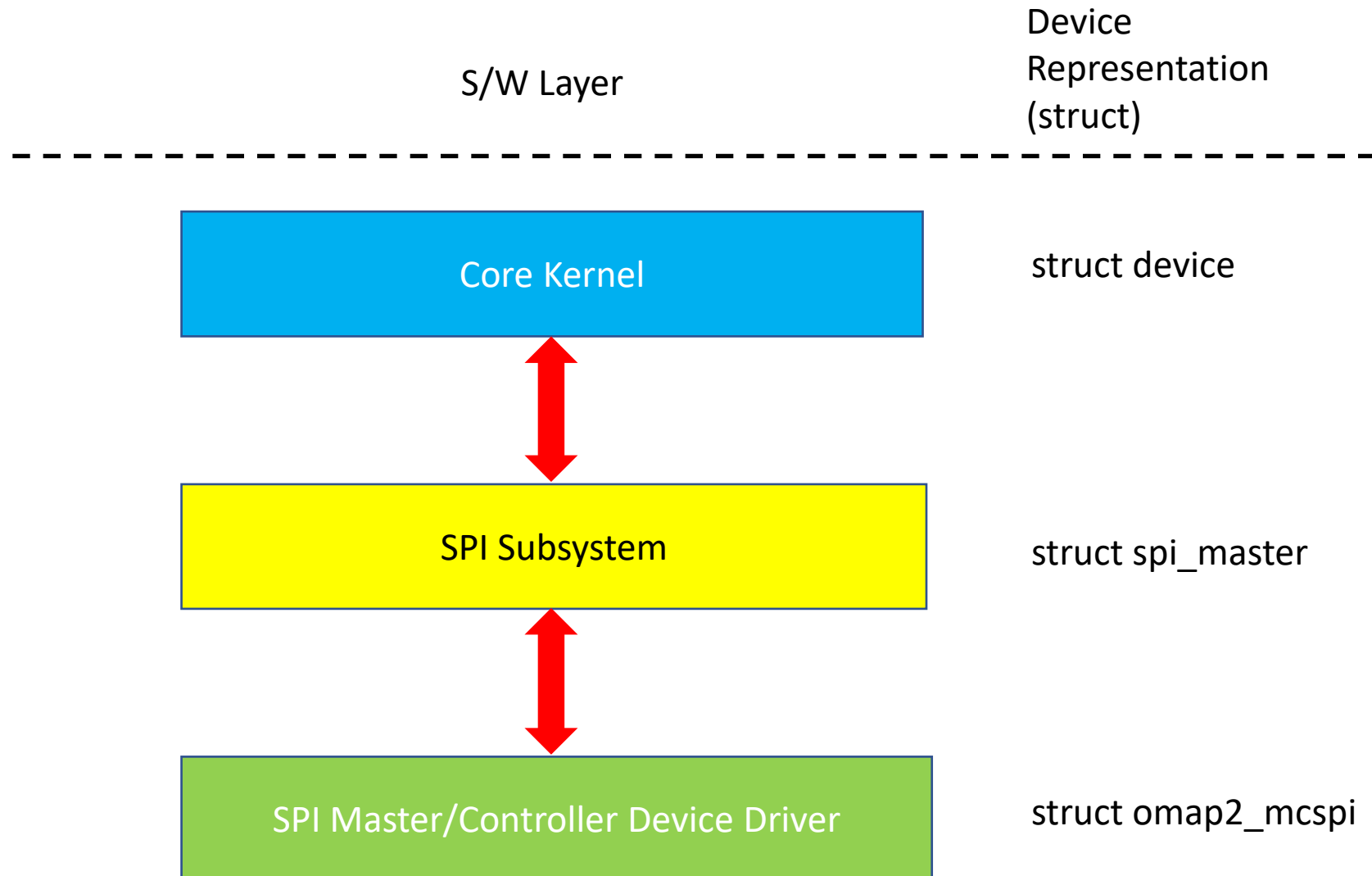# TI OMAP2 SPI Master Linux Device Drivers
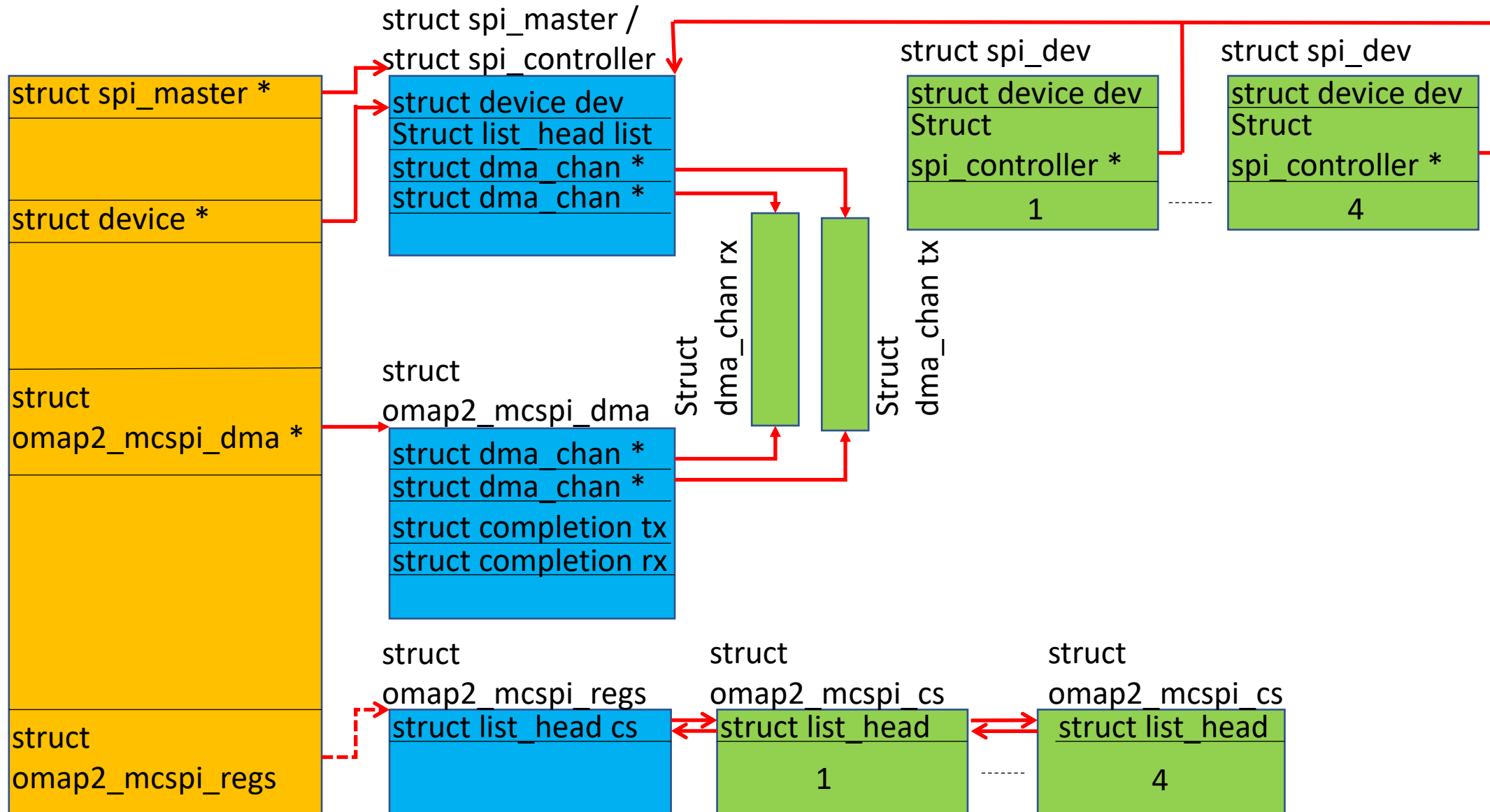
