

MPS Remote Control - C - X PROTOCOL SIMULATOR MEINBERG Main Overview Localhost Daemon Control: Manual Remote Connection: (i) IP Address: PID: simulator-server 1 simulator-server 2  $\mathbf{x}$ Status Online Status: Online Version 2.0.1 Version 2.0.1 License Unlimited License: Unlimited CPU: 24 Cores, 0% used CPU: 12 Cores, 0% used Simulated Units: 0 Simulated Units: 0 Runtime 22d, 19h, 07m, 23s Runtime: 22d, 19h, 07m, 23s Scanning network...

# MANUAL

# Meinberg Protocol Simulation mpsv2

21st July 2020

Meinberg Funkuhren GmbH & Co. KG

# **Table of Contents**

4.1.1       Boot procedure .         4.2       Installation on an independent system .         4.2       Installation on an independent system .         5       Control         5.1       Connection on the same computer .         5.1.2       Connection from a remote computer .         5.2       Control via the command line .         5.2.1       Required parameters .         5.2.2       Optional Parameters .         5.2.3       Options .         6       Remote Control Interface .         6.1       Main Tab .         6.1.1       Localhost Daemon Control .         6.1.2       Manual Remote Connection .         6.1.3       Remote Control Settings .         6.1.4       Overview of detected simulation services .         6.2       Connection Tab .         6.2.1       Symbol 'Add' - Create a new simulation group .         6.2.2       Symbol 'Delete' - Delete the selected group(s) .         6.2.3       Symbol 'Delete All' - Deletion of all available groups .         6.2.4       Symbol 'Delete All' - Deletion of all available groups .         6.2.5       Symbol 'Stop All' - Storting all Groups .         6.2.6       Symbol 'Stop All' - Storting all Groups .         6.2.7       Symbol 'Run' - St	1	Imprint 1
<ul> <li>4 Basics <ul> <li>4.1 USB Live Linux .</li> <li>4.1.1 Boot procedure .</li> <li>4.1.2 Network configuration .</li> <li>4.2 Installation on an independent system .</li> </ul> </li> <li>5 Control <ul> <li>5.1 Control via Remote Control Interface .</li> <li>5.1.1 Connection on the same computer .</li> <li>5.1.2 Connection form a remote computer .</li> <li>5.2 Control via the command line .</li> <li>5.2.1 Required parameters .</li> <li>5.2.2 Optional Parameters .</li> <li>5.2.3 Options .</li> </ul> </li> <li>6 Remote Control Interface <ul> <li>6.1 Main Tab .</li> <li>6.1.1 Localhost Daemon Control .</li> <li>6.1.2 Manual Remote Connection .</li> <li>6.1.3 Remote Control Settings .</li> <li>6.1.4 Overview of detected simulation services .</li> <li>6.2 Connection Tab .</li> <li>6.2.1 Symbol 'Add' - Create a new simulation group .</li> <li>6.2.3 Symbol 'Delete ' - Delete the selected group(s) .</li> <li>6.2.4 Symbol 'Delete ' - Delete the selected group(s) .</li> <li>6.2.4 Symbol 'Delete All' - Deletion of all available group .</li> <li>6.2.5 Symbol 'Open' - Opening of a group configuration file .</li> <li>6.2.7 Symbol 'Kun All' - Starting all Groups .</li> <li>6.2.8 Symbol 'Stavi - Stopping the selected Group(s) .</li> <li>6.2.9 Symbol 'Kun All' - Starting the selected Group(s) .</li> <li>6.2.1 Symbol 'Stavis Details' - Stopping the selected Group(s) .</li> </ul> </li> </ul>	2	License Agreement 2
<ul> <li>4.1 USB Live Linux.</li> <li>4.1.1 Boot procedure.</li> <li>4.2. Installation on an independent system</li> <li>5 Control</li> <li>5.1 Control via Remote Control Interface</li> <li>5.1.1 Connection on the same computer.</li> <li>5.1.2 Connection from a remote computer.</li> <li>5.2 Control via the command line .</li> <li>5.2.1 Required parameters</li> <li>5.2.2 Optional Parameters</li> <li>5.2.3 Options</li> <li>6 Remote Control Interface</li> <li>6.1.4 Localhost Daemon Control</li> <li>6.1.3 Remote Control Settings</li> <li>6.1.4 Overview of detected simulation services</li> <li>6.2 Connection Tab</li> <li>6.2.1 Symbol 'Add' - Create a new simulation group</li> <li>6.2.3 Symbol 'Delete All' - Delete the selected group(s)</li> <li>6.2.4 Symbol 'Delete All' - Deletion of all available groups</li> <li>6.2.5 Symbol 'Stop All' - Stopping all Groups</li> <li>6.2.8 Symbol 'Stop All' - Stopping all Groups</li> <li>6.2.9 Symbol 'Run All' - Starting all Groups</li> <li>6.2.10 Symbol 'Stop All' - Stopping all Groups</li> <li>6.2.10 Symbol 'Stop All' - Stopping all Groups</li> <li>6.2.11 Symbol 'Stop Y - Stopping all Groups</li> <li>6.2.11 Symbol 'Stop All' - Stopping all Groups</li> <li>6.2.11 Symbol 'Stop All' - Stopping all Groups</li> <li>6.2.11 Symbol 'Stop Y - Stopping all Groups</li> <li>6.2.11 Symbol 'Stop</li></ul>	3	Introduction 4
<ul> <li>5.1 Control via Remote Control Interface</li></ul>	4	4.1       USB Live Linux       5         4.1.1       Boot procedure       5         4.1.2       Network configuration       6
<ul> <li>6.1 Main Tab</li> <li>6.1.1 Localhost Daemon Control</li> <li>6.1.2 Manual Remote Connection</li> <li>6.1.3 Remote Control Settings</li> <li>6.1.4 Overview of detected simulation services</li> <li>6.2 Connection Tab</li> <li>6.2.1 Symbol 'Add' - Create a new simulation group</li> <li>6.2.2 Symbol 'Edit' - Edit an available group</li> <li>6.2.3 Symbol 'Delete' - Delete the selected group(s)</li> <li>6.2.4 Symbol 'Delete All' - Deletion of all available groups</li> <li>6.2.5 Symbol 'Delete All' - Deletion of all available groups</li> <li>6.2.6 Symbol 'Save' - Saving the current group configuration file</li> <li>6.2.7 Symbol 'Run All' - Starting all Groups</li> <li>6.2.8 Symbol 'Stop All' - Stopping all Groups</li> <li>6.2.9 Symbol 'Run' - Starting the selected Group(s)</li> <li>6.2.10 Symbol 'Stop' - Stopping the selected Group(s)</li> <li>6.2.11 Symbol 'Status Details' - Status details of the selected Group(s)</li> </ul>	5	5.1       Control via Remote Control Interface       9         5.1.1       Connection on the same computer       9         5.1.2       Connection from a remote computer       9         5.2       Control via the command line       11         5.2.1       Required parameters       11         5.2.2       Optional Parameters       11
<ul> <li>6.2.13 Symbol 'Reset All Statistics' - Resetting all Groups</li></ul>	6	6.1       Main Tab       12         6.1.1       Localhost Daemon Control       12         6.1.2       Manual Remote Connection       13         6.1.3       Remote Control Settings       13         6.1.4       Overview of detected simulation services       14         6.2       Connection Tab       15         6.2.1       Symbol 'Add' - Create a new simulation group       16         6.2.2       Symbol 'Edit' - Edit an available group       25         6.2.3       Symbol 'Delete' - Delete the selected group(s)       25         6.2.4       Symbol 'Delete All' - Deletion of all available groups       25         6.2.5       Symbol 'Open' - Opening of a group configuration file       25         6.2.6       Symbol 'Save' - Saving the current group configuration       25         6.2.7       Symbol 'Run All' - Starting all Groups       25         6.2.8       Symbol 'Stop All' - Stopping all Groups       25         6.2.9       Symbol 'Stop' - Stopping the selected Group(s)       25         6.2.10       Symbol 'Status Details' - Status details of the selected Group(s)       25         6.2.11       Symbol 'Status Details' - Status details of the selected Group(s)       25         6.2.12       Symbol 'Status Details' - Status details of the selected Grou

# 1 Imprint

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# **3** Introduction

Congratulations that you have purchased the Meinberg Protocol Simulation Software.

This manual explains the most important simulation functions and will help you get started. The simulation software allows tests of NTP-time servers, NTP-clients, PTP-time servers, PTP switches and many other devices for network synchronization. Amongst other these devices can be tested on general functionality in relation to the appropriate protocol, response time, packet loss rates and responses to failure or the handling of increased load. By using a suitable and well equipped system, you can for example simulate about 1.000.000 NTP clients or up to 500 PTP slaves at full rate.

The following simulation modes are supported by the software:

NTP Clients (IPv4, IPv6) NTP Server (IPv4, IPv6)

## PTPv2 (IEEE 1588-2008)

Unicast Slaves (IEEE802.1/Ethernet Layer 2, IPv4, IPv6) Unicast Masters (IEEE802.1/Ethernet Layer 2, IPv4, IPv6) Unicast Controllers (IEEE802.1/Ethernet Layer 2, IPv4, IPv6) Multicast Slaves (IEEE802.1/Ethernet Layer 2, IPv4, IPv6) Multicast Masters (IEEE802.1/Ethernet Layer 2, IPv4, IPv6)

In this manual you will first be explained, in a "Quick start guide", how to start the simulation service.

