

# SysLink 02.00.00.68 beta1 DataSheet TI816x



## Introduction

The purpose of this document is to provide the performance data for the SYS/Link modules on TI816X platform.

## Terms and Abbreviations

Abbreviation	Description
CCS	Code Composer Studio
IPC	Inter-Processor Communication
GPP	General Purpose Processor e.g. ARM
DSP	Digital Signal Processor e.g. C64X
EVM	Evaluation Module
SysLink	SYS/Link
API	Application Programmable Interface
SFQ	Single Frame Queue
MFQ	Multiple Frame Queue

## Processor Information

Processor core	Speed
ARM (Cortex A8)	986 MHz
DSP (C674x)	800 MHz
Video-M3 (Cortex M3)	250 MHz
VPSS-M3 (Cortext M3)	250 MHz

Note: Performance numbers for Cortex-A8, DSP and VIDEO-M3 cores are only mentioned for all modules. VPSS-M3 numbers are not published as it is identical with VIDEO-M3.

## Setup details

- EVM and Silicon details

- \* TI816X EVM (Rev B)
- \* DDR2 interface
- \* PG1.0 Silicon

- Internal memory configuration

- \* L1 and L2 cache for DSP is configured as follows:
  - \* L1D: 32K
  - \* L1P: 32K
  - \* L2 : 256K

## Build details

The performance numbers were obtained with the following build configurations:

- IPC product build and SysLink RTOS build (SYS/BIOS side)

- \* Whole program debug
- \* Disable asserts
- \* Disable logger

- Syslink HLOS build (Linux side)

- \* Optimized build (SYSLINK\_BUILD\_OPTIMIZE = 1)
- \* Release mode (SYSLINK\_BUILD\_DEBUG = 0)
- \* Disable all the traces (SYSLINK\_TRACE\_ENABLE = 0)

- Linux kernel

- \* Default configuration with kernel debugging disabled

## Resource Usage

### Notify

- Total available events = 32
- Usage by different modules is as follows:

Module	Event Ids used
FrameQBufMgr	0
FrameQ	1
MessageQ (TransportShm)	2
RingIO	3
NameServerRemoteNotify	4

## Gate Hardware Spinlocks

- Total number of Gate hardware spinlocks = 64
- Usage by different modules is as follows:

Module	Number of spin locks used
Shared Region 0	1
Frame Queue instance	2
Frame Queue Buffer Manager instance	2
RINGIO instance	2

Note: The Frame Queue, Frame Queue Buffer Manager and RINGIO instances will utilize the above specified Gate Hardware Spinlocks only if the gate type specified is GateMP\_RemoteProtect\_SYSTEM.

## Performance data

### Notify

#### ARM to DSP round trip time

The time (round trip) taken for a notification to travel from ARM to DSP and back to ARM is measured. Here is the procedure followed to get the round trip

time:

- On ARM side, send notification from ARM to DSP (Capture the time stamp "T1" before calling Notify send API)
- On DSP side, in Notify callback function, send notification to ARM
- On ARM side, receive the notification from DSP (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Round trip time: 66.90 micro seconds

#### ARM to Video-M3 round trip time

The time (round trip) taken for a notification to travel from ARM to Video-M3 and back to ARM is measured. Here is the procedure followed to get the round trip time:

- On ARM side, send notification from ARM to Video-M3 (Capture the time stamp "T1" before calling Notify send API)
- On Video-M3 side, in Notify callback function, send notification to ARM
- On ARM side, receive the notification from Video-M3 (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Round trip time: 91.50 micro seconds

## Message Queue

### ARM to DSP round trip time

The time (round trip) taken for a message to travel from ARM to DSP and back to ARM is measured. Here is the procedure followed to get the round trip time:

- Transfer the message from ARM to DSP (Capture the time stamp "T1" before calling put() API on ARM side)
- Receive the message on the DSP and send the received message back to ARM on another messageQ to ARM
- Receive the message on the ARM (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Message Size	Average Round Trip Time (in micro secs)
64 bytes	109
128 bytes	123
1 KB	105
10 KB	104
100 KB	135

### ARM to Video-M3 round trip time

The time (round trip) taken for a message to travel from ARM to Video-M3 and back to ARM is measured. Here is the procedure followed to get the round trip time:

- Transfer the message from ARM to Video-M3 (Capture the time stamp "T1" before calling put() API on ARM side)
- Receive the message on the Video-M3 and send the received message back to ARM on another messageQ to ARM
- Receive the message on the ARM (Capture the time stamp "T2" after get() API on ARM side)
- Measure the time elapsed "T2-T1"

Message Size	Average Round Trip Time (in micro secs)
64 bytes	130
128 bytes	132
1 KB	145
10 KB	168
100 KB	144

## Frame Queue

### API profiling (DSP)

The frames are allocated and transferred (put) through the frame queue one after the other and after this the frames are received (get) and freed one after

the other in the same thread. Profile each API during the transfer of frame with in the same processor.

