

User's Guide
bintec R4100 / R4300
IP

Purpose This document is part of the user's guide to the installation and configuration of bintec gateways running software release 7.4.5 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

The *IP* menu is described below.

R4100 Setup Tool	Funkwerk Enterprise Communication GmbH
[IP]: IP Configuration	MyGateway
Routing Static Settings Network Address Translation 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.

R4100 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:

R4100 Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [ROUTING] [ADD]		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 8 .
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.

Description	Meaning
Local	Route to a destination host or network that can be reached via the Local interface of your gateway.

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 destination 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.

R4100 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 = <i>WAN without transit network</i> . Defines when the interface selected under PARTNER / INTERFACE is to be used. For possible values see table “Mode selection options,” on page 10 .
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, igrp, 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** → **ADEXT** 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".
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.

R4100 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 Submenu

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:

R4100 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.

```

R4100 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:

R4100 Setup Tool		Funkwerk Enterprise Communication GmbH	
[IP] [NAT] [EDIT] [OUTSIDE] [ADD]: NAT - sessions from		MyGateway	
OUTSIDE (Internet)			
Description			
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
Description	Here you enter a name for this NAT entry.
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>

Field	Description
Protocol	Only for SERVICE = user defined . Defines the protocol. Possible values: <i>icmp, tcp, udp, gre, esp, ah, l2tp, any</i>
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	Netmask for INTERNAL ADDRESS . If you use external and internal network IP addresses, the values for EXTERNAL MASK and INTERNAL MASK must be identical.

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.

```

R4100 Setup Tool                               Funkwerk Enterprise Communications GmbH
[IP] [UPNP]: UPnP Configuration                 MyGateway

        Static settings
        Interfaces

        EXIT
  
```

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 following submenus:

- **STATIC SETTINGS**
- **INTERFACES**

5.1 Static Settings Submenu

The **Static Settings** submenu is described below.

In the **IP → UPNP → STATIC SETTINGS** menu basic UPnP settings can be adjusted.

R4100 Setup Tool	Funkwerk Enterprise Communications GmbH
[IP] [UPNP] [STATIC]: UPnP Static Settings	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.
TCP port number for UPnP	<p>Here you enter the port number on which the gateway listens for UPnP requests.</p> <p>Possible values are 1 to 65535, default is 5678.</p>

Table 5-1: **IP → UPNP → STATIC SETTINGS**

5.2 Interfaces Submenu

The Interfaces submenu is described below.

Index	Name	Client Requests	UPnP Control
1000	en1-0	enable	disabled
1002	en1-0-snap	enable	disabled
10001	Internet	disabled	enabled
50000	ethoa50-0	disabled	disabled
50002	ethoa50-0-snap	disabled	disabled

EXIT

In the **IP → UPnP → INTERFACES** menu you configure the UPnP settings of each individual gateway interface.

You can decide whether UPnP client requests are accepted via the respective interface (for requests from inside) and/or whether this interface is controlled by UPnP.

The screenshot shows an example configuration with an ADSL internet access via the WAN Partner *Internet* and the connection of the local network via the *en1-0* ethernet interface. To use messenger services as MS Messenger behind an active NAT Firewall the following options are selected: **UPnP CONTROL** is *enabled* on the *Internet* interface; **CLIENT REQUESTS** are *enabled* for the interfaces *en1-0* and *en1-0-snap*.

Configuration is carried out in **IP → UPnP → INTERFACES → EDIT**.

R4100 Setup Tool		Funkwerk Enterprise Communications GmbH	
[IP] [UPNP] [INTERFACES] [EDIT]: Configure UPnP Interfaces		MyGateway	
Interface Index		1000	
Interface Name		en1-0	
UPnP Client Requests		disabled	
UPnP-controlled Interface		disabled	
SAVE		CANCEL	

The menu contains of the following fields:

Field	Description
Interface Index	Here the index of the interface is displayed for which the UPnP settings are adjusted. The entry cannot be changed.
Interface Name	Here the name of the interface is displayed for which the UPnP settings are adjusted. The entry cannot be changed.
UPnP Client Requests	Here you specify, whether UPnP client requests are accepted via the respective interface (for requests from inside). Possible values: <ul style="list-style-type: none"> <input type="checkbox"/> <i>disabled</i> (default value) <input type="checkbox"/> <i>enabled</i>

Field	Description
UPnP-controlled Interface	<p>Here you specify, whether the NAT configuration of this interface is controlled by UPnP.</p> <p>This control is performed by means of UPnP requests sent by LAN UPnP clients, and received on one interface with UPnP CLIENT REQUESTS set to <i>enabled</i>.</p> <p>Possible values:</p> <ul style="list-style-type: none">■ <i>disabled</i> (default value)■ <i>enabled</i>

Table 5-2: **IP → UPnP → INTERFACES → EDIT**

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

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