After that, the structure of the main dialogs of the remote control interface (mpsrc) and the most important functions of how to set up a connection and the configuration of the simulation will be described in detail.

Should you notice any mistakes in the handling of the software, please help us to correct them, by writing an e-mail to support@meinberg.de. Thank you very much for your help and have fun using the Meinberg Protocol Simulation!

# 4 Basics

# 4.1 USB Live Linux

The simulation is delivered on a USB stick, with a bootable Linux live system. Via this system, you can start the software on any 64bit-systems without installation effort.

# 4.1.1 Boot procedure

Insert the USB stick with the imprint "Meinberg" into one of your USB ports and restart the system. Make sure that in the BIOS, the booting of USB sticks is activated and that the USB stick is at top priority of the boot order.

The following boot menu should appear on your screen if the boot order was correctly configured.

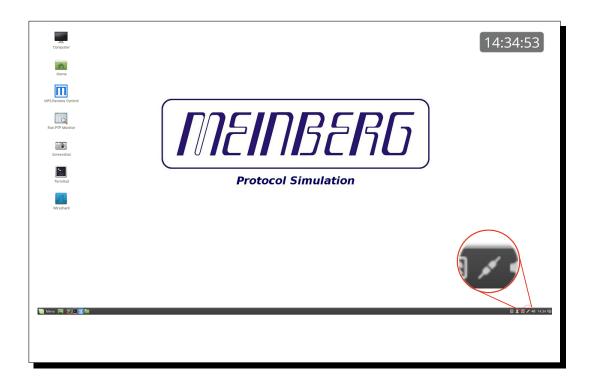


Now, you can choose between graphical user interface "MPS Live Linux (desktop)" or terminal mode "MPS Live Linux (Terminal)".

# 4.1.2 Network configuration

## 4.1.2.1 Configuration via graphical user interface

To make the configuration via graphical user interface, log in as user: "meinberg" with the password: "live", after a successful boot procedure. Your screen should show the following picture:



After logging-in, click on the marked symbol on the right side at the lower edge of the screen and after that on "Network Settings". In this field you can make settings for the network adapter.

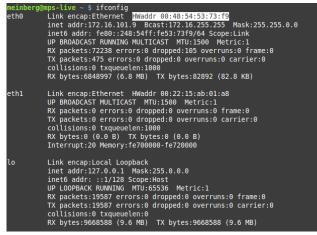
In the window "Networking" click on "Add Profile" to create a new profile for one of the network adapters. It appears a new window called "New Profile". Select the tab "Identity", enter a name for this profile and select the network adapter (MAC address) for which the profile has to be created. This done, click on the tab "IPv4" and configure the IP settings as you desire. Confirm your entry with "Add". To configure more IP addresses, repeat the procedure. To finalize the network configuration you have to restart the system.

	1	New Profile		×			New Profile			×
Security Identity	Name	eth0			Security Identity	IPv4		0	N	
IPv4 IPv6	MAC Address	00:48:54:53:73:F9 (eth0)	•		IPv4 IPv6	Addresses		Manual	-	
	Cloned Address					Address	192.168.100.10		)	
	MTU	automatic	- +			Netmask	255.255.255.0			
	Firewall Zone	Default	~			Gateway	192.168.100.254		)	
									+	U
						DNS		Automatic 🚺	N	
	<ul><li>Connect aut</li><li>Make availal</li></ul>	omatically ble to other users				Server			-+	
			Cancel Add					Cancel	Add	

## 4.1.2.2 Configuration via terminal

To make the configuration via terminal, select "MPS Live Linux (Terminal)" in the boot menu.

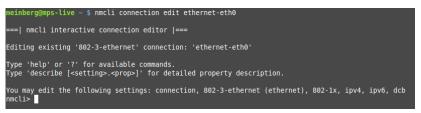
You will automatically log in as user: "meinberg". For an overview of all installed network adapters, type in the command "ifconfig". Write down the MAC address (HWaddr) of the adapter, for which you would like to configure an IP address.



Type in the command: "nmcli connection add type ethernet ifname [name of the network adapter]" to create a profile.

meinberg@mps-live ~ \$ nmcli connection add type ethernet ifname eth0 Connection 'ethernet-eth0' (4e10e70e-b975-47ea-a148-3ae46931756b) successfully added. meinberg@mps-live ~ ■

With the command "nmcli connection edit ethernet-*[name of the network adapter]*" you will enter the configuration menu of the new profile.



Now, type in "set ethernet.mac-address" and confirm with the enter key. Type in the MAC address you wrote down before and confirm with the enter key. By using the command: "set connection.interface-name [name of the network adapter]" you assign the profile to the appropriate adapter.



Using the command: "set ipv4.method manual" or "set ipv4 method auto" you can select between a static and a dynamic IP address. If you want to configure a static IP-address use the command: set ipv4.addresses [IP-address/netmask].

#### nmcli> set ipv4.method manual nmcli> set ipv4.addresses 192.168.100.10/24 nmcli>

With the commands "save" and "activate" you can save and activate the settings you have made. Exit the configurator with the command: "quit". To configure more IP-addresses, repeat the procedure. To complete the initial setup, restart the simulation service with the command: "mps restart".

nmmuly sove Connection 'ethernet-eth0' (4e10e70e-b975-47ea-a148-3ae46931756b) successfully updated. nmcll> activate Monitoring connection activation (press any key to continue) Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/7

# 4.2 Installation on an independent system

In addition to the possibility of using the simulation service via live Linux, you can install it on any self-sufficient 64-bit Linux system. You will find the installation file on the partition "mps-setup" on the USB stick with the imprint "Meinberg". Alternatively, you can download it, according to your distribution (Debian, Ubuntu, Mint / CentOS, SuSE) at:

# https://www.meinbergglobal.com/download/software/mpsv2/mpsv2\_linux.zip

Now, extract the zip archive and start the installation script "install" via the command line. After the installation you can start the simulation using the command: "(sudo) mps start" in the remote control mode or directly via the command line. Please note, that the execution of the simulation service requires root privileges. More information about the control types can be found in the following chapter.

# 5 Control

# 5.1 Control via Remote Control Interface

# 5.1.1 Connection on the same computer

In order to configure and control the simulation on the same computer, start the live Linux system with the graphical user interface and log in as user: "meinberg" with the password: "live". Now, start the Remote Control Interface by double clicking on the desktop icon "MPS Remote Control". Double click on the panel "Localhost" and login as user: "root" without the need of a password.

М	PS Remote Control	-					
7	MEINBER	6 ряото	COL SIMULATO	₹_M/			
	ain Overview						
Ma	Localhost Daemon (	Control:	Manual Remote C	onnection:			*
	<b>&gt;</b>		IP Address:		2		~
	PID: -	ſ	Connect to: Localhost		22	1	
	Loc Status: Version: License: CPU:	alhost Online 2.0.1 RC-benz Unlimited 24 Cores, 0% used	Anonymous Legin Dest. Port (def. 63624): Type: Name: Password:	63624 Public root Cancel	- т ок		
	Simulated Units: Runtime:	0 0d, 19h, 00m, 32s					
Sc	anning network						

# 5.1.2 Connection from a remote computer

Alternatively, you can also configure and control the simulation from a remote Windows or Linux system.

# 5.1.2.1 Installation on a Windows system

Download the Remote Control Interface installation program from Meinberg's website at:

# https://www.meinbergglobal.com/download/software/mpsv2/mpsrc\_win\_setup.exe

Alternatively, you can also find the program on the partition "mps-setup" on the USB stick with the imprint "Meinberg".

Attention: Do not remove the USB stick while the "Live-System" is still running.

After a successful installation adjust your firewall settings, so that TCP-Port 63625 and UDP-Port 65353 are unlocked. The ports to be used for this purpose can be changed afterwards.

# 5.1.2.2 Installation on a Linux system

Download the installation program MPSv2 from Meinberg's website at:

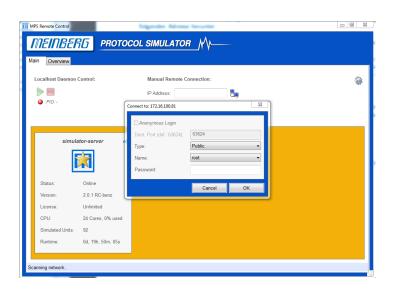
## https://www.meinberg.de/download/software/mpsv2/mpsv2\_linux.zip

Alternatively, you can also find the program on the partition "mps-setup" on the USB stick with the imprint "Meinberg".

Attention: Do not remove the USB stick while the "Live-System" is still running. Now, extract the zip archive and start the installation script "install" via the command line.

## 5.1.2.3 Connection after successful installation

After the successful installation, you can start the Remote Control Interface by using the Linux command: "mpsrc" or for Windows by double-clicking on the desktop icon "MPS Remote Control". Now, double click on the panel with the name of the simulation computer and login as user: "root" without the need of a password.



# 5.2 Control via the command line

To start the simulation service via the command line with the following parameters, it must, if it is running in the remote control mode, first be terminated with the command: "(sudo) mps stop".

