Application Note 43

Using a TransPort Router with DialServ in PPP Mode

September 2016

Contents

1 INTRODUCTION

1.1 Outline

The DialServ daughter card hardware option expands the functionality of a TransPort router so it can appear as a PSTN line to a PSTN modem. This can be extremely useful when an application can only use a PSTN modem but alternative (faster & cheaper) methods of routing the data are available. The TransPort router will answer the incoming PSTN call from the directly attached modem and route the data via the cellular (or any other WAN) interface to a specified destination or just to the Internet depending on the application and project requirements.

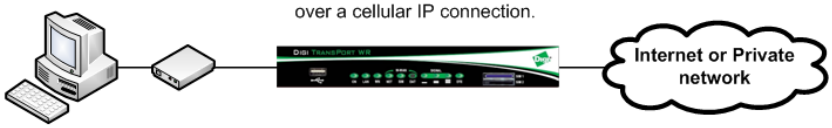
The DialServ hardware will provide a dial tone to the connected PSTN device and answer calls regardless of the number the PSTN device dials, so no changes need making to the modem configuration.

It is even possible to replace an end to end PSTN solution by using 2 TransPort routers connected over IP. One modem can dial up to its own locally attached TransPort router which forwards the data via IP and the other (remote) TransPort router receiving the IP connection, dialling its own locally attached PSTN modem. The data is transferred between the 2 modems as if a PSTN line was being used.

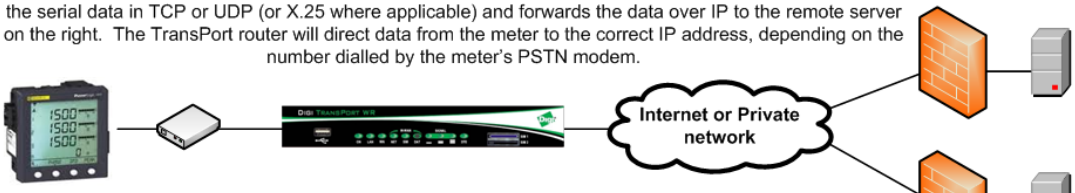
If the application or hardware is serial based and not IP aware, the TransPort router can encapsulate the data in a TCP or UDP data packet (or X.25 if applicable) before forwarding the data to its configured destination.

Example scenarios for TransPort routers with the DialServ hardware option

Simple PPP. The PC on the left needs to connect to the internet. The PSTN modem dials and is answered by the local TransPort router. All data from the PC is sent to the internet or private network over a cellular IP connection.

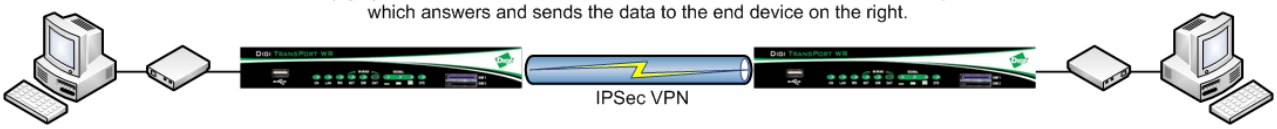


Serial with multiple destinations. The electric meter on the left needs to send usage data to 2 servers. The built in PSTN modem dials and is answered by the local TransPort router. The TransPort router encapsulates the serial data in TCP or UDP (or X.25 where applicable) and forwards the data over IP to the remote server on the right. The TransPort router will direct data from the meter to the correct IP address, depending on the number dialled by the meter's PSTN modem.



The servers on the right might need to initiate a connection to the electric meter on the left. In this scenario, the server on the right can open an IP connection to the TransPort router, which sends a ring signal to the electric meter. The built in modem will answer and the data will be received from the server.

End to End PSTN replacement. 2 TransPort routers can be connected over IP. The PC on the left needs to send data to the PC on the right. The left PSTN modem dials and is answered by the locally connected TransPort router. The data is forwarded to the remote (right) TransPort router via IP. The remote TransPort router dials its locally attached PSTN modem which answers and sends the data to the end device on the right.



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.

Configuration: This Application Note assumes the devices are set to their factory default configurations. Most configuration commands are only shown if they differ from the factory default.

This application note applies to;

Models shown: Digi TransPort WR41 router with the DialServ hardware option.

Other Compatible Models: All other Digi Transport products with a DialServ daughter card.

Firmware versions: 5130 or newer

Please note: This application note has been specifically rewritten for firmware release 5.123 and later but the original application note was testing and working for routers running earlier firmware and the previous GUI. Routers running earlier firmware will find that the screen shots do not accurately reflect what will be seen on those older routers. Contact tech.support@digi.com if you require this document for the older GUI.

1.3 Corrections

Requests for corrections or amendments to this application note are welcome and should be addressed to: tech.support@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	Updated for new GUI

2 SCENARIO

For the purposes of this application note, the following scenario will be used.

Simple PPP. The PC on the left needs to connect to the internet. The PSTN modem dials and is answered by the local TransPort router. All data from the PC is sent to the internet via the TransPort router's cellular IP connection.

A PSTN dial up connection to an ISP is replaced with a cellular IP connection, but no changes will be made to the PC or its attached modem configuration.

It is also possible for the TransPort router to accept incoming TCP socket connections from a device on the internet and forward that data on to the PC via the DialServ modem.

3 CONFIGURE THE CELLULAR INTERFACE

This section assumes the WR41 is using a GSM/UMTS W-WAN module. For CDMA modules additional steps will be required.