By Jitesh Verma
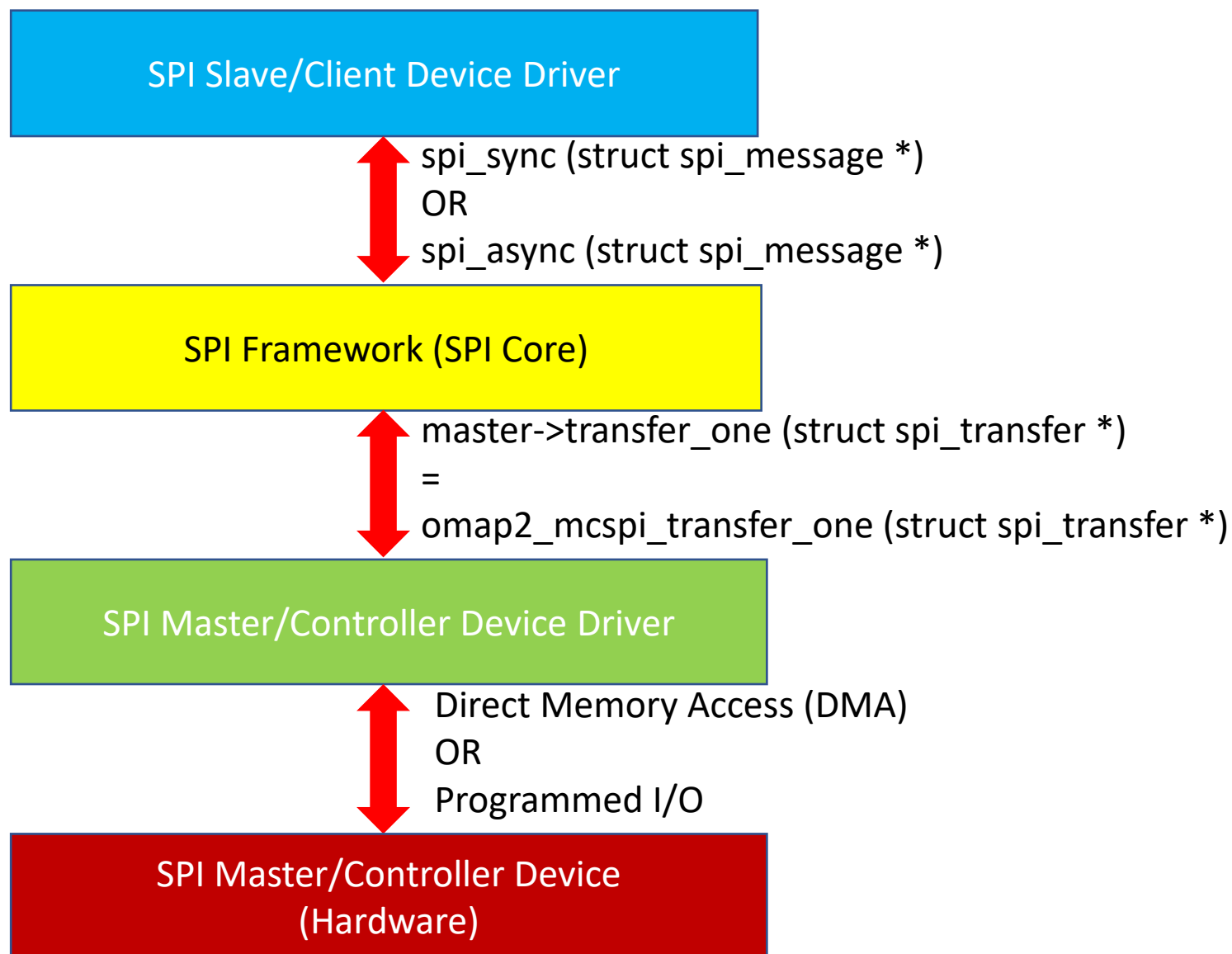
S/W Layers & its Device Representation (for SPI Master)

