Application Note 67

Using The Low Power Modes on TransPort

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1 INTRODUCTION

1.1 Outline

This Application Note describes how to configure and apply the reduced power consumption functionality on the WR21, WR31, WR41 and WR44v2. In normal operation, the WR21 & WR31 consumes around 300mA from a 12V DC supply which equates to about 4W. The WR41v2 consumes around 400mA from a 12V DC supply which equates to about 4.8W. The WR44v2 consumes around 800mA from a 12V DC supply which equates to about 10W. For some applications (remote sites with no mains supply available, only batteries or solar/wind power), it is advantageous to reduce the power consumed by the unit. This can be done but comes at the cost of reduced functionality and/or reduced performance. For example, with the most aggressive power reductions available on the WR21, the power consumption can be reduced to under 1W.

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. It also assumes a basic ability to access and navigate a Digi TransPort router and configure it with basic routing functions.

This application note applies only to:

Model: Digi Transport WR21, WR31, WR41 & WR41v2, WR44v2

Firmware versions: 5.235 and later.

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.

For the purpose of this application note the following applies:

- The user has access to a suitable supply and measuring equipment and that a serial interface to a terminal emulator is available.

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
1.1	Update with WR31 values
1.0	Content update

2 DIGI CONFIGURATION

2.1 Configuring and applying the low power modes

Note that the configuration of low power modes is only available via the command line interface (CLI) at the time of writing.

There are five areas of functionality where power saving may be achieved.

These are:

- CPU speed
- Front-panel LED display
- Ethernet capability
- Cellular module functionality
- GPS functionality (where fitted)

There are four separate power configuration profiles available, 0, 1, 2 & 3. These are shown by issuing the CLI command "**pwrctrl ?**" which results in the following display.

```
pwrctrl ?
Format "pwrctrl <0...3> <param name> <param value|?|!>"
Parameters are..
       cpuspeed:
           leds:
            eth:
           gprs:
            gps:
```

Note that power control profile 0 is in force on boot-up of the unit. If a different power mode configuration is required, this must be activated once the unit has powered up. This can be done manually at the command line or automatically using the inbuilt Python scripting functionality.

The default settings of profile 0 are shown by issuing the CLI command "**pwrctrl 0 ?**", for example:

```
pwrctrl 0 ?
Parameters are..
       cpuspeed: 0
           leds: ON
            eth: ON
           gprs: ON
            gps: ON
```

A power configuration profile is activated by issuing the command:

```
pwrctrl n act_rq
```

Where n is the profile number. This result in the following response from the unit:

```
Power control profile n activated
OK
```

2.2 Configuring power options

The CPU speed parameter has two settings available on the WR21 & WR31 platform:
0 = high speed (454MHz)
1 = low speed (360MHz)

The CPU speed parameter has three settings available on the WR41 & WR41v2 platform:
0 = high speed (400MHz)
1 = medium speed (266MHz)
2 = low speed (133MHz)

All the other parameters are set to ON or OFF.

The following few lines show an example of a command-line session on a WR21 that illustrates setting the CPU to low-speed and all other parameters to OFF.

```
pwrctrl 1 cpuspeed 1
OK
pwrctrl 1 leds off
OK
pwrctrl 1 eth off
OK
pwrctrl 1 gprs off
OK
pwrctrl 1 gps off
OK
pwrctrl 1 ?
Parameters are..
       cpuspeed: 1
           leds: OFF
            eth: OFF
           gprs: OFF
            gps: OFF
OK
```

The profile is not activated until the "**pwrctrl 1 act_rq**" command is issued. This may be done immediately after setting the parameters and is useful when testing the functionality. However, the profile is not saved until a "**config 0 save**" command is issued.

The following table shows the results of tests made on all platforms for each of the possible configurations. Since the cellular module consumes significant power when transmitting, this has been shown separately and was measured as the test unit was transferring data to the Device Cloud server over the cellular link. Since this is possibly a common scenario, it was felt that it would be useful to include this information.

3 TESTING

3.1 Determining the power consumption for other supply voltages

The following WR21, WR31, WR41 and WR44v2 power consumption tables were calculated using a bench power supply with voltage and current metering facilities. For each entry, the configuration was modified, the "**pwrctrl 0 act_rq**" command issued and the new current reading noted down.

