Industrial Ethernet Training 21

Port Forwarding with Weidmueller security routers

Abstract:
Port forwarding allows to access network devices from outside the local network. Local ports are configured that forward the traffic through the router to the wanted IP station connected to the router's local area network.

Hardware reference

No.	Component name	Article No.	Hardware / Firmware version
1	IE-Training Kit-01	2874670000	1.1.2 (Build 125086)
2			
3			

IE-Training Kit Content

No.	Component name	Article No.	Hardware / Firmware version
1	IE-SR-4TX	2751270000	1.6.4
2	IE-SW-AL08M-8TX	2682280000	1.11
3	IE-SW-AL05M-5TX	2682250000	1.16
4	IE-CS-MBGW-2TX-1COM	2682600000	3.14

Software reference

No.	Software name	Article No.	Software version
1			
2			
3			

File reference

No.	Name	Description	Version
1			
2			

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Content

1 Warning and Disclaimer

Warning
Controls may fail in unsafe operating conditions, causing uncontrolled operation of the controlled devices. Such hazardous events can result in death and / or serious injury and / or property damage. Therefore, there must be safety equipment provided / electrical safety design or other redundant safety features that are independent from the automation system.

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Security notes
In order to protect equipment, systems, machines and networks against cyber threats, it is necessary to implement (and maintain) a complete state-of-the-art industrial security concept. The customer is responsible for preventing unauthorized access to his equipment, systems, machines and networks. Systems, machines and components should only be connected to the corporate network or the Internet if necessary and appropriate safeguards (such as firewalls and network segmentation) have been taken.

2 Prerequisites

You need to have the following hardware and documentation

- Via Ethernet connected Industrial Ethernet Training Kit
- Application Note Industrial Ethernet Training 01 "*Setting up default configuration of IE Training Kit*" for applying default IP address configuration

Note: *The mentioned Prerequisites are only mandatory for performing the exact use case we are exemplifying in this Application Note. These are optional, if you only want to understand the functionality of the following Application and implement it by yourself.*

Note: *Additional information and tutorial videos to this Application Note can be found in the Weidmueller support center (*Weidmüller - Support Center (weidmueller.com)). These videos can also be found by searching for "*Industrial Ethernet tutorials"* in the support center.

3 Port Forwarding

Industrial devices, like switches or production machines, often have private IP addresses within a local network, making them inaccessible from outside the network, e.g., via WAN. Port forwarding in industrial networks is used to allow external access to devices or services within a private network. In industrial settings, various equipment and systems, such as programmable logic controllers (PLCs), production machines or Human Machine Interfaces (HMIs), may need to be accessed remotely for monitoring, maintenance, or troubleshooting. Port forwarding involves configuring the router to forward specific external ports to the internal IP addresses and ports of the devices within the network. When a request comes to a specific configured external port, the router maps it to the corresponding internal IP address and port of the device, meaning we can access the local network devices via the Weidmüller router. It is crucial to implement port forwarding judiciously, since port forwarding creates a direct pathway to internal devices making them vulnerable for potential cyber threats and unauthorized access. Make sure to protect the network from unwanted access by using the firewall of the Weidmüller router (more information in the Application Note "*Configuring the firewall on a Weidmueller security router*") and a VPN encrypted connection with u-link for example.

4 Configuration of Port Forwarding

To demonstrate the functionality of Port forwarding, we use switch 1 (8-port switch) and later connect the computer via **WAN** instead of **LAN** to the router, since requests from outside the local network come from the router's WAN port. This means that we have to do some changes first.

4.1 Configuring WAN IP

1. Log in to the router's web interface as usual by typing in "*192.168.1.10*" into the browser's URL bar and using the login credentials. Go to "*IP configuration*".

