

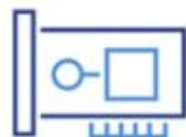
Solution operation and life cycle management

Initial setup and firmware updates for the DSE solution

Lenovo

vSphere on DPU

The concept of the Distributed Services Engine is vSphere on DPU. The solution allows VMware to offload and accelerate infrastructure service functions on to DPUs. For example, storage services, network services, and infrastructure management can all be offloaded from the CPU to the DPU, allowing more CPU resources to be used for your workload.



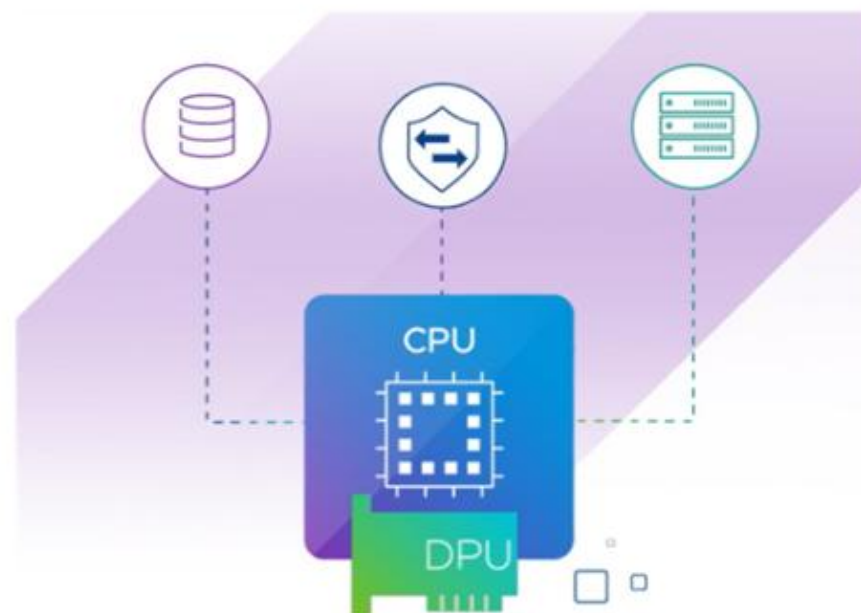
Offload and accelerate infrastructure service functions on DPUs



