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# 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

# Features Needed to Access OS

Add-in Card/ UEFI Driver Related

Platform Related DXE Driver Related

# Features Needed to Access OS

## Add-in Card/ UEFI Driver Related

| | |
|---|---|
| USB | Graphics |
| LAN | Integrated PCI Devices |
| IDE/SATA | |

## Platform Related DXE Driver Related

# 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
- ACPI
- ACPI S3
- BDS
- CSM
- SMBIOS

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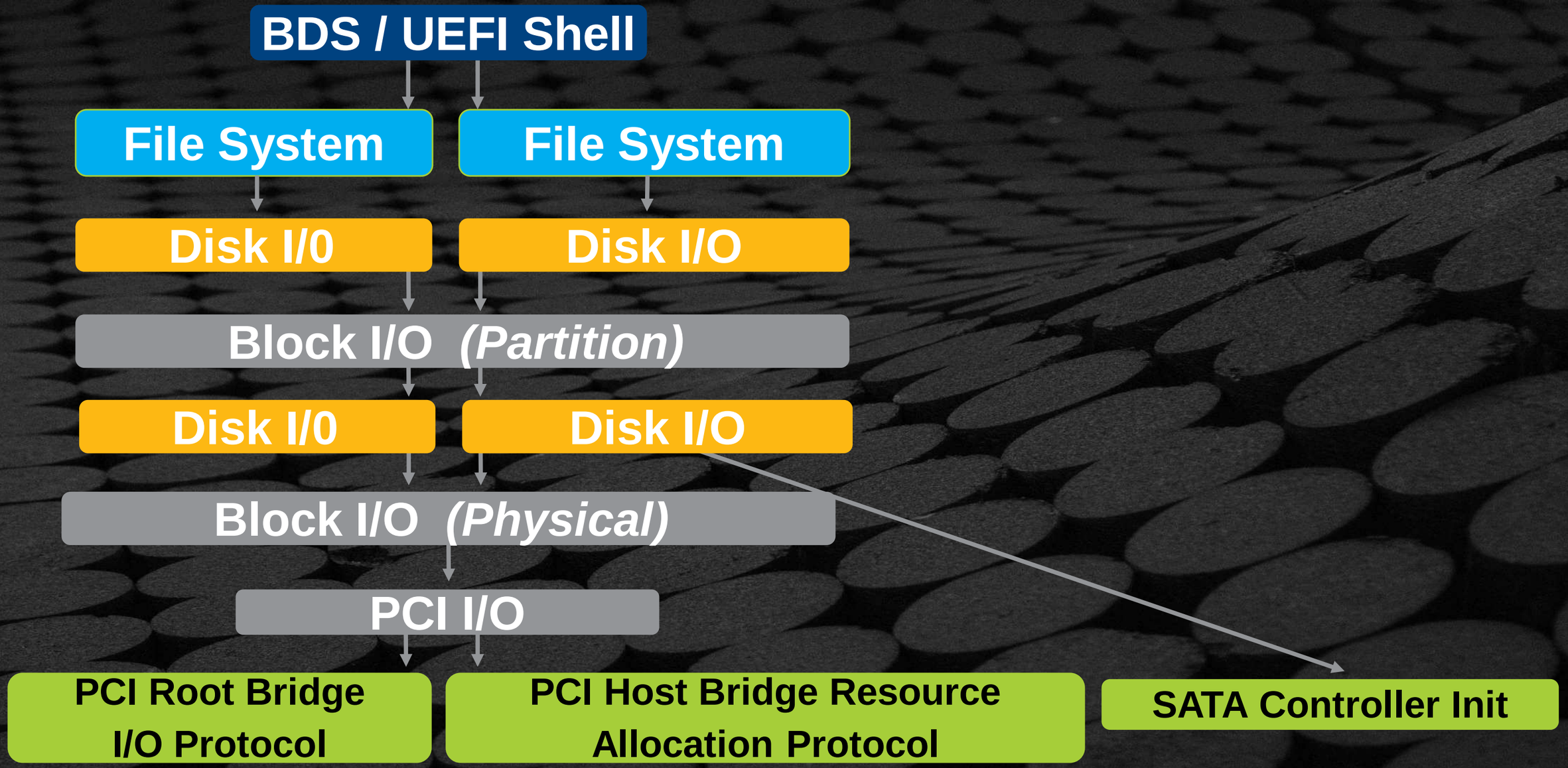
# ADD-IN CARD

