

**bintec Workshop**  
**Automatic Router Backup (Redundancy) with**  
**BRRP**

**Purpose** This document is part of the user's guide to the installation and configuration of bintec gateways running software release 7.1.4 or later. For up-to-the-minute information and instructions concerning the latest software release, you should always read our **Release Notes**, especially when carrying out a software update to a later release level. The latest **Release Notes** can be found at [www.funkwerk-ec.com](http://www.funkwerk-ec.com).

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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](http://www.funkwerk-ec.com).

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|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Introduction</b>  | <b>3</b>  |
| 1.1      | Scenario   | 3         |
| 1.2      | Requirements   | 4         |
| <b>2</b> | <b>Configuration of Physical and Virtual IP and MAC Addresses</b>                | <b>5</b>  |
| 2.1      | Configuration of Gateway 1 to Master Gateway                                     | 5         |
| 2.1.1    | Configuring IP Address on LAN Interface ETH1                                     | 5         |
| 2.1.2    | Configuring Virtual IP Address on LAN Interface ETH1 (Virtual Interface Submenu) | 6         |
| 2.1.3    | Configuring IP Address on Interface ETH3   | 7         |
| 2.1.4    | Configuring Virtual IP Address on Interface ETH3 (Virtual Interface Submenu)     | 8         |
| 2.2      | Configuration of Gateway 2 to Backup Gateway                                     | 9         |
| 2.2.1    | Configuring IP Address on LAN Interface ETH1                                     | 9         |
| 2.2.2    | Configuring Virtual IP Address on LAN Interface ETH1 (Virtual Interface Submenu) | 10        |
| 2.2.3    | Configuring IP Address on Interface ETH3   | 12        |
| 2.2.4    | Configuring Virtual IP Address on Interface ETH3 (Virtual Interface Submenu)     | 13        |
| <b>3</b> | <b>Configuration of Virtual Gateways</b>   | <b>15</b> |
| 3.1      | Configuration of Gateway 1 to Master Gateway                                     | 15        |
| 3.1.1    | Settings for Virtual Gateway 1 ETH1  | 15        |
| 3.1.2    | Settings for Virtual Gateway 1 ETH3  | 16        |
| 3.2      | Configuration of Gateway 2 to Backup Gateway                                     | 18        |
| 3.2.1    | Settings for Virtual Gateway 2 ETH1  | 18        |
| 3.2.2    | Settings for Virtual Gateway 2 ETH3  | 19        |
| <b>4</b> | <b>Configuring State Transitions</b>   | <b>21</b> |

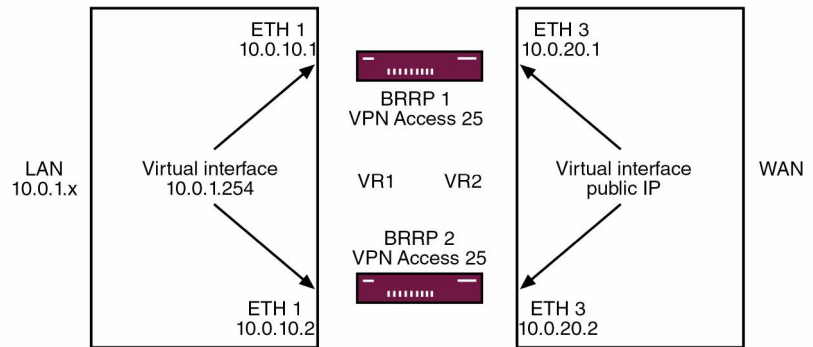
|          |                                      |            |
|----------|--------------------------------------|------------|
| 4.1      | Settings for Gateway 1 and Gateway 2 | .21        |
| 4.1.1    | Tasks at Gateway 1                   | .22        |
| 4.1.2    | Tasks at Gateway 2                   | .23        |
| <b>5</b> | <b>BRRP Gateway State</b>            | <b>.25</b> |
| <b>6</b> | <b>Result</b>                        | <b>.27</b> |
| 6.1      | Test                                 | .27        |
| 6.2      | Overview of Configuration Steps      | .29        |

# 1 Introduction

The configuration of BRRP (Bintec Router Redundancy Protocol) is described in the following chapters using two Bintec VPN Access 25 gateways.

The Setup Tool is used for the configuration.

## 1.1 Scenario



If the master gateway fails, e.g. due to a hardware fault, the backup gateway takes over the functionality of the master gateway. The backup gateway remains in hot standby mode as long as the master gateway is active. How the gateways behave in the event of a failure can be defined with a configurable set of rules.

If BRRP is used, virtual IP and MAC addresses must be configured so that these IP and MAC addresses can be passed to the backup gateway if a failure occurs. The first step is to define the physical IP addresses on the Ethernet interface, then set additional virtual IP and MAC addresses. As the virtual addresses are the actual gateway addresses and are used for data traffic, they must be entered in internal host and router systems. If you use a syslog server, for example, the physical IP address can be used for management.

## 1.2 Requirements

- Two Bintec **VPN Access 25** gateways.
- Internet access with static public IP address, see Bintec FAQ: **Internet leased line with fixed IP address**.
- Connect your LAN via a switch to the Ethernet interface ETH1 of the two gateways.
- Connect your Internet access via a switch to the Ethernet interface ETH3 of the two gateways.



