

Industrial Ethernet Training 09

Configuring the DHCP Server of a Weidmueller router

Abstract:

A Dynamic Host Configuration Protocol (DHCP) server is a feature in the router that automatically provides and assigns IP addresses, default gateways and other network parameters such as the DNS server to client devices connecting to the router. Furthermore, this protocol is used as standard to respond to broadcast queries by clients. This application note describes the configuration of a DHCP server of a Weidmueller router.

Hardware reference

No.	Component name	Article No.	Hardware / Firmware version
1	IE-Training Kit-01	2881730000	1.1.2 (Build 125086)
2			
3			

IE-Training Kit Content

No.	Component name	Article No.	Hardware / Firmware version
1	IE-SR-4TX	2751270000	1.4.7
2	IE-SW-AL08M-8TX	2682280000	1.08
3	IE-SW-AL05M-5TX	2682250000	1.14
4	IE-CS-MBGW-2TX-1COM	2682600000	3.11

Software reference

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

File reference

No.	Name	Description	Version
1			
2			

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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 for doing

You need to have the following hardware and documentation

- Industrial Ethernet Training Kit
- Application Note Industrial Ethernet Training 01 “Setting up default configuration of IE Training Kit” for applying default IP address configuration

3 Why implementing a DHCP server?

A Dynamic Host Protocol server, short DHCP server, is an important feature to set up a TCP/IP network in a quick manner. The server host, in this case the router, automatically assigns IP addresses to any client devices connecting to the router. After connecting, the client sends a DHCP request to the router. The router then automatically responds to the client with its IP address and additional configuration information.

Furthermore, DHCP minimizes configuration errors caused by manual configuration of the client devices. For example, with DHCP one cannot assign the same IP address to two different clients, which would lead to an address conflict. Besides, assigning IP addresses manually to many devices in a large network would require a lot of work and thus a lot of time.

4 Setting up DHCP on router

The router is going to be the host of the server and will assign the IP addresses to the client devices. We will now configure the DHCP server on the router's web interface, as the router is going to be the host of the server and assign the IP addresses to the client devices.

1. First, connect to the router. Make sure you are connected to the router via an Ethernet cable and that you are in the same network. Next, we can type in the IP "192.168.1.10" into our browser's URL field and log in with the default credentials.

