to the Cloud with a secure connection via MQTT TLS
- Docker enabled

### 3.2. Product Overview

All technical data, such as the manufacturer's address, product name, part number, serial number, MAC address, certification signs (for example, CEL and UL), environmental signs (for example, disposal), and other data is provided in the form of side label attached to the device's housing.

For further details see <u>Technical Data</u>.



Figure 1: Example of TigoGateway Side Label



## 3.2.1. Network Topology

The network topology in which the TigoGateway is used is described in the diagram below.



Figure 2: TigoGateway Network Topology



### 3.2.2. LEDs

The positions of the LEDs on TigoGateway are illustrated in the schematic diagrams below.

**Table 4: Front and Bottom Panel LEDs Front Panel Bottom Panel Core**Tigo OIO-Link PWR APL SYS SF/MS/RUN **BF/NS/ERR** CHO ieldbus 0 Pair/GEN CH1 ī. IOLW ٩ PWR Edge Reset Legend: Legend: 1. PWR - On/Off 10. PWR - On/Off (Connector) 2. APL - IOLW Master Configured 11. LAN1 - RJ45 Ethernet Port 1 3. SYS - Firmware Running 12. LAN2 – RJ45 Ethernet Port 2 4. SF/MS/RUN – System Failure 13. CH0 – RJ45 Ethernet Port 3 5. BF/NS/ERR - Bus Failure 14. CH1 – RJ45 Ethernet Port 4 6. Pair/GEN - General 7. IOLW - IOLW Connected QSI – Quality Signal Indicator 8. 9. EDGE - Edge Operational



### 3.2.3. LED Indications

The tables below indicate the states of each LED on the TigoGateway.

### 3.2.3.1. PWR LED

Table 5: Power LEL	Tabl	e 5:	Power	LED
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LED Type	Color	State	Description
PWR		On	All processes are powered
		Off	One or more processes is not powered

#### 3.2.3.2. APL LED

#### Table 6: APL LED

LED Type	Color	State	Description
APL		On	IO-Link Wireless Master configured.
		Blinking	Communication established.
	$\bigcirc$	On	Initialization of components done.
	۲	Blinking	Communication error.
		Off	Components not initialized.

#### 3.2.3.3. System LED

#### Table 7: System LED

LED Type	Color	State	Description
SYS	٢	On	The firmware is running.
	٢	Blinking	File system formatting is in progress
	0	On	A system error has occurred.
		Blinking	Firmware crash, unrecoverable (an internal
		(3 x Yellow, 3 x Green)	exception occurred that cannot be handled).
		Blinking (1 Hz, 4Hz)	1 Hz: The maintenance firmware is idle
			(waiting for update).
			4 Hz: The maintenance firmware is in
			operation: a firmware update will be
			installed.
		Off	No supply voltage to the TigoGateway, or a
			hardware defect during a firmware reset.

#### Table 8: System LED States

LED State	Description
Blinking	The display turns on and off in phases.
Blinking (3 x Yellow, 3 x Green)	<ul> <li>The indicator turns on and off with a frequency of approximately 1 Hz:</li> <li>3 x Yellow "On" for 500 ms and "Off" for 500 ms</li> </ul>
S X Green)	<ul> <li>3 x Green "On" for 500 ms and "Off" for 500 ms</li> </ul>



Blinking	The indicator turns on in phases Yellow or Green with a frequency of approximately:
(1Hz, 4 Hz)	• 1 Hz: 1 x Yellow "On" for 500 ms and 1 x Green "On" for 500 ms
	• 4 Hz: 1 x Yellow "On" for 125 ms and 1 x Green "On" for 125 ms

### 3.2.3.4. TigoGateway Device Status (PROFINET)

The **SF** (system failure) and **BF** (bus failure) LEDs indicate the status of the TigoGateway. The LNK and ACT LEDs indicate the status of the PROFINET.

The following table describes the LED states of the TigoGateway.

Table 9: TigoGateway I	Device Status	
------------------------	---------------	--

LED	Color	State	Description
SF		Off	No error
(System Failure)		Flashing (1 Hz, 3 s)	DCP signal service is initiated via the bus.
	•	On	Watchdog timeout - channel, generic or extended diagnosis present - system error
BF		Off	No error
(Bus Failure)	۲	Flashing (2 Hz)	No data exchange
	۲	On	No configuration or low speed physical link or no physical link.

#### Table 10: LED States

LED Status	Definition
Flashing (1 Hz, 3 s)	The indicator turns on and off for 3 seconds with a frequency of 1 Hz: "on" for 500 ms, followed by "off" for 500 ms.
Flashing (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: "on" for 250 ms, followed by "off" for 250 ms.

#### 3.2.3.5. IO-Link Wireless and Edge Computing LEDs

The following table describes the LED states of the link and activity LEDs.

#### Table 11: Lower Front Panel LEDs Status

LED	Color	State	Description
IOLW	0	On	All paired ports are in operation mode or no port is paired
	0	On	When a paired device sends an event and all ports are operational, the LED initially turns yellow for a user-configured duration, after which it turns green. In the case of multiple events, the LED indication restarts from the time of the last event occurrence.
	0	On	one of the paired ports is not in operation mode
	0	On	One or more of the paired ports falls within the QSI threshold range, but none of them are below it.
	0	On	The paired ports are beyond the upper limit of the QSI threshold



LED	Color	State	Description
			range.
	0	On	One or more of the paired ports falls below the lower limit of the QSI threshold range.
Edge	0	On	IMX finishes the Power-Up process

### 3.2.3.6. Ethernet LEDs

LED	Color	State	Description
LINK	0	On	The device is linked to the Ethernet.
		Off	The device has no link to the Ethernet.
ACT	0	Flickering (load dependent)	The device sends/receives Ethernet frames.
	١	Off	The device does not send/receive Ethernet frames

#### Table 12: Ethernet Status (Bottom Panel)



#### Figure 3: Bottom Panel

#### Table 13: LED States

Definition
The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: On for approximately 50 ms, followed by Off for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.



# **3.2.4. Connection Points**

#### 3.2.4.1. Power Supply

The device's power is supplied via a 3-pin terminal block about 15mm in length (PWR IN).



#### **Table 14: Power Supply Connectors**

#### 3.2.4.2. Ethernet

Users must use the following connectors to establish a connection with the interface ports of the TigoGateway.

- Connector **CH0** for Ethernet interface port 1
- Connector CH1 for Ethernet interface port 2

#### Table 15: EtherNet Connectors

Connector	Location	Dimensions	Description
CH0-OT	Bottom Panel	STD	RJ45 Ethernet port with link and active LED
CH1-OT	Bottom Panel	STD OT	RJ45 Ethernet port with link and active LED
LAN1-IT	Bottom Panel	STD IMX8	RJ45 Ethernet port with link and active LED
LAN2-IT	Bottom Panel	STD IMX8	RJ45 Ethernet port with link and active LED

#### 3.2.4.3. SMA Antenna

The TigoGateway 1TE is equipped with one SMA antenna for a single IO-Link Wireless Track. A track supports up to 8 IO-Link wireless devices. The types of data transferred (e.g. length and data type) may vary depending on the connected devices.

#### Table 16: Top Panel Connectors

Connector	Location	Dimensions	Description
SMA T1	Top Panel	STD	T1 Antenna (all variants of board)



#### Table 17: SMA Antenna

SMA Antenna	Туре	Manufacturer
	2.4GHz Antenna - 2.4GHz, 5GHz Bandwidth: 1000 MHz	Silram Technologies Ltd., Kfar Saba, Israel
	Impedance: 50 Ohms Power Rating: 1 W	Model: TLW2.5A-SMA-Male



# Note:

It is not permitted to use an alternative SMA antenna from the one supplied by CoreTigo Ltd. Using an alternative SMA antenna may result in a loss of device approval. Additionally, SMA antennas must be mounted for proper device functioning.



# 4. Installation Overview

#### Warning:

Comply with all safety instructions relevant to the TigoGateway and to the mounting tools.



The TigoGateway may only be installed and commissioned by qualified electricians in accordance with EN 50110-1/-2 and IEC 60364.

Make sure that the TigoGateway is not damaged. A damaged TigoGateway must not be put into operation.

TigoGateway can only be used in an indoor location.

### 4.1. Hardware Installation

This section describes how to mount and ground the TigoGateway.

### **4.1.1. Select the Mounting Location**

The TigoGateway can be mounted in the control cabinet or on any part of the system that meets the following requirements:

- The TigoGateway should be hung on a DIN rail which is a metal rail of a standard type widely used for mounting circuit breakers and industrial control equipment inside equipment racks. Standard DIN Rails are available in 35mm (7.5 and 15mm deep), 32mm and 15mm widths and are supplied in 1 m (3'3") and 2 m (6'6") lengths.
- The TigoGateway must not be mounted in the shearing areas of moving system parts (otherwise it might be damaged).
- The cables for the TigoGateway must be laid in such a way that they cannot be caught in the shearing areas of moving system parts (otherwise they might be damaged).
- The mounting location must have sufficient space for easy replacement of the TigoGateway and connecting all required cables to it.
- The mounting location must meet the TigoGateway's vibration and shock resistance requirements.
- The diagnostic LEDs of the TigoGateway must be visible when it is mounted.
- The TigoGateway must not be mounted on or near highly inflammable materials.
- To prevent the TigoGateway from overheating:
  - o It must not be mounted near strong heat sources
  - o It must have an unobstructed air supply
  - o Its cooling must not be impeded
- Do not bridge any gaps with the unit to protect it from any tensile forces that may occur.



# 4.1.2. Equipment Required

Mounting the TigoGateway requires the assembly of a DIN rail on a convenient wall. TigoGateway is attached to the DIN rail from the rear side as shown below.



Figure 4: TigoGateway Bracket for DIN Rail

### **4.1.3. Mount the TigoGateway**

# $\mathbf{D}$

Note:

Make sure not to soil the connectors on the TigoGateway during installation. Dirt will damage the contacts.

- 1. Disconnect the system from the power supply.
- 2. Ensure sufficient equipotential bonding in the system.
- 3. Secure unit in the desired position on the DIN rail (inner width 25mm, outer width 35mm, depth 7.5mm).
- 4. Mount the TigoGateway's two SMA antennas (X1, X2).

All SMA antennas (X1, X2) must be mounted for proper TigoGateway operation.

### 4.1.4. Ground the TigoGateway

Each of the TigoGateway's power supply connectors has an FE pin that is connected to the metal housing of the TigoGateway. The metal housing has a central grounding point for the FE.

Ground the TigoGateway as follows:

- 1. Connect TigoGateway to FE (functional earth) in one or more of the following ways:
  - Via the metal housing.
  - Via FE of the power supply connectors.
  - Via a cable lug and the mounting hole, if the TigoGateway is mounted on a non-conductive base.
- 2. Make sure that the contacts are attached solidly and that the cable cross-section is sufficient.



## 4.1.5. Demount the TigoGateway

- 1. Disconnect the part of the plant to which you have mounted the TigoGateway from the power supply.
- 2. Verify that the plant on which the TigoGateway is mounted is de-energized.
- 3. If the TigoGateway is dirty, clean it first.
- 4. Before demounting from the DIN rail, disconnect the cables.
- 5. Remove the TigoGateway for replacement or reuse.



#### Warning:

During operation, high surface temperatures can occur on the housing and at the metal connections, especially at the M12 connector sleeve. When the TigoGateway is in operation, let it cool down before touching it or use gloves.



#### Warning:

If the demounted TigoGateway is defective, mark it as defective to prevent it from being used again.



### Disposal of Waste Electronic Equipment

Important notes from the European Directive 2021/19/EU "Waste Electrical and Electronic Equipment (WEEE)".

#### Warning:



- This product must not be treated as household waste. As a consumer, you are legally obliged to dispose of all waste electronic equipment according to national and local regulations.
- This product must be disposed of at a designated waste electronic equipment collection point.

### 4.2. Connect TigoGateway

Warning:



# Danger of electrical shock.

- Operate the TigoGateway exclusively with 24 V DC SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) power supply.
- Always use two separate supply lines/power supplies for 1L and 2L to supply the devices.
- Pay attention to a central grounding (FE) if two separate power supplies are used.

#### Fuse Protection

The maximum supply current must not be exceeded and must be fused with an external fuse (16 A). Otherwise, there is a risk of malfunction and damage to the printed circuit board and the connecting plug.

#### Connection Example with TigoBridge

The connection example described below shows a typical installation that uses a TigoBridge to connect a wired IO-Link Device via a wireless connection to the IO-Link Wireless Master.



#### Process:

- 1. Connect the Ethernet cable to the **CH0** connector of the TigoGateway and to the Controlling IPC and/or to PLC.
- 2. Connect the power cable to the **PWR** connector of the TigoGateway.
- 3. Connect the wired IO-Link device with the cable to the W-Bridge.
- 4. Connect the power cable (+24 V DC SELV or PELV) to the power connector of the W-Bridge.
- 5. Switch on the power supply units of the TigoGateway and TigoBridge.



#### Figure 5: Connection Example with TigoBridge



# 4.3. Login to TigoGateway

To login to TigoGateway follow the below procedure.

1. Connect Ethernet cable to TigoGateway LAN1 port.

**Important**: make sure Ethernet cable is connected to Network with DHCP capabilities as TigoGatway requires to get an IP from the network.

2. Use the URL provided by CoreTigo, which appears on the left side-label http://tigogateway-YYZZ:9001/ ,see <u>Product Overview.</u>

The TigoGateway home page opens.

- 3. From here the user can access the three software tools detailed in <u>Software Setup</u>.
- 4. On the landing page connect the TigoEngine using the **GET STARTED** button
- 5. Use the SW Key provided with the TigoGateway to activate your TigoEngine License

REF

#### **References:**

- For further details of how to use TigoEngine, see the *TigoEngine User Manual*.
- 6. Connect to the TigoGateway to start IOLW configuration, for more information see 0 TigoEngine configuration



Figure 6: TigoGateway Homepage



# 4.4. Built-In Software

Three software tools enable the installation, setup, maintenance and control of the TigoGateway, in addition to the available internet browser:

- <u>TigoEngine</u> IO-Link Wireless configuration tool
- Linux Cockpit Linux OS web-based management system
- <u>Docker</u> Containers management tool

## 4.4.1. TigoEngine

TigoEngine is a software-based management platform for the efficient setup of IO-Link Wireless masters and devices. It enables installation, configuration, and monitoring of an IO-Link Wireless system.



Note:

The TigoEngine is already installed on the TigoGateway, and the user will be provided with a suitable license.

#### Reference:

For further information please refer to the *TigoEngine User Manual*.

Online and offline setup of IO-Link Wireless components is possible, with a variety of options to connect to IO-Link Wireless masters. With its intuitive user interface, TigoEngine simplifies the deployment and maintenance of an IO-Link Wireless system.

