



SIG

VPN Server - Router - Firewall

USER GUIDE

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DECLARATION OF CONFORMITY

eks Engel FOS GmbH & Co. KG hereby declares under sole responsibility that the listed devices conform to

- the Radio Equipment Directive (RED) 2014/53/UE,
- the Restriction of the use of certain Hazardous Substances (RoHS) Directive 2011/65/UE.

Type of device: VPN Server

Models:

SIG-E-400, SIG-A-400, SIG-EC-400

The harmonized standards to which these devices comply are:

Standard	Title
EN 61000-6-2 2006	Immunity: EN61000-4-2 Electrostatic Discharge EN61000-4-3 RF Radiated Immunity EN61000-4-4 EFT/Burst Immunity EN61000-4-5 Surge Immunity EN61000-4-6 RF Conducted Immunity EN61000-4-8 Power Frequency Magnetic Field Immunity
EN 61000-6-4 2007 A1/2011	Emission: EN55022 Radiated and conducted emission
EN 301 489-1 V1.9.2 EN 301 489-3 V1.6.1 EN 301 489-7 V1.3.1 EN 301 489-17 V2.2.1 EN 301 489-24 V1.5.1	Radio - EMC
EN 301 511 V9.0.2 EN 301 908-1 V6.2.1 EN 301 908-2 V6.2.1 EN 300 328 V1.9.1 EN 301893 V1.8.1	Radio - Spectrum
EN 60950-1/A2 2014 EN 62311 2008	Safety and Health

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OVERVIEW

1 Purpose of this manual

The present user guide describes the features and the installation of the SIG hardware version which is an Industrial VPN Server. The commissioning of the virtual VPN server version is described in another document.

In the rest of the document the term "SIG" is used to designate the product.

2 Products Identification

This family of Industrial VPN Server consists of these models:
SIG-E-400, SIG-A-400, SIG-EC-100

The main features are summarized below:

Models			
SIG-	E-400	A-400	EC-400
WAN Ethernet	•		•
WAN ADSL		•	
WAN Cellular (-HG, -HW : 3G+, -LE : 4G)			•
LAN Ethernet 10-100 Mb/s	4	4	4
USB	•	•	•
Link redundancy			•
Power supply VAC	110-230	110-230	110-230
2 SIM card reader			•

OVERVIEW

3 Specifications

General characteristics	
Dimensions	With feet: 50 X 220 X 220 mm (h, l, p) Without foot: 44 X 220 X 220 mm (h, l, p)
Weight	Max 0.65 kg
Casing	Metallic IP20 – IEC60529
Temperature	Non-operating: -40°/ + 85°C Operating: -20°/ + 60°C (fanless)
Humidity	10 to 95 % relative (non-condensing)
Power supply	110 to 230 VAC
Consumption	SIG-E : 2W SIG-A, SIG-C et SIG-EC : 5W
EMC	Immunity EN61000-6-2: EN61000-4-2 : ESD : 4 kV contact – 8kV air EN61000-4-3 : RF - radiated: 10V/m < 2 GHz EN61000-4-4 : Burst EN61000-4-5 : Surge : 4KV line / earth EN61000-4-6 : RF - conducted EN61000-4-8 : Magnetic fields Emission EN61000-6-4: EN 55022: RF - conducted and radiate
Electrical safety	EN 60950-1
Hazardous substances	2011/65/UE (RoHS) REACH

WAN network	
Ethernet	RJ45 Auto : 10/100 full & half duplex MDI/MDI-X
ADSL	ADSL2+ and RE-ADSL ITU G992.5 (ADSL2+ and Reach Extended ADSL) Max data rate : UL : 1 Mbps, DL : 24 Mbps PPPoE : PPP over Ethernet PPPoA : PPP over ATM EoA : Ethernet over ATM RFC2684 Bridged IPoA : Routed IP over ATM, RFC2684 Routed
4G/3G+	-LE : 4G LTE Europe LTE bands: B1, B2, B3, B4, B5, B7, B8, B20 UMTS bands: B1, B2, B5, B8 GSM bands: 850/900/1800/1900 -CH : 4G LTE China LTE bands: B1, B3, B8, B38, B39, B40, B41 UMTS bands: B1, B5, B8, B9 GSM bands: 900/1800 -HG : 3G+ HSPA worldwide (except. North America) UMTS bands: B1, B2, B5, B8 GSM bands: 850/900/1800/1900 -HW : 3G+ HSPA worldwide UMTS bands: B1, B2, B4, B5, B6, B8, B19 GSM bands: 850/900/1800/1900 Max data rate 4G: UL @ 50 Mbps and DL @ 100Mbps Max data rate 3G+: UL @ 5,7 Mbps and DL @ 21 Mbps Max data rate 2G: UL @ 237 Kbps and DL @ 237 Kbps Antenna connector female SMA