```
R4100 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.)

R4100 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.

R4100 Setup Tool		Funkwerk Enterprise Communications GmbH	
[IP] [TDRS] [EDIT]: Configure TCP Download Rate Control		MyGateway	
Interface	50000	ethoa50-0	
Optimize Download Rate via TCP ACK prioritisation (recommended for ADSL)		no	
TDRS 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.

R4100 Setup Tool		Funkwerk Enterprise Communications GmbH	
[IP] [TDRS] [EDIT]: Configure TCP Download Rate Control		MyGateway	
Interface	10001	DSL	
Optimize Download Rate via TCP ACK prioritisation (recommended for ADSL)		yes	
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	<p>Here you choose whether the download rate is to be optimized by prioritizing TCP ACK packets.</p> <p>If you choose <i>yes</i>, all of the following fields are no longer available.</p> <p>Available values are <i>yes</i> and <i>no</i>. Default is <i>no</i>.</p>

Field	Description
TDRS Mode	<p>Only available for OPTIMIZE DOWNLOAD RATE VIA TCP ACK PRIORITISATION = no.</p> <p>Here you choose the TDRS (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 yes and no. Default is yes.</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:

R4100 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**.

R4100 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 37</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> <ul style="list-style-type: none"> ■ <i>equal for all interfaces of the group</i> (default value): Here the percentage of the data traffic to be assigned to an interface is displayed. ■ <i>individual for all interfaces of the group</i>: Here you enter the percentage of the data traffic to be assigned to an interface. <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.

Field	Description
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.
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 37

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**.

R4100 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 40 .
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.

R4100 Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [BOD]: Bandwidth on Demand for IP	MyGateway
<p>Filter Rules for BOD Configure Interfaces for BOD</p> <p>EXIT</p>	

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***.

Field	Description
Type	<p>Only if PROTOCOL = <i>icmp</i>.</p> <p>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.</p> <p>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>.</p> <p>Source port number or range of source port numbers.</p> <p>Possible values: see “Source Port and Destination Port selection options” on page 44</p> <p>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></p> <p>Port numbers or range of port numbers.</p>
Destination Address	Defines the destination IP address of the data packets.

Field	Description
Destination Mask	Netmask for DESTINATION ADDRESS .
Destination Port	Only for PROTOCOL = tcp/udp-port . 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 44. 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.

R4100 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.

R4100 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**.

R4100 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) Submenu

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.

R4100 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) Submenu

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.

R4100 Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [DHCP] [ADD]: Define Range of IP Addresses	MyGateway
Interface	en1-0
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.

Field	Description
Type	<p>Restrict the use of the DHCP address pool for specific client types:</p> <ul style="list-style-type: none"> ■ <i>IPSec</i>: DHCP address pool is only used for IPSec clients. ■ <i>Non-IPSec</i>: DHCP address pool is not used for IPSec clients. ■ <i>Any</i>: DHCP address pool is used for all clients.
IP Address	First IP address in the address pool.
Number of Consecutive Addresses	<p>Total number of IP addresses in the address pool, including the first IP address (IP ADDRESS).</p> <p>The default value is 1.</p>
Lease Time (Minutes)	<p>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.</p> <p>The default value is 120.</p>
MAC Address	<p>Only for NUMBER OF CONSECUTIVE ADDRESSES = 1</p> <p>IP ADDRESS is only assigned to the device with MAC ADDRESS.</p>
Client Identifier	<p>Only for NUMBER OF CONSECUTIVE ADDRESSES = 1</p> <p>If you highlight the MAC ADDRESS field, you can alternatively select the option CLIENT IDENTIFIER. This is required, if no MAC address is available, e.g. if the IPSec client is run on a PC without Ethernet equipment.</p> <p>Thus enter the client name here.</p>