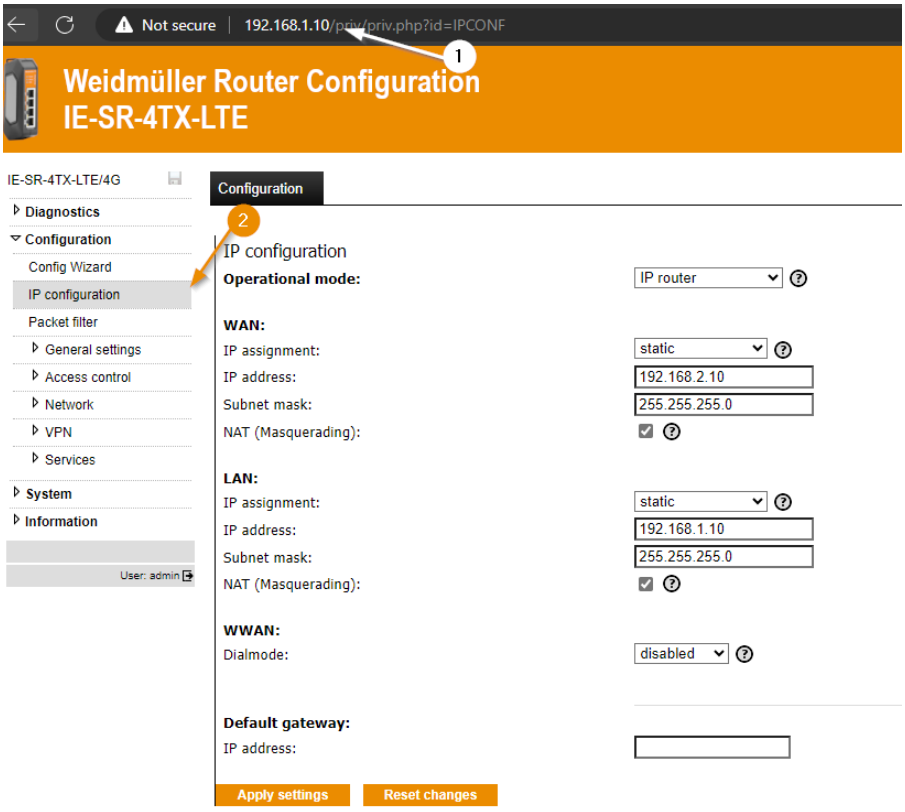

Figure 1: IP configuration

2. For WAN, change the option "*IP Assignment*" to "*static*" and the IP address to "*192.168.2.10*". Check the checkbox for "*NAT (Masquerading)*" and hit "*Apply settings*".

