

*presented by*



# The EDID Protocols and GOP Driver

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# Agenda



- The EDID Protocols and GOP
- Some Additional Notes and Use Cases
- Call for Action and Q&A



# The EDID Protocols and GOP



# The EDID Protocols and GOP



UEFI Specification has three EDID protocols defined:  
**EdidDiscovered**, **EdidOverride** and **EdidActive**.

A correct implementation and usage of those protocols is critical to a GOP driver, which also provides great flexibility through a standard way for the platform to handle certain scenarios that used to be handled using proprietary method between the platform and a legacy VBIOS producer.

# The EDID Protocols and GOP



Some examples for how those protocols should be implemented or used in GOP driver.

- **EdidDiscovered**

This protocol is installed for each video output device child handle that is physically connected to a GPU controller at the point when `GOPDriverBinding->Start ()` gets called. For an example, if a GPU controller has a CRT, a DVI and an HDMI connector, but only CRT is connected at the time when connecting GOP to this GPU controller, the CRT will be installed as a child handle, and **EdidDiscovered** is installed to this CRT child handle as well.

A physically connected video output device will always have **EdidDiscovered** protocol installed, even if the video output device is not EDID capable (like a very old analog CRT) or it's EDID capable but the EDID is not retrievable to a GPU/GOP (like an LCD EDID detection channel is connected to the platform instead of GPU), the protocol will be installed with "**SizeOfEdid**" set to 0, and **\*Edid** to NULL in this case.

# The EDID Protocols and GOP



On the other hand, when no video output devices are connected to a non-headless GPU controller, an active video output device can also be assigned by the platform or chosen by the GOP driver if not assigned, this active video output device is also enumerated as a “connected” child handle too, so **EdidDiscovered** is installed for this child handle with “**SizeOfEdid**” set to 0, and **\*Edid** to NULL.

# The EDID Protocols and GOP



- **EdidOverride** and **EdidActive**

Usually, **EdidOverride** should only be queried and **EdidActive** should only be installed for the active video output device assigned by the platform or selected by the GOP driver when connecting it to a GPU controller. However, for the platforms with embedded video output device LCD (either LVDS or eDP type sink device) present, this might not be always true, when LCD is purposely not assigned by the platform as an active video output device because the LCD lid is closed, `GOPDriverBinding->Start ()` should still query **EdidOverride** and install **EdidActive** protocols. This is to ensure a valid and same EDID for LCD is obtained for both pre OS GOP and post OS IHV display driver.

# The EDID Protocols and GOP



An example on a platform with non-EDID LCD: during `GOPDriverBinding->Start ()`, CRT is connected, and since LCD is not a detachable video output device so it's always connected.

When the LCD lid is open, platform doesn't need to assign any active video output device since GOP driver will always pick up LCD as the only active video output device per Windows 8 requirement, both CRT and LCD are installed child handles but GOP driver will only query **EdidOverride** and install **EdidActive** for LCD.

When the LCD lid is closed, platform may want to assign CRT as the active video output device or otherwise LCD will be selected by GOP driver as the active video output device as the lid status is unknown to GOP driver, in this case both CRT and LCD are installed child handles CRT, CRT is the only active video output device but GOP driver will query **EdidOverride** and install **EdidActive** for LCD and CRT.





# Some Additional Notes and Use Cases



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- **EdidOverride.GetEdid** has \*EdidSize and \*\*Edid buffer defined as both IN and OUT parameters. The function consumer (most likely a GOP driver) puts the original EDID and size retrieved from the child handle into the IN buffer, and expects the function producer to put theirs in the OUT buffer. When EDID is not available either from caller or callee, \*Edid should be set to NULL, and EdidSize to 0x0.
- **EdidOverride.GetEdid** has two attributes defined ***EFI\_EDID\_OVERRIDE\_DONT\_OVERRIDE*** and ***EFI\_EDID\_OVERRIDE\_ENABLE\_HOT\_PLUG***.  
For ***EFI\_EDID\_OVERRIDE\_DONT\_OVERRIDE***, it should be set to 1 if the function provider wants GOP to use the over ride EDID only when a video output device doesn't provide EDID; or set to 0 if GOP always need to use the over ride EDID. For simplicity, we suggest the function provider set this bit to 1 for all detachable video output devices as well as for the LCDs for which EDID is not retrievable to GOP/GPU, and only set the bit to 0 for the LCDs for which EDID is retrievable to GOP/GPU but requires some modification from the platform.

# Some Additional Notes and Use Cases



- For ***EFI\_EDID\_OVERRIDE\_ENABLE\_HOT\_PLUG***, the objective of this bit is to force a GOP/GPU to drive a video output device even if it's not physically connected. However, as it's currently not spec'd out on how a GOP client can figure out from the child handle enumeration whether or not a video output device is physically connected, for now it should be set to 1 when providing **EdidOverride** for all detachable video output devices, and set to 0 for embedded video output device-LCD.

# Some Additional Notes and Use Cases



- **EdidOverride** is the standard way to support the platform to provide or modify EDID for the embedded panel-LCD, this has been a common practice on mobile/AIO designs. With this protocol in place, no any proprietary method is ever needed.
- When a GPU controller has physical display connectors present but no video output device is connected, GOP driver will still try to query **EdidOverride** and install **EdidActive** for an active video output device in during GOPDriverBinding->**Start ()**. This active video output device is either assigned by the platform or chosen by the GOP driver if not assigned, this is to enable the platform to make a platform specific decision on which video output device at what resolution it needs for the graphics console out, moreover, the video output device will be turned on (except for DP or any video output device via a DP translator) if it's later plugged in (referred as “hot plug” in UEFI spec, but it's not a HW interrupt driven event but a set-up)

# Some Additional Notes and Use Cases



- For a truly headless GPU controller (no display connectors, rendering only GPU), the GOP driver will not install any child handle, neither Edid protocols nor **GraphicsOutput** protocol will be installed as it can't even be used for the graphics console-out. The GPU controller will get initialized and return **EFI\_SUCCESS** after connecting the GOP driver to it. However, IHVs/IBVs don't need to connect this kind of GPU in pre-OS time in order to save some POST time.



# Calls for Action and Q & A



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We noticed that most of IHVs and IBVs haven't implemented **EdidOverride** function, we encourage you to do so as it's pretty useful in those use cases described in this presentation. On the other hand, it's also worth to note that the usage of these two attributes get modified in Spec 2.3.1 Errata drafts, please use the new one in your implementation.

Questions?