LAN network	
Ethernet	RJ45 : 4 ports Auto : 10/100 full & half duplex MDI/MDI-X

Routing / @IP /	
IP Routing	Routing tables Static routes RIP or OSPF Address translation (DNAT, SNAT, NAT 1:1)
IP@ assignment	WAN interface: DHCP client or fixed IP LAN interface: DHCP server
DNS	WAN interface: compatible with DYNDNS, No-IP or ETIC DNS LAN interface: relay & server
Redundancy	VRRP RFC 3768 protocol Multi WAN for backup on some SIG models

OVERVIEW

Security	
VPN tunnel	OpenVPN (TLS/SSL), IPSEC, L2TP/IPSEC, PPTP Shared key or X509 certificate Encryption 3DES & AES 128-192-256 Authentication: MD5 & SHA-1 Up to 100 VPN tunnels (mix OpenVPN IPSEC allowed)
Firewall	Stateful packet inspection (SPI: 50 rules) IP@ and ports filtering
Remote access	Up to 25 remote users RAS access: Login & Password and Certificate (optional) Customizable LAN machine network access rights
Log	Timestamped Events: connection, restart, alarms

Divers	
SNMP	Supported MIBs: RFC1213-MIB (MIB-2) ADSL-LINE-MIB SNMP traps
Configuration	Web server
Management	Save and restore configurations Reset product to return to factory configuration

4 Product overview

The SIG is both a VPN server, a router, a firewall and a remote access server for industrial applications.

It is designed to connect industrial machines on an intranet or the Internet with a high level of security.

It provides depending on model:

- SIG-E : A WAN Ethernet interface
- SIG-A : An ADSL modem
- SIG-EC : A WAN Ethernet interface and a 3G/4G cellular modem

4.1 Applications

High security remote control system up to 100 sites

The SIG connects up to 100 sites using VPNs with a high level of security.

High availability

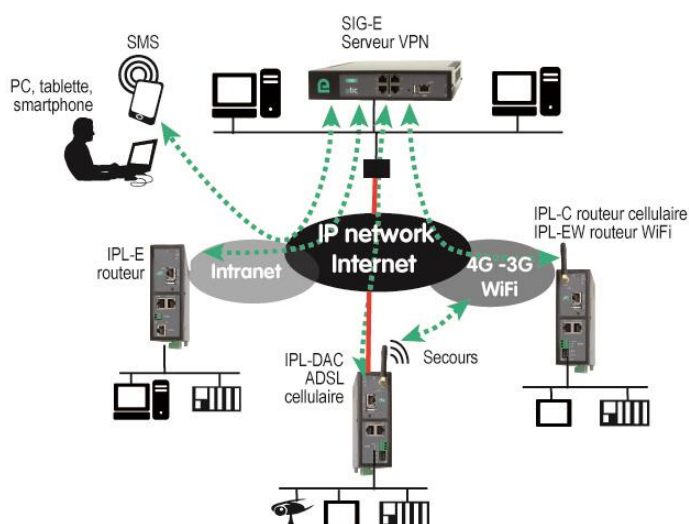
The SIG manages backup links. For example, a remote site equipped with an ADSL router with 3G backup. In case of failure of the ADSL line, the VPN will be restored by the cellular network.

In addition, 2 SIG can work in redundancy mode. In case of failure of the first one, the second SIG will take over automatically.

Remote access server for remote operation

A remote user can connect to any device in the system using a PC, tablet or a smartphone. His access rights may be limited according to his identity.

Traffic filtering (Firewall)



OVERVIEW

4.2 Main functions

IPSec VPN and OpenVPN VPN for safety

VPN connection guarantees a high level of performance and security:

Transparency: The VPN interconnects the two networks so that any machine in one network can communicate with a machine on the other network.