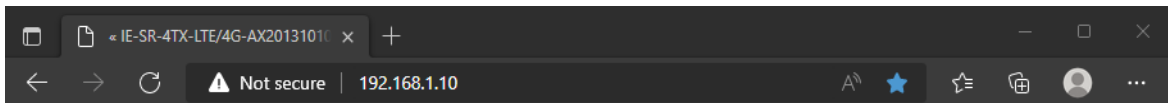


Figure 1: Connecting to router web interface

2. After logging in, navigate to "Configuration", then "Services" and lastly to the "DHCP server" option.

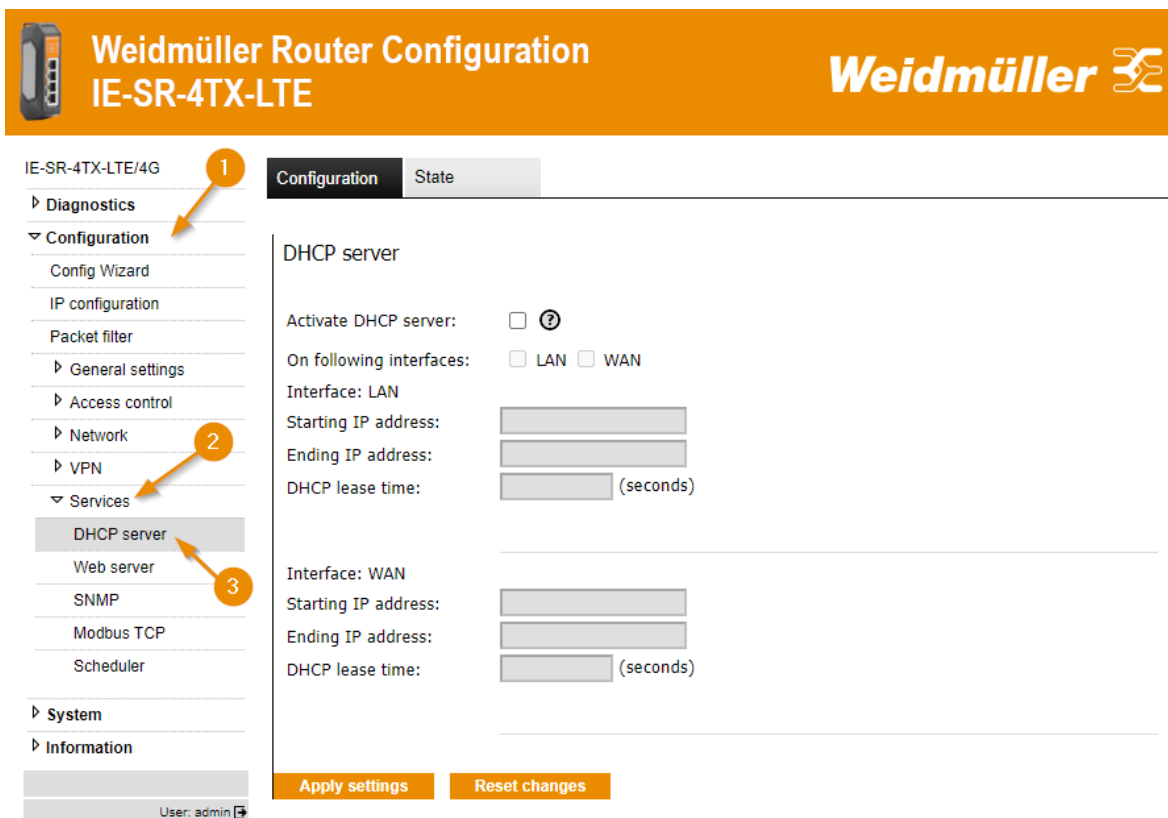


Figure 2: DHCP server settings

3. As of now, the DHCP server option is deactivated. Start off by checking the checkbox “Activate DHCP server” and then selecting the preferred interface by clicking the checkbox, which will be the “LAN interface”. This allows to edit the next settings which are crucial for the further configuration of the DHCP server.

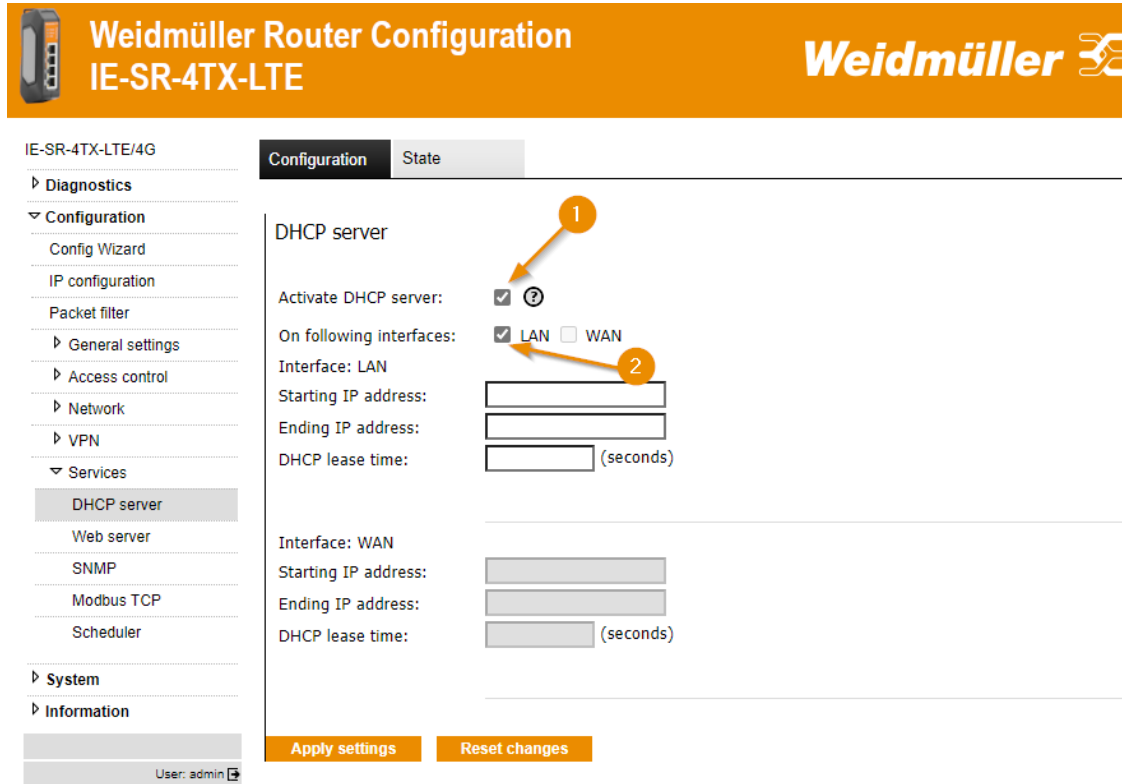


Figure 3: Activating DHCP server on LAN

Next, the IP address range as well as the DHCP lease time must be configured.

The IP address range is defined by declaring a starting IP address and an ending IP address. This means, that the router only assigns IP addresses in this range to new client devices. In the event of an exhausted IP address pool, the router stops giving out IP addresses to new client devices, meaning that these devices will have no network connectivity. For this purpose, the DHCP lease time is used.