Field	Description
Alive Test Period (seconds, 0=disabled)	<p>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.</p> <p>Possible values are 0..65535.</p> <p>Default value is 0.</p> <p>If set to 0, no alive check is performed.</p>
Gateway	<p>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.</p>
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.

R4100 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>v1lv2c1v3</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</i> . <i>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 *AUTHENTICATION AND ACCOUNTING* 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**.

R4100 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 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 authenticating WLAN clients according to 802.1x standard.
IP Address	The IP address of the RADIUS server.
Password	Common password used for communication between the RADIUS server and gateway.
Default User Password	<p>Only for PROTOCOL = IPSec</p> <p>This is the password used for a download of predefined IPSec configurations from a RADIUS server.</p> <p>For PPP RADIUS dial-out, if necessary, configure the DEFAULT USERPASSWORD via RADIUSSRVDEFAULTPW MIB variable in the RADIUSSERVTABLE.</p>

Field	Description
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>
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 1812.</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 50 and 50000.</p> <p>The default value is 1000 (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 <i>inactive</i>.</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.

R4100 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.

R4100 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. (bin-tec 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) = enabled).</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 (see 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 R4100 / R4300. 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 R4100 / R4300. 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 1305 457">■ <i>single request</i> (default value): Multiple TACACS+ sessions (subsequent TACACS+ requests) may be supported simultaneously over a single TCP connection.<li data-bbox="802 474 1305 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.

R4100 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.

R4100 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 = positive IP address that is assigned to NAME .
TTL	Period of validity of the assignment of NAME to ADDRESS in seconds (only relevant for RESPONSE = positive), 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.

R4100 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.

R4100 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.

R4100 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.

R4100 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.

R4100 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 → DYN DNS → DYN DNS PROVIDER LIST** submenu.

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

R4100 Setup Tool [IP] [DYN DNS] [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 subdomains 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.

R4100 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) ■ <i>selfhost</i> (www.selfhost.de) ■ <i>no-ip</i> (www.no-ip.com)
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.

R4100 Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [ROUTING]: Routing protocols	MyGateway
Routed	running
RIP >	
OSPF	
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.

R4100 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.

R4100 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.</p> <p>Possible values:</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>disabled</i> <input type="checkbox"/> <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”).</p> <p>Possible values:</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>disabled</i> <input type="checkbox"/> <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.</p> <p>Possible values are:</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>disabled</i> <input type="checkbox"/> <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.</p> <p>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.

R4100 Setup Tool	Funkwerk Enterprise Communication GmbH
[IP] [ROUTING] [RIP] [TIMER]: RIP timer configuration	MyGateway
<p>Timer for RIP V2 (RFC 2453)</p> <p>-----</p> <p>Update Timer 30</p> <p>Route Timeout 180</p> <p>Garbage Collection Timer 120</p> <p>Timer for Triggered RIP (RFC 2091)</p> <p>-----</p> <p>Hold down timer 120</p> <p>Retransmission timer 5</p> <p>SAVE CANCEL</p>	

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.

R4100 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**.

R4100 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 to 16</i> . The default value is <i>0</i> .

Table 13-3: *FILTER* menu fields

13.2 OSPF Submenu

The *OSPF* menu is described below.

R4100 Setup Tool	Bintec Access Networks GmbH
[IP] [ROUTING] [OSPF]: OSPF Configuration	MyGateway
Static Settings Interfaces Areas EXIT	

The **IP → ROUTING PROTOCOLS → OSPF** menu differs from RIP in that all global and interface-specific OSPF settings are made here.

OSPF (Open Shortest Path First) is a routing protocol that is frequently used in larger networks as an alternative to RIP. It was originally developed to avoid a number of limitations of RIP (when used in larger networks).