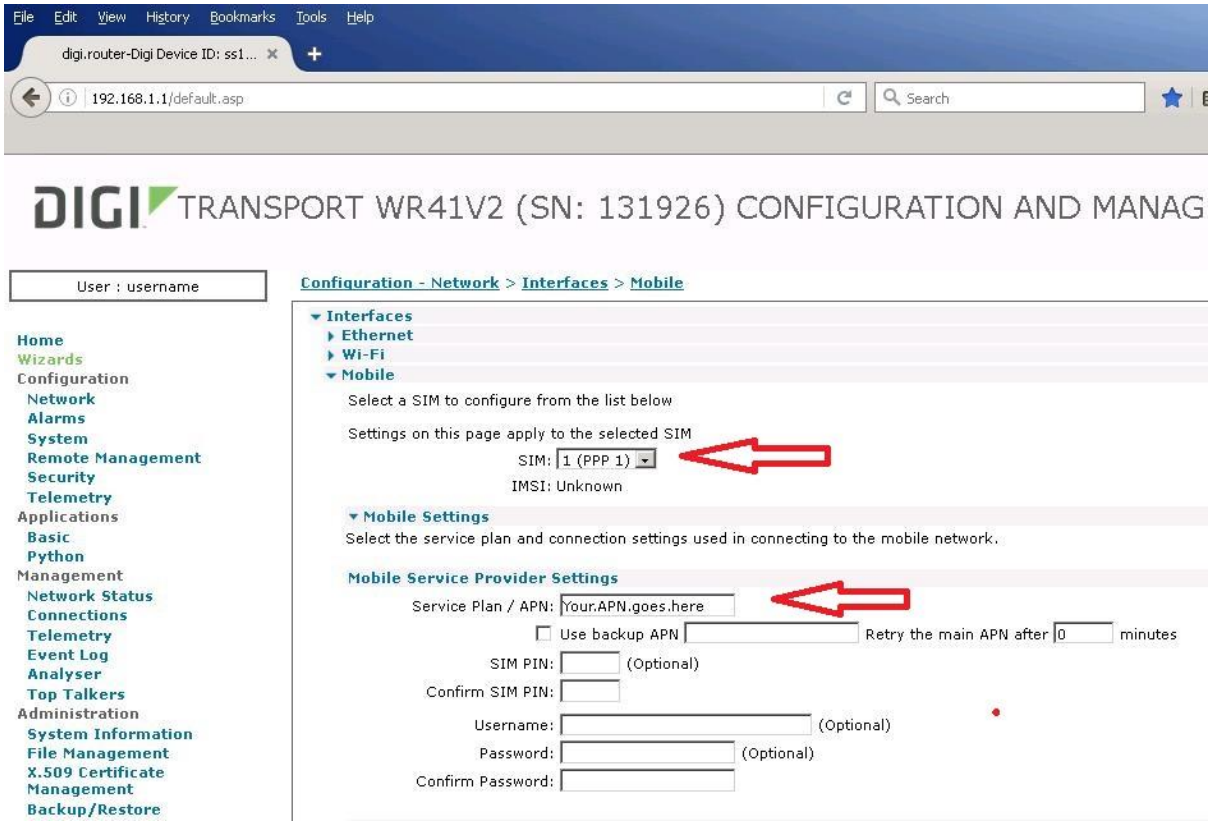
3.1 Configure the Cellular WAN Interface

Configuration - Network > Interfaces > Mobile

Parameter	Setting	Description
Settings on this page apply to the selected SIM		
SIM	1 (PPP 1)	The following config will apply to SIM 1 & PPP 1

Configuration - Network > Interfaces > Mobile > Mobile Settings

Parameter	Setting	Description
Service Plan / APN	Your APN	Contact your service provider to obtain the APN
SIM PIN	Your PIN code	The SIM PIN (Optional)
Username	APN Username	Contact your service provider to obtain the APN username (Optional)
Password	APN Password	Contact your service provider to obtain the APN password (Optional)



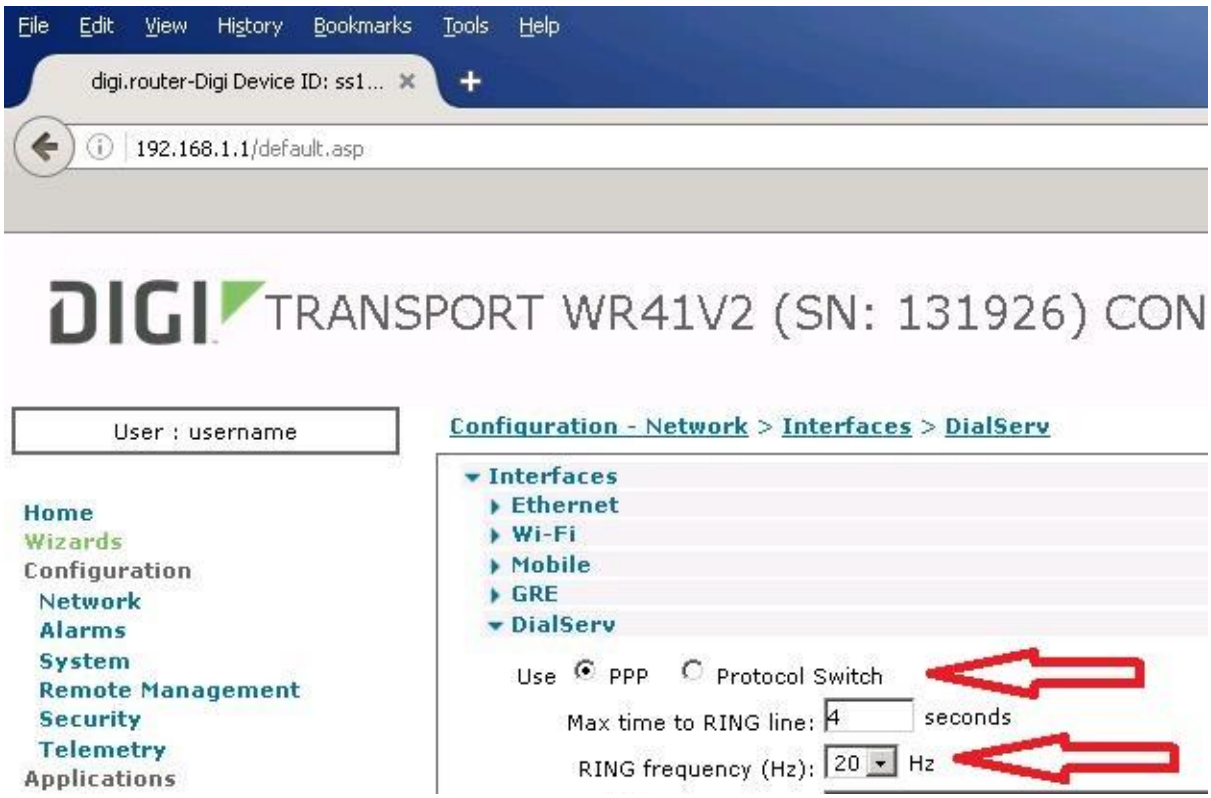
Parameter	Setting	Description
Dial-out number:	*98*1#	Dial string to attach to the cellular network
Use W-WAN /external modem:	Any W-WAN Channel	Configures the TransPort to use any available cellular channel
Username:	username	Username given by the cellular provider
Password:	password	Username given by the cellular provider
Confirm Password:	password	Same as above
Always On Mode:	OFF / ON	Optional – If the PPP link should be up all the time set this to On. If the PPP link should be dial on demand, set this to Off.

