Application Note 34

Configuring ADSL to backup to PSTN/ISDN with automatic testing and recovery back to ADSL.

UK Support

November 2015

Contents

1 INTRODUCTION

1.1 Outline

The document describes how to configure a Digi Transport router to fail over to PSTN when there is a problem with the main ADSL connection. Once the ADSL connection is working again the router will test it by sending pings and then revert back to ADSL and drop the PSTN connection.

This application note uses PPP 4 (PSTN) as the failover interface, however, if the router being configured has ISDN, simply configure PPP 2 (ISDN) instead of PPP 4. The same configuration can be applied to the ISDN interface.

For failover from ADSL to a cellular network, please see Application Note 35 as the configuration is slightly different.

1.2 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 DR64 router with ADSL & PSTN running firmware version 5122.

Other Compatible Models: All Digi Transport products.

Firmware versions: 4905 or later.

Configuration: This Application Note assumes that the Digi Transport router is already configured with a working ADSL connection through PPP 1.

1.3 Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to: uksupport@digi.com

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

1.4 Version

Version Number	Status
1.0	Published
1.1	Re-branded to Digi Transport
1.2	Updated to new GUI

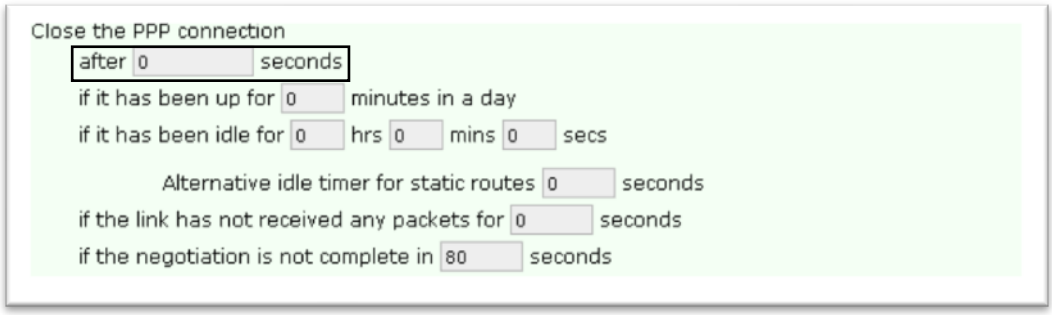
2 CONFIGURATION

2.1 Configure PPP 1 (ADSL)

This PPP interface should already be configured for use with the ISP. You should confirm that you have a working ADSL connection before proceeding with this configuration.

Navigate to **Configuration - Network > Interfaces > Advanced > PPP 0 - 9 > PPP 1**

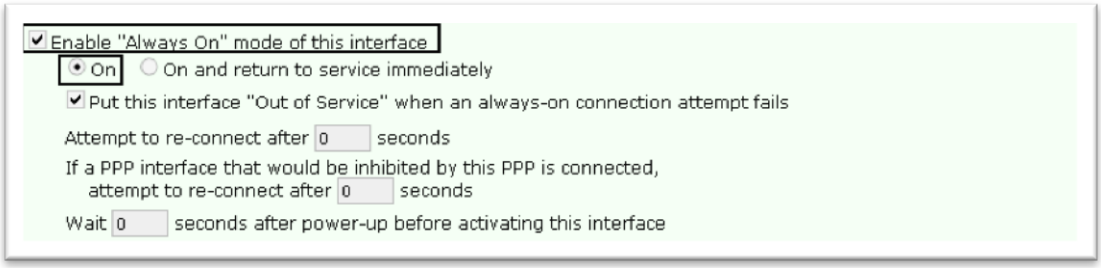
The inactivity timer should be set to 0.



Parameter	Setting	Description
Close the PPP connection after *n* seconds	0	Interface is always connected and active

Navigate to **Configuration - Network > Interfaces > Advanced > PPP 0 - 9 > PPP 1 > Advanced**

The PPP 1 interface needs to be configured to be “always on”.



