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# Pre-OS Display Switching With UEFI GOP

UEFI Fall Plugfest – October 24-27, 2011  
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# Agenda



- When is a display switch needed in pre-OS time?
- Example: choose boot-up display(s) using GOP driver
- Additional Notes
- Q & A



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**When is a display switch needed in pre-OS time?**

# When is a display switch needed in pre-OS time?



When some mobile system events like lid open/close or docking/undocking occur during pre-OS boot, a platform may choose to switch display(s) as the designated or active display(s) become unavailable.

Or when pre-OS applications or test suites need to test multiple displays.

# When is a display switch needed in pre-OS time?



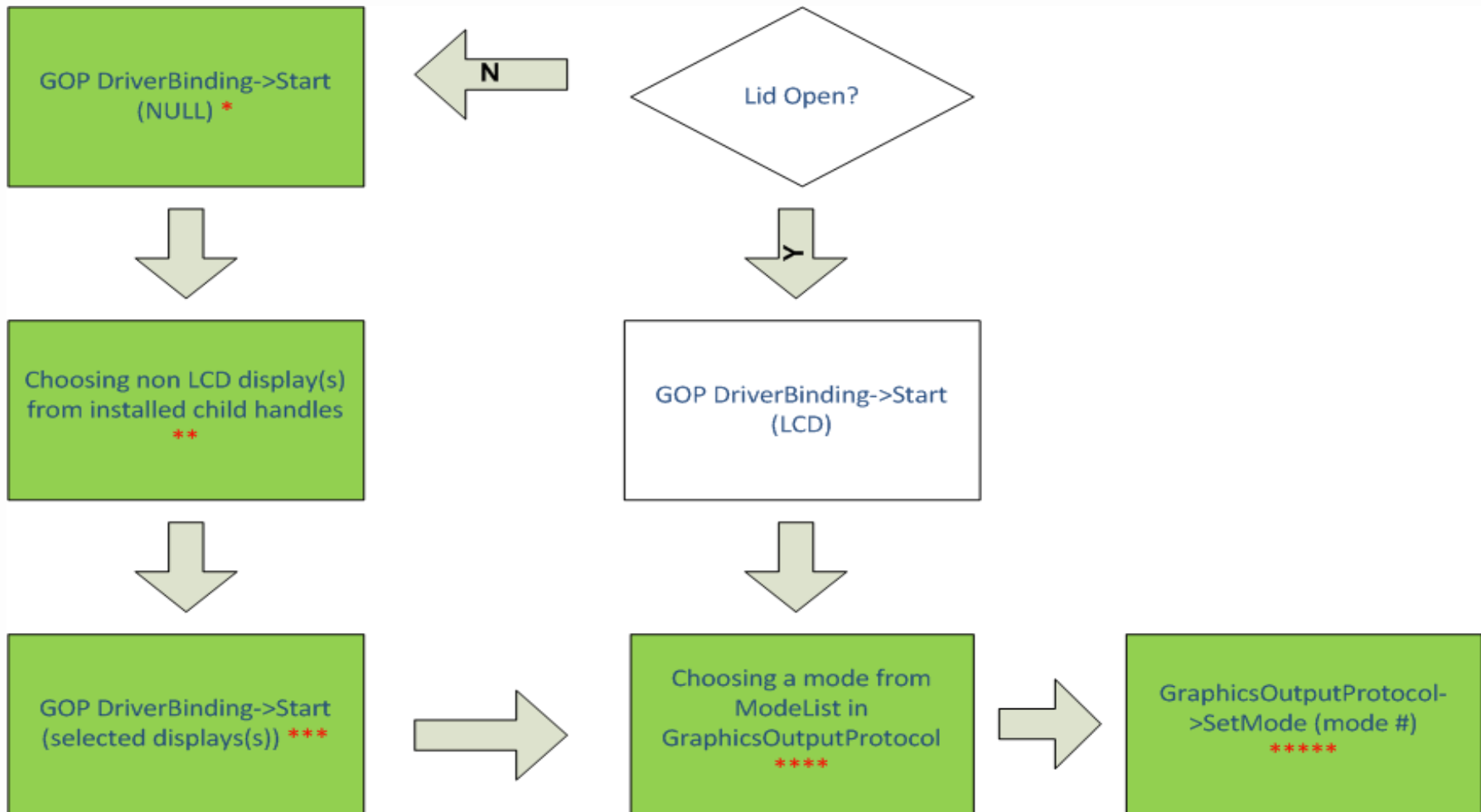
Such a display switch was supported through different proprietary interfaces in the legacy VGA BIOS provided by various graphic vendors.

Such a display switch can also be achieved through standard UEFI interfaces and a same or similar sequence supported by GOP drivers provided by various graphic vendors!



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**Example: choose boot-up display(s)  
using GOP driver**



*Boxes in light green shows a generic sequence when switching from display set A to set B*

## Example: choose boot-up display(s) using GOP driver



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# Additional Notes





# Additional Notes



- \* A GOP driver is a “bus” driver, since a GPU usually has child video output devices.

What happens when `RemainingDevicePath` is set to `NULL` in `Start ()` ?

- a GOP driver will likely create child handles for each physically connected video output device
- `GraphicsOutputProtocol` will be installed to one child handle, the “active” display selected by the GOP driver in `SetMode ()`
- Faster boot time if GOP driver uses a single display

*Note: Platforms may use settings to change the logic used by the GOP driver to pick the primary display*

# Additional Notes



- \*\* The LCD child handle will still be present if it's a supported display device (connected but not available when the lid is closed).
- \*\*\* A set of video output devices is described in several `ACPI _ADR`s.
  - Unfortunately, the `ACPI _ADR` definition is not standard across GOP driver providers.
  - Platform vendors may need to use different `ACPI _ADR`s for different graphic vendors.  
*Final Solution is TBD.*

# Additional Notes



**\*\*\*\*** If the `RemainingDevicePath` assignment changes in `Start()` and the function returns successfully, the `ModeList` from `GraphicsOutputProtocol` will be changed accordingly to reflect the new modes supported by newly assigned video output devices.

# Additional Notes



- \*\*\*\*\* The actual switch to a new display set happens in `SetMode()`, not after the call to `Start` (new display devices).
- Display timing, resolution and display surface will stay the same after `Start` (new display devices).



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# Questions?



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# But wait, there's more ...

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~~Welcoming Remarks~~—Aven Chuang, Insyde Software  
~~UEFI Forum Updates~~—Dong Wei, VP of the UEFI Forum

T



~~Best Practices for UEFI Driver Compatibility~~—Stefano Righi,  
American Megatrends, Inc.  
~~Understanding Platform Requirements for UEFI III~~—Brian  
Richardson, Intel Corporation

W



~~UEFI Security Enhancements~~—Kevin Davis, Insyde Software  
~~How to Protect the Pre-OS Environment with UEFI~~—Tony  
Mangefeste, Microsoft

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~~Pre-OS Display Switching using GOP~~—James Huang, AMD  
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