

IP

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bintec User's Guide - R Series
Version 1.0

Purpose This document is part of the user's guide to the installation and configuration of bintec gateways running software release 7.2.4 or later. For up-to-the-minute information and instructions concerning the latest software release, you should always read our **Release Notes**, especially when carrying out a software update to a later release level. The latest **Release Notes** can be found at www.funkwerk-ec.com.

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Guidelines and standards bintec gateways comply with the following guidelines and standards:

R&TTE Directive 1999/5/EG

CE marking for all EU countries and Switzerland

You will find detailed information in the Declarations of Conformity at www.funkwerk-ec.com.

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- 1 IP Menu 3**
- 2 Routing Submenu 5**
- 3 Static Settings Submenu 11**
- 4 Network Address Translation Submenu 13**
 - 4.1 Requested from OUTSIDE/INSIDE Submenu 14
- 5 UPnP Submenu 21**
- 6 Bandwidth Management (TDRC / Load Balancing / BOD) Submenu 25**
 - 6.1 TCP Download Rate Control (TDRC) Menu 25
 - 6.2 IP Load Balancing over Multiple Interfaces Submenu 32
 - 6.2.1 IP Routing List Submenu 35
 - 6.3 IP triggered Bandwidth on Demand (IP BOD) Submenu 38
 - 6.3.1 Filter Submenu 39
 - 6.3.2 Submenu Rules for BOD 42
 - 6.3.3 Configure Interfaces for BOD Submenu 45
- 7 IP Address Pool WAN (PPP) Submenu 47**
- 8 IP Address Pool LAN (DHCP) Submenu 49**
- 9 SNMP Submenu 53**
- 10 Remote Authentication (RADIUS/TACACS+) Submenu 57**
 - 10.1 RADIUS Authentication and Accounting Submenu 57
 - 10.2 TACACS+ Authentication and Authorization Submenu 63
- 11 DNS Submenu 71**



- 11.1 Static Hosts Submenu75
- 11.2 Forwarded Domains Submenu77
- 11.3 Dynamic Cache Submenu78
- 11.4 Advanced Settings Submenu80
- 11.5 Global Statistics Submenu81
- 12 DynDNS Submenu83**
- 13 Routing Protocols Submenu89**
 - 13.1 RIP Submenu90
 - 13.1.1 Static Settings Submenu91
 - 13.1.2 Timer Submenu93
 - 13.1.3 Filter Submenu95
- Index: IP99**

1 IP Menu

The *IP* menu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP]: IP Configuration	MyGateway
Routing Static Settings Network Address Translation UPnP Bandwidth Management (TDRC / Load Balancing / BOD) IP address pool WAN (PPP) IP address pool LAN (DHCP) SNMP Remote Authentication (RADIUS/TACACS+) DNS DynDNS Routing Protocols EXIT	

The *IP* main menu provides access to the submenus:

- ***ROUTING***
- ***STATIC SETTINGS***
- ***NETWORK ADDRESS TRANSLATION***
- ***UPNP***
- ***BANDWIDTH MANAGEMENT (TDRC / LOAD BALANCING / BOD)***
- ***IP ADDRESS POOL WAN (PPP)***
- ***IP ADDRESS POOL LAN (DHCP)***
- ***SNMP***
- ***REMOTE AUTHENTICATION (RADIUS/TACACS+)***
- ***DNS***
- ***DYNDNS***
- ***ROUTING PROTOCOLS***

2 Routing Submenu

The **ROUTING** submenu is described below.

The **IP → ROUTING** menu contains a list of all your gateway's IP routes.

FLAGS show the current status (*Up, Dormant, Blocked*) and the type of route (*Gateway Route, Interface Route, Subnet Route, Host Route, Extended Route*). The protocol with which your gateway has "learned" the routing entry is shown under **PRO**, e.g. **LOC** = local, i.e. configured manually.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH			
[IP] [ROUTING]: IP Routing			MyGateway		
The flags are: U (Up), D (Dormant), B (Blocked),					
G (Gateway Route), I (Interface Route),					
S (Subnet Route), H (Host Route),					
E (Extended Route)					
Destination	Gateway	Mask	Flags Met	Interface	Pro
192.168.0.0	192.168.0.254	255.255.255.0	US	0 en0-1	loc
192.168.1.0	192.168.100.2	255.255.255.0	DG	1 branch	loc
192.168.100.2	192.268.100.1	255.255.255.0	DH	1 branch	loc
ADD		ADDEXT		DELETE	
				EXIT	

You can add a new route with **ADD** or edit an existing entry by tagging it with the cursor and pressing **ENTER**. The following menu opens:

R232bw Setup Tool [IP] [ROUTING] [ADD]	Funkwerk Enterprise Communication GmbH MyGateway
Route Type	Host route
Network	LAN
Destination IP Address	
Gateway IP Address	
Metric	1
SAVE	CANCEL

The **ROUTING** → **ADD/EDIT** menu consists of the following fields:

Field	Description
Route Type	Type of route. Possible values: <ul style="list-style-type: none"> ■ <i>Host route</i> (default value): Route to a single host. ■ <i>Network route</i>: Route to a network. ■ <i>Default route</i>: This route is valid for all IP addresses and is only used if no other suitable route is available.
Network	Defines the type of connection (LAN, WAN). For possible values see table “Network selection options,” on page 7 .
Destination IP Address	Only if ROUTE TYPE <i>Host route</i> or <i>Network route</i> . IP address of the destination host or network.
Netmask	Only if ROUTE TYPE = <i>Network route</i> . Netmask for DESTINATION IP ADDRESS . If no entry is made, the gateway uses a default netmask.

Field	Description
Partner / Interface	WAN partner or interface (only if NETWORK = WAN without transit network).
Gateway IP Address	Only for NETWORK = LAN or WAN with transit network . IP address of the host to which your gateway should forward the IP packets.
Metric	The lower the value, the higher the priority of the route (possible values 0...15; default value is 0).

Table 2-1: **ROUTING** → **ADD/EDIT** menu fields

NETWORK offers the following selection options:

Description	Meaning
LAN	Route to a destination host or network that can be reached via your gateway's LAN connection.
WAN without transit network	Route to a destination host or network that can be reached via a WAN partner without including any transit network available.
WAN with transit network	Route to a destination host or network that can be reached via a WAN partner including any transit network available.
Refuse	Your gateway discards data packets using this route and sends a message to the sender saying the destination of the packet is unreachable.
Ignore	Your gateway discards data packets using this route without sending a message to the sender.

Table 2-2: **NETWORK** selection options

In addition to the normal routing table, the gateway can also make routing decisions based on an Extended Routing Table. Apart from the source and destina-

tion address, the gateway can also include the protocol, source and destination port, type of service (TOS) and the status of the gateway interface in the decision.



Note

Entries in the Extended Routing Table are treated preferentially compared with entries in the normal routing table.

The configuration is set up in the **IP → ROUTING → ADDEXT** menu.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [ROUTING] [ADD]: IP Routing - Extended Route		MyGateway	
Route Type	Host route		
Network	LAN		
Destination IP Address			
Gateway IP Address			
Metric	1		
Source Interface	don't verify		
Source IP Address			
Source Mask			
Type of Service (TOS)	00000000	TOS Mask	00000000
Protocol	don't verify		
SAVE		CANCEL	

This menu shows the following fields in addition to the fields of the **ROUTING → ADD/EDIT** menu:

Field	Description
Mode	Only for NETWORK = WAN without transit network . Defines when the interface selected under PARTNER / INTERFACE is to be used. For possible values see table "Mode selection options," on page 10 .

Field	Description
Source Interface	Interface over which the data packets reach the gateway. Default value is <i>don't verify</i> .
Source IP Address	Address of the source host or network.
Source Mask	Netmask for SOURCE IP ADDRESS .
Type of Service (TOS)	Possible values: 0..255 in binary format.
TOS Mask	Bit mask for TYPE OF SERVICE (TOS) .
Protocol	Defines a protocol. Possible values: <i>don't verify, icmp, ggp, tcp, egp, pup, udp, hmp, xns, rdp, rsvp, gre, esp, ah, igmp, ospf, l2tp</i> . Default value is <i>don't verify</i> .
Source Port	Only if PROTOCOL = <i>tcp</i> or <i>udp</i> . Source port number or range of source port numbers (see table "Selection options of Source Port and Destination Port," on page 10).
Destination Port	Only if PROTOCOL = <i>tcp</i> or <i>udp</i> . Destination port number or range of destination port numbers (see table "Selection options of Source Port and Destination Port," on page 10).

Table 2-3: **ROUTING** → **ADDEXT** menu fields

MODE offers the following selection options:

Description	Meaning
always (default value)	Always use the route.
dialup wait	Route can be used if the interface is "up". If the interface is "dormant", then dial and wait until the interface is "up".

Description	Meaning
dialup continue	Route can be used if the interface is "up". If the interface is "dormant", then select and use the alternative route (rerouting) until the interface is "up".
up only	Route can be used if the interface is "up".

Table 2-4: **MODE** selection options

SOURCE PORT and **DESTINATION PORT** offer the following selection options:

Description	Meaning
any (default value)	The route is valid for all >> port numbers.
specify	Enables the entry of a port number.
specify range	Enables the entry of a range of port numbers.
priv (0...1023)	Privileged port numbers: 0 ... 1023.
server (5000....32767)	Server port numbers: 5000 ... 32767.
clients 1 (1024....4999)	Client port numbers: 1024 ... 4999.
clients 2 (32768....65535)	Client port numbers: 32768 ... 65535.
unpriv (1024...65535)	Unprivileged port numbers: 1024 ... 65535.

Table 2-5: Selection options of **SOURCE PORT AND DESTINATION PORT**

3 Static Settings Submenu

The **STATIC SETTINGS** submenu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP][STATIC]: IP Static Settings	MyGateway
Domain Name Primary Domain Name Server Secondary Domain Name Server Primary WINS Secondary WINS Remote CAPI Server TCP port 2662 Remote TRACE Server TCP port 7000 RIP UDP port 520 Primary BOOTP Relay Server Secondary BOOTP Relay Server Unique Source IP Address HTTP TCP port 80 <div style="display: flex; justify-content: space-around;"> SAVE CANCEL </div>	

The **IP → STATIC SETTINGS** menu is for configuring the general IP settings for your gateway.

The **IP → STATIC SETTINGS** menu consists of the following fields:

Field	Description
Domain Name	Default Domain Name of Gateway.
Primary Domain Name Server	IP address of a global Domain Name Server (DNS).
Secondary Domain Name Server	IP address of an alternative global Domain Name Server.
Primary WINS	IP address of a global Windows Internet Name Server (=WINS) or NetBIOS Name Server (=NBNS).
Secondary WINS	IP address of an alternative global WINS or NBNS.

Field	Description
Remote CAPI Server TCP Port	TCP port number for >> Remote CAPI connections. The default value is 2662. Deactivate with 0.
Remote TRACE Server TCP Port	TCP port number for remote traces. The default value is 7000. Deactivate with 0.
RIP UDP Port	UDP port number for >> RIP (Routing Information Protocol). The default value is 520. Deactivate with 0.
Primary BOOTP Relay Server	Here you can enter the IP address of a server to which BootP or DHCP requests are forwarded.
Secondary BOOTP Relay Server	Here you can enter the IP address of an alternative BootP or DHCP server.
Unique Source IP Address	Here you can enter an IP address that is used by the gateway as source address for locally generated IP packets. This should only be configured in special cases.
HTTP TCP Port	Here you enter the TCP port for accessing the HTTP service of the gateway (HTML start page). The default value is 80.

Table 3-1: **STATIC SETTINGS** menu fields

4 Network Address Translation Sub-menu

The **IP → NETWORK ADDRESS TRANSLATION** menu is described below.