Parameter	Setting	Description
Enable “Always on” mode	Checked + ON	Configures interface as always on

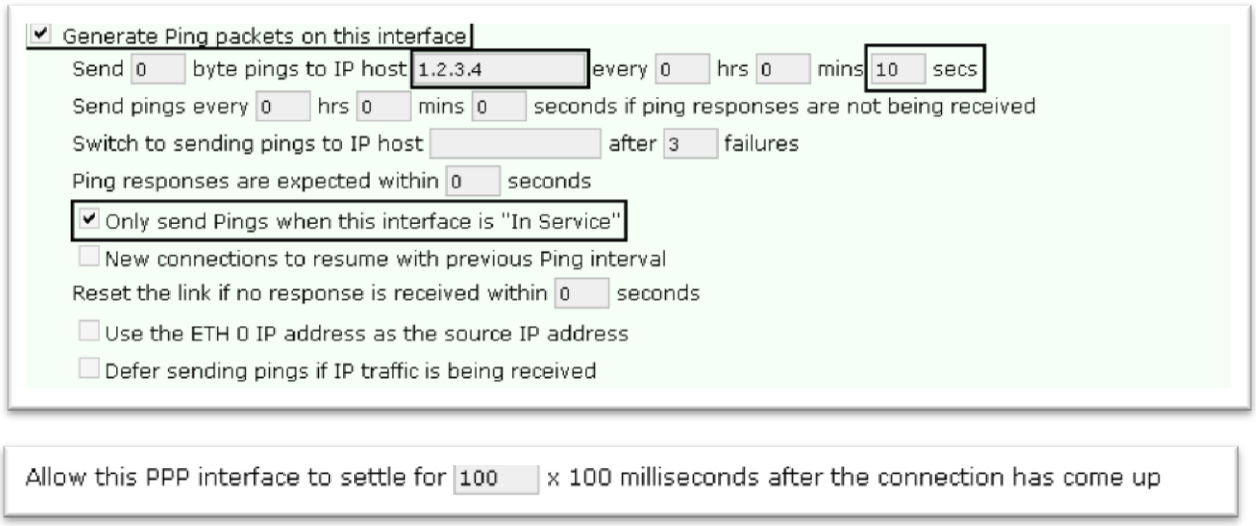
Click APPLY

2.2 Configure Auto-Pings

PPP 1 should be configured to generate ICMP requests that the firewall can monitor and use to detect when the ADSL connection has a problem.

It is also necessary to configure a settling time on the interface. The settling time is a parameter that prevents the Digi Transport from using the interface until it has been up for the specified number of seconds. This delay is required so that any ICMP echo requests (used for testing the interface) are not sent so soon after the interface has come up that the ISP drops the reply packet. (ISP routing tables are often not updated within the first few seconds of an interface coming up. Sending packets immediately often causes the reply to these packets to be dropped.)

Navigate to **Configuration - Network > Interfaces > Advanced > PPP 0 - 9 > PPP 1 > Advanced**



Parameter	Setting	Description
Generate Ping packets on this interface	Checked	Send ICMP requests every x seconds
Ping IP host	1.2.3.4	A public IP address that you can ping to check connectivity via ADSL
Every *n* hrs *n* mins *n* secs	0 hrs 0 mins 10 secs	Time between pings
Only send Pings when interface is in service	Checked	Do not send ICMP requests if using cellular
Settling time (*100ms)	100	Do not send 1st ping until 10 seconds after interface has come up

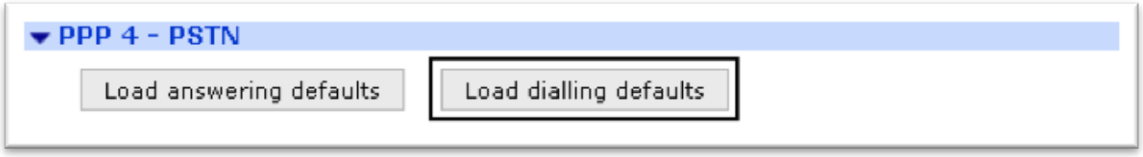
Click APPLY

2.3 Configure PPP 4 (PSTN)

It will be necessary to configure PPP 4 as an outbound interface as the default is for the interface to accept incoming calls. Then ISP configuration will be added.