# 5.2.1 Required parameters

> -m,	-mode	Simulation mode ("NTP"/"PTP")
> -c,	-count	Number of units to be simulated
> -i,	-interface	Network adapter (e.g. "eth0")

# 5.2.2 Optional Parameters

> -hw,	-hwAddr	MAC address of the first unit to be simulated [default: EC:46:70:FF:00:00]
> -p,	-protocol	Network protocol ("L2"/"IP4"/"IP6") [default: "IP4"]
> -iр,	–ipAddr	IP address of the first unit to be simulated [default: 172.26.1.1/2000::1]

# NTP configuration options:

> -ra, _refAddr	NTP server address
> -pt, _pollType	NTP polling mode ( $0 = user-defined$ , $1 = fast sync$ , $2 = standard$ ) [default: 2]
> -di, _defPollIntv	Standard polling interval [default: 4 (2 EXP 4 = 16 seconds)]
> -ci, -custPollIntv	User-defined polling interval (ms) [default: 500]

# PTP configuration options:

> -tt, _transmType	Transmission mechanism (0 = Unicast, 1 = Multicast) [default: 1]
> -ck, _clockType	Device type (0 = Master, 1 = Slave, 2 = Controller(uc)/Auto(mc)) [default: 1]
> -dm,  –delayMech	Delay mechanism (0 = Peer2Peer, 1 = End2End) [default: 1]
> -dn,   –domainNum	Domain number [default: 0]
> -ai,     –annIntv	Announce interval (2(x Sec., -77) [default: 0]
> −si,    –syncIntv	Sync interval (2(x Sec., -77) [default: 0]
> -ri, -reqIntv	Request interval (2(x Sec., -77) [default: 0]
> -hm, _hybridMode	Hybrid mode (0/1) [default: 0]
> -pm,  –priMasAddr	Primary unicast master or controller address
	[default: EC:46:70:FF:F0:00/172.26.0.1/2000::1]
> -am,  —altMasAddr	Alternative unicast master or controller address

# 5.2.3 Options

> - <b>d</b> ,	-daemon	Start the simulation in the Remote Control mode
> -n,	–netInfo	Display information about the network adapter and terminate the service
> -l,	-license	Show license information and terminate the service
> - <b>s</b> ,	–stats	Display statistics every second
> -f,	-statsFile	Write statistics into a file every 30 seconds
> -h,	-help	A list of all possible configuration parameters

# Parameter list

For a complete list of all possible configuration options enter the command: "mpsd -h" or "mpsd -help". Please note that a simulation can only be started either in the remote control mode or via the command line, but not in parallel.

# **6** Remote Control Interface

# 6.1 Main Tab

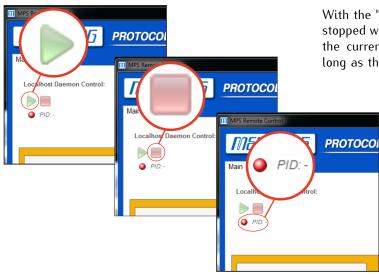
The main tab consists of four functional areas.



The individual areas will be described in the following sections.

# 6.1.1 Localhost Daemon Control

If the Remote Control Interface was started on a Linux system, the simulation service can be started, stopped and monitored in this area. This function is only available, when using Linux, since it is not available on Windows systems.



With the "Play" button, the service can be started and stopped with the "Stop" button. In the "PID" area, both, the current status and process-ID are displayed, as long as the service is running.

# 6.1.2 Manual Remote Connection

If the service does not automatically appear in the overview (4), i.e. due to blocked UDP-Ports, the connection to a simulation service can also be done manually. To do so, enter the IP address of the simulation computer in this area and click on the button which is used to establish the connection. Now, the window for the connection (user selection, password entry) should appear. More information can be found in the description of overview (4).

# 6.1.3 Remote Control Settings

To open a new window with the title "Preferences" click on the gearwheel icon. In this window you can make general settings for the Remote Control Interface.

OL SIMULATOR		
Preferences	<u> </u>	
I Save & Restore open connection	s	
UDP Listening Port (def.: 65353): TCP Source Port (def.: 63625):	65353 63625	
Default Configuration Location: Default Statistics Location:	C:\Users\thorn\Documents/ C:\Users\thorn\Documents/	
Status. Omme	Cancel OK	

# **Configuration Options:**

#### Save & Restore open connections

If this function is activated, all open connections will be saved when the Remote Control Interface is terminated and automatically restored at the next start.

#### **UDP** Listening Port

The simulation service sends (if enabled) UDP broadcast packets with general information about the service to the network. In this field the corresponding source port can be configured. By default, port 65353 is used. Attention: Once the setting has been changed, only the services which use the same destination port will be detected automatically! Therefore, remember to also change the settings for the service. The required steps are explained in chapter "Connection Tab".

# TCP Source Port

A connection to a simulation service is set up with the help of the transmission protocol "TCP". The source port which should be used can be set under "TCP Source Port". As default, port 63625 is used.

#### Default Configuration Location

The default target path for group configurations can be selected under "Default Configuration Location".

#### **Default Statistics Location**

The target path for saved statistical files can be selected under "Default Statistics Location".

# 6.1.4 Overview of detected simulation services

Automatically detected or manually registered services are displayed in the service overview (4).



The following options are available to connect to one of the services:

- Double click the Meinberg Star Icon
- Left click on the blue arrow icon of the service  $\rightarrow$  Connect
- Right click on the panel of the service  $\rightarrow$  Connect

To establish a connection, a connection window will appear, in which you can make the following settings:

#### Setting options:

#### Anonymous Login

An anonymous login can only be made without user name and password. This function is only possible if it is activated in the simulation service.

#### Dest. Port

"Dest. Port" stands for the destination-port of the TCP connection and can only be configured, if the service was added manually. For an automatically detected service the field is already filled in.

#### Type

In the field "Type" you can select the user type. "Public" users are introduced by previously mentioned UDP packets, whereas "Private" (secret) users remain unknown and have to be entered manually by the respective user. The type is determined once at each user creation.

#### Name

Depending on the previously selected user type you can either choose a public user or enter your private user name.

#### Password

In this field type in your personal user password.

c	onnect to: 172.16.100.81	×
	Anonymous Login	
	Dest. Port (def.: 63624):	63624
	Туре:	Public 🔻
	Name:	<b></b>
	Password:	
		Cancel OK

#### Confirm your entry with "OK".

#### Please Note:

Upon delivery, only the user "root" without password exists. After the first login with the user name "root", you can change the user database as desired.

# 6.2 Connection Tab

After having successfully established a connection with a simulation service, the connection tab will open up.

