



# Application Note 31

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## Virtual Router Redundancy Protocol (VRRP) and VRRP+

September 2016

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# 1 INTRODUCTION

## 1.1 Outline

This document contains information about using VRRP to achieve physical redundancy, and VRRP+ to achieve logical redundancy, with Digi TransPort Devices.

## 1.2 VRRP Concepts

### 1.2.1 VRRP

VRRP is an internet standard defined by RFC2338 (<http://www.faqs.org/rfcs/rfc2338.html>) and to quote the RFC:

“VRRP specifies an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN. The VRRP router controlling the IP address(es) associated with a virtual router is called the Master, and forwards packets sent to these IP addresses. The election process provides dynamic fail over in the forwarding responsibility should the Master become unavailable. This allows any of the virtual router IP addresses on the LAN to be used as the default first hop router by end-hosts. The advantage gained from using VRRP is a higher availability default path without requiring configuration of dynamic routing or router discovery protocols on every end-host.”

To paraphrase, VRRP works by setting up a Virtual Router - a 'floating' IP Address that clients can use as their default gateway/next hop which transparently swaps between devices in case of failure.

In this case, 'failure' refers to the loss of the complete unit i.e. *physical redundancy*; it does not take into account the status of the connections behind the router.

### 1.2.2 VRRP+

VRRP+ is an extension to VRRP developed by Sarian Systems Ltd before becoming part of Digi International. It allows other devices to be monitored and alter the priorities of the VRRP routers. For example, if a host becomes unreachable on the far end of a network link then the default router can be changed by adjusting the VRRP priority of the router connected to that failing link.

In this case we are able to achieve *logical redundancy* in addition to the *physical redundancy* provided by basic VRRP and fail over based on the status of connections behind the router.

## 1.3 VRRP Definitions

As defined in RFC2338:

Term	Definition
<b>VRRP Router</b>	A router running the Virtual Router Redundancy Protocol. It may participate in one or more virtual routers.
<b>Virtual Router</b>	An abstract object managed by VRRP that acts as a default router for hosts on a shared LAN. It consists of a Virtual Router Identifier and a set of associated IP address(es) across a common LAN. A VRRP Router may backup one or more virtual routers.
<b>IP Address Owner</b>	The VRRP router that has the virtual router's IP address(es) as real interface address(es). This is the router that, when up, will respond to packets addressed to one of these IP addresses for ICMP pings, TCP connections, etc.
<b>Primary IP Address</b>	An IP address selected from the set of real interface addresses. One possible selection algorithm is to always select the first address. VRRP advertisements are always sent using the primary IP address as the source of the IP packet.
<b>Virtual Router Master</b>	The VRRP router that is assuming the responsibility of forwarding packets sent to the IP address(es) associated with the virtual router, and answering ARP requests for these IP addresses. Note that if the IP address owner is available, then it will always become the Master.
<b>Virtual Router Backup</b>	The set of VRRP routers available to assume forwarding responsibility for a virtual router should the current Master fail.

Digi TransPort Parameters:

For a full explanation of the VRRP and VRRP+ parameters please refer to the Digi TransPort Reference Manual.

## 1.4 VRRP Operation

VRRP routers are organised into groups which are identified with a Group ID, all VRRP routers within the group should be able to provide the same routing and hence act as fallbacks to each other.

In VRRP, routers do not communicate with each other – they only need to be aware of failures in the virtual master router. To achieve this, the virtual master router sends out multicast 'I am alive' announcements which are listened to by the virtual router backup devices in the same VRRP group.

If an announcement is not received by the virtual router backup within an allotted time (usually 1 second) then it will assume control and start announcing itself as the virtual master router. If there are multiple virtual router backups then the one with the highest priority will take over.

VRRP routers have a priority of which the highest number will become the virtual master router. This ranges from 1 to 255 and usual settings are to use 255 for the highest priority and 100 for the backup priority.

If the current virtual master router receives an announcement from a group member with a higher priority then it will pre-empt that device and become the virtual master router.

## 1.5 VRRP Interoperability

The Digi TransPort VRRP implementation is fully RFC compliant and will work with other vendors' VRRP implementations providing they are also RFC compliant.

## 1.6 Assumptions

This guide has been written for use by technically competent personnel with a good understanding of the communications technologies used in the product, and of the requirements for their specific application.

This application note applies to;

**Models shown:** Digi TransPort WR21 (primary router) and WR44 (secondary router)

**Other Compatible Models:** All Digi TransPort products

**Firmware versions:** 5.123 or later.

## 1.7 Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to: [tech.support@digi.com](mailto:tech.support@digi.com)

Requests for new application notes can be sent to the same address.