Simplify lifecycle management of DPUs



Isolation of workload domain from the infrastructure domain

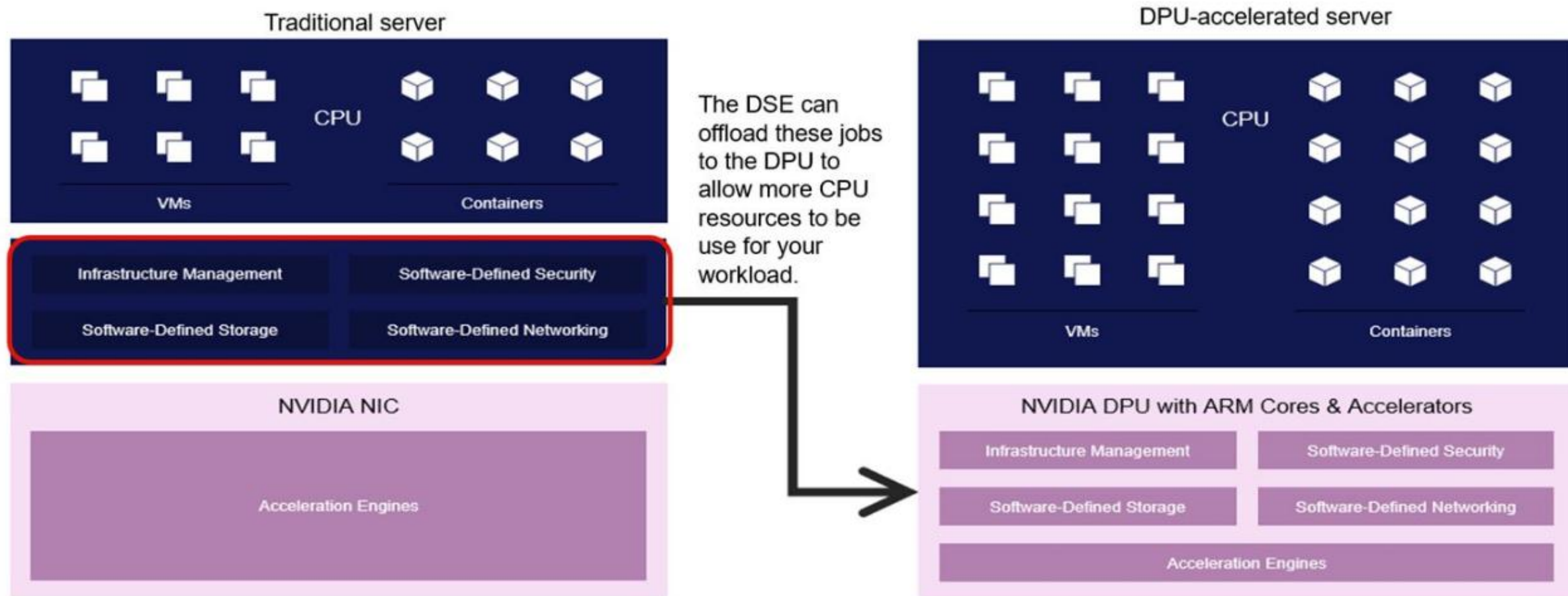


vSphere on DPUs

Enabled by vSphere Distributed Services Engine

DPU-accelerated servers

The following figures show a comparison between traditional servers and DPU-accelerated servers.



ThinkAgile VX DPU models

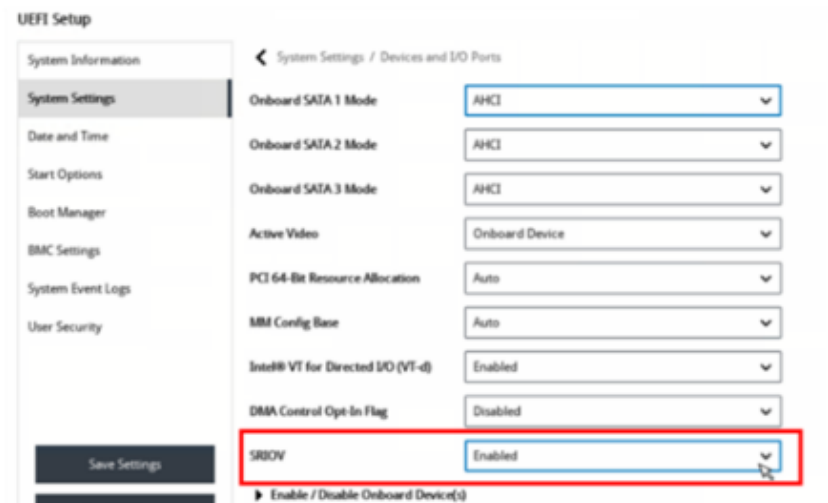
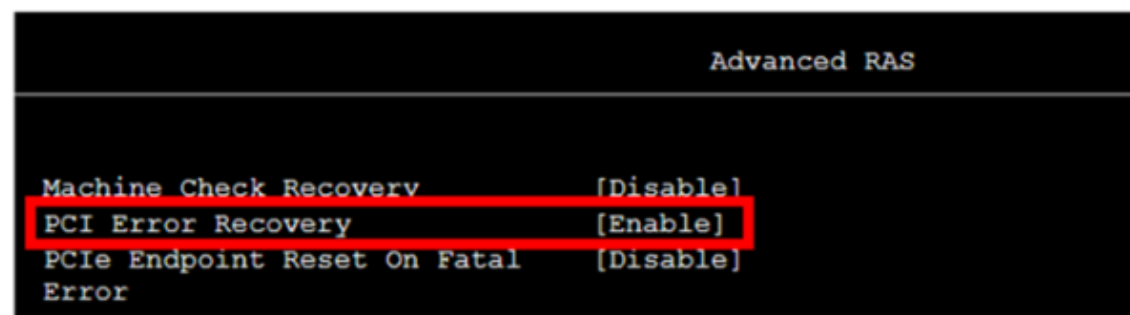
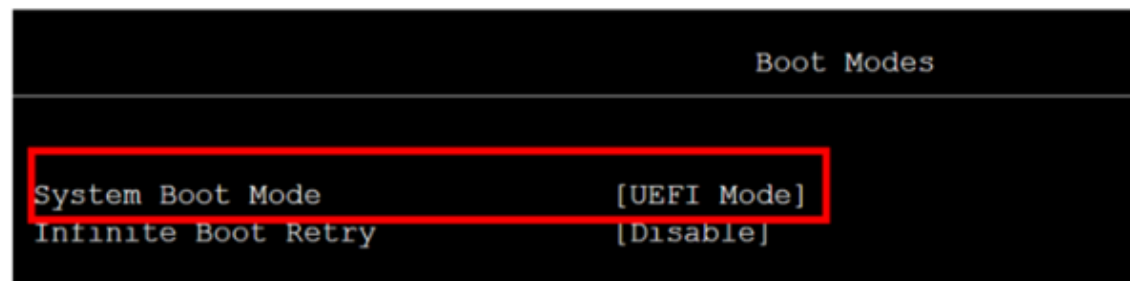
The ThinkAgile VX CTO models with the Distributed Services Engine have the following features:

- DPU settings applied at NVIDIA
- ThinkAgile VX node UEFI settings applied in the factory (also listed in the Best Recipe)
- ESXi 8.0 U1 preloaded in the factory for Certified Nodes (CN) and Integrated Systems (IS)
- The OS will be installed on both the M.2/7 mm drive and the DPU
- UEFI, XCC, and DPU firmware (NIC and ARM) and driver versions will be maintained in the existing Best Recipes Cycle releases
- All code can be updated via vLCM using the ThinkAgile VX Repository Pack – this will be included in LXCI June 2023 release.

UEFI settings for the DSE solution

To work with the DSE, apply the following UEFI settings:

- Set **System Boot Mode** to **UEFI Mode**
 - **F1** → **Boot Manager** → **Boot Mode**
- Enable **PCIe Error Recovery**
 - **F1** → **System Settings** → **Recovery and RAS** → **Advanced RAS**
- Enable **SRIOV** (needed for VMware NSX offloading)
 - **F1** → **System Settings** → **Device and IO Ports**
 - This item is only available when the correct adapters are installed in the system



OCP Enablement Kit for vSphere DSE identification in XCC

If equipped, the OCP Enablement Kit for vSphere DSE will be identified as the **Rear_OCP_Card** in XCC. Users can also check the part number or FRU number for further confirmation.

Other Hardware ?					
Name	Manufacture ID	Serial Number	Manufacture Date	Part Number	FRU Number
IO_Board	LENOVO	L3HF29J00M1	2022-10-24	STA7A90421	03KM422
ROT_Board	LENOVO	L2HF2AD00SA	2022-10-17	STA7B28783	03KM033
Rear_OCP_Card	Lenovo	L1HF2C9000V	2023-01-04	SN37B41311	03GX844
PCIe_Riser_1	LENOVO	L1HF27D0019	2022-07-25	STA7A90440	03KL993
PCIe_Riser_2	LENOVO	L1HF27D0002	2022-09-19	STA7A90440	03KL993
SFF_Retimer_1	LENOVO	V1HZ2AP005Y	2022-11-07	SC57A26292	02JG693