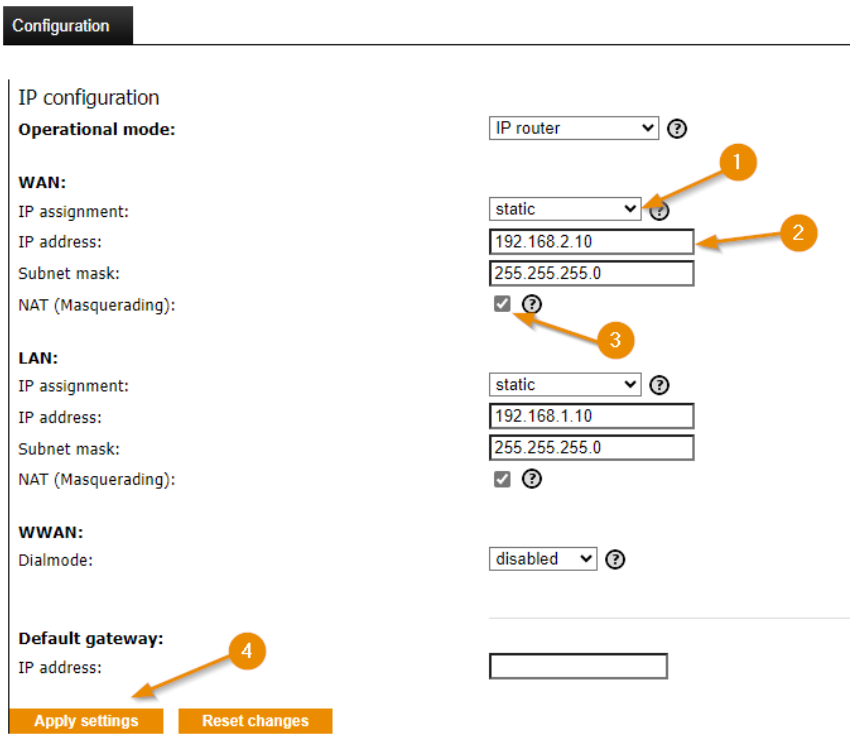

Figure 2: Configuring WAN IP

3. Now, change your computer's IP address to "*192.168.2.x" (refer to Application Note 1 "Setting up default configuration of IE Training Kit" for help*) and plug the Ethernet cable into the router's WAN port. After finishing these steps, simply reconnect to the web interface by typing the WAN IP "*192.168.2.10*" into the URL bar and logging in with the credentials.

Figure 3: Reconnecting to the router

4.2 Configuring Port Forwarding

Now that we are successfully connected via WAN, we cannot reach the other devices on the Training Kit, since they have a different IP network address range. We can change that by implementing Port forwarding.

1. Go to "*Configuration*", click on "*Network*" and open the menu "*Forwarding*".

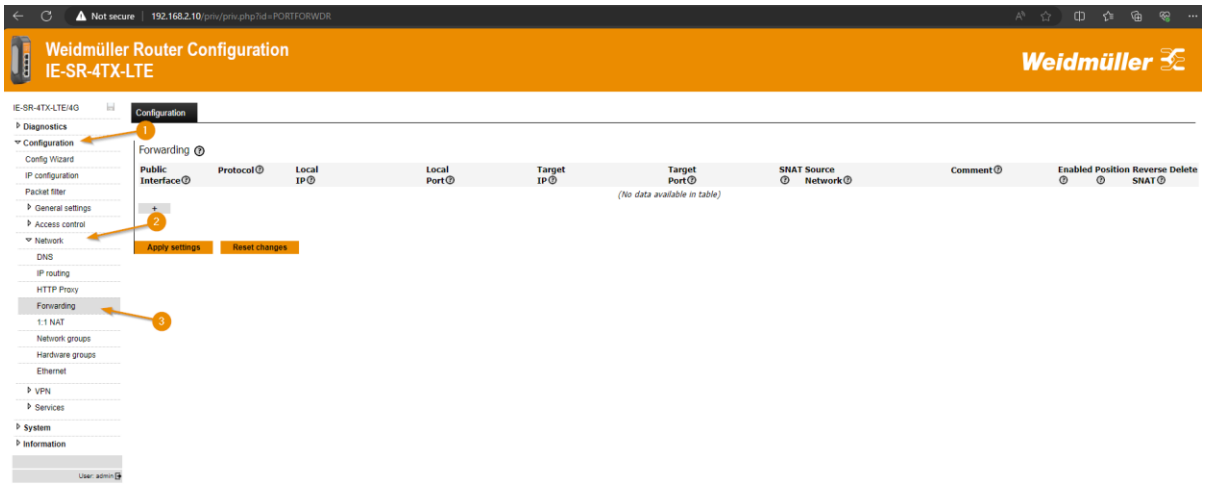

Figure 4: Forwarding menu

2. Click on the "*+*" to create a new port forwarding rule. Set the option "*Public interface*" to "*WAN*" and "*Protocol*" to "*TCP*" since we are using this protocol for the requests. Next, change the "*Local Port*" to any unused port number you like, we used "*100*". The "*Target IP*" is the IP of the device we want the traffic to forward to, in this case switch 1 with the IP "*192.168.1.20*". Lastly, set the "*Target Port*" to "*80*", this is the standard TCP port and enable the option "*SNAT*" so the switch always knows where to send the packets back. Click on "*Apply settings*".