## 1.8 Version and Revision History

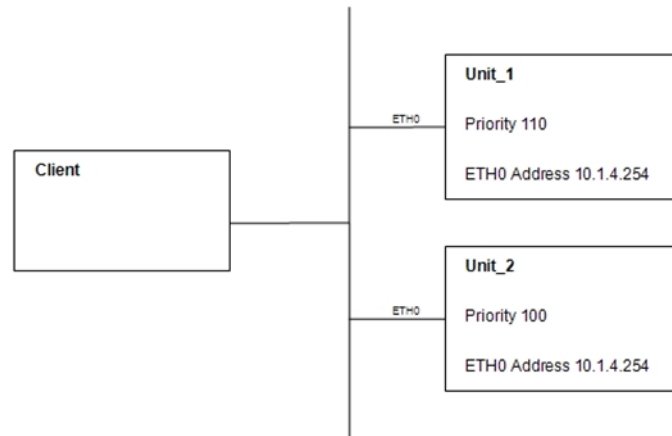
Version Number	Status
1.0	Published
1.1	Re-branded to Digi TransPort
2.0	Updated for new Web GUI
2.1	Updated screenshots for new web interface and rebranding (Sep 2016)

## 2 VRRP IMPLEMENTATION

You can implement VRRP on the Digi TransPort units in a number of different ways depending on requirements.

### 2.1 Using a Single VRRP IP Address

Here is an example of using a single Virtual IP address shared between two units.



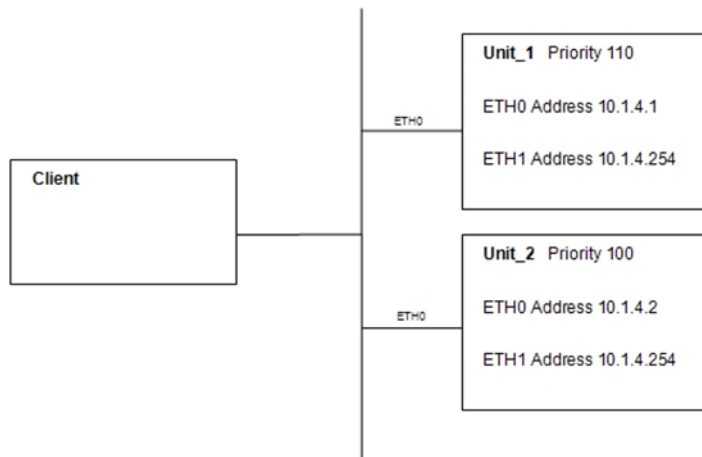
This will mean that the IP Address 10.1.4.254 is not assigned to any one unit, but floats between them depending on which is the VRRP master router. If both ETH0 interfaces are connected to a hub/switch along with a client, then the client will be able to always see a router at the 10.1.4.254 address.

Unit\_1 has a priority of 110 so should become the VRRP master router over Unit\_2 which has a lower priority of 100.

This is the simplest configuration but it is not generally adopted, as it means that you can only connect to the unit that is the VRRP master at any one time, which is no good for administration and monitoring of both the units.

### 2.2 Using a Dedicated VRRP IP Address (Hub mode or single eth port)

A more common solution would be to have an IP address for each unit and then a third address for VRRP. Depending on the Digi TransPort model, VRRP can be implemented in different ways. If the unit has a single LAN port (e.g. WR21) then use ETH0 and ETH1 in this configuration.

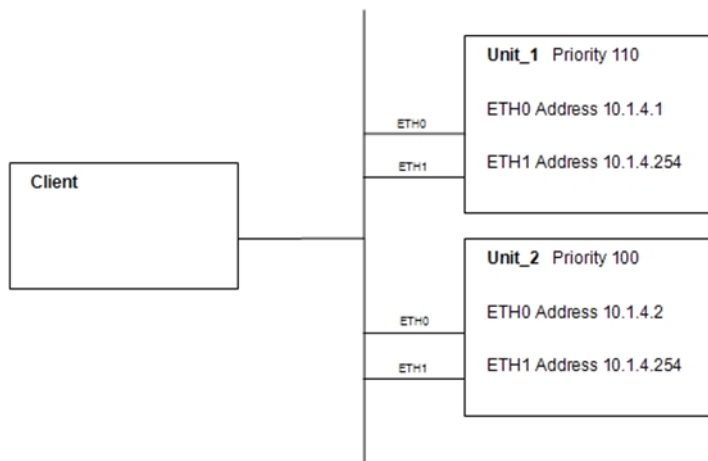


So as before the 10.1.4.254 VRRP address floats between the two routers on ETH1 and can be used by the clients as a default gateway, but the routers can also be reached on their own IP addresses on ETH0.

If the unit has multiple ports (e.g. WR44) and is in 'Hub mode' then the same applies.

### 2.3 Using a Dedicated VRRP IP Address (VLAN mode on multi-port)

If a multi-port unit in 'VLAN mode' is used, a second uplink cable for the VRRP-addressed port will be required:



**NOTE:** Do not try this configuration in 'Hub mode' otherwise a network loop will form with undesirable consequences.

This may not be practical, so an alternative solution would be to keep the unit in Hub mode and use the Group feature to make each port a member of a different hub group, but have the ETH0 and ETH1 ports in the same group for VRRP. This would require 1 uplink cable for the VRRP group.

## 3 VRRP CONFIGURATION

### 3.1 Configuring a Single VRRP Address

This section shows a single VRRP address configuration from section 2.1.

For the Primary router, under **Configuration - Network > Interfaces > Ethernet > ETH 0** enter the **IP address** and **Mask** to be used for VRRP.