4 CONFIGURATION OF PSTN ANSWERING MODE

4.1 DialServ Configuration

The first step is to configure the DialServ PSTN settings.

Browse to **Configuration - Network > Interfaces > DialServ**



Ensure PPP is used when the external modem connects to the TransPort, select the PPP option, not Protocol switch.

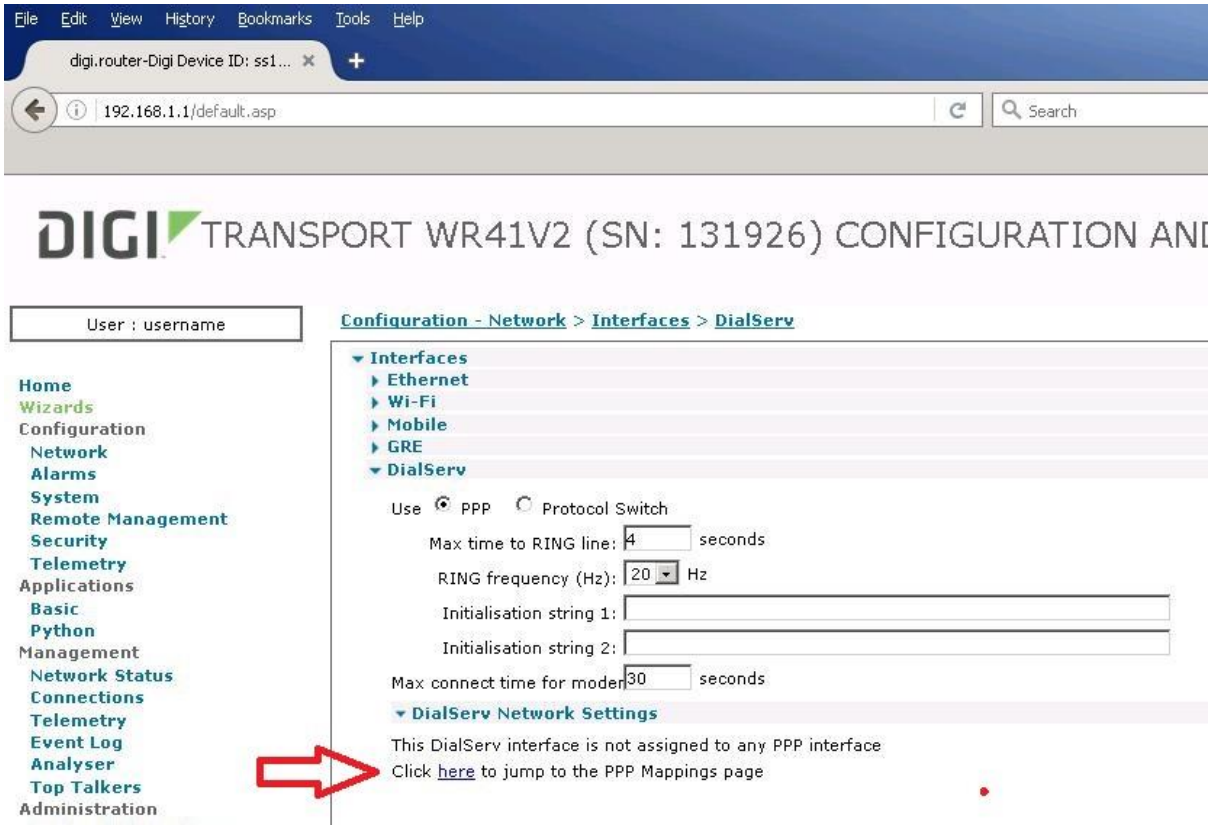
The 'Max time to RING line' parameter is the number of seconds before an outgoing call from the TransPort to the PSTN modem is cleared if unanswered.

Most modems use a RING frequency of 20Hz. If the modem connected to the TransPort uses a different RING frequency, change the value to match, otherwise leave it set at 20Hz.

If any extra modem initialisation strings are required, they can be entered into the bottom 2 boxes. These will be sent to the DialServ card before a PSTN call is initiated.