Authentication: The router that establishes the VPN is authenticated by the one that accepts it and any other connection is rejected.

Confidentiality: Data traffic via the VPN is encrypted.

The SIG allows the simultaneous establishment of IPSec and OpenVPN tunnels (100 in total).

Although the SIG is designed to perform the VPNs concentrator function (also known as VPN server), it can either behave as a server or as a VPN client.

The SIG provides 4 independant OpenVPN servers. Each of these OpenVPN servers can be set differently to meet the technical requirements (key refresh period, type of encryption ...).

The IPSec setting can be different for each VPN.

These different characteristics make it possible to accept OpenVPNs or IPSec VPNs originating from routers of different manufacturers and also to take into account backup paths in order to build high availability remote control systems.

Remote access server for PCs, tablets and smartphones

The SIG can also behave like a remote access server.

If he is registered in the user list, a remote user can access to particular devices of a machine network depending on his identity.

The new HTTPS portal make possible to access easily and safely to HMIs or PLCs web servers using a tablet, a PC or a smartphone.

IP router

The SIG provides powerful, flexible and comprehensive solutions to route IP packets from one network to other networks :

- Static routes, to reach nested networks,
- Network address translation d'adresse (NAT, DNAT, port forwarding),
- Routing protocol (RIP),
- Domain name management DNS et DynDNS.

Firewall

The firewall protects against the sophisticated attacks coming from the Internet.

It is also able to filter IP frames between the WAN interface or any VPN interface on one hand, and the LAN interface on the other hand.

VRRP redundancy

VRRP makes possible to use two routers shaping a redundant solution.

Automatic backup of a private VPN network over the cellular network

The SIG-EC provides a WAN Ethernet interface and a cellular interface. It is designed for critical industrial remote SCADA systems.

In normal situation the data are transmitted via the main interface (usually the WAN Ethernet).

In case of a failure the data are transmitted via the backup interface (usually the cellular one).

SNMP

The SIG is an SNMP agent; it complies with the MIB2 standard and transmits an SNMP trap when configurable events occur.

DNS

DNS makes it possible to assign Internet names to devices or organizations independently of their public IP address.

The SIG behaves like a DNS server for the devices connected to the LAN.

DHCP server

On the LAN interface, the SIG can behave like a DHCP server.

Configuration

The SIG is configured using an HTML browser (HTTP or HTTPS).

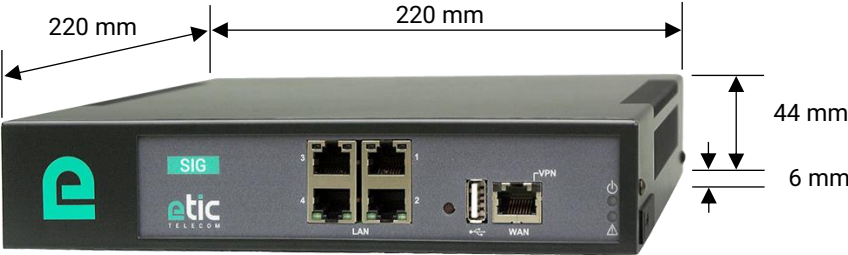
EticFinder

The ETICFinder software can easily detect all ETIC branded products connected to an Ethernet network to display their MAC address and their IP address.

INSTALLATION

1 Description

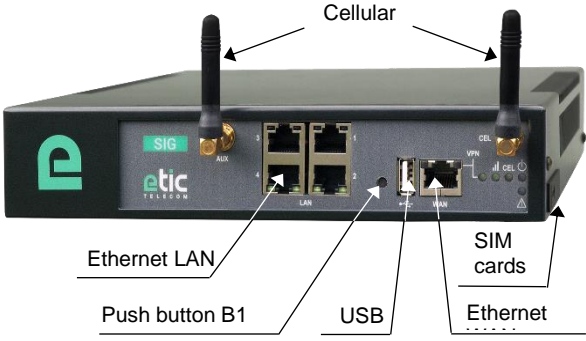
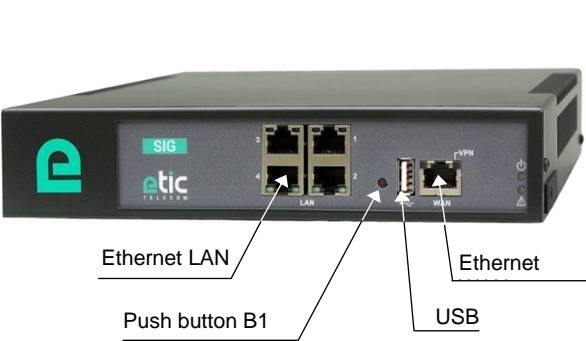
1.1 Dimensions