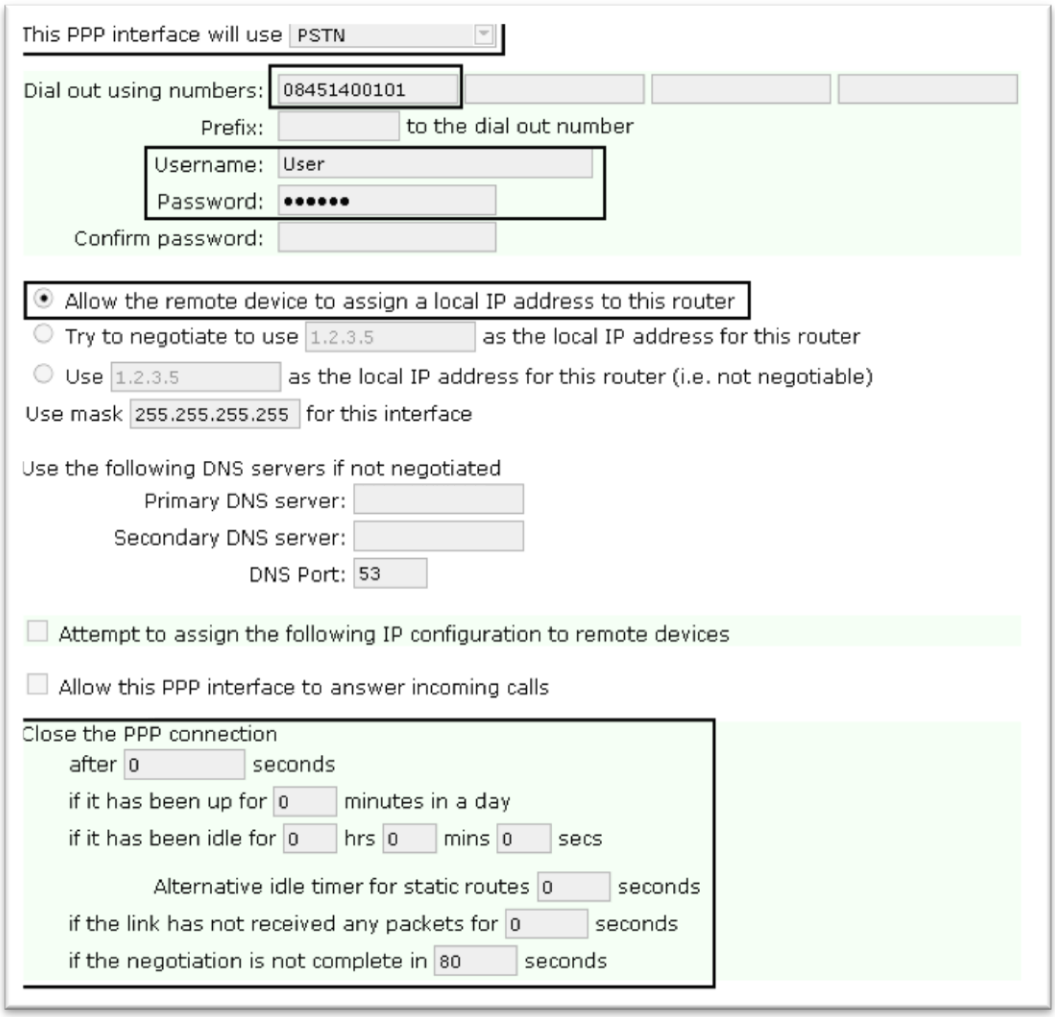
Navigate to **Configuration - Network > Interfaces > Advanced > PPP 0 - 9 > PPP 4**

Click "**Load dialling defaults**".