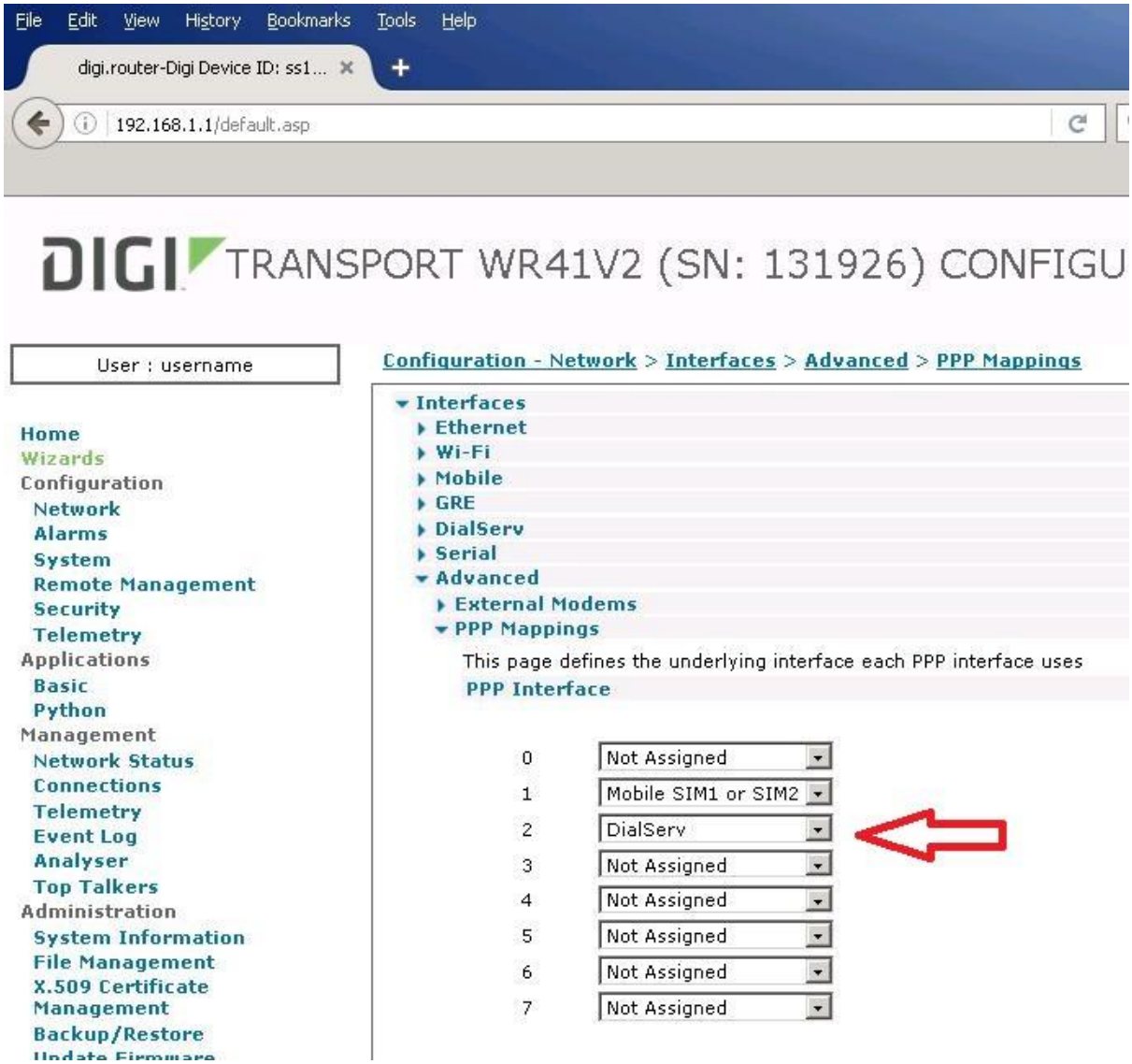
Parameter	Setting	Description
Use	PPP	Selects PPP mode of operation
RING frequency (Hz)	20	This needs to match the expected RING frequency of the connected PSTN modem
Initialisation strings	AT commands	Extra initialisation strings to be sent to the DialServ

On a router with factory default configuration, the DialServ will not be assigned to a PPP interface. The next step is to assign the DialServ a PPP interface to use for making and receiving calls. Click on the hyperlink highlighted below to jump to the PPP mapping page.



The following options will be displayed.

The location is **Configuration - Network > Interfaces > Advanced > PPP Mappings**



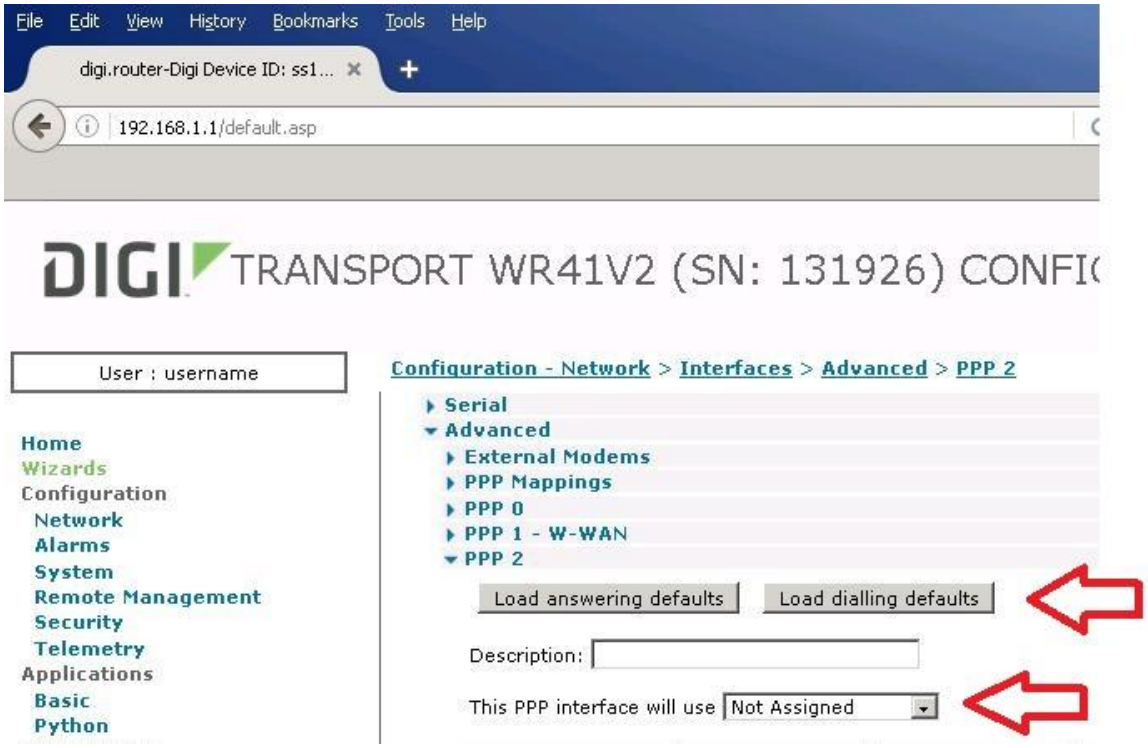
PPP 2 will be assigned to DialServ. Click on the dropdown box next to the number '2' and select 'DialServ' from the list. Click 'Apply'.