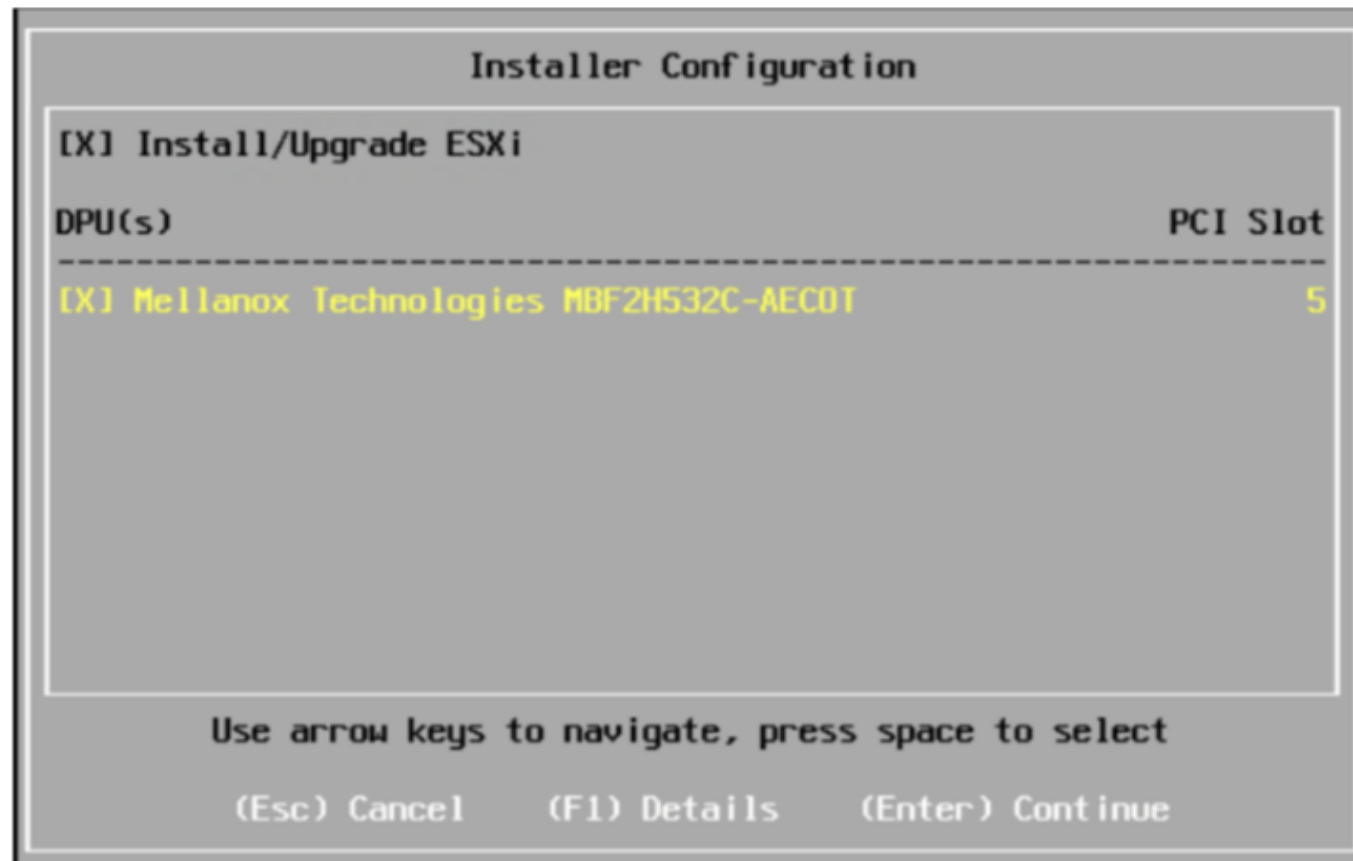
BlueField-2 identification in XCC

The BlueField-2 DPU adapter will be identified as shown below. Users can also check the FRU number for further confirmation.

PCI Adapters ?				
Slot	Device Name	Device Type	Card Interface	FRU Number
OnBoard	ASPEED AST2600 VGA	GPU	OnBoard	N/A
OnBoard	PCH Integrated SATA Controller 0	SATA Controller	OnBoard	N/A
OnBoard	PCH Integrated SATA Controller 1	SATA Controller	OnBoard	N/A
OnBoard	PCH Integrated SATA Controller 2	SATA Controller	OnBoard	N/A
5	Nvidia BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto		PCI-E x8	03GX901
	Nvidia BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto 00:AB:00:00	Ethernet	PCI-E x8	
	Nvidia BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto 00:AB:00:01	Ethernet	PCI-E x8	

BlueField-2 identification in the ESXi installation

The BlueField-2 adapter will be identified as a Mellanox adapter in the ESXi installation (the adapter name will be amended in the future release). Customers will not generally see this screen, as the OS will be installed in the factory before the system is shipped.



BlueField-2 firmware identification

The BlueField-2 firmware version can be identified in the XCC **Firmware Update** section.

XClarity Controller 2 | ThinkAgile VX650 V3 I5 | System name: | Service Log | USERID | 3:38 PM

Component	Status	Version	Identifier	Release Date
UEFI	Active	1.20	ESE113A	2023-02-10
LXPM	Active	4.05	EAL1050	2023-01-16
LXPM Windows Drivers	Active	4.05	EAL301S	2023-01-17
LXPM Linux Drivers	Active	4.05	EAL201O	2023-01-17
Embedded OS	N/A	1.02	EAL501J	2023-03-16

Adapter Firmware | Update Firmware ?

Note: the system must have completed booting at least once for all adapters to be detected. Activation of retimer device needs a host power cycle.