Navigate to **Configuration - Network > Interfaces > Advanced > PPP 0 - 9 > PPP 4**

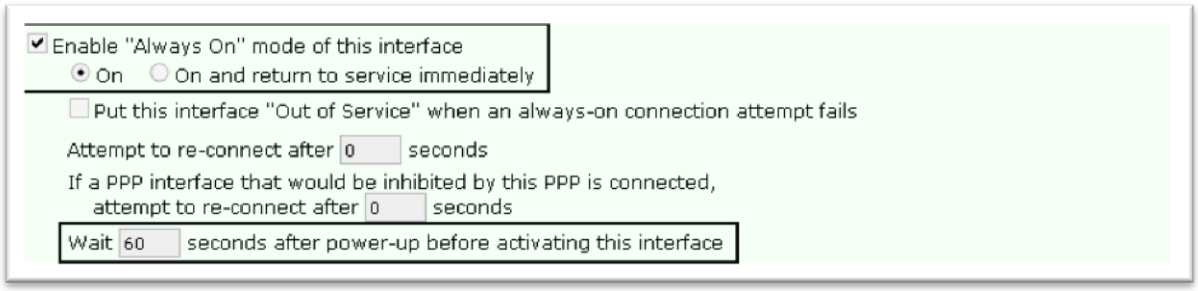
The PPP 4 configuration needs to be configured to be "always on". The interface will also be configured for use with an ISP, enter the details as shown in the tables below.



Parameter	Setting	Description
This PPP Interface will use	PSTN	Use internal PSTN modem
Dial-out using numbers	0845 1400101	Replace with the number for your ISP
Allow the remote device to assign a local IP address to this router	Selected	Your ISP will normally assign an IP address automatically
Username	User	Replace with your dial up username
Password	Pass	Replace with your dial up password
Close the PPP connection	0	Keep interface in service even if no data passes through interface

Navigate to **Configuration - Network > Interfaces > Advanced > PPP 0 - 9 > PPP 4 > Advanced**

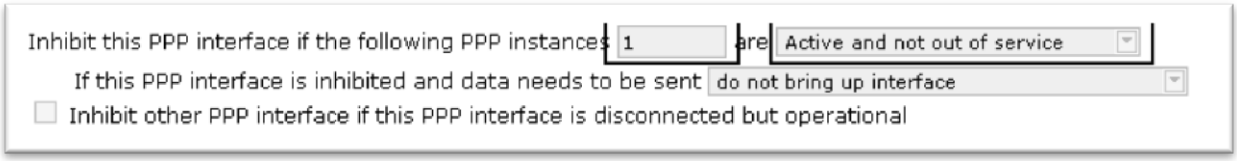
Configure Always on mode and a power up delay of 60 seconds to allow the ADSL connection to come up and be the primary connection.



Parameter	Setting	Description
Enable “Always on” mode	Checked + ON	Interface should always be active
Power-up delay	60	Timer to allow main ADSL connection to come up before this one is activated

Navigate to **Configuration - Network > Interfaces > Advanced > PPP 0 - 9 > PPP 4 > Advanced**

The PSTN interface needs to be configured so that if PPP 1 (ADSL) is up and in service (i.e. passing data) then this interface is not allowed to initiate a connection.



Parameter	Setting	Description
Inhibit this PPP interface if the following PPP instances	1	Inhibit auto-activation of PPP 4 when PPP 1 is active
Inhibit mode	Active and not out of service	Only inhibit if PPP 1 is passing data

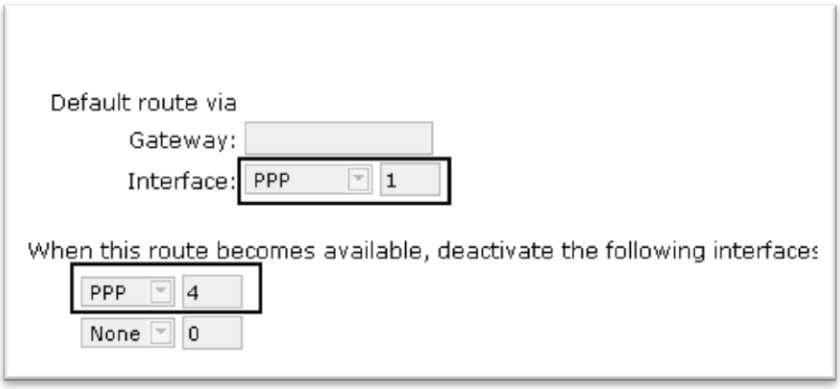
Click APPLY

2.4 Configure the Default Routes

It is necessary to configure two default routes, one for PPP 1 and one for PPP 4. The PPP 1 default route needs to be set so PPP 4 is deactivated when PPP 1 returns to service after a successful recovery.