[Configuration - Network > Interfaces > Ethernet > ETH 0](#)

▼ **Interfaces**

▼ **Ethernet**

▼ **ETH 0**

Description:

Get an IP address automatically using DHCP

Use the following settings

IP Address:

Mask:

Gateway:

DNS Server:

Secondary DNS Server:

Changes to these parameters may affect your browser connection

▶ **Advanced**

▶ **QoS**

▶ **VRRP**

Click the **Apply** button.



Under the VRRP sub-menu, tick ‘Enable VRRP on this interface’ and enter the **VRRP Group ID** and **VRRP Priority**.

[Configuration - Network](#) > [Interfaces](#) > [Ethernet](#) > [ETH 0](#) > [VRRP](#)

▼ VRRP

Enable VRRP on this interface

VRRP Group ID:

VRRP Priority:

Send advertisements every  seconds when in MASTER mode

Switch to MASTER mode if no advertisements are received within  seconds

Delay VRRP startup by  seconds after the ethernet interface connects

Boost the priority by  for  seconds after switching to the MASTER state

Enable VRRP+ Probing

Adjust priority according to status of another VRRP

Click the **Apply** button and then Save.

CLI commands to achieve the above:

```
eth 0 ipaddr 10.1.41.254
eth 0 mask 255.255.0.0
eth 0 vrrpid 1
eth 0 vrrpprio 110
```

Parameter	Setting	Description
IP Address	10.1.41.254	Enter the TransPort’s Ethernet IP address
Mask	255.255.0.0	Enter the TransPort’s Ethernet subnet mask
VRRPID	1	VRRP ID group used for this IP Address
VRRPPRIO	110	VRRP Priority for this instance

For the Secondary router, enter the same parameters as above, but change the **VRRP Priority** to **100**.

Go to **Management - Event Log** to observe VRRP starting.

For example, on the Primary router you will see the following as it becomes the Virtual Router Master:

```
15:19:53, 19 Oct 2011,ETH 0 Available,Ethernet
15:19:53, 19 Oct 2011,ETH 0 VRRP BACKUP -> MASTER
```

The Secondary router will come up as a Virtual Router Backup:

```
15:19:47, 19 Oct 2011,ETH 0 Out Of Service,Ethernet
15:19:47, 19 Oct 2011,ETH 0 VRRP INIT -> BACKUP
```

### 3.2 Configuring a Dedicated VRRP IP Address

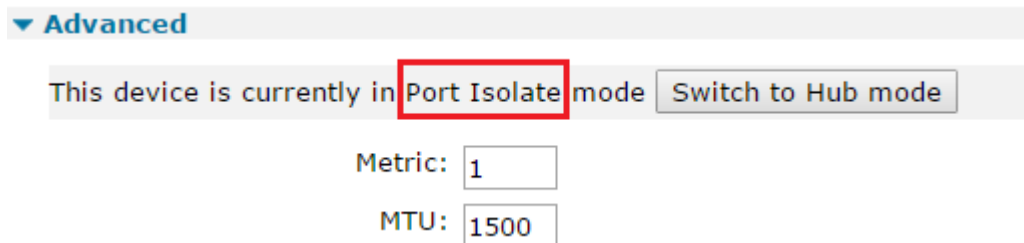
This section shows a dedicated VRRP IP address configuration from section 2.2.

Configure the same VRRP IP address and VRRP parameters as above on each unit, but for ETH1 rather than ETH0, leaving each unit's ETH0 IP address unique to itself.

**NOTE:** Both the ETH0 IP addresses and the ETH1 VRRP IP address should be members of the same subnet.

Also, in both routers, go to **Configuration - Network > Interfaces > Ethernet > ETH 0 > Advanced**

Make sure the device is in **Port Isolate** mode (click the Switch to Port Isolate if in Hub Mode).



Click the **Apply** button and then Save.