The problems (with RIP) avoided by OSPF include:

- Reduced network load
After a short initialization phase, routing information is not sent periodically as with RIP, but only changed routing information.

- **Authentication**
Gateway authentication can be configured to increase the security when exchanging routing information.
- **Routing Traffic Control**
Gateways can be combined to form areas to limit the traffic created by exchanging routing information.
- **Connection costs**
OSPF differs from RIP in that the connection costs are not calculated from the number of next hops, but from the bandwidth of the respective transport medium.
- **No limitation of the number of hops**
The limitation of the maximum number of 16 hops for RIP does not exist for OSPF.

Although the OSPF protocol is considerably more complex than RIP, the basic concept is the same, i.e. OSPF also determines the best path for forwarding the packets in each case.

Autonomous System OSPF is an Interior Gateway Protocol that is used to distribute routing information within an autonomous system (AS). The Link State Updates are exchanged between the gateways by flooding. Each change of routing information is passed to all gateways in the network. OSPF areas are defined to limit the number of Link State Updates. All gateways of an area have an identical Link State database.

Area Border Routers An area is interface-specific. Gateways whose interfaces belong to several areas and connect these to the backbone are called Area Border Routers (ABR). ABRs therefore contain the information of the backbone area and all areas connected. A gateway whose interfaces are all incorporated in one area are called Internal Routers (IR).

Link State Packets There are three types of Link State packets: Router links show the state of the interfaces of a gateway that belong to a certain area. Summary links are generated by the ABR to define how the information on reachability in the network is exchanged between areas. Usually all information is sent to the backbone area, which then passes the information to the other areas. Network links are sent by Designated Routers (DS) within a segment and propagate all gateways that are

connected to a certain multi-access segment like Ethernet, Token Ring and FDDI (also NBMA). External links point to networks outside the AS. These networks are incorporated in OSPF using redistribution. In this case, an Autonomous System Border Router (ASBR) incorporates these external routes in the AS.

Authentication It is possible to increase security by authenticating the OSPF packets, so that the gateways can participate in Routing Domains using predefined passwords.

Backbone Area It is recommended that several areas are defined in larger networks. If more than one area is configured, one of these areas must possess the area ID 0.0.0.0, which defines the backbone area. This must be the center point of all areas, i.e. all areas must be physically connected to the backbone area. Occasionally, gateways cannot be physically connected directly to the backbone area and virtual links must be set up.

Virtual links The purpose of virtual links is to connect areas in which no physical connection to the backbone is possible and to maintain the connection of the backbone in case of a failure of the 0.0.0.0 area.

Summary links Summarizing is the term given to the consolidation of the various routes into a single advertisement (summary link). This is usually done by the ABR at the area borders.

Stub area Certain areas can be defined as stub areas in OSPF. This prevents external networks, e.g. those propagated from other protocols by redistribution in OSPF, being propagated into the stub area. Externally routing of such areas is propagated with a default route. The configuration of a stub area reduces the database size in the area and reduces the amount of storage space needed on the gateways incorporated in the area.

The **IP → OSPF** menu provides access to the following submenus:

- **STATIC SETTINGS**
- **INTERFACES**
- **AREAS.**

13.2.1 Static Settings Submenu

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

R4100 Setup Tool	Bintec Access Networks GmbH
[IP] [ROUTING] [OSPF] [STATIC]: OSPF Static Settings	MyGateway
<p>OSPF enabled</p> <p>Generate Default Route for the AS no</p> <p>Propagate Routes on discard/refuse interfaces no</p>	
SAVE	CANCEL

The **IP → ROUTING PROTOCOLS → OSPF → STATIC SETTINGS** menu contains global OSPF parameters. OSPF on the gateway is activated in this menu.

The **STATIC SETTINGS** menu contains the following fields:

Field	Description
OSPF	Activates (<i>enabled</i> , default value) or deactivates (<i>disabled</i>) OSPF.
Generate Default Route for the AS	If this value is set to <i>yes</i> , the gateway propagates a default route over all active OSPF interfaces (see ADMIN STATUS field in the IP → OSPF → INTERFACES menu). The default value is <i>no</i> .