Locate UEFI Drivers related to Add-in Cards

# Protocol Stack: IDE/SATA



# Driver Stack: IDE/SATA

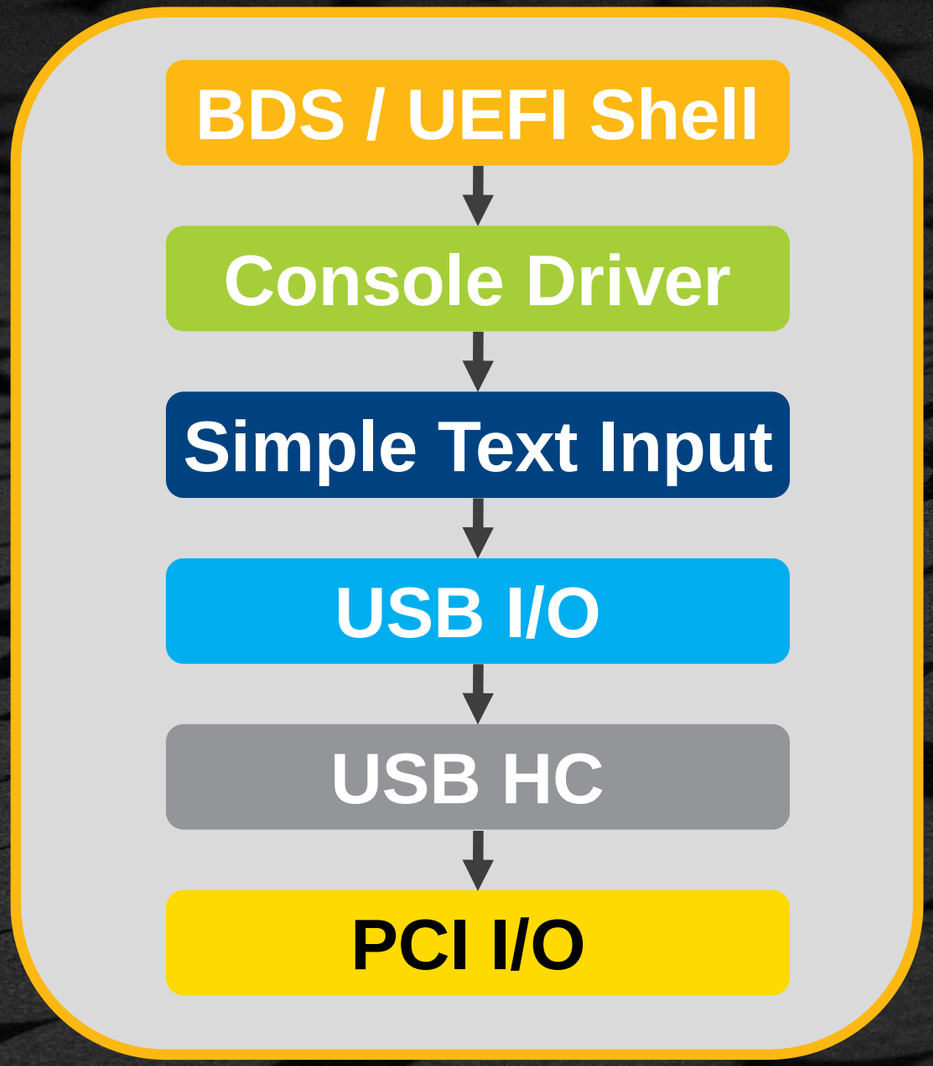
| Driver | Driver Target |
|---|---|
| BDS and UEFI Shell | Generic |
| FAT | Generic |
| Partition | Generic |
| Disk I/O | Generic |
| ATA Bus | PCAT |
| PCI Bus | Generic |
| PCI Root Bridge | Memory Controller |
| PCI Host Bridge | Memory Controller |
| SATA Controller Init | PCH |

Not Likely
Medium Likely
Very Likely

EDK II Modules

- **`MdeModulePkg/Bus/Ata/AtaBusDxe`**
- **`Vlv2DeviceRefCodePkg/ValleyView2Soc/SouthCluster/SataController/Dxe`**