TigoEngine can connect to IO-Link Wireless masters using either of the following physical interfaces:

- UART over USB
- Ethernet

#### **TigoEngine Key Functionalities**

- IO-Link Wireless Master communication and configuration
- Scanning for available IO-Link Wireless devices within range of an IO-Link Wireless master
- Pairing and connecting IO-Link Wireless devices to the relevant IO-Link Wireless masters
- Configuration of IO-Link Wireless device parameters based on IODD
- Wireless channel blacklist configuration per master
- Loading parameters from an IO-Link sensor
- Bulk configuration of devices via uploaded files
- Firmware upgrade—updating wireless devices using FOTA
- Third party software integration via an MQTT publisher—exporting process data from TigoEngine to third party software (requires an MQTT broker on the third party software side)
- Performance Monitoring:
  - Packet Error Rate (PER) real-time display—enables analysis of latency and network interferences
  - o Link Quality Indication (LQI)
  - Received Signal Strength Indication (RSSI)



## 4.4.2. Linux Cockpit

Cockpit is a web-based graphical interface for servers, intended for general use. It resembles a desktop interface, but for individual servers.

Cockpit makes Linux discoverable i.e. there is no need to remember commands at a command-line. The user can see the server in a web browser and perform system tasks easily with a mouse, such as starting containers, administering storage, configuring networks, and inspecting logs.

Cockpit uses APIs that already exist on the system. It does not reinvent subsystems or add a layer of its own tooling. By default, Cockpit uses the system's normal user logins and privileges. Network-wide logins are also supported through single-sign-on and other authentication techniques. It runs on demand only.

#### **Cockpit Usage Process**

1. From the home page click the **Get Started** button in the **Cockpit** area of the page.



2. In the warning page which opens, click on Advanced.

Your	connection is not private
Attacke passwo	ers might be trying to steal your information from <b>tigogateway-0019</b> (for example, rrds, messages, or credit cards). <u>Learn more</u>
NET::ERR	_CERT_AUTHORITY_INVALID
Ō	To get Chrome's highest level of security, <u>turn on enhanced protection</u>



3. Click on the **Proceed to TigoGateway** link.



The Login window opens.

System management Log in User name Password Reuse my password for remote connections Log In Server: TigoGateway-0019	6	<b>C</b> oreTi	go
User name Password Reuse my password for remote connections Log In Server: TigoGateway-0019	System mar	nagement Log in	
Password  Reuse my password for remote connections  Log In  Server: TigoGateway-0019	User name		
Reuse my password for remote connections     Log In Server: TigoGateway-0019	Password		
Log In Server: TigoGateway-0019	<ul> <li>Reuse my passw</li> </ul>	ord for remote connection	5
Server: TigoGateway-0019		Log In	
	Server: TigoGateway-	-0019	

- 4. Enter the Username (tigogateway) and Password (tigogateway) provided to you by CoreTigo.
- 5. Click the green Log In button.

The TigoGateway Cockpit dashboard opens.

root@ TigoGateway-0019 ▼					🕲 Help 🕶 😩 🕶
Q Search	TigoGateway-0019 running NXP i.MX F	Release Distro 5.15-kirkstone (kirkstone)			Restart 👻
System					
Overview	1 Last login: May 4, 2023 2:14:30 PM on web co	nsole			×
Logs					
Networking					
Accounts	Health	Usage	System information	Configuration	
Services	1 service has failed	CPU 0% of 4 CPUs	Machine ID cd889fdcb1d74ce2b1a2a5a669a9a140	Hostname	TigoGateway-0019 edit
	Loading available updates failed	Memory 1.4 / 1.9 GiB	Uptime 4 days	System time	May 7, 2023 6:41 AM
Tools				Domain	Join Domain
Terminal				Performance profile	none
		View graphs	View hardware details	Secure Shell keys	Show fingerprints



6. If the condition **Limited Access** appears in the toolbar, click the **green Turn On Administrative Access** button.

Apart from other functions available in the Linux Cockpit, the most useful function for TigoGateway users is the **Networking** capability, which affords access to the network cards of the device.

#### The user can then change the settings for the network cards available.

Other functions available are mostly for information purposes as displayed in the dashboard. Some drilldown capability is available from the items in the side-panel menu, to access further details and configure settings at each level, such as **Logs**, **Accounts**, **Services**.

From the **Terminal** menu item in the side-panel menu, the user can create command lines, similar to regular Windows functionality.

Cockpit supports a large list of optional and third-party applications.

PEE	Reference:
	Red Hat Customer Portal product documentation

7. To view networking functionality, click the **Networking** item in the side-panel menu.

root@ TigoGateway-0019		🔞 Help 👻 😩 👻
Q  Şearch	Nages Sending Nages Receiving	
Overview Logs	400 0 09.59 09.40 09.41 09.42 09.43 09.59 09.40 09.41 09.42	09.43
Networking		
Accounts	Interfaces Add Bond Add	Bridge Add VLAN
Services 🕴	Name IP Address Sending Receiving	
Tools	br-fca048447324 17218.0.1/16 2.93 Kbps 2.77 Kbps	
Terminal	decker0 17217.01/16 0 bps 0 bps	
	eth0 192168.8106/22 8.16 Kbps 36.9 Kbps	
	ethi 19216650.99/22 3.53 Kbps 2.58 Kbps	
	Unmanaged Interfaces	
	Name IP Address Sending Receiving	
	vethO6eelOe	
	veth4fba572	
	veth7ea614e	
	veth9kdlb4	
	veth08fa8ac	
	vethccef4lb	
	vethdal7825	

In the **Interfaces** list, the interfaces **eth0** and **eth1** equilibrate to the **LAN1** and **LAN2** ports on the bottom panel of the TigoGateway.

8. To configure settings for these interfaces click on their names in the list.

The details are displayed when you click on one of them.

root⊜ TigoGateway-0019		🕑 Help 👻 😩 🗸
Q Search	Networking > docker0	
System		
Overview	kps Sending kps. Receiving	
Logs	400 400	
Networking		
Accounts	09.42 09.43 09.44 09.45 09.46 09.42 09.43 09.44 00	9:45 09:46
Services 🕔	dockerO Bridge 02:42:D9:79:B4:DB	Delete
Tools	Status 172.17.0.1/16, fe80:0:0:0:42:d9ff.fe79:b4db/64	
Terminal	Carrier Yes	
	General Connect automatically	
	IPv4 Address 172.170.1/16	
	IPv6 Link local	
	brage Configure	
		_
	Ports Sending Receiving	•

9. Click the Automatic (DHCP) link listed alongside the item IPv4.



#### The IPv4 Settings window opens.

root@ TigoGateway-0019				⑦ Help ▼
Q. Search	Networking > docker0			
System		IPv4 Settings	×	
Overview	Kbps Sending	Addresses	Manual 👻 🕂	
Logs	400			
Networking		172.17.0.1 16	Gateway	
Accounts		DNS	Automatic 🕢 🛨	09:44 09:45 09:46
Services 🔋	docker0 Bridge 02:42:D9:79:B4:DB			Delete
		DNS Search Domains	Automatic 🗸 🕇	
Tools	Carrier Ves			
Terminal	General Connect automatically	Routes	Automatic 🕢 🕂	
	IPv4 Address 172.17.0.1/16			
	IPv6 Link local			
	Bridge Configure	Apply Cancel		
	Ports	Sendin	g Receiving	+

10. Open the dropdown list available in Addresses.

	IPv4 Settings		X	
	172.17.0.1	16	Automatic (DHCP) Link local	
4db/64	DNS DNS Search Domains		Automatic 💌 🛨	
	Routes		Automatic 🕢 +	
L.	Apply Cancel			

11. Here you can fix a static IP Address through the **Manual** menu option which opens another window in which you can insert an appropriate IP address.

Addresses		Manual 🔻
Address	Prefix length or Netmask	Gateway
DNS		Automatic 💌
DNS Search Domains		Automatic 💽
Routes		Automatic 💉



# 4.4.3. Docker

Docker is a set of platform-as-a-service products that use OS-level virtualization to deliver software in packages called Containers. The software that hosts the Containers is called Docker Engine.

A Container is a standard unit of software that packages up code and all its dependencies, to ensure the application will run quicker and more reliably from one computing environment to another. A Docker Container image is a lightweight, standalone, executable package of software that includes everything needed to run an application such as code, runtime, system tools, system libraries and settings.

Container images become Containers at runtime and Docker Container images become Containers when they run on the Docker Engine.

Containerized software runs on the OS supported by Docker, regardless of the infrastructure. Containers isolate software from its environment and ensure that it works uniformly despite differences for instance between development and staging.



Figure 7: Containerized Applications

For further details on the Docker functionality, please refer to the following.



Welcome - Portainer Documentation

The Docker is used to promote a new business logic and upload it to a virtual application.

Refer also to Docker Configuration.



#### **Docker Usage Process**

1. From the home page click the **Get Started** button in the **Docker** area of the page.



2. In the warning page which opens, click on Advanced.

A	
Your connection is not	private
Attackers might be trying to steal yo passwords, messages, or credit cards	our information from <b>tigogateway-0019</b> (for example, s). <u>Learn more</u>
NET::ERR_CERT_AUTHORITY_INVALID	
Q To get Chrome's highest leve	l of security, <u>turn on enhanced protection</u>
Advanced	Back to safety
Advanced	Back to sat



3. Click on the **Proceed to TigoGateway** link.



The Login window opens.

✓ New Portainer installation	
Please create the initial administrator user.	
Username	admin
Password	
Confirm password	x
▲ The password must be at least 12 cl	haracters long.
Create user	
Allow collection of anonymous statistics. Y	ou can find more information about this in our privacy policy.

4. Enter the Username and Password provided to you by CoreTigo, and confirm the password.



# The Quick Setup page opens.

Opgrade to Business Edition	Environment Wizard	
	Quick Setup C A admir	1 ~
ක Home	Environment Wizard	
Environment: O None selected	Welcome to Portainer We have connected your local environment of Docker to Portainer.	
Settings ≪ Users ~ ← Environments ~ M Registries M Authentication logs ~	User started below with your local portaine or connect more contracted environments.	
Q Notifications	Get Started       Add         Proceed using the local environment which Portainer is running in       Connect to other environments	
New version available 2.18.2     Dismiss See what's new     portainer.lo Community Edition 2.18.1     https://foopsakway.ool 96445/#//nome		

5. Click the **Get Started** box (initial setup only) to access the **Home** page.

Opgrade to Business Edition	Environments
	Home C C A admin ~
Home     Environment:      None selected	Latest News From Portainer New Portainer CE 218.2 - now with improved page load performance, Kubernetes services view, and improvements to how you deploy Edge agents. Upgrade to Portainer Business with a free license for up to 5 nodes here. Learn more about the new features and how to upgrade here.
Settings	
뽔 Users 🗸 🗸	😑 Environments Q. Search by name, group, tag, status, URL × 🕄 Refresh 👌 Kubeconfig
🖨 Environments 🗸 🗸	Click on an environment to manage
M Registries	Platform         Connection Type         Status         Tags         Groups         Agent Version         Clear all         Sort By         [] <th]< th="">         []         []</th]<>
Authentication logs ~	
Q Notifications	locata @ Up * 2023-66-11 50:32 Standalone 20:012-ce /var/nun/docker.aock
er Settings V	© Instage massgemes (> no tups > 0.com         ≥ 0.com
	temé per page 10 →
New version available 2.18.2	
Dismiss See what's new	
portainer.io Community Edition 2.18.1	
https://tigogateway-0019:9443/#1/2/docker/dashboard	

This page is normally accessed from the side-panel menu, when required.



6. Click the **blue Docker** icon. The **Dashboard** opens, displaying an overview of the product setup.

Opprade to Business Edition	Environment summary			
	Dashboard			4 💿 🕺 admin 🗸
â Home	O Environment info			
1. Contract (1. Contract)	Environment	Iocal 🐵 4 📟 2 GB - Standalone 20.10.12-ce		
🧼 local 💌	URL	/var/run/docker.sock		
Dashboard				
App Templates ~	GPU	none		
Stacks	Tags			
Ocontainers				
≣ Images				
≪ Networks			<b>☉</b> <sup>6</sup>	U 2 running U 0 stopped
Volumes     Svente	Stack		Containers	♦ 0 nearriny
Events				
		(9 2.7 GB		
Settings	Inages		Volumes	
octing	1			
R Users ✓	Networks			
Environments V				
Authentication logs				
우 Notifications				
New version available 2.18.2     Dismiss See what's new				
portainer.lo Community Edition 2.18.1				



# 5. Configuration

Before the TigoGateway can operate together with its connected devices, it must be configured.

Configuration has the following levels:

- PROFINET IO-Link configuration for input/output data of the PROFINET I/O modules/submodules.
- IO-Link Wireless Master configuration of TigoGateway parameters (e.g. track mode).
- Port configuration of parameters for the wireless ports (subslots), for connected IO-Link Wireless
  devices and TigoBridge devices, and for Standard IO mode.
- (Optional) MQTT Client configuration if MQTT communication is used, then the parameters of the MQTT client in the TigoGateway need to be configured.

Configuration is performed using one or more tools together with a GSDML file.

Two GSDML files are available, and which GSDML file the user selects determines which tool(s) he/she can use to configure each of the above levels.

# 5.1. Introduction

The parameters can be grouped in the following categories and sub-categories:

- TigoGateway:
  - Input/output data of the PROFINET I/O modules/submodules.
  - Parameters for the IO-Link Wireless Master (e.g. track mode).
  - Parameters for the wireless ports (e.g. wireless slot number).
  - MQTT Client parameters if the MQTT communication is to be used, then the MQTT Client in the TigoGateway requires MQTT Client parameters to be set.
- Connected IO-Link devices:
  - IO-Link device parameters.

To set parameters, use the following tools:

#### • Configuration Software of the PROFINET IO-Controller

The PROFINET IO-Controller must be configured to exchange process data with the TigoGateway device. The configuration software of the PROFINET IO-Controller requires a GSDML file to configure the device.

The configuration software of the PROFINET IO-Controller imports the GSDML file, and the user can make the configuration settings and parameterizations for the device. Load the configuration to the PROFINET IO-Controller.

The PROFINET IO-Controller performs the configuration and parameterization of the TigoGateway device.

#### TigoEngine

<u>TigoEngine</u> is software that enables the user to do the following:

- Set all parameters for the TigoGateway, its connected IO-Link devices, and the MQTT Client in the TigoGateway.
- Monitor the TigoGateway and IO-Link devices in any system connected to TigoEngine.



#### Linux Cockpit

Linux Cockpit is a web-based graphical interface for servers, intended for general use, enabling the user to do the following:

- Configuration of the IMX8.
- Setting the IP address of the IMX8.
- Basic user management functionality.

# 5.2. Configure TigoGateway

### 5.2.1. Choose a GSDML File

The table below details which configuration tool(s) each GSDML file can be used with, and which configuration levels it is suitable for.

The following guidelines might also help you to decide which GDSML file to select:

- If you want to use one configuration tool for every level of configuration (except MQTT communication), you can do so with the Expert file and the PROFINET IO-Controller.
- If you want to use TigoEngine for IO-Link Wireless Master configuration or Port configuration, you need to use the PDCT GSDML file.

