



BCM53112/BCM5315X/BCM5316X

Cut-Through Mode Latency and Performance

Application Note

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1 Introduction

This document describes the cut-through mode performance and limitations for the BCM53112/BCM5315X/BCM5316X and the software workaround to avoid the chip lock-up issue.

NOTE: The latency measurements listed in this document are from a single controlled experiment and do not represent guaranteed maximum latencies under any other conditions.

2 Lock-Up Issue and Software Workaround

The BCM53112/BCM5315X/BCM5316X B1 chip has a lock-up issue when running cut-through mode. The following software workaround is required to avoid the lock issue.

Configure the following two parameters for maximum transition:

- MAX_TX_PACKETS = 1
- MAX_TX_BYTES = 0xFFFF

3 Cut-Through Performance Measurement and Summary

There are three measurements for cut-through performance for different interfaces and speeds. The measured configuration is as follows:

- Cut-through threshold is 64B.
- No meta-data or TLV enabled in NPA.
- Unicast flows with no oversubscription of egress ports.
- Traffic generator throttled to 50% line-rate to avoid PPM induced delays for 1G and 2.5G measurements.
- Traffic generator throttled to 20% line-rate to avoid PPM induced delays for 10G measurements.

The latency measurement is based on the following methodology:

- Measure the round trip delay from the TX of the traffic generator, through the chip, to the RX of the traffic generator RX.
- Subtract the non-chip delay from the previous measurement to calculate the BCM53112/BCM5315X/BCM5316X delay.
 - For 1G GPHY ports, non-chip delay is measured with the TX of the traffic generator looped back directly to the RX of the traffic generator.
 - For 2.5G SGMII ports, non-chip delay is measured with Viper SerDes in remote loopback.
 - For 10G XFI ports, non-chip delay is measured with Eagle SerDes in remote loopback.

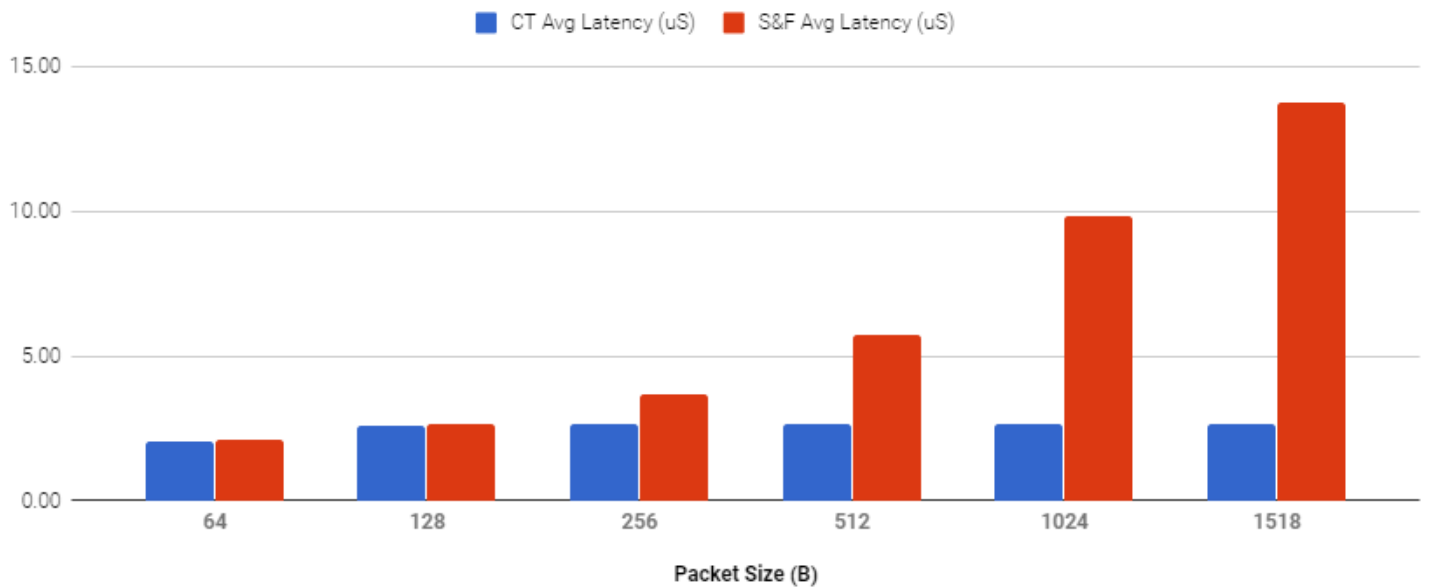
3.1 Latency Measurements between 1G (GPHY) Ports

Table 1 and Figure 1 provide the latency measurements between the 1G (GPHY) ports.