Network Address Translation (▶▶ **NAT**) is a feature of your gateway for defined conversion of source and destination addresses of IP packets (in **SESSIONS REQUESTED FROM INSIDE** and **SESSIONS REQUESTED FROM OUTSIDE**). If NAT is activated, IP connections are still only allowed as standard in one direction, outgoing (forward) (= protective function). Exceptions to the rules can be configured (in **SESSIONS REQUESTED FROM OUTSIDE**).

The **IP → NETWORK ADDRESS TRANSLATION** menu shows a list of all interfaces of your gateway.

To edit an entry, tag the interface for which you wish to configure NAT with the cursor and press **Return**. The following menu opens:

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [NAT] [EDIT]: NAT Configuration (Internet)	MyGateway
Network Address Translation	off
Silent Deny	no
PPTP Passthrough	no
Enter configuration for sessions:	requested from OUTSIDE requested from INSIDE
SAVE	CANCEL

The **NETWORK ADDRESS TRANSLATION → EDIT** menu consists of the following fields:

Field	Description
Network Address Translation	<p>Defines the type of NAT for the selected interface. Possible values:</p> <ul style="list-style-type: none"> ■ <i>off</i> (default value): Do not execute NAT. ■ <i>on</i>: Execute Forward NAT. ■ <i>reverse</i>: Execute Reverse NAT.
Silent Deny	<p>Defines whether the sender of an IP packet denied by NAT is to be informed of the denial. Possible values:</p> <ul style="list-style-type: none"> ■ <i>no</i> (default value): Sender is informed by a relevant ICMP message. ■ <i>yes</i>: The sender is not informed.
PPTP Passthrough	<p>PPTP Passthrough allows setting up and operation of several simultaneous outgoing PPTP connections of hosts in the network even if NAT is activated. Possible values: <i>yes</i> or <i>no</i>.</p> <p>If PPTP PASSTHROUGH = <i>yes</i>, the gateway itself cannot be configured as a tunnel endpoint.</p>

Table 4-1: **NETWORK ADDRESS TRANSLATION** menu fields

4.1 Requested from OUTSIDE/INSIDE Submenu

The **REQUESTED FROM OUTSIDE/INSIDE** menu is described below.

For other NAT settings, the **IP → NETWORK ADDRESS TRANSLATION → EDIT** menu contains two submenus (the possible settings of the two menus differ only slightly):

■ **IP → NETWORK ADDRESS TRANSLATION → EDIT → REQUESTED FROM OUTSIDE**
In this menu you can allow certain incoming IP connections.

■ **IP → NETWORK ADDRESS TRANSLATION → EDIT → REQUESTED FROM INSIDE**
In this menu you can map the source IP addresses and ports for certain outgoing IP connections (= address mapping).

Both menus show a list of the address mappings already configured. The abbreviations used are explained above the list.

```

R232bw Setup Tool                               Funkwerk Enterprise Communication GmbH
[IP] [NAT] [EDIT] [OUTSIDE] [ADD]: NAT - sessions from      MyGateway
                                           OUTSIDE (Internet)

Abbreviations:  r(remote) i(internal) e(external) a(address) p(port)

Service      Conditions
-----
http         ia 192.168.0.254/32, ep 80, ip 80

ADD                                DELETE                                EXIT

```

Add an entry with **ADD** or edit an existing entry by tagging it with the cursor and pressing **Return**. The following menu opens:

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [NAT] [EDIT] [OUTSIDE] [ADD]: NAT - sessions from		MyGateway	
OUTSIDE (Internet)			
Service	user defined		
Protocol	icmp		
Remote Address			
Remote Mask			
External Address			
External Mask			
External Port	any		
Internal Address			
Internal Mask	255.255.255.255		
Internal Port	any		
SAVE		CANCEL	

The **REQUESTED FROM OUTSIDE/INSIDE → ADD/EDIT** menu consists of the following fields:

Field	Description
Service	<p>REQUESTED FROM OUTSIDE → ADD/EDIT: Service for which incoming connections are allowed.</p> <p>REQUESTED FROM INSIDE → ADD/EDIT: Service for which address mapping is defined for outgoing connections.</p> <p>Possible values: <i>ftp, telnet, smtp, domain/udp, domain/tcp, http, nntp, user defined</i> (for other services, default value)</p>
Protocol	<p>Only for SERVICE = user defined. Defines the protocol.</p> <p>Possible values: <i>icmp, tcp, udp, gre, esp, ah, l2tp, any</i></p>

Field	Description
Remote Address	Optional. IP address of a host or network at the remote end. Enable or address mapping applies only to packets of this host or network.
Remote Mask	Netmask for REMOTE ADDRESS .
Remote Port Port...to Port	Only in REQUESTED FROM INSIDE → ADD/EDIT menu. Only for SERVICE = user defined . Entry of destination port or port range for outgoing IP connections for which address mapping is to be used. Possible values: <ul style="list-style-type: none"> ■ <i>any</i> ■ <i>specify</i>: Enables the entry of a port number. ■ <i>specify range</i>: Enables the entry of a port number range .
External Address	External host or network IP address at the selected interface.
External Mask	Netmask for EXTERNAL ADDRESS . If you use external and internal network IP addresses, the values for EXTERNAL MASK and INTERNAL MASK must be identical.

Field	Description
External Port Port...to Port	<p>Only for SERVICE = user defined.</p> <ul style="list-style-type: none"> ■ REQUESTED FROM OUTSIDE → ADD/EDIT: Only for SERVICE = user defined; original destination port of incoming IP connection. ■ REQUESTED FROM INSIDE → ADD/EDIT: The newly set source port of the outgoing IP connection. <p>Possible values:</p> <ul style="list-style-type: none"> ■ <i>any</i> (default value): For REQUESTED FROM INSIDE → ADD/EDIT; this means no port mapping. ■ <i>specify</i>: Enables the entry of a port number. ■ <i>specify range</i> (only for REQUESTED FROM OUTSIDE → ADD/EDIT) Enables the entry of a port number range.
Internal Address	IP address of the internal host or network.
Internal Mask	<p>Netmask for INTERNAL ADDRESS.</p> <p>If you use external and internal network IP addresses, the values for EXTERNAL MASK and INTERNAL MASK must be identical.</p>

Field	Description
Internal Port Port	<ul style="list-style-type: none">■ REQUESTED FROM OUTSIDE → ADD/EDIT: Newly set destination port of the incoming IP connection.■ REQUESTED FROM INSIDE → ADD/EDIT: Original source port of the outgoing IP connection. <p>Possible values:</p> <ul style="list-style-type: none">■ <i>any</i> (default value): For REQUESTED FROM OUTSIDE → ADD/EDIT; this means no port mapping.■ <i>specify</i>: Enables the entry of a port number.

Table 4-2: **REQUESTED FROM OUTSIDE/INSIDE** menu fields

5 UPnP Submenu

The **IP → UPNP** menu is described below.

With Universal Plug and Play (UPnP) current messenger services like real time video/audio conferencing can be applied as peer-to-peer communication with one peer behind a gateway with activated NAT.

UPnP enables (mostly) Windows-based operating systems to control other UPnP devices within the local network that also have their UPnP function activated. This applies for gateways, access points and print servers. Specific device drivers are not required as common protocols are used like TCP/IP, HTTP and XML.

Your bintec gateway provides the function of the UPnP subsystem Internet Gateway Device (IGD).

Within a network behind a gateway with activated NAT, UPnP-aware PCs operate as LAN UPnP clients, given that UPnP has been activated on the PCs.

TCP port 5678 is preconfigured on the gateway for supporting UPnP exchanges between LAN UPnP clients and the gateway. The LAN UPnP client operates as a so-called Service Control Point, i.e. it discovers and controls the UPnP devices within the network.

The ports assigned dynamically by e.g MSN Messenger range from 5004 to 65535. These ports are opened at the gateway when an audio/video conference is initiated by the Messenger and are closed immediately after the session has been terminated.

The peer-to-peer communication is initiated via public SIP servers. These exchange the information between both clients first, then the clients communicate directly with each other.

Further information on UPnP can be found at www.upnp.org.

Configuring your gateway for UPnP is carried out in the menu **IP → UPNP**:

R232bw Setup Tool	Funkwerk Enterprise Communications GmbH
[IP] [UPNP]: UPnP Configuration	MyGateway
UPnP status	disabled
TCP port number for UPnP	5678
SAVE	CANCEL

The menu contains the following fields:

Field	Description
UPnP status	<p>Here you choose which policy the gateway applies to UPnP requests from the LAN.</p> <p>Available values are:</p> <ul style="list-style-type: none"> ■ <i>disabled</i> (default) - The gateway discards UPnP requests, there are no changes to NAT. ■ <i>restricted</i> - The gateway opens ports and creates port mappings exclusively for the requesting client. The remote IP address of the incoming packets is compared with the IP address of the LAN UPnP client. Thus a LAN UPnP client cannot map ports for other LAN hosts. ■ <i>enabled</i> - The gateway creates UPnP NAT settings according to the parameters included in the requests received from LAN UPnP clients, regardless of the IP address of the requesting LAN UPnP client.

Field	Description
TCP port number for UPnP	Here you enter the port number on which the gateway listens for UPnP requests. Possible values are 1 to 65535, default is 5678.

Table 5-1: **IP → UPnP**

6 Bandwidth Management (TDRC / Load Balancing / BOD) Submenu

The **BANDWIDTH MANAGEMENT (TDRC / LOAD BALANCING / BOD)** menu is described below.

```

R232bw Setup Tool                               Funkwerk Enterprise Communication GmbH
[IP][BW]: Bandwidth Management for IP           MyGateway

TCP Download Rate Control (TDRC)
IP Load Balancing over Multiple Interfaces
IP triggered Bandwidth on Demand (IP BOD)

EXIT

```

The **BANDWIDTH MANAGEMENT (TDRC / LOAD BALANCING / BOD)** menu provides access to the submenu:

- **TCP DOWNLOAD RATE CONTROL (TDRC)**
- **IP LOAD BALANCING OVER MULTIPLE INTERFACES**
- **IP TRIGGERED BANDWIDTH ON DEMAND (IP BOD)**

6.1 TCP Download Rate Control (TDRC) Menu

The **TCP DOWNLOAD RATE CONTROL (TDRC)** menu is described below.

The **IP → BANDWIDTH MANAGEMENT (TDRC / LOAD BALANCING / BOD) → TCP DOWNLOAD RATE CONTROL (TDRC)** menu displays a list of the interfaces, for

which the TDRC-Mechanismus has already been configured. (The screenshot contains example values.)

R232bw Setup Tool		Funkwerk Enterprise Communications GmbH	
[IP] [TDRC]: Configure TCP Download Rate Control		MyGateway	
Interface	Mode	Maximum Receive Rate	
10001 DSL	TCP ACK prioritisation		
50000 ehtoa50-0	static	1024	
ADD	DELETE	EXIT	

An increasing number of network services requires that data is transferred not only as fast as possible, but also at constant transfer rates (e.g. VoIP). Your gateway offers a mechanism to ensure this especially for ADSL connections.

Constant transfer rates for low latency data streams can basically be secured in two ways.

Both mechanisms are configured in the menu **IP → BANDWIDTH MANAGEMENT (TDRC / LOAD BALANCING / BOD) → TCP DOWNLOAD RATE CONTROL (TDRC) → ADD/EDIT**. (The screenshots do not show the default values.)

- On the one hand it is possible to reduce the download rate available for general usage so that a certain bandwidth is reserved for a High Priority QoS queue.

R232bw Setup Tool		Funkwerk Enterprise Communications GmbH	
[IP] [TDRC] [EDIT]: Configure TCP Download Rate Control		MyGateway	
Interface	50000	ethoa50-0	
Optimize Download Rate via TCP ACK prioritisation (recommended for ADSL)			no
TDRC Mode static (fixed maximum rate for TCP download)			
Maximum TCP Download Rate (kbits/s)		1024	
Control all TCP Services			no
Select TCP Services >			
SAVE		CANCEL	

- On the other hand it is possible to use the available bandwidth as effectively as possible by prioritizing the upload of TCP ACK packets in the upstream of asynchronous ADSL connections. This avoids latency that would be created as a result of the comparatively small upload bandwidth of ADSL connections.