#### Table 18: Configuration Tool and GSDML File Combinations

Configuration	GSDML File			Configuration	Comment		
ΤοοΙ	Available for	CPU	IO-Link	IO-Link	Port	MQTT	
	Use with Tool			Wireless Master		client	
PROFINET IO- Configuration Software (PLC configuration tool)	GSDML-V2.35- CoreTigo- TigoMaster- Expert- 20211202 GSDML-V2.35- CoreTigo- TigoMaster- PDCT- 20211202	Defined by the Linux Cockpit Defined by the Linux Cockpit	Applicable Applicable	Applicable N/A	Applicable Applicable	N/A N/A	The software for the PROFINET IO-Controller enables you to configure parameters and then load the configuration to the IO- -Controller, which in turn configures the TigoGateway.
TigoEngine							See <u>TigoEngine</u>
Linux Cockpit							See Linux Cockpit



### 5.2.2. Import the GSDML File to the PROFINET IO-Controller Software

- 1. Make sure to have a copy of the desired GSDML file.
- 2. Open the PROFINET IO-Controller Software (TIA Portal).
- 3. Select Options > Manage General Station Description (GSD) Files.

Siemens - C:\Users\user\Documents\Auto	omation/profinet_test/profinet_test												
Project Edit View Insert Online Optic	ons Tools Window Help											Totally Integrated Auto	mation
📑 📑 🔚 Save project 🛛 昌 🐰 🖷 🗍 🎽 🖻	ettings	ne 🖉 Go offline 🛛 🛃 📑 🔀	dearch in project>	÷.									PORTAL
Project tree	upport gackages	DC/DC1								_ 0.00	х на		10 II N
	Innage general station description files (GSD)								and the line			an ore country	
Devices	tart Automation License Manager	-/				5	l opology v	/iew	Network view	Device view	Op	dons	
38		塑 💪 🖽 🏦 🔍 ±		Devi	ce overview								
1 M M	now reference text		-	1	land de	dire.	la stature	0	*	distants and	~	Catalog	
▼ 🗋 profinet_test	lobal libraries	•			Module	SIDE	1 address	Q address	type	Aracie no.			
Add new device			-			105					<u> </u>	arch>	INH INI
Devices & networks						101						filter Profile: <all></all>	- 0
PLC_1 [CPU 1214C DC/DC/DC]					▼ PLC 1	1			CPU 1214C DC/DC/DC	6ES7 214-1	- P	CPU	
Device configuration					DI 14/00 10 1	11	01	01	DI 14/DO 10		_ P	Signal boards	
😼 Online & diagnostics					AI 2 1	12	64 67		AL2		- P	Communications boards	
🕨 😓 Program blocks	103 102	101 1 2	3 4 5 6			13					1	Battery boards	
<ul> <li>Technology objects</li> </ul>	Rack_0	anyor matrices 1		1	HSC 1	1 16	100010		HSC		P	III DI	
External source files				-	HSC 2	1.17	100410		HSC			DQ DQ	
PLC tags				1	HSC 3	1 18	100810		HSC		P .	I DI/DQ	
PLC data types		311 17.000			HSC 4	1 19	101210		HSC		- P	A D	
Watch and force tables					HSC 5	1 20	1016_10_		HSC		- P	AQ	
Online backups					HSC.6	1 21	1020_10_		HSC		12	AliaQ	
Traces		<b>B</b>			Pulse_1	1 32		100010	Pulse generator (PTO/P			Communications module	15
Device proxy data					Pulse 2	1 33		1002_10	Pulse generator (PTO/P		111	Technology modules	
Program info					Pulse_3	1 34		1004_10	Pulse generator (PTO/P				
PLC alarm text lists					Pulse_4	1 35		1006_10	Pulse generator (PTO/P				
Local modules					PROFINET interface_1	1 X1			PROFINET interface				
El Ungrouped devices			~	•		2				Í	~		
Security settings	< 11	> 100%	· · · · · · · · · · · · · · · · · · ·				11			>			
Common data							Properti	es 🛍	Info 🔒 🐘 Diagnosti	cs i i i i i i	-		
Documentation settings		0							- 1 - 1				
Canguages & resources	General Cross-references	Compile											
Card Bandrah K.B. and and	Show all messages	•											
Card Readenose memory													
	! Message		Go to ?	Date	Time						-		
	Y PLC_1			11/2/2020	11:16:13 AM						^		
	<ul> <li>Hardware configuration</li> </ul>			11/2/2020	11:18:13 AM								
	PLC_1 stopped.			11/2/2020	11:20:28 AM								
	Hardware configuration	vas loaded successfully.		11/2/2020	11:20:36 AM								
	Routing configuration was	s loaded successfully.		11/2/2020	11:20:36 AM								
	PLC_1 started.			11/2/2020	11:20:39 AM								
	'set/reset PD_DB' has been	leleted successfully.		11/2/2020	11:20:34 AM								
	'first_timer' has been delete	d successfully.		11/2/2020	11:20:34 AM								
	'second_timer' has been de	leted successfully.		11/2/2020	11:20:34 AM								
	'set/reset PD_DB_1' has been	n deleted successfully.		11/2/2020	11:20:34 AM								
	'set/reset PD' has been dele	ted successfully.		11/2/2020	11:20:34 AM								
	'PDOut' has been deleted si	ccessfully.		11/2/2020	11:20:34 AM								
	'PDin' has been deleted suc	cessfully.		11/2/2020	11:20:34 AM								
	- Wain' has been deleted suc	cessfully.		11/2/2020	11:20:34 AM								
✓ Details view	"Main' was loaded successfi	illy.		11/2/2020	11:20:34 AM								
	Scanning for devices completed for	r interface Intel(R) Ethemet Connection (4) 12	19-LM. Foun	11/2/2020	11:16:35 AM								
	Loading completed (errors: 0; wan	nings: 0).		11/2/2020	11:20:40 AM							Information	

Figure 8: Manage General Station Description (GSD) Files

- 4. In the **Manage General Station Description Files** window, make sure that the **Installed GSDs** tab is selected.
- 5. Click the ellipsis (...) button.

Manage general station description files X											
Installed GSDs GSDs in the project											
Source path:											
Content of imported path											
File 🔺		Version	Language	Status							
				_							
<				>							
		Delete	Install	Cancel							

Figure 9: Manage General Station Description Files - Installed GSDs Tab

6. Select the Source Path for the GSDML file.


7. A list of available GSD files appears under **Content of imported path**.

Manage general station description files			×
Installed GSDs GSDs in the project			
Source path: Cutter Category			
CilligoGateway			
Content of imported path			
File	Version	Language	Status
GSDML-V2.41-CoreTigo-TigoGateway-1TM-Expert-20230421	V2.41	English	Not yet installed
GSDML-V2.41-CoreTigo-TigoGateway-1TM-PDCT-20230421	V2.41	English	Not yet installed
	Delet	e Instal	Cancel

Figure 10: List of Available GSD Files

- 8. Select the desired GSDML file from the list.
- 9. Click the Install button.

When the installation is complete, a new module (TigoGateway) is added to the **Hardware catalog** under **Other field devices**.

Devices       Plant       <			_ # = ×		es & networks	TigoGateway V1 → Devices &	
Network overview Impose the second secon		Options	Device view	Network view	🚽 Topology view		Devices
TigoGateway VI <sup>1</sup> TigoGateway VI <sup>1</sup> Adde new device <sup>1</sup> Devices 3 networks <sup>1</sup> Devices 3 networks <sup>1</sup> Device configuration <sup>1</sup> TigoGateway ITI: <sup>1</sup> Device files <sup>1</sup> TigoGateway ITI: <sup>1</sup> Device files <sup>1</sup> Device files <sup>1</sup> Device tables <sup>1</sup> Device providata <sup>1</sup> Device files <sup>1</sup> Device providata <sup>1</sup> Device files <sup>1</sup> Device providata <sup>1</sup> Device files <sup>1</sup> Devic	1		w ()	Network overview	• 🖻	Network Connections	1 I I I I I I I I I I I I I I I I I I I
TopoGateway V1         W Add new device         Devices S networks         PLC_1 (CM 1214C DODODC)         If Device configuration         W Dives & instructions         Image: Device configuration         Image: Device c		✓ Catalog	T	Paulca			
Add new device       PLC_1         Devices a networks       Filer         Program blocks       Program blocks         Program blocks       Prover supply and distribution         Prover supply and distribution       Prover supply and distribution		Search	ration 1 S	▼ 57-1200 ct			TigoGateway V1
Devices & networks     PCL-1     (CPU 1214C CODDCOC)     Police configuration     U     Online & diagnostics     PCL-1     (CPU 1214C     POlice Configuration     U     Online & diagnostics     PCL-1     (CPU 1214C     POlice     PCL-1     PCL-1     (CPU 1214C     POlice     PCL-1     PCL		General	5	PIC 1			Add new device
<ul> <li>COULTAC CONCOCI</li> <li>Device configuration</li> <li>COULTAC</li> <li>Technology objects</li> <li>For Forgram blocks</li> <li>For Forgram blocks</li> <li>Forgram blocks</li> <li>Forgl</li></ul>	- E	Filter Profile: <all></all>	· · · ·	P roct		PLC_1	📥 Devices & networks
Device configuration       Image: Configuration         Work configuration       Image: Configuration         Work configuration       Image: Configuration         Image: Configurat		Controllers				CPU 1214C	PLC_1 [CPU 1214C DC/DC/DC]
Image: Second		▶ 🔄 HM		-			Device configuration
<ul> <li>Program blocks</li> &lt;</ul>		PC systems					S Online & diagnostics
<ul> <li>Technology objects</li> <li>External source files</li> <li>External source tables</li> <li>E</li></ul>		Drives & starters					🕨 🙀 Program blocks
<ul> <li>External source files</li> <li>In Crease</li> <li>In Crease<!--</td--><td></td><td>Image: Network components</td><td></td><td></td><td></td><td></td><td>Technology objects</td></li></ul>		Image: Network components					Technology objects
<ul> <li>Pic tags</li> <li>Pic</li></ul>		Detecting & Monitoring					External source files
Image: PLC data types       Image: PLC data types         Image: Watch and force tables       Image: PLC data types         Image: Image: PLC data types       Image: PLC data types         Image: Image: Image: PLC data types       Image: Image: PLC data types         Image: Imag		Distributed I/O					PLC tags
<ul> <li>Watch and force tables</li> <li>Online backups</li> <li>Other field devices</li> <li>Other fie</li></ul>		Power supply and distribution					Compared PLC data types
Control backups     C		Field devices		1			Watch and force tables
Image: Second		<ul> <li>Other field devices</li> </ul>		-			Online backups
> Image: Device proxydata       > Image: Image		Additional Ethernet devices		t			🕨 📴 Traces
Image: Second		- DI PROFINETIO					OPC UA communication
Image: Program info       > Image: Imag		Drives					Device proxy data
Image: PLC alarm text lists       Image: PLC alarm text lists         Image:		Encoders					Program info
Image: Second and the second and t		🕨 📺 Gateway					FLC alarm text lists
Image: Security settings     Image: Security settings		- 词 1/0		-			Local modules
<ul> <li>&gt; End Security settings</li> <li>&gt; Security settings</li> <li>&gt; Get Cross-device functions</li> <li>&gt; Get Common data</li> <li>&gt; Common data</li> <li< td=""><td></td><td>🕶 🌆 CoreTigo Ltd</td><td></td><td></td><td></td><td></td><td>Grouped devices</td></li<></ul>		🕶 🌆 CoreTigo Ltd					Grouped devices
Set Cross-device functions     Set Cross-device functions     Set Cross-device function set		TigoGateway 1TE					Security settings
> 🙀 Common data >> 📺 TigoNaster 2114 > 🕅 Documentation settings >> 🛄 Hilscher Gesellschaft für Syste		TigoGateway 1TE-PNT					Section Cross-device functions
Tim Documentation settings		TigoMaster 2TH				1	Common data
	mautomatio.	🕨 🧊 Hilscher Gesellschaft für System		-		1	Documentation settings
▶ 🛅 SIEMENS AG		SIEMENS AG				1	Languages & resources

Figure 11: New Module Added to Hardware Catalog



# 5.2.3. Configure the IP Address

- 1. In the **Hardware catalog** pane, locate the TigoGateway, and then drag it to **Devices & networks** > **Topology view**.
- 2. In the **Network View** tab, draw a connection between the TigoGateway and PLC.



Figure 12: Network View

- 3. Select the TigoGateway and go to the **Device view** tab.
- 4. Click on the TigoGateway (which is outlined in **Red**) to open configuration fields.

Devices				🛃 Topol	ogy view	🔥 Ne	twork vie	w 🚺	Device view
199	📸 🏕 TigoMaster (TigoGateway 11	IF 🗄 🗑 🚄 🗄 🗍 @ ±	3	Device overview					
2									
▼ D TigoGateway V1				1 Module	Rack	Slot	I address	Q address	Туре
Add new device				<ul> <li>TigoMaster</li> </ul>	0	0			TigoGateway 1T
A Devicer & network	1050			PROFINET interface	0	0 X1			TigoMaster
	1.50th			<ul> <li>16-Port IO-Link Wireless Mas</li> </ul>	0	1			16-Port IO-Link
		1		IO-Link Wireless Master (	0	11	23	23	IO-Link Wireless
				Deactivated	0	1 WP01	4		Deactivated
Online & diagnostics				Deactivated_1	0	1 WP02	5		Deactivated
Program blocks				Deactivated_2	0	1 WP03	6		Deactivated
La lechnology objects		DP-NORM		Deactivated_3	0	1 WP04	7		Deactivated
External source files				Deactivated_4	0	1 WP05	8		Deactivated
PLC tags				Deactivated_5	0	1 WP06	9		Deactivated
PLC data types				Deactivated_6	0	1 WP07	10		Deactivated
Watch and force tables				Deactivated_7	0	1 WP08	11		Deactivated
Online backups			-						
Traces									
OPC UA communication									
Device proxy data									
Program info									
PLC alarm text lists									
Local modules									
Distributed I/O									
Ungrouped devices									
Security settings									
Cross-device functions									
Common data									
Documentation settings									
Languages & resources			~						
Version control interface	< =	> 100%	· · · · · · · · · · · · · · · · · · ·	<					>
Doline access	TigoMaster (TigoGateway 1)	TE-DNT)				1 106		Managette	
Card Reader/USB memory	rigomaster [rigodateway i			<u>S</u> H	operues	La inte		Jiagnostic	5
	General IO tags 5	system constants Texts							
	▼ General								^
	Catalog information	Catalog information							
	General	Short designation:	TigoGateway 1TE-PNT						
	Ethernet addresses	Direct of the second	Supports EastClastics Identification 6	Maintenance 1.2 and 5 (IOI D cohered de	c) Charrel	Deulee PT-	ed IPT Com	munication	down to
	Advanced options	Description:	1ms Sendclock, Advanced startup.	Maintenance 1-5 and 5 (IOLD submodule	s), snared l	Device, RI a	na iki Com	munication	down to
	Identification & Maintenance								
	41								

Figure 13: Device View

- 5. In the General tab, go to PROFINET interface [x3] > Ethernet addresses.
- 6. Under IP protocol, set the desired IP address.