### Note

You are urgently advised to read **Release Notes 6.3.4** to obtain a basic understanding of the BRRP configuration.

## 2 Configuration of Physical and Virtual IP and MAC Addresses

### 2.1 Configuration of Gateway 1 to Master Gateway

#### 2.1.1 Configuring IP Address on LAN Interface ETH1

- Go to **ETHERNET UNIT 1**.

| VPN Access 25 Setup Tool                          |               | Bintec Access Networks GmbH |  |
|---|---------------|-----------------------------|--|
| [SLOT 0 UNIT 1 ETH]: Configure Ethernet Interface |               | Gateway1                    |  |
| IP Configuration                                  | Manual        |                             |  |
| local IP Number                                   | 10.0.10.1     |                             |  |
| local Netmask                                     | 255.255.255.0 |                             |  |
| Second Local IP Number                            |               |                             |  |
| Second Local Netmask                              |               |                             |  |
| Encapsulation                                     | Ethernet II   |                             |  |
| Mode  | Auto          |                             |  |
| MAC Address                                       |               |                             |  |
| Bridging  | disabled      |                             |  |
| Advanced Settings >                               |               |                             |  |
| Virtual Interfaces >                              |               |                             |  |
| SAVE  |               | CANCEL                      |  |

Use <Space> to select

The following fields are relevant:

| Field           | Meaning           |
|-----------------|-------------------|
| local IP Number | Local IP address. |
| local Netmask   | Local netmask.    |

Table 2-1: Relevant fields in **ETHERNET UNIT 1**

Proceed as follows to define the necessary settings:

- Enter your local IP address under **LOCAL IP NUMBER**, e.g. *10.0.10.1*.
- Enter your associated netmask under **LOCAL NETMASK**, e.g. *255.255.255.0*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

## 2.1.2 Configuring Virtual IP Address on LAN Interface ETH1 (Virtual Interface Submenu)

- Go to **ETHERNET UNIT 1 → VIRTUAL INTERFACE → ADD**.

|   |                             |
|---|-----------------------------|
| VPN Access 25 Setup Tool                      | Bintec Access Networks GmbH |
| [SLOT 0 UNIT 1 ETH]..[ADD]: Configure Virtual | Gateway1                    |
| LAN Interface # 1                             |                             |
| IP Configuration                              | BRRP                        |
| Local IP Number                               | 10.0.1.254                  |
| Local Netmask                                 | 255.255.255.0               |
| MAC Address                                   | 00005e000101                |
| Advanced Settings >                           |                             |
| SAVE  | CANCEL                      |
| Use <Space> to select                         |                             |

The following fields are relevant:

| Field            | Meaning   |
|------------------|---|
| IP Configuration | Type of protocol.   |
| Local IP Number  | Virtual IP address.   |
| Local Netmask    | Netmask for the virtual IP address.                               |
| MAC Address      | Virtual MAC address. The first 5 bytes are entered automatically. |

Table 2-2: Relevant fields in **ETHERNET UNIT 1 → VIRTUAL INTERFACE → ADD**



Proceed as follows to define the necessary settings:

- Set **IP CONFIGURATION** to **BRRP**.
- Enter your virtual IP address under **LOCAL IP NUMBER**, e.g. **10.0.1.254**.
- Enter your associated virtual netmask under **LOCAL NETMASK**, **255.255.255.0**.
- Enter **00005e000101** under **MAC ADDRESS**.
- Press **SAVE** to confirm your settings.

### 2.1.3 Configuring IP Address on Interface ETH3

- Go to **ETHERNET UNIT 3**.

| VPN Access 25 Setup Tool                          |               | Bintec Access Networks GmbH |  |
|---|---------------|-----------------------------|--|
| [SLOT 0 UNIT 3 ETH]: Configure Ethernet Interface |               | Gateway1                    |  |
| IP Configuration                                  | Manual        |                             |  |
| local IP Number                                   | 10.0.20.1     |                             |  |
| local Netmask                                     | 255.255.255.0 |                             |  |
| Second Local IP Number                            |               |                             |  |
| Second Local Netmask                              |               |                             |  |
| Encapsulation                                     | Ethernet II   |                             |  |
| Mode  | Auto          |                             |  |
| MAC Address                                       |               |                             |  |
| Bridging  | disabled      |                             |  |
| Advanced Settings >                               |               |                             |  |
| Virtual Interfaces >                              |               |                             |  |
| SAVE  |               | CANCEL                      |  |
| Use <Space> to select                             |               |                             |  |

The following fields are relevant:

| Field           | Meaning           |
|-----------------|-------------------|
| local IP Number | Local IP address. |
| local Netmask   | Local netmask.    |

Table 2-3: Relevant fields in **ETHERNET UNIT 3**

Proceed as follows to define the necessary settings:

- Enter your local IP address under **LOCAL IP NUMBER**, e.g. *10.0.20.1*.
- Enter your associated netmask under **LOCAL NETMASK**, e.g. *255.255.255.0*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

## 2.1.4 Configuring Virtual IP Address on Interface ETH3 (Virtual Interface Submenu)

- Go to **ETHERNET UNIT 3 → VIRTUAL INTERFACE → ADD**.