Field	Description
Propagate Routes on discard/refuse interfaces	<p>The logical interfaces REFUSE and IGNORE have the following meaning: REFUSE means (if a route exists on this) that packets from this interface are discarded and an ICMP Unreachable Reply is generated. IGNORE means (if a route exists on this) that packets from this interface are discarded without comment.</p> <p>If the value is <i>yes</i>, routes connected to the two discard/refuse interfaces are saved by OSPF in its database. If the value is <i>no</i> (default value), these routes are ignored.</p>

Table 13-4: **STATIC SETTINGS** menu fields

13.2.2 Interfaces Submenu

The **INTERFACES** menu is described below.

R4100 Setup Tool		Bintec Access Networks GmbH			
[IP] [ROUTING] [OSPF] [INTERFACE]: Interface Configuration		MyGateway			
Interface	Area	IP Address	AdminStatus	State	Metric
en0-1	0.0.0.0	192.16.0.181	passive	down	10
en0-1-snap	0.0.0.0	0.0.0.0	passive	down	10
vss8-0	0.0.0.0	0.0.0.0	passive	down	1
vss8-0-snap	0.0.0.0	0.0.0.0	passive	down	1
vss8-1	0.0.0.0	0.0.0.0	passive	down	1
vss8-1-snap	0.0.0.0	0.0.0.0	passive	down	1
EXIT					



Note

If your interfaces are not only to be assigned to backbone area 0.0.0.0, you must first define other OSPF areas in **IP → ROUTING PROTOCOLS → OSPF → AREAS → ADD**.

All OSPF-capable gateway interfaces are listed here and all interface-specific settings made.

The configuration is set up in **ADD/EDIT**.

R4100 Setup Tool		Bintec Access Networks GmbH	
[IP] [ROUTING] [OSPF] [INTERFACE] [EDIT]: Configure Interface		MyGateway	
en0-1			
Admin Status		passive (propagate routes)	
Area ID		0.0.0.0	
Metric Determination		auto (ifSpeed)	
Metric (direct routes)		10	
Authentication Type		none	
Authentication Key			
Export indirect static routes		no	
SAVE		CANCEL	



Note

To configure OSPF for an interface, the field **OSPF** in **IP → ROUTING PROTOCOLS → OSPF → STATIC SETTINGS** must be set to *enabled*.

The menu contains the following fields:

Field	Description
Admin Status	<p>The status of an OSPF interface defines whether routes are propagated and/or OSPF protocol packets are sent over the interface.</p> <p>If OSPF is not yet activated, only the ADMIN STATUS field is shown (in this case changes are irrelevant).</p> <p>Possible values:</p> <ul style="list-style-type: none"> ■ <i>active (propagate routes + run OSPF)</i>: OSPF is activated for this interface, i.e. routes are propagated and/or OSPF protocol packets are sent over this interface. ■ <i>passive (propagate routes)</i>: OSPF is not activated for this interface, i.e. no routes are propagated or OSPF protocol packets sent over this interface. Networks reachable over this interface are, however, included when calculating the routing information and propagated over active interfaces. ■ <i>off</i>: OSPF is completely deactivated for this interface.
Area ID	Identifies the area to which this interface is assigned.
Metric Determination	Defines how the metric of this interface is calculated. See table "Metric Determination selection options," on page 108 .

Field	Description
Metric (direct routes)	<p>Shows the base metric value. The basis of the metric actually used for a route is a base metric value, which is obtained from the bandwidth of the interface:</p> $\text{BMV} = 100,000,000 / \text{bandwidth in bps}$ <p>This results in, for example, 1 for 100Mbit Ethernet or 1562 for dialup ISDN interfaces (1 B-channel). This value is then adjusted if necessary depending on the METRIC DETERMINATION. If you have selected <i>fixed</i> for METRIC DETERMINATION, you can enter the value for the metric here.</p>
Authentication Type	<p>The type of authentication used if OSPF packets are sent over this OSPF interface (or incoming packets checked). Defines how the key in the AUTHENTICATION KEY field is used.</p> <p>The default value is <i>none</i>. If set to <i>simple</i>, the key is sent as a text string in each packet. If set to <i>md5</i>, the key is used to create a hash, which is sent with each packet.</p> <p>The default value is <i>none</i>.</p>
Authentication Key	<p>A text string used in conjunction with the defined AUTHENTICATION TYPE.</p>
Export indirect static routes	<p>If this value is set to <i>no</i> (default), only direct routes (i.e. routes to networks reached directly over this interface) are propagated over active OSPF interfaces (see ADMIN STATUS field). If the value is set to <i>yes</i>, indirect static routes are propagated over active interfaces.</p>