7. Under **PROFINET**, make sure the **PROFINET** device name is correct.

Siemens - C:\Users\CoreTigo\Downloads	ATigoGateway VI ITigoGateway VI									-
Project Edit View Insert Online Optic	ons Tools Window Help							Totally I	ateorate	d Automation
💁 🕒 🔙 Save project 🛛 😹 🐰 🗐 🕞 🕽		💋 Go online 🖉 Go offine 🛔 🖪		arch in project>				Totally I	ntegrate	PORT
Project tree	TigoGateway V1 + Ungrouped	d devices + TigoMaster [TigoGat	teway 1TE-PNT]							- 6 53
Devices					Topol	ogy view	A N	twork vie	w In	Device view
192 III III III III	at Toolar ter Moodatesau 170			Deutre cumpdeux	1		Terre		144	
	ar constant of the state of the			Device overview						
T (1 Teof ateau VI			6	Module		Rack	Slot	I address	Q addres	s Type
Add new device			1	<ul> <li>TigoMester</li> </ul>		0	0			TigoGateway 11
A Devices & networks	1500			PROFINET in	sterface	0	0 X1			TigoMester
* MRC 1 CRU1214C DODODOC				<ul> <li>16-Port IO-Link</li> </ul>	Wireless Mas	0	1			16-Port IO-Link
Device confermation	1 ×			IO-Link Wire	eless Mester (	0	11	2_3	2_3	IO-Link Wreles:
R Online & diagnostics				Deactivate	d	0	1 WP01	4		Deactivated
h 🕞 Program blocks				Deactivate	d_1	0	1 WP02	5		Deactivated
Technology objects				- Deactivate	d_2	0	1 WP03	6		Deactivated
Sal External source files	-	DP-NORM		Deactivate	d_3	0	1 WP04	7		Deactivated
B.C. taos	-			Deactivate	d_4	0	1 WP05	8		Deactivated
PLC data types				Deactivate	d_5	0	1 WP06	9		Deactivated
Watch and force tables				Deactivate	d_6	0	1 WP07	10		Deactivated
Online backups	11.00	(a) (ann		Deactivate	d_7	0	1 WPOB	11		Deactivated
> 📷 Traces	<   II	> 100%	· · · · · ·			11	_		_	
OPC UA communication	TigoMaster [TigoGateway 1TE				Q. Pro	operties	<ul> <li>Inf</li> </ul>	0 🙎 🛙	lagnost	ics -
Device proxy data	General 10 tars Sus	tem constants   Texts								
Program info	deneral to tage sys	Ethomat addresses								
PLC alarm text lists	General	Echemet addresses							_	
Local modules	Catalog Information	Interface networked with								
Distributed I/O	<ul> <li>PROFINELLIMENTACE [k1]</li> </ul>									
Ungrouped devices	General	Subnet:	PNIE_1							
Security settings	Ethemet addresses		Add new subnet							
Cross-device functions	Manufaction & Unistances									
Common data	The red Device	Internet protocol version 4 (	IPv4)							
Constant Constan	shared Device	internet protocol tersion + c								
Languages & resources			Set IP address in the project							
Zersion control interface			Raddens: 102 100	[000   k						
Doline access			# #991955. 192 . 160							
Card Reader/US8 memory			Subnet mask: 255 . 255	5.255.0						
			Synchronize router settings with	h IO controller						
			Use router							
	1		Buday adding (1)							
			IP address is set directly at the	device						
		PROFINET								
			Generate PROFINET device nam	e automatically						
Des Desta Residence	-	PROFINET device name:	tigomaster							
- Details view		Converted name:	tigomaster							
		Device number;	1							-

Figure 14: Ethernet Addresses

# 5.2.4. Configure Ports (Subslots)

TigoGateway has a modular structure that includes various slots and subslots: see the table below.

The eight subslots are IO-link wireless ports that need to be configured as detailed in this section.

Table	19:	Slots	and	Subslots	of	TigoGateway	
labic	15.	01013	ana	00031013	~	ingoodicmay	

Slot	Subslot	Submodule	Description
0	1	DAP	Device access point TigoGateway IO-Link Wireless device (ixed)
	32768	PN-IO	PROFINET interface (fixed)
	32769	X31	Ethernet interface, PROFINET IO port 1 (fixed)
	32770	X32	Ethernet interface, PROFINET IO port 2 (fixed)
1	1	IO-Link Wireless Master	IO-Link Wireless master (fixed) 2 input bytes and 2 output bytes
	2	Configuration port WP01	Each port (subslot) needs configuring, as detailed in the rest of
	3	Configuration port WP02	- this section.
	4	Configuration port WP03	-
	5	Configuration port WP04	-
	6	Configuration port WP05	-
	7	Configuration port WP06	-
	8	Configuration port WP07	
	9	Configuration port WP08	



## To configure ports:

1. Go to the **Device View** tab.

Here you can see a table of the various modules of TigoGateway. Note the **Slot** column (which combines slot and subslot), and in particular the rows for slot/subslot **1 WP01–1 WP08**: these are the IO-Link wireless ports, which need to be configured.

ojett tree 🛛 🗧 📢	TigoGateway V1 + Ungrouped devices +	TigoMaster [TigoGateway 1TE-PNT]					_##X	Hardware calling		1.11
Devices	11-2-11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	P Topolo	gy view.	A No	twack vie	w Dr	Device view	Options		
1 2	🏕 Bookester (Spoleteway 18 💌 * 📑	Device overview								
	•	V Module	Back	(Size	Laddress	O address	Tupe	✓ Catalog		
TigoGateway V1		· TooMaster	0	0			TooGateway IT_	deaths		(MAR)
Add new device		PROFINETimentace	ä	0.83			Tigolacter	-	(Trans	1000010
Devices & networks	255	· B Port IO-Link Wreless Mest.	0	1			8 Port IO-Link W	Mitter Proble:	1981	1.1
<ul> <li>Image: Barrier State (CPU 1214C DC/DC/DC)</li> </ul>	40	IO-Link Wireless Master L.	0	11	2.3	2.3	O-Link Wieless	<ul> <li>Biead module</li> </ul>		
T Device configuration		Deactivated	0	1 10701	4		Descousted	<ul> <li>m Submodules</li> </ul>		
S Online & diagnostics		Deactivated_1	0	1 10/02	5		Descrivated	• [] IOL wireles	s generic devices	
<ul> <li>B Program blocks</li> </ul>	_	Deactivated_2	0	1 1/203	4		Deactivated	Deactive	rted	
<ul> <li>La Technology objects</li> </ul>	1.11	Deactivated_3	0	1 WP04	3		Deactivated	DCM11	Viniess Device 11+PQI (Eq	en)
External source files		Deactivated_4	0	1 10705			Deactivated	DUAL1	Vieless Device 1 / 1 0 + PQ	(Expert)
<ul> <li>ALC sags</li> </ul>		Deactivated_5	-0	1 WPD6			Deschvated	IDC:st t	Vireless Device 1 0 + PQI (E)	pert)
E PLC data types		Deactivated_6	0	1 1/07	10		Deactivated	I DUNKS	wreness perice 161+ PQLIE	perty.
<ul> <li>Watch and force tables</li> </ul>	Committee a	Deactivated_7	0	1 WPC8	11		Desctivated	D-Link 1	Select Device 15 2 16 0 +	de la de
Quine backups				_				ID CINK Y	Wretess Device 16 O + PQLI	ciperty
• 🔛 Tinces								A D C C C C	Amoras Device 31+ PQI (Eq	een)
OPC UA communication								DUN T	Weleti Device 2020 + PQ	copert
Device providete								DC/R V	Vereiers Denke 3 0 = PQHE	pant)
at nogram into		12						a countra a	American Device 32 11 PQ (2)	pero .
FLC alarm text into								a souther a	vieless Device 22 v 22 C +	An in the
Local modules								Contract of	Vieless Device 31 0 - Politie	aperts .
Contracted to								DURN	Series Centre 41/4/0 + 80	(tuner)
<ul> <li>M reductes oracles</li> </ul>								- Children and Chi	Vielan Device 40 - 8000	(a sperg
· · · · · · · · · · · · · · · · · · ·								The second se	limitent Device #1 + POI (Ex	and i
Reconstructions								De la contra de	Visies Device 81/8/0 - 80	(I start)
The second second second								1/1/08 S	PRESERVE VEINER DOUG V + FV	Dr. Party

Figure 15: Device View Tab – Wireless Ports 1 WP01–1 WP08

2. In the **Catalog** pane, go to **Submodules** -> **IOL** wireless generic devices.

Here you can see a list of the IO-Link wireless device types. For details of each device type see the table below.

	TigoGateway V1 + Ungrouped devices +	TigoMaster [TigoGateway 1TE-PNT]					_##X	Hardware catalog 1	
Devices		P Topol	ogy view	J. N	etwork vi	nv IN	Device view	Options	
42 m	- Tooldester (TooGateway 172	Device overview							
		1		1.202.111			14010	Y Catalon	_
1 TisoCateway V1		Y Module	- Reck	\$1012	1 address	Q address	s Type	- catalog	-
Add new device		<ul> <li>TigoMaster</li> </ul>	0	0			TigoGateway 1T_	Ceatthe	141
Devices & networks	approx .	<ul> <li>PROFINET Interface</li> </ul>	0	0.01			ngohuster	Fitter Profile: chit-	
BLC 1 CPU 1214C DODODCI	18 -	B Port IO-Link Wireless Mest	0	1			I Port IO-Cirk W.	mead module	
RY Device configuration		IO-Link Wireless Master (	0	11	2.3	2.3	IO-Link Varelets	Submodules	
Coline & diagnostics		Desctivated	0	1 1/201	4		Deactivated	- 10 IOL wireless generic devices	-
• Rooram blocks		Descovated_1	0	1 11/02			Descovated	Deactivated	
Technology abjects	100 million (100 m	Deactivated_2	0	1 10903	•		Descovated	IO-Link Wreless Device 1 1 - PQI (Expert)	į
Sei Esternal source files		Deactivated_3	0	1 10904	2		Descousted	IO-Link Wreless Device 1 I/1 O - PQI (Ex	pert)
PLC tegt		Deschveted_4	0	1 10705			Deactovased	ID-Link Wreless Device 1 O + NOI (Experi ID-Link Wreless Device 1 O + NOI (Experi ID-Link Wreless Device 1 D + NOI (Exper)	0
• Di PLC data tupes		Descovered_5	0	1 1406			Descovated	IO-Link Wireless Device 161 + PQI (Experi ID-Link Wireless Device 161 + PQI (Exper ID-Link Wireless Device	0
Watch and force tables		Descovered 6		1 10007	10		Deschueted	IO-Link Wreless Device 16 II 16 O + POI	(tipe
Coline backups		Descaved_7	0	1 WPGB			Descousies	IO Link Wreless Device 16 O + PQI (Expe	inti
• Cal Traces		1						ID-Link Wreless Device 21 + PQI (Expert)	1
GPC UA communication								IO-Link Wreless Device 2 II 2 O + PQI (Ex	(pert)
Device provy data		Contract of Contra						III IO-Link Wreless Device 2 O + PQI (Exper	0
27 Program info								IO-Link Wreless Device 32 I + PQI (Exper	0
PLC alarm text lists								IO Link Wreless Device 32 // 32 O + PQI	(Expe
Local modules								IO-Link Wreless Device 32 O + PQI (Expe	(the
• 🕞 Distributed #0								IO-Link Wreless Device 41 + PQI (Expert)	1
Set Ungrouped devices								IO-Link Wreless Device 4 II 4 O + PQI (Ex	per()
15 Security settings		1000						IO-Link Wreless Device 4 O = PQI (Esper	6
Cross-device functions		1000						IO-Link Wreless Device 81 - PQI (Expert)	I
Common dete								IO-Link Wreless Device 8 If 8 O + PQI (Ex	pero
Documentation settings								IO-Link Wreless Device 8 O + PQI (Experi IO-Link Wreless Device 8 O + PQI (Exper IO-Link Wreles) (Exper IO-Link Wreles) (Exper I	10
Languages & resources									-
<ul> <li>Vertion control interface</li> </ul>									

Figure 16: IO-Link Wireless Device Types



Device Type	Description	Input Process Data	Output Process
		Size (PD_IN)	Data Size (PD_OUT)
IO-Link 1 I + PQI	IO-Link with 1 byte input data and port qualifier information	1 byte + 1 byte PQI	-
IO-Link 1 I / 1 O + PQI	IO-Link with 1 byte input data and 1 byte output data and port qualifier information	1 byte + 1 byte PQI	1 byte
IO-Link 1 O + PQI	IO-Link with 1 byte output data and port qualifier information	-	1 byte
IO-Link 16 I + PQI	IO-Link with 16 bytes input data and port qualifier information	16 bytes + 1 byte PQI	-
IO-Link 16 I / 16 O + PQI	IO-Link with 16 bytes input data and 16 bytes output data and port qualifier information	16 bytes + 1 byte PQI	16 bytes
IO-Link 16 O + PQI	IO-Link with 16 bytes output data and port qualifier information	-	16 bytes
IO-Link 2 I + PQI	IO-Link with 2 bytes input data and port qualifier information	2 bytes + 1 byte PQI	-
10-Link 21/20 + PQI	IO-Link with 2 bytes input data and 2 bytes output data and port qualifier information	2 bytes + 1 byte PQI	2 bytes
IO-Link 2 O + PQI	IO-Link with 2 bytes output data and port qualifier information	-	2 bytes
IO-Link 32 I + PQI	IO-Link with 32 bytes input data and port qualifier information	32 bytes + 1 byte PQI	-
IO-Link 32 I / 32 O + PQI	IO-Link with 32 bytes input data and 32 bytes output data and port qualifier information	32 bytes + 1 byte PQI	32 bytes
IO-Link 32 O + PQI	IO-Link with 32 bytes output data and port qualifier information	-	32 bytes
IO-Link 4 I + PQI	IO-Link with 4 bytes input data and port qualifier information	4 bytes + 4 bytes PQI	-
10-Link 4 I / 4 0 + PQI	IO-Link with 4 bytes input data and 4 bytes output data and port qualifier information	4 bytes + 4 bytes PQI	4 bytes
IO-Link 4 O + PQI	IO-Link with 4 bytes output data and port qualifier information	-	4 bytes
IO-Link 8 I + PQI	IO-Link with 8 bytes input data and port qualifier information	8 bytes + 8 bytes PQI	-
IO-Link 8 I / 4 8 O + PQI	IO-Link with 8 bytes input data and 8 bytes output data and port qualifier information	8 bytes + 8 bytes PQI	8 bytes
IO-Link 8 O + PQI	IO-Link with 8 bytes output data and port qualifier information	-	8 bytes

## Table 20: IO-Link Wireless Device Types

3. Configure each IO-Link wireless port (subslot).

4. Select the type of device that is / will be connected to the port being configured, and drag it into the port's row in the **Device View** tab.