|   |                             |
|---|-----------------------------|
| VPN Access 25 Setup Tool                        | Bintec Access Networks GmbH |
| [SLOT 0 UNIT 3 ETH].. [EDIT]: Configure Virtual | Gateway1                    |
| LAN Interface # 1                               |                             |
| IP Configuration                                | BRRP                        |
| Local IP Number                                 | 62.155.115.11               |
| Local Netmask                                   | 255.255.255.0               |
| Second Local IP Number                          |                             |
| Second Local Netmask                            |                             |
| MAC Address                                     | 00005e000102                |
| Advanced Settings >                             |                             |
| SAVE  | CANCEL                      |
| Use <Space> to select                           |                             |

The following fields are relevant:

| Field            | Meaning                   |
|------------------|---------------------------|
| IP Configuration | Type of protocol.         |
| Local IP Number  | Static public IP address. |
| Local Netmask    | The associated netmask.   |

| Field       | Meaning   |
|-------------|---|
| MAC Address | Virtual MAC address. The first 5 bytes are entered automatically. |

Table 2-4: Relevant fields in **ETHERNET UNIT 3** → **VIRTUAL INTERFACE** → **ADD**

Proceed as follows to define the necessary settings:

- Set **IP CONFIGURATION** to **BRRP**.
- Enter your static public IP address under **LOCAL IP NUMBER**, *62.155.115.11*.
- Enter the associated netmask under **LOCAL NETMASK**, e.g. *255.255.255.0*.
- Enter *00005e000102* under **MAC ADDRESS**.
- Press **SAVE** to confirm your settings.

## 2.2 Configuration of Gateway 2 to Backup Gateway

### 2.2.1 Configuring IP Address on LAN Interface ETH1

- Go to **ETHERNET UNIT 1**.

|   |                             |
|---|-----------------------------|
| VPN Access 25 Setup Tool                          | Bintec Access Networks GmbH |
| [SLOT 0 UNIT 1 ETH]: Configure Ethernet Interface | Gateway2                    |
| IP Configuration                                  | Manual                      |
| local IP Number                                   | 10.0.10.2                   |
| local Netmask                                     | 255.255.255.0               |
| Second Local IP Number                            |                             |
| Second Local Netmask                              |                             |
| Encapsulation                                     | Ethernet II                 |
| Mode  | Auto                        |
| MAC Address                                       |                             |
| Bridging  | disabled                    |
| Advanced Settings >                               |                             |
| Virtual Interfaces >                              |                             |
| SAVE  | CANCEL                      |
| Use <Space> to select                             |                             |

The following fields are relevant:

| Field           | Meaning           |
|-----------------|-------------------|
| local IP Number | Local IP address. |
| local Netmask   | Local netmask.    |

Table 2-5: Relevant fields in *ETHERNET UNIT 1*

Proceed as follows to define the necessary settings:

- Enter your local IP address under **LOCAL IP NUMBER**, e.g. *10.0.10.2*.
- Enter your associated netmask under **LOCAL NETMASK**, *255.255.255.0*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

## 2.2.2 Configuring Virtual IP Address on LAN Interface ETH1 (Virtual Interface Submenu)

- Go to *ETHERNET UNIT 1* → *VIRTUAL INTERFACE* → *ADD*.

|   |                             |
|---|-----------------------------|
| VPN Access 25 Setup Tool                      | Bintec Access Networks GmbH |
| [SLOT 0 UNIT 1 ETH]..[ADD]: Configure Virtual | Gateway2                    |
| LAN Interface # 1                             |                             |
| IP Configuration                              | BRRP                        |
| Local IP Number                               | 10.0.1.254                  |
| Local Netmask                                 | 255.255.255.0               |
| MAC Address                                   | 00005e000101                |
| Advanced Settings >                           |                             |
| SAVE  | CANCEL                      |
| Use <Space> to select                         |                             |

The following fields are relevant:

| Field            | Meaning   |
|------------------|---|
| IP Configuration | Type of protocol.   |
| local IP Number  | Static public IP address.   |
| local Netmask    | The associated netmask.   |
| MAC Address      | Virtual MAC address. The first 5 bytes are entered automatically. |

Table 2-6: Relevant fields in **ETHERNET UNIT 1 → VIRTUAL INTERFACE → ADD**

Proceed as follows to define the necessary settings:

- Set **IP CONFIGURATION** to **BRRP**.
- Enter your local IP address under **LOCAL IP NUMBER**, e.g. **10.0.1.254**.
- Enter your associated netmask under **LOCAL NETMASK**, e.g. **255.255.255.0**.
- Enter **00005e000101** under **MAC ADDRESS**.
- Press **SAVE** to confirm your settings.