S/W Layer

Device Representation (struct)

S/W Layer	Device Representation (struct)
Core Kernel	struct device
SPI Subsystem	struct spi_master
SPI Master/Controller Device Driver	struct omap2_mcspi

OMAP2 SPI Driver Private Data Structures

Data Transfer in SPI S/W Stack/Sub-system/Framework

SPI Slave/Client Device Driver

spi_sync (struct spi_message *)
OR
spi_async (struct spi_message *)

SPI Framework (SPI Core)

master->transfer_one (struct spi_transfer *)
=
omap2_mcspi_transfer_one (struct spi_transfer *)

SPI Master/Controller Device Driver

Direct Memory Access (DMA)
OR
Programmed I/O

SPI Master/Controller Device (Hardware)

Data Transfer Structure – struct spi_transfer

struct spi_transfer

void *tx_buf
void *rx_buf
dma_addr_t tx_dma
dma_addr_t rx_dma
struct sg_table tx_sg
struct sg_table tx_sg
struct list_head transfer_list

struct sg_table tx_sg

struct scatterlist *
nents = n

struct scatterlist sgl[]

struct scatterlist *[1]
struct scatterlist *[2]
struct scatterlist *[n]

struct scatterlist [1]

page_link
offset
length
dma_address
dma_length

struct sg_table rx_sg

struct scatterlist *
nents = n

struct scatterlist sgl[]

struct scatterlist *[1]
struct scatterlist *[2]
struct scatterlist *[n]

struct scatterlist [1]

page_link
offset
length
dma_address
dma_length

struct list_head

struct list_head *next
struct list_head *prev

Data Transfer Structure List (Implemented in SPI subsystem)

struct spi_transfer

| void *tx_buf |
| void *rx_buf |
| dma_addr_t tx_dma |
| dma_addr_t rx_dma |
| struct sg_table tx_sg |
| struct sg_table tx_sg |
| struct list_head transfer_list |

struct spi_transfer

| void *tx_buf |
| void *rx_buf |
| dma_addr_t tx_dma |
| dma_addr_t rx_dma |
| struct sg_table tx_sg |
| struct sg_table tx_sg |
| struct list_head transfer_list |

struct spi_transfer

| void *tx_buf |
| void *rx_buf |
| dma_addr_t tx_dma |
| dma_addr_t rx_dma |
| struct sg_table tx_sg |
| struct sg_table tx_sg |
| struct list_head transfer_list |

struct list_head (Dummy Node)

SPI Core/Framework – Slave Device Driver Interaction

SPI Slave/Client Device Driver (spidev.c)

spidev_read ()
spidev_write()
spidev_ioctl ()

spidev_sync/async()