In the example below, port WP01 is being configured for IO-Link Wireless Device 32 I / 32 O + PQI.



Figure 17: Setting a Port's Device Type

A **Device Inspector** pane appears (outlined in **Red** in the image below).

Slemens - CriUsers/CoreTigo/Download	stfigoGateway V1 TigoGateway V	1							-
ject Edit View Insert Online Opt	ons Tools Window Help							Totally Integrated Autom	ation
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	TigoGateway V1 + Ungrou	iped devices 🔸 TigoMaster [TigoGateway 1T	E-PNT]					Hardware catalog	
Devices				Topology	view	A Network vi	ew IT Device view	w Options	
39 🖂 🔤 5	👌 🚁 🛛 TigoMaster (TigoCateway 1	IZF 🖬 🗹 🖌 🕄 🔍 😫 🔜	Device overview						
				l leut le		- In the second	less le	Y Catalon	_
TigoGateway V1		-	Module Testholar	- Fack S	ot Tado	oress Q address	S Type A	m daub	
Add new device		o 11	<ul> <li>Inpotentier</li> <li>Inpotentier</li> </ul>	0 0	**		Teachaster	cia. Grando	
📥 Devices & networks	all		B Bort (Culink Wineless Master (Evrant) 1	0 0	~		8 Bort (Cul ink Wine)	Filter Profile: (Alb)	
* 📑 PLC_1 [CPU 1214C DC/DC/DC]	415		<ul> <li>B Port (organic surgers) starting (Experig) 1</li> <li>Collick Workers Master (Experig) 1</li> </ul>				Which Western Me	Head module	
Device configuration			Polick Western Device 23 (123 O + POL/R	0 1	10011 40	100 64 95	Publick Visioners Re	<ul> <li>Submodules</li> </ul>	
🐁 Online & diagnostics				0 1	WP02		IO CHIR HIPERESS DE	<ul> <li>IOL wireless generic devices</li> </ul>	
Program blocks				0 1	WPOR			Deactivated	
Technology objects			5	0 1	WP04			IO-Link Wireless Device 1 I + PQI (Expert	0
External source files		CP NOIM		0 1	WP05			IO-Link Wireless Device 1 If 1 O = PQI (E)	spert)
PLC tags				0 1	WPD6			IO-Link Wireless Device 1 O + PQI (Experi	(1)
PLC data types				0 1	WP07			IO-Link Wireless Device 161 + PQI (Expe	(81
Watch and force tables				0 1	VPOR			ID-Link Wireless Device 16 If 16 O + PQI	(Expe
Online backups				• •	10.00			IO-Link Wireless Device 16 O + PQI (Exp.)	ert)
🕨 🔄 Traces								IO-Link Wireless Device 21 + PQI (Expert	0
DPC UA communication								ID-Link Wireless Device 2 If 2 O + PQI (E)	(spert)
Device proxy data		×						IO-Link Wireless Device 2 O + PQI (Expe	(71)
Program info	< II >	100%	<					D Link Wireless Device 321 + PQI (Expendence)	(11)
PLC alarm text lists	<b>IO-Link Wireless Device 32</b>	# 32 O + PQI (Expert) [IO-Link Wireless Devis	e 32 # 32 O + PQI (Expert)]	3 Prope	ties	Info 😒 I	Diagnostics	IO-Link Wireless Device 32 I/ 32 O + PQI	(Exper
Local modules	Connect 10 mars 1	Extension Tests				1.0		IO-Link Wireless Device 32 O + PQI (Exp	en)
Distributed NO	General 10 tags	System constants Texts						IO-Link Wireless Device 4 I + PQI (Expert	0
Ungrouped devices	<ul> <li>General</li> </ul>	General						<ul> <li>IO-Link Wireless Device 4 If 4 O = PQI (E)</li> </ul>	spert)
Security settings	Catalog information							E IO-Link Wireless Device 4 O + PQI (Experience)	(7)
Cross-device functions	Hardware interrupts							IO-Link Wireless Device 81 + PQI (Expert	0
Common deta	Module parameters	Name: IOLink	Neless Device 32 ¥ 32 O + PQI (Expert)					IO-Link Wireless Device 8 If 8 O = PQI (E)	spert)
Documentation settings	I/O addresses	Author: User						IO-Link Wireless Device 8 O + PQI (Experi-	10
Languages & resources		Comment							
Version control interface		Contract.					~		
Online access									
<ul> <li>Card Reader/US8 memory</li> </ul>									
							<u> </u>		
		Catalana Information							
		Catalog information							
		Short designation: IO-Link1	táreless Device 32 I/ 32 O + PQI (Expert)						
		Description: 104.nk1	Areless Device with 32 I/ 32 O + PQI. The IO-Link port configu	ration is transfe	red by the f	PLC .			
Datally sleep	-								
Details view							V		
		Article number:							



5. In the General tab (of the inspector pane) select Module Parameters.



Here you can configure the other parameters of the port whose device type you have just set (in our example, port WP01).

Siemens - C. UsersiCoreTigo/Downloads	iligoGateway V1\ligoGateway V1			
ject Edit View Insert Online Optio	ns Tools Window Help			Totally Integrated Automatic
Save project 🔠 🗶 🗄 🖂 🗴	(카*(~~비즈) 또 또 별 및 및 (	Goonine 🖉 Gooffine 🛃 🖪	🗶 🖂 🛄 😰 😡 -Seanth in projects 📲	POF
Project tree 🛛 🕄	TigoGateway V1 + Ungrouped	I devices + TigoMaster (TigoGat	ey 1TE-PNT]	- P = X Hardware catalog
Devices			🚰 Topology view 🛛 📥 Network v	view 🔐 Device view Options
8 2	🛔 Tigol laster (TigoGateway 178		Device overview	
			A Park Star Lating California	Catalog
<ul> <li>IgoGetenay V1</li> </ul>			Tooklaster 0 0	TopGateway 187, C. A Searcho
Add new device			PROFINET interface     0 0 X1	Tigoldester Balley Bulley ath
Devices & networks			8 Port IO-Link Wireless Master (Expert)_1 0 1	8 Port IO-Link Wirel
<ul> <li>PLC_1 [OPU 1214C DODODC]</li> </ul>	40.4		<ul> <li>IO-Link Wreless Master (Expert)</li> <li>0</li> <li>11</li> <li>2_3</li> <li>2_3</li> </ul>	ID-Link Wreless Ma
Device configuration			ID-Link Wireless Device 32 il 32 O + PQI (IL. 0 1 WP01 68100 6495	ID-Link Wreless De
Second Contine & diagnostics			* 0 1 WP02	• La tot wreiess generic devices
<ul> <li>Program blocks</li> </ul>			0 1 WP03	Cescovared
Technology objects		10.000	0 1 WP04	OCHA WHEES DEVICE TT = POI (Cipert)
Di Esternal source ties			0 1 WP05	Octavity Markets Design 1.0 - 201 (Exercit)
FLC tags			0 1 WP06	Policie Weiters Device 10 + Policient)
<ul> <li>El PLC dete types</li> </ul>	212	900		10 July Western Device 16   16 0 + POLICE
<ul> <li>Watch and force tables</li> </ul>	S 1			10 July Weeks Device 16 0 - 10 (Benetic
Online backups	IO-Unk Wireless Device 32 I/ 32	2 O + PQI (Expert) (IO-Link Wirele	Sevice 32 9 32 0 + PQI (Lxpert) Sevice 32 9 Roperties 1 Info	Diagnostics Diagnostics Diagnostics Diagnostics
Haces	General IO tags Sys	tem constants Texts		10 City Minister Device 21 - 70 (1941)
<ul> <li>OPC UN communication</li> </ul>	* Central			a Dulia Walay David 10 - PU (Least)
<ul> <li>Bevice proxy data</li> </ul>	Catalog information	Module parameters		- Police Weless Device 2.0 - Policett)
ing mogram and	Hardware internats	IO-Link Port narrameters		Dut ink Windows Device 32 # 32 0 + PDI (Fy
<ul> <li>PLL alaren tela asts</li> </ul>	Module parameters	no-chik rort parameters		Deline Winders Device 32.0 + POLif worth
Local modules	NO addresses	Eastly fort discovery	a bla	[10] Od ink Windows Device (1), 201 (Except).
				Od ink Windows Device 4 H 4 O + POLITISM
• En orgrouped desces		Enable Process Alarm:	404	<ul> <li>IOU ink Weekers Device 4.0 - EOU (Excert)</li> </ul>
security seconds		Configuration Source:	40	IDJ ink Winders David Bits FOUR Parent)
Considerate functions		Enable Input fraction:	cable	In the Winders Device Stills O + FOLIFICE
Common data		Enable PullPlum	nabila	ID Link Wireless Device & D + POL(Event)
Call Documentation settings		Cater ready		
Languages a resources		Port mode:	aming	
Caline access		Validation and backup:	a Device Check	
Card Basdard ICB mamony		Port cycle time:		
and a second sec		Vendor ID:		
		Device ID:	<i>2112</i> 15	
		Side		
		Teck:	h	
		Device TX power:	1	
		Maximum number of		
		transmission retries:	141	
		Men volve time:	285	
Details view		sict type:	nge too	
		Low power device:	Sable	
		Max PD segmentlength:		
Nome		Unique ID:	1,00,00,00,00,00,00,00	) Information

#### Figure 19: Module Parameters

6. In the **Unique ID** box, type the ID of the wireless-device connected to the port.

IO-Link Wireless Device 32	l/ 32 O + PQI (Expert) [IO-Link Wirele	ss Device 32 I/ 32 O + PQI (Expert)]	<b>Properties</b>	i Info	Diagnostics	
General IO tags	System constants Texts					
<ul> <li>General</li> <li>Catalog information</li> </ul>	Module parameters					F
Hardware interrupts	IO-Link Port parameters					7
Module parameters						
I/O addresses	Enable Port diagnosis:	Enable				
	Enable Process Alarm:	Enable				
	Configuration Source:	PNIO				
	Enable Input fraction:	Disable				
	Enable Pull/Plug:	Enable				
	Port mode:	Cyclic				-
	Validation and backup:	No Device Check				
	Port cycle time:	0				
	Vendor ID:	0				
	Pevice ID:	16777315				
	Class	10///215				
	SIUL Te also	0				
	Irack:	wn				
	Device TX power:	31		_		-
	Maximum number of transmission retries:	5				
	I-Am-Alive time:	3 rac				
	Slothes	Sizela elet				
	side type.	Single slot				
	Low power device:	Disable				_
	Max PD segment length:	2				
	Unique ID:	CF,45,C3,81,01,00,00,F3,03				

#### Figure 20: Unique ID

- 7. Change the value of any other parameters as needed by the system: for details of the various parameters and their possible values, see <u>Parameters</u>.
- 8. Compile and download in order to apply the current settings.



9. In the **Project Tree**, under the relevant PLC go to **PLC Tags** > **Show All Tags**.



Figure 21: Show All Tags

10. In the **Tags** tab, set the W-Device tags.

⊒	profir	iet_test ► PLC_1 [CF	U 1214C DC/DC/DC] 🕨	PLC tags		_ • •
			💶 Tags 🛛 🔳	User constan	ts 🖉 🖉 System o	onstants
۶	e 1	) 🗄 🛍 🖧				-
F	LC tag	js				
	N	ame 🔺	Tag table	Data type	Address	Retain
	-00	Tag_1	Default tag table	Byte	%868	
		<add new=""></add>		-	<b>=</b>	



11. In the **Project Tree**, under the relevant PLC go to **Watch and Force Tables > Watch Table\_1**.



12. In Watch Table\_1, set the watch parameters.

Project tree		Dani	ielB1 🕨 PLC_1 [CPU	1214C DC/DC/DC	[] → Watch and fo	rce tables 🕨 Wa	atch table_1	_∎≡×	
Devices									
ÊŇ	<u> </u>	1	2 🛍 📝 🌆 🖓	% 🌮 🎦 🕯					
2		- i	Name	Address	Display format	Monitor value	Modify value	9	
🔽 🔽 DanielB1	<b>V</b> 🔍 🔨	1	"port1_input1"	%IB68	Hex	16#04			
Add new device		2	"port1_input2"	%IB69	Hex	16#85			
Devices & networks		з		Add new>					
PLC_1 [CPU 1214C DC/DC/	<b>V</b> 🔍								
Device configuration	=								
😓 Online & diagnostics									
Program blocks									
Technology objects									
External source files	_								
🕨 📜 PLC tags									
PLC data types									
▼ → Watch and force tables									
📑 Add new watch table			• 1						
Force table								>	
Watch table_1					<b>Reperties</b>	🔄 🗓 Info 🛛 🖁	Diagnostics		
Online backups		Ge	neral Cross-ret	ferences Cor	nnile				
🕨 💽 Traces									
Device proxy data			Show all mess	ages	•				
Program info									
PLC alarm text lists		1 1	Message				Go to	?	
		0	The software	has not been loaded	d, because it is up-to-d	ate.		^	
M Details view		- 📀	Hardware co	nfiguration					
Details view		- 📀	Loading completed (errors: 0; warnings: 0).						
		$\bigcirc$	Connected to PLC_1	I, via address IP=192	.168.10.201.			~	
		<						>	

Figure 23: Watch Table

13. Use **Watch Table\_1** to monitor W-Device data for the TigoBridge, and for IO-Link Wireless sensors and actuators.



# 5.3. TigoEngine Configuration

In order to use the TigoEngine it is necessary to have a valid user license.

Licenses are granted by CoreTigo. Some are for a limited period with an expiry date, and some are perpetual. After expiration of the license the user will only be able to access the TigoEngine if the license has been renewed by CoreTigo.

After successful installation of the TigoEngine you will be prompted to activate your account.



#### References:

• For further details of how to use TigoEngine, see the *TigoEngine User Manual*.

TigoEngine supports multiple TigoGateway connections.

TigoEngine's **Masters** view is used for connecting a new TigoGateway to TigoEngine and keeping a record of connected TigoGateways.



**Note:** To activate your account online TigoEngine should have access to TCP port 443 (TigoEngine access <u>https://licensing.coretigo.com/ems</u>).

Proceed as follows:

- 1. Type in the Product Key you received from CoreTigo.
- 2. Click the **SUBMIT** button.

Activat	e Your Account Onli
sert Product key	
x0x0xx00-0x0	0-00x0-xxx0-xxx00x000x0x
	SUBMIT

Figure 24: Insert the Product Key



You are directed to the Login screen.

	Tigo
Log in Enter your username and	password to
A admin	
۵	ø
	Sign in

#### Figure 25: TigoEngine Login Screen

3. Enter your credentials and click the **Sign in** button.

There are 2 levels of access to TigoEngine:

- Administrators (Admin) have access to all features, including user management (registering new users and editing/deleting any user profile).
- Users can access all features except user management.

All access to TigoEngine requires user authentication, either with a TigoEngine **username** and **password** or with a Single Sign On such as Microsoft Azure.

