UEFI & EDK II TRAINING

Porting Beyond the UEFI Shell with EDK II

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LESSON OBJECTIVE

* Locate driver locations for porting EDK II modules beyond the UEFI Shell for the New Project Platform

* Determine the protocols then the UEFI Driver with Devices on a platform

* The goal is to boot to the OS

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Features Needed to Access OS

Add-in Card/ UEFI Driver Related

USB	LAN
IDE/SATA	Graphics
Integrated PCI Devices	

Platform Related DXE Driver Related

SMM	BDS
ACPI	CSM
ACPI S3	SMBIOS

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ADD-IN CARD
Locate UEFI Drivers related to Add-in Cards

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BDS / UEFI Shell

File System   **File System**

Disk I/0   **Disk I/O**

Block I/O (Partition)

Disk I/0   **Disk I/O**

Block I/O (Physical)

PCI I/O

PCI Root Bridge I/O Protocol   **PCI Host Bridge Resource Allocation Protocol**   **SATA Controller Init**
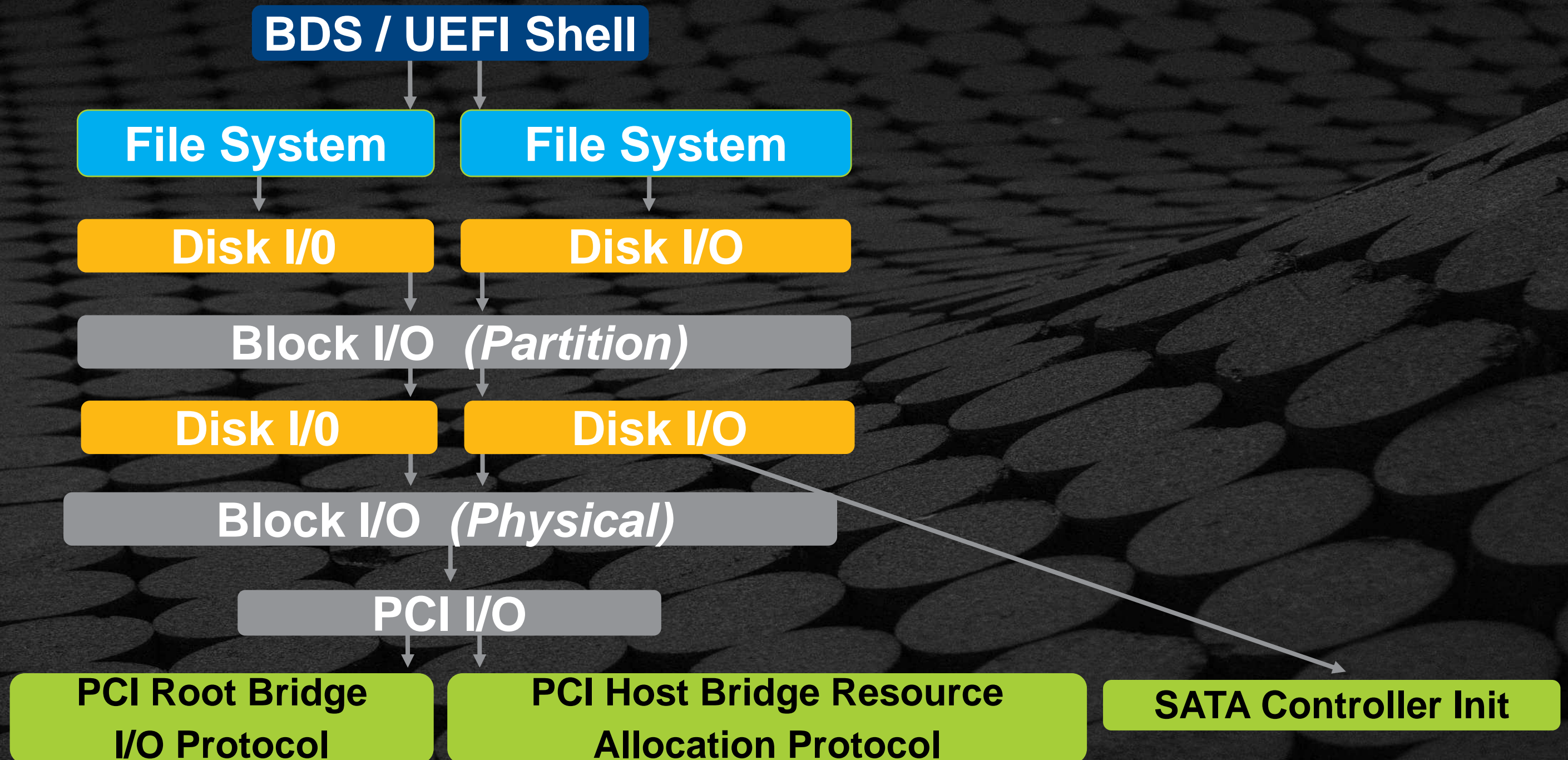
Driver Stack: IDE/SATA

