Industrial Ethernet Training 22

IP Forwarding with Weidmueller security routers

Abstract:
IP Forwarding describes the process of forwarding the IP traffic and its packets from a known IP address, like a router, to another IP-station, like a switch, using an IP alias. This application shows how to configure IP forwarding in a Weidmueller security router.

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 IP 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 a WAN connection. IP forwarding in industrial networks enables external access to these devices or services. To reach them from outside the network, we can use an IP alias for the actual IP of the device, so the router can map it to the corresponding target IP. IP aliasing allows a single network interface to be associated with multiple devices and their IP addresses. This can be useful for routing different services through different IP addresses, providing flexibility in how external requests are handled. When a request from outside the LAN network for a specific IP alias reaches the router, it maps it to the corresponding internal IP address of the device. This configuration allows us to access local network devices via the Weidmüller router's WAN port while keeping the LAN IP hidden. However, it is crucial to implement these techniques judiciously since IP forwarding may allow third parties to exploit cyber threats and gain 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 IP Forwarding

To demonstrate the functionality of IP 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 usually come from the router's WAN port. This means that we must 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*".

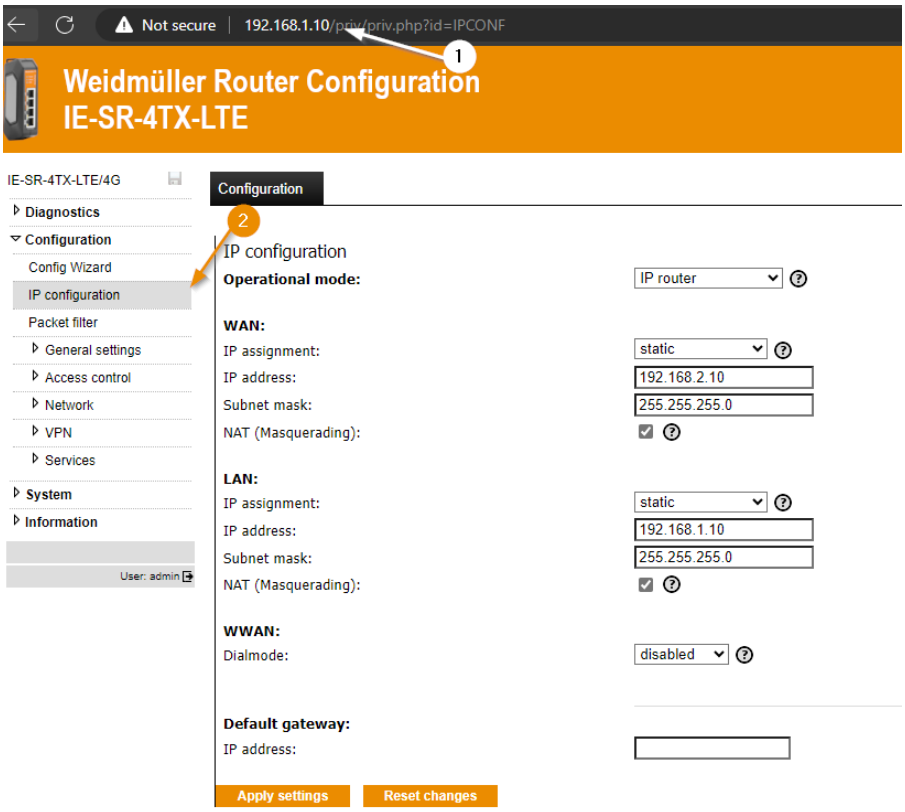

Figure 1: IP configuration

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*".