After TigoEngine has been installed, the System Administrator logs in to TigoEngine using the default Administrator's authentication credentials, which are:

- User = admin
- Password = admin
  - 4. In TigoEngine's Masters view, click the Connect New Master button.

Ocore Tigo Engineering Taol	Masters					Admin v
	Status ()   OPC-UA Connection ()   Nome	Image IP Address	Connection time	Туре	Protocol	<b>(</b>
Masters & Devices     V Industrial IoT	]					
图 1000 Uploader			No doto			
<ul> <li>▲ Alerts &amp; Events</li> <li>         ③ Settings     </li> </ul>						



5. In the Connect New Master window, set the following:



- $\circ$  **Name** type the desired name for this TigoGateway.
- **IP** type the IP address of the TigoGateway that you want to connect to TigoEngine.

Connect New Master	×
* Name:	
* IP:	
Credentials	
	USB Master >
	Cancel Connect

Figure 27: Connect New Master

6. Click Connect.

When the TigoGateway is connected, its details appear in the table in the **Masters** window, together with a **Green** bubble mark in the **Status** column.

**Disconnect** the TigoGateway or **Edit/Delete** its details in TigoEngine by selecting it and then clicking the relevant button in the **Actions** column.

Er	CoreTigo	<	Masters									Admin ~
6 <sup>9</sup> Confi	iguration	~		OPC-UA stotus (	) Nome	Imoge	IP Address	Connection time	Туре	Protocol		Ð
Y Indus	Masters & Devices strial IoT		1	OPD-UA	CS_Gateway	,	192,168,1,100	7/20/2023, 10:45:37 AM	TigoGateway-1TE		Z 🗑 Disconnect	
E 1000 ▲ Alerts	I Uploader ts & Events											
اڑھ Settli	ings											

Figure 28: Masters View – TigoGateway Connected



**Note:** The status indication ( ) shows the HTTP connection to the wireless master. When it is green, the user can scan ,pair and configure the wireless ports.

The OPC UA connection indication ( OPC-UA ) shows the OPC UA connection to the wireless master. When it is green, data exchange (process data & MQTT ) between the wireless master and TigoEngine is active.



# 5.4. Docker Configuration

Proceed as follows:

- 1. Select "Get Started" from the Docker section in the TigoGateway landing page.
- 2. If this is the first time you are logging in, then you should create a username and password.
  - a. NOTE: if a username and password are not created, you will be presented after a few minutes with a message that the Portainer needs to be restarted. In this case, you should restart the TigoGateway device.

	portainer.io
✓ New Portainer installat	tion
Please create the initial administrat	or user.
Username	admin
Password	••••••
Confirm password	····· 🗸
▲ The password must be at left.	east 12 characters long. 🗸
Create user	
Allow collection of anonymous s policy.	tatistics. You can find more information about this in our privacy

3. To create a new registry, select **Registries** in the side-panel menu.

	~
⋒ Home	
👉 local	×
Dashboard	
App Templates	~
😂 Stacks	
Containers	
i≡ Images	
ଝ Networks	
Volumes	
③ Events	
Host	~
Settings	
뽔 Users	~
🖨 Environments	~
640 Registries	
Authentication logs	~
A Notifications	
Settings	~

#### The Registries window opens.

Registries $\mathcal{G}$		Û	?	0	admin	~
Information View registries via an environment to manage access for user(s) and/or team(s)						
( Registries	Q Search for a registry	📋 Rer	nove	+ /	Add registr	<b>y</b>



4. Click the **blue +Add Registry** button.

The Create Registry window opens.

	•	(()			
DockerHub DockerHub authenticated account	AWS ECR Amazon elastic container registry	Quay.io Quay container registry			
Important notice For information on how to generate an Acc ECR connection details	cess Key, follow the AWS guide.	$\mathbf{X}$			
Name*	MyTigoEngine				
Registry URL* 🕐	530412914495.dkr.ecr.eu	530412914495.dkr.ecr.eu-west-1.amazonaws.com			
Authentication ②					
0		AKIAXW7YSY476D76Z7X7			
AWS Access Key*	AKIAXW/YSY4/6D/6Z/X/				
AWS Access Key* AWS Secret Access Key*	AKIAXW/YSY4/6D/6Z/X/	•••••			
AWS Access Key* AWS Secret Access Key* Region*	eu-west-1				



- 5. Select **AWS ECR** and enter the ECR connection details.
- 6. The next step is to delete an existing stack. Select **Stacks** in the side-panel menu.



#### The Stacks List window opens.

Stacks list C			Ę	? ?	admin
Stacks		Q Search fo	r a stack	+ Add stack	□ :
○ Name ↓↑ Filter ▼	Type $\downarrow\uparrow$	Control	Created ↓↑	Ownershi	p ↓↑
tigoengine	Compose	Total	2023-03-07 14:51:30 by admin	🗞 adminis	trators

- 7. Select the stack or search for it.
- 8. Click the red Remove button.

The stack is removed.

9. The next step is to delete existing images (virtual applications). Select the image(s) in the side-panel menu.





### The Images window opens.

😑 Images	Q Search for an i
$ \bigcirc Id \downarrow \uparrow \\ Filter \nabla $	Tags ↓↑
sha256:03c8b63ff355d580993078d9cd57d5	530412914495.dkr.ecr.eu-west-1.amazonaws.com/engineusermanagment:2.3.1110.0
sha256:23d92ca24efcf3248208585f560d83	530412914495.dkr.ecr.eu-west-1.amazonaws.com/iotintegration:2.3.1110.0
sha256:8e8ad64f4b7acb823ec8ac77aaa9ec	530412914495.dkr.ecr.eu-west-1.amazonaws.com/tigoengine:2.3.1110.0
sha256:fda9a6c368a83896b590d0856264d0 Unused	530412914495.dkr.ecr.eu-west-1.amazonaws.com/tigogateway_homepage:2.3.1110.0 (localhost/tigogateway_homepage_contain

All images except the Portainer image should be selected.

10. Click Force Remove.

Q Search for an image	👔 Remove 👻 🏦 In
	Force Remove

The images are removed.

11. The next step is to create a new stack. Select **Stacks** in the side-panel menu.



The Stacks List window opens.

s Stacks list <i>C</i>		'Stacks list' ව 👌 admin 🗸
Stacks	Q Search for a stack	The Remove + Add stack



12. Click the **blue +Add Stack** button.

The Stack details window opens.

Name	mystack			
This stack will be	طع This field must consis deployed using docker compose .	t of lower case alphanume	ric characters, '_' or '-' (e.g. 'my-name', or 'abc-123	!').
Build method	l			
Use our Web e	<b>ditor</b> ditor		Upload Upload from your computer	0
Upload You can upload a	Compose file from your computer			
	×			

- 13. Allocate a name to the stack.
- 14. Select the **Upload** option.
- 15. Click on Select File and get the updated docker-compose.yml file.
- 16. Under Actions, click the **blue Deploy the Stack** button.

This process make take some time to complete.

17. After completion, check the **Stacks > Containers** list to verify the addition.

Î		«	Stack details 🕫								
	Home		≔ Stack 🖉 Editor								
			Stack details			_					
	local	×	tigoengine (  Stop this stack  De	elete this stack + Crea	ate template from sta	ick					
	Dashboard		Stack duplication / migration								
	App Templates	~	This feature allows you to duplicate or migrate this stack.								
	Containers		Stack name (optional for migration)								
	Images		Select								
	Networks										
	Volumes		(→ Migrate Copplicate								
	Events										
Ð	Host	~									
Set	tings		(9) Containers					Q Search			
	Users	~	C Name I t	State 11 Either V	Quick Actions	Stock 11	Image 12				
	Environments	~		State of File g	QUICK ACTIONS	Stack +	inage 📲				
	Registries		tigoengine-postgres-1	running	🗎 🛈 🖬 ⊱ 🥔	tigoengine	postgres				
	Authentication logs	~	tiggengine-engineeringtool-1	unhealthy		tigoengine	naine 52041201440E div or ou wort 1 amazennue comitigeonaine:2 21110.0				
	Notifications										
	Settings	~	tigoengine-user_management-1	unhealthy	🖹 🛈 al >= 🥔	tigoengine	530412914495.dkr.ecr.eu-west-1.amazonaws.co	m/engineusermanagment:2.3.1110.0			
			tigoengine-hwinterface-1	unhealthy	🖹 () al >_ 🥔	tigoengine	530412914495.dkr.ecr.eu-west-1.amazonaws.co	m/iotintegration:2.3.1110.0			



# 6. Commissioning

The TigoGateway is provided with a default IP Address 192.168.1.100, and the subnet mask address is 255.255.255.0.

The IP Address can be set for the NetX card which connects to the industrial protocol types – PROFINET, Ethernet/IP, EtherCAT – or for the IMX8 card.

# 6.1. Set the IP Address with the Ethernet Device Configuration Tool

To set the IP address using the Ethernet Device Configuration tool:

- 1. Start the **Ethernet Device Configuration** software. (Download it from: **Ethernet Device Configuration**).
- 2. Check whether the checkmark for option **DCP** is set in the menu.
- 3. Go to **Options > Protocols**. If the checkmark for option DCP is not set, set it.
- 4. Click Search devices.

The software lists all devices found in the local network.

Under **IP address**, the window displays **0.0.0.0** (i.e. no IP address set) or the IP address set in the device (i.e. 192.168.1.100).

vices Online	Find:		next pr	evious			
IAC Address	Device Type 👻	Device Name	IP Address	Protocol	Device ID	Vendor ID	Device role
0-02-A2-12-0=-00			192.168.1.100	DCP	0x0001	0x011E	Device

Figure 29: Ethernet Device Configuration

- 5. Use the MAC address or the device type, e.g. to identify the device.
- 6. Use the mouse pointer to select the corresponding device from the list of the devices found.
- 7. Click Configure > Set IP Address.



The dialog for setting the IP address will be displayed.

								×
Γ	192	•	168	•	10	•	98	
[	255	•	255	•	255	•	0	
Γ	0	•	0	•	0	•	0	
Cli	ient	ID						~
Γ								
		192   255   0   Client	192 . 255 . 0 .	192       168         255       255         0       0         Client ID	192       168         255       255         0       0         Client ID	192       168       10         255       255       255         0       0       0         Client ID	192       168       10         255       255       255         0       0       0         Client ID	192       168       10       98         255       255       255       0         0       0       0       0       0         Client ID

Figure 30: IP Configuration Dialog

- 8. Select the option Use Static IP Address.
- 9. Enter the IP address and subnet mask.

The entry of the IP address for the standard gateway is optional.

- 10. Uncheck Store settings temporary to set it as permanent.
- 11. Click **OK**.

The device is now accessible via its new IP address.

# 6.2. Use an OPC UA Client

TigoGateway has an integrated OPC UA server, enabling you to communicate with it using an OPC UA client. Communication has 2 levels:

- Read only—anonymous authentication permits read access only.
- Read and write—authentication with a username and password enables read and write access to users who have write permission.

The OPC UA client establishes a connection via the following URL: opc.tcp://IP address:4840

For test purposes, you can use such a client as the UaExpert from Unified Automation GmbH (<u>http://www.unifiedautomation.com</u>).

## 6.2.1. Requirements

- OPC UA client application installed on your local PC
- A username and password that have Admin privileges
- Device IP address



## 6.2.2. Instructions

- 1. Start UaExpert (or your chosen OPC UA client).
- 2. Select **File > New**, and then select **Server > Add**.
- 3. In the Add Server dialog box, type the desired Configuration Name.

Mdd Server	?	×
Configuration Name Test		
Discovery Advanced		_
Endpoint Filter: No Filter		•
Q       Local         Y       Incal Network         >       Microsoft Terminal Services         >       Microsoft Windows Network         >       Web Client Network         Image: Service Discovery       Image: Service Discovery         Image: Service Discovery       Image: Service Discovery	>	
Authentication Settings		
Anonymous		_
Username root	Store	
Password		
Certificate		
Private Key     Connect Automatically		
OK	Car	icel

Figure 31: Add Server Dialog Box (Discovery Tab)

4. In the Advanced tab, set Endpoint Url = opc.tcp://<IP address>:4840.

Add Server ?	×
Configuration Name Test	
Discovery Advanced	
Server Information Endpoint Url opc. tcp://10.11.4.199:4840	
Reverse Connect	-
Security Settings	
Security Policy None 🔻	
Message Security Mode None 🗸	
Authentication Settings	
Username root Store	
Password	-
O Private Key	
Session Settings	
Session Name	]
Connect Automatically	cel

Figure 32: Add Server Dialog Box > Advanced Tab)

- 5. Under Authentication Settings, do the following:
  - If you need write access, select the Username/Password option, and enter the relevant Username and Password (root/password)
  - o If read access only is sufficient, select the **Anonymous** option.



6. Click **OK**.

In the project window, under **Project > Servers**, the UaExpert enters the server, for example, Test.

Open the Context menu of the server (Test) and select Connect.
 The connection starts.

# 6.2.3. Set the Device Date and Time Using OPC UA

## 6.2.3.1. Requirements

- OPC UA client.
- A username and password that have write permission
- NTP Server IP address
- Converted IP address (from NTP server to a decimal number)
- Device is connected

## 6.2.3.2. Examples of an NTP Server

The German Federal Institute of the Physikalisch-Technische Bundesanstalt in Braunschweig has the following NTP servers:

- ptbtime1.ptb.de—IP address 192.53.103.108
- ptbtime2.ptb.de—IP address 192.53.103.104

## 6.2.3.3. Converting an IP Address to a Decimal Number

This section uses one of the above IP Addresses as its example: namely, 192.53.103.108 (belonging to NTP server ptbtime1.ptb.de).

Like most IP addresses, our example is composed of 4 segments, which are separated from each other by a period. To convert an IP address to a decimal number, each segment is inserted into a specific place in the conversion formula below, where the letters A, B, C, D are the placeholders for the 4 segments (in our example, A is the placeholder for 192, B is the placeholder for 53, C is the placeholder for 103, and D is the placeholder for 108).

The conversion formula is: ((A \* 256 + B) \* 256 + C) \* 256 + D = IP address as a decimal number

Inserting an example IP address into the formula gives the following: ((192 \* 256 + 53) \* 256 + 103) \* 256 + 108 = 3224725356

The decimal number in this example IP address is 3224725356.



#### 6.2.3.4. Instructions

1. In the Address Space window, go to Root > Objects > DeviceSet > [Device name] > Configuration > NtpClient > NtpClientUpdateConfiguration.