(If used by SPI Slave/Client Device Driver)

spi_sync ()
spi_async ()

SPI Framework (SPI Core)
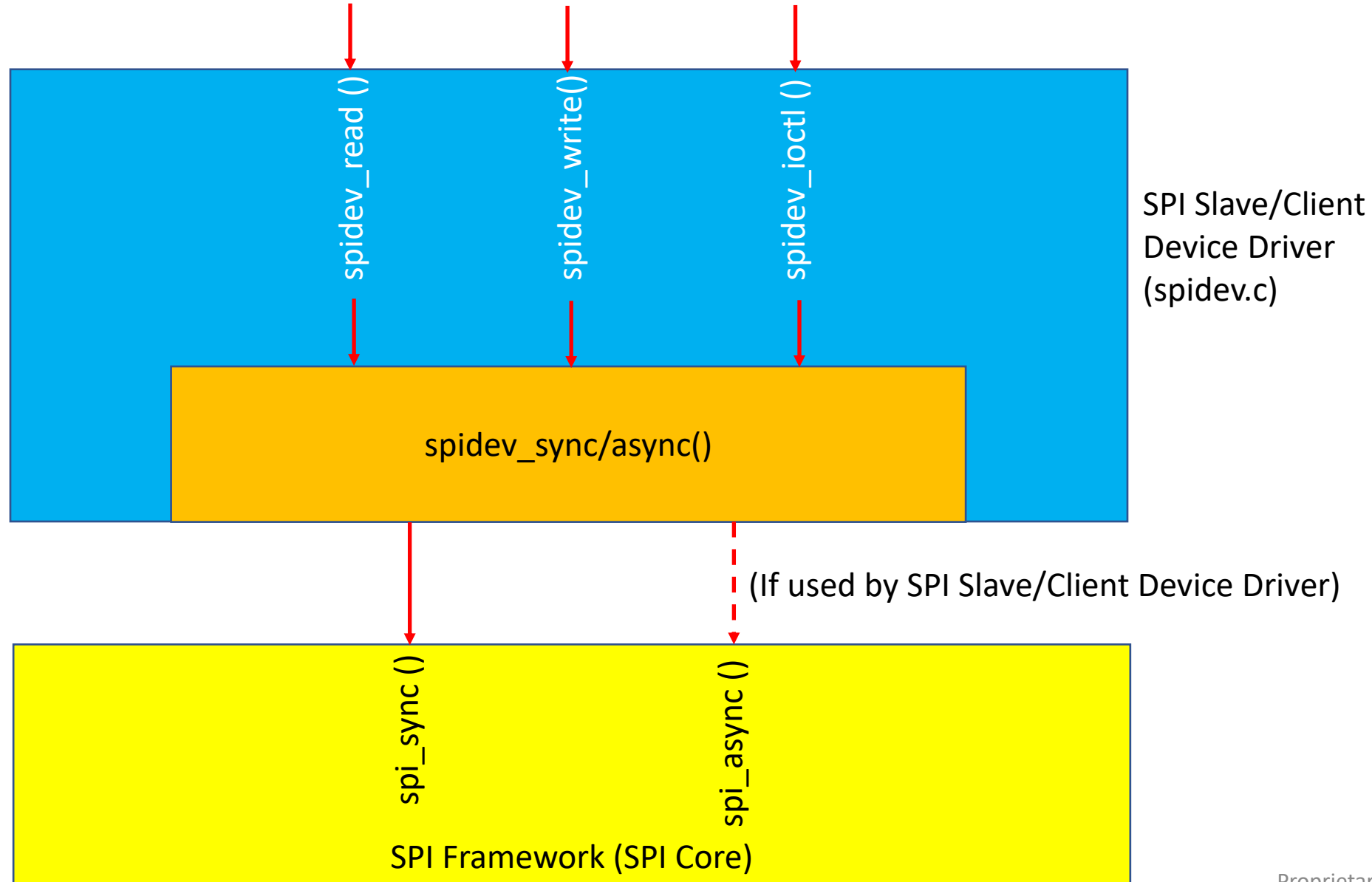
SPI Core/Framework – Master Device Driver Interaction

SPI Framework (SPI Core)

master->set_cs()

master->can_dma()

master->
prepare_message()

master->
transfer_one()

omap2_mcspi_set_cs ()

omap2_mcspi_can_dma ()

omap2_mcspi_prepare_message ()

