

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.

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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.

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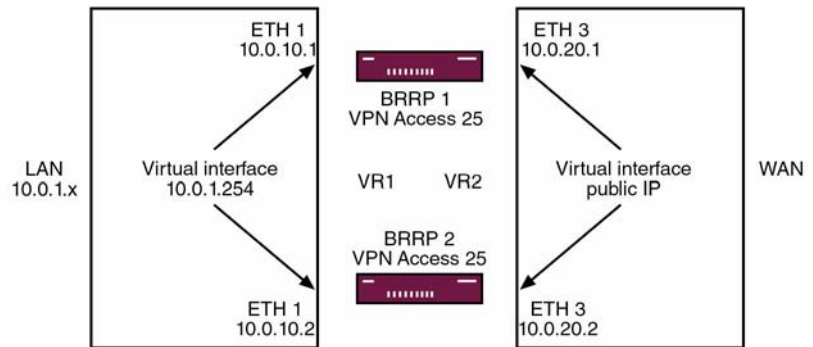
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1 Introduction

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	any
Virtual Router ID	1
Slave Interface Protocol	BRRP
Slave Admin Action	sync
Virtual Router ID	2
SAVE	CANCELs

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



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	any	1	BRRP	sync	2	
2	BRRP	any	2	BRRP	sync	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	any	1	BRRP	sync	2	
2	BRRP	any	2	BRRP	sync	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 VR1 is in the **OPERSTATE** *Init*, the VR2 is set to the **ADMINSTATE** *Down* internally (= **OPERSTATE** *Init*), to have the backup router handle the entire traffic.

If VR1 is in the **OPERSTATE** *Backup*, the VR2 is forced to the **OPERSTATE** *Backup*. If this is not possible, both VRs are set to the **STATE** *Init* or *Master* (according to the state previously active).

If the VR1 is in the **OPERSTATE** *Master*, the VR2, too, tries to get **OPERSTATE** *Master*. This is reached most easily by having the backup router quit its master role "voluntarily".

2nd rule:

This is the same behavior as for rule 1, 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	ETHERNET UNIT 1	e.g. 10.0.10.1	Yes
local Netmask	ETHERNET UNIT 1	e.g. 255.255.255.0	Yes
IP Configuration	ETH UNIT 1 → VIRTUAL INTERFACE → ADD	<i>BRRP</i>	Yes
Local IP Number	ETH UNIT 1 → VIRTUAL INTERFACE → ADD	e.g. 10.0.1.254 (LAN)	Yes
Local Netmask	ETH UNIT 1 → VIRTUAL INTERFACE → ADD	e.g. 255.255.255.0	Yes
MAC Address	ETH UNIT 1 → VIRTUAL INTERFACE → ADD	00005e000101	Yes
local IP Number	ETHERNET UNIT 3	e.g. 10.0.20.1	Yes
local Netmask	ETHERNET UNIT 3	e.g. 255.255.255.0	Yes
IP Configuration	ETH UNIT 3 → VIRTUAL INTERFACE → ADD	<i>BRRP</i>	Yes
Local IP Number	ETH UNIT 3 → VIRTUAL INTERFACE → ADD	e.g. 62.155.115.11(WAN)	Yes
Local Netmask	ETH UNIT 3 → VIRTUAL INTERFACE → ADD	e.g. 255.255.255.0	Yes
MAC Address	ETH UNIT 3 → VIRTUAL INTERFACE → ADD	00005e000102	Yes
Virtual Router ID	BRRP → CONFIGURATION → ADD	1	Yes
Virtual Router State	BRRP → CONFIGURATION → ADD	<i>up</i>	Yes
Priority	BRRP → CONFIGURATION → ADD	e.g. 254 (Master)	Yes
Pre-empt Mode	BRRP → CONFIGURATION → ADD	e.g. <i>false</i>	Yes
Virtual Router ID	BRRP → CONFIGURATION → ADD	1	Yes
Virtual Router State	BRRP → CONFIGURATION → ADD	<i>up</i>	Yes
Priority	BRRP → CONFIGURATION → ADD	e.g. 100 (Backup)	Yes
Pre-empt Mode	BRRP → CONFIGURATION → ADD	e.g. <i>false</i>	Yes
Task ID	BRRP → TASK DEFINITION → ADD	1	Yes

Field	Menu	Description	Compulsory field
Master Interface Protocol	BRRP → TASK DEFINITION → ADD	<i>BRRP</i>	Yes
Master Action	BRRP → TASK DEFINITION → ADD	<i>any</i>	Yes
Virtual Router ID	BRRP → TASK DEFINITION → ADD	<i>1</i>	Yes
Slave Interface Protocol	BRRP → TASK DEFINITION → ADD	<i>BRRP</i>	Yes
Slave Admin Action	BRRP → TASK DEFINITION → ADD	<i>sync</i>	Yes
Virtual Router ID	BRRP → TASK DEFINITION → ADD	<i>2</i>	Yes
Task ID	BRRP → TASK DEFINITION → ADD	<i>2</i>	Yes
Master Interface Protocol	BRRP → TASK DEFINITION → ADD	<i>BRRP</i>	Yes
Master Action	BRRP → TASK DEFINITION → ADD	<i>any</i>	Yes
Virtual Router ID	BRRP → TASK DEFINITION → ADD	<i>2</i>	Yes
Slave Interface Protocol	BRRP → TASK DEFINITION → ADD	<i>BRRP</i>	Yes
Slave Admin Action	BRRP → TASK DEFINITION → ADD	<i>sync</i>	Yes
Virtual Router ID	BRRP → TASK DEFINITION → ADD	<i>1</i>	Yes