

WLAN DRIVER INGRESS QOS

Rev 0.1

WLAN Driver Ingress QoS

REVISION HISTORY

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1 OVERVIEW

1.1 INTRODUCTION

The WLAN Ingress QoS (WLAN IQ) feature tracks WLAN RX traffic, marks packets as high priority and low priority, forwards high priority traffic, drop low priority packets to relief system resource, whenever WLAN RX traffic is heavy.

1.2 SCOPE

This document describes WLAN Ingress QoS feature and how it works from a user perspective.

1.3 REFERENCES

IngressQoS_AppNote

2 HOW WLAN IQ WORKS

2.1 HOW TO DEFINE PACKET PRIORITY

WLAN IQ in WLAN driver defined packet as high priority in the following two conditions

- 1) Packet with WMM category is not BE, if WMM is enabled
- 2) Packet with TOS value is not 0, if WMM is not enabled
- 3) Packet classified as high priority by Ingress QoS Port (refer to IngressQoS_AppNote)

2.2 HOW TO DECIDE WLAN RX BUSY

WLAN Driver runs in low priority thread context in passive mode, whenever system do not have enough capability to handle WLAN RX, then there are getting more packets queued in WLAN RX DMA queue, and free WLAN RXDMA buffer is getting less.

WLAN IQ utilizes the number of free WLAN RXDMA buffers to evaluate RX busying status. Parameters `iq_thres_hi` (High Threshold) and `iq_thres_lo` (Low Threshold) are introduced for this purpose.

- 1) Whenever, the number of free WLAN RXDMA buffer is less than `iq_thres_lo`, WLAN IQ treats WLAN RX is in heavy activity (WLAN IQ state machine is in `WL_IQ_THRES_STATE_LO`, refer to 4.3), and WLAN IQ will drop low priority packet (refer to 2.1), just forward high priority packet.

- 2) When the number of free RXDMA buffer is over `iq_thres_hi` (WLAN IQ state machine is in `WL_IQ_THRES_STATE_HI`, refer to 4.3), WLAN IQ will forward all the RX packets.

3 RELATED WL COMMAND

- `iq_thres_hi` : get/set RXDMA high threshold(default `WL_IQ_RXDMA_THRES_HI`)
- `iq_thres_lo` : get/set RXDMA low threshold(default `WL_IQ_RXDMA_THRES_LO`)
- `iq_hash_to` : get/set hash item MAC timeout value (default `WL_IQ_HASH_TIMEOUT`)
- `iq_cleanup_to` : get/set hash table cleanup timeout value(default `WL_IQ_HASH_CLEANUP_TIMEOUT`)
- `iq_enable`: enable/disable iq function(default: disabled)
- `iq_show`: display iq hashtable for debug purpose
- `iq_trace`: set/get IQ feature trace value(default is no trace. 1--trace hash table operation; 2: trace flow drop/not-drop operation)

4 HASH TABLE

4.1 IMPLEMENTATION OF HASH TABLE

WLAN IQ feature utilizes hash table (including (Src,Dst) MAC pair) mechanism to track traffic. Only low priority traffics are stored in hash table.

Whenever WLAN interface receives packets, (Src, Dst) MAC pair will be extracted. If WLAN IQ State machine is in `WL_IQ_THRES_STATE_LO` (refer to 4.3), and (Src, Dst) MAC pair is in hash table(i.e it is a low priority traffic), this packet will be dropped; otherwise, this packet will be delivered to Linux kernel, and (Src, Dst) MAC pair will be inserted into hash table if this packet is low priority packet(refer to 3.1)

Hash table item (Src,Dst) MAC pair will be cleaned up by a watchdog timer `wl_iq_watchdog`, if this MAC pair is not used for a period, defined with `iq_hash_to`.

4.2 WATCHDOG TIMER

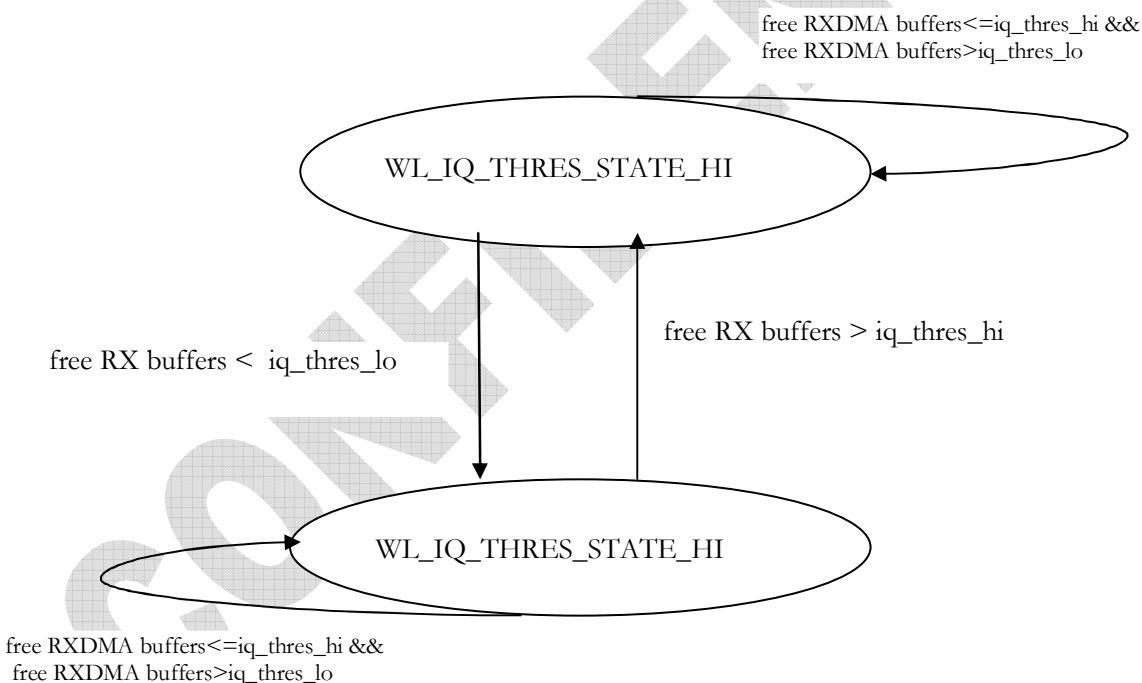
Watchdog timer `wl_iq_watchdog` is responsible to clean up the hash table (refer to 4.1). Its timeout value is defined as `iq_cleanup_to`.

Please be noticed, watchdog timer `wl_iq_watchdog` stops when WLAN RX heavy traffic is detected (WLAN IQ State machine is in `WL_IQ_THRES_STATE_LO`, refer to 4.3), to avoid performance dropping.

5 STATE MACHINE

5.1 STATE MACHINE AND PACKET HANDLING

WLAN IQ detects WLAN RX heavy traffic using state machine.



When WLAN IQ State Machine is in state `WL_IQ_THRES_STATE_HI`, all packets will be forward.

When WLAN IQ State Machine is in state `WL_IQ_THRES_STATE_LO`, low priority packet will be dropped, if there does not exists high priority traffic.

6 LIMITATION

Because WLAN IQ distinguishes packet as high or low only using (Src, Dst) MAC pair, WLAN IQ could not differentiate two flows with same (Src, Dst) MAC pair. For example, one ftp traffic and one video traffic run between same two PCs, packets from both two traffic will have same (Src,Dst) MAC pair, i.e.,.

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