4.2 Load Default Answering Settings for DialServ / PPP 2

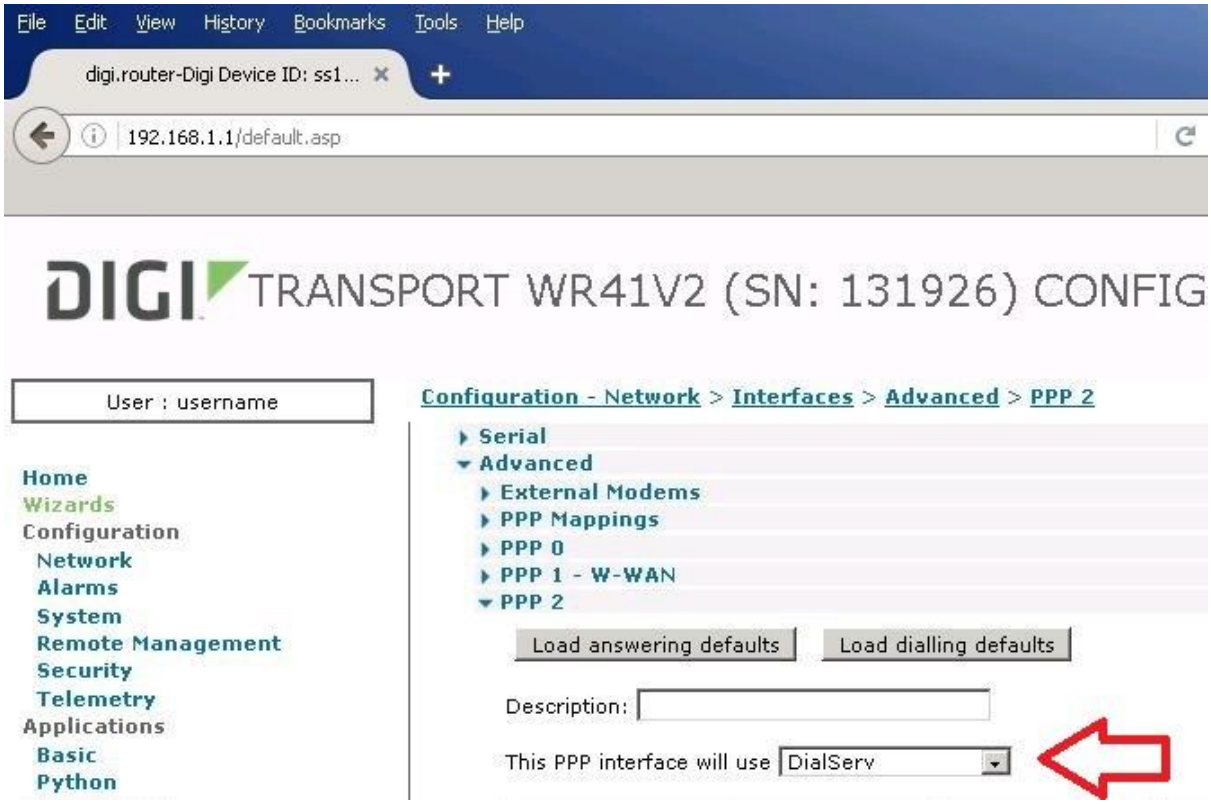
Browse to **Configuration - Network > Interfaces > Advanced > PPP 2**

Click on Load answering defaults.

The action is confirmed with a message to the right of the buttons as shown:



Note though that the PPP interface is no longer assigned to DialServ. Click the dropdown box and re-select DialServ.



Scroll down and click Apply.

Parameter	Setting	Description
Load answering defaults	Click	Loads default answering parameters for PPP 2
This PPP interface will use	DialServ	DialServ will use PPP 2

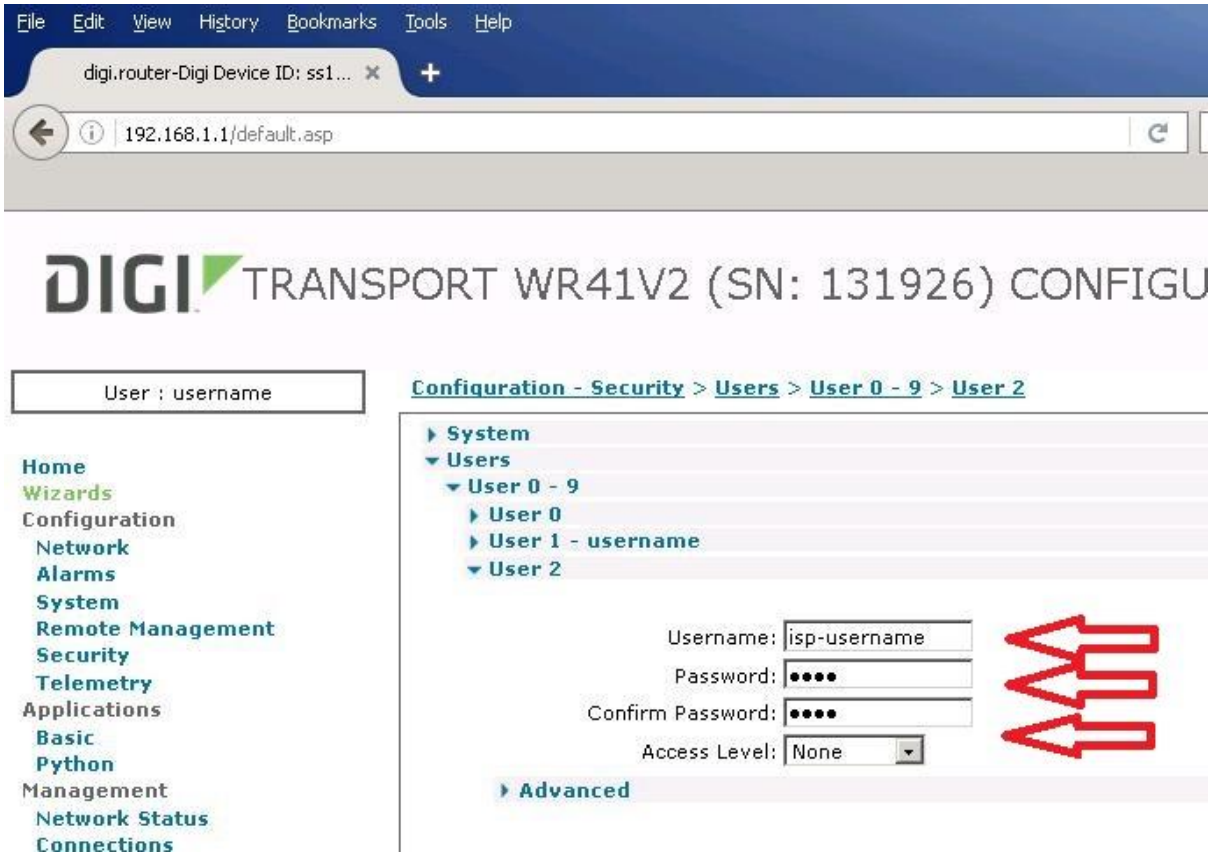
4.3 Configure the PSTN Username & Password