Driver	Driver Target
BDS and UEFI Shell	Generic
FAT	Generic
Partition	Generic
Disk I/O	Generic
ATA Bus	PCAT
PCI Bus	Generic
PCI Root Bridge	Memory Controller
PCI Host Bridge	Memory Controller
SATA Controller Init	PCH

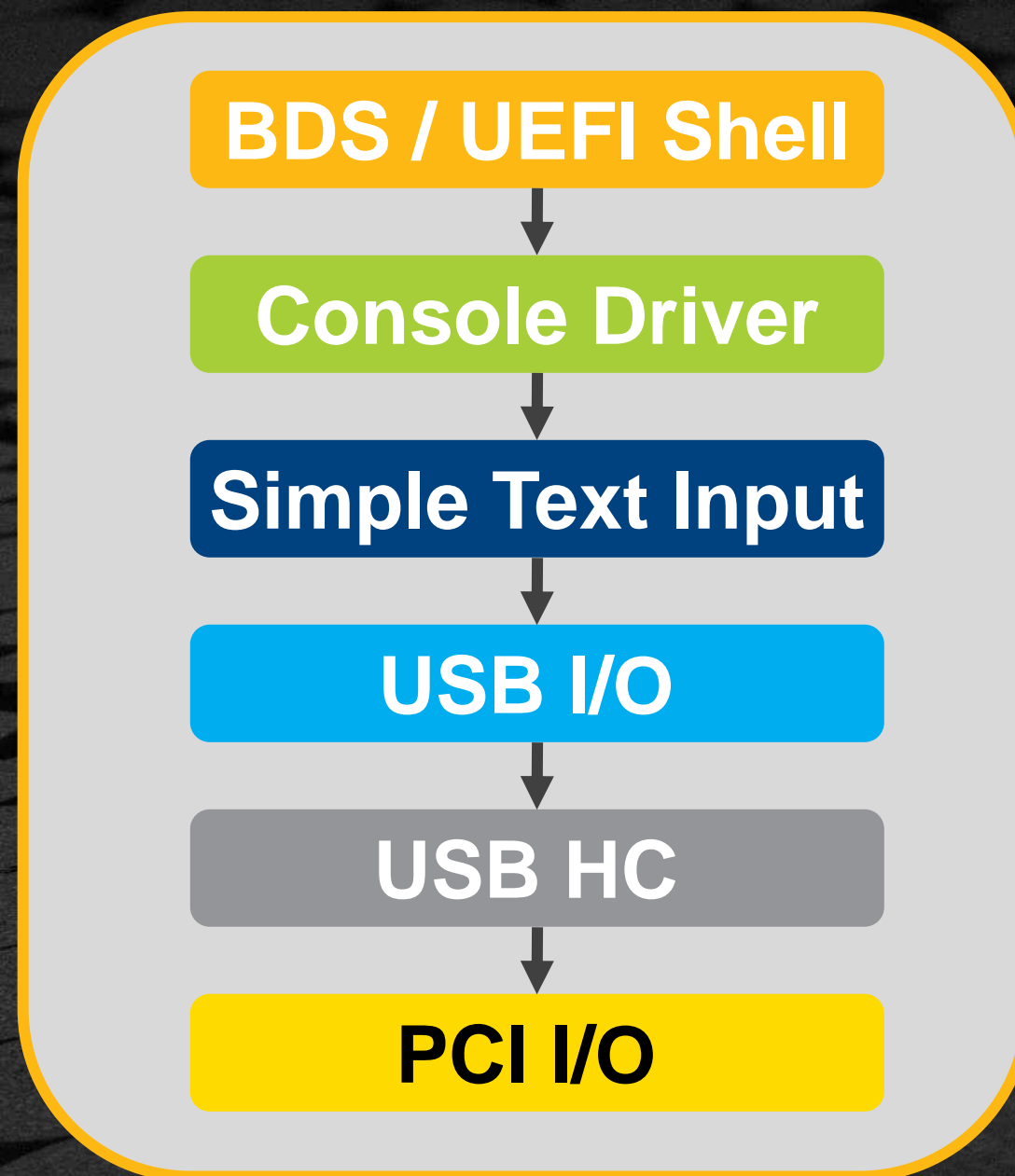| Not Likely |
|------------|
| Medium Likely |
| Very Likely |