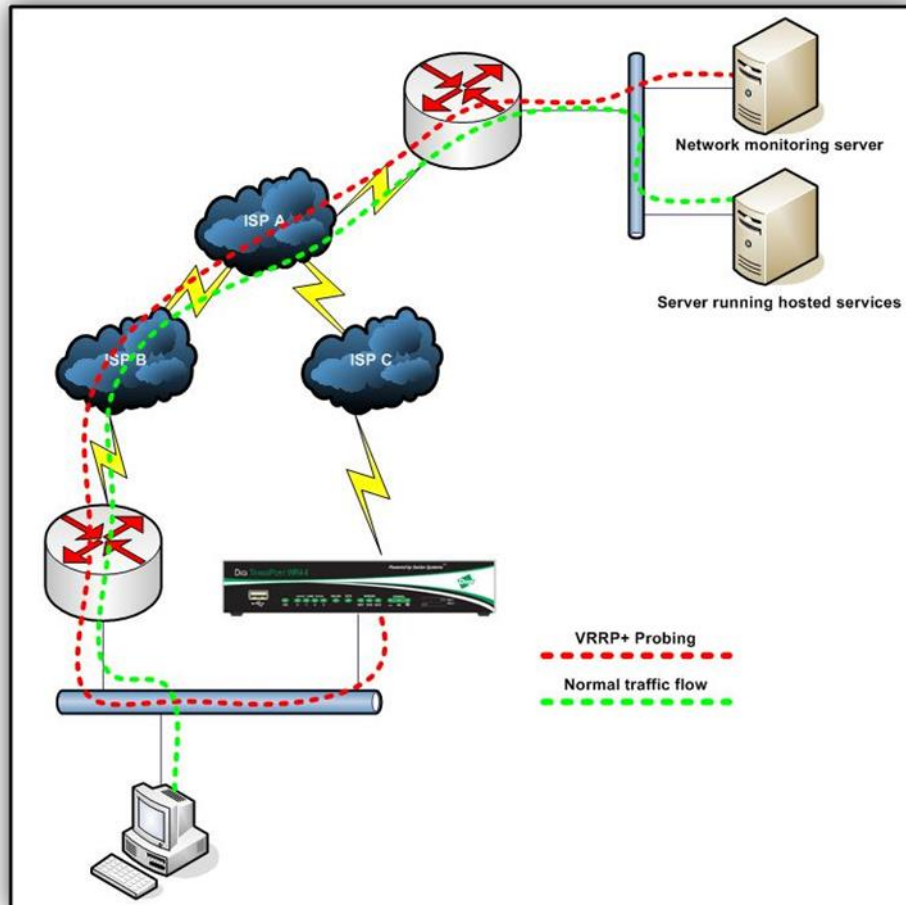
See section 6.1 for testing this setup.

## 4 VRRP+ IMPLEMENTATION

### 4.1 Using VRRP+

VRRP+ was developed by Sarian Systems Ltd before becoming part of Digi International. It allows VRRP to be extended to provide intelligent fail over scenarios.

For example, if you have two routers that connect to the internet, a DSL router and a cellular or ISDN router that you want to use as backup.



In addition to the backup router taking over if the DSL router fails completely, it is also desirable to swap over if the DSL line fails or the DSL ISP has some kind of fault which prevents access to the hosted services.

To achieve this the Digi TransPort backup router is set to use VRRP+ probing to send ICMP (ping) packets to the network monitoring server.

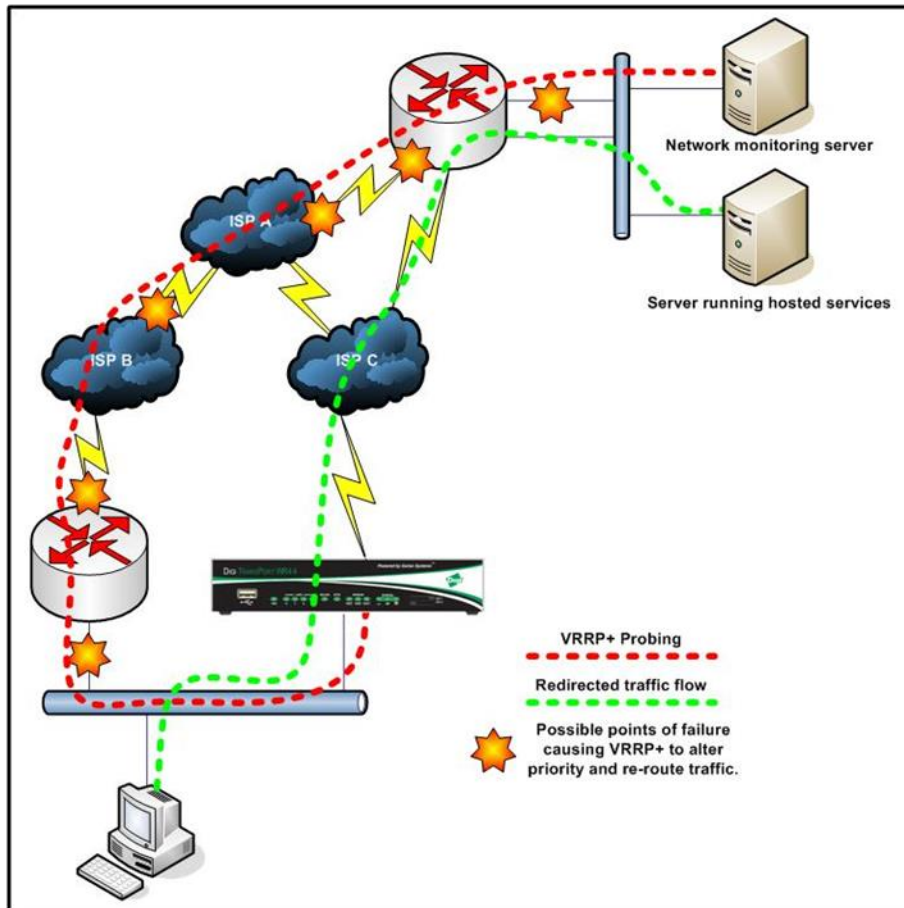
In the event of a failure of a ping, the VRRP Priority on the Digi TransPort backup router will be incremented by 20, giving it a VRRP priority of 120. This makes it higher than the priority of the primary virtual router and will cause the backup virtual router to become the VRRP Master Router and take all the traffic bound for the internet.