🕂 🕅 🗶 🖉	li 🕞	💌 🔳 Þ 📃 1	A 😼		User: root	۵ 🐳
Status ID	Owner Mode	Units Interface	Netw. Protocol	First Address Protocol Para	ameters Ru	intime
		_	_			
		2	2			
Summarized Statistics						12
		РТР:		PTP Unicast:		
MAC Resolution (ARP/ND		PTP: Announces sent:	0(0.00/sec)	<b>PTP Unicast:</b> Transmission Requests sent:	0	
MAC Resolution (ARP/ND Requests sent:	)P):		0(0.00/sec) 0(0.00/sec)		0	
MAC Resolution (ARP/ND Requests sent: Responses received:	0 <b>P):</b>	Announces sent:		Transmission Requests sent:		
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out:	1 <b>P):</b> 0 0	Announces sent: Syncs sent:	0 (0.00/sec)	Transmission Requests sent: Transmission Grants received:	0	
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out: Responses unrelatable:	1 <b>P):</b> 0 0	Announces sent: Syncs sent: Follow Ups sent:	0 (0.00/sec) 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Denials received:	0	ia I
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received:	1 <b>P):</b> 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out:	0 0 0	
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received:	<b>IP):</b> 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Responses received: (P)Delay Requests timed out:	0(0.00/sec) 0(0.00/sec) 0(0.00/sec) 0(0.00%) 0(0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Grants unrelatable:	0 0 0	
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received: Responses sent:	<b>IP):</b> 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Responses received: (P)Delay Requests timed out:	0(0.00/sec) 0(0.00/sec) 0(0.00/sec) 0(0.00%) 0(0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Grants unrelatable:	0 0 0	
MAC Resolution (ARP/ND equests sent: lesponses received: lesponses unreliable: lequests received: lesponses sent: VTP:	<b>IP):</b> 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Responses received: (P)Delay Requests timed out:	0(0.00/sec) 0(0.00/sec) 0(0.00/sec) 0(0.00%) 0(0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Requests timed out: Transmission Requests timed out: Transmission Grants unrelatable: Transmission Cancels sent:	0 0 0 0	5
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received: Responses sent: VTP: Requests sent:	<b>IPJ:</b> 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Responses received: (P)Delay Responses unrelatab	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00%) 0 (0.00%) 0	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests imed out Transmission Grants unrelatable: Transmission Cancels sent: Transmission Requests received:	0 0 0 0	i.
MAC Resolution (ARP/ND Requests sent: Requests timed out: Requests timed out: Responses unrelatable: Requests received. Responses sent: Requests sent: Requests sent: Responses received:	P): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Responses received: (P)Delay Responses unrelatab Announces received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00%) 0 (0.00%) 0 (0.00%) 0 0 (0.00%) 0 (0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Requests timed out: Transmission Requests timed out: Transmission Cancels sent: Transmission Requests received: Transmission Grants sent:	0 0 0 0 0	ι.
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out: Requests received: Requests received: Requests sent: Responses sent: Responses received: Requests timed out:	P): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Requests timed out (P)Delay Requests timed out (P)Delay Responses unrelatat Announces received: Rogue Announces received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00%) 0 (0.00%) 0 0 0 (0.00%) 0 0 0 (0.00/sec) 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Requests timed out: Transmission Requests timed out: Transmission Grants unrelatable: Transmission Requests received: Transmission Grants sent: Transmission Genits sent:		ja I
MAC Resolution (ARP/ND Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received: Requests sent: Requests sent: Requests timed out: Responses unrelatable:	P): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Responses received: (P)Delay Responses unrelatab Announces received: Rogue Announces received: Syncs received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00%) 0 (0.00%) 0 (0.00%) 0 (0.00%) 0 (0.00%) 0 (0.00%) 0 (0.00%) 0 (0.00/sec) 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Requests timed out: Transmission Requests timed out: Transmission Grants unrelatable: Transmission Requests received: Transmission Grants sent: Transmission Genits sent:		μά.
MAC Resolution (ARP/ND Requests sent: Requests timed out: Responses unrelatable: Requests received: Responses sent: Requests sent: Requests sent: Requests sent: Requests could Requests received: Requests received: Requests received:	P): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Announces sent: Syncs sent: (P)Delay Requests sent: (P)Delay Requests the dout: (P)Delay Requests the dout: (P)Delay Responses unrelatab Announces received: Rogue Announces received: Syncs received: Follow Ups received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00%) 0 (0.00%) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Requests timed out: Transmission Requests timed out: Transmission Cancels sent: Transmission Cancels sent: Transmission Grants sent: Transmission Cancels received:		
MAC Resolution (ARP/ND Requests sent: Requests timed out: Responses unrelatable: Requests received: Responses sent: Requests sent: Requests sent: Requests sent: Requests could Requests received: Requests received: Requests received:	P): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Requests timed out (P)Delay Responses unrelatat (P)Delay Responses unrelatat Announces received: Rogue Announces received: Syncs received: Follow Ups received: (P)Delay Requests received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00%) 0 (0.00%) 0 0 (0.00%) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Requests timed out: Transmission Requests timed out: Transmission Grants unrelatable: Transmission Cancels sent: Transmission Grants sent: Transmission Grants sent: Transmission Cancels received: <b>Miscellaneous:</b>		
Summarized Statistics MAC Resolution (ARP/hD Requests sent: Responses received: Requests incolution Responses unrelatable: Responses sent: NTP: Requests sent: Responses received: Requests incolution: Responses unrelatable: Requests received: Responses sent:	P): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Announces sent: Syncs sent: Follow Ups sent: (P)Delay Requests sent: (P)Delay Requests timed out (P)Delay Responses unrelatat (P)Delay Responses unrelatat Announces received: Rogue Announces received: Syncs received: Follow Ups received: (P)Delay Requests received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00%) 0 (0.00%) 0 0 (0.00%) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Requests timed out Transmission Requests timed out Transmission Cancels sent: Transmission Cancels sent: Transmission Requests received: Transmission Grants sent: Transmission Cancels received: Miscellaneous: Simulated Falures:		ι.

In area 1, the main menu to configure, control and monitor the simulation service, is displayed.

	1			
1	÷	Create a new simulation group		
2		Edit an available group		
3	×	Delete the selected group(s)		
4	*	Deletion of all available groups		
5	Opening of a group configuration file			
6		Saving the current group configuration		
7		Starting all Groups		
8		Stopping all Groups		
9		Starting the selected Group(s)		
10		Stopping the selected Group(s)		
11	R	Status details of the selected Group(s)		
12		Statistics / Figures of the selected Group(s)		
13		Resetting all Group Statistics		
14		Resetting Statistics of the selected Group(s)		
15	<b>i</b>	Default settings of the simulation service		
16		Disconnect		

The following chart shows the individual symbols and their fundamental functions.

# 6.2.1 Symbol 'Add' - Create a new simulation group

By clicking on the symbol "Add", a window to perform group configurations opens up. This window is divided into a main tab (Main), a special tab (Special) and other protocol specific tabs (NTP, PTP...).

## Main Tab (Main)

Main	Special	NTP
Simulation Mo	de:	NTP 🔹
Group Name:		Unit Group 24
Simulated Uni	ts:	10
Network Interfa	ace:	eth0 💌
MAC Cache:		Per Unit 👻
MAC Cache Ti	meout:	60 sec
Network Proto	col:	IPv4 -
First MAC Addr	ress:	EC:46:70:FF:00:5C
Last MAC Addr	ress:	EC:46:70:FF:00:65
First IP Addres	IS:	172.83.23.5
Last IP Addres	S:	172.83.23.14
Subnet Mask:		16 bits
Network IP Add	dress:	172.83.0.0
Broadcast IP A	ddress:	172.83.255.255
🔲 Gateway		
Gateway IP Ad	dress:	172.83.255.254
DSCP:		Default PHB (0x00)
TTL / Hop Lim	it:	64
Request Time	out	1000 ms
		Cancel OK

#### Simulation Mode

Simulation mode (NTP or PTP). Depending on the selected mode, additional protocol specific tabs will be faded in or hidden.

# Group Name Name of the group.

## Simulated Units

Number of units to be simulated (i.e. NTP Clients or PTP Slaves). For each additional simulated unit the configured MAC and IP address will be incremented.

## Network Interface

The network adapter which shall be used.

# MAC Cache

Type of the simulated MAC address storage. Depending on the selection, a separate MAC cache per simulated unit (Per Unit) or total cache per group (Per Group) will be created.

## MAC Cache Timeout

The validity period of an entry in the MAC cache, in seconds.

# Network Protocol

The network protocol which shall be used (IPv4, IPv6, IEEE 802.3). Depending on the selected protocol a MAC and / or IP address must be configured subsequently.

# First MAC Address

MAC-address of the first simulation unit. The calculated MAC address of the last unit will be displayed in the field "Last MAC Address".

# First IP Address

IP address of the first simulation unit. The calculated IP address of the last unit will be displayed in the field "Last IP Address". Depending on the selected network protocol, an IPv4 or Ipv6 address must be configured.

#### Subnet Mask / Network Prefix

Number of netmask bits. Depending on the configuration, a corresponding network address will be displayed in the field "Network IP Address".

## Gateway

Activation of the gateway configuration. At activated gateway, the corresponding address of the gateway to be used, can be configured in the next field "Gateway IP Address".

# <u>DSCP</u>

Differentiated Service Code Point (Per Hop Behavior), which can be used for prioritization of IP packets in switches.

# TTL/Hop Limit

TTL (Time to live) determines the number of possible hops between start- and end nodes of network packets.

#### **Request Timeout**

Standard validity period of a request in milliseconds (i.e. NTP Request), before it is marked as unanswered.

#### Special Tab (Special)

In the tab "Special", special features such as VLAN, failure simulation or Date-/Time- simulation can be switched on or off and configured. If the features are switched off, the corresponding configuration fields will be deactivated.

Main Special	PTP		
✓ VLAN Tagging			
Priority (PCP):	1: Best Effor	t	•
Drop Eligible:	0		•
ID:	0		
Ignore Untagged Packets			
Failure Simulation			
Time Between Failures (TBF):	300	to 360	sec
Time To Recover (TTR):	30	to 35	sec
☑ Date/Time Simulation			
Simulated Date:	31.01.2016		
Simulated Time:	23	: 50	
Leap Second:	None		•
		Cancel	ОК

VLAN Tagging

Priority (PCP) Prioritization of VLAN packets.

Drop Eligible Setting the Drop Eligible Bits (dropping of packets in case of congestion).

 $\frac{\text{ID}}{\text{ID}}$  of the VLAN tag (0-4095)

Ignore Untagged Packets Prevent the reception of untagged packets.

## Failure Simulation

Time Between Failures (TBF): Period of time between two simulated failures of a unit in seconds.

Time To Recover (TTR) Period of time between the beginning of a simulated failure and the recovery of a unit in seconds.

Date/Time Simulation

<u>Simulated Date</u> Date of the simulated group.

<u>Simulated Time</u> Time of the simulated group.

Leap Second

Indication, whether for the next possible leap second insertion point, a positive or negative leap second shall be inserted.

# NTP Tab (NTP)

Depending on the selected simulation mode, you can make specific settings for NTP clients or server in this tab.

Main	Special	NTP
Stratum:		1
Precision:		0.000001s (-20)
Root Delay:		1000 us
Root Dispersio	on:	10000 us
		Reference Clock
Reference ID:		Custom
		MPS
Source Port:		Standard (123)
Client Simul	lation	
Server IP Addre	ess:	172.83.23.23
Polling Interval	l:	Custom 👻
Custom Interva	al:	100 ms
		Cancel OK

#### Stratum

The stratum value (NTP server level) of a simulated NTP server.

#### Precision

The time precision which the server announces to the outside.

#### Root Delay

Estimated round trip delay to the primary reference clock.

#### Root Dispersion

Greatest possible time error in relation to the primary reference clock.

#### Reference ID

ID of the current reference, in form of a reference clock type, an IPv4 address, a MD5 Hash (IPv6) or an unsynchronized condition.

#### Source Port

Source port of outgoing NTP packets, which is to be used.