EDK II Modules
- `MdeModulePkg/Bus/Ata/AtaBusDxe`
- `Vlv2DeviceRefCodePkg/ValleyView2Soc/SouthCluster/SataController/Dxe`

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BDS / UEFI Shell

↓

Console Driver

↓

Simple Text Input

↓

USB I/O

↓

USB HC

↓

PCI I/O

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DRIVER	DRIVER TARGET
BDS and UEFI Shell	Generic
Console Driver	Generic
USB KB Driver	Generic
USB Bus Driver	Generic
USB Host Controller	USB Controller Specific

Not Likely

Medium Likely
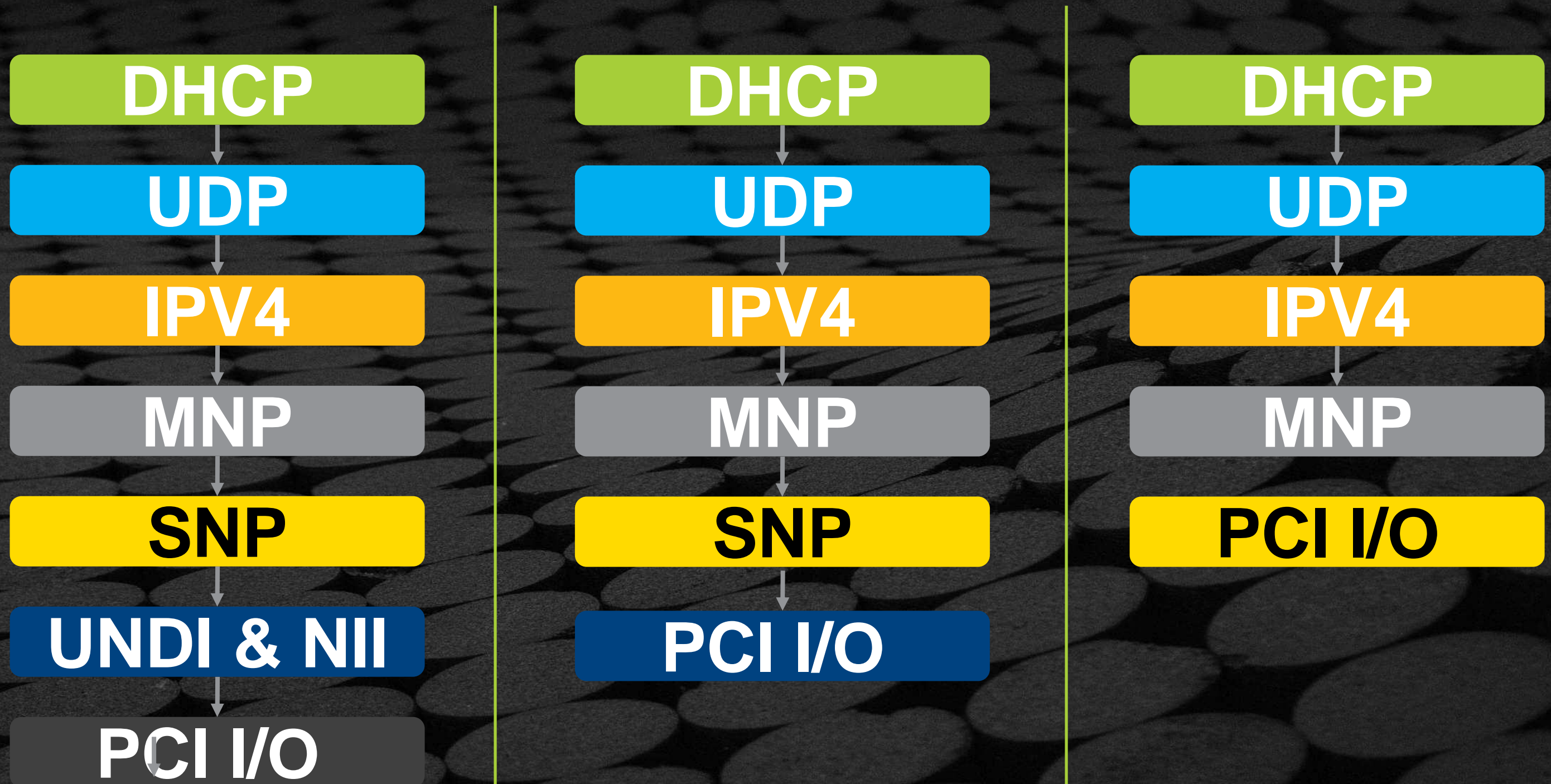
Very Likely

EDK II Modules
- **MdeModulePkg/Bus/Pci/UhciDxe/**
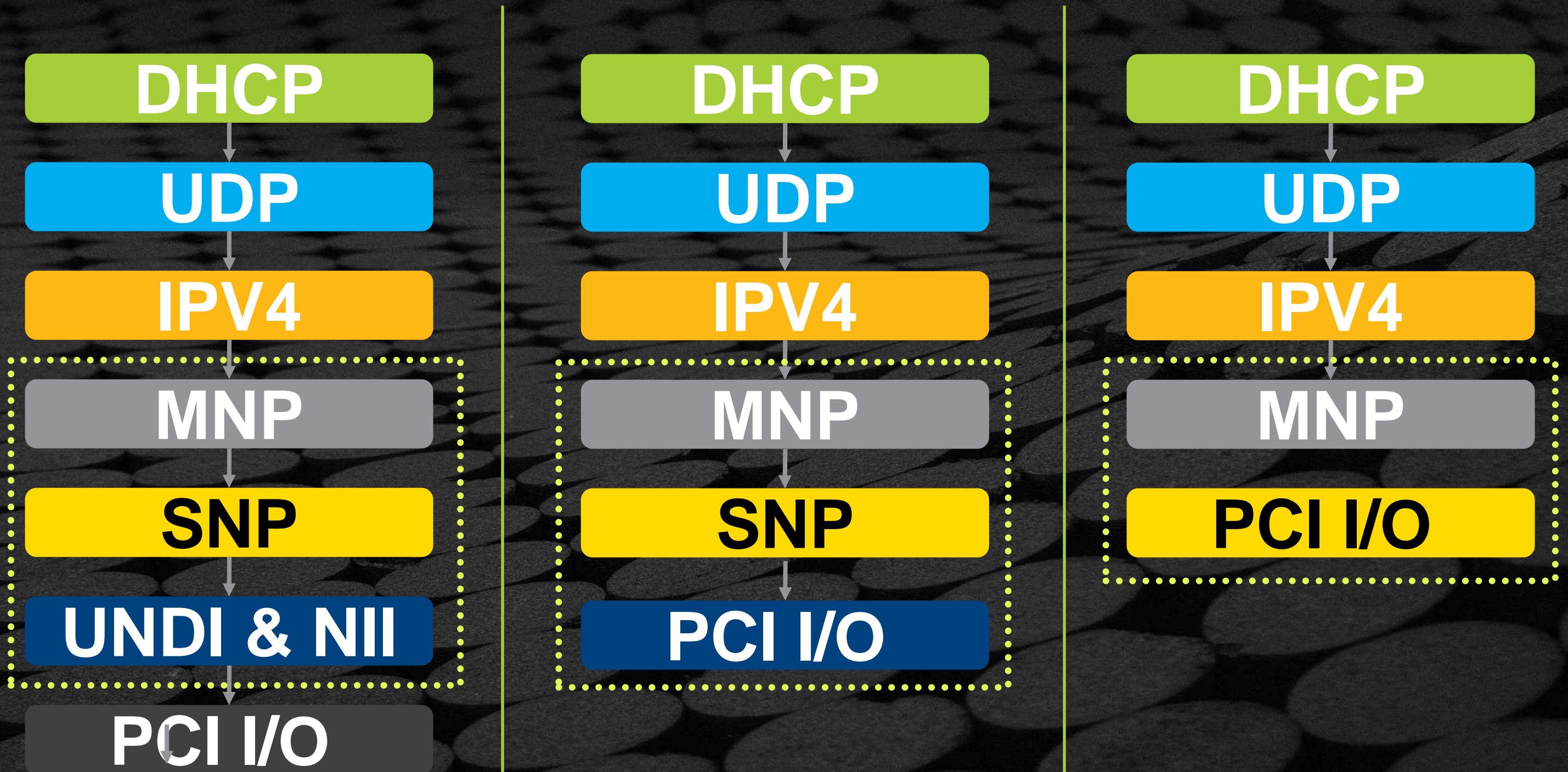- **MdeModulePkg/Bus/Pci/EhciDxe**
- **MdeModulePkg/Bus/Usb/***