Slot No.	Device Name	Status	Version	Manufacturer	Release Date
1	Gen4 SFF Retimer	Active	1.15.1	Lenovo	N/A
2	Gen4 SFF Retimer	Active	1.15.1	Lenovo	N/A
4	Gen4 SFF Retimer	Active	1.15.1	Lenovo	N/A
5	Nvidia BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto	Active	24.33.1246	Mellanox Technologies	2023/01/10

The OneCli `scan` command can also be used to check BlueField-2 firmware information. Click [here](#) to learn more about the command.

```
OneCli.exe update scan --bmc <user>:<pw>@<ip>
```

No.	Updatable Unit	Slot	Installed Version
10	Nvidia BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto (BlueField UEFI)	PCI_Slot 2	18.2.0.12580

BlueField-2 settings in the ARM UEFI

This screenshot from the ARM UEFI shows the BlueField-2 settings applied by NVIDIA. This information is just for reference, and servicers or customers will not need to do anything with it.



ThinkAgile VX DSE solution firmware updates with vLCM

To update the firmware of the ThinkAgile VX with DSE solution:

- Check [ThinkAgile VX Best Recipe](#) for the latest supported and certified code stack
- Only certified UEFI, XCC, and BlueField-2 code can be used on DPU models – for more information, refer to the [Checking compatibility with the VMware Compatibility Guide](#) page in this course
- All hosts in the cluster must have homogenous hardware configurations (the same DPU)
- Only one DPU per host

Note: For more information about vLCM, refer to the following document: [Working with the vSphere Lifecycle Manager function](#).

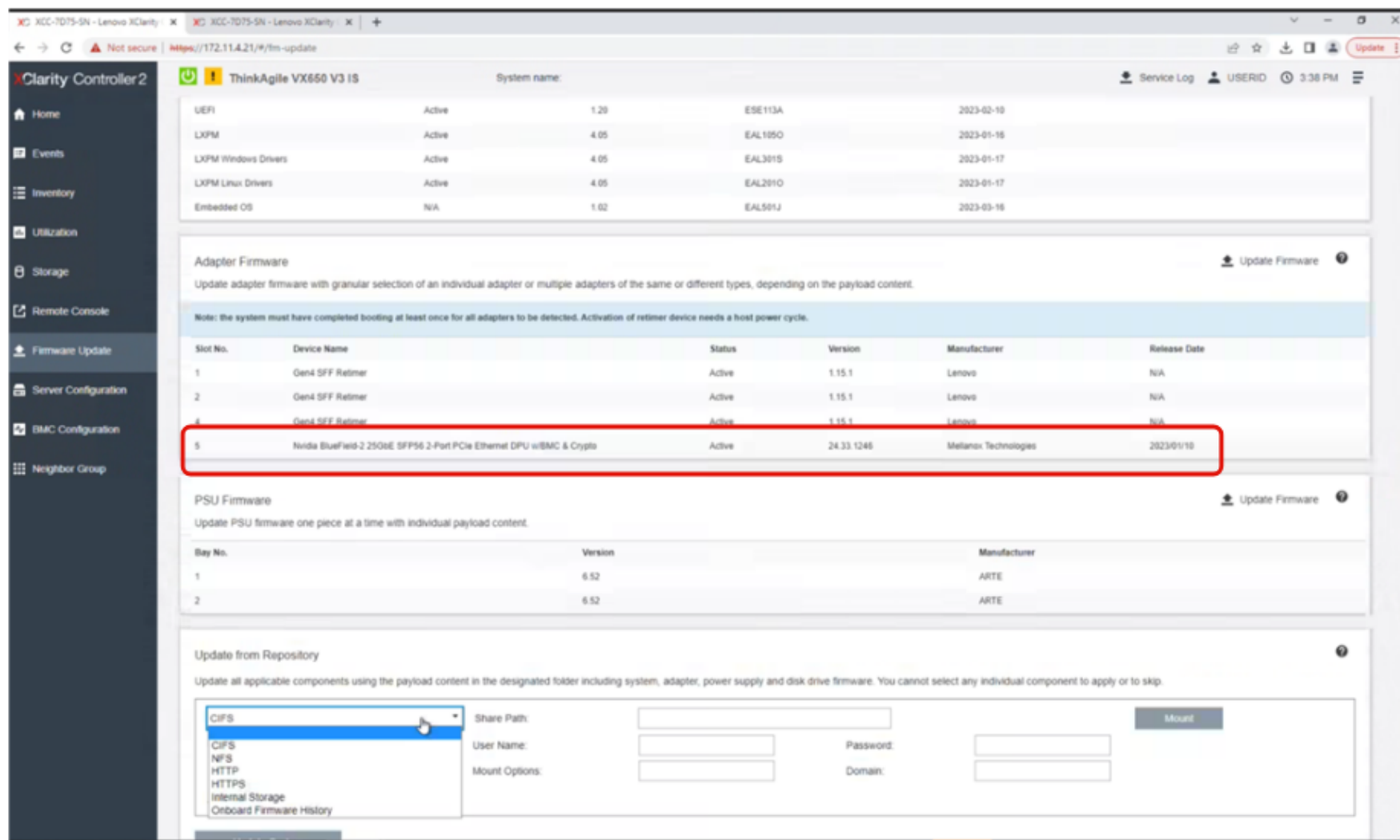
The screenshot displays the Telco NanoEdge vLCM interface. The top navigation bar includes 'Summary', 'Monitor', 'Configure', 'Permissions', 'Hosts', 'VMs', 'Datastores', 'Networks', and 'Updates' (which is the active tab). A left sidebar shows a tree view with 'Hosts' expanded, containing 'Baselines', 'Image' (selected), 'VMware Tools', 'VM Hardware', and 'Cluster Settings'. The main content area shows a message: 'Identified standalone vib(s) vmware-fdm 7.0.2-17694817 belonging to vSphere FDM 7.0.2-17694849 solution component.' Below this is 'Step 1: Define Image' with an 'EDIT' button. The text states: 'Hosts in this cluster are managed collectively. This image below will be applied to all hosts in this cluster.' A table lists the configuration details:

ESXI Version	7.0 U2a - 17867351
Vendor Addon ⓘ	Lenovo Customization Addon for Lenovo ThinkSystem LVO.702.10.1
Firmware and Drivers Addon ⓘ	Lenovo ThinkSystem Server Repository Pack 3.2.0
Components ⓘ	No additional components Show details

At the bottom, there is a progress indicator: 'Checking for HCL compatibility issues...' with a circular progress bar.

Manual ARM firmware update process

After installing the BMU (Bare Metal Update) OS, the firmware can be seen in XCC and updated with the new firmware update package.



The screenshot shows the XCC (XClarity Controller) interface for a ThinkAgile VX650 V3 IS system. The left sidebar contains navigation options: Home, Events, Inventory, Utilization, Storage, Remote Console, Firmware Update (selected), Server Configuration, BMC Configuration, and Neighbor Group. The main content area displays the 'Firmware Update' section, which includes a table of system components and their firmware versions. A red box highlights the 'Nvidia BlueField-2 250GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto' component, which is currently active and has a version of 24.33.1246. Below this, there are sections for 'Adapter Firmware' and 'PSU Firmware', each with an 'Update Firmware' button. At the bottom, there is a section for 'Update from Repository' with a dropdown menu for selecting the update source (CIFS, NFS, HTTP, HTTPS, Internal Storage, Onboard Firmware History) and fields for 'Share Path', 'User Name', 'Password', and 'Domain'.

Slot No.	Device Name	Status	Version	Manufacturer	Release Date
1	Gen4 SFF Retimer	Active	1.15.1	Lenovo	N/A
2	Gen4 SFF Retimer	Active	1.15.1	Lenovo	N/A
4	Gen4 SFF Retimer	Active	1.15.1	Lenovo	N/A
5	Nvidia BlueField-2 250GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto	Active	24.33.1246	Mellanox Technologies	2023/01/18

Bay No.	Version	Manufacturer
1	6.52	ARTE
2	6.52	ARTE

Enabling network offloads in vSphere

Work through the following steps to enable network offloads in vSphere:

1. [Create a vSphere Distributed Switch](#)
2. [Add Hosts to a vSphere Distributed Switch](#)
3. [Configure NSX host transport node on DPU-enabled vSphere Lifecycle Manager cluster](#)
4. [View the Topology of Network Offloads Switch](#)