Table 1: Latency Measurements

	Packet Size (B)	64	128	256	512	1024	1518	9600	RND-64B-1518B	IMIX
	Port Information									
Cut-Through	Port 2 → Port 1	2.08	2.58	2.67	2.67	2.65	2.67	2.67	2.67	2.55
	Port 1 → Port 2	2.08	2.57	2.67	2.67	2.65	2.67	2.67	2.68	2.55
	CT average latency (μS)	2.08	2.57	2.67	2.67	2.65	2.67	2.67	2.67	2.68
Store and Forward	Port 2 → Port 1	2.10	2.64	3.70	5.75	9.83	13.78	93.57	10.03	8.78
	Port 1 → Port 2	2.11	2.64	3.67	5.74	9.82	13.76	93.57	10.03	8.79
	S and F average latency (μS)	2.10	2.64	3.69	5.74	9.82	13.77	93.57	10.03	8.78

Figure 1: Cut-Through (CT) and Store and Forward (S and F) Latency versus Packet Size



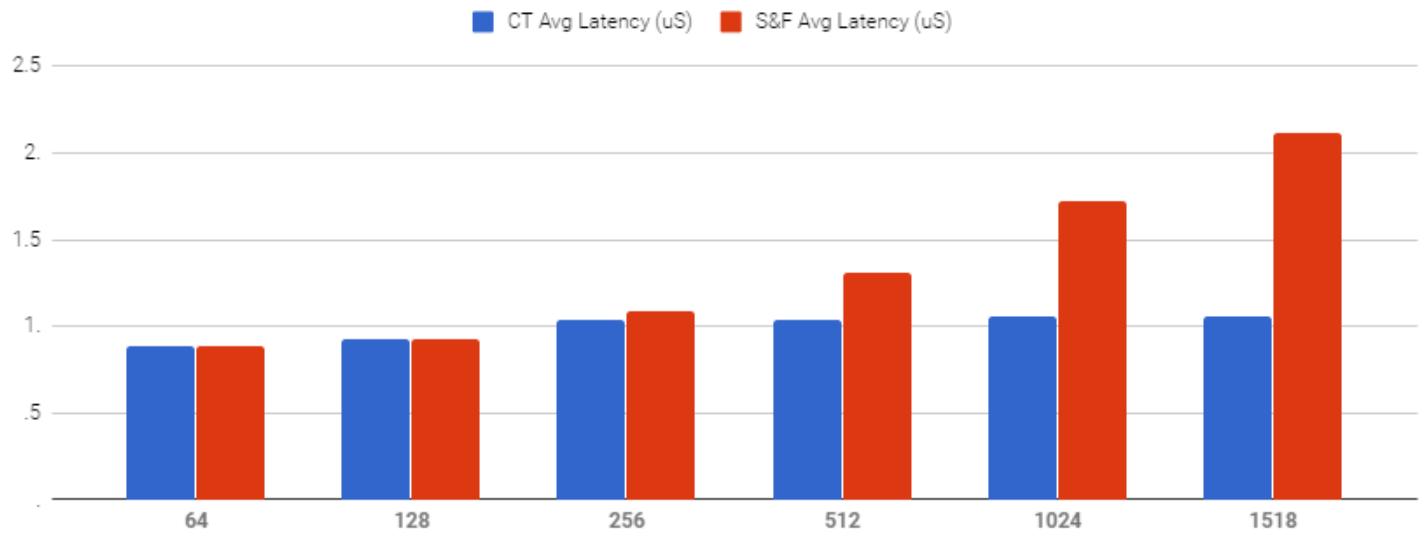
3.2 Latency Measurements between 2.5G (SGMII) Ports

Table 2 and Figure 2 provide the latency measurement between the 2.5G (SGMII) ports.

Table 2: Latency Measurements

	Packet Size (B)	64	128	256	512	1024	1518	9600	RND-64B-1518B	IMIX
	Port Information									
Cut-Through	Port 2 → Port 1	0.888	0.93	1.047	1.05	1.06	1.06	1.058	1.05	0.95
	Port 1 → Port 2	0.876	0.913	1.034	1.04	1.05	1.06	1.045	1.04	0.94
	CT average latency (μS)	0.882	0.9215	1.0405	1.04	1.06	1.06	1.0515	1.04	0.95
Store and Forward	Port 2 → Port 1	0.888	0.93	1.095	1.32	1.73	2.12	8.588	1.52	1.21
	Port 1 → Port 2	0.876	0.913	1.075	1.30	1.71	2.10	8.565	1.51	1.20
	S and F average latency (μS)	0.882	0.9215	1.085	1.31	1.72	2.11	8.5765	1.52	1.20

Figure 2: Cut-Through (CT), Store, and Forward (S and F) Latency versus Packet Size



3.3 Performance Summary

Table 3: Performance Summary

Interface	Port Speed	Throughput	CT Latency
GPHY	1 Gb/s	100%	~ 2.7 μS
SGMII	2.5 Gb/s	100%	~ 1.5 μS
XFI	10 Gb/s	30%	~ 1.0 μS

According to this performance summary, it is recommended that cut-through mode is not supported on 10G ports.

4 Cut-Through Mode Limitations

The BCM53112/BCM5315X/BCM5316X has the following two limitations:

- Cut-through mode is not supported on 10G ports.
- Cut-through mode is only supported between ports running at the same speed.

Revision History

53112-5315X-5316X-AN900; September 13, 2018

Initial Release.