# Protocol Stack: USB



# Driver Stack: USB

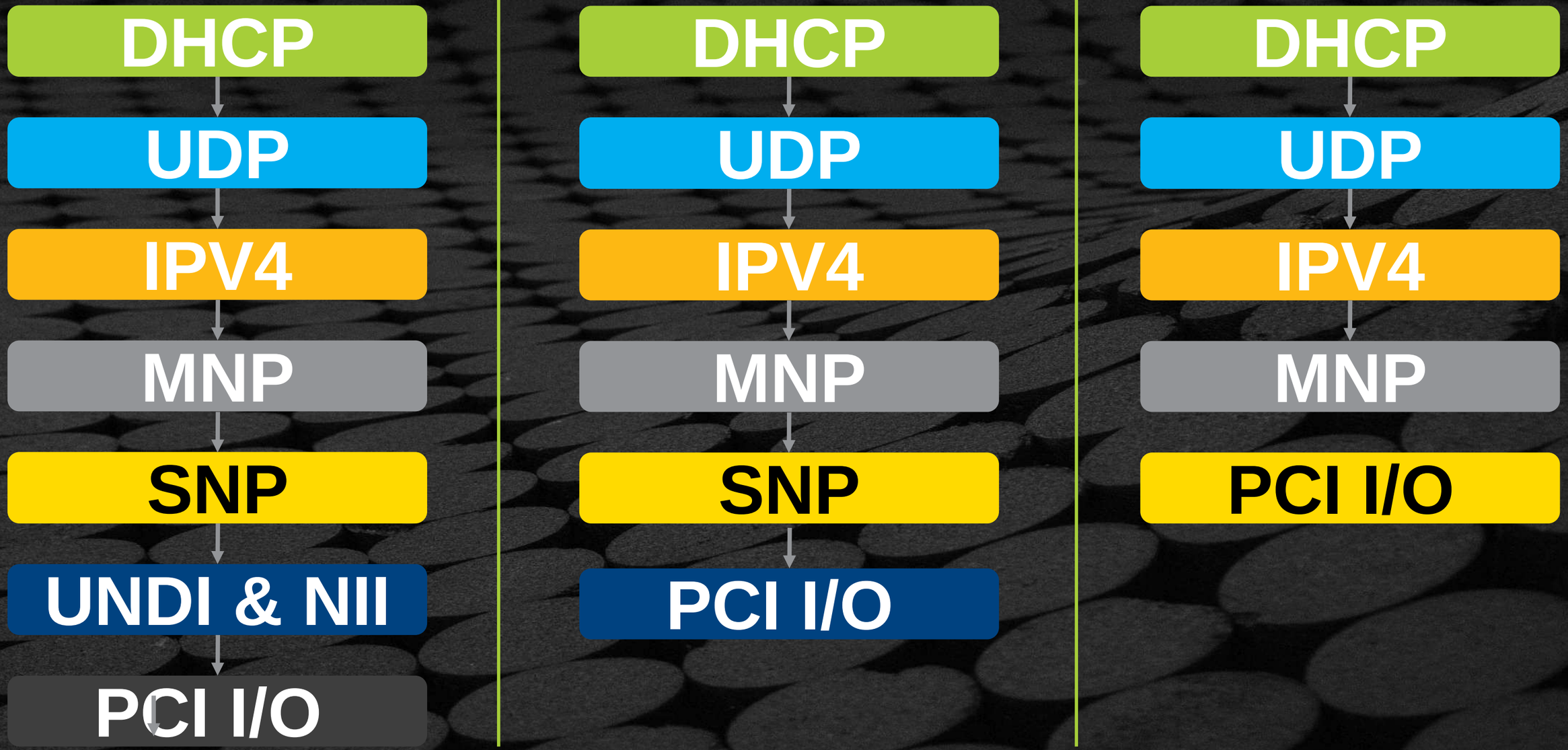
| Driver | Driver Target |
|---|---|
| BDS and UEFI Shell | Generic |
| Console Driver | Generic |
| USB KB Driver | Generic |
| USB Bus Driver | Generic |
| USB Host Controller | USB Controller Specific |