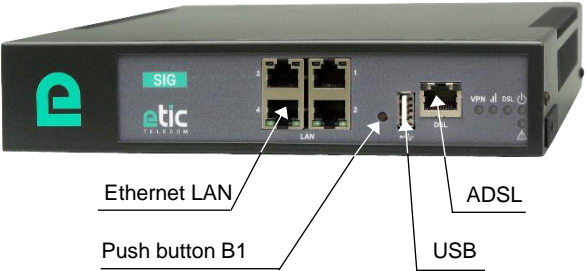
1.2 Front panel

SIG-E-400

SIG-EC-400

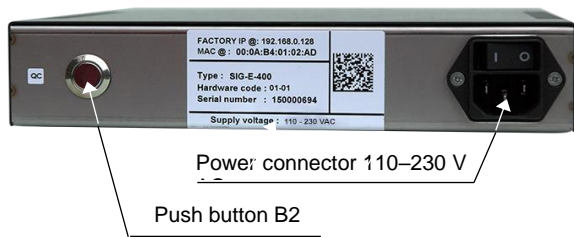


SIG-A-400



INSTALLATION

1.3 Rear panel




1.4 Connectors


Ethernet RJ45 connector			
Position	Signal	Function	RJ45
1	Tx +	Emission polarity +	
2	Tx -	Emission polarity -	
3	Rx +	Reception polarity +	
4	N.C.	-	
5	N.C.	-	
6	Rx -	Reception polarity -	
7	N.C.	-	
8	N.C.	-	

SIG-EC-400 Antenna connectors			
Antenna	Network	Type	Observation
CEL	Cellular	SMA female	3G et 4G
AUX	Cellular	SMA female	To improve the 4G transmission data rate, 2 antennas can be connected.

SIG-A-400 ADSL RJ45 connector			
Position	Signal	Function	RJ45
1	N.C.	-	
2	N.C.	-	
3	N.C.	-	
4	TIP	ADSL line	
5	RING	ADSL line	
6	N.C.	-	
7	N.C.	-	
8	N.C.	-	





1.5 Push-buttons

Front panel push-button B1		
Pressing the PB	LED 	Function
10 seconds	5 flashes	The hotline of ETICTELECOM is authorized to connect remotely to the router administration server within 1 hour delay.

Rear panel push-button B2		
Pressing the PB	LED 	Function
During operation	Flashing red	Temporary return to the factory configuration. (IP address 192.168.0.128) The current configuration is not lost.
During power-up	Flashing red	Return to the factory configuration. The current configuration is deleted except if it has been saved into a file.

INSTALLATION

1.6 LED indicators

LED indicators Depending on models			
Function	LED	Description	
Operation		Off Steady green Slow blinking green Steady red Fast blinking red	Power off The unit is ready The unit is busy Startup (30s) – Hardware or software failure or SIM card missing or memory flash drive missing Firmware download in progress
Application alarm		Reserved	
ADSL connection	DSL	Off Flashing 4 s Slow blinking 2 s Fast blinking 0,5 s Steady green	ADSL interface disabled ADSL signal not detected / Line not connected Connection in progress 1 st step (adsl) Connection in progress 2 nd step (password and @ IP) Connected / Brief flashing when traffic on link
ADSL signal quality		Off 1 flash 2 flashes 3 flashes	No signal measured Not sufficient signal Sufficient signal Strong signal
Cellular connection	CEL	Off Flashing every 4 s Blinking slowly - 2 s Blinking fast - 0,5 s Steady green	SIM card missing - wrong PIN code – Cellular interface disable Interface enable - not connected Connection in progress (first step) Connection in progress (password and IP@) Connected / Brief flashing when traffic on link
Cellular signal quality		Off 1 flash 2 flashes 3 flashes	No signal measured Not sufficient signal Sufficient signal Strong signal
VPN connexion	VPN	Off Blinking slowly - 2 s Steady green	No VPN connection in progress Connection in progress At least one VPN is established
Ethernet WAN	Left LED	Off Green	Not connected or interface disable Connected / Brief flashing when traffic on link
Ethernet LAN x 4	Left LED	Off Green	Not connected or interface disable Connected / Brief flashing when traffic on link

2 Safety instructions

The product shall be installed in a fire electrical resistant cabinet by a qualified operator.