## 2.2.3 Configuring IP Address on Interface ETH3

- Go to **ETHERNET UNIT 3**.

|   |                             |
|---|-----------------------------|
| VPN Access 25 Setup Tool                          | Bintec Access Networks GmbH |
| [SLOT 0 UNIT 3 ETH]: Configure Ethernet Interface | Gateway2                    |
| IP Configuration                                  | Manual                      |
| local IP Number                                   | 10.0.20.2                   |
| local Netmask                                     | 255.255.255.0               |
| Second Local IP Number                            |                             |
| Second Local Netmask                              |                             |
| Encapsulation                                     | Ethernet II                 |
| Mode  | Auto                        |
| MAC Address                                       |                             |
| Bridging  | disabled                    |
| Advanced Settings >                               |                             |
| Virtual Interfaces >                              |                             |
| SAVE  | CANCEL                      |
| Use <Space> to select                             |                             |

The following fields are relevant:

| Field           | Meaning           |
|-----------------|-------------------|
| local IP Number | Local IP address. |
| local Netmask   | Local netmask.    |

Table 2-7: Relevant fields in **ETHERNET UNIT 3**

Proceed as follows to define the necessary settings:

- Enter your local IP address under **LOCAL IP NUMBER**, e.g. *10.0.20.2*.
- Enter your associated netmask under **LOCAL NETMASK**, *255.255.255.0*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

## 2.2.4 Configuring Virtual IP Address on Interface ETH3 (Virtual Interface Submenu)

- Go to **ETHERNET UNIT 3 → VIRTUAL INTERFACE → ADD**.

|   |  |                             |  |
|---|--|-----------------------------|--|
| VPN Access 25 Setup Tool                        |  | Bintec Access Networks GmbH |  |
| [SLOT 0 UNIT 3 ETH] ..[EDIT]: Configure Virtual |  | Gateway2                    |  |
| LAN Interface # 1                               |  |                             |  |
| IP Configuration                                |  | BRRP                        |  |
| Local IP Number                                 |  | 62.155.115.11               |  |
| Local Netmask                                   |  | 255.255.255.0               |  |
| Second Local IP Number                          |  |                             |  |
| Second Local Netmask                            |  |                             |  |
| MAC Address                                     |  | 00005e000102                |  |
| Advanced Settings >                             |  |                             |  |
| SAVE  |  | CANCEL                      |  |
| Use <Space> to select                           |  |                             |  |

The following fields are relevant:

| Field            | Meaning   |
|------------------|---|
| IP Configuration | Type of protocol.   |
| Local IP Number  | Static public IP address.   |
| Local Netmask    | The associated netmask.   |
| MAC Address      | Virtual MAC address. The first 5 bytes are entered automatically. |

Table 2-8: Relevant fields in **ETHERNET UNIT 3 → VIRTUAL INTERFACE → ADD**

Proceed as follows to define the necessary settings:

- Set **IP CONFIGURATION** to **BRRP**.
- Enter your static public IP address under **LOCAL IP NUMBER**, e.g. **62.155.115.11**.

- Enter the associated netmask under **LOCAL NETMASK**, e.g. 255.255.255.0.
- Enter 00005e000102 under **MAC ADDRESS**.
- Press **SAVE** to confirm your settings.



## 3 Configuration of Virtual Gateways



### Note

- The right interface is selected automatically when the Virtual Router ID (VR ID) is selected.
- **PRIORITY 255** means that the gateway always has the master function.
- If you select optional authentication, the password is transferred in clear text and would be readable with a sniffer.

### 3.1 Configuration of Gateway 1 to Master Gateway

The configuration is made in the Setup Tool in the **BRRP** menu.

#### 3.1.1 Settings for Virtual Gateway 1 ETH1

- Go to **BRRP → CONFIGURATION → ADD**.

| VPN Access 25 Setup Tool                        |                   | Bintec Access Networks GmbH |  |
|---|-------------------|-----------------------------|--|
| [BRRP] [DAEMON] [ADD]: Configure Virtual Router |                   | Gateway1                    |  |
| Virtual Router ID                               | 1                 |                             |  |
| Virtual Router State                            | up                |                             |  |
| Priority  | 254               |                             |  |
| Interface                                       | en0-1-1           |                             |  |
| Master IP Address                               | 10.0.1.254        |                             |  |
| MAC Address                                     | 00005e000101      |                             |  |
| Advertisement Interval                          | 1                 |                             |  |
| Master Down Interval                            | 3                 |                             |  |
| Pre-empt Mode                                   | false             |                             |  |
| Authentication Type                             | No Authentication |                             |  |
| SAVE  |                   | CANCEL                      |  |

The following fields are relevant:

| Field                | Meaning                           |
|----------------------|-----------------------------------|
| Virtual Router ID    | The ID of the virtual gateway.    |
| Virtual Router State | The state of the virtual gateway. |
| Priority             | The priority of the gateway.      |
| Pre-empt Mode        | Mode in case of a failure.        |

Table 3-1: Relevant fields in **BRRP** → **CONFIGURATION** → **ADD**

Proceed as follows to define the necessary settings:

- Set **VIRTUAL ROUTER ID** to 1.
- Set **VIRTUAL ROUTER STATE** to *up*.
- Enter 254 under **PRIORITY**.
- Set **PRE-EMPT MODE** to *false*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

### 3.1.2 Settings for Virtual Gateway 1 ETH3

- Go to **BRRP** → **CONFIGURATION** → **ADD**.