To ensure that no changes need to be made to the PC or its attached PSTN modem, the current username and password that are sent to the ISP for verification need to be entered into the TransPort router. This is so that when the PSTN modem dials into the TransPort (although it has

really dialled the ISP number) the username and password will be accepted and the PPP link will come up.

Browse to **Configuration - Security > Users > User 0 - 9 > User 2**

If User 2 is already in use, pick the next free user entry.



Click OK and Save the current configuration to flash.

Parameter	Setting	Description
Username	username	This needs to match the username the PSTN modem sends to the ISP for verification.
Password / Confirm Password	password	This needs to match the password the PSTN modem sends to the ISP for verification.
Access Level	None	Access level to the router management interface.

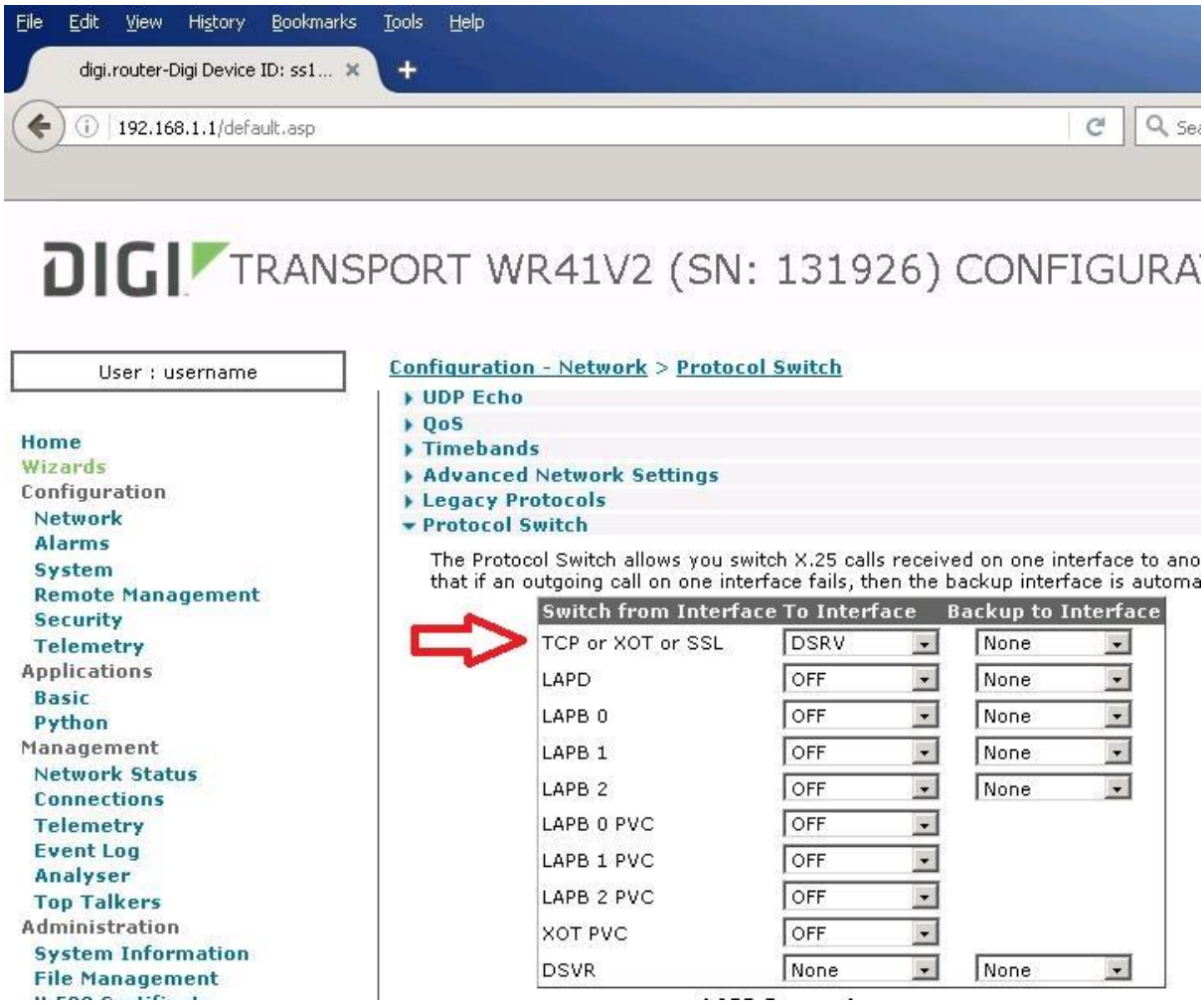
5 OPTIONAL: ALLOW INBOUND TCP CONNECTIONS AND FORWARD TO THE PSTN MODEM ATTACHED TO THE PC

It is also possible to allow remote devices to initiate a TCP connection to the TransPort's public IP address of 80.3.19.103 on TCP port 10502 (example address and port number). When connection is opened to the configured socket, the data will be de-capsulated, the DialServ modem will send a RING signal to the attached PSTN modem in the PC. The PC's PSTN modem will answer and when the link has trained up, the data will be forwarded to the PC.

5.1 Configuration of the Protocol Switch

Configure the protocol switch to forward TCP connections to the DialServ modem. If the Protocol Switch menu option is not available, contact tech.support@digi.com and request that Protocol Switch is enabled.