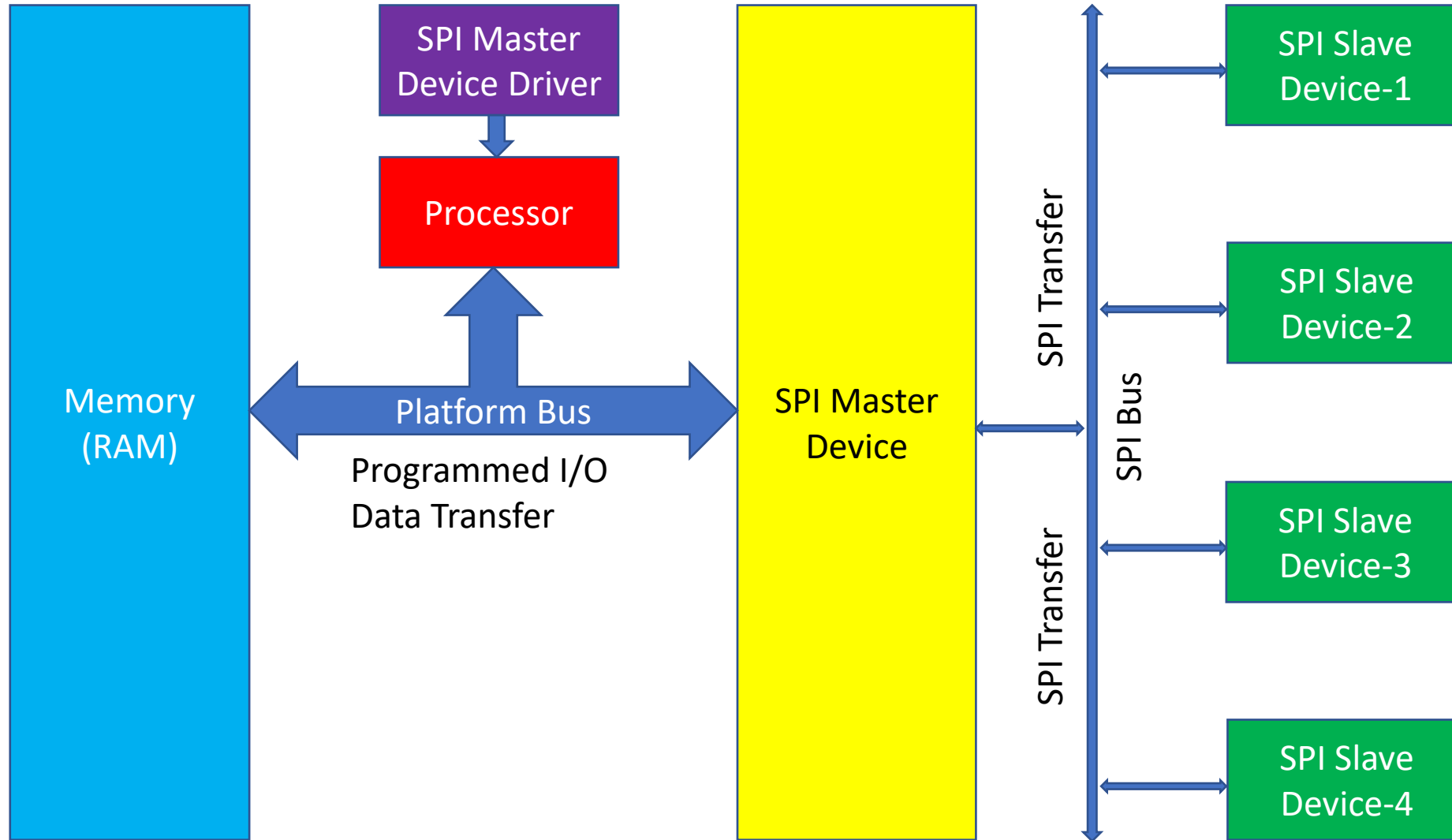omap2_mcspi_transfer_one ()

