

|  |
| --- |
|  |

|  |
| --- |
| APTA L\_A Simulation  Rev 0.4 |



**Marvell.** Moving Forward Faster

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision** | **Author** | **Change List** | **Date** |
| V0.2 | | | |
|  | Heejeong Ryu | Initial version | 1/30/2018 |
| V0.3 | | | |
|  | Heejeong Ryu | 1. Added note for APTA\_OK=0 handling 2. Added basic command interface timing chart 3. Added restriction note for function call conflict | 5/31/2018 |
| V0.4 | Heejeong Ryu | Added remote\_status\_g\* register field information | 6/12/2018 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Contents

[1 Overview 3](#_Toc515527168)

[2 Block Diagram 3](#_Toc515527169)

[3 Interface Signals 4](#_Toc515527170)

[4 APTA Command Program Sequence 4](#_Toc515527171)

[5 APTA Command Table 6](#_Toc515527172)

[6 Timing Diagram 6](#_Toc515527173)

# Overview

There’re two ways to run APTA L->A simulation.

1. APTA\_TRAIN\_SIM\_EN

When SOC set APTA\_TRAIN\_SIM\_EN = 0x1 before APTA Train Start, PHY MCU bypass APTA Train algorithm and run a dummy one. In this case, it must be APTA\_TRAIN\_CMD\_IF\_EN = 0.

The APTA dummy commands list in order is:

* + APTA\_START
  + APTA\_COEFFICIENT\_1\_2 DECREMENT
  + APTA\_COEFFICIENT\_2\_3 DECREMENT
  + APTA\_COEFFICIENT\_3 INCREMENT
  + APTA\_COEFFICIENT\_1 INCREMENT
  + APTA\_COMP

1. APTA Command Interface

When SOC set APTA\_TRAIN\_CMD\_IF\_EN = 1 before APTA Train Start, SOC control L->A command each APTA train step by Command Interface.

# Block Diagram



# Interface Signals

| Signal Name | Dir | Address | Description |
| --- | --- | --- | --- |
| ~~PIN\_PAPTA\_TRAIN\_ENABLE~~  APTA\_OK | I | PhyWrapper Register 0x1F0  Packet\_Mode\_Status1[6] | Indicator for “APTA OK” condition  1: PhyWrapper enable APTA transactions. “APTA OK” condition is meet.  0: PhyWrapper disable APTA transaction.; APTA OK condition is not meet. |
| PHY\_REMOTE\_CTRL\_COMMAND\_TYPE\_LANE[7:0] | I | 0x601c[31:24] | PHY REMOTE Control Type Command |
| PHY\_REMOTE\_CTRL\_COMMAND\_CODE\_LANE[15:0] | I | 0x601c[15:0] | PHY REMOTE Control Code Command |
| PHY\_REMOTE\_CTRL\_VALUE\_LANE[31:0] | I | 0x6020[31:0] | PHY REMOTE Control Value |
| PHY\_MCU\_REMOTE\_REQ\_LANE | I | 0x22e4[0] | PHY MCU Remote Request |
| PHY\_MCU\_LOCAL\_ACK\_LANE | O | 0x6030[24] | PHY MCU Local Acknowledge |
| PHY\_LOCAL\_STATUS\_LANE[7:0] | O | 0x602c[23:16] | Command Interface Local Status  0: Complete  Indicator to process current command complete  1: Invalid  Indicator for Invalid Command Type or Code |
| PHY\_LOCAL\_VALUE\_LANE[31:0] | I | 0x6024[31:0] | Command Interface Local Value |
| APTA\_TRAIN\_SIM\_EN | I | 0xe604[29] | APTA Train Simulation Enable  1: Enable APTA Train L\_A Dummy Algorithm  0: Normal  SOC must set APTA\_TRAIN\_SIM\_EN to 1 before APTA Train start. |
| APTA\_TRAIN\_CMD\_IF\_EN | I | 0xe604[30] | APTA Train Command Interface Simulation Enable  1: Enable APTA Train L\_A Command Interface  0: Normal  SOC must set APTA\_TRAIN\_CMD\_IF\_EN to 1 before APTA Train start. |
| remote\_status\_gn1\_lane[1:0] | I | 0x260c[25:24] | Remote Gn1 (C-1) Status Read Out.  b11: maximum  b10: minimum  b01: updated  b11: ready |
| remote\_status\_g0\_lane[1:0] | I | 0x260c[17:16] | Remote G0 (C0) Status Read Out.  b11: maximum  b10: minimum  b01: updated  b11: ready |
| remote\_status\_g1\_lane[1:0] | I | 0x260c[9:8] | Remote G1 (C1) Status Read Out.  b11: maximum  b10: minimum  b01: updated  b11: ready |

Note: PHY\_LOCAL\_VALUE\_LANE register is not used for APTA Command Interface.

# APTA Command Program Sequence

1. Program APTA\_TRAIN\_CMD\_IF\_EN = 0x1 to enable APTA Command Interface mode.
2. ~~Assert PIN\_PAPTA\_TRAIN\_ENABLE to 0x1~~.