The product shall be connected only to equipment that complies with the IEC60950-1 or IEC62368-1 standards and that meets the following classifications:

- IEC60950-1 : Limited power circuits and SELV type – §2.2 and 2.5
- IEC62368-1 : ES1 & PS2



To avoid any risk of burns, it is strongly recommended to wear gloves to handle the product in operation when the ambient temperature exceeds 30 °C.

Cellular models:

- The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body.
- The antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

3 Cooling

The product is designed to be mounted into a server cabinet.

To avoid obstructing the airflow around the unit, the spacing must be at least 25 mm above and below, and 10 mm left and right.

4 Earthing

For safety and EMC reasons, the product must be connected to the protective earth of the installation by its power cord.

INSTALLATION

5 Connecting to the ADSL line

Line length / signal level :

The SIG-A can be connected to an analogue line telephone line or an unbundled loop when the attenuation of the reception signal is better than 63 dB

When the reception level is close to the limit, disconnections may occur.

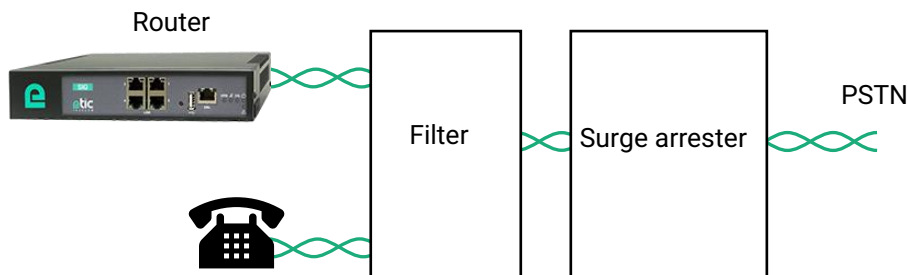
In that situation, we recommend to ask to the ISP to setup the line with the RE-ADSL modulation which is suited for long line and weak signal.

ADSL filter :

If the line must be used for analogue voice transmission simultaneously with ADSL transmission, it is necessary to connect an ADSL filter.

Surge arrester :

The ADSL board of the SIG-A is protected very carefully against over voltage coming from the line. However, when the line is exposed to lightning, we recommend to connect a surge arrester between the line and the SIG.



IP address :

The IP address assigned by the ISP to the ADSL interface of the SIG can be a fixed or a dynamic public IP address.

If it is dynamic, it changes frequently; for instance at each ADSL connection.

It is why, the router which owns a dynamic IP address can only initiate the communication (initiate a VPN for instance) towards a router owning a fixed IP address.

Reciprocally, a router owning a dynamic IP address cannot easily receive a connection except a Dynamic DNS service is used.

6 Connecting the to the cellular network

6.1 Pre-installation checks

Authorization to use a cellular connection

Check the use of a cellular router is authorized.

Control of the reception level before installing

Before installing the SIG, refer to a cell map over the Internet to check that the cellular reception signal is strong enough at the location where it will be installed.

Select the right mobile service provider.

Reception level confirmation

If the reception seems possible, confirm with a control on site.

The reception level can be measured with a smartphone.

Most smartphones provide the reception level information (parameters or diagnostic menu).

To carry-out that control, use mandatorily a SIM card subscribed with the mobile service provider selected for the SIG.

Remark:

The SIG itself provides the reception level information in two ways:

- A reception level led indicator

- The diagnostic menu of the administration web server

6.2 Antenna

The antenna shall not be installed inside metal cases.

The antenna is supplied separately. Use only an approved antenna.

We provide a complete catalog of cellular antennas.