R232bw Setup Tool		Funkwerk Enterprise Communications GmbH	
[IP] [TDRC] [EDIT]: Configure TCP Download Rate Control		MyGateway	
Interface	10001	DSL	
Optimize Download Rate via TCP ACK prioritisation (recommended for ADSL)			yes
SAVE			
SAVE		CANCEL	

The menu contains the following fields:

Field	Description
Interface	Here you choose the interface the TDRC configuration is applied to.
Optimize Download Rate via TCP ACK prioritisation	Here you choose whether the download rate is to be optimized by prioritizing TCP ACK packets. If you choose <i>yes</i> , all of the following fields are no longer available. Available values are <i>yes</i> and <i>no</i> . Default is <i>no</i> .

Field	Description
TDRC Mode	<p>Only available for OPTIMIZE DOWNLOAD RATE VIA TCP ACK PRIORITISATION = no.</p> <p>Here you choose the TDRC (TCP Download Rate Control) policy. With the values <i>dynamic (maximum rate less amount of high priority traffic)</i> and <i>static (fixed maximum rate for TCP download)</i> you limit the download rate for TCP connections.</p> <p>Available values:</p> <ul style="list-style-type: none"> ■ <i>static (fixed maximum rate for TCP download)</i> (default) - The download rate of TCP connections is statically restricted to the value specified by MAXIMUM TCP DOWNLOAD RATE (KBITS/S). ■ <i>dynamic (maximum rate less amount of high priority traffic)</i> - The download rate is restricted to a value dynamically determined. The value is computed from the value specified by MAXIMUM TCP DOWNLOAD RATE (KBITS/S) minus the bandwidth that is required by all QoS High Priority traffic over the current interface at the moment of adding or terminating a TCP session. This choice requires a QoS configuration for the respective interface. ■ <i>disabled</i> - The TCP download rate remains unrestricted.
Maximum TCP Download Rate (kbits/s)	<p>Only available for OPTIMIZE DOWNLOAD RATE VIA TCP ACK PRIORITISATION = no.</p> <p>Here you specify the maximum bandwidth in kbps for TCP downloads over this interface.</p> <p>Available values are 1 to 100000, default is 1024.</p>

Field	Description
Control all TCP Services	<p>Only available for OPTIMIZE DOWNLOAD RATE VIA TCP ACK PRIORITISATION = no.</p> <p>Here you choose if the download control configured is to be applied to all TCP connections.</p> <p>Available values are <i>yes</i> and <i>no</i>. Default is <i>yes</i>.</p>

Table 6-1: **IP → BANDWIDTH MANAGEMENT (TDRC / LOAD BALANCING / BOD) → TCP DOWNLOAD RATE CONTROL (TDRC) → ADD/EDIT**

If you choose *no* for **CONTROL ALL TCP SERVICES**, **SELECT TCP SERVICES** allows access to the configuration of all services that TDRC is to be applied to (the screenshot shows the preconfigured services):

TCP Port		Status
80	HTTP	builtin
443	HTTPS	builtin
20	FTP Data	builtin
110	POP3	builtin
143	IMAP2	builtin
ADD	DELETE	EXIT

ADD allows access to the configuration of further TCP services:

R232bw Setup Tool		Funkwerk Enterprise Communications GmbH	
[IP] [TDRC] [SERVICES] [ADD]: Configure TCP Services		MyGateway	
TCP Service Port		1	
Status		enabled	
Alias Name (Description)			
SAVE		CANCEL	

The menu contains the following fields:

Field	Description
TCP Service Port	Here you enter the TCP port of the service you want to configure to be observed by the TDRC. Available values are 1 to 65535, default is 1.
Status	Here you choose if the TDRC is to be activated for the service configured. Available values are <i>enabled</i> and <i>disabled</i> , default is <i>enabled</i> . For the preconfigured services the state <i>built-in</i> is displayed in the CONFIGURE TCP SERVICES -list.
Alias Name (Description)	Here you enter a description for the service you have configured, the maximum length of the entry is 20 characters.

Table 6-2: **IP → BANDWIDTH MANAGEMENT (TDRC / LOAD BALANCING / BOD) → TCP DOWNLOAD RATE CONTROL (TDRC) → ADD/EDIT → SELECT TCP SERVICES → ADD**

6.2 IP Load Balancing over Multiple Interfaces Submenu

The **IP LOAD BALANCING OVER MULTIPLE INTERFACES** menu is described below.

The increasing amount of data traffic over the Internet necessitates the possibility of being able to send data over different interfaces to increase the total bandwidth available. IP load balancing enables the distribution of data traffic within a certain group of interfaces to be controlled.

The configuration is set in the **IP → BANDWIDTH MANAGEMENT (LOAD BALANCING/BOD) → IP LOAD BALANCING OVER MULTIPLE INTERFACES** menu.

The menu shows a list of the interface groups already configured for load balancing.

Access to the menu for configuring the groups is via **ADD/EDIT**.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [IP LOAD BALANCING] [ADD]		MyGateway	
Description			
Interface Group ID	0		
Distribution Policy	session round-robin		
Distribution Mode	always (use operational up and dormant interfaces)		
Distribution Ratio	equal for all interfaces of the group		
Interface 1	none		
Interface 2	none		
Interface 3	none		
SAVE		CANCEL	

The menu contains the following fields:

Field	Description
Description	Here you enter the desired description of the interface group.

Field	Description
Interface Group ID	<p>The ID of the interface group. This is assigned by the system automatically, but can also be edited. It is used only for internal assignment of the group.</p> <p>The default value is 0.</p>
Distribution Policy	<p>Here you select in what way the data traffic is distributed to the interfaces configured for the group. Possible values: see “Distribution Policy selection options” on page 35</p>
Distribution Mode	<p>Here you select the state the interfaces in the group may have if they are to be included in load balancing. Possible settings:</p> <ul style="list-style-type: none"> ■ <i>always (use operational up and dormant interfaces)</i>: Interfaces that are either up or dormant are included (default value). ■ <i>up-only (operational up interfaces only)</i>: Only interfaces that are up are included.
Distribution Ratio	<p>Not for DISTRIBUTION POLICY = <i>service/source-based routing</i>.</p> <p>Here you select whether the percentage share of data traffic is to be the same for all interfaces of the group or configured individually for each interface.</p> <p>Possible settings:</p> <ul style="list-style-type: none"> ■ <i>equal for all interfaces of the group</i> (default value): All interfaces are automatically assigned the same share. ■ <i>individual for all interfaces of the group</i>: Each interface can be assigned a share individually.

Field	Description
Interface 1 - 3	Here you select the interfaces that are to belong to the group from the available interfaces.
Distribution Fraction (in percent)	<p>Not for DISTRIBUTION POLICY = <i>service/source-based routing</i>.</p> <p>Appears only for INTERFACE 1 - 3 if an interface has been selected.</p> <p>Here you enter the percentage of the data traffic to be assigned to an interface.</p> <p>The meaning differs according to the DISTRIBUTION POLICY used:</p> <ul style="list-style-type: none"> ■ based on the number of sessions to be distributed for <i>session round-robin</i>. ■ based on the data rate for <i>bandwidth load-/upload-/download-dependent</i>.

Table 6-3: **IP LOAD BALANCING OVER MULTIPLE INTERFACES** menu fields

DISTRIBUTION POLICY offers the following selection options:

Field	Description
session round-robin	A newly added session is assigned to one of the group interfaces according to the percentage assignment of sessions to the interfaces. The number of sessions is decisive.
bandwidth load-dependent	A newly added session is assigned to one of the group interfaces according to the share of the total data rate handled by the interfaces. Decisive is the current data rate based on the data traffic in both the send and receive direction.

Field	Description
bandwidth download-dependent	A newly added session is assigned to one of the group interfaces according to the share of the total data rate handled by the interfaces. Decisive is the current data rate based on the data traffic in the receive direction only.
bandwidth upload-dependent	A newly added session is assigned to one of the group interfaces according to the share of the total data rate handled by the interfaces. Decisive is the current data rate based on the data traffic in the send direction only.
service/source-based routing	A newly added session is assigned to one of the group interfaces according to the configuration of the static routing in the IP LOAD BALANCING OVER MULTIPLE INTERFACES → ADD/EDIT → IP ROUTING LIST menu. This menu is only accessible if you have selected <i>service/source-based routing</i> . see “IP Routing List Submenu” on page 35

Table 6-4: **DISTRIBUTION POLICY** selection options

6.2.1 IP Routing List Submenu

The **IP ROUTING LIST** menu only appears if an interface has been selected in **DISTRIBUTION POLICY** *service/source-based routing* and **INTERFACE 1 - 3**.

The **IP LOAD BALANCING OVER MULTIPLE INTERFACES → ADD/EDIT → IP ROUTING LIST** menu contains a list of all configured routing entries. The configuration is set in **IP ROUTING LIST → ADD/EDIT**.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [ROUTING] [ADD]: Configure Service/Source-Based Routing		MyGateway	
Interface	Internet1		
Type	Host route		
Network	WAN without transit network		
Destination IP Address			
Gateway IP Address			
Source IP Address			
Source Mask			
Protocol	tcp		
Service	unlisted service	Port	-1
SAVE		CANCEL	

The menu contains the following fields:

Field	Description
Interface	Shows the interface to be edited. This field cannot be changed.
Type	Type of route. Possible values: <ul style="list-style-type: none"> ■ <i>Host route</i>: Route to a single host ■ <i>Network route</i> (default value): Route to a network ■ <i>Default route</i>: The route is valid for all IP addresses and is only used if no other suitable route is available
Network	Defines the type of connection (LAN, WAN). For possible values see table "Network selection options," on page 38 .
Destination IP Address	Only if ROUTE TYPE <i>Host route</i> or <i>Network route</i> . IP address of the destination host or network.

Field	Description
Destination Mask	Only if ROUTE TYPE = <i>Network route</i> Netmask for Destination IP Address. If no entry is made, the gateway uses a default netmask.
Gateway IP Address	Only for NETWORK LAN or WAN with transit network . IP address of the host to which your gateway should forward the IP packets.
Source IP Address	IP address of the source host or network.
Source Mask	Netmask for SOURCE IP ADDRESS .
Protocol	Defines a protocol. Possible values: <i>tcp, egp, pup, udp, hmp, xns, rdp, rsvp, gre, esp, ah, igrp, ospf, l2tp, don't verify, icmp, ggp</i> . The default value is <i>don't verify</i> .
Service	Here you select a predefined service for whose data traffic the entry is to apply. The value <i>unlisted service</i> is shown when accessing the menu. This is only a bookmark. The data traffic is not filtered by this entry as long as the default value <i>-1</i> is left in the PORT field.
Port	Can only be edited if PROTOCOL = <i>tcp</i> or <i>udp</i> and SERVICE = <i>unlisted service</i> . Entry of destination port for PROTOCOL <i>tcp</i> or <i>udp</i> . Possible settings are values from <i>-1</i> to <i>65535</i> . The default value <i>-1</i> means the destination port can be any port.

Table 6-5: **IP ROUTING LIST** → **ADD/EDIT** menu fields

NETWORK contains the following selection options (depending on type of interface):

Description	Meaning
LAN	Route to a destination host or network that can be reached via your gateway's LAN connection.
WAN without transit network	Route to a destination host or network that can be reached via a WAN partner without including any transit network available.
WAN with transit network	Route to a destination host or network that can be reached via a WAN partner including any transit network available.

Table 6-6: **NETWORK** selection options

6.3 IP triggered Bandwidth on Demand (IP BOD) Submenu

The **IP TRIGGERED BANDWIDTH ON DEMAND (IP BOD)** menu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [BOD]: Bandwidth on Demand for IP	MyGateway
Filter Rules for BOD Configure Interfaces for BOD EXIT	

Application-controlled bandwidth management is configured via filters, filter rules and interface assignment.