The DHCP lease time defines the time period during which a certain client device keeps its assigned IP address before it is deleted and can be reassigned to another device. Say we connect a notebook to our network for a one-time use. The DHCP server then automatically assigns an IP address to the notebook. By doing so, this specific IP address is blocked and cannot be used since it is assigned to the laptop. Without a lease time, the notebook would keep this IP address forever and block it in the DHCP IP pool although we used it only once and the notebook is not connected to the network anymore. With a predefined lease time, say 24 hours, the notebook would lose this IP since it is not connected to the network anymore and the router can assign it to new devices connecting to the network. Therefore, the DHCP lease time is important as to not waste the resources for inactive devices.

Configuring the DHCP Server of a Weidmueller router

4. Set "192.168.1.11" as the starting IP address. Note that IP addresses ending with 0 or 255 are usually reserved as network identifier and broadcast addresses in the network. Also, the router must not be in the IP address range of the DHCP server. Since the router's IP address is "192.168.1.10", we take the next possible IP address as a starting address for the DHCP IP address pool.

A common practice is to not occupy the whole IP address pool and to leave a certain amount of IP addresses unused in case these are needed for more devices or devices that require a static assignment. Therefore, set "192.168.1.111" as the ending IP address. Lastly, set a lease time of 86.400 seconds, which equals to 24 hours. The lease time can be set to any value between 3.000 and 700.000 seconds. Finally, apply the settings.

The image shows the Weidmüller Router Configuration web interface for the IE-SR-4TX-LTE model. The left sidebar contains a navigation menu with categories: Diagnostics, Configuration, Services, System, and Information. Under Configuration, the DHCP server is selected. The main content area is titled 'DHCP server' and has two tabs: Configuration and State. The Configuration tab is active, showing settings for the LAN interface. The settings include: 'Activate DHCP server' (checked), 'On following interfaces' (LAN selected, WAN unselected), 'Interface: LAN' (selected), 'Starting IP address' (192.168.1.11), 'Ending IP address' (192.168.1.111), and 'DHCP lease time' (86400 seconds). The WAN interface settings are currently empty. At the bottom, there are 'Apply settings' and 'Reset changes' buttons. Four orange callout numbers are present: 1 points to the Starting IP address field, 2 points to the Ending IP address field, 3 points to the DHCP lease time field, and 4 points to the 'Apply settings' button.

Weidmüller Router Configuration
IE-SR-4TX-LTE

Weidmüller

IE-SR-4TX-LTE/4G

Configuration State

Diagnosics

Configuration

Config Wizard

IP configuration

Packet filter

General settings

Access control

Network

VPN

Services

DHCP server

Web server

SNMP

Modbus TCP

Scheduler

System

Information

User: admin

DHCP server

Activate DHCP server: ☒ ?

On following interfaces: ☒ LAN ☐ WAN

Interface: LAN

Starting IP address: 192.168.1.11

Ending IP address: 192.168.1.111

DHCP lease time: 86400 (seconds)

Interface: WAN

Starting IP address:

Ending IP address:

DHCP lease time: (seconds)

Apply settings Reset changes

Figure 4: DHCP server configuration

5 Connecting device via DHCP to router

To test the DHCP server, we can, for example, assign the IP address of one of our switches via DHCP and see what happens. For this purpose, connect the 8-port switch via LAN to the router.

1. Access the switch's web interface by typing in "192.168.1.20" into the browser's URL field and logging in with the default credentials.

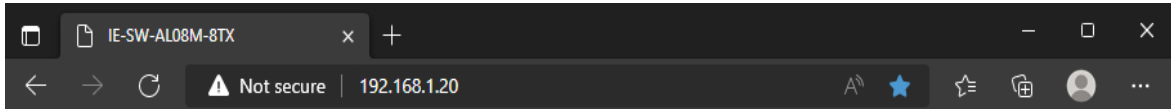


Figure 5: Accessing switch web interface

2. Go to "Basic Settings" and then to the "IP Settings". As of now, the IP assignment is set to "Static". To change this to an automatic DHCP configuration, we just need to change the IP Assignment to "DHCP" in the drop-down menu "IP Assignment" and hit "Apply". Furthermore, we acknowledge the warning given by the switch by clicking "OK". Finding out the new IP address of the device is shown in the next step.