6.3 Coaxial cable

If necessary, the antenna can be connected to the SIG through a coaxial cable.

The signal attenuation in a usual coaxial cable is 0.2 to 0.4 dB / m, that is to say 2 to 4 dB for a 10 meters long cable.

If a coaxial cable must be used to connect the antenna to the SIG, the attenuation in the cable has to be taken into account to calculate the effective RF signal received by the SIG.

Refer to our cables and antennas catalogue.

INSTALLATION

6.4 Cellular service subscription

The SIG is designed to connect to the LTE-UMTS-GPRS data transmission service like the one used by the tablets.

The subscription should also provide the SMS service if SMS alarms are required.

A telephone service subscription is not needed.

One will take care to subscribe to a service authorizing the right volume of data per month (MB/month) and to check the price of the MB exceeding the limit of the subscription plan, if it exists.

The subscription must be preferably signed in the country where the machine is supposed to be installed to avoid roaming costs.

6.5 Installing or removing the SIM card

This model provides two SIM card holders. If you use only one SIM card, use the SIM card holder Nr 1 (on top)



Installing the SIM card:

- Power off the SIG.
- Remove the anti-steal lid at the top of the product
- Insert the SIM card according to the drawing.
- Push the card until it locks

Removing the SIM card:

- Power off the SIG.
- Remove the anti-steal lid at the top of the product.
- Push on the SIM card to unlock it.
- Remove the SIM card

6.6 Controlling the conformance of the connection

After installing and setting up the SIG, control the conformance of the connection:

Reception level

The reception level must be better than -90 dBm (two flashes of the reception level led indicator). See the table below.

PING error rate


Each PING request must receive an answer.

Network response delay to a PING request

The response delay must be better than 500 ms.

If the delay is longer than one second, it means the network is overloaded or that the signal level is weak.

If the connection is not conform, change the position of the antenna or select an alternative service like UMTS instead of LTE for instance.

 Cellular network reception level LED		
State	Description	Reception level dBm
3 flashes	<u>Strong signal</u>	-50 à - 80
2 flashes	<u>Sufficient signal</u> The connection is reliable but the data rate may be reduced due to transmission errors.	-81 à -90
1 flash	<u>No sufficient signal</u> Connection drops and errors may append. Try to improve the reception level.	-91 à -110
Off	<u>No signal</u> Check the antenna connector and the presence of the SIM card.	< -111

To control the signal level with the html server:

- In the menu, select **Diagnostics > Network status > Interfaces**.

PREPARING THE SETUP

1 Connecting a PC for configuration

1.1 Overview

The SIG is configured using a PC with a web browser. No additional software is required.

Online help:

For most pages of the administration server an help page is available by clicking [?](#) located at the top right of the page.

Administration server address:

When the product is delivered, the IP address of the administration web server is 192.168.0.128.

First setup:

For the first configuration, we advise to connect the PC directly to the LAN interface of the SIG. Subsequent changes can be made remotely.

Restoring the factory IP address:

The factory IP address 192.168.0.128 can be restored (see the User guide of the product).

Restricted access to the administration server:

If you do not have access to the administration server, it is probably that access has been restricted for security reasons or for other reasons.

Network IP address:

Later in the text, we often speak off “network IP address”. We mean the lowest value of the addresses of the network.

For instance, if the netmask of a network is 255.255.255.0, the network IP address of that network is terminated by a zero (X.Y.Z.0.).

Characters allowed

Accented characters are not supported.

PREPARING THE SETUP

1.2 First configuration

Step 1: Create or modify the PC TCP/IP connection

Assign to the PC an IP address different but consistent with the factory IP address of the SIG.
For the first configuration, assign for instance 192.168.0.1 to the PC.

