RPU Driver.debugfs API  
Reference

Copyright © Imagination Technologies Limited. All Rights Reserved.

‑‑This document is strictly confidential. Neither the whole nor any part of the information contained in, nor the product described in, this document may be adapted or reproduced in any material form except with the written permission of Imagination Technologies Limited. Imagination Technologies, the Imagination logo, PowerVR, MIPS, Meta, Ensigma and Codescape are trademarks or registered trademarks of Imagination Technologies Limited. All other logos, products, trademarks and registered trademarks are the property of their respective owners. This document can only be distributed subject to the terms of a Non‑Disclosure Agreement or Licence with Imagination Technologies Limited.

Filename : RPU Driver.debugfs API.Reference  
Version : 1.0.62 Not Issued - Live Document  
Issue Date : 28 Nov 2020  
Author : Imagination Technologies Limited

Contents

[1. Introduction 3](#_Toc57476992)

[2. Modes of operation 3](#_Toc57476993)

[2.1. Regular Mode 3](#_Toc57476994)

[2.2. Production Mode 3](#_Toc57476995)

[2.3. Debug Mode 3](#_Toc57476996)

[3. DebugFS interface 3](#_Toc57476997)

[3.1. Configuration Parameters (Regular mode) 4](#_Toc57476998)

[3.2. Configuration Parameters (Production and FCM modes) 4](#_Toc57476999)

[3.3. Configuration Parameters (Debug mode) 6](#_Toc57477000)

List of Figures

**No table of figures entries found.**

IF{{Internal}}

Document History

| Issue | Date | Changes/Comments |
| --- | --- | --- |
| 1.0.47 | 22 Nov 2019 | External Issue. |
| 1.0.59 | 30 Oct 2020 | Added Beacon Template variables |

END{{Internal}}

# Introduction

This document describes the RPU Host driver debugfs API.

# Modes of operation

The RPU host driver can be compiled to make the RPU operate in any one of the below modes of operation:

* Regular mode
* Production mode

IF{{Internal}}

* Debug Mode

END{{Internal}}

## Regular Mode

This is the regular operation mode of the RPU in which it exposes all its functionality and has limited statistics support.

## Production Mode

Production mode is used for performing production tests, using continuous transmit on a configured channel at a particular rate, power etc. It also has a sub-mode called Factory Calibration Mode (FCM) in which different types of calibrations (like RF calibration) can be performed

IF{{Internal}}

## Debug Mode

This mode exposes some configuration parameters and additional statistics which are not available in regular mode to help in debugging functional issues in the RPU.

END{{Internal}}

# DebugFS interface

The debugfs interface exposes configuration parameters in certain operation modes which provide control of the RPU driver and firmware. These parameters can be set and queried from Linux shell.

E.g.

1. Command to query WLAN params:

cat /sys/kernel/debug/img/wlan/conf

1. Command to query Power IP params:

cat /sys/kernel/debug/img/pwr/conf

1. Command to set WLAN params:

echo <param\_name>=<param\_val> > /sys/kernel/debug/img/wlan/conf

1. Command to set Power IP params:

echo <param\_name>=<param\_val> > /sys/kernel/debug/img/pwr/conf

The debugfs also exposes a statistics section which displays the statistics after a measurement run etc. The statistics returned depend on the operation mode.

E.g.

1. Command to query WLAN stats:

cat /sys/kernel/debug/img/wlan/stats

1. Command to query Power IP stats:

cat /sys/kernel/debug/img/pwr/stats

## Configuration Parameters (Regular mode)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Values allowed | Function | Mode Applicable In | Description |
| data\_type | 0 – LFC error  1 – VBAT monitor  2 – Temperature  3 – All of the above | Power | Regular | To select a particular power monitor data type to fetch from the Power IP. |