# Client Simulation

Switching the NTP client simulation on or off. Depending on the condition, the following entry fields are activated or deactivated. Independent from the client simulation, the server function is basically always activated.

#### Server IP Address

IP address of the NTP server, which shall be tested.

# Polling Interval

NTP polling mode (user-defined, fast sync, standard). Depending on the selected mode, different entry fields are faded in or hidden.

Client Simulation			Client Simulation		
Server IP Address:	172.26.0.1		Server IP Address:	172.26.0.1	
Polling Interval:	Custom		Polling Interval:	Fast Sync 🗸	
Custom Interval:	1000 ms		Fast Sync Interval:	100	ms
Client Simulation		]	Fast Sync Duration:	50	sec
Server IP Address:	172.26.0.1		Fast Sync Target Percentage:	90	%
Polling Interval:	4 (16s) •		Fast Sync Default Interval:	15	sec

In the user-defined mode, the length of the polling interval (user-defined interval) must be specified in milliseconds. Next to the "Fast Sync Interval" in milliseconds the duration (Fast Sync Duration) in seconds, the target percentage of answered requests, as well as the standard interval (Fast Sync Default Interval) after the end of the duration and fulfillment of the target percentage are needed in seconds, in the "Fast Sync" mode.

# PTP Tab (PTP)

Depending on the selected simulation mode, you can make specific settings for PTP in this tab.

#### Transmission Type

Transmission type of PTP packets (Unicast or Multicast). Depending on the selected "Transmission Type" different control panels are faded in or hidden.

Main Special PTF			Main	Special	PTP		
Transmission Type:	Unicast		Trans	smission Type:	Multicast		•
Clock Type:	Slave	•	Clock	k Type:	Slave		•
Profile:	Custom	•	Profil	e:	Custom		•
Timestamping Mechanism:	One-Step	•	Time	stamping Mechanism:	One-Step		•
Domain Number:	0		Dom	ain Number:	0		
Announce Interval:	0 (1/s)	•	Anno	unce Receipt Timeout:	3		Intervals
Sync Interval:	0 (1/s)	•	(P)De	elay Request Interval:	0 (1/s)		•
(P)Delay Request Interval:	0 (1/s)	•	Delay	Mechanism:	E2E		•
Transmission Duration:	60	sec	V Hy	brid Mode			
🗐 Unicast Load Balancing			UTC	Offset	36		sec
Group IDs:	0,1,255						
Recommendation Validity:	5	Intervals					
✓ Avoid Master Hopping							
Primary Master Address	172.26.0.1						
Alternate Master							
Alternate Master Address	172.26.0.2						
UTC Offset	36	sec					
	Cancel	OK				Cancel	OK

# Clock Type

Clock type of the simulated unit(s). For the transmission via unicast, you can select from the clock types "Slave", "Master" and "Controller" (Unicast Load Balancer). In the Multicast mode you can as well choose between "Slave" and "Master". Additionally, the type "Auto" is available, which automatically decides between "Slave" and "Master" (Best Master Clock Algorithm). Also at the selection of the clock type, different control panels are faded in or hidden, and possible additionally required configuration tabs are displayed.

# <u>Profile</u>

Configuration set, or PTP profile. Depending on the selected transmission type you can choose between "Telecom G.8265.1" and "SMPTE" (Unicast) or "Power C37.228", "Telecom G.8275.1" and "SMPTE" (Multicast). When you select a profile, appropriate standard defined parameters are preset and possible additionally required control panels faded in. Profile specific parameters will be explained in detail, at the end of this chapter.

#### Timestamping Mechanism

Timestamping mechanism. The possibility to choose between "One-Step" and "Two-Step". Follow-Up packets are only generated in the "Two-Step" procedure.

#### Domain Number

PTP domain number. By using the domain number, you can separate the PTP traffic onto different domains.

## Announce Receipt Timeout (Multicast)

Number of "announce" intervals, which a simulated device is waiting for, before it marks a detected "Master" as passive and reacts in the appropriate way depending on the set clock type.

#### Announce Interval (Multicast Master, Auto / Unicast Slave, Controller)

Interval that sends out "announce" packets. In the "Unicast" mode this parameter is configured on the "Slave's" side and is requested from the corresponding "Master" by the "Slave". In the "Multicast" mode, the "Announce Interval" is configured directly at the "Master".

## Sync Interval (Multicast Master, Auto / Unicast Slave)

Interval that sends out "Sync" (and "Follow-up") packets. In the "Unicast" mode this parameter is configured on the "Slave's" side and is requested from the corresponding "Master" by the "Slave". In the "Multicast" mode, the "Sync Interval" is configured directly at the "Master".

## (P)Delay Request Interval (Multicast / Unicast Slave)

Interval that sends out "(Peer) Delay Requests" packets. In the "Unicast" mode this parameter is configured on the "Slave's" side and is requested from the corresponding "Master" by the "Slave". In the "Multicast" mode, the interval is configured for all clock types, for the "Master" it means the maximum possible request rate and for the "Slave" it means the actually used rate.

## Delay Mechanism (Multicast)

The mechanism which is to be used for the calculation of the delay. In "E2E" (End to End) mode, "Delay Requests" and "Delay Response" packets are send, in "P2P" (Peer to Peer) mode, "Peer Delay Requests" and "Peer Delay Response" packets.

## Hybrid Mode (Multicast)

If "Hybrid Mode" is activated, "Delay Request" packets are directly send to the Master via Unicast, to avoid unnecessary multicast traffic.

## Max. Requests (Unicast Master)

Maximum number of incoming "Delay Request" packets per second, which a simulated Unicast Master is able to handle. This parameter is only necessary, if PTP Unicast "Load Balancing" (ULB) is used.

## Transmission Duration (Unicast Slave, Controller)

Validity of a Unicast packet subscription (Announce/Sync/Delay Request) in seconds.

# Unicast Load Balancing (Unicast Slave)

If ULB is activated, the entry fields "Group IDs", "Recommendation Validity" and "Avoid Master Hopping" are enabled and instead of "Primary Master Address", "Alternate Master" and "Alternate Master Address"; "Primary Controller Address", "Alternate Controller" and "Alternate Controller Address" are displayed. Furthermore, functionalities for the communication with unicast controllers are enabled by specific ULB TLVs.

#### Group IDs (Unicast Slave)

Accepted "Group IDs" of proposed Unicast Masters, at the use of ULB. 255 is to be used as "Wildcard Group ID".

#### Recommendation Validity (Unicast Slave)

Number of subscription intervals, for which a proposed Master is used. After expiry, a new request is send to the controller.

#### Avoid Master Hopping (Unicast Slave)

If activated, it prevents the simulated Slave to switch between two Masters, which are both being proposed due to their identical quality characteristics.

Primary Master Address (Unicast Slave) IP Address of the Unicast Master, which is to be used first.

Primary Controller Address (Unicast Slave - ULB)

IP Address of the Unicast Controller, which is to be used first.

#### Alternate Master (Unicast Slave)

Configuration activation of an alternate Unicast Master, which is only to be used, if the primary Master is not accessible.

#### Alternate Controller (Unicast Slave - ULB)

Configuration activation of an alternate Unicast Controller, which is only to be used, if the primary Controller is not accessible.

Alternate Master Address (Unicast Slave) IP Address of the Unicast Master, which is to be used alternatively.

Alternate Controller Address (Unicast Slave - ULB) IP Address of the Unicast Controller, which is to be used alternatively.

#### UTC Offset

Current difference of the TAI time scale to UTC, due to leap seconds. At the evaluation of PTP packets, the "UTC Offset" is used to calculate the "Delay" and the "Offset".

## Profile Version (C37.238 Profile)

The power profile version, which is to be used. Depending on the selected version, different and additional configuration possibilities are displayed in the tab C37.238.

Destination MAC Address (G.8275.1 Profile) The target MAC Address of PTP packets in the G.8275.1 Profile.

## PTP Unicast Load Balancing Reiter (PTP ULB)

In this tab, you can make specific configurations for the PTP Unicast Controller.

М	in Special PTP P ax. Recommendations: 5 ax. Utilization: 90 Controlled Masters: 1 First Controlled Master Address: 172.26.0.6 Group ID: 0 OK Cancel	97F ULB	N SV N ey	<u>lax. Recommendations</u> laximum number of recommended Masters, in an an- ver to a Slave request. <u>lax. Utilization</u> laximum utilization of the controlled Masters. After sceeding this limit value, a Master is no more recom- ended.
	1722801.0 1722802.0 1722803.0 Controlled Masters: First Controlled Master Address: Group ID: OK Cancel	1 172.26.0.6 0		
	172.26.0.1, 0 172.26.0.2, 0 172.26.0.3, 0 172.26.0.4, 0 172.26.0.5, 0	Cancel OK	+ ↓ ∑ ×	<ul> <li>Hinzufügen von Master(n)</li> <li>Master in der Liste nach oben versetzen</li> <li>Master in der Liste nach unten versetzen</li> <li>Master editieren</li> <li>Löschen der/des selektierten Master(s)</li> <li>Löschen aller Master</li> </ul>

# PTP Quality Tab (PTP Master)

In this tab you can configure the quality parameter of simulated PTP Masters, which, among others, are crucial for the result of the "Best Master Clock Algorithm" (BMCA).