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DHCP	DHCP	DHCP
UDP	UDP	UDP
IPV4	IPV4	IPV4
MNP	MNP	MNP
SNP	SNP	PCI I/O
UNDI & NII	PCI I/O	
PCI I/O		

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DHCP
↓
UDP
↓
IPV4
↓
MNP
↓
SNP
↓
UNDI & NII
↓
PCI I/O

DHCP
↓
UDP
↓
IPV4
↓
MNP
↓
SNP
↓
PCI I/O

DHCP
↓
UDP
↓
IPV4
↓
MNP
↓
PCI I/O

Driver Stack: Network

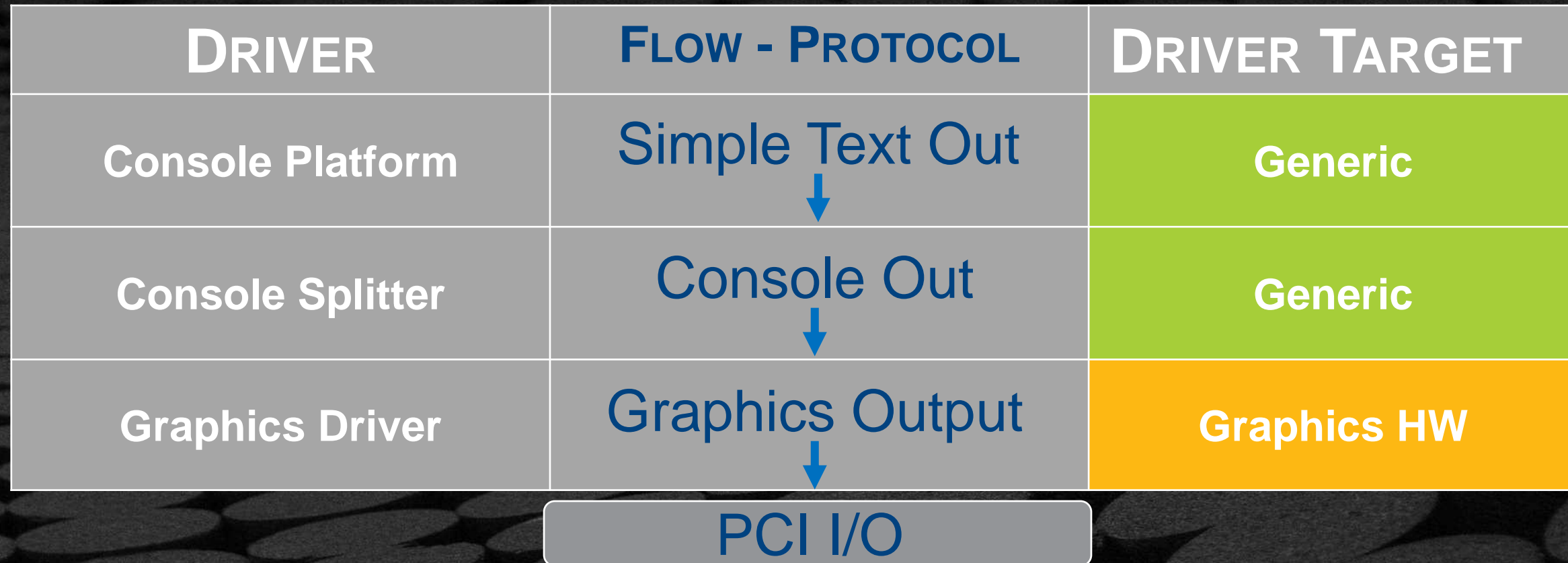| DRIVER	DRIVER TARGET
DHCP	Generic
UDP	Generic
IP	Generic
MNP	*One of these must be NIC HW specific*
SNP	
NII & UNDI	