## Configuration Parameters (Production and FCM modes)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Values allowed | Function | Mode Applicable In | Description |
| op\_mode | 0 – Production Mode  1 – FCM Mode | WLAN | Production/FCM | To select a particular sub-mode of operation in Production Mode. |
| antenna\_sel | 1 – Antenna 1  2 – Antenna 2 | WLAN | Production/FCM | To select a particular antenna to be used for Transceiver. Applicable only in SISO mode. |
| nss | 1 – 1x1 Mode  2 – 2x2 Mode | WLAN | Production/FCM | To control number of spatial streams supported at system level. |
| tx\_pkt\_chnl\_bw | 0 – 20 MHz  1 – 40 MHz  2 – 80 MHz | WLAN | Production/FCM | Channel bandwidth to be used for transmitting the packet. |
| tx\_pkt\_tput\_mode | 0 – Legacy  1 – HT mode  2 – VHT mode | WLAN | Production/FCM | Throughput mode to be used for transmitting the packet. |
| tx\_pkt\_sgi | 0 – Disable  1 – Enable | WLAN | Production/FCM | Enable/Disable Short Guard Interval while transmitting the packet. |
| tx\_pkt\_nss | 1 – 1x1 Mode  2 – 2x2 Mode | WLAN | Production/FCM | Number of spatial streams per packet. |
| tx\_pkt\_preamble | 0 – Short Preamble  1 – Long Preamble  2 – Mixed Preamble  3 – GF Preamble | WLAN | Production/FCM | Type of preamble to be used for each packet. Short/Long Preamble are applicable only when *tx\_pkt\_tput\_mode* is set to Legacy and Mixed/GF Preamble are applicable only when *tx\_pkt\_tput\_mode* is set to HT/VHT. |
| tx\_pkt\_stbc | 0 – Disable  1 – Enable | WLAN | Production/FCM | To enable/disable STBC per packet. |
| tx\_pkt\_fec\_coding | 0 – BCC  1 – LDPC | WLAN | Production/FCM | To set the FEC coding type per packet to BCC or LDPC |
| tx\_pkt\_mcs | -1 – Not being used  <val (>=0)> - MCS index to be used | WLAN | Production/FCM | MCS index at which TX pkt will be transmitted. Mutually exclusive with *tx\_pkt\_rate*. |
| tx\_pkt\_rate | -1 – Not being used  <val> - Legacy rate to be used (1, 2, 5.5, 11,  6, 9, 12, 18, 24, 36, 48, 54) | WLAN | Production/FCM | Legacy rate at which packets will be transmitted. Mutually exclusive with *tx\_pkt\_mcs*. |
| phy\_threshold | -113 to 20 | WLAN | Production/FCM | Energy detection threshold in dBm.  Default values are:  -65 dBm in Debug mode  -93 dBm in Production/FCM mode. |
| phy\_calib\_rxdc | 0 – Disable  1 – Enable | WLAN | Production/FCM | Used to enable/disable RX DC calibration. |
| phy\_calib\_txdc | 0 – Disable  1 – Enable | WLAN | Production/FCM | Used to enable/disable TX DC calibration. |
| phy\_calib\_rxiq | 0 – Disable  1 – Enable | WLAN | Production/FCM | Used to enable/disable RX IQ calibration. |
| phy\_calib\_txiq | 0 – Disable  1 – Enable | WLAN | Production/FCM | Used to enable/disable TX IQ calibration. |
| phy\_calib\_dpd | 0 – Disable  1 – Enable | WLAN | Production/FCM | Used to enable/disable DPD calibration. |
| phy\_calib\_txpow | 0 – Disable  1 – Enable | WLAN | Production/FCM | Used to enable/disable TX Power calibration. |
| chnl\_primary | Primary channel number | WLAN | Production/FCM | Configures the Primary channel to be used. |
| chnl\_bw | 0 – 20 MHz  1 – 40 MHz  2 – 80 MHz | WLAN | Production/FCM | Configures the channel bandwidth. |
| chnl\_sec\_20\_offset | 1 – Secondary 20MHz of the chnl\_bw lies to the right/above the primary 20.  -1 – Secondary 20MHz of the chnl\_bw lies to the left/below the primary 20 | WLAN | Production/FCM | Configures the Secondary 20 MHz offset of the channel. Applicable only when the *chnl\_bw* is 40/80 MHz. |
| chnl\_sec\_40\_offset | 1 – Secondary 40MHz of the chnl\_bw lies to the right/above the secondary 20.  -1 – Secondary 40MHz of the chnl\_bw lies to the left/below the secondary 20 | WLAN | Production/FCM | Configures the Secondary 40 MHz offset of the channel. Applicable only when the *chnl\_bw* is 80 MHz. |
| tx\_mode | 0 – Continuous Tx  1 – Regular Tx | WLAN | Production/FCM | Used for configuring the type of TX stream. |
| tx\_pkt\_num | -1 – Infinite packets  <val (>0)> - Num frames to Tx. | WLAN | Production/FCM | Number of packets to transmit before stopping. Applicable only when tx\_mode is set to Regular Tx. |
| tx\_pkt\_len | Desired packet length (>= 0) | WLAN | Production/FCM | Used to set the packet data length to be used for the TX stream. Default is 4000 bytes. |
| tx\_power | Value in db. | WLAN | Production/FCM | Used to set transmit power for frame transmission. |
| tx | 0 – Disable  1 – Enable | WLAN | Production/FCM | Enable/Disable packet transmission. Transmits configured number of packets (*tx\_pkt\_num*) of packet length (tx\_pkt\_len) in the mode configured (*tx\_mode*). |
| rf\_params | Hex value string | WLAN | Production | Hexadecimal value string for RF related parameters. |
| rx | 0 – Disable  1 – Enable | WLAN | Production | Enable/Disable packet reception. |
| aux\_adc\_input\_chain\_id | 1 – TX Chain ID 1  2 – TX Chain ID 2 | WLAN | FCM | Used to set the TX chain ID from which the Aux ADC measures the power. |