Main Spe	cial PTP	,	PTP Quality		
Priority 1:		128			
Clock Class:		248			
Clock Accuracy:		0x2B (<= 1	0ms)	•	
Clock Variance:		65535			
Priority 2:		128			
Steps Removed:		0			
GM Clock ID:		EC:46:70:	FF:FE:FF:00:00		
Time Source:		0x60 (Hand	d-Set)	•	
Time Scale:		PTP		•	
🔲 Time Traceable					
E Frequency Tracea	ble				
			Cancel		ОК

#### Priority 1

Priority 1. First priority parameter in the BMCA. Value range: 0-255

#### Clock Class

Traceability of the time and frequency precision. Second quality parameter in the BMCA. Value range: 0-255.

<u>Clock Accuracy</u> <u>Clock accuracy</u>. Third quality parameter in the BMCA.

#### <u>Clock Variance</u>

Maximum possible clock variance. Calculated with the "Allan Deviation". Fourth quality parameter in the BMCA. Value range: 0-65535.

## Priority 2 Priority2. Fifth quality parameter in the BMCA. Value range: 0-255.

Steps Removed Number of "Boundary Clocks" between the Master and the Grandmaster.

<u>GM Clock ID</u> PTP Clock ID of the Grandmaster.

## Time Source

Time Source, i.e. "GPS". When selecting the time source "Custom", an additional entry field for a user-defined hexadecimal value fades in ("Custom Time Source").

## <u>Time Scale</u>

Used time scale. You can choose between the standard PTP time scale and any other scale.

<u>Time Traceable</u> Shows, if the current frequency can be traced back to a reference clock.

#### Frequency Traceable Indicates whether the current frequency is due to a reference clock.

# PTP SMPTE Tab (PTP SMPTE Master)

In this tab you can make specific settings for the Master operation in the SMPTE profile. The corresponding values will be taken over into the "Synchronization Metadata TLV".

Main Special	PTP PTP Quality PTP SMPTE
System Frame Rate:	29.97 Hz 💌 🍃
Master Locking Status:	1: Free Run 💌
Time Address Flags:	Drop Frame     Color Frame Indication
Current Local Offset:	+ • 3636 sec
Daily Jam Time:	18 x 10 min
	Current
Daylight Saving:	🗐 Next Discontinuity
	🗐 Previous Daily Jam Time
	Cancel OK

#### System Frame Rate

Standard frame rate of the simulated device. When choosing the framerate "Custom", an additional entry field for a user-defined rate in Hz fades in.

#### Master Locking Status

Additional information about the clock class, which shows the current synchronization status.

#### Time Address Flags

Divided in "Drop Frame" and "Color Frame Indication".

## Current Local Offset

Current Offset of the system time to the local time in seconds.

## Daily Jam Time

Point in local time (in ten-minute intervals) since midnight, for jamming ST 12-1 time address to local time.

## Dailight Saving

Divided in "Current", "Next Discontinuity" and "Previous Daily Jam Time". Shows if at these times it is either summer- or wintertime.

# PTP C37.238 Tab (PTP C37.238 Master)

In this tab you can make specific settings for the Master operation in Profile C37.238. The corresponding values are taken over into the "C.37.238 TLV". Depending on the selected profile version ("Profile Version"), different configuration possibilities are offered.

	(	237.23	8-20	011			
Main	Special	PTP	F	PTP Quali	ty	PTP C37.2	38
Grandmaste	r ID:	3					De l
Network Tim	e Inaccuracy:	0				ns	
Alternate Tim	ne Offset:	+	-▼ 36	00		sec	
Alternate Tim	ne Scale Name:	CET	ſ				
	1	C	27.2	38-re	vioi	00	
				30-re			DTD 027 020
<u> </u>	/lain Sp	pecial	PTP		PIP	Quality	PTP C37.238
	Grandmaster ID:			3			
	Network Time Ina	ccuracy:		0			ns
	STD UTC Offset:			+ •	3600		sec
	STD Time Zone N	ame:		CET			
I	Includes DST						
				1		<ul> <li>hour of data</li> </ul>	ay (UTC)
	STD Time Adjustn	ient:		0		day of we	ek (0 = Sunday)
				4		week of m	nonth (4 = last week)
				9		month (0	= January)
	DST UTC Offset:			+ •	7200	_	sec
				1		hour of da	iy (UTC)
	DS Time Adjustme	ent		0		day of we	ek (0 = Sunday)
				4		• week of m	nonth (4 = last week)
				2		month (0	= January)
	DS Time Zone Na	me:		CEST			
_							
_							
_							
_							
						Cancel	ОК

<u>Grandmaster ID</u> ID of the simulated "Power Profile Grandmaster". Value range: 0–255.

Network Time Inaccuracy Know inaccuracy of the network time in nanoseconds.

Alternate Time Offset (C37.238-2011) Offset of an individual time scale to UTC in seconds.

Alternate Time Scale Name (C37.238-2011) Name of the individual time scale.

STD UTC Offset (C37.238-revision) Standard offset to UTC, at activated "Daylight Saving Time" in seconds.

STD Time Zone Name (C37.238-revision) Name of the time zone, at inactivated "Daylight Saving Time".

#### Includes DST (C37.238-revision)

Shows if a time zone should be configured for the "Daylight Saving Time" or not.

#### STD Time Adjustment (C37.238-revision)

The time, when it is switched from "Daylight Saving Time" to standard time. Is divided in "hour of day", "day of week", "week of month" and "month".

# DST UTC Offset (C37.238-revision)

Offset to UTC, at activated "Daylight Saving Time" in seconds.

#### DS Time Adjustment (C37.238-revision)

The time, when it is switched from standard time to "Daylight Saving Time". Is divided in "hour of day", "day of week", "week of month" and "month".

#### DS Time Zone Name (C37.238-revision)

Name of the time zone at activated "Daylight Saving Time".

# 6.2.2 Symbol 'Edit' - Edit an available group

When you click on the symbol "Edit", the window for group configuration, which was explained in detail in the previous chapter, opens up. In this window, all previously made configurations can be changed at any time later.

# 6.2.3 Symbol 'Delete' - Delete the selected group(s)

When you click on the symbol "Delete", the selected group or groups will be deleted. Ongoing groups will automatically be stopped before deletion. Please note, that deleted groups cannot be restored.

# 6.2.4 Symbol 'Delete All' - Deletion of all available groups

When you click on the symbol "Delete All", all configured groups will be deleted. Ongoing groups will automatically be stopped before deletion. Please note, that deleted groups cannot be restored.

# 6.2.5 Symbol 'Open' - Opening of a group configuration file

When you click on the symbol "Open", a new window opens up to select a saved group configuration (\*.mps). After your selection and a subsequent click on "Open" the current group configuration is deleted and the saved configuration is uploaded.

Open saved unit group configu	ration	×
💭 🗢 🕌 « Eigene Dokume	ente ► Meinberg ► mpsrc ► Savefiles	✓ 4 Savefiles durchsuchen
Organisieren 👻 Neuer Ordn	er 🖉	III 🕶 🗌 🔞
<ul> <li>★ Favoriten</li> <li>⇒ Bibliotheken</li> <li>⇒ Bilder</li> <li>⇒ Dokumente</li> </ul>	Name	
Okumente     Musik     Videos     Computer		
Netzwerk		Wählen Sie eine Datei für die Vorschau aus.
Datei <u>n</u> ame:	< >	MPS configuration file (".mps;"      Offnen     Abbrechen

# 6.2.6 Symbol 'Save' - Saving the current group configuration

When you click on "Save", a window opens up to save the current group configuration. After you enter the file name and click on the button "Save", the current configuration is saved.

# 6.2.7 Symbol 'Run All' - Starting all Groups

When you click on the symbol "Run All", all listed simulation groups are started.

# 6.2.8 Symbol 'Stop All' - Stopping all Groups

When you click on the symbol "Stop All", all listed simulation groups are stopped.

# 6.2.9 Symbol 'Run' - Starting the selected Group(s)

When you click on the symbol "Run", all the selected simulation groups are started.

# 6.2.10 Symbol 'Stop' - Stopping the selected Group(s)

When you click on the symbol "Stop", all the selected simulation groups are stopped.

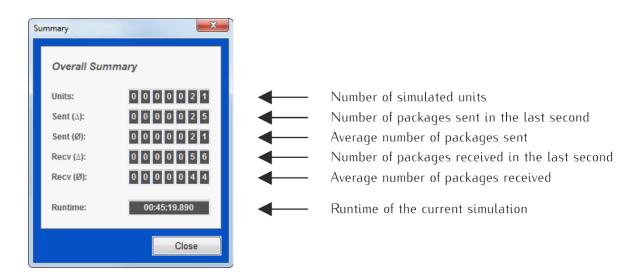
# 6.2.11 Symbol 'Status Details' - Status details of the selected Group(s)

When you click on the symbol "Status Details", a new window opens up, which displays details about the current simulation status. Depending on the simulation type (NTP, PTP Master / Slave, PTP Controller), the displayed information differs from one another. Using the navigation buttons (arrow left, arrow right) you can select the device, for which the details should be displayed.