Browse to **Configuration - Network > Protocol Switch**



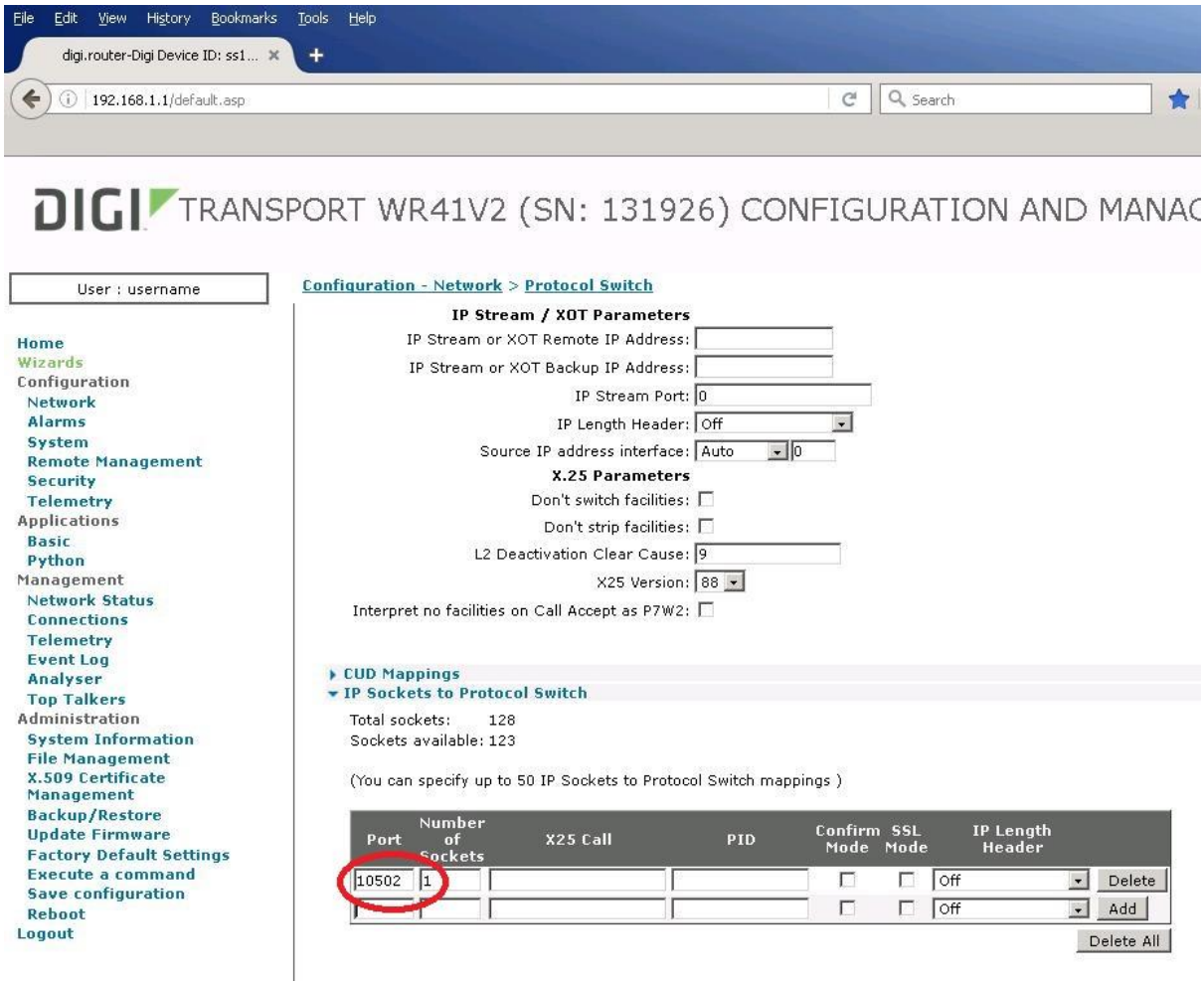
Click on the dropdown option below 'To Interface', to the right of 'TCP or XoT or SSL' this will display the options for the protocol switch, select the option you require. In this example, the data will be switched from TCP to DialServ and the serial data will be forwarded to the meter's PSTN modem.

Parameter	Setting	Description
Switch from Interface: TCP or XoT to	DSRV	The protocol that TCP data will be switched to.

5.2 Configure Listening TCP Ports

The IP port numbers to listen on, and, number of sockets to listen on needs to be configured.

Browse to
Configuration - Network > Protocol Switch > IP Sockets to Protocol Switch



Enter the IP port number to listen on, in this example; the router will listen on port 10502.

Enter the number of listening sockets required, only 1 socket is required so set this to 1.

Confirm mode, leave this disabled but see the note below.

Click Add, then scroll down and click Apply. Save the current configuration to flash.

Parameter	Setting	Description
IP Port	0 - 65535	This is the IP port number that the TransPort router will listen on.
# Sockets	1 - 10	This is the number of listening sockets created for the specified port.

Confirm Mode

Note that this parameter (as seen in the above screen shot) should initially be disabled / unticked.

Confirm mode ensures that end-to-end connectivity has been established before the listening socket answers to the remote devices connection request.

When confirm mode is enabled, the TransPort router will detect the inbound connection on port 10502, but will not reply. The remote server should keep trying to connect, this is normal TCP/IP operation. The DialServ will send a RING to the attached PC's PSTN modem, which will answer and train up. Once the link is established between the 2 PSTN modems, the TransPort router will answer the next socket connection attempt from the remote device and the received data will be forwarded to the PC.

If the remote devices have difficulty establishing a connection with the PC, enable 'Confirm Mode'.