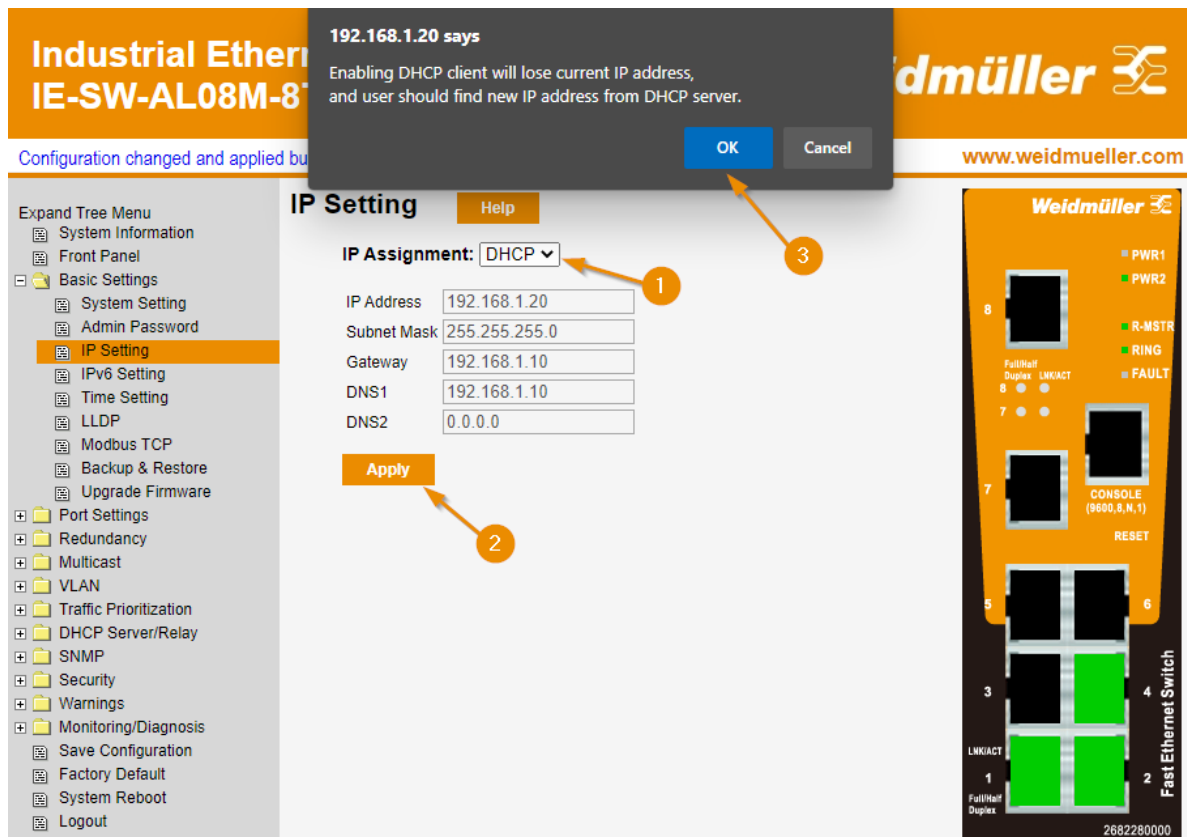


Figure 6: Activating DHCP on switch

Configuring the DHCP Server of a Weidmueller router

- Since DHCP automatically assigns an IP address to our device, we can no longer reach it via "192.168.1.20". Instead, we must look at the DHCP Server State in the router's web interface to find out the newly assigned IP address for the switch. To do so, go to the router's web interface and navigate to DHCP server as done previously. Then, in the DHCP menu, go to the menu tab "State". Here, we can overlook all current leases and find the new IP address of the switch. In our case, the new IP address is "192.168.1.77" with which we can connect to the device now.

The screenshot displays the Weidmüller Router Configuration web interface for an IE-SR-4TX-LTE router. The interface is divided into a left sidebar and a main content area. The sidebar contains a menu with categories: Diagnostics, Configuration, General settings, Access control, Network, VPN, Services, System, and Information. The 'Configuration' menu is expanded, showing options like Config Wizard, IP configuration, Packet filter, DHCP server, Web server, SNMP, Modbus TCP, and Scheduler. The 'DHCP server' option is selected. The main content area has two tabs: 'Configuration' and 'State'. The 'State' tab is active, showing the 'DHCP server' status. Below this, there is a section titled 'Currently active leases' which contains a table with the following data:

Expiry time:	Station:	IP address:	Client hostname:	Client id:
October 26 2022 09:10:17 AM	00:15:7e:1d:00:28	192.168.1.77	*	*

Below the table is a 'Reload' button. The interface also shows a 'User: admin' status at the bottom left. Numbered callouts (1-5) highlight specific elements: 1 points to the 'Configuration' menu, 2 points to the 'Services' menu, 3 points to the 'DHCP server' option, 4 points to the 'State' tab, and 5 points to the 'IP address' column in the table.

Figure 7: Overlooking current DHCP leases in router

6 Results

After completing the steps, we understand the purpose of DHCP and why it is an important feature of the router. Furthermore, we can activate the DHCP server feature in the router and properly configure it. Besides, we know how to use DHCP on the client devices, such as a switch, to automatically receive an IP address from the server. We also learned how to find the newly assigned IP address in the DHCP state of the router.