Navigate to **Configuration - Network > IP Routing/Forwarding > Static Routes > Default Route 0**

The configuration of default route 0 should be configured as shown.

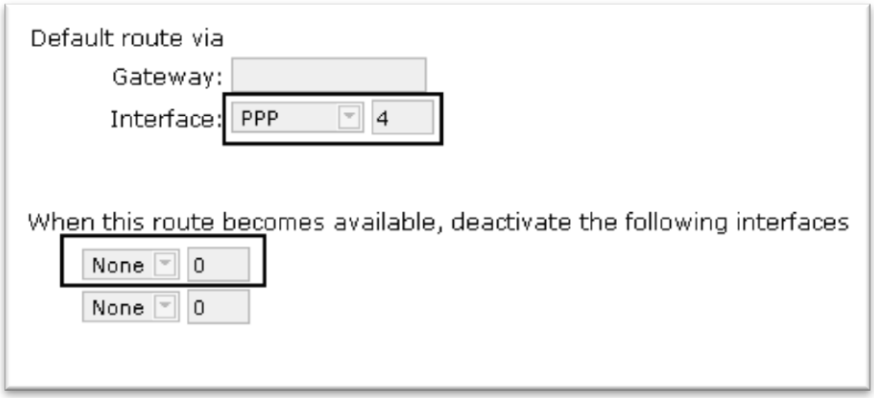


Parameter	Setting	Description
Interface	PPP	Default route 0 is via PPP 1
Interface #	1	
Deactivate interface	PPP	PPP 4 will be deactivated when this route comes back into service after an outage
Deactivate interface #	4	

Click OK

Configuration - Network > IP Routing/Forwarding > Static Routes > Default Route 1

The configuration of default route 1 should be configured as shown.



Parameter	Setting	Description
Interface	PPP	Default route 1 is via PPP 4
Interface #	4	
Deactivate interface	None	This will allow for recovery to ADSL
Deactivate interface #	0	

Click APPLY

2.5 Configure the Firewall

The firewall should be configured to monitor the ICMP requests generated by PPP 1. If the firewall detects that 3 consecutive ICMP echo requests have failed, it will take PPP 1 out of service and be deactivated thus allowing PPP 4 to come up. The IP address in the firewall rule must be the IP address that PPP 1 is sending pings to.

The recovery code will then reactivate and test the ADSL connection before bringing it back into service. When the recovery is successful and PPP 1 comes back into service, PPP 4 will be deactivated.

Navigate to **Configuration – Security > Firewall**

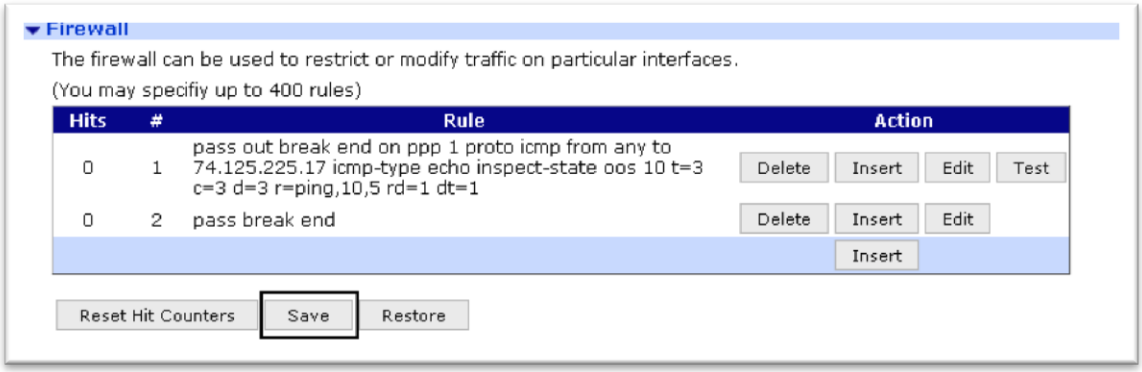
Insert the following 2 rules:

Rule 1 (replace 1.2.3.4 with the IP address auto-pings are configured for)

```
pass out break end on ppp 1 proto icmp from any to 1.2.3.4 icmp-type echo inspect-state
oos 10 t=3 c=3 d=3 r=ping,10,5 rd=1 dt=1
```

Rule 2

```
Pass break end
```



Save the firewall rules by clicking the "Save" button.