Not Likely	
Medium Likely	
Very Likely	

EDK II Modules
- `MdeModulePkg/Universal/Network/*`
- `NetworkPkg/* (IPV6)`
- `OptionRomPkg/UndiRuntimeDxe (Intel NIC)`

Protocol and Driver Stack: Graphics

DRIVER	FLOW - PROTOCOL	DRIVER TARGET
Console Platform	Simple Text Out ↓	Generic
Console Splitter	Console Out ↓	Generic
Graphics Driver	Graphics Output ↓	Graphics HW

PCI I/O

Not Likely
Medium Likely
Very Likely

EDK II Modules
- `MdeModulePkg/Universal/Console/ . . .`
- `IntelFrameworkModulePkg/Csm/BiosThunk/VideoDxe`
- `<Misc>Pkg/GopDriver/IntelGopDriver . . .`
    `Intel GOP Driver`
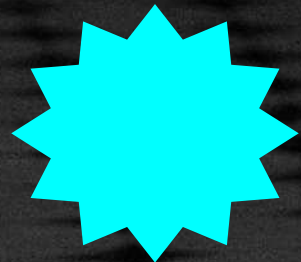- `silicon/<Misc>Pkg/GOP/ . . ./vbt.bin`

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UEFI Device Driver Model

See Section 2.6.3 of UEFI Specification

Follow the UEFI Driver Binding Protocol

EDK II Modules Example
`OptionRomPkg/UndiRuntimeDxe`

PLATFORM DXE DRIVERS

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Intel typically provides SMM Driver code
You're only required to provide platform-specific SMI handlers

Base Protocol
`/IA32FamilyCpuPkg/SmmBase/SmmBase.inf`

Access Protocol (SMRAM)
`/<MemCntlX>Pkg/SmmAccessDxe/SmmAccessDxe.inf`

Control Protocol (SMI)
`/<PchX>Pkg/SmmControlDxe/SmmControlDxe.inf`

MinnowBoard Max
- `<Access> Vlv2DeviceRefCodePkg/ValleyView2Soc/CPU`
- `<Control> Vlv2DeviceRefCodePkg/ValleyView2Soc/SouthCluster`

ACPI

Provides ACPI Table driver for a platform

Composed of ACPI Table Driver (generic) and ACPI Platform Driver (platform-specific)

Platform Driver runs during DXE (before BDS)

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ACPI tables**

`/NewPlatformPkg/AcpiTablesDxe/AcpiTablesDxe.inf`

ASL code**

`/NewPlatformPkg/AcpiTablesDxe/Asl/*.asl`
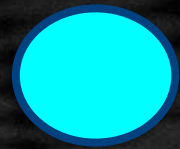
Platform specifics are in the ACPI platform driver