|   |               |                             |                   |
|---|---------------|-----------------------------|-------------------|
| VPN Access 25 Setup Tool                        |               | Bintec Access Networks GmbH |                   |
| [BRRP] [DAEMON] [ADD]: Configure Virtual Router |               | Gateway1                    |                   |
| Virtual Router ID                               | 2             | Virtual Router State        | up                |
| Priority  | 254           | Interface                   | en0-3-1           |
| Master IP Address                               | 62.155.115.11 | MAC Address                 | 00005e000102      |
| Advertisement Interval                          | 1             | Master Down Interval        | 3                 |
| Pre-empt Mode                                   | false         | Authentication Type         | No Authentication |
| SAVE  |               | CANCEL                      |                   |

The following fields are relevant:

| Field                | Meaning                           |
|----------------------|-----------------------------------|
| Virtual Router ID    | The ID of the virtual gateway.    |
| Virtual Router State | The state of the virtual gateway. |
| Priority             | The priority of the gateway.      |
| Pre-empt Mode        | Mode in case of a failure.        |

Table 3-2: Relevant fields in **BRRP** → **CONFIGURATION** → **ADD**

Proceed as follows to define the necessary settings:

- Set **VIRTUAL ROUTER ID** to 2.
- Set **VIRTUAL ROUTER STATE** to *up*.
- Enter 254 under **PRIORITY**.
- Set **PRE-EMPT MODE** to *false*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

## 3.2 Configuration of Gateway 2 to Backup Gateway

The configuration is made in the Setup Tool in the *BRRP* menu.

### 3.2.1 Settings for Virtual Gateway 2 ETH1

■ Go to *BRRP* → *CONFIGURATION* → *ADD*

| VPN Access 25 Setup Tool                        |                   | Bintec Access Networks GmbH |        |
|---|-------------------|-----------------------------|--------|
| [BRRP] [DAEMON] [ADD]: Configure Virtual Router |                   | Gateway2                    |        |
| Virtual Router ID                               | 1                 |                             |        |
| Virtual Router State                            | up                |                             |        |
| Priority  | 100               |                             |        |
| Interface                                       | en0-1-1           |                             |        |
| Master IP Address                               | 10.0.1.254        |                             |        |
| MAC Address                                     | 00005e000101      |                             |        |
| Advertisement Interval                          | 1                 |                             |        |
| Master Down Interval                            | 3                 |                             |        |
| Pre-empt Mode                                   | false             |                             |        |
| Authentication Type                             | No Authentication |                             |        |
|   | SAVE              |                             | CANCEL |

The following fields are relevant:

| Field                | Meaning                           |
|----------------------|-----------------------------------|
| Virtual Router ID    | The ID of the virtual gateway.    |
| Virtual Router State | The state of the virtual gateway. |
| Priority             | The priority of the gateway.      |
| Pre-empt Mode        | Mode in case of a failure.        |

Table 3-3: Relevant fields in *BRRP* → *CONFIGURATION* → *ADD*

Proceed as follows to define the necessary settings:

- Set **VIRTUAL ROUTER ID** to 1.
- Set **VIRTUAL ROUTER STATE** to *up*.
- Enter the priority under **PRIORITY**, e.g. 100.
- Set **PRE-EMPT MODE** to *false*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

### 3.2.2 Settings for Virtual Gateway 2 ETH3

- Go to **BRRP → CONFIGURATION → ADD**

| VPN Access 25 Setup Tool                        |                   | Bintec Access Networks GmbH |  |
|---|-------------------|-----------------------------|--|
| [BRRP] [DAEMON] [ADD]: Configure Virtual Router |                   | Gateway2                    |  |
| Virtual Router ID                               | 2                 |                             |  |
| Virtual Router State                            | up                |                             |  |
| Priority  | 100               |                             |  |
| Interface                                       | en0-3-1           |                             |  |
| Master IP Address                               | 62.155.115.11     |                             |  |
| MAC Address                                     | 00005e000102      |                             |  |
| Advertisement Interval                          | 1                 |                             |  |
| Master Down Interval                            | 3                 |                             |  |
| Pre-empt Mode                                   | false             |                             |  |
| Authentication Type                             | No Authentication |                             |  |
| SAVE  |                   | CANCEL                      |  |

The following fields are relevant:

| Field                | Meaning                           |
|----------------------|-----------------------------------|
| Virtual Router ID    | The ID of the virtual gateway.    |
| Virtual Router State | The state of the virtual gateway. |

| Field         | Meaning                      |
|---------------|------------------------------|
| Priority      | The priority of the gateway. |
| Pre-empt Mode | Mode in case of a failure.   |

Table 3-4: Relevant fields in **BRRP** → **CONFIGURATION** → **ADD**

Proceed as follows to define the necessary settings:

- Set **VIRTUAL ROUTER ID** to 2.
- Set **VIRTUAL ROUTER STATE** to *up*.
- Enter the priority under **PRIORITY**, e.g. 100.
- Set **PRE-EMPT MODE** to *false*.
- Leave all the other settings as they are.
- Press **SAVE** to confirm your settings.

## 4 Configuring State Transitions

Up to now you have configured a LAN-side gateway (VR ID 1) ETH1 and a WAN-side gateway (VR ID 2) ETH3. Now an adjustment must be made between these two gateways. For example, if the ETH1 interface fails, no external to internal routing would take place. The ETH3 interface must therefore be deactivated as well. The resulting state changes are described below.