- Filter** Filters define which IP packets (and thus applications) are to influence the available bandwidth.
- Rule** Rules define whether other ISDN B-channels are to be added to an existing connection to transfer the IP packets covered by the filters.
- Chain** Several rules can be interlinked to form a defined rule chain.
- Interface** You can also assign a rule chain individually to each interface. Configuration is made in the following submenus:
- ***FILTER***
 - ***RULES FOR BOD***
 - ***CONFIGURE INTERFACES FOR BOD***

6.3.1 Filter Submenu

The ***FILTER*** menu is described below.

This shows a list of all configured filters (including the filters from ***IP → ACCESS LISTS*** and ***QoS***).

The filters are configured in ***IP → BANDWIDTH MANAGEMENT (LOAD BALANCING / BOD) → IP TRIGGERED BANDWIDTH ON DEMAND (IP BOD) → FILTER → ADD/EDIT***.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [BOD] [FILTER] [EDIT]		MyGateway	
Description			
Index			
Protocol any			
Source Address			
Source Mask			
Destination Address			
Destination Mask			
Type of Service (TOS)	00000000	TOS Mask	00000000
SAVE		CANCEL	

The **FILTER** → **ADD/EDIT** menu contains the following fields:

Field	Description
Description	Designation of the filter. Note that only the first 10 or 15 characters are visible in other menus.
Index	Cannot be changed here. The gateway assigns a number automatically to new filters defined here.
Protocol	<p>Defines a protocol. Possible values:</p> <p><i>any, icmp, ggp, ip, tcp, egp, igp, pup, chaos, udp, hmp, xns_idp, rdp, rsvp, gre, esp, ah, tlsp, skip, kryptolan, iso-ip, igrp, ospf, ipip, ipx-in-ip, vrrp, l2tp.</i></p> <p>The default value is <i>any</i> and matches any protocol.</p>

Field	Description
Type	<p>Only if PROTOCOL = <i>icmp</i>. Possible values: <i>any, echo reply, destination unreachable, source quench, redirect, echo, time exceeded, param problem, timestamp, timestamp reply, address mask, address mask reply.</i></p> <p>The default value is <i>any</i>. See RFC 792.</p>
Connection State	<p>If PROTOCOL = <i>tcp</i>, you can define a filter based on the state of the TCP connection. Possible values:</p> <ul style="list-style-type: none"> ■ <i>established</i>: All TCP packets that would not open any new TCP connection on routing over the gateway match the filter. ■ <i>any</i> (default value): All TCP packets match the filter.
Source Address	Defines the source IP address of the data packets.
Source Mask	Netmask for SOURCE ADDRESS .
Source Port	<p>Only for PROTOCOL = <i>tcp/udp-port</i>. Source port number or range of source port numbers.</p> <p>Possible values: see “Source Port and Destination Port selection options” on page 42 The default value is <i>any</i>.</p>
Specify Port ..to Port	<p>If SOURCE PORT or DESTINATION PORT = <i>specify</i> or <i>specify range</i> Port numbers or range of port numbers.</p>
Destination Address	Defines the destination IP address of the data packets.
Destination Mask	Netmask for DESTINATION ADDRESS .

Field	Description
Destination Port	Only for PROTOCOL = <i>tcp/udp-port</i> . Destination port number or range of destination port numbers that matches the filter. Possible values: see “ Source Port and Destination Port selection options ” on page 42. The default value is <i>any</i> .
Type of Service (TOS)	Identifies the priority of the IP packet, cf. RFC 1349 and RFC 1812 (shown in binary format).
TOS Mask	Bitmask for Type of Service (shown in binary format).

Table 6-7: **FILTER** menu fields

SOURCE PORT and **DESTINATION PORT** contain the following selection options:

Field	Description
any (default value)	The route is valid for all port numbers.
specify	Enables the entry of a port number.
specify range	Enables the entry of a range of port numbers.
priv (0...1023)	Privileged port numbers: 0 ... 1023.
server (5000....32767)	Server port numbers: 5000 ... 32767.
clients 1 (1024....4999)	Client port numbers: 1024 ... 4999.
clients 2 (32768....65535)	Client port numbers: 32768 ... 65535.
unpriv (1024...65535)	Unprivileged port numbers: 1024 ... 65535.

Table 6-8: **SOURCE PORT** and **DESTINATION PORT** selection options

6.3.2 Submenu Rules for BOD

The **RULES FOR BOD** menu is described below.

All the configured rules are listed in **IP → BANDWIDTH MANAGEMENT (LOAD BALANCING / BOD) → IP TRIGGERED BANDWIDTH ON DEMAND (IP BOD) → RULES FOR BOD**.

Configuration is carried out in the **ADD/EDIT** menu.

R232bw Setup Tool [IP] [BOD] [RULE] [ADD]	Funkwerk Enterprise Communication GmbH MyGateway
Action	invoke M
Direction	outgoing
Number of Channels	0
Filter	Firstfilter (1)
SAVE	CANCEL

The menu consists of the following fields:

Field	Description
Index	Appears only for EDIT . Cannot be changed. Shows the INDEX of existing rules. The gateway assigns a number to newly defined rules automatically.
Insert behind Rule	Appears only for ADD and if at least one rule exists. Defines the existing rule behind which the new rule is inserted. You can start a new independent chain with <i>none</i> .

Field	Description
Action	<p>Defines the action to be taken for a filtered data packet.</p> <ul style="list-style-type: none"> ■ <i>invoke M</i> (default value): B-channels are added if FILTER and DIRECTION match. ■ <i>invoke !M</i>: B-channels are added if FILTER or DIRECTION do not match. ■ <i>deny M</i>: B-channels are not added if FILTER and DIRECTION match. ■ <i>deny !M</i>: B-channels are not added if FILTER or DIRECTION do not match. ■ <i>ignore</i>: Use next rule.
Direction	<p>Direction of data packets. Possible values:</p> <ul style="list-style-type: none"> ■ <i>outgoing</i> (default value): outgoing data packets ■ <i>incoming</i>: incoming data packets ■ <i>both</i>: incoming and outgoing data packets.
Number of Channels	<p>Number of B-channels that are to be added. The default value is 0.</p>
Filter	Filter used.
Next Rule	<p>Appears only if an existing rule is edited. Defines the next rule to be used.</p>

Table 6-9: **RULES FOR BOD** menu fields

You can reorganize the indexing of the rules in the **IP → BANDWIDTH MANAGEMENT (LOAD BALANCING / BOD) → IP TRIGGERED BANDWIDTH ON DEMAND (IP BOD) → RULES FOR BOD → REORG** menu, but the sequence of the configured rules is retained. The rule that is to receive rule **INDEX 1** is defined in the **INDEX OF RULE THAT GETS INDEX 1** field.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH [IP] [BOD] [RULE] [REORG] : Reorganize Rules	MyGateway
Index of Rule that gets Index 1 none		
REORG		CANCEL

The rule chain that starts with rule **INDEX 1** is always applied as standard to the interface of the gateway (e.g. WAN partner).

6.3.3 Configure Interfaces for BOD Submenu

The **CONFIGURE INTERFACES FOR BOD** menu is described below.

All the WAN partner interfaces are listed in the **IP → BANDWIDTH MANAGEMENT (LOAD BALANCING / BOD) → IP TRIGGERED BANDWIDTH ON DEMAND (IP BOD) → RULES FOR BOD** menu.

Assign the selected interfaces to the start of a rule chain in **CONFIGURE INTERFACES FOR BOD → EDIT**.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH	MyGateway
[IP] [BOD] [INTERFACES] [EDIT]		
Interface	branch	
First Rule	RI 1 FI 1 (Firstfilter)	
SAVE		CANCEL

The menu consists of the following fields:

Field	Description
Interface	Name of interface that has been selected. This field cannot be edited.
First Rule	Defines the start of the rule chain to be applied to data packets received over INTERFACE . If you enter <i>none</i> (default value), you specify that no filters are used for INTERFACE .

Table 6-10: **CONFIGURE INTERFACES FOR BOD → EDIT** menu fields

7 IP Address Pool WAN (PPP) Sub-menu

The *IP ADDRESS POOL WAN (PPP)* menu is described below.

The *IP → IP ADDRESS POOL WAN (PPP)* menu is for setting up a pool of IP addresses that your gateway as dynamic IP address server can assign to WAN partners to enable them to dial in.

All the configured IP address pools are listed here. The configuration is set up in the *IP ADDRESS POOL WAN (PPP) → ADD/EDIT* menu.

R232bw Setup Tool [IP] [DYNAMIC] [EDIT]	Funkwerk Enterprise Communication GmbH MyGateway
Pool ID	0
IP Address	192.168.0.11
Number of Consecutive Addresses	2
SAVE	CANCEL

The menu contains the following fields:

Field	Description
Pool ID	Unique number for identifying an IP address pool.
IP Address	First IP address in the range.
Number of Consecutive Addresses	Number of IP addresses in the range, including the first IP address. The default value is 1.

Table 7-1: *IP ADDRESS POOL WAN (PPP)* menu fields

8 IP Address Pool LAN (DHCP) Sub-menu

The **IP ADDRESS POOL LAN (DHCP)** menu is described below.

IP → IP ADDRESS POOL LAN (DHCP) is used for configuring the gateway as **DHCP** server (Dynamic Host Configuration Protocol).

All the configured interfaces and relevant IP address pools are listed here. The configuration is set up in the **IP ADDRESS POOL LAN (DHCP) → ADD/EDIT** menu.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [DHCP] [ADD]: Define Range of IP Addresses		MyGateway	
Interface	en0-1		
Type	Any		
IP Address			
Number of Consecutive Addresses	1		
Lease Time (Minutes)	120		
MAC Address			
Alive Test Period (seconds, 0=disabled)	0		
Gateway			
NetBT Node Type	not specified		
		SAVE	CANCEL

The menu contains the following fields:

Field	Description
Interface	Interface to which the address pool is assigned. When a DHCP request is received over INTERFACE , one of the addresses from the address pool is assigned.
IP Address	First IP address in the address pool.

Field	Description
Number of Consecutive Addresses	Total number of IP addresses in the address pool, including the first IP address (IP ADDRESS). The default value is 1.
Lease Time (Minutes)	Defines the length of time an address from the pool is assigned to a host. After the LEASE TIME (MINUTES) expires, the address can be re-assigned. The default value is 120.
MAC Address	Only for NUMBER OF CONSECUTIVE ADDRESSES = 1 IP ADDRESS is only assigned to the device with MAC ADDRESS .
Alive Test Period (seconds, 0=disabled)	Specifies a period (in seconds) for checking that the clients, which got an IP address from IP ADDRESS POOL LAN (DHCP) , are still alive. If not, the IP addressed can be assigned to further requesting clients. Possible values are 0..65535. Default value is 0. If set to 0, no alive check is performed.
Gateway	Defines which IP address is transferred to the DHCP client as gateway. If no IP address is entered here, the IP address defined in INTERFACE is transferred.

Field	Description
NetBT Node Type	<p>Defines how and in which order the host carries out resolution of NetBIOS names to IP addresses.</p> <p>Possible values:</p> <ul style="list-style-type: none">■ <i>not specified</i> (default value)■ <i>Broadcast Node</i>■ <i>Point-to-Point Node</i>■ <i>Mixed Node</i>■ <i>Hybrid Node</i>

Table 8-1: **IP ADDRESS POOL LAN (DHCP)** menu fields

9 SNMP Submenu

The **IP → SNMP** menu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP][SNMP]: SNMP Configuration	MyGateway
SNMP versions	v1 v2c v3
SNMP listen UDP port	161
SNMP trap UDP port	162
SNMP trap broadcasting	off
SNMP trap community	snmp-Trap
SAVE	CANCEL

IP → SNMP is for changing the basic ►► **SNMP** settings.