IF{{Internal}}

## Configuration Parameters (Debug mode)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Values allowed | Function | Mode Applicable In | Description |
| stats\_type | 0 – All Stats 1 – Host Stats 2 – UMAC Stats 3 – LMAC Stats 4 – PHY Stats | WLAN | Debug | To obtain statistics of all the components or specific to a particular component |
| max\_agg\_limit | 1 to 64 | WLAN | Debug | Maximum number of MPDU’s which can be aggregated into an AMPDU by the RPU. This is used for performance tuning experiments. |
| max\_agg | 0 – Disable  1 – Enable | WLAN | Debug | If set this parameter promotes maximum aggregation to the limit set in *max\_agg\_limit*. |
| mimo\_ps | 0 – Disable  1 – Enable | WLAN | Debug | To enable/disable MIMO power save capability. |
| bg\_scan | 0 – Disable  1 – Enable | WLAN | Debug | To enable/disable background scanning.  When background scanning is enabled the RPU carries out active scans in channels 1, 6, 11, 36, 40, 44, 48 once every 5 seconds. |
| bt\_coex | 0 – Disable  1 – Enable | WLAN | Debug | Used for enabling/disabling Bluetooth coexistence. |
| antenna\_sel | 1 – Antenna 1  2 – Antenna 2 | WLAN | Debug | To select a particular antenna to be used for Transceiver. Applicable only in SISO mode. |
| rate\_protection\_type | 0 – None  1 – RTS/CTS  2 – CTS2SELF | WLAN | Debug | Used for rate protection. |
| rf\_params | Hex value string | WLAN | Debug | Hexadecimal value string for RF related parameters. |
| nss | 1 – 1x1 Mode  2 – 2x2 Mode | WLAN | Debug | To control number of spatial streams supported at system level. |
| tx\_pkt\_chnl\_bw | 0 – 20 MHz  1 – 40 MHz  2 – 80 MHz | WLAN | Debug | Channel bandwidth to be used for transmitting the packet. |
| tx\_pkt\_tput\_mode | 0 – Legacy  1 – HT mode  2 – VHT mode | WLAN | Debug | Throughput mode to be used for transmitting the packet. |
| tx\_pkt\_sgi | 0 – Disable  1 – Enable | WLAN | Debug | Enable/Disable Short Guard Interval while transmitting the packet. |
| tx\_pkt\_nss | 1 – 1x1 Mode  2 – 2x2 Mode | WLAN | Debug | Number of spatial streams per packet. |
| tx\_pkt\_preamble | 0 – Short Preamble  1 – Long Preamble  2 – Mixed Preamble  3 – GF Preamble | WLAN | Debug | Type of preamble to be used for each packet. Short/Long Preamble are applicable only when *tx\_pkt\_tput\_mode* is set to Legacy and Mixed/GF Preamble are applicable only when *tx\_pkt\_tput\_mode* is set to HT/VHT. |
| tx\_pkt\_stbc | 0 – Disable  1 – Enable | WLAN | Debug | To enable/disable STBC per packet. |
| tx\_pkt\_fec\_coding | 0 – BCC  1 – LDPC | WLAN | Debug | To set the FEC coding type per packet to BCC or LDPC |
| tx\_pkt\_mcs | -1 – Not being used  <val (>=0)> - MCS index to be used | WLAN | Debug | MCS index at which TX pkt will be transmitted. Mutually exclusive with *tx\_pkt\_rate*. |
| tx\_pkt\_rate | -1 – Not being used  <val> - Legacy rate to be used (1, 2, 5.5, 11,  6, 9, 12, 18, 24, 36, 48, 54) | WLAN | Debug | Legacy rate at which packets will be transmitted. Mutually exclusive with *tx\_pkt\_mcs*. |
| phy\_threshold | -113 to 20 | WLAN | Debug | Energy detection threshold in dBm.  Default values are:  -65 dBm in Debug mode  -93 dBm in Production/FCM mode. |
| ch\_scan\_mode | 0 - Channel Mapping 1 – Auto | WLAN | Debug | Used to set scan mode to auto or channel mapping mode.  Default: channel mapping mode(0) |
| ch\_probe\_cnt | 1 to 4 | WLAN | Debug | Used to set the number of probes to be sent per channel during scan.  Default: 2 |
| active\_scan\_dur | 50 to 65535 Tus | WLAN | Debug | Used to set the active channel scan duration  Default: 50 Tus |
| passive\_scan\_dur | 130 to 65535 Tus | WLAN | Debug | Used to set the passive channel scan duration  Default: 130 Tus |
| beacon\_head | Hex Dump String | WLAN | Debug | Used to set the Hex dump of  Beacon head. Set update\_template=1 to trigger command to pass beacon\_head, beacon\_tail, probe\_resp values to RPU |
| beacon\_tail | Hex Dump String | WLAN | Debug | Used to set the Hex dump of Beacon tail. Set update\_template=1 to trigger command to pass beacon\_head, beacon\_tail, probe\_resp values to RPU |
| probe\_resp | Hex Dump String | WLAN | Debug | Used to set the Hex dump of Probe Response. Set update\_template=1 to trigger command to pass beacon\_head, beacon\_tail, probe\_resp values to RPU |
| update\_template | 1 | WLAN | Debug | trigger command to pass beacon\_head, beacon\_tail, probe\_resp values to RPU.  Make sure AP is running on wlan1 interface for this command to work. |

END{{Internal}}