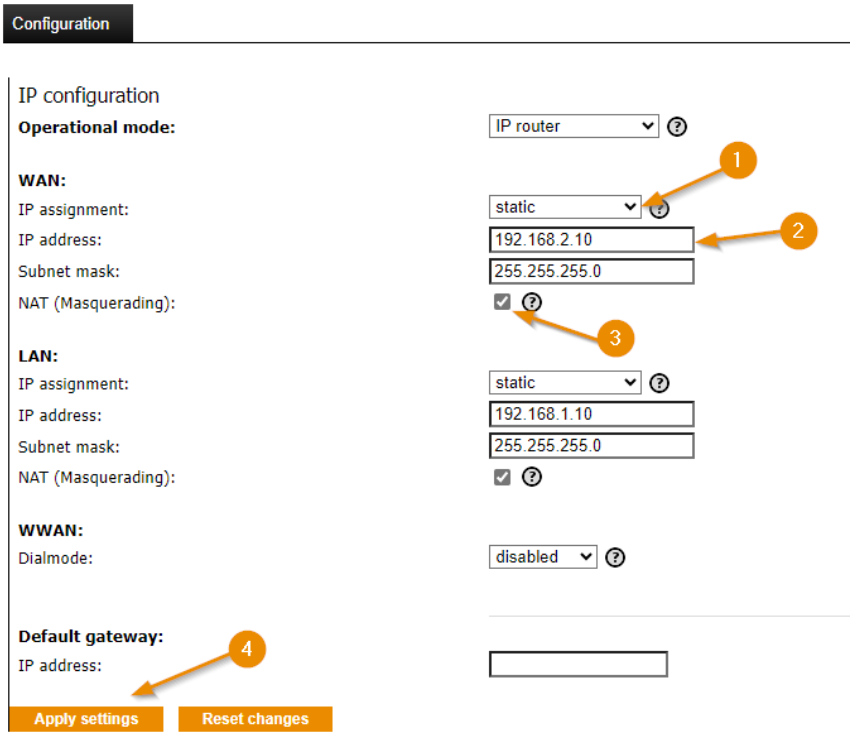

Figure 2: Configuring WAN IP

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 IP Forwarding

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

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

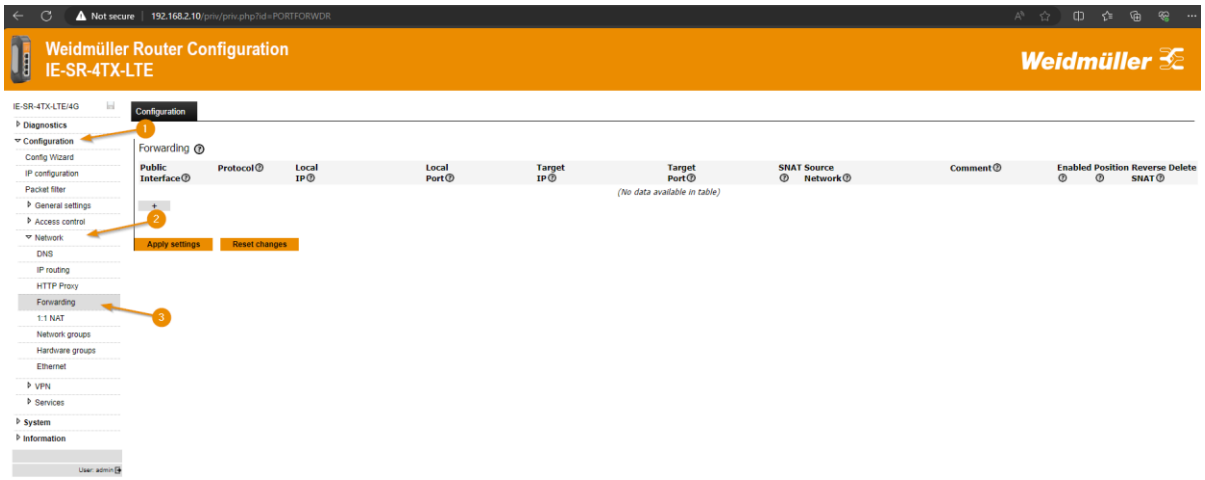

Figure 4: Forwarding menu

2. Click on the “*+*” to create a new forwarding rule. Set the option “*Public interface*” to “*WAN*" and “*Protocol”* to “*”. The “*Local IP*” is the IP alias we want to use to connect to the device, which is configured to “*192.168.2.253*” in our example (it can be any free IP address in the WAN IP range). Next, type in the Target IP of the device whose traffic we want to forward, in our case switch 1 on the Training Kit with the IP “*192.168.1.20*”. Enable “*SNAT*” so the switch has a known IP address to send the packets back to. Click on “*Apply settings*”.