The **SNMP** menu contains the following fields:

Field	Description
SNMP versions	<p>This parameter determines which SNMP version the gateway allows for listening for external SNMP access and for sending SNMP traps to external networks.</p> <p>Available values are:</p> <ul style="list-style-type: none"> ■ <i>v1lv2clv3</i> (default) - The gateway accepts SNMP access of the versions 1, 2c and 3. ■ <i>off</i> - The gateway accepts no external SNMP access, i.e. SNMP access is possible exclusively from the console of the gateway (e.g. via SSH or the serial interface). ■ <i>v1lv2c</i> - The gateway accepts SNMP access of the versions 1 and 2c which supports 64 bit counters and access control through SNMP communities. ■ <i>v3</i> - The gateway accepts only SNMP access of version 3, supporting "real" user management and access control through access levels. <p>You can find further information on all SNMP versions in the corresponding RFCs and Drafts:</p> <ul style="list-style-type: none"> ■ SNMP V. 1: RFC 1157 ■ SNMP V. 2c: RFC 1901 – 1908 ■ SNMP V. 3: RFC 3410 – 3418.
SNMP listen UDP port	<p>Here you enter the number of the UDP port on which the gateway accepts SNMP requests. The default value is <i>161</i>. <i>0</i> deactivates the feature.</p>

Field	Description
SNMP trap UDP port	Here you enter the number of the UDP port to which the gateway sends SNMP traps. The default value is <i>162.0</i> deactivates the feature.
SNMP trap broadcasting	For activating SNMP trap broadcasting. The gateway then sends SNMP traps to the broadcast address of the LAN. Possible values are <i>on</i> and <i>off</i> (default value).
SNMP trap community	Here you can enter an SNMP ID. This must be sent by the SNMP Manager with every SNMP request so that this is accepted by your gateway. The default value is <i>snmp-Trap</i> .

Table 9-1: **IP → SNMP** menu fields

10 Remote Authentication (RADIUS/TACACS+) Submenu

The *REMOTE AUTHENTICATION (RADIUS/TACACS+)* menu is described below.

The *IP → REMOTE AUTHENTICATION (RADIUS/TACACS+)* menu offers access to the following submenus:

- *RADIUS AUTHENTICATION AND ACCOUNTING*
- *TACACS+ AUTHENTICATION AND AUTHORIZATION*

10.1 RADIUS Authentication and Accounting Submenu

The *RADIUS SERVER* menu is described below.

Client / Server RADIUS (Remote Authentication Dial In User Service) is a service that enables authentication and configuration information to be exchanged between your gateway and a RADIUS server. The RADIUS server administrates a database with information about user authentication and configuration and for statistical recording of connection data.

RADIUS can be used for:

- authentication
- accounting
- exchanging configuration data.

For an incoming connection, the bintec gateway sends a request with user name and password to the RADIUS server, which then searches its database. If the user is found and can be authenticated, the RADIUS server sends corresponding confirmation to the gateway. This confirmation also contains parameters (called RADIUS attributes), which the gateway uses as WAN connection parameters.

If the RADIUS server is used for accounting, the gateway sends an accounting message at the start of the connection and a message at the end of the connection. These start and end messages also contain statistical information about the connection (IP address, user name, throughput, costs).

RADIUS packets The following types of packets are sent between the RADIUS server and bintec gateway (client):

Type	Purpose
ACCESS_REQUEST	Client → Server If an access request is received by the gateway, a request is sent to the RADIUS server if no corresponding WAN partner has been found in the gateway.
ACCESS_ACCEPT	Server → Client If the RADIUS server has authenticated the information contained in the ACCESS_REQUEST, it sends an ACCESS_ACCEPT to the gateway together with the parameters used for setting up the connection.
ACCESS_REJECT	Server → Client If the information contained in the ACCESS_REQUEST does not correspond to the information in the user database of the RADIUS server, it sends an ACCESS_REJECT to reject the connection.
ACCOUNTING_START	Client → Server If a RADIUS server is used for accounting, the gateway sends an accounting message to the RADIUS server at the start of each connection.
ACCOUNTING_STOP	Client → Server If a RADIUS server is used for accounting, the gateway sends an accounting message to the RADIUS server at the end of each connection.

All the RADIUS servers currently configured are listed in the **IP → RADIUS SERVER** menu.

The configuration is set up in **IP → RADIUS SERVER → ADD/EDIT**.

R232bw Setup Tool [IP] [RADIUS] [ADD]	Funkwerk Enterprise Communication GmbH MyGateway
Protocol	authentication
IP Address	
Password	
Priority	0
Policy	authoritative
Port	1812
Timeout (ms)	1000
Retries	1
State	active
Validate	enabled
Dialout	disabled
Alive Check (if inactive)	enabled
SAVE	CANCEL

The menu contains the following fields:

Field	Description
Protocol	<p>Defines whether the RADIUS server is used for authentication purposes or accounting.</p> <p>Possible values:</p> <ul style="list-style-type: none"> ■ <i>authentication</i> (default value) - The RADIUS server is used for controlling access to a network. ■ <i>accounting</i> - The RADIUS server is used for recording statistical connection data. ■ <i>shell login</i> - The RADIUS server is used for controlling access to the SNMP shell of the gateway. ■ <i>IPSec</i> - The RADIUS server is used for sending configuration data for IPSec peers to the gateway. ■ <i>802.1x</i> - The RADIUS server is used for controlling access to a WLAN.
IP Address	The IP address of the RADIUS server.
Password	This is the common password used for communication between the RADIUS server and gateway.
Priority	<p>Priority of the RADIUS server. If a number of RADIUS server entries exist, the server with the highest priority is used first. If this server does not answer, the server with the next lower priority is used.</p> <p>Possible values: Whole numbers from 0 (highest priority) to 7 (lowest priority). The default value is 0.</p>

Field	Description
Policy	<p>Defines how the bintec gateway responds if a negative answer is received to a request. Possible values:</p> <ul style="list-style-type: none"> ■ <i>authoritative</i> (default value): A negative answer to a request is accepted. ■ <i>non authoritative</i>: A negative answer to a request is not accepted. A request is sent to the next RADIUS server until the gateway receives an answer from a server configured as authoritative.
Port	<p>TCP port used for RADIUS data. RFC 2138 defines the default ports as 1812 for authentication (1645 in older RFCs) and 1813 for accounting (1645 in older RFCs). You can obtain the port to be used from the documentation for your RADIUS server.</p> <p>The default value is <i>1812</i>.</p>
Timeout (ms)	<p>Maximum waiting time in milliseconds between the ACCESS_REQUEST and answer. After timeout, the request is repeated according to RETRIES or the next configured RADIUS server is requested.</p> <p>Possible values: Whole numbers between <i>50</i> and <i>50000</i>.</p> <p>The default value is <i>1000</i> (1 second).</p>

Field	Description
Retries	<p>Number of repetitions if a request is not answered. If an answer is still not received after these retries, STATE is set to <i>inactive</i>. The gateway then tries to reach the server every 20 seconds; if the server answers, STATE is set to <i>active</i> again.</p> <p>Possible values: Whole numbers between 0 and 10.</p> <p>The default value is 1.</p> <p>To prevent STATE being set to <i>inactive</i>, set this value to 0.</p>
State	<p>State of the RADIUS server.</p> <p>Possible values:</p> <ul style="list-style-type: none"> ■ <i>active</i> (default value): Server answers requests. ■ <i>inactive</i>: Server does not answer (see RETRIES). ■ <i>disabled</i>: Requests to a certain RADIUS server are temporarily deactivated.
Validate	<p>Possible values:</p> <ul style="list-style-type: none"> ■ <i>enabled</i> (default value): The gateway checks the identity of the RADIUS server using the MD5 checksum from PASSWORD. This option should be activated for security purposes. ■ <i>disabled</i>: This option should only be selected in special cases.

Field	Description
Dialout	<p>Here you can define whether the gateway receives requests from RADIUS server dialout routes. This enables temporary interfaces to be configured automatically and the gateway can initiate outgoing connections that are not configured permanently.</p> <p>Possible values: <i>enabled</i>, <i>disabled</i> (default value).</p>
Alive Check (if inactive)	<p>Here you can activate a check of the reachability of a RADIUS server in STATE inactive.</p> <ul style="list-style-type: none"> ■ <i>enabled</i> (default value): An Alive Check is carried out regularly (every 20 seconds) by sending an ACCESS_REQUEST to the IP address of the RADIUS server. If the server is reachable, STATE is set to <i>active</i> again. If the RADIUS server is only reachable over a dialup connection, this can cause additional costs if the server is <i>inactive</i> for a long time. ■ <i>disabled</i>: Alive Check is not carried out.

Table 10-1: **RADIUS SERVER** menu fields

10.2 TACACS+ Authentication and Authorization Submenu

The **TACACS+ AUTHENTICATION AND AUTHORIZATION** menu is described below.

The **IP → REMOTE AUTHENTICATION (RADIUS/TACACS+) → TACACS+ AUTHENTICATION AND AUTHORIZATION** menu displays a list of all already configured TACACS+ servers.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [TACACS+]: Configure TACACS+ Server		MyGateway	
IP Address	Priority	AdminStatus	OperStatus
192.168.0.100	0	up	up
ADD	DELETE	EXIT	

The TACACS+ protocol provides access control for gateways, network access servers and other network devices via one or more centralized servers. TACACS+ is an AAA protocol and thus provides authentication, authorization and accounting services (bintec gateways do not support TACACS+ Accounting at present).

Your bintec Gateway provides for the following TACACS+ functions:

- Authentication for login shell
- Authentication for ppp connections
- Command authorization on the shell (e.g. telnet, setup. show)

TACACS+ uses TCP port 49 and sets up a secure and encrypted connection.

Configuration of a TACACS+ server is carried out in the **IP → REMOTE AUTHENTICATION (RADIUS/TACACS+) → TACACS+ AUTHENTICATION AND AUTHORIZATION → ADD/EDIT** menu.

R232bw Setup Tool [IP] [TACACS+] [ADD]	Funkwerk Enterprise Communication GmbH MyGateway
Server's IP Address or Hostname	
Priority	0 TCP Port 49
TACACS+ Key (Secret)	
Policy	non authoritative
Encryption (recommended)	enabled
Timeout (seconds)	3
Block Time (seconds)	60
PPP Authentication	disabled
Login Authentication/Authorization	enabled
TACACS+ Accounting	disabled
Administrative Status	up
TACACS+ Single-Connection	single request
SAVE	CANCEL

It contains the following configuration options:

Field	Description
Server's IP Address or Hostname	Here you enter the IP address of the TACACS+ server that is to be queried for AAA (Authentication, Authorization, Accounting) request. (bintec gateways do not support TACACS+ Accounting at present.)
Priority	<p>Here you assign a priority to the current TACACS+ server.</p> <p>The server with the lowest value is the first one used for a TACACS+ AAA request. If there is no response or the access was denied (only for POLICY = non authoritative), the entry with the next lowest priority will be used.</p> <p>Available values are 0 to 9, the default value is 0.</p>

Field	Description
TCP Port	Here the default TCP port used for the TACACS+ protocol is set to 49. The value cannot be changed.
TACACS+ Key (Secret)	<p>Here you enter the password used to authenticate and (if applicable) encrypt the data exchange between the TACACS+ server and the Network Access Server (your gateway) (encryption only for ENCRYPTION (RECOMMENDED) = <i>enabled</i>).</p> <p>The maximum length of the entry is 32 characters.</p>
Policy	<p>Here you can choose the interpretation of the TACACS+ reply.</p> <p>Available values:</p> <ul style="list-style-type: none"> ■ <i>authoritative</i>: A negative answer to a request is accepted, i.e. no further TACACS+ server sent a request. ■ <i>non authoritative</i> (default value): The TACACS+ servers are sent a request according to their PRIORITY, until a positive answer or, if the request was sent to an authoritative server, a negative answer is sent back. <p>The gateway-internal user management is not disabled when using TACACS+ and is checked after all TACACS+ servers had been queried.</p>