`/NewPlatformPkg/AcpiPlatformDxe/AcpiPlatformDxe.inf`

**MinnowBoard Max
- `<Tables and ASL Code> Vlv2DeviceRefCodePkg/AcpiTablesPCAT`

ACPI S3 Additional Features

○ **Platform Independent Modules**

`IntelFrameworkModulePkg/Universal/Acpi/AcpiS3SaveDxe...`

○ **ScriptSave driver**

`MdeModulePkg/Universal/Acpi/BootScriptExecutorDxe`

○ **Platform Dependent Modules**

```
PEI:
                                                         // Check for recovery paths or just an S3 resume.
<NewProjectPkg>/PlatformInitPei/BootMode.c               // Get S3 resume information for MRC


DXE:
 <NewProjectPkg>/PlatformDxe/Platform.c:                 // Set memory variable for S3 resume.


SMM:
<NewProjectPkg>/PlatformSmm/Platform.c                   // Allocate reserved ACPI memory for S3 resume
BDS:
<NewProjectPkg>/Library/PlatformBdsLib/BdsPlatform.c:    // Prepare S3 information
```

SMM, ACPI, & S3 Table

Feature	Driver Target
SMM Base	Generic
SMM Access	Generic
SMM Control	Generic
SMI Handlers	Platform Specific
ACPI Support Driver	Generic
ACPI Platform Driver	Platform Specific
S3 Universal Drivers	Generic
S3 Platform Driver	Platform Specific
ACPI Tables	Platform Specific
ASL Module	Platform Specific

Not Likely
Medium Likely
Very Likely

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BDS

BDS & BDS Libraries

`/MdeModulePkg/Universal/BdsDxe`

`/NewPlatformPkg/Library/NewPlatformBdsLib`

Areas of Concern

- Console Settings
- Language strings are contained in .UNI file
- Extended Memory Testing

Compatibility Support Module (CSM)

CSM 32 Component

8259 Chipset

`PcAtChipsetPkg/8259InterruptControllerDxe`

Legacy BIOS Region

`IntelFrameworkModulePkg/Csm`

Platform Specific

Legacy chipset support
`<RefCode>Pkg/<SoC>/SouthCluster/LegacyInterrupt/Dxe`

Platform specifics (i.e. MP tables)
`<RefCode>Pkg/<SoC>/CPU/CpuInit/Dxe/MpCommon`

Video ROM (may be platform specific)
`NewPlatformPkg/PciPlatform`

MinnowBoard Max
`<RefCode>Pkg/<SoC>:    Vlv2DeviceRefCodePkg/ValleyView2Soc`

SMBIOS

Memory Subclass Driver

MEMORY SUBCLASS DRIVER	TYPE
Physical Memory Array	Type 16
Memory Device	Type 17
Memory Array Mapped Address	Type 19
Memory Device Mapped Address	Type 20

Processor Subclass Driver

Processor Subclass Driver	Type
Processor Information	Type 4
Cache Information	Type 7

Platform Misc. Info

PLATFORM	TYPE
BIOS Information	Type 0
System Information	Type 1
System Enclosure	Type 3
System Slots	Type 9

Platform Location

`NewPlatformPkg/SmBiosMiscDxe`

SMBIOS Memory Location

`<MemCntlX>Pkg/SmBiosMemory`

Processor Information

`<IA32FamilyCpu>Pkg/CpuMpDxe/SMBIOS`

Not Likely
Medium Likely
Very Likely

MinnowBoard Max
- `<MemCtlX> Vlv2DeviceRefCodePkg/ValleyView2Soc/NorthCluster`

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Feature	Driver Target
BDS	Generic
CSM32	Generic
CSM16	Generic
CSM Platform	Platform Specific
SMBIOS	Platform Specific

Not Likely
Medium Likely
Very Likely

SUMMARY

- Locate driver locations for porting EDK II modules beyond the UEFI Shell for the New Project Platform

- Determine the protocols then the UEFI Driver with Devices on a platform

- The goal is to boot to the OS

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Questions?

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