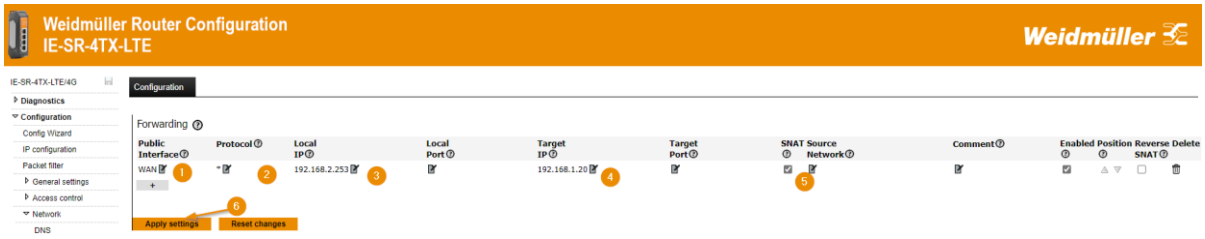

Figure 5: IP Forwarding configuration

4.3 Connecting to switch

IP forwarding is successfully configured. The switch on the Training Kit can be addressed with the new Local IP we assigned prior.

1. To do so, simply type in the configured local IP "*192.168.2.253*" into the URL bar.

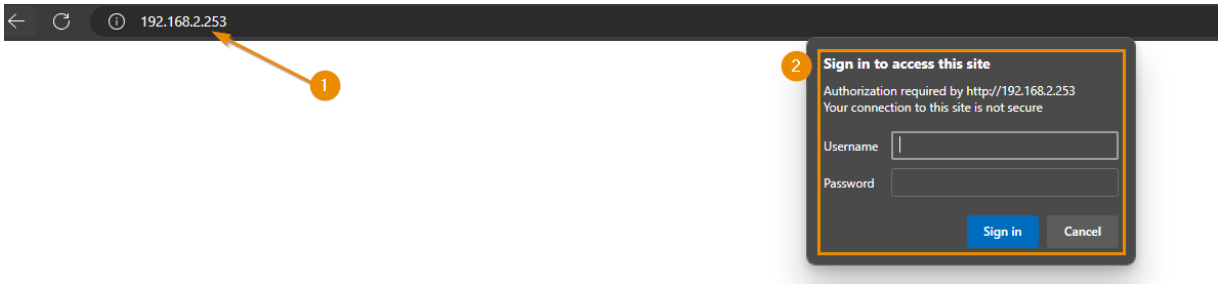

Figure 6: Connecting to switch via IP forwarding

2. After logging in, the switch web interface is accessible as usual.

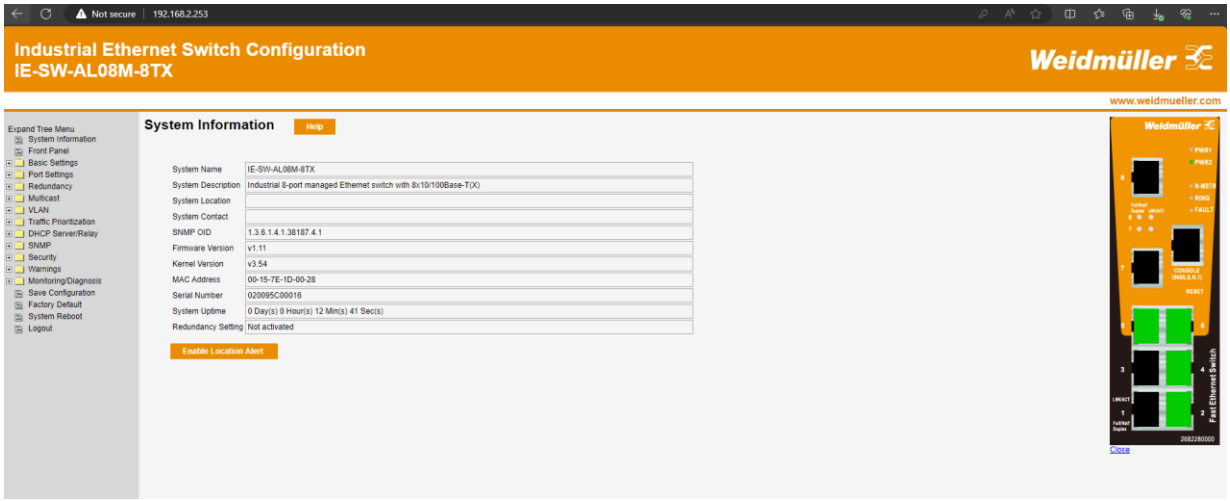

Figure 7: Switch web interface

5 Results

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