Whilst the DSL router is unable to route traffic, the backup router will still try to ping the network monitoring server to detect when the main route becomes available again. When the VRRP+ probing router

receives ICMP replies from the network monitoring server, the VRRP priority on the backup router is decreased by 20 returning it to 100. Network traffic then uses the main DSL router as its gateway.

If the network monitoring server is behind a firewall and cannot be configured to respond to ICMP (ping) requests, this can be overcome by setting the router to probe an alternative port such as 80 (HTTP/Web) on a web server instead.

In the event of VRRP+ detecting a routing failure, the traffic flow should be altered as shown:



## 5 VRRP+ CONFIGURATION

This shows the VRRP+ configuration from section 4.1. This example shows the configuration of the VRRP+ operation and does not cover the configuration of the DSL/GPRS/ISDN portion.

### 5.1 Configuring the Primary (DSL) Router

Go to **Configuration - Network > Interfaces > Ethernet > ETH 0**

Enter the **IP address** and **Mask** to be used for Primary Router address.

**NOTE:** There are no VRRP parameters for this interface.

[Configuration - Network > Interfaces > Ethernet > ETH 0 > VRRP](#)

▼ Interfaces

▼ Ethernet

▼ ETH 0

Description:

Get an IP address automatically using DHCP

Use the following settings

IP Address:

Mask:

Gateway:

DNS Server:

Secondary DNS Server:

Changes to these parameters may affect your browser connection

▶ Advanced

▶ QoS

▶ VRRP

Click the **Apply** button.

Go to **Configuration - Network > Interfaces > Ethernet > ETH 0 > Advanced**

Make sure the device is in **Port Isolate** mode (click the Switch to Port Isolate if in Hub Mode).

▼ Advanced

This device is currently in  mode

Metric:

MTU:

Click the **Apply** button.

Go to **Configuration - Network > Interfaces > Ethernet > ETH 1**

Enter the **IP address** and **Mask** to be used for VRRP:

[Configuration - Network > Interfaces > Ethernet > ETH 1](#)

▼ **Interfaces**

▼ **Ethernet**

▶ **ETH 0**

▼ **ETH 1**

Description:

Get an IP address automatically using DHCP

Use the following settings

IP Address:

Mask:

Gateway:

DNS Server:

Secondary DNS Server:

Changes to these parameters may affect your browser connection

▶ **Advanced**

▶ **QoS**

▶ **VRRP**

Click the **Apply** button.

Under the VRRP sub-menu, tick ‘Enable VRRP on this interface’ and enter the **VRRP Group ID** and **VRRP Priority**, then click **Apply**.

[Configuration - Network](#) > [Interfaces](#) > [Ethernet](#) > [ETH 0](#) > [VRRP](#)

**▼ VRRP**

Enable VRRP on this interface

VRRP Group ID:

VRRP Priority:

Send advertisements every  seconds when in MASTER mode

Switch to MASTER mode if no advertisements are received within  seconds

Delay VRRP startup by  seconds after the ethernet interface connects

Boost the priority by  for  seconds after switching to the MASTER state

Enable VRRP+ Probing

Adjust priority according to status of another VRRP

---

**Apply**

Click the **Apply** button and then save.

CLI commands to achieve the above:

```
eth 0 ipaddr 10.1.41.1
eth 0 mask 255.255.0.0
eth 1 ipaddr 10.1.41.254
eth 1 mask 255.255.0.0
eth 1 vrrpid 1
eth 1 vrrpprio 110
```

Parameter	Setting	Description
IP Address	10.1.41.1	Enter the TransPort’s Ethernet IP address for Eth 0
Mask	255.255.0.0	Enter the TransPort’s Ethernet subnet mask for Eth 0
IP Address	10.1.41.254	Enter the TransPort’s Ethernet IP address for Eth 1
Mask	255.255.0.0	Enter the TransPort’s Ethernet subnet mask for Eth 1
VRRPID	1	VRRP ID group used for this IP Address
VRRPPRIO	110	VRRP Priority for this instance

## 5.2 Configuring the Secondary Router

Go to **Configuration - Network > Interfaces > Ethernet > ETH 0**

Enter the **IP address** and **Mask** to be used for Primary Router address.

**NOTE:** There are no VRRP parameters for this interface.

[Configuration - Network](#) > [Interfaces](#) > [Ethernet](#) > [ETH 0](#)

▼ Interfaces

▼ Ethernet

▼ ETH 0

Description:

Get an IP address automatically using DHCP

Use the following settings

IP Address:

Mask:

Gateway:

DNS Server:

Secondary DNS Server:

Changes to these parameters may affect your browser connection

▶ Advanced

▶ QoS

▶ VRRP

Click the **Apply** button.

Make sure the device is in **Port Isolate** mode (click the Switch to Port Isolate if in Hub Mode).

▼ Advanced

This device is currently in  mode

Metric:

MTU:

Click the **Apply** button.