SPI Master/Controller Device Driver
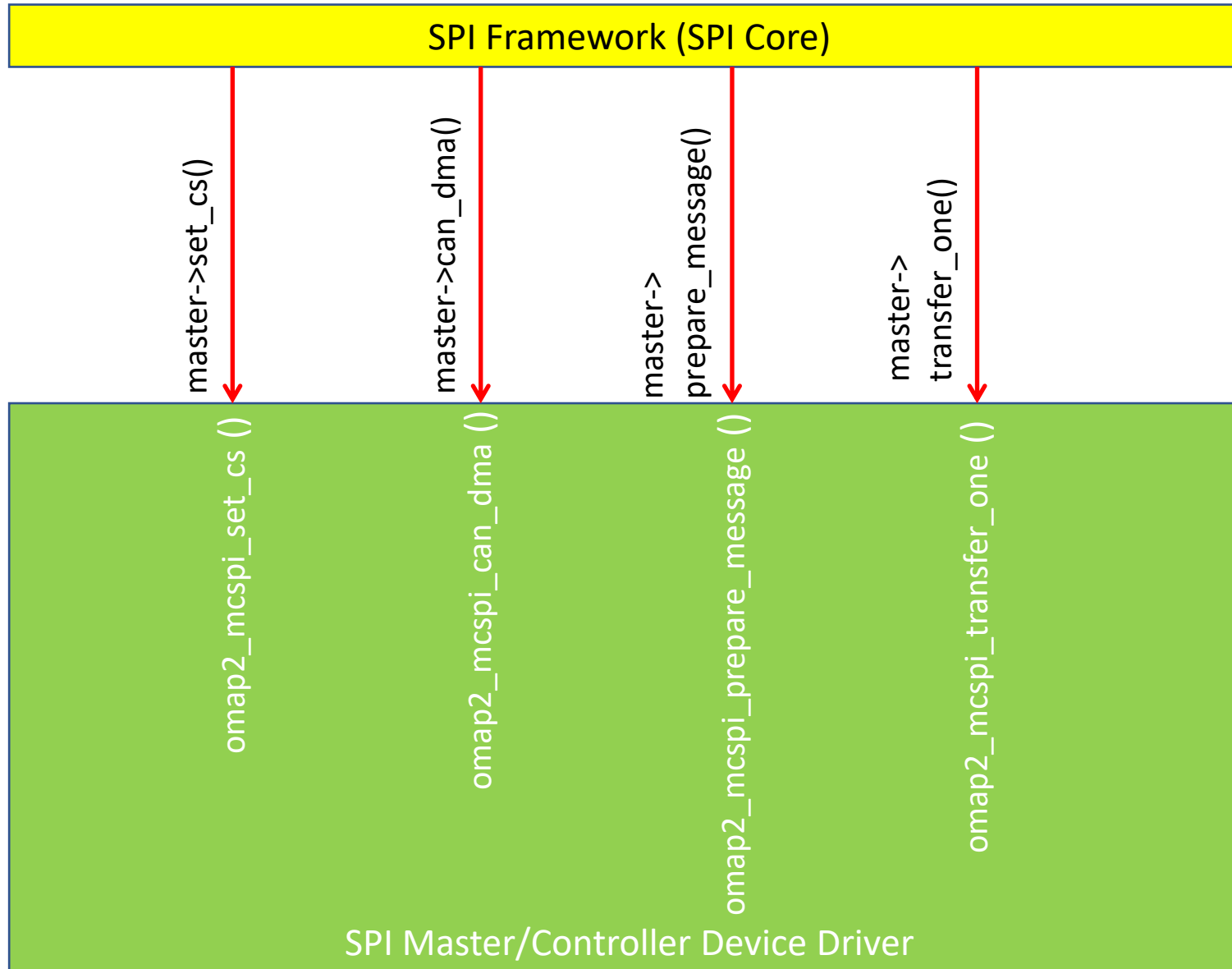
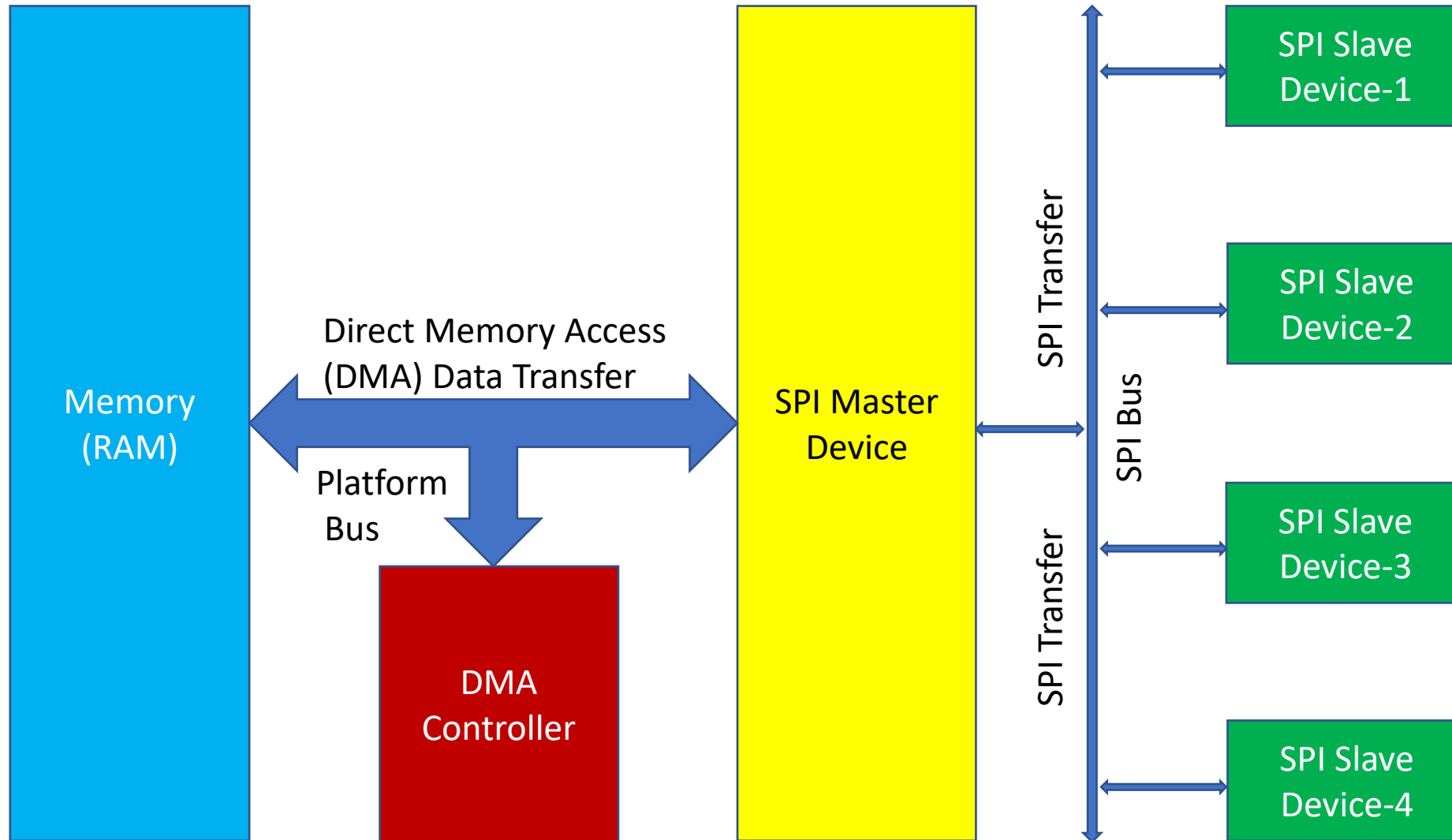# High-level System Hardware Architecture