### 4.1 Settings for Gateway 1 and Gateway 2

■ Go to **BRRP** → **TASK DEFINITION** → **ADD**.

| VPN Access 25 Setup Tool                         |            | Bintec Access Networks GmbH |  |
|--|------------|-----------------------------|--|
| [BRRP] [TASKS] [ADD]: Redundancy Task Definition |            | Gateway1                    |  |
| Task ID  | 1          |                             |  |
| Master Interface Protocol                        | BRRP       |                             |  |
| Master Action                                    | Initialize |                             |  |
| Virtual Router ID                                | 1          |                             |  |
| Slave Interface Protocol                         | BRRP       |                             |  |
| Slave Admin Action                               | down       |                             |  |
| Virtual Router ID                                | 2          |                             |  |
| SAVE   |            | CANCEL                      |  |

The following fields are relevant:

| Field                     | Meaning                           |
|---------------------------|-----------------------------------|
| Master Interface Protocol | The protocol used.                |
| Master Action             | The state of the virtual gateway. |
| Virtual Router ID         | The virtual router ID used.       |
| Slave Interface Protocol  | The protocol used.                |
| Slave Admin Action        | The state of the virtual gateway. |

| Field             | Meaning                     |
|-------------------|-----------------------------|
| Virtual Router ID | The virtual router ID used. |

Table 4-1: Relevant fields in **BRRP → TASK DEFINITION → ADD**

Proceed as follows to define the necessary settings:

- Set **MASTER INTERFACE PROTOCOL** to *BRRP*.
- Set **MASTER ACTION** to *Initialize*.
- Set **VIRTUAL ROUTER ID** to *1*.
- Set **SLAVE INTERFACE PROTOCOL** to *BRRP*.
- Set **SLAVE ADMIN ACTION** to *down*.
- Set **VIRTUAL ROUTER ID** to *2*.
- Press **SAVE** to confirm your settings.



**Note**

Use the settings for all tasks as shown in the two tables below.

### 4.1.1 Tasks at Gateway 1

- Go to **BRRP → TASK DEFINITION**.

| VPN Access 25 Setup Tool  |          |                |           | Bintec Access Networks GmbH |              |           |
|---------------------------|----------|----------------|-----------|-----------------------------|--------------|-----------|
| [BRRP] [TASKS]: Task List |          |                |           | Gateway1                    |              |           |
| Task ID                   | Protocol | Master Trigger | VR_ID/IFC | Protocol                    | Slave Action | VR_ID/IFC |
| 1                         | BRRP     | Init           | 1         | BRRP                        | down         | 2         |
| 1                         | BRRP     | backup         | 1         | BRRP                        | up           | 2         |
| 1                         | BRRP     | master         | 1         | BRRP                        | up           | 2         |
| 2                         | BRRP     | Init           | 2         | BRRP                        | down         | 1         |
| 2                         | BRRP     | backup         | 2         | BRRP                        | up           | 1         |
| 2                         | BRRP     | master         | 2         | BRRP                        | up           | 1         |
| ADD                       |          | DELETE         |           | EXIT                        |              |           |



## 4.1.2 Tasks at Gateway 2

■ Go to **BRRP** → **TASK DEFINITION**

| VPN Access 25 Setup Tool  |          |                |           | Bintec Access Networks GmbH |              |           |  |
|---------------------------|----------|----------------|-----------|-----------------------------|--------------|-----------|--|
| [BRRP] [TASKS]: Task List |          |                |           | Gateway2                    |              |           |  |
| Task ID                   | Protocol | Master Trigger | VR_ID/IFC | Protocol                    | Slave Action | VR_ID/IFC |  |
| 1                         | BRRP     | Init           | 1         | BRRP                        | down         | 2         |  |
| 1                         | BRRP     | backup         | 1         | BRRP                        | up           | 2         |  |
| 1                         | BRRP     | master         | 1         | BRRP                        | up           | 2         |  |
| 2                         | BRRP     | Init           | 2         | BRRP                        | down         | 1         |  |
| 2                         | BRRP     | backup         | 2         | BRRP                        | up           | 1         |  |
| 2                         | BRRP     | master         | 2         | BRRP                        | up           | 1         |  |
| ADD                       |          | DELETE         |           | EXIT                        |              |           |  |



### Note

The figure for the Task ID is used to improve sorting the entries, but has no effect on the function of the rules. The list is sorted numerically by Task ID.

### Explanation of rules:

Each virtual gateway has an **OPERADMINSTATE** (*up* or *down*) and an **OPERSTATE** (*Init*, *backup* or *master*). If the **OPERADMINSTATE** is *down*, the virtual gateway is deactivated and the **OPERSTATE** is *init*. If the **OPERADMINSTATE** is *up*, the gateway assumes the **OPERSTATE** *master* or *backup*, depending on the advertisement packets received from other routers and its own priority.

1st rule:

If virtual router 1 (VR 1) is in the *Init* state (e.g. BRRP just started, or physical interface on which the virtual interface of VR 1 is based is in the *down* state), the state of VR 2 must be prevented from changing to *master*. **SLAVE ACTION** *down* for VR 2 sets the **OPERADMINSTATE** of VR 2 to *down*, which also sets the virtual interface of VR 2 to *down*.