NTP		PTP Master / Slave
Unit Group 1 Status Details	Unit Group 2 Status Details	×
Device Information:	Overview:	Master Information:
Poling Type: Custom Poling Type: Custom Poling Intervat: 1000ms Reference Information: Address: 172.27.38.200 Source Port: 123 Leap: - Version: NTPv4 Stratum: 12 Presion: 105 Root Delay: 1007us Root Delay: 1007us Root Dispersion: 9994us Reference ID: Unsynchronized Close Vinit Group 3 Status Details Voerview: Initializing: 0 Faulty: 0 Disabled: 0 Listening: 1 Pre-Master: 0 Master: 0 Passive: 0 Stave: 0	Initializing:       0         Faulty:       0         Disabled:       0         Listening:       0         Pre-Master:       0         Master:       0         Passive:       0         Uncalibrated:       0         Stave:       10         Device Information:       0         (2)       172.16.38.210         Port State:       Slave         Port State:       Slave         Port State:       Slave         PTP Controller       10         Device Information:       10         Or State:       Slave         Port State:       Slave         PTP Controller       10         Device Information:       10         Device Information:       10         Device Information:       10         Device State:       Slave         Port State:       Slave         Disability:       Slav	Address: 172.27.38.201 Clock ID: EC:46:70.FF:FF:FF:10.01 Priority 11: 138 Clock Accuracy: 0:28 Clock Variance: 6:535 Priority 2 138 GM Clock ID: EC:46:70.FF:FF:FF:00.00 Announce Intv: 1s (28.9 sec) Sync Intv: 1s (41.8 sec) Request Intv: 1s (41.8 sec) Close
Device Information:		
Port State: Listening		
	JI	Close

# 6.2.12 Symbol 'Statistics Summary' - Statistics / Figures of the selected Group(s)

When you click on the symbol "Statistics Summary" a window opens up, which displays a summary of the current simulation statistics. If you have not selected a simulation group, a complete statistics is displayed. If a group is selected, only a group specific statistics is shown.



# 6.2.13 Symbol 'Reset All Statistics' - Resetting all Groups

When you click on the symbol "Reset All Statistics", all the statistics are reset. Please note, that a reset cannot be reversed. This is why you should not forget to save the statistics before you reset them.

# 6.2.14 Symbol 'Reset Statistics' - Resetting Statistics of the selected Group(s)

When you click on the symbol "Reset Statistics", the statistics of the selected group(s) are reset. Please note, that a reset cannot be reversed. This is why you should not forget to save the statistics before you reset them.

# 6.2.15 Symbol 'Daemon Preferences' - Default settings of the simulation service

When you click on the symbol "Daemon Preferences", a new window opens up where you can configure the simulation service. This is divided into the following five tabs:

#### **Basic Settings (General):**

In this tab you can configure general settings, e.g. the type of user registration.

17	2.16.101.119 P	references					X		
	General	User Database	Interfa	aces	Addressing	Statistics			
	Anonymous Login (Disable User Authentication)								
	Send Da	aemon Information p	periodio	ally (U	DP Broadcast)				
	UDP Source	ce Port (def.: 65352	2):	65352	2				
	UDP Dest.	. Port (def.: 63353):		65353	}				
	TCP Source	ce Port (def.: 63624	):	63624	ļ				
				[	Cancel	ОК			

Anonymous Login (Disable User Authentication) If you activate the anonymous login, the user authentication will be disabled. Users will automatically login as "Anonymous".

Send Daemon Information perdiodically (UDP Broadcast) Switching on and off the every second transmission of UDP broadcast packets, by which simulation services are detected on the network automatically from the "Remote Control Interface".

#### UDP Source Port

UDP source port for the transmission of UDP Broadcast Packets. Default settings: 65352.

#### UDP Dest. Port

UDP destination port, to which UDP Broadcast Packets are send. Default settings: 65353.

#### TCP Source Port

TCP source port, which is used to establish a connection to the "Remote Control Interfaces".

#### User Management (User Database)

In this tab you can create, edit or delete a user profile. When registering for the first time, only the user: "root" without a password exists. If you want to create an additional profile click the "+" button.

General	User Database	Interfaces	Addressing	Statistics	
Name:		admir	1		
Туре:		Admir	nistrator	Ŧ	
Private					
Password:		••••	•		
Confirm Pas	ssword:	••••	•		
OK	Cancel				
Name	Туре		Private		74
admin	Admini	strator			2
user	Default	tUser			2
info	Info Us	er			

#### <u>Name</u>

Freely selectable user name.

#### Туре

The rights of a user depend on its user type. The "Administrator" has unlimited configuration rights. The "Default User" can basically use all the control functions, but is not allowed to configure the simulation service. The "Info User" can only view the statistics of the simulation groups.

#### <u>Private</u>

Switching the "Private" function on or off. "Private User" are not published via the UDP Broadcast Packets, they must be known and entered manually.

## Password / Confirm Password

Freely selectable password (min. 1 character). To confirm, reenter the selected password.

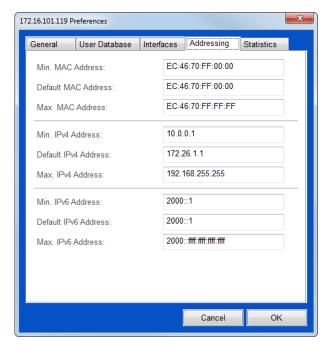
# Network Interfaces (Interfaces)

In this tab all the network interfaces of the simulation computer are listed. The use can assign an alias to each interface (i.e. network description). Furthermore, Name, MAC address, as well as all the assigned IP-addresses can be displayed.

2.16.101.119 F	references				<u> </u>
General	User Databas	se Interface	Addressing	Statistics	
Name:		et	0		
MAC Addr	ress:	54	:BE:F7:08:26:80		
IP Addres:	s(es):	10	.0.0.1	*	
Alias:	Ca	ncel			
Index	Name MAC	Address	Alias		X
2	eth0 54:BE	E:F7:08:26:80			
3		3:21:11:78:BE			
4	eth2 54:BE	E:F7:08:26:7F			
			Cancel	ОК	

# Network Addresses (Addressing)

In this tab you can configure limits and default values for MAC, IPv4 and IPv6 addresses.



Min. MAC Address Smallest configurable MAC address.

<u>Default MAC Address</u> Standard pre-set MAC address.

<u>Max. MAC Address</u> Biggest configurable MAC address.

<u>Min. IPv4 Address</u> Smallest configurable IPv4 address.

<u>Default IPv4 Address</u> Standard pre-set IPv4 address.

<u>Max. IPv4 Address</u> Biggest configurable IPv4 address.

<u>Min. IPv6 Address</u> Smallest configurable IPv6 address.

<u>Default IPv6 Address</u> Standard pre-set IPv6 address.

<u>Max. IPv6 Address</u> Biggest configurable IPv6 address.

# Statistics (Statistics)

.72.16.101.119 P	references					×
General	User Database	Interfa	ces	Addressing	Statistics	
Print Sta	atistics to stdout ev	ery sec	ond (-	s)		
Print Sta	atistics to file period	dically				
Interval:		[	30			sec
File:			/root/l	Neinberg/mpsro	c/Statistics/s	
				Cancel	ОК	

Print Statistics to stdout every second (-s) Switching on or off the "every second" data output of the simulation statistics to "stdout" (standard output).

Print Statistics to file periodically Switching on or off the cyclical recording of the simulation statistics.

#### <u>Interval</u>

Time period between two saving processes of simulation statistics in seconds.

# <u>File</u>

File path and file name of the cyclically recorded statistics file.

# 6.2.16 Symbol 'Disconnect'

By clicking on the symbol "Disconnect" a connection to the simulation service is closed.

# 6.2.17 Group Overview

In area 2 (see chapter "Connection Tab") you will find a list of configured simulation groups. Next to the detailed information on the simulation parameters, it also contains a status display (green = active, red = inactive), information about the owner of the group (Owner) and the current runtime (Runtime) of the simulation.

Right-click on the headline to fade-in or hide individual columns.

With a **Right-click** on individual or several selected groups a context menu appears. This offers an additional possibility to perform functions from the main menu.

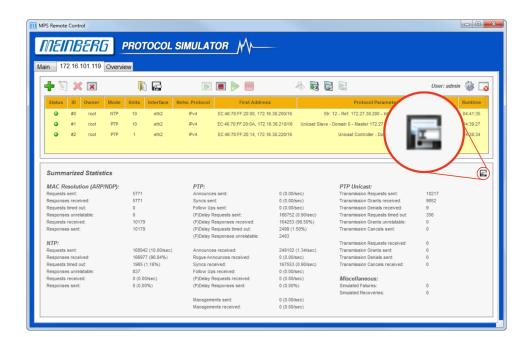
With a **Double-click** on one of the simulation groups you get directly to the edit window of the group.