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

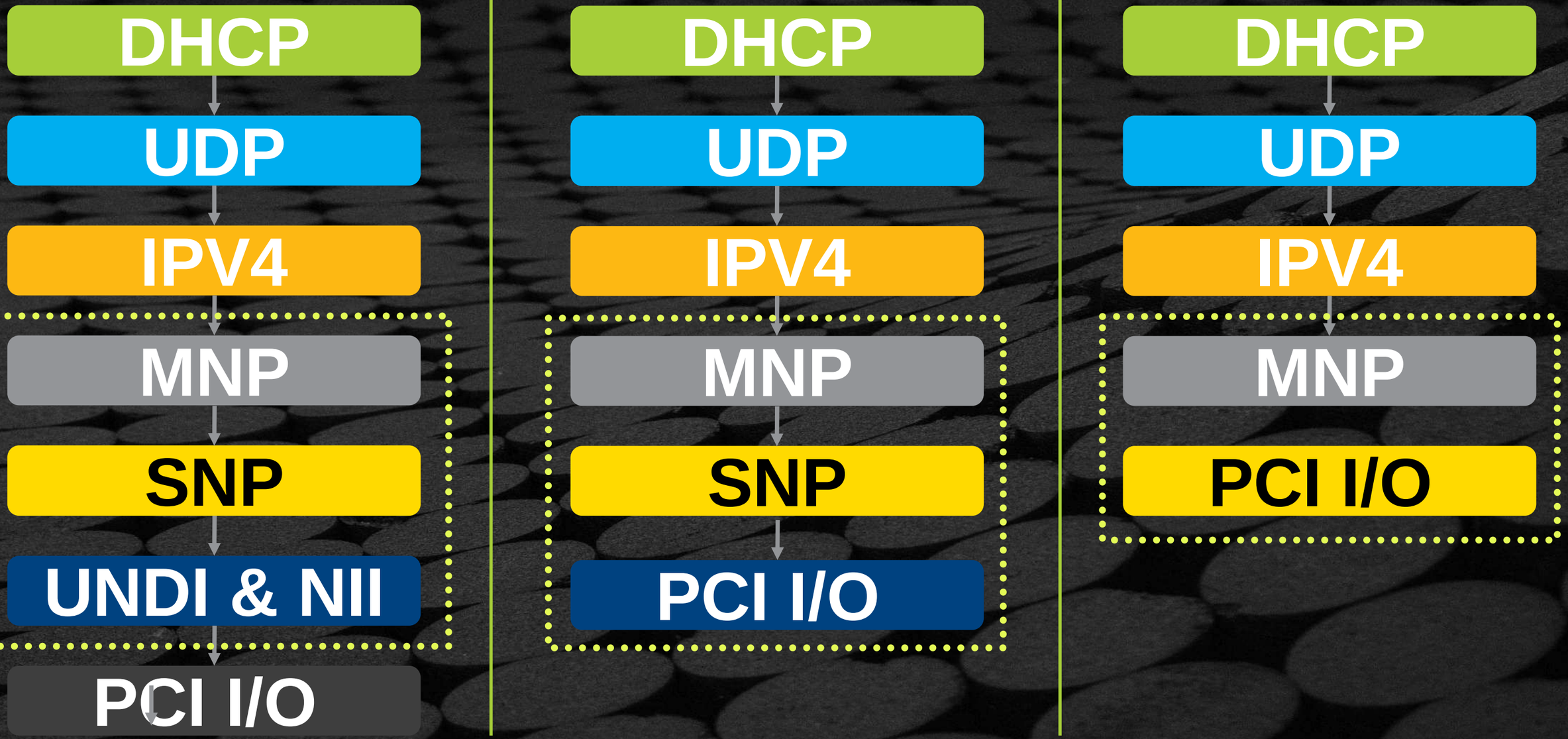
EDK II Modules

- **MdeModulePkg/Bus/Pci/UhciDxe/**
- **MdeModulePkg/Bus/Pci/EhciDxe**
- **MdeModulePkg/Bus/Usb/***

# Protocol Stack: Network



# Protocol Stack: Network



# 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

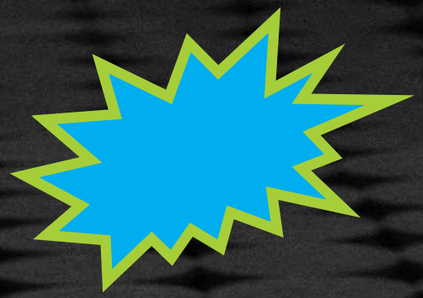
| Driver | Flow - Protocol | Driver Target |
|---|---|---|
| Console Platform | Simple Text Out | Generic |
| Console Splitter | Console Out | Generic |
| Graphics Driver | Graphics Output | Graphics HW |
| | PCI I/O | |

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**

# Integrated PCI Devices: Option ROMs



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

# SMM Related

## 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)

# ACPI Locations

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:**

`<NewProjectPkg>/PlatformInitPei/BootMode.c`

```
// Check for recovery paths or just an S3 resume.
// 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

# 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 |

## SMBIOS Memory Location

**<MemCntlX>Pkg/SmBiosMemory**

## Processor Information

**<IA32FamilyCpu>Pkg/CpuMpDxe/SMBIOS**

**MinnowBoard Max**

- **<MemCtlX> Vlv2DeviceRefCodePkg/ValleyView2Soc/NorthCluster**

## 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**

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

# BDS, CSM and SMBIOS Table

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

Not Likely
Medium Likely
Very Likely

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# 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


Questions?


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