Field	Description
Encryption (recommended)	<p>Here you can choose whether the data exchange between the TACACS+ server and the NAS is encrypted. Available values are <i>enabled</i> (default value) and <i>disabled</i>.</p> <ul style="list-style-type: none"> ■ <i>enabled</i>: The TACACS+ packets are MD5 encrypted. ■ <i>disabled</i>: The packets and therefore all related information are sent unencrypted. Unencrypted transfer is not recommended for standard usage, but for debug purposes only.
Timeout (seconds)	<p>Here you enter the time in seconds the NAS waits for a TACACS+ response. If no reply is received during waiting time, the next configured TACACS+ server is queried (only for POLICY = non authoritative) and the current server is set into a <i>blocked</i> state (siehe OPERSTATUS = blocked in IP → REMOTE AUTHENTICATION (RADIUS/TACACS+) → TACACS+ AUTHENTICATION AND AUTHORIZATION).</p> <p>Available values are 1 to 60, the default value is 3.</p>
Block Time (seconds)	<p>Here you enter the amount of time in seconds for which the current server is set to a blocked state. After the Block Time has ended, the server is set to the state specified for the field ADMINISTRATIVE STATUS (see below).</p> <p>Available values are 0 to 3600, the default value is 60. A value of 0 means that the server is never set to a <i>blocked</i> state and thus no further servers are queried.</p>

Field	Description
PPP Authentication	<p>This function is not supported by R Series. It may be included in a later version of our system software.</p> <p>Here you define whether the current TACACS+ server is used for authentication of the ppp-dialin-clients.</p>
Login Authentication/Authorization	<p>Here you can choose whether to use the current TACACS+ server for login authentication to a gateway. Available choices are <i>enabled</i> (default value) and <i>disabled</i>.</p>
TACACS+ Accounting	<p>This function is not supported by R Series. It may be included in a later version of our system software.</p> <p>Here you define whether accounting for ppp connections and login is used.</p>
Administrative Status	<p>Here you can choose the status the server is to be put in.</p> <p>Possible values:</p> <ul style="list-style-type: none"> ■ <i>up</i> (default value): The associated server is used for authentication, authorization and accounting according to the priority (see field PRIORITY) and the current operational status (see OPERSTATUS in IP → REMOTE AUTHENTICATION (RADIUS/TACACS+) → TACACS+ AUTHENTICATION AND AUTHORIZATION). ■ <i>down</i>: This entry will not be considered for TACACS+ AAA requests.

Field	Description
TACACS+ Single-Connection	<ul style="list-style-type: none"><li data-bbox="802 286 1306 452">■ <i>single request</i> (default value): Multiple TACACS+ sessions (subsequent TACACS+ requests) may be supported simultaneously over a single TCP connection.<li data-bbox="802 479 1306 645">■ <i>multiple requests</i>: Multiple sessions are not being multiplexed over a single TCP connection, a new connection will be opened for each TACACS+ session and closed at the end of that session.

Table 10-2: **IP → REMOTE AUTHENTICATION (RADIUS/TACACS+) → TACACS+ AUTHENTICATION AND AUTHORIZATION → ADD/EDIT**

11 DNS Submenu

The *DNS* menu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [DNS]: IP Configuration - Nameservice	MyGateway
Positive Cache	enabled
Negative Cache	enabled
Overwrite Global Nameservers	yes
Default Interface	none
DHCP Assignment	self
IPCP Assignment	global
Static Hosts	(0)
Forwarded Domains	(0)
Dynamic Cache	(0 pos 0 neg)
Advanced Settings...	Global Statistics...
SAVE	CANCEL

Name Resolution with the Gateway

The gateway offers the following options for name resolution:

- DNS proxy function, for forwarding DNS requests sent to the gateway to a suitable DNS server. This also includes specific forwarding of certain domains (Forwarded Domains).
- DNS cache, for saving the positive and negative results of DNS requests.
- Static entries (Static Hosts), for manually defining or preventing assignments of IP addresses to names.
- DNS monitoring, for providing an overview of DNS requests in the gateway.

Global Name Server

The IP addresses of global name servers that are asked if the gateway cannot answer requests itself or by forwarding entries are entered in **IP → STATIC SETTINGS**.

For local applications, the IP address of the gateway itself or the general loopback address (127.0.0.1) can be entered as global name server.

The gateway can also receive the addresses of the global name servers dynamically from WAN partners or if necessary transfer these to WAN partners:

Name Resolution Strategy in the Gateway

A DNS request is handled by the gateway as follows:

1. If possible, the request is answered directly from the static or dynamic cache with IP address or negative answer.
2. Otherwise, if a suitable forwarding entry exists, the relevant DNS server is asked, if necessary by setting up a WAN connection at extra cost. If the DNS server can resolve the name, the information is forwarded and a dynamic entry created in the cache.
3. Otherwise, if global name servers are entered, the Primary Domain Name Server then the Secondary Domain Name Server are asked. If the IP address of the gateway or the loopback address is entered for local applications, these are ignored here. If one of the DNS servers can resolve the name, the information is forwarded and a dynamic entry created in the cache.
4. Otherwise, if a WAN partner is selected as default interface, the associated DNS server is asked, if necessary by setting up a WAN connection at extra cost. If one of the DNS servers can resolve the name, the information is forwarded and a dynamic entry created in the cache.
5. Otherwise, if overwriting the addresses of the global name servers is allowed (**OVERWRITE GLOBAL NAMESERVER = yes**), a connection is set up – if necessary at extra cost – to the first WAN partner configured to enable DNS server addresses to be requested from DNS servers, if this has not been attempted previously. If name server negotiation is successful, these are entered as global name servers and are therefore available for further requests.
6. Otherwise the initial request is answered with a server error.

If one of the DNS servers answers with “non-existent domain”, the initial request is immediately answered accordingly and a corresponding negative entry is made in the DNS cache of the gateway.

The configuration is set up in **IP → DNS**.

The menu contains the following fields:

Field	Description
Positive Cache	<p>Activation of the positive dynamic cache. Possible values:</p> <ul style="list-style-type: none"> ■ <i>enabled</i> (default value): Successfully resolved names and IP addresses are saved in the cache. ■ <i>flush</i>: All positive dynamic entries in the cache are deleted. ■ <i>disabled</i>: Successfully resolved names and IP addresses are not saved in the cache and existing dynamic positive entries are deleted.
Negative Cache	<p>Activation of the negative dynamic cache. Possible values:</p> <ul style="list-style-type: none"> ■ <i>enabled</i> (default value): Requested names for which a DNS server has sent a negative answer are saved as negative entries in the cache. ■ <i>flush</i>: All negative dynamic entries in the cache are deleted. ■ <i>disabled</i>: Names that could not be resolved are not saved in the cache and existing dynamic negative entries are deleted.

Field	Description
Overwrite Global Nameservers	<p>Defines whether the addresses of the global name servers in the gateway (in IP → STATIC SETTINGS) may be overwritten with name server addresses sent by WAN partners. Possible values:</p> <ul style="list-style-type: none"> ■ <i>yes</i> (default value) ■ <i>no</i>
Default Interface	<p>Defines the WAN partner to which a connection is set up for name server negotiation if other name resolution attempts were not successful. The default value is <i>none</i>.</p>
DHCP Assignment	<p>Defines which name server addresses are sent to the DHCP client if the gateway is used as DHCP server. Possible values:</p> <ul style="list-style-type: none"> ■ <i>none</i>: No name server address is sent. ■ <i>self</i> (default value): The address of the gateway is sent as name server address. ■ <i>global</i>: The addresses of the global name servers entered in the gateway are sent.
IPCP Assignment	<p>Defines which name server addresses are sent by the gateway to a WAN partner in dynamic name server negotiation. Possible values:</p> <ul style="list-style-type: none"> ■ <i>none</i>: No name server address is sent. ■ <i>self</i>: The address of the gateway is sent as name server address. ■ <i>global</i> (default value): The addresses of the global name servers entered in the gateway are sent.
Static Hosts	<p>The number of static entries is shown in brackets.</p>

Field	Description
Forwarded Domains	The number of forwarding entries is shown in brackets.
Dynamic Cache	The number of positive and negative dynamic entries in the DNS cache is shown in brackets.

Table 11-1: **DNS** menu fields

This menu provides access to the following submenus:

- **STATIC HOSTS**
- **FORWARDED DOMAINS**
- **DYNAMIC CACHE**
- **ADVANCED SETTINGS...**
- **GLOBAL STATISTICS...**

11.1 Static Hosts Submenu

The **IP → DNS → STATIC HOSTS** submenu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [DNS] [HOSTS] [ADD]	MyGateway
Default Domain:	
Name	
Response	positive
Address	
TTL	86400
SAVE	CANCEL

This menu shows a list of Static Hosts already configured. This can be added to or edited in the **STATIC HOSTS** → **ADD/EDIT** menu.

The menu contains the following fields:

Field	Description
Default Domain	Shows the domain name of the gateway entered in IP → STATIC SETTINGS .
Name	Host name, which is assigned the ADDRESS with this static entry. Can also start with the wildcard *, e.g. *.funkwerk-ec.com. If an incomplete name is entered without a dot, this is completed with “. <DEFAULT DOMAIN>.” after pressing SAVE .
Response	Type of static entry. Possible values: <ul style="list-style-type: none"> ■ <i>positive</i> (default value): A DNS request for NAME is answered with the associated ADDRESS. ■ <i>ignore</i>: A DNS request is ignored; no answer is given. ■ <i>negative</i>: A DNS request for NAME is answered with a negative answer.
Address	Only for RESPONSE = <i>positive</i> IP address that is assigned to NAME .
TTL	Period of validity of the assignment of NAME to ADDRESS in seconds (only relevant for RESPONSE = <i>positive</i>), which is sent to requesting hosts. The default value is 86400 (= 24 h).

Table 11-2: **STATIC HOSTS** menu fields

11.2 Forwarded Domains Submenu

The **IP → DNS → FORWARDED DOMAINS** submenu is described below.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [DNS] [FORWARDS] [ADD]		MyGateway	
Global Nameservers: none, Default Interface: none			
Default Domain:			
Name			
Interface	none		
TTL	86400		
SAVE		CANCEL	

This menu shows a list of Forwarded Domains already configured. This can be added to or edited in the **FORWARDED DOMAINS → ADD/EDIT** menu.

The menu contains the following fields:

Field	Description
Global Nameservers	Shows the global name servers entered in IP → STATIC SETTINGS .
Default Domain	Shows the domain name of the gateway entered in IP → STATIC SETTINGS .
Name	Host name that is to be resolved with this forwarding entry. Can also start with the wildcard *, e.g. *.funkwerk.de. If an incomplete name is entered without a dot, this is completed with “.<DEFAULT DOMAIN>.” after pressing SAVE .

Field	Description
Interface	Defines the WAN partner to which a connection is to be set up for the resolution of NAME . The default value is <i>none</i> .
TTL	Substitute value for the TTL value supplied by the DNS server in a positive answer, if this is 0 or exceeds MAXIMUM TTL FOR POS CACHE ENTRIES . The TTL value indicates the period of validity of the assignment of the name to the IP address in seconds. The default value is 86400 (= 24 h).

Table 11-3: **FORWARDED DOMAINS** menu fields

11.3 Dynamic Cache Submenu

The **IP → DNS → DYNAMIC CACHE** submenu is described below.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH		
[IP] [DNS] [DYNAMIC]: Nameservice - Dynamic Cache		MyGateway		
Name	Address	Resp	TTL	Ref
DELETE	STATIC	EXIT		

The **MENU IP → DNS → DYNAMIC CACHE** is used to show the DNS entries learned dynamically by the DNS servers. Here dynamic entries can also be converted to static entries or deleted. The list contains the following columns:

Column	Meaning
Name	Host name to which ADDRESS is assigned.
Address	IP address that is assigned to NAME .
Resp	Type of dynamic entry. Possible values: <ul style="list-style-type: none"> ■ <i>pos</i> (positive): A DNS request for NAME is answered with the associated IP address. ■ <i>neg</i> (negative): A DNS request for NAME is answered with a negative answer.
TTL	Shows how many seconds the dynamic entry still remains in the cache. The entry is deleted on expiry of TTL . When a positive dynamic entry is saved in the cache, the value is taken from the answer from the DNS server. If this value is 0 or exceeds MAXIMUM TTL FOR POS CACHE ENTRIES , the value is set to MAXIMUM TTL FOR POS CACHE ENTRIES . For a negative dynamic entry, the value is set to MAXIMUM TTL FOR NEG CACHE ENTRIES . The display is not updated.
Ref	Shows how often the entry has been called.

