



Intel® Open Source HD Graphics

Programmer's Reference Manual

For the 2016 Intel Atom™ Processors, Celeron™ Processors, and Pentium™ Processors based on the "Apollo Lake" Platform (Broxton Graphics)

Volume 5: Command Stream Programming

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User Mode Privileged Commands

A subset of the commands are privileged. These commands may be issued only from a privileged batch buffer or directly from a ring. Batch buffers in GGTT memory space are privileged and batch buffers in PPGTT memory space are non-privileged. On parsing privileged command from a non-privileged batch buffer, a Command Privilege Violation Error is flagged and the command is dropped. Command Privilege Violation Error is logged in Error identity register of command streamer which gets propagated as "Command Parser Master Error" interrupt to SW. Privilege access violation checks in HW can be disabled by setting "Privilege Check Disable" bit in GFX_MODE register. When privilege access checks are disabled HW executes the Privilege command as expected.

User Mode Privileged Commands

User Mode Privileged Command	Function in Non-Privileged Batch Buffers	Source
MI_UPDATE_GTT	Command is converted to NOOP.	*CS
MI_STORE_DATA_IMM	Command is converted to NOOP if Use Global GTT is enabled.	*CS
MI_STORE_DATA_INDEX	Command is converted to NOOP.	*CS
MI_STORE_REGISTER_MEM	Register read is always performed. Memory update is dropped if Use Global GTT is enabled.	*CS
MI_BATCH_BUFFER_START	Command when executed from a batch buffer can set its "Privileged" level to its parent batch buffer or lower. Chained or Second level batch buffer can be "Privileged" only if the parent or the initial batch buffer is "Privileged". This is HW enforced.	*CS
MI_LOAD_REGISTER_IMM	Command is converted to NOOP if the register accessed is privileged.	*CS
MI_LOAD_REGISTER_MEM	Command is converted to NOOP if Use Global GTT is enabled. Command is converted to NOOP if the register accessed is privileged.	*CS
MI_LOAD_REGISTER_REG	Register write to a Privileged Register is discarded.	*CS
MI_REPORT_PERF_COUNT	Command is converted to NOOP if Use Global GTT is enabled.	Render CS
PIPE_CONTROL	Still send flush down, Post-Sync Operation is NOOP if Use Global GTT or Use "Store Data Index" is enabled. Post-Sync Operation LRI to Privileged Register is discarded.	Render CS
MI_SET_CONTEXT	Command is converted to NOOP.	Render CS



User Mode Privileged Command	Function in Non-Privileged Batch Buffers	Source
MI_ATOMIC	Command is converted to NOOP if Use Global GTT is enabled.	Render CS
MI_COPY_MEM_MEM	Command is converted to NOOP if Use Global GTT is used for source or destination address.	*CS
MI_SEMAPHORE_WAIT	Command is converted to NOOP if Use Global GTT is enabled.	*CS
MI_SEMAPHORE_WAIT	Command is converted to NOOP, if Register Poll is enabled	*CS
MI_ARB_ON_OFF	Command is converted to NOOP.	*CS
MI_DISPLAY_FLIP	Command is converted to NOOP.	*CS
MI_CONDITIONAL_BATCH_BUFFER_END	Command is converted to NOOP if Use Global GTT is enabled.	*CS
MI_FLUSH_DW	Still send flush down, Post-Sync Operation is converted to NOOP if Use Global GTT or Use "Store Data Index" is enabled.	Blitter CS, Video CS, Video Enhancement CS

Parsing one of the commands in the table above from a non-privileged batch buffer flags an error and converts the command to a NOOP.

The tables below list the non-privileged registers that can be written to from a non-privileged batch buffer executed from various command streamers.

User Mode Non-Privileged Registers for Blitter Command Streamer (BCS)

MMIO Name	MMIO Offset	Size in DWords
BCS_GPR	0x22600	32
BCS_SWCTRL	0x22200	1

This table represents the Base offset for Video Command Streamers and Media Engine message range:

Unit	MMIO Base Offset	Description
VCS/MFC	0x12000	Video Command Streamer 0
VCS1/MFC1	0x1C000	Video Command Streamer 1
VECS	0x1A000	Video Enhancement Command Streamer
HUC	0xD000	
HEVC	0x1E900	



User Mode Non-Privileged Registers for Video Enhancement Command Streamer (VECS)

MMIO Name	MMIO Base	MMIO Offset	Size in DWords
VECS_GPR	VECS	0x600	32

User Mode Non-Privileged Registers for Video Command Streamer (ALL VCS)

MMIO Name	Unit Base	MMIO Range	Size in DWords
VCS_GPR	VCS	0x600	32
MFC_VDBOX1	VCS	0x800-0xFFF	512
HuC	HUC	0x0A0	4
HuC	HUC	0x064	1
HuC	HUC	0x080	1
HEVC	HEVC	0x00	64
HEVC-Enc	HEVC	0x00	64