6 TESTING

With the PSTN modem directly connected to the TransPort DialServ card, initiate a dial up connection. The PSTN modem will go off hook, detect the dial tone & dial the usual number. The DialServ will answer and the modems will train up. The PPP link will then come up using the Dialserv PSTN interface. This is shown below:

TransPort Event Log (via CLI is shown, read from bottom upwards, comments are in red):

```
type eventlog.txt
PPP 2 is up and IP traffic can now pass on the PPP link
05:32:06, 03 Jun 2010,PPP 2 up
05:32:06, 03 Jun 2010,PPP 2 Start IPCP
The username and password are verified as being correct
05:32:06, 03 Jun 2010,PPP Login OK by freeisp lvl 4
The PSTN modem sends its username (freeisp) and has its password checked
05:32:06, 03 Jun 2010,PPP 2 Start AUTHENTICATE
05:32:02, 03 Jun 2010,PPP 2 Start LCP
PPP 2 is used to answer the incoming PSTN call
05:32:02, 03 Jun 2010,PPP 2 Start
Incoming call is detected by DialServ on ASY1
05:32:02, 03 Jun 2010,Modem connected on asy 1
Event log was cleared
05:31:23, 03 Jun 2010,Clear Event Log
OK
```

TransPort PPP Status for PPP 2, note the IP address associated with this interface is 1.2.3.4 as per the PPP 2 setting.

```
ppp 2 status
               Name: DialServ PSTN
          Local MRU: 1500
         Remote MRU: 1500
          Local ACCM: 0x0
         Remote ACCM: 0x0
      Local VJ Comp: ON. 11 slots
     Remote VJ Comp: OFF
```

```
  Link Active With: ASY 1
        IP Address: 1.2.3.4
            Uptime: 0 Hrs 0 Mins 7 Seconds
OK
```

The PC that initiates the dial up will show the following info (Via command prompt, output filtered to only show PPP dial up info):

```
C:\>ipconfig /all |more

PPP adapter Dial up:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Dial up
   Physical Address. . . . . . . . . :
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
   IPv4 Address. . . . . . . . . . . : 10.10.10.0(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.255
   Default Gateway . . . . . . . . . : 0.0.0.0
   DNS Servers . . . . . . . . . . . : 1.2.3.4
   NetBIOS over Tcpip. . . . . . . . : Disabled
```

A ping test to the PPP 2 IP address should be successful. Note the response time is quite high. This is because the data is going over the PSTN link. This response time will vary depending on the number of apps running on the PC that need network access.

```
C:\>ping 1.2.3.4

Pinging 1.2.3.4 with 32 bytes of data:
Reply from 1.2.3.4: bytes=32 time=240ms TTL=250
Reply from 1.2.3.4: bytes=32 time=178ms TTL=250
Reply from 1.2.3.4: bytes=32 time=322ms TTL=250
Reply from 1.2.3.4: bytes=32 time=188ms TTL=250

Ping statistics for 1.2.3.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
```

```
    Minimum = 178ms, Maximum = 322ms, Average = 232ms
```

A ping test to an external public website or known IP address should also be successful. This proves that the cellular link is up and running, the TransPort is responding to DNS queries and routing is working correctly.

```
C:\>ping www.google.com

Pinging google.navigation.opendns.com [208.69.34.231] with 32 bytes
of data:
Reply from 208.69.34.231: bytes=32 time=218ms TTL=49
Reply from 208.69.34.231: bytes=32 time=212ms TTL=49
Reply from 208.69.34.231: bytes=32 time=210ms TTL=49
Reply from 208.69.34.231: bytes=32 time=248ms TTL=49

Ping statistics for 208.69.34.231:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 210ms, Maximum = 248ms, Average = 222ms

C:\>
```

7 CONFIGURATION FILES

7.1 Digi Transport Command Line Configuration

Only the relevant parts of the configuration file that specifically relate to the configuration of this example will be explained.

The Digi Transport's Ethernet IP address:

```
eth 0 IPaddr "10.1.51.254"
eth 0 mask "255.255.255.0"
```

Cellular Module configuration when using UMTS/WCDMA:

```
modemcc 0 apn "internet"
```

DialServ modem configuration:

```
pots 0 ring_secs 4
pots 0 ring_freq 20
```

Default route configuration:

```
def_route 0 ll_ent "PPP"
def_route 0 ll_add "1"
```

PPP 1 configuration (Cellular interface):

```
ppp 1 IPaddr "0.0.0.0"
ppp 1 username "vodafone"
ppp 1 epassword "Ozt7Ww=="   ← This is the encrypted version of the PPP 1
password
ppp 1 phonenum "*98*1#"
ppp 1 name "Cellular PPP link"
ppp 1 timeout 0
ppp 1 use_modem 1
ppp 1 aodion 1
ppp 1 pwr_dly 20
ppp 1 autoassert 1   ←  In this example, Always on mode is On
```

PPP 2 Configuration (DialServ answering interface):

```
ppp 2 r_callb 1
ppp 2 name "DialServ PSTN"
ppp 2 ans ON
ppp 2 use_modem 3
ppp 2 do_nat 0
ppp 2 ipanon ON
```

Internal ASY port connection between DialServ and router:

```
modemcc 1 asy_add 1
```

PSTN modem username & password verification

This username and password MUST match what the PSTN modem normally sends to the ISP

```
user 2 name "freeisp"
user 2 epassword "Pi1zXw=="
user 2 access 4
```

7.2 Digi Transport Firmware Versions

The Digi Transport configuration above was tested on a Digi Transport WR41 with firmware version 5.2.15.6

Digi TransPort WR41-U8P3-WE1-XX(WR41v2) Ser#:131926 HW Revision: 32021

Software Build Ver5.2.15.6. Aug 17 2016 17:42:02 MW

ARM Bios Ver 7.56u v41 399MHz B256-M256-F80-O140,0 MAC:00042d020356

Power Up Profile: 0

Async Driver Revision: 1.19 Int clk

Wi-Fi Revision: 2.0

Ethernet 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

POTS Revision: 0.01

RealPort Revision: 0.00

MultiTX Revision: 1.00

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

TELITUPD Revision: 1.0

SCRIBATSK Revision: 1.0

BASTSK Revision: 1.0

PYTHON Revision: 1.0

CLOUDSMS Revision: 1.0

ARM Sync Driver Revision: 1.18

TCP (HASH mode) Revision: 1.14

TCP Utils Revision: 1.13

PPP Revision: 5.2

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 (GOBI UMTS) Revision: 5.2

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

PWRCTRL Revision: 1.0

RADIUS Client Revision: 1.0

SSH Server Revision: 1.0

SCP Revision: 1.0

SSH Client Revision: 1.0

CERT Revision: 1.0

LowPrio Revision: 1.0

Tunnel Revision: 1.2

OVPN Revision: 1.2

QDL Revision: 1.0

OK

ss131926>