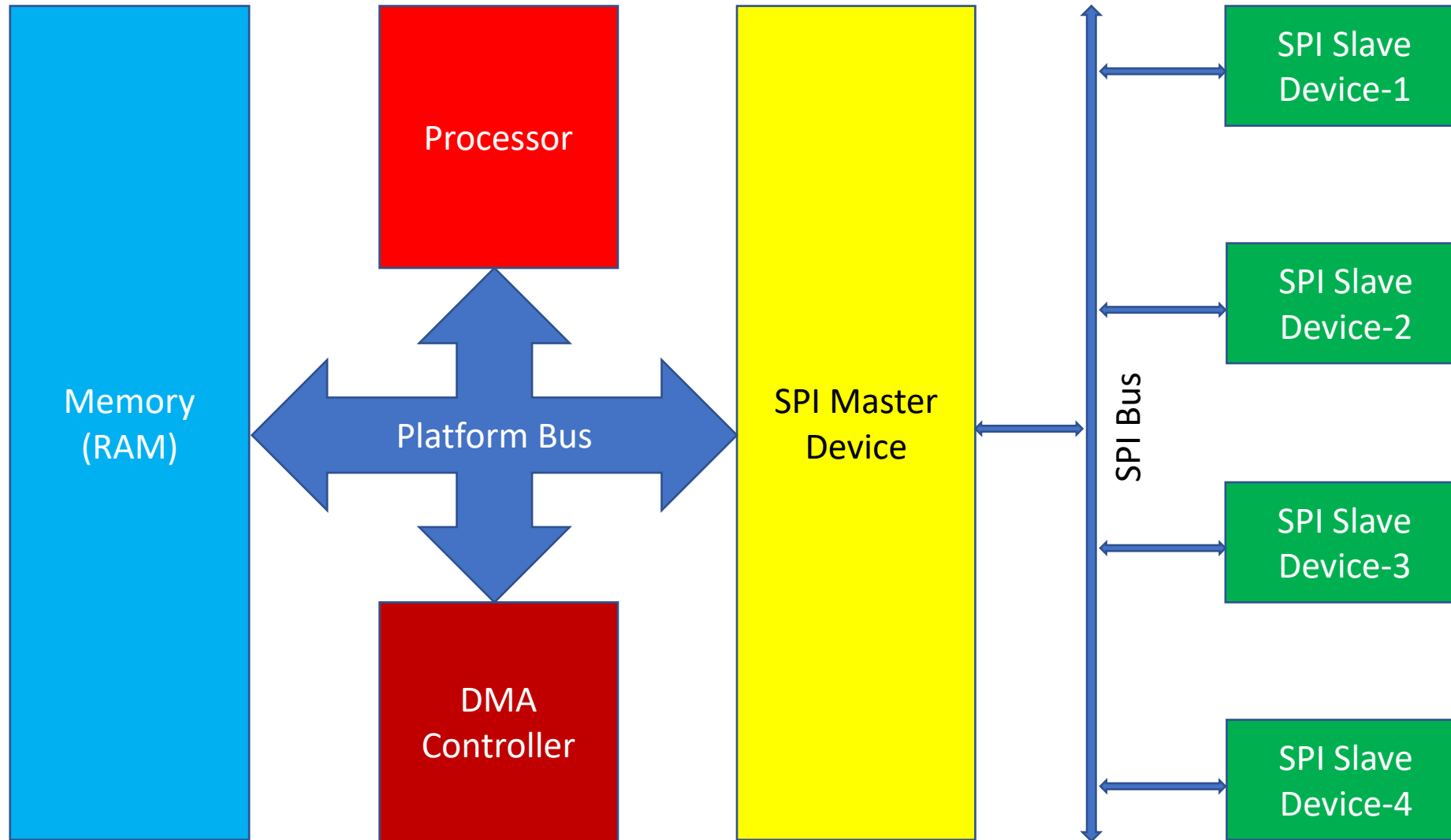
H/W Architecture – Programmed I/O Data Transfer
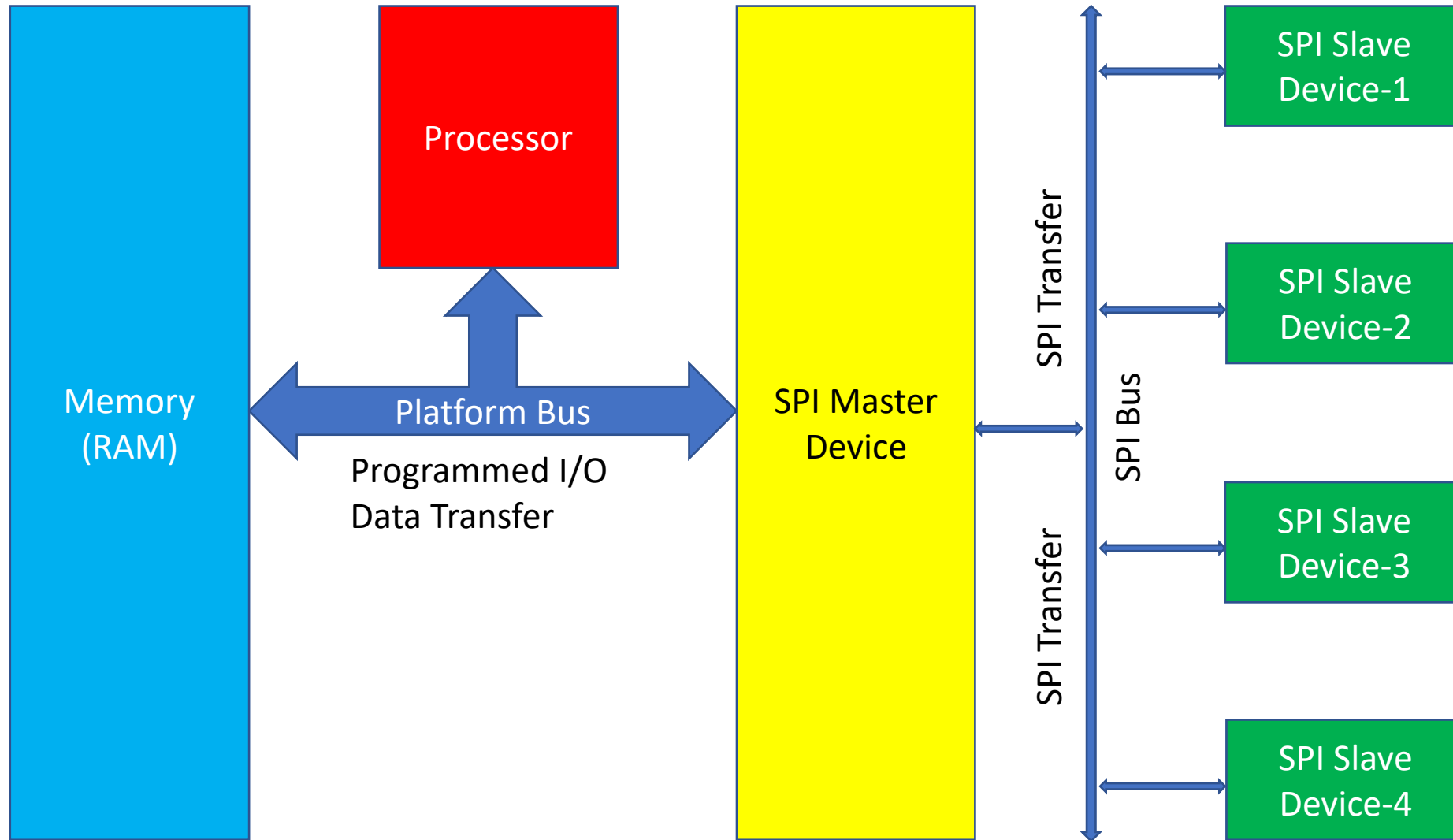
H/W-S/W Architecture – Programmed I/O Data Transfer

H/W Architecture – DMA Data Transfer

H/W-S/W Architecture – DMA Data Transfer

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