Figure 33: Path to NtpClientUpdateConfiguration

2. Right-click NtpClientUpdateConfiguration, and then click Call.



Figure 34: Right-Clicking NtpClientUpdateConfiguration

- 3. In the Call NtpClientUpdateConfiguration dialog box, set the following:
  - ServerIpAddress = 3224725356
  - ServerlpAddressFallback = 3224725352

Call NtpClientUpda	teConfiguration on NtpClient		?	×
Input Arguments				
Name	Value	DataType	Descri	ption
ServerIpAddress	3224725356	JInt32		
ServerIpAddressFallback	3224725352	JInt32		
Output Arguments				
Name	Value	DataType	Descri	ption
Status		Int32		
Result				
		Call	Close	2

Figure 35: Call NtpClientUpdateConfiguration Dialog Box-Before Call

4. Click Call.



5. Verify that the Status = **0** and the **Result** = **Succeeded**.

Call NtpClientUpda	teConfiguration on NtpClient		?	×
Input Arguments				
Name	Value	DataType	Descrip	otion
ServerIpAddress	3224725356	UInt32		
ServerIpAddressFallback	3224725352	UInt32		
Output Arguments				
Name	Value	DataType	Descrip	otion
Status	0	Int32		
Result				
Succeeded				
		-		
		Call	Close	:

Figure 36: Call NtpClientUpdateConfiguration Dialog Box-After Call

## 6.2.4. OPC UA configuration for LEDs indications

The following section provides detailed instructions on how to configure OPC UA settings specifically for LED indications, focusing on QSI threshold and IOLW event timeout parameters.

#### 6.2.4.1. QSI Threshold

 To update QSI threshold range In the Address Space window go to Root > Objects > DeviceSet > [Device name] > TigoGatewayLEDsConfig.



Figure 37: Path to TigoGatewayLEDsConfig

2. Modify the **value** column associated with the **QSI\_TH\_High/Low** to set the desired lower and upper limits.

#	Server	Node Id	Display Name	Value	Datatype
1	OPC UA Server	NS7 Numeric 1	QSI_M	162	Byte
2	OPC UA Server	NS7 Numeric 721	QSI_TH_High	254	Byte
3	OPC UA Server	NS7 Numeric 720	QSI_TH_Low	0	Byte

Figure 38: Configuration of QSI Threshold

#### 6.2.4.2. Event Timeout

The event timeout parameter determines the duration for which the **IOLW** LED indication remains yellow when a paired device sends an event and all ports are operational.

To configure the Event Timeout parameter:

- 1. Navigate to the TigoGatewayLEDsConfig (Error! Reference source not found.)
- 2. Select Status\_LED\_Event\_Period





Figure 39: Status\_LED\_Event\_Period

3. Modify the **value** column associated with the **Status\_LED\_Event\_Period** parameter to set the desired duration. (Units are in seconds)

#	Server	Node Id	Display Name	Value	Datatype
1	OPC UA Server	NS7 Numeric 722	Status_LED_Eve	300	UInt32

Figure 40: Configuration of Event Timeout



# 7. Parameters

The TigoGateway is supplied with default parameter values, many of which you can change to suit the needs of your application. Which parameter values you can change depends on which GSDML file and which configuration tool you are using.

After you have changed any parameter value, the PROFINET IO-Controller sends the new value to TigoGateway when starting communication.

Parameter Group	Parameter	Default	Value Range	Description
Wireless IO-Link port parameters (for WT 01–WT 08)	ireless IO-Link Enable port diagnosis ort parameters or WT 01–WT 08)		0: Disable	PROFINET port diagnosis is deactivated: i.e. no diagnostic alarmsare triggered.
			1: Enable	PROFINET port diagnosis is activated.
	Enable process alarm (device notification)	1	0: Disable	PROFINET process alarms are deactivated.
			1: Enable	PROFINET process alarms are activated.
	Enable input fraction	0	0: Disable	Input fraction is deactivated.
			1: Enable	Input fraction is activated.
	Enable pull/plug	1	0: Disable	PROFINET pull/plug alarms are deactivated.
			1: Enable	PROFINET pull/plug alarms are activated.

## Table 21: Port Parameters (When GSDML File = PDCT)

### Table 22: Port Parameters (When GSDML File = Expert)

Parameter Group	Parameter	Default	Value Range	Description
Wireless IO-Link port parameters (for WT 01–WT 08)	Enable port diagnosis	1	0: Disable	PROFINET port diagnosis is deactivated, i.e. no diagnostic alarms are triggered.
			1: Enable	PROFINET port diagnosis is activated.
	Enable process alarm (device notification)	1	0: Disable	PROFINET process alarms are deactivated.
			1: Enable	PROFINET process alarms are activated.
	Configuration source	1	0: PDCT	Configuration is done via a port and device configuration tool.



Parameter Group	Parameter	Default	Value Range	Description
			1: PNIO	Configuration is done via the PROFINET IO-Controller.
	Enable input fraction	0	0: Disable	Input fraction is deactivated.
			1: Enable	Input fraction is activated.
	Enable pull/plug	1	0: Disable	PROFINET pull/plug alarms are deactivated.
			1: Enable	PROFINET pull/plug alarms are activated.
	Port mode (operating mode of IO-Link port)	2	0: Deactivated	The w-port is inactive. Input and output process data is 0.
			1: IO-Link Wireless cyclic	The w-port operates in cyclic mode.
			2: IO-Link Wireless roaming	The w-port operates in roaming mode.
	Validation and backup	No Device check	No Device Check	There is no device check for validation or backup of connected IO-Link devices (default).
			Type Compare, No Backup/Restore	A device check is performed for validation of connected IO-Link devices to the specified device type,without backup/restore.
			Type Compare, Restore Only	A device check is performed for validation or restore of connected IO-Link devices to the specified device type, without backup.
			Type Compare, Backup and Restore	A device check is performed for validation or backup/restore of connected IO-Link devices to the specified device type.
	Port cycle time	0	0 255	For details see Port Cycle Time.
	Vendor ID	0	0 65535	See ioddfinder.io-link.com or the
	Device ID	16777 2 15	0 16777215	documentation of the manufacturer of the connected IO-Link device.
	Slot	0	0 7	Wireless slot number to be used for the port
	Track	0	0 2	Wireless track number to be used for the port

Parameter Group	Parameter	Default	Value Range	Description
	Device TX power	31	1 31	The transmit power level of the IO-Link device
Wireless IO-Link port parameters	Maximum number of transmission retries	8	2 31	Maximum number of retries for a transmission in OPERATE mode
(for WT 01–WT 08)	I-Am-Alive time	3 s	1.664 ms 10 min	For details see <u>I-Am-Alive Time</u>
	Slot type	0	0: Single slot	Slot type is single slot
			1: Double slot	Slot type is double slot
	Low power device	0	0: Disable	The connected IO-Link device is not a low power device.
			1: Enable	The connected IO-Link device is a low power device.
	Max PD segment length	2	1 32	The maximum length of the PDout data allocated to this specific wireless connection.
	Wireless Unique ID of the W-Device Byte 0	0	0 255	Unique ID of the IO-Link W- Device.
	Wireless Unique ID of the W-Device Byte 1	0	0 255	
	Wireless Unique ID of the W-Device Byte 2	0	0 255	
	Wireless Unique ID of the W-Device Byte 3	0	0 255	
	Wireless Unique ID of the W-Device Byte 4	0	0 255	
	Wireless Unique ID of the W-Device Byte 5	0	0 255	
	Wireless Unique ID of the W-Device Byte 6	0	0 255	Unique ID of the IO-Link W- Device (continued).
	Wireless Unique ID of the W-Device Byte 7	0	0 255	
	Wireless Unique ID of the W-Device Byte 8	0	0 255	

### Table 23: Wireless Master Parameters

Parameter Group	Parameter	Default	Value Range	Description
IO-Link Wireless	Master ID	1	1 29	Master identifier
configuration		0	0: disable	The channel cannot be used by the IO-Link Wireless Master

Parameter Group	Parameter	Default	Value Range	Descr	iption
	AHT (Adaptive Hopping Table)		1: enable	The channel can IO-Link Wireless	be used by the Master
	Reconnect	0	0: enable	Reconnection att connection is los	empts when t.
			1: disable	No reconnection connection is los	attempts when t.
	Blacklist	255 255 240	-	List of frequency	channels that
		240 240 240		the W-Master ca communicate wit	nnot use to h W-Devices
		240 240 240		Bitwise coded 1	MHz channels 3-
		255		78 (2403 2478 1 (2401 MHz), 2 (2479 MHz) and cannot beused	3 MHz). Channels (2402 MHz), 79 80 (2480 MHz)
	Deiving time out	<u>г</u>	F C0		
	Pairing timeout	5	5 60	I imeout for pairin	ng in seconds
IO-Link Wireless	Track mode	4	0: Stop	Track is inactive.	
configuration	wireless track)		1: Cyclic	Track is in cyclic cannot perform s operations.	only mode and ervice
			2: Service	Track is in service mode. This is the same as cyclic mode except that the track can perform service operations such as scanning and pairing.	Only 1 track at time can be set to Roaming or Service mode.
			3: Roaming		
			4: Auto		
	TxPower (Transmission power)	31	1 31	The maximum al thetransmission by theIO-Link Wi	lowable value for power is selected reless Master.

# 7.1. Port Cycle Time

The Port Cycle Time parameter sets up the cycle time of a W-Port of the TigoGateway. The cycle time is encoded using **Time Base** values (bits 6+7) and **Multiplier** values (bits 0-5), as shown in the following table.

#### Table 24: Port Cycle Time Calculation

Value Range	Time Base (Bits 6+7)	Multiplier (Bits 0-5)	Resulting Cycle Time/Notes
0	0	0	Free-running mode.

1 64	00	1 63	If the free-running mode is chosen with a time base of 0, the TigoGatewaystack will automatically configure the master cycle time to be the minimum master cycle time based on the PD Segmentation length, Slot Type, and Max Retry configurations.
65 127	01: 5ms	1 63	5 315 ms (Time Base * Multiplier) For TigoBridge the minimum possible transmission time is 5 ms
128 255	1011: reserved	1 63	Reserved. Do not use.

# 7.2. I-Am-Alive Time

The **I-Am-Alive Time** parameter controls TigoGateway and W-Device communication if no other messages are transmitted. The W-Device must send **I-Am-Alive** messages to the TigoGateway before timeout, otherwise the TigoGateway reports a communication error (**ComLost**).

The **I-Am-Alive Time** parameter comprises a **Time Base** and **Multiplier**, and is calculated by multiplying them by each other.

The table below shows the coding of the time base.

#### Table 25: Time Base of I-Am-Alive Time

Value	Time Base	Description
0	Reserved	Reserved. Do not use.
1	1.664 ms	Time base is 1.664 ms
2	5 ms	Time base is 10 ms
3	1 sec	Time base is 1 sec
4	1 min	Time base is 1 min
5 255	Reserved	Reserved. Do not use.

The multiplier has the value range of 1 ... 255.



The I-Am-Alive Time parameter (Multiplier \* Time Base) is calculated as shown in the following table:

Multiplier (Bits 8-15)	Time Base (Bits 0-7)	Calculated I-Am-Alive Time	Value
1	1: 1.664 ms	1.664 ms	257
	2: 5 ms	5 ms	258
	3: 1 sec	1 sec	259
	4: 1 min	1 min	260
2	1: 1.664 ms	3.328 ms	513
	2: 5 ms	10 ms	514
	3: 1 sec	2 sec	515
	4: 1 min	2 min	516
3	1: 1.664 ms	4.992 ms	769
	2: 5 ms	15 ms	770
	3: 1 sec	3 sec	771
	4: 1 min	3 min	772
4 254	1 4	Multiplier * Time base	Value of Multiplier * 256 + value of Time base
255	1: 1.664 ms	424.32 ms	65281
	2: 5 ms	1275 ms	65282
	3: 1 sec	255 s	65283
	4: 1 min	255 min (10 min is used)	65284

#### Table 26: Calculation of I-Am-Alive Time

The TigoGateway verifies the calculated **I-Am-Alive Time** with the following limits:

- Minimum I-Am-Alive Time = W-Sub-cycle duration [ms] \* (MaxRetry + 1)
- Maximum I-Am-Alive Time = 10 minutes

# 7.3. Unique ID Parameters: Example

If the unique ID of the TigoBridge is 03:F3:00:00:01:30:C0:45:CF, then the **Unique ID** parameters are set as follows:

- Byte 1 = CF
- Byte 2 = 45
- Byte 3 = C0
- Byte 4 = 30
- Byte 5 = 01
- Byte 6 = 00
- Byte 7 = 00
- Byte 8 = F3
- Byte 9 = 03



# 8. Status and Diagnostics

# 8.1. TigoGateway

See also <u>LED indications</u>.

# 8.2. IO-Link Diagnosis

## 8.2.1. Event Qualifier

The event qualifier is bit-coded information about the event.

	Mode	Т	ype	Source		Instance	
Bit	7 Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

#### Figure 41: Event Qualifier

### Table 27: Event Qualifier

Bit	Name	Description
Bit 6–7	Mode	0: Reserved
		1: Event single shot
		2: Event disappears
		3: Event appears
Bit 4–5	Туре	0: Reserved
		1: Notification
		2: Warning
		3: Error
Bit 3	Source	0: Device (remote)
		1: Master/Port
Bit 0–2	Instance	0: Unknown
		1–3: Reserved
		4: Application
		5–7: Reserved

# 8.2.2. IO-Link Wireless Master Event Codes

#### **Event Code** Description Туре Remedy 0x0000 No malfunction Notification No action required 0xFF21 Communication to Wireless Device Event No action required (IO-Link Device is connected to Bridge) 0xFF22 Communication loss to IO-Link Device Error Check connection from IO-Link (IO-Link Device is disconnected from Device to the TigoBridge TigoBridge) 0xFFB1 If the PER is too high, check Max Retry error, indicating a packet loss Error the system configuration The W-Master cannot create a message (ranges, operating channels, to the W-Device after MaxRetry attempts. etc.). This error indicates that one packet failed to be transmitted successfully. This can be, for example, the result of a noisy environment (RF-wise). It affects the PER of the system. 0xFFB2 IMA timeout Check connection from IO-Link Error Device to TigoBridge The W-Master did not receive a message from the connected W-Device within the IMA timeout. This error indicates that the IOLW connection failed. Possibly this leads to Communication Loss 0xFF22.

Table 28: Master Event Codes

# 8.2.3. IO-Link Device Event Codes (Common)

The following table lists standard IO-Link Device Event Codes. For device-specific Event Codes or remedies, use the manual of the relevant IO-Link Device.