Rule 1 explained:

`pass out break end on PPP 1` – allow traffic outbound from PPP 1

proto icmp from any to 1.2.3.4 icmp-type echo – allow pings out to 1.2.3.4

inspect-state – monitor the pings for echo replies and allow them back in

oos 10 t=3 c=3 d=3 – if 3 consecutive pings fail, deactivate PPP 1 and start recovery procedures after 10 seconds. This 10 second timer could be increased (by editing the firewall rule) to prevent the Digi Transport from switching rapdily between PPP 1 and PPP 4 in the case where PPP 1 works intermitantly. This "oos 10" can be thought of as a de-bounce timer in the context of this application note.

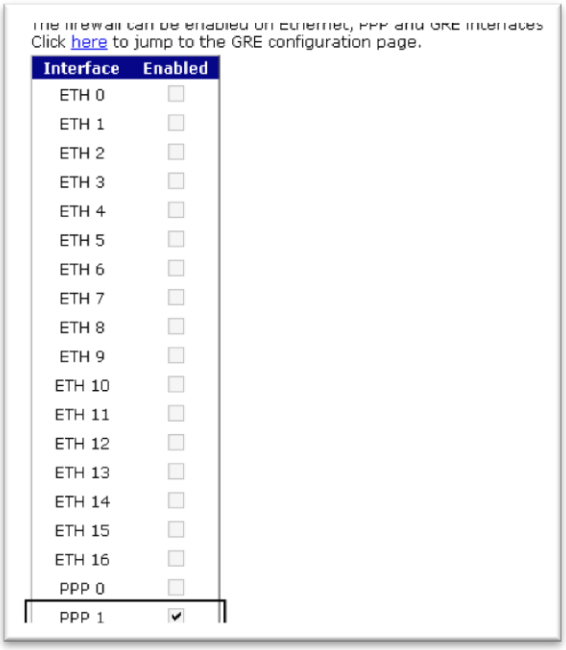
r=ping,10,5 rd=1 dt=1 – during recovery, test the link every 10 seconds with a ping, allow 5 seconds for the response to each ping, if the recovery fails deactivate the interface and deactivate the link before trying again

Rule 2 allows all other traffic through.

For a more detailed explanation of the above firewall keywords refer to the Sar/OS reference manual.

Scroll down to enable the firewall on PPP 1 to activate the ICMP monitoring and recovery.

Navigate to **Configuration - Security > Firewall**



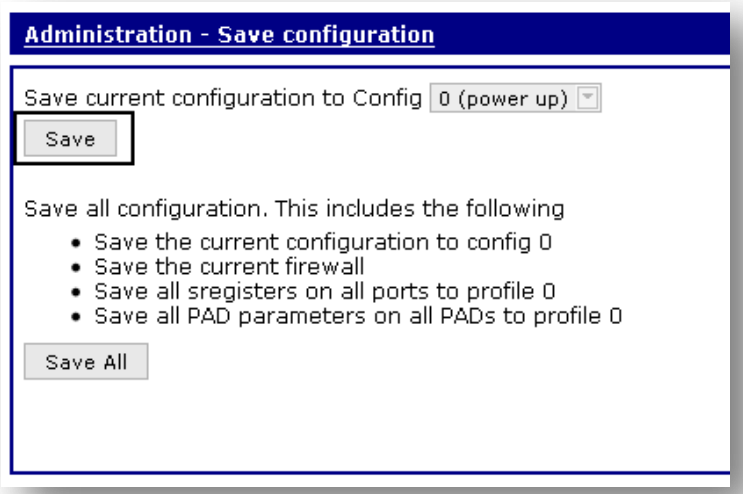
Parameter	Setting	Description
Interface PPP1	ON	Switches the firewall on for this interface

Click APPLY

2.6 Save configuration

Save your configuration as the power up configuration.