The screenshot shows the VMware vSphere documentation interface. At the top, there's a navigation bar with the VMware logo, 'Docs', a search bar, and links for 'EN', 'VMware Pages', 'MyLibrary', and 'Login'. Below this, the main content area is titled 'VMware vSphere' and 'Product Documentation'. The left sidebar shows a tree view under 'Expand All' with categories like 'Compatibility', 'Create a vSphere Distributed Switch' (highlighted), 'Upgrade a vSphere Distributed Switch to a Later Version', and 'Edit General and Advanced vSphere Distributed Switch'. The main content area displays the article 'Create a vSphere Distributed Switch' with social media sharing icons (Twitter, Facebook, LinkedIn), action links (Add to Library, RSS, Download PDF, Feedback), and a date 'Updated on 09/21/2022'. A dropdown menu shows 'Selected product version: VMware vSphere 8.0'. The article text begins with 'Create a vSphere distributed switch on a data center to handle the networking configuration of multiple hosts at a time from a central place.'

Creating a new distributed switch with a DPU in vSphere

- Install ESXi on the boot device (M.2/7 mm) and DPU
- Create a distributed switch
 - In the vSphere Client, right-click a data center from the inventory tree
 - Datacenter → Distributed Switch → New Distributed Switch
- Create a name or accept the default generated name
- Select **Distributed Switch 8.0.0**
- Select **Type of Networking Offloads Capability**
- Select **Configure Settings → Network Offloads compatibility → NVIDIA BlueField**
- Select the number of uplinks (equal to the port number of the BlueField-2 adapter installed in the system)
- Enable **Network I/O Control**
- (Optional) Create port groups

The screenshot shows the 'New Distributed Switch' wizard in vSphere, specifically the 'Configure settings' step. On the left, a progress bar indicates four steps: 1. Name and location, 2. Select version, 3. Configure settings (which is the active step), and 4. Ready to complete. The main area on the right is titled 'Configure settings' and includes a close button (X). Below the title, it says 'Specify network offloads compatibility, number of uplink ports, resource allocation and default port group.' The settings are as follows: 'Network Offloads compatibility' is a dropdown menu with 'NVIDIA BlueField' selected and highlighted by a red rectangle; 'Number of uplinks' is an empty input field; 'Network I/O Control' is a dropdown menu with 'Disabled' selected; 'Default port group' has a checked checkbox for 'Create a default port group'; and 'Port group name' is a text field containing 'DPortGroup 1'. At the bottom right, there are three buttons: 'CANCEL', 'BACK', and 'NEXT'.

Step	Description
1	Name and location
2	Select version
3	Configure settings
4	Ready to complete

Configure settings

Specify network offloads compatibility, number of uplink ports, resource allocation and default port group.

Network Offloads compatibility: NVIDIA BlueField (selected)

Number of uplinks:

Network I/O Control: Disabled

Default port group: ☒ Create a default port group

Port group name: DPortGroup 1

CANCEL BACK NEXT

vSphere DPU identification

After completing the configuration, the DPU can be identified in vSphere.

The screenshot displays the vSphere Web Client interface for a host named 172.21.53.23. The left sidebar shows a tree view with the host selected. The main content area is divided into several panels:

- Host Details:** Provides information about the hypervisor (VMware ESXi), model (ThinkAgile VX650 V3 IS), processor type (Intel(R) Xeon(R) Gold 6448H), logical processors (128), DPU (1), NICs (3), virtual machines (3), state (Connected), and uptime (2 hours).
- Capacity and Usage:** Shows CPU usage (2.808 GHz used, 153.6 GHz allocated), memory usage (117.39 GB used, 1,023.68 GB allocated), and storage usage (934.54 GB used, 6.57 TB allocated).
- Configuration:** Lists image profile (LVO_8.0.1-LVO.801.10.1), vSphere HA State (? N/A), Fault Tolerance (Legacy) (Unsupported), Fault Tolerance (Unsupported), and EVC Mode (Disabled).
- Related Objects:** Shows the cluster TAVX-Cluster.
- Hardware:** Lists CPU (128 CPU(s) x Intel(R) Xeon(R) Gold 6448H), Memory (1023.68 GB), Virtual Flash Resource (0 B / 0 B), DPU (NVIDIA BlueField-2), Networking (2 Network(s)), and Storage (3 Datastore(s)).
- Tags:** Indicates no tags are assigned.

The bottom of the interface includes tabs for Recent Tasks and Alarms.

vSphere DPU identification - continued

After completing the configuration, the DPU can be identified in vSphere.