Table 11-4: **DYNAMIC CACHE** menu fields

A dynamic entry can be converted to a static entry by tagging the entry with the **Space** bar and confirming with **STATIC**.

The relevant entry then disappears from **IP → DNS → DYNAMIC CACHE** and is listed in **IP → DNS → STATIC HOSTS**. **TTL** is transferred in this operation.

11.4 Advanced Settings Submenu

The **IP → DNS → ADVANCED SETTINGS** submenu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [DNS] [ADVANCED]: Nameservice - Advanced Settings	MyGateway
Maximum Number of DNS Records	100
Maximum TTL for Pos Cache entries	86400
Maximum TTL for Neg Cache Entries	86400
SAVE	CANCEL

The menu contains the following fields:

Field	Description
Maximum Number of DNS Records	<p>Maximum total number of static and dynamic entries.</p> <p>Once this value is reached, the dynamic entry not requested for the longest period of time is deleted when a new entry is added.</p> <p>If MAXIMUM NUMBER OF DNS RECORDS is reduced by the user, dynamic entries are deleted if necessary.</p> <p>Static entries are not deleted; MAXIMUM NUMBER OF DNS RECORDS cannot be set to a lower value than the current number of existing static entries.</p> <p>Possible values: 0 .. 1000. The default value is 100.</p>

Field	Description
Maximum TTL for Pos Cache entries	For a positive dynamic entry in the cache this is set to TTL , if the TTL field of the DNS record received has the value 0 or exceeds MAXIMUM TTL FOR POS CACHE ENTRIES . The default value is 86400.
Maximum TTL for Neg Cache Entries	Is set to TTL for a negative dynamic entry in the cache. The default value is 86400.

Table 11-5: **ADVANCED SETTINGS...** menu fields

11.5 Global Statistics Submenu

The **IP → DNS → GLOBAL STATISTICS** submenu is described below.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [DNS] [STATISTICS]: Nameservice - Global Statistics		MyGateway	
Received DNS Packets	0		
Invalid DNS Packets	0		
DNS Requests	0		
Cache Hits	0		
Forwarded Requests	0		
Cache Hitrate (%)	0		
Successfully Answered Queries	0		
Server Failures	0		
EXIT			

Contains the following fields (the menu is updated every second):

Field	Description
Received DNS Packets	Shows the number of received DNS packets addressed direct to the gateway, including the answer packets for forwarded requests.
Invalid DNS Packets	Shows the number of invalid DNS packets received and addressed direct to the gateway.
DNS Requests	Shows the number of valid DNS requests received and addressed direct to the gateway.
Cache Hits	Shows the number of requests that were answered with static or dynamic entries from the cache.
Forwarded Requests	Shows the number of requests forwarded to other name servers.
Cache Hitrate (%)	Shows the number of CACHE HITS per DNS REQUEST in %.
Successfully Answered Queries	Shows the number of successfully answered requests (positive and negative).
Server Failures	Shows the number of requests that were not answered by any name server (either positively or negatively).

Table 11-6: **GLOBAL STATISTICS...** menu fields

12 DynDNS Submenu

The *DYNDNS* menu is described below.

The use of dynamic IP addresses has the disadvantage that a host in the network can no longer be found once its IP address has changed. Dynamic DNS ensures that your gateway can still be reached after changing the IP address.

The following configuration steps are necessary:

- Registration of a host name at a DynDNS provider
- Configuration of the gateway

Registration The registration of a host name means that you define an individual user name for the DynDNS service, e.g. *dyn_client*. The service providers offer various domain names for this, so that a unique host name results for your gateway, e.g. *dyn_client.provider.com*. The DynDNS provider relieves you of the task of answering all DNS requests concerning the host *dyn_client.provider.com* with the dynamic IP address of your gateway.

To ensure that the provider always knows the current IP address of your gateway, the gateway contacts the provider when setting up a new connection and propagates its present IP address.

Configuration of the gateway The configuration is set up in *IP → DYNDNS*. The first menu window contains a list of the entries already configured for using DynDNS services.

```

R232bw Setup Tool                               Funkwerk Enterprise Communication GmbH
[IP] [DYNDNS]: Dynamic DNS Service                MyGateway

DynDNS Services:

Host Name           Interface  Permission  State
dyn_client.provider.com  internet  enabled     up_to_date

DynDNS Provider List>

      ADD                DELETE                EXIT

```

From here you can also access the **IP → DYNDNS → DYNDNS PROVIDER LIST** submenu.

In the **IP → DYNDNS → ADD/EDIT** menu, you can configure name resolution over a DynDNS provider or change an existing configuration:

R232bw Setup Tool [IP] [DYNDNS] [ADD]	Funkwerk Enterprise Communication GmbH MyGateway
Host Name Interface User Password	en0-1
Provider MX Wildcard Permission	dyndns off enabled
SAVE	CANCEL

The menu contains the following fields:

Field	Description
Host Name	Full host name as registered with the DynDNS provider.
Interface	Defines the WAN interface whose IP address is to be propagated over the DynDNS service (e.g. the interface of the Internet Service Provider).
User	User name as registered with the DynDNS provider.
Password	Password as registered with the DynDNS provider.

Field	Description
Provider	<p>Selection of a preconfigured DynDNS provider. A choice of DynDNS providers is already available in the unconfigured state and their protocols are supported.</p> <p>The default value is <i>dyndns</i>.</p>
MX	<p>Full host name of a mail server, to which e-mails are forwarded if the host currently configured is not to receive mail.</p> <p>Ask your provider about this forwarding service and make sure e-mails can be received from the host entered as MX.</p>
Wildcard	<p>Here you can activate the forwarding of all sub-domains of HOST NAME to the current IP address of INTERFACE.</p> <p>Possible values:</p> <ul style="list-style-type: none"> ■ <i>on</i>: The additional name resolution is activated. ■ <i>off</i> (default value): The additional name resolution is deactivated.
Permission	<p>Here you can activate or deactivate the DynDNS entry just configured. Possible values are:</p> <ul style="list-style-type: none"> ■ <i>enabled</i> (default value): Entry is activated. ■ <i>disabled</i>: Entry is deactivated.

Table 12-1: **DYNDNS** menu fields

The **IP → DYNDNS → DYNDNS PROVIDER LIST** menu shows a list of the preconfigured providers. You cannot edit or delete the preconfigured providers.

A new provider is configured in the **IP → DYNDNS → DYNDNS PROVIDER LIST → ADD/EDIT** menu.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [DYNDNS] [DYNDNS PROVIDER] [ADD]		MyGateway	
Name			
Server			
Path			
Port		80	
Protocol		dyndns	
Minimum Wait (sec)		300	
SAVE		CANCEL	

The menu contains the following fields:

Field	Description
Name	Here you can give the provider any name you like.
Server	Host name or IP address of the server on which the provider's DynDNS service runs.
Path	Path on the provider's server, where the script for administration of your gateway's IP address can be found. Ask your provider for the path to be used.
Port	Port at which your gateway is to reach your provider's server. Ask your provider for the relevant port. Default value: 80.

Field	Description
Protocol	<p>Here you select one of the protocols implemented.</p> <p>The following are available:</p> <ul style="list-style-type: none"> ■ <i>dyndns</i> (default value) (www.dyndns.org) ■ <i>static dyndns</i> (www.dyndns.org) ■ <i>ods</i> (http://www.ods.org) ■ <i>hn</i> (http://hn.org) ■ <i>dyns</i> (http://dyns.cx) ■ <i>GnuDIP HTML</i> (http://gnudip2.sourceforge.net) ■ <i>GnuDIP TCP</i> (http://gnudip2.sourceforge.net) ■ <i>custom dyndns</i> (www.dyndns.org)
Minimum Wait (sec)	<p>Here you enter the minimum time (in seconds) that the gateway must wait before it is allowed to propagate its current IP address to the DynDNS provider again.</p> <p>The default value is 300 seconds.</p>

Table 12-2: **DYNDNS PROVIDER LIST** → **ADD/EDIT** menu fields

13 Routing Protocols Submenu

The **ROUTING PROTOCOLS** menu is described below.

```

R232bw Setup Tool                               Funkwerk Enterprise Communication GmbH
[IP] [ROUTING]: Routing protocols                MyGateway

          Routed                                running

          RIP >

          SAVE                                  CANCEL
  
```

The contents of a gateway's routing table can be configured statically. A gateway also has the option of updating its routing tables dynamically by exchanging information with other gateways. This information exchange is specified in a routing protocol.

Routing protocols allow the gateway to adapt to changing network conditions dynamically and quickly find the best routing solutions in complex networks. One of the most frequently used routing protocols is **RIP**. It is explained briefly in the following chapters.

The **ROUTING PROTOCOLS** submenu is part of the **IP** menu. This shows the state of the Routing Daemon (**ROUTED**) and enables it to be activated or deactivated (with **ROUTED** = *running* or *stopped*).

The possible states of the Routing Daemon are:

- *running*: Activates RIP (dependent on the interface-specific RIP configuration) and OSPF.
- *stopped*: Deactivates RIP (dependent on the interface-specific RIP configuration) and OSPF.

The **IP → ROUTING PROTOCOLS** menu also provides access to the **RIP** submenu.

The use of the routing protocols is activated globally in the **IP → ROUTING PROTOCOLS → ROUTED** menu. RIP is also activated on the respective interface by selecting the relevant protocol version in **RIP SEND** or **RIP RECEIVE**.

13.1 RIP Submenu

The **RIP** menu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [ROUTING] [RIP]: RIP configuration	MyGateway
UDP port	520
Static Settings >	
Timer >	
Filter >	
SAVE	CANCEL

The **IP → ROUTING PROTOCOLS → RIP** menu is used for making global RIP settings. The activation of RIP is set specific to interface in **IP → ADVANCED SETTINGS** of the respective interface menu.

A gateway exchanges routing information with other gateways using the RIP (Routing Information Protocol). A gateway sends messages to remote networks every 30 seconds using information from its own current routing table. The complete routing table is always exchanged in this process. If triggered RIP is used, information is only exchanged if the routing information has changed and only the changed information is sent.

Observing the information sent by other gateways enables new routes and shorter paths for existing routes to be saved in the routing table. As intermediate routes between networks can become unreachable, RIP removes routes that

are older than 5 minutes (i.e. routes not verified in the last 300 seconds). Routes learnt are not deleted if triggered RIP is used.



Note

The setting option **UDP PORT**, which is used for sending and receiving RIP updates, is only for test purposes. If the setting is changed, this can mean that the gateway sends and listens at a port to which no other gateways react. The default value 520 should be retained.