2nd rule:

This rule is not necessary for master priority 255, as only the *master* or *init* states are possible in this case. A VR with priority 255 will always declare itself as master if it is switched on and the physical interface is *up*. If priorities from 1-254 are used, the **OPERSTATE backup** is possible for every virtual gateway. If VR 1 is in the **OPERSTATE backup**, the **OPERADMINSTATE** of VR 2 must be set to *up* so that the **OPERSTATE** of VR 2 can change to *master* or *backup*, depending on the advertisements of the other gateway.

3rd rule:

If VR 1 is in the **OPERSTATE master**, it must also be possible for VR 2 to change to **OPERSTATE master**. That is, the **OPERADMINSTATE** of VR 2 must be set to *up*.

4th/5th/6th rule:

This is the same behavior as for rules 1-3, but conversely! If VR 2 changes its **OPERSTATE**, the state at VR 1 must be changed accordingly.

## 5 BRRP Gateway State

The respective state is shown under **CONFIGURATION** in **BRRP**.

As can be seen, both virtual interfaces of gateway 1 are in the master state and both virtual interfaces of gateway 2 in the backup state.

■ Go to **BRRP** → **CONFIGURATION**.

| VPN Access 25 Setup Tool             |      |        | Bintec Access Networks GmbH |               |              |
|--------------------------------------|------|--------|-----------------------------|---------------|--------------|
| [BRRP] [DAEMON]: Virtual Router List |      |        | Gateway1                    |               |              |
| VrID                                 | Prio | State  | Interface                   | IP Address    | MAC Address  |
| 1                                    | 254  | master | en0-1-1                     | 10.0.1.254    | 00005e000101 |
| 2                                    | 254  | master | en0-3-1                     | 62.155.115.11 | 00005e000102 |
| ADD                                  |      | DELETE |                             | EXIT          |              |

| VPN Access 25 Setup Tool             |      |        | Bintec Access Networks GmbH |               |              |
|--------------------------------------|------|--------|-----------------------------|---------------|--------------|
| [BRRP] [DAEMON]: Virtual Router List |      |        | Gateway2                    |               |              |
| VrID                                 | Prio | State  | Interface                   | IP Address    | MAC Address  |
| 1                                    | 100  | backup | en0-1-1                     | 10.0.1.254    | 00005e000101 |
| 2                                    | 100  | backup | en0-3-1                     | 62.155.115.11 | 00005e000102 |
| ADD                                  |      | DELETE |                             | EXIT          |              |

Return to the main menu and finally save your new configuration in the flash memory with **EXIT** and **SAVE AS BOOT CONFIGURATION AND EXIT**.



## 6 Result

You have now created a redundant system. If a gateway fails, the other gateway takes over its function. This ensures a virtually uninterrupted connection.

### 6.1 Test

You can trace what happens in the event of a failure by entering *debug all* in the command line of gateway 2. This is done by disconnecting the cable from the Ethernet interface ETH1.

Gateway2:> debug all

```

00:29:47 INFO/ETHER: en0-1: link down
00:29:47 DEBUG/ETHER: slot 0/1: rmv multicast 01:00:5e:00:00:12
00:29:47 NOTICE/INET: BRRP: vr # 1 - disable ifc 104
00:29:47 NOTICE/INET: BRRP: vr # 1 stopped
00:29:47 INFO/INET: BRRP: wd_action: vr # 2 ==> stop vr
00:29:47 NOTICE/INET: BRRP: vr # 2 - disable ifc 304
00:29:47 DEBUG/ETHER: slot 0/3: rmv multicast 01:00:5e:00:00:12
00:29:47 NOTICE/INET: BRRP: vr # 2 stopped
00:30:12 INFO/ETHER: en0-1: (100BaseTx/halfdup) link up
00:30:12 INFO/INET: BRRP:
00:30:12 INFO/INET: BRRP: VRouter PRIO      : 100
00:30:12 INFO/INET: BRRP: VRouter MAC_ADDR   : 00005e000101
00:30:12 INFO/INET: BRRP: VRouter IF_INDEX  : 100
00:30:12 INFO/INET: BRRP: VRouter IP       : 10.0.10.2
00:30:12 INFO/INET: BRRP: VRouter ADV_INT   : 1000
00:30:12 INFO/INET: BRRP: VRouter MASTER_DOWN: 3609
00:30:12 INFO/INET: BRRP: VRouter SKEW_TIME : 609
00:30:12 INFO/INET: BRRP: VRouter State    : 0
00:30:12 INFO/INET: BRRP: Server IF_INDEX  : 104
00:30:12 INFO/INET: BRRP: Server NB_IP     :
00:30:12 INFO/INET: BRRP: Server NB_IP     :
00:30:12 INFO/INET: BRRP: Server MAC_ADDR   : 00005e000101
00:30:12 DEBUG/ETHER: slot 0/1: add multicast 01:00:5e:00:00:12
00:30:12 NOTICE/INET: BRRP: vr # 1 now in backup state
00:30:12 NOTICE/INET: BRRP: vr # 1 started on ifc 104 ip 10.0.1.0 mac
00005e000101
00:30:12 INFO/INET: BRRP: wd_action: vr # 2 ==> start vr
00:30:12 INFO/INET: BRRP: VRouter VR_ID    : 2
00:30:12 INFO/INET: BRRP: VRouter PRIO      : 100
00:30:12 INFO/INET: BRRP: VRouter MAC_ADDR   : 00005e000102
00:30:12 INFO/INET: BRRP: VRouter IF_INDEX  : 300
00:30:12 INFO/INET: BRRP: VRouter IP       : 10.0.20.2
00:30:12 INFO/INET: BRRP: VRouter ADV_INT   : 1000
00:30:12 INFO/INET: BRRP: VRouter MASTER_DOWN: 3609
00:30:12 INFO/INET: BRRP: VRouter SKEW_TIME : 609
00:30:12 INFO/INET: BRRP: VRouter State    : 0
00:30:12 INFO/INET: BRRP: Server IF_INDEX  : 304
00:30:12 INFO/INET: BRRP: Server NB_IP     : 1
00:30:12 INFO/INET: BRRP: Server IPs      : 62.155.115.0
00:30:12 INFO/INET: BRRP: Server MAC_ADDR   : 00005e000102
00:30:12 DEBUG/ETHER: slot 0/3: add multicast 01:00:5e:00:00:12
00:30:12 NOTICE/INET: BRRP: vr # 2 now in backup state
00:30:12 NOTICE/INET: BRRP: vr # 2 started on ifc 304 ip 62.155.115.0
mac 00005e000102