IPS Remote Control							
neinberg P	ROTOCOL	SIMULATOR M					
in 172.16.101.119 Overvie	w						
+ 🛛 🗶 🗷	N 🖬	D 🔳 🕨	1 4		i 🗟 🗟	User:	admin 🎲 🗔
Status ID Owner Mode	Units Interface	Netw. Protocol First /	Address (2		Protocol Parar	neters	Runtime
2 #0 rect NTP	10 (2) 40	Dua 20487055700	1 172 16 36 2		Str. 12 - Ref. 172.27 38.200 - k	w. 1000ms - Port 123	04:16:12
<ul> <li>● #1 root #77*</li> <li>● #2 root #77*</li> </ul>	18 p.2 1 eV	Edit Group Delete Group Stop Group Reset Group Statistics Status Details Statistics Summary	A, 172.16.38.210/16 A, 172.16.38.220/16	< < < <		18.201 - Ann 1a, Sync 1a, Rao ain 0 - Ann 1a	
				1	Units		
Unit Group 1 Statistics				1	Interface MAC Cache		
MAC Resolution (ARP/NDP):		PTP:		1	Netw. Protocol		
Requests sent	2600	Announces sent	0 (0.00/sec	1	First Address	sent: 0	
Responses received:	2600	Synca sent:	0 (0.00/sec 0 (0.00/sec		Gateway	ceived: 0	
Requests timed out: Responses unrelatable:	0	Follow Ups sent: (P)Delay Requests sent:	0 (0.00/sec		DSCP	ceived: 0 timed out: 0	
Requests received:	4564	(P)Delay Responses received			Timeout (ms)	relatable: 0	
Responses sent:	4564	(P)Delay Requests timed out:	0 (0.00%)	$\checkmark$	Protocol Parameters	ent: 0	
		(P)Delay Responses unrelatat	ie: 0		VLAN		
NTP:	1277774 (48 00/s c )	Associate constant	0 (0.00/sec		Failure	received: 0	
Requests sent: Responses received:	157230 (10.00/sec) 155389 (96.83%)	Announces received: Rogue Announces received:	0 (0.00/sec 0 (0.00/sec		Dute	nt 0	
Requests timed out:	1841 (1.17%)	Syncs received.	0 (0.00/sec			cceived: 0	
Responses unrelatable:	793	Follow Ups received:	0 (0.00/sec	-	Tartan Ne		
Requests received.	0 (0.00/sec)	(P)Delay Requests received.	0 (0.00/sec		Reset		
Responses sent	0 (0.00%)	(P)Delay Responses sent	0 (0.00%)		On Galeon and es.	0	
		Managements sent:	0 (0.00/sec)		Simulated Recoveries:	0	
		Managements sent. Managements received:	0 (0.00/sec) 0 (0.00/sec)				
			- (				

# 6.2.18 Simulation Statistics

In area 3 (see chapter "Connection Tab") you will find an overview chart of the current simulation statistics. If in the group overview one or more groups are selected, the statistics will only be displayed for the selected group(s). Otherwise a summarized complete overview will be displayed. To deselect a selected group, left-click on the headline of the group overview.

To save the statistics click on the saving symbol (see graphic):



# 6.3 Overview Tab

In the overview tab, the groups which have been created on connected simulation services are displayed in a list. The overview tab is similar to the connection tab, the only difference is that is does not have the configuration menu. Double-click on one of the simulation groups and you will directly get to the corresponding connection tab. In addition, the saving symbol offers the possibility to save a summary of all simulation statistics.

neinberg	PRO	госо	L SIM	ULATOR	_M			
in 172.16.101.119 O	verview							
Daemon Status ID	Owner Mo	de Units	Interface	Netw. Protocol	First Address	Protocol Paramete	ers	Runtime
172.16.101.119 🔮 #0	admin NT	P 10	eth2	IPv4	EC:46:70:FF:00:00, 172.16.38.150/16	Str. 12 - Ref. 172.27.38.12 - Intv. 10	000ms - Port 123	00:00:51
172.16.101.119 🔮 #1	admin NT	P 10	eth2	IPv4	EC:46:70:FF:00:0A, 172,16,38,160/16	Str. 12 - Ref. 172.27.38.14 - Intv. 1	00ms - Port 123	00:00:34
172 16 101 119 @ #2	admin NT	P 10	eth2	IPv4		Str. 12 - Ref. 172.27.38.11 - Intv. 25		00:00:44
Summarized Statistics	5							12
Summarized Statistics			PTP:			PTP Unicast:		12
MAC Resolution (ARP/NE Requests sent:	- DP): 13		Annou	unces sent:	0 (0.00/sec)	Transmission Requests sent:	0	1
MAC Resolution (ARP/NE Requests sent: Responses received:	DP): 13 13		Annou Syncs	unces sent: s sent:	0 (0.00/sec)	Transmission Requests sent: Transmission Grants received:	0	
MAC Resolution (ARP/NL Requests sent: Responses received: Requests timed out:	<b>DP):</b> 13 13 0		Annou Syncs Follow	unces sent: s sent: v Ups sent:	0(0.00/sec) 0(0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Denials received:	0	1.
MAC Resolution (ARP/NE Requests sent: Responses received: Requests timed out: Responses unrelatable:	DP): 13 13 0 0		Annou Syncs Follow (P)Del	unces sent: s sent: v Ups sent: lay Requests sent:	0(0.00/sec) 0(0.00/sec) 0(0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out:	0 0	ž
MAC Resolution (ARP/NL Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received;	DP): 13 13 0 0 50		Annou Syncs Follow (P)Del (P)Del	unces sent: s sent: v Ups sent: lay Requests sent: lay Responses recei	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) ved: 0 (0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Grants unrelatable:	0 0 0	1
MAC Resolution (ARP/NE Requests sent: Responses received: Requests timed out: Responses unrelatable:	DP): 13 13 0 0		Annou Syncs Follow (P)Del (P)Del (P)Del	unces sent: s sent: v Ups sent: lay Requests sent: lay Responses recei lay Requests timed o	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) ved: 0 (0.00%) ut: 0 (0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out:	0 0	ι.
MAC Resolution (ARP/NL Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received;	DP): 13 13 0 0 50		Annou Syncs Follow (P)Del (P)Del (P)Del	unces sent: s sent: v Ups sent: lay Requests sent: lay Responses recei	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) ved: 0 (0.00%) ut: 0 (0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Grants unrelatable:	0 0 0	
MAC Resolution (ARP/NL Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received: Responses sent: NTP:	DP): 13 13 0 0 50	16/sec)	Annou Syncs Follow (P)Del (P)Del (P)Del (P)Del	unces sent: s sent: v Ups sent: lay Requests sent: lay Responses recei lay Requests timed o	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) ved: 0 (0.00%) ut: 0 (0.00%)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Grants unrelatable: Transmission Cancels sent:	0 0 0 0 0	ي ت
MAC Resolution (ARP/NL Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received: Responses sent: NTP: Requests sent:	DP): 13 13 0 0 50 50 50		Annou Syncs Follow (P)Del (P)Del (P)Del (P)Del (P)Del	unces sent: s sent: v Ups sent: lay Requests sent: lay Responses recei lay Requests timed o lay Responses unrel	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) ved: 0 (0.00%) ut: 0 (0.00%) atable: 0 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Grants unrelatable: Transmission Cancels sent: Transmission Requests received:	0 0 0 0 0	ι.
MAC Resolution (ARP/NL Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received: Responses sent:	DP): 13 13 0 50 50 4207 (81.	43%)	Annou Syncs Follow (P)Del (P)Del (P)Del (P)Del (P)Del (P)Del	unces sent: s sent: v Ups sent: lay Requests sent: lay Responses recei lay Responses unrel unces received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) ved: 0 (0.00%) ut: 0 (0.00%) atable: 0 0 (0.00/sec)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Grants unrelatable: Transmission Cancels sent: Transmission Grants sent:		ι.
MAC Resolution (ARP/NE Requests sent: Responses received: Responses unrelatable: Responses unrelatable: Requests received: Responses sent: NTP: Requests sent: Responses received: Responses received: Responses unrelatable:	7 13 13 0 0 50 50 4207 (81.1 4183 (99) 22 (0.529) 23	.43%) 6)	Annou Syncs Follow (P)Del (P)Del (P)Del (P)Del Annou Rogue Syncs Follow	unces sent: s sent: v Ups sent: lay Requests sent: lay Requests simed o lay Responses unrel unces received: Announces received s received: Ups received:	0 (0.001sec) 0 (0.001sec) 0 (0.001sec) 0 (0.001sec) wet: 0 (0.001se) stable: 0 0 (0.001sec) 0 (0.001sec) 0 (0.001sec) 0 (0.001sec)	Transmission Requests sent: Transmission Grants received: Transmission Denials received: Transmission Requests timed out: Transmission Cancels sent: Transmission Cancels sent: Transmission Grants sent: Transmission Grants sent: Transmission Cancels received:		j.
MAC Resolution (ARP/NE Requests sent: Responses received: Requests timed out: Responses unrelatable: Requests received: Responses sent: Responses sent: Responses neceived: Requests timed out: Responses unrelatable: Requests reveved:	- <b>DP):</b> 13 13 0 50 50 4207 (81: 4183 (99; 22 (0.529 23 0 (0.00/s/s)	.43%) 6) ec)	Annou Syncs Follow (P)Del (P)Del (P)Del (P)Del Annou Rogue Syncs Follow (P)Del	unces sent: s sent: // Ups sent: lay Requests sent: lay Responses recei lay Requests timed o lay Responses unrel unces received: s received: // Ups received: lay Requests received: lay Requests received:	0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) ut: 0 (0.00/s) atable: 0 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 0 (0.00/sec) 1 (	Transmission Requests sent: Transmission Granta received: Transmission Demiss received: Transmission Requests timed out: Transmission Cancels sent: Transmission Cancels sent: Transmission Grants sent: Transmission Grants sent: Transmission Grants sent: Transmission Cancels received: Miscellaneous:		
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