3.2 WR21 Power Consumption Matrix

Table 2.1 Power Consumption Measurements

CPU Speed (MHz)	LEDs	Ethernet	Cellular	Current (mA)	Power (W) @12V
454	On	On	Transmitting	328	3.96
454	On	On	Idle	228	2.74
454	On	On	Off	200	2.40
454	On	Off	Transmitting	302	3.62
454	On	Off	Idle	205	2.46
454	On	Off	Off	172	2.09
454	Off	On	Transmitting	315	3.78
454	Off	On	Idle	218	2.62
454	Off	On	Off	193	2.32
454	Off	Off	Transmitting	292	3.50
454	Off	Off	Idle	193	2.32
454	Off	Off	Off	159	1.91
360	On	On	Transmitting	285	3.42
360	On	On	Idle	196	2.35
360	On	On	Off	166	1.99
360	On	Off	Transmitting	263	3.15
360	On	Off	Idle	165	1.98
360	On	Off	Off	133	1.60
360	Off	On	Transmitting	284	3.41
360	Off	On	Idle	186	2.32
360	Off	On	Off	155	1.86
360	Off	Off	Transmitting	250	3.00
360	Off	Off	Idle	155	1.86
360	Off	Off	Off	78	0.94

3.3 WR31 Power Consumption Matrix

Table 2.1 Power Consumption Measurements

CPU Speed (MHz)	LEDs	Ethernet	Cellular	Current (mA)	Power (W) @12V
454	On	On	Transmitting	328	3.96
454	On	On	Idle	228	2.74
454	On	On	Off	200	2.40
454	On	Off	Transmitting	302	3.62
454	On	Off	Idle	205	2.46
454	On	Off	Off	172	2.09
454	Off	On	Transmitting	315	3.78
454	Off	On	Idle	218	2.62
454	Off	On	Off	193	2.32
454	Off	Off	Transmitting	292	3.50
454	Off	Off	Idle	193	2.32
454	Off	Off	Off	159	1.91
360	On	On	Transmitting	285	3.42
360	On	On	Idle	196	2.35
360	On	On	Off	166	1.99
360	On	Off	Transmitting	263	3.15
360	On	Off	Idle	165	1.98
360	On	Off	Off	133	1.60
360	Off	On	Transmitting	284	3.41
360	Off	On	Idle	186	2.32
360	Off	On	Off	155	1.86
360	Off	Off	Transmitting	250	3.00
360	Off	Off	Idle	155	1.86
360	Off	Off	Off	78	0.94

3.4 WR41 Power Consumption Matrix

Table 2.2 Power Consumption Measurements

CPU Speed (MHz)	LEDs	Ethernet	Cellular	Current (mA)	Power (W)
400	On	On	Transmitting	399	4.79
400	On	On	Idle	299	3.59
400	On	On	Off	248	2.98
400	On	Off	Transmitting	372	4.46
400	On	Off	Idle	268	3.22
400	On	Off	Off	217	2.60
400	Off	On	Transmitting	388	3.46
400	Off	On	Idle	274	3.29
400	Off	On	Off	233	2.80
400	Off	Off	Transmitting	358	4.30
400	Off	Off	Idle	259	3.11
400	Off	Off	Off	211	2.53
266	On	On	Transmitting	388	4.66
266	On	On	Idle	276	3.31
266	On	On	Off	230	2.76
266	On	Off	Transmitting	368	4.42
266	On	Off	Idle	259	3.11
266	On	Off	Off	206	2.47
266	Off	On	Transmitting	277	3.32
266	Off	On	Idle	263	3.16
266	Off	On	Off	222	2.66
266	Off	Off	Transmitting	349	4.19
266	Off	Off	Idle	248	2.98
266	Off	Off	Off	200	2.40
133	On	On	Transmitting	372	4.46
133	On	On	Idle	264	3.17
133	On	On	Off	220	2.64
133	On	Off	Transmitting	348	4.18
133	On	Off	Idle	234	2.81
133	On	Off	Off	191	2.29
133	Off	On	Transmitting	334	4.01
133	Off	On	Idle	254	3.05
133	Off	On	Off	207	2.48
133	Off	Off	Transmitting	369	4.43
133	Off	Off	Idle	227	3.32
133	Off	Off	Off	185	2.22

3.5 WR44v2 Power Consumption Matrix

Table 2.3 Power Consumption Measurements

CPU Speed (MHz)	LEDs	Ethernet	Cellular	Current (mA)	Power (W)
800	On	On	Transmitting	820	9.84
800	On	On	Idle	750	9
800	On	On	Off	713	8.56
800	On	Off	Transmitting	750	9
800	On	Off	Idle	680	8.16
800	On	Off	Off	640	7.68
800	Off	On	Transmitting	800	9.6
800	Off	On	Idle	730	8.76
800	Off	On	Off	690	8.28
800	Off	Off	Transmitting	740	8.88
800	Off	Off	Idle	675	8.1
800	Off	Off	Off	635	7.62
400	On	On	Transmitting	805	9.66
400	On	On	Idle	740	8.88
400	On	On	Off	697	8.36
400	On	Off	Transmitting	730	8.76
400	On	Off	Idle	660	7.92
400	On	Off	Off	619	7.43
400	Off	On	Transmitting	780	9.36
400	Off	On	Idle	710	8.52
400	Off	On	Off	666	7.99
400	Off	Off	Transmitting	730	8.76
400	Off	Off	Idle	652	7.82
400	Off	Off	Off	612	7.34