Go to **Configuration - Network > Interfaces > Ethernet > ETH 1**

Enter the **IP address** and **Mask** to be used for VRRP:



[Configuration - Network](#) > [Interfaces](#) > [Ethernet](#) > [ETH 1](#)

▼ Interfaces

▼ Ethernet

▶ ETH 0

▼ ETH 1

Description:

Get an IP address automatically using DHCP

Use the following settings

IP Address:

Mask:

Gateway:

DNS Server:

Secondary DNS Server:

Changes to these parameters may affect your browser connection

▶ Advanced

▶ QoS

▶ VRRP

Click the **Apply** button.

Under the VRRP sub-menu, tick 'Enable VRRP on this interface' and enter the **VRRP Group ID** and **VRRP Priority**.

Tick 'Enable VRRP+ Probing' and enter the following details for the ETH 1 VRRP Probe.

▼ VRRP

Enable VRRP on this interface

VRRP Group ID:

VRRP Priority:

Send advertisements every  seconds when in MASTER mode

Switch to MASTER mode if no advertisements are received within  seconds

Delay VRRP startup by  seconds after the ethernet interface connects

Boost the priority by  for  seconds after switching to the MASTER state

Enable VRRP+ Probing

Send  probe to IP address  TCP port

every  seconds when in Backup state

every  seconds when in Master state

Adjust priority by   after  probe failures

Reset probe failure count after  probe successes

Use interface   over which to send probe

Get the source IP address from interface

Adjust priority according to status of another VRRP

CLI commands to achieve the above:

```
eth 0 ipaddr 10.1.41.2
eth 0 mask 255.255.0.0
eth 1 ipaddr 10.1.41.254
eth 1 mask 255.255.0.0
eth 1 vrrpid 1
eth 1 vrrpprio 100
eth 1 vprobemode icmp
eth 1 vprobeip 166.241.38.77
eth 1 vprobebackint 1
eth 1 vprobemastint 1
eth 1 vprobefailcnt 3
eth 1 vprobesuccesscnt 1
eth 1 vprobeadj 20
eth 1 vprobeadjup ON
eth 1 vprobeent eth
```

Parameter	Setting	Description
IP Address	10.1.41.2	Enter the TransPort's Ethernet IP address for Eth 0
Mask	255.255.0.0	Enter the TransPort's Ethernet subnet mask for Eth 0
IP Address	10.1.41.254	Enter the TransPort's Ethernet IP address for Eth 1
Mask	255.255.0.0	Enter the TransPort's Ethernet subnet mask for Eth 1
VRRPID	1	VRRP ID group used for this IP Address
VRRPPRIO	100	VRRP Priority for this instance
Vprobemode	ICMP	VRRP Probe mode (ICMP,TCP)
Vprobeip	166.241.38.77	IP Address to send probes to**
Vprobbedbackint	1	How often to probe the address when in backup mode
Vprobemastinit	1	How often to probe the address when in master mode
Vprobefailcnt	3	How many failed probes before adjusting priority
Vprobesuccesscnt	1	How many successful probes before resetting the failed state
Vprobeadj	20	Amount to adjust priority by
Vprobeadjup	ON	Whether to adjust priority UP or DOWN
Vprobeent	ETH	Which interface to send the probe over

\*\* This should ideally be an IP address that you own and have control of. The IP address is usually a WAN address at the Head Office network.

Go to **Configuration - Network > IP Routing/Forwarding > Static Routes > Routes 0 - 9 > Route 0**

Enter a static route to the VRRP+ probed IP address, this is required so the probing does not follow the default route.

**Configuration - Network > IP Routing/Forwarding > Static Routes > Routes 0 - 9 > Route 0**

▾ IP Routing/Forwarding  
   ▸ IP Routing  
   ▾ Static Routes  
     ▾ Routes 0 - 9  
       ▾ Route 0

Description:

Destination Network:  Mask:

via

Gateway:

Interface:

Use PPP sub-configuration:

Metric:

▸ Advanced

Finally, click **Apply** then save the configuration as power up profile 0.

CLI commands to achieve the above:

```
route 0 IPAddr 166.241.38.77
route 0 mask 255.255.255.255
route 0 gateway 10.1.41.1
route 0 ll_ent eth
```

Parameter	Setting	Description
IP Address	166.241.38.77	The Probe address
Mask	255.255.255.255	Subnet mask to only send traffic to probe address
Gateway	10.1.41.1	Address of next hop gateway
Interface	eth	Interface to exit to get to next hop gateway

See section 6.2 for testing this setup.

### 5.3 Note about VRRP and IPsec SAs

It is quite common that the secondary router will use IPsec to create a secure tunnel into the head office network when the primary route (the red path shown above) is out of service.

When the primary route is working correctly, the left router will become VRRP master again. When this happens, it is usually desirable to drop the IPsec VPN on the backup router (right) and remove the SAs associated with that tunnel.

To configure removal of IPsec SAs (on the backup router) when the backup router is not VRRP master, browse to **Configuration - Network > Virtual Private Networking (VPN) > IPsec > IPsec Tunnels > IPsec 0 > Advanced** and put a tick in the box as shown (but for the relevant IPsec VPN):

[Configuration - Network > Virtual Private Networking \(VPN\) > IPsec > IPsec Tunnels > IPsec 0](#)

**Tunnel Negotiation**

**Advanced**

IPsec mode  Transport  Tunnel

Use  AH authentication on this tunnel

Use  compression on this tunnel

Delete SAs when this tunnel is down

Replay detection window

Delete SAs when Ethernet  is not a VRRP master

Go out of service if automatic establishment fails

Disconnect the configured interface after  consecutive auto-negotiation failures

Click the **Apply** button and save.