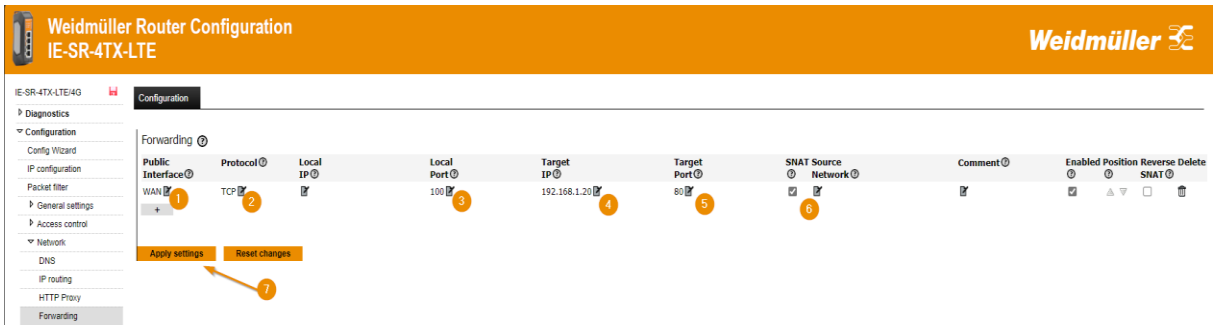

Figure 5: Port forwarding configuration

4.3 Connecting to switch

Port forwarding is successfully configured. The switch on the Training Kit is now reachable again via the configured ports.

1. Connect to the switch by typing in the IP address of router + : + Local Port. In this case, type in "*192.168.2.10:100*".

Figure 6: Connecting to switch via Port forwarding

2. After logging in, we can access the switch web interface as usual.

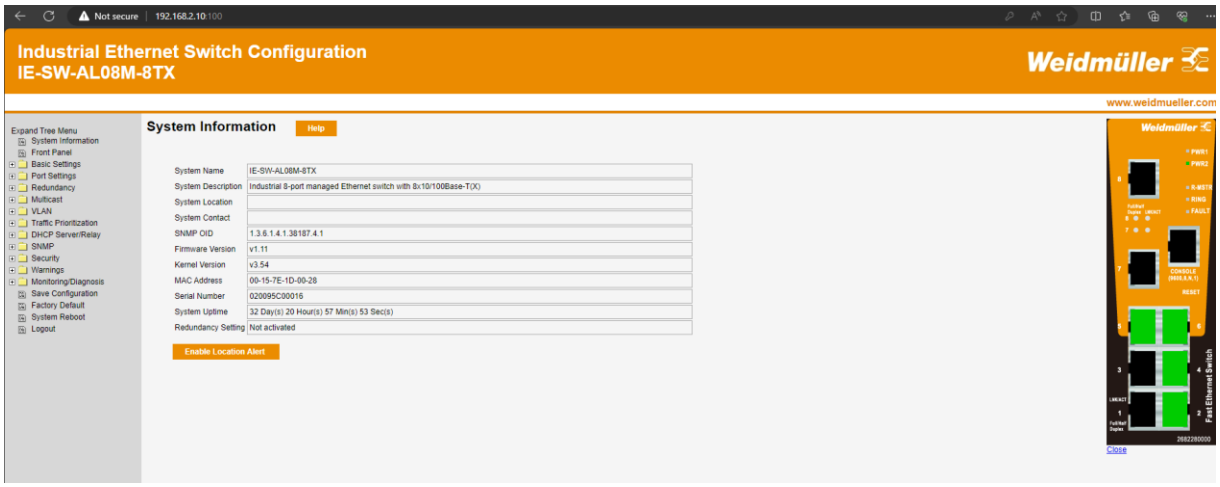

Figure 7: switch web interface

5 Results

We have successfully implemented Port forwarding with the Weidmüller router. The switch is now accessible by using the configured local port, while being outside of the network and simultaneously keeping the device's IP hidden. This is important for remote maintenance of any machines and devices that are in the router's local area network.