The **IP → ROUTING PROTOCOLS → RIP** menu provides access to three other sub-menus, in which you can define exactly how RIP updates are handled:

- **STATIC SETTINGS**
- **TIMER**
- **FILTER.**

13.1.1 Static Settings Submenu

The **STATIC SETTINGS** menu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [ROUTING] [RIP] [STATIC]: RIP Static Settings	MyGateway
Default Route distribution	enabled
Poisoned Reverse	disabled
RFC 2453 variable timer	enabled
RFC 2091 variable timer	disabled
SAVE	CANCEL

The **IP → ROUTING PROTOCOLS → RIP → STATIC SETTINGS** menu is for configuring basic RIP parameters. It contains the following fields:

Field	Description
Default Route distribution	<p>Here you determine whether the default route of your gateway is to be propagated via RIP updates. Possible values:</p> <ul style="list-style-type: none"> ■ <i>disabled</i> ■ <i>enabled</i> <p>The default value is <i>enabled</i>.</p>
Poisoned Reverse	<p>Procedure for preventing routing loops</p> <p>With standard RIP, the routes learnt are propagated over all interfaces with RIP SEND activated. With POISONED REVERSE, the gateway propagates over the interface over which it learnt the routes, with the metric (Next Hop Count) 16 (=“Network is not reachable”). Possible values:</p> <ul style="list-style-type: none"> ■ <i>disabled</i> ■ <i>enabled</i> <p>The default value is <i>disabled</i>.</p>
RFC 2453 variable timer	<p>Here you can determine whether the timers described in RFC 2453 are to use the values you can configure in the IP → ROUTING PROTOCOLS → RIP → TIMER menu. Possible values are:</p> <ul style="list-style-type: none"> ■ <i>disabled</i> ■ <i>enabled</i> (default value) <p>If you select <i>disabled</i>, the times defined in RFC are retained for the timeouts.</p>

Field	Description
RFC 2091 variable timer	<p>Here you can determine whether the timers described in RFC 2091 are to use the values you can configure in the IP → ROUTING PROTOCOLS → RIP → TIMER menu. Possible values are:</p> <ul style="list-style-type: none"> ■ <i>disabled</i> (default value) ■ <i>enabled</i> <p>If you keep the <i>disabled</i> setting, the times defined in RFC are retained for the timeouts.</p>

Table 13-1: **STATIC SETTINGS** menu fields

The timers that can be activated in the **STATIC SETTINGS** menu are configured in the **IP → ROUTING PROTOCOLS → RIP → TIMER** menu.

13.1.2 Timer Submenu

The **TIMER** menu is described below.

R232bw Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [ROUTING] [RIP] [TIMER]: RIP timer configuration	MyGateway
Timer for RIP V2 (RFC 2453)	

Update Timer	30
Route Timeout	180
Garbage Collection Timer	120
Timer for Triggered RIP (RFC 2091)	

Hold down timer	120
Retransmission timer	5
SAVE	CANCEL

In this menu you can configure the timers defined by RFC 2091 and RFC 2453 for the various events in the lifetime of a route.

The menu is divided into fields for configuration of the **RIP-V2 TIMER (RFC 2453)** and **TRIGGERED-RIP TIMER (RFC 2091)**.

The **TIMER** menu contains the following fields (all timers are stated in seconds):

Field	Description
Update Timer	An RIP update is sent on expiry of this period of time. The default value is 30.
Route Timeout	The ROUTE TIMEOUT is activated after the last update of a route. After timeout, the route is deactivated and the GARBAGE COLLECTION TIMER is started. The default value is 180.
Garbage Collection Timer	The GARBAGE COLLECTION TIMER is started as soon as the route timeout has expired. After this timeout, the invalid route is deleted from the IPROUTE TABLE if no further update is received for the route. The default value is 120.
Hold down timer	The HOLD DOWN TIMER is activated as soon as the gateway contains an unreachable route (metric 16). After this timeout, the route is deleted from the IPROUTE TABLE , if applicable. The default value is 120.

Field	Description
Retransmission timer	After this timeout, update request or update response packets are sent again until an update flush or update acknowledge packet arrives. The default value is 5.

Table 13-2: *TIMER* menu fields

13.1.3 Filter Submenu

The *FILTER* menu is described below.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH			
[IP] [ROUTING] [RIP] [FILTER]: RIP Distribution Filter		MyGateway			
Interface	Direction	State	IP Address	Netmask	Priority
ADD		DELETE		EXIT	

In the **IP → ROUTING PROTOCOLS → RIP → FILTER** menu, you can define exactly which routes are to be exported or imported.

You can use the following strategies for this:

- You explicitly deactivate the import or export of certain routes. The import or export of all other routes that are not listed is still allowed.
- You explicitly activate the import or export of certain routes. In this case, you must also explicitly deactivate the import or export of all other routes. You can do this using a filter for **IP ADDRESS** = no entry (this corresponds to the IP address 0.0.0.0) with **NETMASK** = no entry (this corresponds to the netmask 0.0.0.0) and **DISTRIBUTION** = *disabled*. To make sure this filter is used last, you must assign it the lowest priority.

You configure a filter for a default route with the following values:

- **IP ADDRESS** = no entry (this corresponds to the IP address 0.0.0.0) with **NETMASK** = 255.255.255.255.

The first menu window shows a list of the filters already configured.

The fields shown correspond to the options configurable in the **ADD/EDIT** submenu. The value for the **DISTRIBUTION** variable is shown under **STATE**.

R232bw Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [ROUTING] [RIP] [FILTER] [ADD]: Define RIP Filter			MyGateway
Interface		en1-0	
IP Address			
Netmask			
Priority		1	
Direction		import	
Distribution		disabled	
Metric1 offset on interface up		0	
Metric1 offset on interface dormant		0	
	SAVE		CANCEL

The **FILTER** → **ADD/EDIT** menu contains the following fields:

Field	Description
Interface	Here you define the interface to which the rule to be configured applies.
IP Address	Here you enter the IP address to which the rule is to be applied. This address can be in the LAN or WAN. The rules for incoming and outgoing RIP packets (import or export) for the same IP address must be separately configured. You can enter individual host addresses or network addresses.
Netmask	Here you enter the netmask of IP ADDRESS .

Field	Description
Priority	<p>Here you enter the priority with which the filter is to be used. If different filters with overlapping IP address range exist, the filter with the higher priority is used first. This enables a single host route to be imported from an IP address range that is actually disabled, if the rule that allows this has a higher priority than the rule that disables the address range.</p> <p>Possible values are 1 to 16, where 1 corresponds to the highest priority. The default value is 1.</p>
Direction	<p>Here you define whether the filter applies to the export or import of routes.</p> <p>Possible values are:</p> <ul style="list-style-type: none"> ■ <i>import</i> ■ <i>export</i>. <p>The default value is <i>import</i>.</p>
Distribution	<p>Here you define whether this filter allows or denies export or import from/to the gateway.</p> <p>Possible values are:</p> <ul style="list-style-type: none"> ■ <i>enabled</i> ■ <i>disabled</i> <p>The default value is <i>disabled</i>.</p>
Metric1 offset on interface up	<p>Here you enter whether and to what extent the metric of an imported or exported route is to be changed if the interface concerned is active (up).</p> <p>Possible values are -16 to 16. The default value is 0.</p>

Field	Description
Metric1 offset on interface dormant	Here you enter whether and to what extent the metric of an imported or exported route is to be changed if the interface concerned is inactive (dormant). Possible values are <i>-16</i> to <i>16</i> . The default value is <i>0</i> .

Table 13-3: ***FILTER*** menu fields

Index: IP

A	Action	44
	Add Routing Entry	5
	ADDEXT	7
	Address	76, 79
	Administrative Status	68
	Alias Name (Description)	31
	Alive Check (if inactive)	63
	Alive Test Period (seconds, 0=disabled)	50
B	Bandwidth Management	25
	Bandwidth on Demand	25
	Block Time (seconds)	67
	BOD	25
C	Cache Hitrate (%)	82
	Cache Hits	82
	Chain	39
	Client / Server	57
	Connection State	41
	Control all TCP Services	30
D	Default Domain	76
	Default Domains	77
	Default Interface	74
	Default Route distribution	92
	Description	32, 40
	Destination Address	41
	Destination IP Address	6
	Destination Mask	41
	Destination Port	9, 10, 42
	DHCP Assignment	74
	Dialout	63
	Direction	44, 97
	Distribution	97

Distribution Fraction (in percent)	34
Distribution Mode	33
Distribution Policy	33, 34
Distribution Ratio	33
DNS	11, 71
DNS Proxy	11
DNS Requests	82
Domain Name	11
Domain Name Server	11, 71
Dynamic Cache	75
DynDNS Registration	83
E Edit Routing Entry	5
Encryption (recommended)	67
Extended Routing	7
External Address	17
External Mask	17
External Port	18
F Filter	39, 44
First Rule	46
Flags	5
Forwarded Domains	75
Forwarded Requests	82
G Garbage Collection Timer	94
Gateway	50
Gateway IP Address	7
H Hold down timer	94
Host Name	84
HTTP TCP Port	12
I Ignore	7
Index	40, 43
Insert behind Rule	43
Interface	28, 39, 46, 49, 78, 84, 96



Interface 1 - 3	34
Interface Group ID	33
Internal Address	18
Internal Mask	18
Internal Port	19
Internet Gateway Device (IGD)	21
Invalid DNS Packets	82
IP Address	47, 49, 60, 96
IP Address Pool LAN (DHCP)	49
IP Address Pool WAN (PPP)	47
IPCP Assignment	74
L LAN	7, 38
LAN UPnP client	21
Lease Time (Minutes)	50
Load Balancing	25
Local Nameservers	77
Login Authentication/Authorization	68
M MAC Address	50
Maximum Number of DNS Records	80
Maximum TCP Download Rate (kbits/s)	29
Maximum TTL for Neg Cache Entries	81
Maximum TTL for Pos Cache Entries	81
Metric	7
Metric1 offset on interface dormant	98
Metric1 offset on interface up	97
Minimum Wait	87
Mode	8, 9
MX	85
N Name	76, 77, 79, 86
Name Resolution	71
Negative Cache	73
NetBT Node Type	51
Netmask	6, 96
Network	6

Network Address Translation	14
Next Rule	44
Number of Channels	44
Number of Consecutive Addresses	47, 50
O Optimize Download Rate via TCP ACK prioritisation	28
OSPF	89
Overwrite Global Nameservers	74
P Partner / Interface	7
Password	60, 84
Path	86
Permission	85
Poisoned Reverse	92
Policy	61, 66
Pool ID	47
Port	61, 86
Positive Cache	73
PPP Authentication	68
PPTP Passthrough	14
Primary BOOTP Relay Server	12
Primary Domain Name Server	11
Primary WINS	11
Priority	60, 65, 97
Protocol	9, 16, 40, 60, 87
Provider	85
R RADIUS packets	58
Received DNS Packets	82
Ref	79
Refuse	7
Remote Address	17
Remote CAPI Server TCP Port	12
Remote Mask	17
Remote Port	17
Remote TRACE Server TCP Port	12
Resp	79



Response	76
Retransmission timer	95
Retries	62
RFC 2091 variable timer	93
RFC 2453 variable timer	92
RIP	89
RIP UDP Port	12
Route Timeout	94
Route Type	6
Routing Protocols	89
Rule	39
S Secondary BOOTP Relay Server	12
Secondary Domain Name Server	11
Secondary WINS	11
Server	86
Server Failures	82
Server's IP Address or Hostname	65
Service	16
Service Control Point	21
Silent Deny	14
SNMP	53
SNMP listen UDP port	54
SNMP trap broadcasting	55
SNMP trap community	55
SNMP trap UDP port	55
SNMP versions	54
Source Address	41
Source Interface	9
Source IP Address	9
Source Mask	9, 41
Source Port	9, 10, 41
Specify Port	41
State	62
Static Hosts	74
Status	31
Successfully Answered Queries	82



T	TACACS+ Accounting	68
	TACACS+ Key (Secret)	66
	TACACS+ Single-Connection	69
	TCP Port	66
	TCP port number for UPnP	23
	TCP Service Port	31
	TDRC Mode	29
	Timeout (ms)	61
	Timeout (seconds)	67
	TOS Mask	9, 42
	TTL	76, 78, 79
	Type	41
	Type of Service (TOS)	9, 42
U	Unique Source IP Address	12
	Universal Plug and Play (UPnP)	21
	Update Timer	94
	UPnP status	22
	User	84
V	Validate	62
W	WAN with transit network	7, 38
	WAN without transit network	7, 38
	Wildcard	85
	WINS	11