Wait until PhyWrapper Register Packet\_Mode\_Status1[6] APTA\_OK bit to be 1.

   1: All conditions are met for APTA request (checked by PhyWrapper).

If this bit is 1, it is okay to continue to Step 3

     0: Conditions are not met for APTA request (checked by PhyWrapper)

1. Program PHY\_REMOTE\_CTRL\_COMMAND\_TYPE=0x60
2. Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE for PHY layer local receiver to adjusts the attached transmitter coefficients following by APTA Command Table.

a. For Message APTA\_ADJUST START send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x00

b. For Message APTA\_COEFFICIENT\_1\_2 DECREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x01

c. For Message APTA\_COEFFICIENT\_1\_2 INCREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x02

d. For Message APTA\_COEFFICIENT\_2\_3 DECREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x03

e. For Message APTA\_COEFFICIENT\_2\_3 INCREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x04

f. For Message APTA\_COEFFICIENT\_2 DECREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x05

g. For Message APTA\_COEFFICIENT\_2 INCREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x06

h. For Message APTA\_COEFFICIENT\_1 DECREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x07

i. For Message APTA\_COEFFICIENT\_1 INCREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x08

j. For Message APTA\_COEFFICIENT\_3 DECREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x09

k. For Message APTA\_COEFFICIENT\_3 INCREMENT send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x0A

l. For Message APTA\_ADJUST Complete send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x0B

m. For Message APTA\_ADJUST Terminate send

Program PHY\_REMOTE\_CTRL\_COMMAND\_CODE=0x0C

1. Program PHY\_MCU\_REMOTE\_REQ\_LANE=0x1
2. Wait until PHY to PHY\_MCU\_LOCAL\_ACK\_LANE=0x1.

Local phy send the APTA\_ADJUST message to the attached remote phy according to APTA Command Table.

After Local phy receive a remote phy status, local phy set PHY\_MCU\_LOCAL\_ACK\_LANE=0x1.

The maximum wait time should be less than 20msec.

1. Read PHY\_LOCAL\_STATUS if need.

|  |  |
| --- | --- |
| PHY\_LOCAL\_STATUS\_LANE[7:0] | Description |
| 0 | Indicate for complete of current command |
| 1 | Indicate for received invalid Command Type or Code |
| 2 | Not Ready to take this command or Not valid in this stage |
| All others | Don’t care |

PHY\_LOCAL\_VALUE\_LANE register is not used for APTA Command Interface.

*During APTA\_OK is 0, if APTA command is trigger, COMPHY will send PHY\_MCU\_LOCAL\_ACK\_LANE = 1 with PHY\_LOCAL\_STATUS = (2) NOTVALID.*

*In the condition of PHY\_MCU\_REMOTE\_REQ\_LANE=1 and PHY\_MCU\_LOCAL\_ACK\_LANE=0, if another function call is happened such as power state, speed change, Train abort, APTA train abort, COMPHY will send PHY\_MCU\_LOCAL\_ACK\_LANE = 1 with PHY\_LOCAL\_STATUS\_LANE = (2) NOTVALID as well.*

1. Program PHY\_MCU\_REMOTE\_REQ\_LANE=0x0
2. Wait until PHY to program PHY\_MCU\_LOCAL\_ACK\_LANE=0 for next communication.

The maximum wait time should be less than 1msec.

1. Repeat 3-9 until complete APTA train using Command interface
2. Program APTA\_TRAIN\_CMD\_IF\_EN = 0x0 to end APTA Command Interface

# APTA Command Table

|  |  |  |
| --- | --- | --- |
| Command type | Command Code | Description |
| **0x60** | 00 | APTA\_ADJUST (START) |
| 01 | APTA\_COEFFICIENT\_1\_2 (DECREMENT) |
| 02 | APTA\_COEFFICIENT\_1\_2 (INCREMENT) |
| 03 | APTA\_COEFFICIENT\_2\_3 (DECREMENT) |
| 04 | APTA\_COEFFICIENT\_2\_3 (INCREMENT) |
| 05 | APTA\_COEFFICIENT\_2 (DECREMENT) |
| 06 | APTA\_COEFFICIENT\_2 (INCREMENT) |
| 07 | APTA\_COEFFICIENT\_1 (DECREMENT) |
| 08 | APTA\_COEFFICIENT\_1 (INCREMENT) |
| 09 | APTA\_COEFFICIENT\_3 (DECREMENT) |
| 0A | APTA\_COEFFICIENT\_3 (INCREMENT) |
| 0B | APTA\_ADJUST (COMPLETE) |
| 0C | APTA\_ADJUST (TERMINATE) |

# Timing Diagram

**Basic Command Interface**



**APTA Command Interface**



Note:

1. During the APTA Command IF operation, Must be PhyWrapper Register APTA\_OK=1, APTA\_TRAIN\_CMD\_IF\_EN=0x1, and APTA\_TRAIN\_SIM\_EN=0x0.

2. APTA Command Interface should be followed by basic command interface rule.