- Frame transfer using SFQ with in DSP with Notify Disabled

API	Average (cycles)
FrameQ_alloc	1295
FrameQ_put	2530
FrameQ_get	1603
FrameQ_free	2628
Total time	8056

- Frame transfer using MFQ with in DSP with Notify Disabled (16 frame pools and internal queues)

API	Average (cycles)
FrameQ_allocv	11131
FrameQ_putv	27968
FrameQ_getv	16628
FrameQ_freev	39212
Total time	94939

### **API profiling (Video-M3)**

The frames are allocated and transferred (put) through the frame queue one after the other and after this the frames are received (get) and freed one after

the other in the same thread. Profile each API during the transfer of frame with in the same processor.

- Frame transfer using SFQ with in Video-M3 with Notify Disabled

API	Average (cycles)
FrameQ_alloc	1983
FrameQ_put	3045
FrameQ_get	2069
FrameQ_free	3052
Total time	10149

- Frame transfer using MFQ with in Video-M3 with Notify Disabled (16 frame pools and internal queues)

API	Average (cycles)
FrameQ_allocv	19081
FrameQ_putv	40631
FrameQ_getv	27512
FrameQ_freev	48020
Total time	135244

### **API profiling (ARM to DSP)**

The frames are allocated and transferred (put) from ARM to DSP and on the DSP side the received (get) and freed one after the other. The same procedure is

repeated from DSP to ARM. The APIs are profiled during the above transfers.

- ARM side

API	Average time(usec)
FrameQ_alloc	21
FrameQ_put	33
FrameQ_get	32
FrameQ_free	33
Total time	118

- DSP side

API	Average (cycles)
FrameQ_alloc	3284
FrameQ_put	14333
FrameQ_get	8268
FrameQ_free	7087
Total time	32973

#### **API profiling (ARM to Video-M3)**

The frames are allocated and transferred (put) from ARM to Video-M3 and on the Video-M3 side the received (get) and freed one after the other. The same procedure is

repeated from Video-M3 to ARM. The APIs are profiled during the above transfers.

- ARM side

API	Average time(usec)
FrameQ_alloc	20
FrameQ_put	32
FrameQ_get	27
FrameQ_free	29
Total time	108

- Video-M3 side

API	Average (cycles)
FrameQ_alloc	5079
FrameQ_put	11552
FrameQ_get	6306
FrameQ_free	8497
Total time	31434

#### **API profiling (Inter Ducati)**

- Frame transfer using SFQ between in Video-M3 and VPSS-M3 with Notify Enabled

API	Average (cycles)
FrameQ_alloc	1693
FrameQ_put	3942
FrameQ_get	2312
FrameQ_free	3413
Total time	11360

## RingIO

### Data transfer from ARM to DSP

The numbers are captured while transferring 1Kbytes of data from ARM to DSP.

- ARM

APIs	Average time(usec)
Create()	8378
Open()	6172
Acquire()	52
Release()	39
SetAttributes()	37
Close()	906
Delete()	881

- DSP

APIs	Cycles
Create()	123801
Open()	116992
Acquire()	3161
Release()	9590
SetAttributes()	4487
Close()	12197
Delete()	27070

### Data transfer from ARM to Video-M3

The numbers are captured while transferring 1Kbytes of data from ARM to Video-M3.

- ARM

APIs	Average time(usec)
Create()	9704
Open()	5980
Acquire()	49
Release()	40
SetAttributes()	36
Close()	902
Delete()	872

- Video-M3

APIs	Cycles
Create()	97413
Open()	77387
Acquire()	3371
Release()	10906
SetAttributes()	4670
Close()	14335
Delete()	33322

## Proc Manager

### DSP

The time taken to load and start the DSP image from ARM is captured. The size of the DSP image is 8.05MB and loaded through nfs

APIs	Average time(usec)
Proc load	104401
Proc start	27

### Video-M3

The time taken to load and start the Video-M3 image from ARM is captured. The size of the Video-M3 image is 4.60MB and loaded through nfs



APIs	Average time(usec)
Proc load	73311
Proc start	32

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