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TYPE C DOCKING BUILT IN SECURITY STORAGE

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Type C Docking Built in Security Storage

Abstract:

Recently, with all the lightweight and extremely thin ultra-book design, the storage is becoming one of challenge as a trade-off for user to have high volume storage. The objective here is to deliver a high-volume external storage built into type C docking and also protected with specific security mechanism.

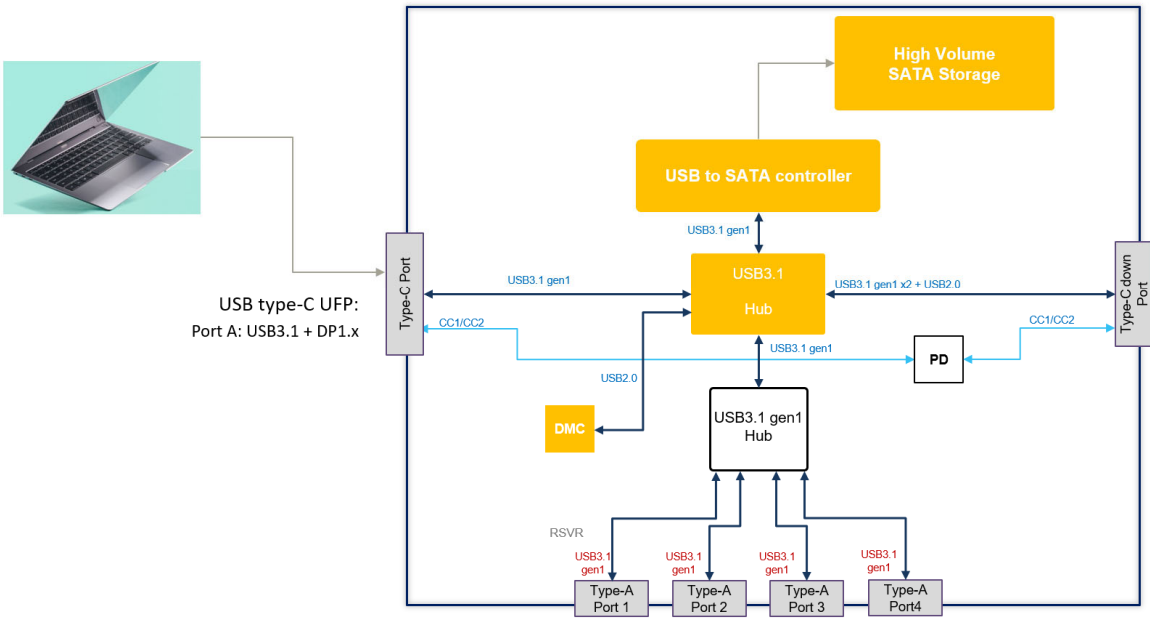
- User is able to operate their laptop on their office desk with high volume external storage and specific secure access
- User is also able to enjoy the light weight and thin chassis when they travel with the laptop

Prior Art

In the past, the type C docking is never merged with built in storage. And there's no security protection for the user plug in USB storage.

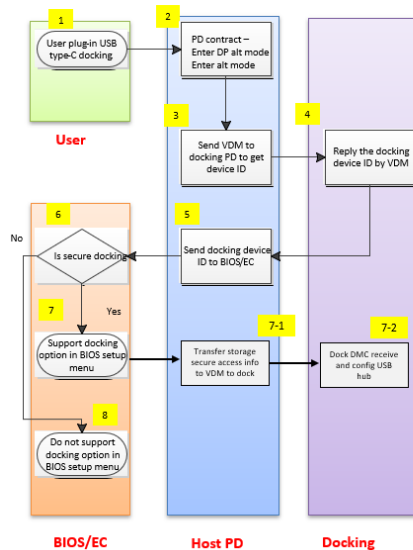
Design Block Diagram

- We provide a type-C dock design solution with key component
 - DMC (dock management controller)
 - USB HUB
 - USB to SATA controller
- Basic connection topology will be
 - laptop and docking power delivery IC complete the CC contract and then laptop XHCI controller establish the USB connection with docking USB HUB and end device.
 - Laptop is able to enumerate the docking SATA storage with USB/SATA controller.
 - User is able to read/write even boot to OS from the dock SATA storage.



< Flow Chart and Block Flow Diagram >

Product Drawing and Algorithm



• Security protection to access docking storage

- Step1: User :** User plug-in USB type-C docking in S0 or SX.
- Step2: host/docking PD :** Enter DP alternative mode for USB connection establish
Enter vendor defined alternative mode for VDM communication
- Step3: Host PD :** Send VDM to docking PD to get device ID.
- Step4: Docking PD :** Reply the docking device ID by VDM.
- Step5: Host PD :** Send docking device ID to BIOS/EC. Host PD can communicate with EC by I2C interface.
- Step6: BIOS/EC:** Is security storage docking? Check the USB-C docking device ID. We only support docking option in BIOS setup menu when the docking is the specific security storage docking.
Yes, go to step7. **No,** go to step8.
- Step7: BIOS/EC :** Support docking option in BIOS setup menu. Will show the password setting for storage security access option in BIOS setup menu when user press hotkey to enter BIOS setup menu. User is able to config that specific docking storage mapping with this laptop.
- Step7-1: BIOS/EC** send the storage security access enable and password to host PD and transfer message to VDM to docking PD/DMC.
- Step7-2: Docking DMC** then config the USB HUB to enable the USB-SATA controller port
- Step8: BIOS/EC :** Do not support docking option in BIOS setup menu. Won't show the docking option in BIOS setup menu when user press hotkey to enter BIOS setup menu.

Business Strategy/Advantages

1. Much increase user friendly experience of ultra-laptop and storage docking solution upon this solution, **light weight, flexible connection and security access protection.**
2. VDM on CC communication happen even is S5, user is even able to boot to the OS on the docking storage.
3. Don't detect **docking device hardware during POST** to decide which docking option showing in BIOS setup menu. It will impact boot time to do the hardware detection. Follow the **docking device ID from EC** to show the docking option in BIOS setup menu. The docking device ID is updated when docking plug-in or plug-out, not during the POST. **It doesn't impact boot time to detect the docking device.**
4. The VDM is a standard in Power delivery protocol. We use the VDM to implement the docking detection and docking device control. No addition hardware component and easy to implement in current NB system.
5. User can enable/disable/configure docking devices in BIOS setup menu. BIOS can enable/disable/configure docking devices from EC to docking via **VDM**. This is able to leave high flexibility to user to decide to lock the storage for one person or all the user.

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