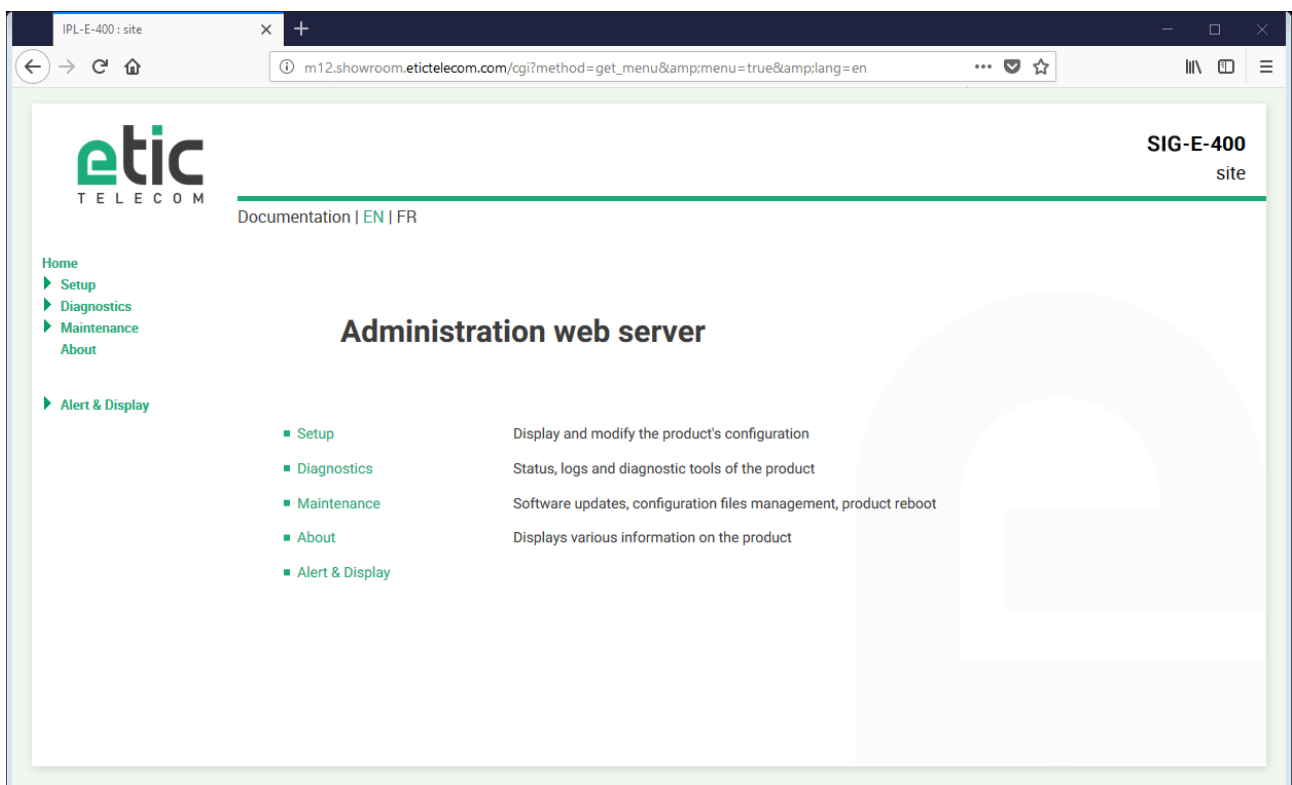
Step 2: Connect the PC to the SIG

Connect the PC directly to the SIG with any Ethernet cable (straight or cross-wired);

Step 3: Launch the web browser

Launch the web browser and then enter the IP address of the SIG: 192.168.0.128

The Home page of the administration server is displayed.



Note: Access to the administration server is not protected when configuring the SIG for the first time.

1.3 Changing the configuration later

Thereafter, the SIG administration server is accessible from the local Ethernet interface or remotely through a remote connection at the IP address assigned to the product.

By default, the access to the administration web server is not allowed through the WAN interface.

2 Access to the administration server through the WAN interface

To allow the access to the administration server through the WAN interface:

- In the menu, choose **Setup > Security > Administration rights**.
- Enter the username and the password.
- Select the protocol to use for configuration **HTTPS only** or **HTTP and HTTPS**.
- Tick the **Enable access from the WAN(s)** checkbox.