Event Code	Description	Туре	Remedy (Common)
0x0000	No malfunction	Notification	No action required
0x1000	General malfunction (unknown error)	Error	See manual of the relevant IO-LinkDevice
0x1800 – 0x18FF	Vendor-specific	-	See manual of the relevant IO-LinkDevice
0x4000	Temperature fault – overload	Error	Check temperature, find source of overload
0x4210	Device temperature overrun	Warning	Clear source of heat
0x4220	Device temperature underrun	Warning	Insulate IO-Link Device
0x5000	Device hardware fault	Error	Exchange IO-Link Device
0x5010	Component malfunction	Error	Repair or exchange

#### Table 29: IO-Link Device Event Codes



Event Code	Description	Туре	Remedy (Common)
0x5011	Non-volatile memory loss	Error	Check batteries
0x5012	Batteries low	Warning	Exchange batteries
0x5013	HMI button pressed	Notification	No action required
0x5100	General power supply fault	Error	Check availability of power supply
0x5101	Fuse blown/open	Error	Exchange fuse
0x5110	Primary supply voltage overrun	Warning	Check tolerance of 1L+ voltage
0x5111	Primary supply voltage underrun	Warning	Check tolerance of 1L+ voltage
0x5112	Secondary supply voltage fault (Port Class B)	Warning	Check tolerance of 1L+ voltage
0x6000	Device software fault	Error	Check firmware revision
0x6320	Parameter error	Error	Check data sheet and values
0x6321	Parameter missing	Error	Check data sheet
0x6350	Parameter changed	Error	Check configuration
0x7700	Wire break of a subordinate device	Error	Check installation
0x7701 – 0x770F	Wire break of subordinate device 1–device 15	Error	Check installation
0x7710	Short circuit	Error	Check installation
0x7711	Ground fault	Error	Check installation
0x8C00	Technology-specific application fault	Error	Reset Device
0x8C01	Simulation active	Warning	Check operational mode
0x8C10	Process variable range overrun – Process Data uncertain	Warning	Check configuration of device
0x8C20	Measurement range exceeded	Error	Check application
0x8C30	Process variable range underrun – Process Data uncertain	Warning	Check configuration of device
0x8C40	Maintenance required	Warning	Clean
0x8C41	Maintenance required	Warning	Refill
0x8C42	Maintenance required	Warning	Exchange wear and tear parts
0x8CA0 – 0x8DFF	Vendor-specific	-	See manual of the relevant IO-LinkDevice
0xB000 – 0xB0FF	Safety extensions	-	See manual of the relevant IO-LinkDevice
0xB100 – 0xBFFF	Profile-specific	-	See manual of the relevant IO-LinkDevice



Event Code	Description	Туре	Remedy (Common)
0xFF91	Internal Data Storage upload request	Notification (single shot)	See manual of the relevant IO-LinkDevice
0xFFB9	Retry error	Error	See manual of the relevant IO-LinkDevice
Any other code	Reserved	-	See manual of the relevant IO-LinkDevice

# 9. Technical Data

# 9.1. TigoGateway 1TE Specifications

The table below describes the TigoGateway functionality.

## Table 30: TigoGateway Functionality

Parameter	Specifications		
Mechanical			
Dimensions	25mm X 105mm X 80mm		
Mounting	DIN rail		
Processors			
NXP IMX8 Arm A53	Application processor up to 1.5Ghz speed		
NetX90	Industrial Ethernet Connectivity Processor		
Interface			
Industrial Ethernat	PROFINET		
	2 x RJ45 – OT Ports (PLC or similar)		
LAN RJ45	2 x RJ45 IT Ports (cloud or similar)		
Electrical Data			
Input Operating Voltage	24V DC [*]		
Radio			
TigoMaster SOM	1 Track (up to 8 IO-Link Wireless devices)		
Frequency Range	Unlicensed 2401-2480 MHz ISM band		
Communication			
IO-Link Wireless			
MQTT			
OPC UA			
Security			
TLS			
Antenna			
SMA Connector			
Certifications/ Compliance			
CE	<ul> <li>ETSI EN 301489-1,17</li> <li>ETSI EN 300328</li> <li>EN 62479</li> <li>EN IEC 61326-1</li> <li>EN IEC 61000-3-2</li> <li>EN IEC 61000-3-3 EN 55032, 55035</li> </ul>		
FCC	Contains 2ATSM-TGRFCM1		
UL	UL 61010-1-2		



Parameter	Specifications	
ISED	<ul> <li>IC: 26463-TIGOGW</li> <li>ICES-003 Issue 7</li> <li>RSS-247 Issue 2</li> <li>RSS-Gen Issue 5</li> <li>IC RF Exposure Report</li> </ul>	
Reach	Certified	
RoHS	Certified	
Ingress Protection		
IP 20		
Operating Environment		
Operating Temperature	0°C to +55°C	
Maximum Temperature Gradient	3K per min	
Storage Temperature	-40°C to 85°C	
Operating Altitude	up to 2000m	
Humidity	5 to 95% RH	
Pollution	Degree 2	

[\*] The TigoGateway's products family should be supplied from a limited, Class 2, power supply or via an overcurrent protective device (fuse, breaker, etc.) rated 4A max., or less.

# 9.2. Protocol

## Table 32: Protocol Technical Data

Feature	Description
Maximum number of cyclic input data	1024 bytes
Maximum number of cyclic output data	1024 bytes
Acyclic communication (CoE)	SDO
	SDO Master-Slave
	SDO Slave-Slave (depending on master capability)
Туре	Complex Slave
Supported protocols	SDO client and server side protocol CoE Emergency messages (CoE) Ethernet over PROFINET (EoE)
	File Access over PROFINET (FoE)
Supported state machine	ESM (PROFINET State Machine)
Supported of synchronization modes	Freerun: the application of the slave is not synchronized to PROFINET.
	Synchronous with SYNCMAN Event: the application of the slave issynchronized to the SM2/3 Event
	Synchronous with SYNC Event: the application of the slave is synchronized to the SYNC0 or SYNC1 Event


Feature	Description
Supported features	PDI watchdog
	PROFINET mailbox handling
	PROFINET state machine handling
	Master-to-slave SDO communication
	Slave-to-slave SDO communication
	Integrated CoE object dictionary (ODV3)
	Ethernet over PROFINET (EoE) handling
	File Access over PROFINET (FoE) server
Number of FMMU channels	8
Number of Sync Manager channels	4
Distributed Clocks (DC)	Supported with 32-bit timestamps and isochronous PDI functionality(Sync0, Sync1)
Ethernet interface	Two Ethernet Interfaces 100BASE-TX
	Integrated Dual-PHY (supports Auto-Negotiation and Auto- Crossover)
Data transport layer	Ethernet II, IEEE 802.3
Restrictions	PROFINET Slave stack
	AoE application interface not available
	FoE for firmware upload is supported, but application interface is not available
	ESC - PROFINET Slave Controller
	No DC Latch functionality
	No support of bit-wise FMMU mapping (Exception: Fill Status of Transmit Mailbox)
	Restricted DC Sync signal generation
	No Single-Shot Mode support
	No Acknowledge Mode support
	Restricted DC Control Functionality
	No adjustment of Register Speed Counter Start (0x0930:0x931)
	No showing of Register Speed Counter Diff (0x0932:0x933)
	No MIO (PHY Management Interface) access from PROFINET Master side
	No physical Read-Write commands supported (APRW, FPRW, BRW)
Reference to stack version	V5.1



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**8. Content**. Company shall be solely responsible for any content and data used or optimized by Company by means of the Product.

UNDER NO CIRCUMSTANCES WHATSOEVER WILL CORETIGO BE LIABLE IN ANY WAY FOR ANY CONTENT AND/OR DATA INCLUDING, WITHOUT LIMITATION, FOR ANY ERRORS OR OMISSIONS IN ANY CONTENT AND/OR DATA, OR FOR ANY INFRINGEMENT OF THIRD PARTY'S RIGHT, LOSS OR DAMAGE OF ANY KIND INCURRED AS A RESULT OF THE USE OF THE CONTENT, DATA AND/OR THE PRODUCT.

**9. Support**. During the Evaluation Period, CoreTigo shall make reasonable efforts to provide Company assistance via telephone, facsimile or email to answer any questions or concerns relating to the Product. Such assistance shall be provided at no charge to Company.

## 10. Warranty Disclaimer.

COMPANY ACKNOWLEDGES THAT THE PRODUCT IS PROVIDED "AS IS", AND CORETIGO DISCLAIMS ANY AND ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY OF NON-INFRINGEMENT OF THIRD PARTIES' RIGHTS, INCLUDING INTELLECTUAL PROPERTY RIGHTS.

**11. High Risk Activities**. Company hereby acknowledges that the Product is not fault tolerant and is not designed, manufactured or intended for use or resale as on-line control equipment in hazardous or high risk environments and activities requiring fail-safe performance (such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines.

and/or devices, or weapons systems), in which the failure of the Product could lead directly to death, personal injury or severe physical or environmental damage, and Company hereby agrees not to use or allow the use of the Product or any portion thereof for, or in connection with, any such environment or activity.

## **12.** Limitation of Liability.

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, CORETIGO, ITS OFFICERS, DIRECTORS AND/OR EMPLOYEES, SHALL NOT BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY PERFORMANCE OF THIS AGREEMENT OR IN



FURTHERANCE OF THE PROVISIONS OR OBJECTIVES OF THIS AGREEMENT, INCLUDING BUT NOT LIMITED TO FOR ANY LOSS OR DAMAGE TO BUSINESS EARNINGS, LOST PROFITS OR GOODWILL, LOST OR DAMAGED DATA OR DOCUMENTATION, AND COSTS OF PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES SUFFERED BY COMPANY AND/OR ANY ENTITY AND/OR PERSON ARISING FROM AND/OR RELATED/CONNECTED TO ANY USE OF THE PRODUCT, EVEN IF CORETIGO IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. COMPANY'S SOLE RECOURSE IN THE EVENT OF ANY DISSATISFACTION WITH THE PRODUCT IS TO STOP USING IT AND RETURN IT TO CORETIGO. IN ANY EVENT, CORETIGO'S LIABILITY UNDER THIS AGREEMENT SHALL NOT EXCEED THE AMOUNTS ACTUALLY RECEIVED BY CORETIGO HEREUNDER.

**13. Indemnification**. Company hereby agrees that CoreTigo shall have no liability whatsoever for any use made of the Product by Company or any third party. Company hereby agrees to defend, indemnify and hold harmless CoreTigo and its affiliates and their respective officers, directors and employees, from any and all claims, damages, liabilities, costs and expenses (including reasonable attorney's fees) arising from claims related to Company's use of the Product, as well as from Company's failure to comply with the terms of this Agreement.

14. Third Party and Open Source Software. The Product contains software provided by third parties, and such third parties' software is provided "AS IS" without any warranty of any kind, and subject to the license terms attached to such third party software, the provisions of this Agreement shall apply to all such third party software providers and third party software as if they were CoreTigo and the Product respectively. In addition, this Product contains open source components. Such open source components are protected under copyright law and are licensed to under specific license terms. Please see the license.txt file included in the Product and available for Company upon request for the applicable license terms of the open source components.

**15. Confidentiality**. All information disclosed by either party ("Disclosing Party") to the other party ("Receiving Party"), prior to or during the Evaluation Period, whether in writing, orally or in any other form which is not in the public domain ("Confidential Information"), shall be held in absolute confidence, and Receiving Party shall take all reasonable and necessary safeguards (affording the Confidential

Information at least the same level of protection that it affords its own information of similar importance) to prevent the disclosure of such Confidential Information to third parties. In addition, Receiving Party will limit its disclosure of the Confidential Information to employees and consultants with a "need to know" and only in the context of such employees' and consultants' fulfillment of their duties under this Agreement, and further provided that such employees and consultants are engaged in a confidentiality agreement with the Receiving Party with terms and conditions similar to the confidentiality terms under this Agreement and that Receiving Party shall remain liable for any breach of the terms herein by any of its employees and consultants. The provisions of this paragraph shall survive termination or expiration of this Agreement, for any reason whatsoever.

It is agreed that the following shall not be considered Confidential Information: (i) information that is already known to the Receiving Party at the time of disclosure, as such may be evidenced in the Receiving Party's written records; (ii) information that is or becomes known to the general public through no act or omission of the Receiving Party in breach of this Agreement; (iii) information that is disclosed to the Receiving Party by a third party who is not in breach of an obligation of confidentiality; or (iv) information that was or is independently developed by the Receiving Party without use of any of the Confidential Information, as such may be evidenced in the Receiving Party's written records.

It is further agreed that the Receiving Party may disclose any information pursuant to a court order, provided the Receiving Party notifies the Disclosing Party of such order and uses reasonable efforts to limit such disclosure only to the extent required. For avoidance of doubt, the source code of the Product constitutes Confidential Information of CoreTigo.

**16. Injunctive Relief**. Each party agrees that the wrongful disclosure of Confidential Information may cause irreparable injury that is inadequately compensable in monetary damages. Accordingly, and notwithstanding Section 18 below, either party may seek injunctive relief in any court of competent jurisdiction for the breach or threatened breach of this Section in addition to any other remedies in law or equity.

## 17. Term and Termination.

17.1. This Agreement shall become valid on the Effective Date and shall remain in effect until completion of the Evaluation Period, unless earlier terminated as provided below.



17.2. Either party shall have the right to terminate this Agreement upon 7 days' prior written notice to the other party.

17.3. The license granted for the Evaluation shall terminate immediately upon written notice from CoreTigo in the event of Company's use of the Product for purposes other than the Evaluation and/or any other failure of Company to comply with any provision of this Agreement.

17.4. Upon the earlier of expiration or termination of this Agreement: (i) the license granted hereunder shall immediately terminate; (ii) Company shall return or, at Company's request, the Product and all of CoreTigo's Confidential Information to CoreTigo and shall destroy all copies of the Product contained in any of its systems, and (iii) CoreTigo shall erase or otherwise destroy all copies of the Company's Confidential Information, which was disclosed to CoreTigo under this Agreement. Upon request of either party, the other party shall certify in writing to the other its compliance with the terms of this Section 17.4.

17.5. Without derogating from any of the terms set forth above, Company further agrees that following the expiration or termination of this Agreement it shall not make any commercial use whatsoever of the content optimized by using the Product.

**18. General**. If any provision, or part thereof, of this Agreement is held to be unenforceable for any reason, such provision shall be reformed only to the extent necessary to make it enforceable and such reform shall not affect the enforceability of such provision under other circumstances, or of the remaining provisions hereof under all circumstances. This Agreement shall be governed by and construed in accordance with the laws of the State of Israel and only the competent courts of Tel Aviv-Jaffa shall have jurisdiction over any dispute arising from this Agreement.

The following Sections shall survive termination of this Agreement: 4, 6, 7, 8, 10, 11, 13, 15, 16, 17.3, 17.4, 17.5, 18.

Company shall not assign and/or subcontract any of its rights and obligations under this Agreement, except with CoreTigo's prior written consent. CoreTigo may assign any of its rights and/or obligations hereunder at its sole discretion.

The parties have read this Agreement, and agree to be bound by its terms, and further agree that it constitutes the complete and entire agreement of the parties and supersedes all previous communications between them, oral or written, relating to the subject matter hereof. No representations or statements of any kind made by either party that are not expressly stated herein shall be binding on such party. Either party may use its standard business forms (such as purchase orders) or other communications to administer transactions under this Agreement but use of such forms is for the parties' convenience only and does not alter the provisions of this Agreement. Any terms or conditions that are preprinted in such forms or that are included in a quotation and/or order acknowledgement are null, void, and of no effect. A waiver of any provision will not constitute a continuing waiver of such provision or a waiver of any other provision. Failure by either party to demand performance or claim a breach of this Agreement will not constitute a waiver or otherwise affect the rights of such party.

This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one in the same instrument.