```

## 6.2 Overview of Configuration Steps

| Field                | Menu  | Description             | Compulsory field |
|----------------------|---|-------------------------|------------------|
| local IP Number      | <b>ETHERNET UNIT 1</b>                      | e.g. 10.0.10.1          | Yes              |
| local Netmask        | <b>ETHERNET UNIT 1</b>                      | e.g. 255.255.255.0      | Yes              |
| IP Configuration     | <b>ETH UNIT 1 → VIRTUAL INTERFACE → ADD</b> | <i>BRRP</i>             | Yes              |
| Local IP Number      | <b>ETH UNIT 1 → VIRTUAL INTERFACE → ADD</b> | e.g. 10.0.1.254 (LAN)   | Yes              |
| Local Netmask        | <b>ETH UNIT 1 → VIRTUAL INTERFACE → ADD</b> | e.g. 255.255.255.0      | Yes              |
| MAC Address          | <b>ETH UNIT 1 → VIRTUAL INTERFACE → ADD</b> | 00005e000101            | Yes              |
| local IP Number      | <b>ETHERNET UNIT 3</b>                      | e.g. 10.0.20.1          | Yes              |
| local Netmask        | <b>ETHERNET UNIT 3</b>                      | e.g. 255.255.255.0      | Yes              |
| IP Configuration     | <b>ETH UNIT 3 → VIRTUAL INTERFACE → ADD</b> | <i>BRRP</i>             | Yes              |
| Local IP Number      | <b>ETH UNIT 3 → VIRTUAL INTERFACE → ADD</b> | e.g. 62.155.115.11(WAN) | Yes              |
| Local Netmask        | <b>ETH UNIT 3 → VIRTUAL INTERFACE → ADD</b> | e.g. 255.255.255.0      | Yes              |
| MAC Address          | <b>ETH UNIT 3 → VIRTUAL INTERFACE → ADD</b> | 00005e000102            | Yes              |
| Virtual Router ID    | <b>BRRP → CONFIGURATION → ADD</b>           | 1                       | Yes              |
| Virtual Router State | <b>BRRP → CONFIGURATION → ADD</b>           | <i>up</i>               | Yes              |
| Priority             | <b>BRRP → CONFIGURATION → ADD</b>           | e.g. 254 (Master)       | Yes              |
| Pre-empt Mode        | <b>BRRP → CONFIGURATION → ADD</b>           | e.g. <i>false</i>       | Yes              |
| Virtual Router ID    | <b>BRRP → CONFIGURATION → ADD</b>           | 1                       | Yes              |
| Virtual Router State | <b>BRRP → CONFIGURATION → ADD</b>           | <i>up</i>               | Yes              |
| Priority             | <b>BRRP → CONFIGURATION → ADD</b>           | e.g. 100 (Backup)       | Yes              |
| Pre-empt Mode        | <b>BRRP → CONFIGURATION → ADD</b>           | e.g. <i>false</i>       | Yes              |
| Task ID              | <b>BRRP → TASK DEFINITION → ADD</b>         | 1                       | Yes              |

| Field                     | Menu                                | Description            | Compulsory field |
|---------------------------|-------------------------------------|------------------------|------------------|
| Master Interface Protocol | <b>BRRP → TASK DEFINITION → ADD</b> | <i>BRRP</i>            | Yes              |
| Master Action             | <b>BRRP → TASK DEFINITION → ADD</b> | e.g. <i>Initialize</i> | Yes              |
| Virtual Router ID         | <b>BRRP → TASK DEFINITION → ADD</b> | <i>1</i>               | Yes              |
| Slave Interface Protocol  | <b>BRRP → TASK DEFINITION → ADD</b> | <i>BRRP</i>            | Yes              |
| Slave Admin Action        | <b>BRRP → TASK DEFINITION → ADD</b> | e.g. <i>up</i>         | Yes              |
| Virtual Router ID         | <b>BRRP → TASK DEFINITION → ADD</b> | <i>1</i>               | Yes              |