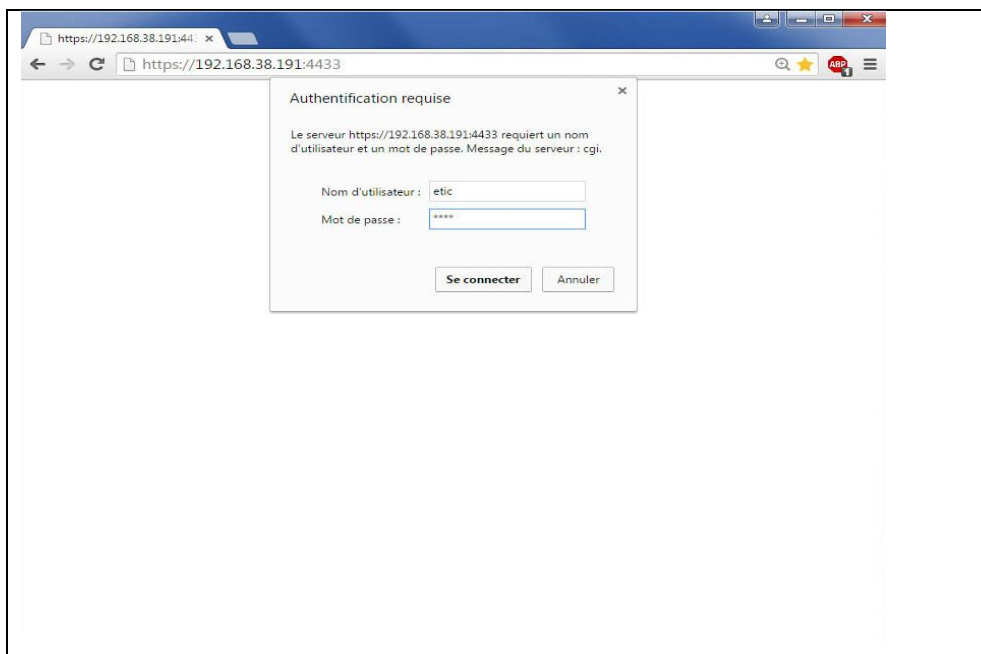
The administration server is accessible with HTTPS through the WAN or the LAN interface.

3 Working with HTTPS

Once HTTPS has been selected, proceed as follows:

The port 4433 is assigned to administration server.

- Open the web browser and enter the IP address of the SIG administration server:
- Example: <https://192.168.38.191:4433>.
- Click **Next** when a warning message is displayed
-
- Enter the user name and password that have been set to protect access to the administration server.




The home page of the administration server is displayed.

PREPARING THE SETUP

4 Temporary return to the factory settings

If the IP address of the SIG could not be founded, or if it is impossible to access the administration server, for example, following a configuration error, it is possible to restore the factory settings without losing the current configuration.

- Press the push-button B2 located on the back.
- Keep the push-button pressed for about 3 seconds;
- The LED  blinks red rapidly
- The administration server becomes accessible at the factory IP address (192.168.0.128), in HTTP without a password. The factory configuration is temporarily running. However, the current configuration is not lost and it is the one that is still displayed in the pages of the Administration Server.
- After reading the IP address or changing some parameters, press again the push button (B2) or reboot the product.
- The product can be reached at the registered IP address.

Note:

If the IP address of the SIG is unknown, the software tool [EticFinder](#) can be used.


This software detects all ETIC branded products on a local network. After starting the software, click on the "Search" button, and when the product list is displayed, double-click on the product address to access the html server.

5 Restoring the factory settings

It is possible to restore the factory configuration permanently using the push button B2 on the rear panel, or by using the administration server. In this case, the current configuration will be lost unless it has been saved to a file.

To restore the factory settings using the push button,

- Power off the SIG,
- Press the push-button B2 located on the back.
- Power on the SIG, while keeping the push-button pressed at least 10 s.

The LED  turns red; the SIG boots and the factory configuration is restored.

Note: The factory configuration can also be restored via the menu [Maintenance > Configurations management](#) of the administration server.

6 Protecting the access to the administration server

- In the menu, choose **Setup > Security > Administration rights**
- Enter a user name and password to protect the administration server.
- Tick the **Password protect the web site access** checkbox

If the username and password to access the administration server are lost, you have to [temporarily return to the factory settings](#); access to the administration server is then free.

7 Configuration steps

To configure the product, we advise to proceed as follows:

- Set up the LAN interface
- Set up the WAN interface
- Set up the routing functions
- Set up VPNs
- Set up the remote access
- Set up the firewall

For details about the advanced setup, refer to the Routing Setup Guide:
Reference: "DOC_DEV_Router setup guide_x"