Table 13-5: **INTERFACES** menu fields

METRIC DETERMINATION offers the following selection options:

Description	Meaning
auto (ifSpeed)	Metric = the value of the basis metric, which is based on the bandwidth (<i>IF SPEED</i>) of the interface.
fixed	The metric defined in the following field is always used, i.e. there is no automatic calculation of the metric.
auto + adjust	If the interface is in the <i>up</i> state, the metric actually used is calculated as follows: Metric = <automatically determined BMV> - 10. Otherwise the automatically calculated metric is used.
fixed + adjust	If the interface is in the <i>up</i> state, the metric actually used is calculated as follows: Metric = <fixed metric> - 10. Otherwise the fixed metric is used.

Table 13-6: **METRIC DETERMINATION** selection options

13.2.3 Areas Submenu

The **AREAS** menu is described below.

R4100 Setup Tool	Bintec Access Networks GmbH	
[IP] [ROUTING] [OSPF] [AREA]: Area Configuration	MyGateway	
Area ID	Import External Routes	
0.0.0.0	yes	
ADD	DELETE	EXIT

OSPF areas must be defined before the gateway interface can be assigned to an area.

An exception is the backbone area, which is generated automatically on booting and to which all interface assignments are set by default, if they are not explicitly assigned to another area.

The **IP → ROUTING PROTOCOLS → OSPF → AREAS** menu contains a list of all configured OSPF areas (**AREAS**). The configuration is set up in **ADD/EDIT**.

R4100 Setup Tool	Bintec Access Networks GmbH
[[IP] [ROUTING] [OSPF] [AREA] [ADD]	MyGateway
Area ID	0.0.0.0
Import external routes	no
Import summary routes	no
Create area default route (only ABR)	no
Area Ranges >	
SAVE	CANCEL

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

Field	Description
Area ID	Identifies the OSPF area to which this entry belongs. The backbone area is <i>0.0.0.0</i> .
Import external routes	Specifies whether the gateway routing information generated from external autonomous systems (not areas) is to be imported. <i>Yes</i> (default value) activates import. If <i>no</i> , this area is defined as a so-called stub area.
Import summary routes	Only if IMPORT EXTERNAL ROUTES = no . Defines whether summary LSAs (routing information generated by Area Border Gateway) are to be sent to the stub area.

Field	Description
Create area default route (only ABR)	Only if IMPORT EXTERNAL ROUTES = no . The Area Border Gateway sends no LSAs to the stub area, but propagates only a default route.

Table 13-7: **AREAS** menu fields

AREA RANGES Submenu

The options in this submenu are only to be used for configuration of the Area Border Gateway. Here you can combine network routes into a complete subnetwork. The complete subnetwork is propagated instead of the subnetworks actually learnt.

R4100 Setup Tool		Bintec Access Networks GmbH	
[IP] [ROUTING] [OSPF] [AREA] [ADD] [RANGE] [ADD]		MyGateway	
Address			
Mask			
Advertise Matching	yes		
SAVE		CANCEL	

The configuration is set up in **ADD/EDIT**.

The menu consists of the following fields:

Field	Description
Address	Here you enter the IP address of the area to be combined.
Mask	Netmask for ADDRESS

Field	Description
Advertise Matching	Subnetworks that are combined into areas either initiate propagation of the given combination (<i>yes</i>), or cause the subnetwork not to be propagated outside the area at all (<i>no</i>), i.e. neither the actual subnetworks nor the combined overall subnetwork are propagated. Possible values: <i>yes</i> (default value), <i>no</i> .

Table 13-8: **AREA RANGE** menu fields

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