Administration - Save configuration



Click Save

Reboot the Digi Transport router (or deactivate PPP 1) so the PPP changes take effect.

3 TESTING

3.1 Simulate a failure

To test the fail over and recovery you will need to configure the PPP interface to ping a IP address that you can easily stop responding to ICMP requests (either through the use of a firewall or by physically disconnecting it from the network). You will also need to alter the firewall rule so it monitors the same IP address that PPP 1 is pinging.

Once you have the IP address configured and the Digi Transport router is up on the main WAN link, remove your test device from the network or adjust the firewall on the remote host so it stops responding to the ICMP requests from the Digi Transport router.

After approximately 30 seconds the router should bring up PPP 4 (the dial-up connection).

To confirm that PPP 4 is up and being used you can:

- check the entries in **Management - Event Log**
- click on **Management - Connections > PPP Connections > PPP 4** and check the link is up and has a valid IP address
- click on **Management – Network Status > IP Routing Table** to view the routing table which should show PPP 4 with a status of UP and PPP 1 with a status of OOS.
- Also for dial-up, the routers OH and CD LED's should be lit.

Once you have confirmed that the router has failed over correctly, re-enable the ICMP response or re-connect the test device to the network. You should notice that after approximately 20 seconds, the router drops the dial-up connection as the main PPP 1 link becomes available again.

This will again be shown in the event log, the routing table, the PPP 4 status should show Link Inactive, and the OH & CD LED's should go out.

4 CONFIGURATION FILES

4.1 Digi Transport Configuration Files

This is the relevant parts of the configuration file:

```
eth 0 IPaddr "10.1.19.201"
eth 0 mask "255.255.0.0"
eth 0 gateway "10.1.2.100"
```

```
def_route 0 ll_ent "PPP"
def_route 0 ll_add 1
def_route 0 deact_ent "PPP"
def_route 0 deact_add 4
def_route 1 ll_ent "PPP"
def_route 1 ll_add 4
def_route 2 ll_ent "PPP"
def_route 2 ll_add 3
def_route 3 ll_ent "PPP"
def_route 3 ll_add 4
```

```
ppp 1 IPaddr "0.0.0.0"
ppp 1 username "user@isp.com"
ppp 1 password "pass"
ppp 1 name "adsl_primary_wan"
ppp 1 timeout 0
ppp 1 aodion 1
ppp 1 immoos ON
ppp 1 autoassert 1
ppp 1 firewall ON
ppp 1 echo 10
ppp 1 echodropcnt 5
ppp 1 pingip "1.2.3.4"
ppp 1 pingint 10
ppp 1 pingis ON
ppp 1 l1iface "AAL"
ppp 1 settledly 100
```

```
ppp 4 l_acfc ON
ppp 4 l_pfc ON
ppp 4 IPaddr "0.0.0.0"
ppp 4 username "user@isp.com"
ppp 4 password "pass"
ppp 4 phonenum "08451400101"
ppp 4 name "PSTN"
ppp 4 use_modem 3
ppp 4 aodion 1
ppp 4 pwr_dly 60
```

```
ppp 4 autoassert 1
ppp 4 defpak 16
ppp 4 inhibitno "1"
ppp 4 inhmode 1
ppp 4 other_local_PPP_mode ON
```

```
ana 0 anon ON
ana 0 l1on ON
ana 0 lapdon 0
ana 0 asyon 1
ana 0 logsize 45
```

4.2 Digi Transport Firmware Versions

This is the firmware \ hardware information:

```
Digi TransPort DR64-HXP1-WE?-XX(MkII) Ser#:9000 HW Revision: 7502a
Software Build Ver5122. Feb 19 2011 15:31:52 9W
ARM Bios Ver 5.95 v35 197MHz B128-M128-F300-O100001,0 MAC:00042d000000
Power Up Profile: 0
Async Driver              Revision: 1.19 Int clk
Ethernet Hub 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 (Option 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
TEMPLOG                         Revision: 1.0
Wi-Fi                     Revision: 2.0
iDigi                     Revision: 2.0
OK
```