## 6 TESTING

### 6.1 VRRP Testing

The testing of VRRP is very simple. Start a ping going to the VRRP IP address and then disconnect the Ethernet cable from the primary router. This will cause the backup router to become the master. The following will be shown in the eventlog of the backup router (**Management - Event Log**):

```
15:38:41, 19 Oct 2011,ETH 1 Available,Ethernet
15:38:41, 19 Oct 2011,ETH 1 VRRP BACKUP -> MASTER
```

When you reconnect the Ethernet cable back to the primary router, the backup router demotes back to being the backup and puts eth 1 out of service:

```
15:38:56, 19 Oct 2011,ETH 1 Out Of Service,Ethernet
15:38:56, 19 Oct 2011,ETH 1 VRRP MASTER -> BACKUP
```

### 6.2 VRRP+ Testing

VRRP+ testing is a little more complicated, in this example a WR21 with an ADSL connection is the primary link and a WR44 with cellular as the backup link. Once the units are configured as above the primary router becomes the VRRP master:

```
15:50:30, 19 Oct 2011,ETH 1 Available,Ethernet
15:50:30, 19 Oct 2011,ETH 1 VRRP BACKUP -> MASTER
```

And the backup router becomes the VRRP backup:

```
15:50:32, 19 Oct 2011,ETH 1 Out Of Service,Ethernet
15:50:32, 19 Oct 2011,ETH 1 VRRP MASTER -> BACKUP
```

In this state all internet traffic is routed to the VRRP gateway (the WR21); as with VRRP if the WR21 should fail then the WR44 becomes the VRRP master:

```
15:52:09, 19 Oct 2011,ETH 1 Available,Ethernet
15:52:09, 19 Oct 2011,ETH 1 VRRP BACKUP -> MASTER
```

VRRP+ also tests the link to the internet; in this example ICMP is used to test the connection to a known public IP address. VRRP+ can be tested by removing the ADSL cable from the WR21 to simulate ADSL failure.

WR21:

```
15:53:37, 19 Oct 2011,Default Route 0 Out Of Service,Activation
```

```
15:53:37, 19 Oct 2011,PPP 1 Out Of Service,Activation
15:53:37, 19 Oct 2011,PPP 1 down,LL disconnect
15:53:37, 19 Oct 2011,ATM PVC 0 down,Lower layer down
15:53:37, 19 Oct 2011,ADSL 0 down
15:53:37, 19 Oct 2011,ADSL line: Idle
15:53:37, 19 Oct 2011,ETH 1 Out Of Service,Ethernet
15:53:37, 19 Oct 2011,ETH 1 VRRP MASTER -> BACKUP
```

#### **WR44:**

```
15:53:39, 19 Oct 2011,ETH 1 Available,Ethernet
15:53:39, 19 Oct 2011,ETH 1 VRRP BACKUP -> MASTER
```

As you can see from this from this example as soon as VRRP Probing detects that that the known public IP address is no longer available via the WR21 it promotes the WR44 to VRRP Master and demotes the WR21 to VRRP backup. The WR44 then routes all internet traffic. As soon as the ADSL line is available and VRRP Probing can reach the public IP address it demotes the WR44 back to backup and the WR21 is master again:

#### **WR21:**

```
15:56:23, 19 Oct 2011,ETH 1 Available,Ethernet
15:56:23, 19 Oct 2011,ETH 1 VRRP BACKUP -> MASTER
15:56:14, 19 Oct 2011,Default Route 0 Available,Activation
15:56:14, 19 Oct 2011,PPP 1 Available,Activation
15:56:14, 19 Oct 2011,PPP 1 up
```

## 7 CONFIGURATION FILES

### 7.1 Digi TransPort Configuration Files

This is the configuration file from the primary router – WR21:

```
eth 0 IPAddr "10.1.41.1"  
eth 0 mask "255.255.0.0"  
eth 1 IPAddr "10.1.41.254"  
eth 1 mask "255.255.0.0"  
eth 1 vrrpid 1  
eth 1 vrrpprio 110  
def_route 0 ll_ent "ppp"  
def_route 0 ll_add 1
```

This is the configuration file from the secondary router – WR44:

```
eth 0 IPAddr "10.1.41.2"  
eth 0 mask "255.255.0.0"  
eth 1 IPAddr "10.1.41.254"  
eth 1 mask "255.255.0.0"  
eth 1 vrrpid 1  
eth 1 vrrpprio 100  
eth 1 vprobemode "ICMP"  
eth 1 vprobeip "166.241.38.77"  
eth 1 vprobebackint 1  
eth 1 vprobemastint 1  
eth 1 vprobefailcnt 1  
eth 1 vprobesuccesscnt 1  
eth 1 vprobeadj 20  
eth 1 vprobeadjup ON  
eth 1 vprobeent "ETH"  
route 0 IPAddr "192.32.42.133"  
route 0 mask "255.255.255.255"  
route 0 gateway "10.1.41.1"  
route 0 ll_ent "ETH"  
def_route 0 ll_ent "ppp"  
def_route 0 ll_add 1
```

### 7.2 Digi TransPort Firmware Versions

This is the firmware / hardware information from the primary router – WR21:

```
Digi TransPort WR21-L52A-DE1-XX Ser#:293824 HW Revision: 1201a  
Software Build Ver5.2.15.6. Aug 17 2016 17:42:08 WW  
ARM Bios Ver 7.56u v43 454MHz B987-M995-F80-00,0 MAC:00042d047bc0  
Power Up Profile: 0  
Async Driver Revision: 1.19 Int clk  
Wi-Fi Revision: 2.0  
Ethernet Port Isolate Driver Revision: 1.11  
Firewall Revision: 1.0  
EventEdit Revision: 1.0  
Timer Module Revision: 1.1  
AAL Revision: 1.0  
ADSL Revision: 1.0  
(B)USBHOST Revision: 1.0  
L2TP Revision: 1.10  
PPTP Revision: 1.00  
TACPLUS Revision: 1.00  
MySQL Revision: 0.01
```

LAPB	Revision: 1.12
X25 Layer	Revision: 1.19
MACRO	Revision: 1.0
PAD	Revision: 1.4
X25 Switch	Revision: 1.7
V120	Revision: 1.16
TPAD Interface	Revision: 1.12
SCRIBATSK	Revision: 1.0
BASTSK	Revision: 1.0
ARM Sync Driver	Revision: 1.18
TCP (HASH mode)	Revision: 1.14
TCP Utils	Revision: 1.13
PPP	Revision: 1.19
WEB	Revision: 1.5
SMTP	Revision: 1.1
FTP Client	Revision: 1.5
FTP	Revision: 1.4
IKE	Revision: 1.0
POLLANS	Revision: 1.2
PPPOE	Revision: 1.0
BRIDGE	Revision: 1.1
MODEM CC (Siemens MC75)	Revision: 1.4
FLASH Write	Revision: 1.2
Command Interpreter	Revision: 1.38
SSLCLI	Revision: 1.0
OSPF	Revision: 1.0
BGP	Revision: 1.0
QOS	Revision: 1.0
RADIUS Client	Revision: 1.0
SSH Server	Revision: 1.0
SCP	Revision: 1.0
CERT	Revision: 1.0
LowPrio	Revision: 1.0
Tunnel	Revision: 1.2
OVPN	Revision: 1.2
TEMPLOG	Revision: 1.0
iDigi	Revision: 2.0
OK	

This is the firmware / hardware information from the secondary router – WR44:

```

Digi TransPort WR44-HXT1-WE1-XX Ser#:160601 HW Revision: 7902a
Software Build Ver5.2.15.6. Aug 17 2016 17:42:08 SW
ARM Bios Ver 6.32 v39 400MHz B512-M512-F80-00,0 MAC:00042d027359
Power Up Profile: 0
Async Driver Revision: 1.19 Int clk
Wi-Fi Revision: 2.0
IX Revision: 1.0
Ethernet Port Isolate Driver Revision: 1.11
Firewall Revision: 1.0
EventEdit Revision: 1.0
Timer Module Revision: 1.1
(B)USBHOST Revision: 1.0
L2TP Revision: 1.10
PPTP Revision: 1.00
TACPLUS Revision: 1.00
MODBUS Revision: 0.00
MySQL Revision: 0.01
RealPort Revision: 0.00

```



LAPB	Revision: 1.12
X25 Layer	Revision: 1.19
MACRO	Revision: 1.0
PAD	Revision: 1.4
X25 Switch	Revision: 1.7
V120	Revision: 1.16
TPAD Interface	Revision: 1.12
GPS	Revision: 1.0
SCRIBATSK	Revision: 1.0
BASTSK	Revision: 1.0
PYTHON	Revision: 1.0
ARM Sync Driver	Revision: 1.18
TCP (HASH mode)	Revision: 1.14
TCP Utils	Revision: 1.13
PPP	Revision: 1.19
WEB	Revision: 1.5
SMTP	Revision: 1.1
FTP Client	Revision: 1.5
FTP	Revision: 1.4
IKE	Revision: 1.0
POLLANS	Revision: 1.2
PPPOE	Revision: 1.0
BRIDGE	Revision: 1.1
MODEM CC (Ericsson 3G)	Revision: 1.4
FLASH Write	Revision: 1.2
Command Interpreter	Revision: 1.38
SSLCLI	Revision: 1.0
OSPF	Revision: 1.0
BGP	Revision: 1.0
QOS	Revision: 1.0
RADIUS Client	Revision: 1.0
SSH Server	Revision: 1.0
SCP	Revision: 1.0
CERT	Revision: 1.0
LowPrio	Revision: 1.0
Tunnel	Revision: 1.2
OVPN	Revision: 1.2
QDL	Revision: 1.0
WiMax	Revision: 1.0
iDigi	Revision: 2.0
OK	