Application Notes

PCIe HSM Server Compatibility Requirements

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1. Hardware security modules

The nShield Solo XC and 5s hardware security modules are intended for installation into a certified personal computer, server, or similar equipment. If the intended installation environment can supply the required electric power, and sufficient cooling, multiple modules can be installed.

2. HSM hardware requirements

A brief overview of the minimum hardware requirements for the nShield Solo XC and 5s HSMs are highlighted below. For the full list of requirements to handle the card, see the *Solo Install Guide* and *nShield 5s Install Guide* respectively.

Category	Requirement
Power	24W
Cooling	1.9 m/s airflow
Connection	PCIe x4 Interface
Notes	Charged Internal Battery

3. Minimum server installation requirements

3.1. Server hardware requirements

Category	Requirement
Power	24W per available module
Memory Storage	16 GB
RAM	2 GB
Connection	PCIe x4 slot Gen2

3.2. PCIe Compatibility

The future PCIe specifications (Gens 3.x, 4.x, 5.x) have made no changes that affect the compatibility of nShield XC and 5s HSM with the PCIe standard. Units should be able to operate in a host that implements a newer standard than Gen2.

4. Information for Solo XC

4.1. OS compatibility

This compatibility list is provided for Solo XC units running with Security World version 12.50 or later appropriate versions. No guarantees of compatibility are provided for previous versions of the software. Refer to the *Security World Release Notes* to verify compatibility with the selected OS version.

Windows		
Server Editions	**Architecture**	**Compatible Firmware**
Windows Server 2008r2	x64	12.50
Windows Server 2012r2	x64	12.50, 12.60, 12.70, 12.80
Windows Server 2016	x64	12.50, 12.60, 12.70, 12.80, 13.3
Windows Server 2016 Core	x64	12.50
Windows Server 2019	x64	12.60, 12.70, 12.80, 13.3, 13.5, 13.6
Windows Server 2019 Core	x64	12.60, 12.70, 12.80, 13.3, 13.5, 13.6
Windows Server 2022	x64	12.81, 13.3, 13.5, 13.6
Windows Server 2022 Core	x64	12.81, 13.3, 13.5, 13.6
Desktop Editions	**Architecture**	**Compatible Firmware**
Windows 7	x64	12.50, 12.60
Windows 10	x64	12.50, 12.60, 12.70, 12.80, 13.3, 13.5, 13.6
Windows 11	x64	13.3, 13.5, 13.6

Linux		
Red Hat Edition	**Architecture**	**Compatible Firmware**
RHEL6	x64, x86	12.50, 12.60, 12.70, 12.80
RHEL7	x64	12.50, 12.60, 12.70, 12.80, 13.3, 13.5, 13.6
RHEL8	x64	12.60, 12.70, 12.80, 13.3, 13.5, 13.6
RHEL9	x64	13.3, 13.5, 13.6

Linux		
SUSE Edition	**Architecture**	**Compatible Firmware**
SUSE 11	x64	12.50, 12.60
SUSE 12	x64	12.50, 12.60, 12.70, 12.80, 13.3
Oracle Enterprise Edition	**Architecture**	**Compatible Firmware**
Oracle Linux 6	x64	12.50, 12.60, 12.70, 12.80
Oracle Linux 7	x64	12.50, 12.60, 12.70, 12.80, 13.3
Oracle Linux 8	x64	12.70, 12.80, 13.3, 13.5, 13.6
Oracle Linux 9	x64	13.5, 13.6

Unix		
Solaris	**Architecture**	**Compatible Firmware**
Solaris 11.3	SPARC, x64	12.60

4.2. Examples of known compatible servers

Dell servers	
Model	**CPU**
PowerEdge R640	Intel® Xeon® Gold 5218 CPU @ 2.30GHz
PowerEdge R630	Intel® Xeon® CPU E5-2650 v4 @ 2.20GHz
PowerEdge R430	Intel® Xeon® CPU E5-2620 v4 @ 2.10GHz
PowerEdge R440	Intel® Xeon® Silver 4114 CPU @ 2.20GHz
PowerEdge R450	Intel® Xeon® Silver 4310 CPU @ 2.10GHz
PowerEdge R640	Intel® Xeon® Gold 5218 CPU @ 2.30GHz
PowerEdge R730	Intel® Xeon® CPU E5-2650 v4 @ 2.20GHz
PowerEdge R740	Intel® Xeon® Silver 4208 CPU @ 2.10GHz

HP servers	
Model	**CPU**

HP servers	
ProLiant DL380 Gen9	Intel® Xeon® CPU E5-2650 v4 @ 2.20GHz
ProLiant DL380 Gen10	Intel® Xeon® Gold 6130 CPU @ 2.10GHz
ProLiant DL385 Gen10	AMD EPYC™ 7262 @ 3.20GHz
ProLiant DL360 Gen9	Intel® Xeon® CPU E5-2650 v4 @ 2.20GHz
ProLiant DL360 Gen10 Plus	Intel® Xeon® Silver 4314 CPU @ 2.40GHz

4.3. List of currently incompatible servers

Dell servers		
Model	**CPU**	**Notes**
PowerEdge R930	Intel® Xeon® processor E7 v4 (Typical)*	Windows Server 2016
PowerEdge FC640	Intel® Xeon® Gen 2 (Typical)*	

*Where marked typical, a known example of an incompatible processor is not provided.

HP servers		
Model	**CPU**	**Notes**
ML110 Gen 9	Intel® Xeon® CPU E5-2650 v4 @ 2.20GHz	RHEL 6.7
DL180 Gen 9	Intel® Xeon® Gold 6130 CPU @ 2.10GHz	Windows Server 2012 R2
DL360 Gen 10	Intel® Xeon® CPU E5-2650 v4 @ 2.20GHz	
DL380 Gen 8	Intel® Xeon® Silver 4314 CPU @ 2.40GHz	Windows Server 2016

4.4. Known configuration issues

4.4.1. Incorrect status code

An HSM with a drained battery should be reporting an SOS-B1 alarm code. In a specific firmware iteration, the hardserver reports "unsupported hardware", instead of the expected message of "B1".

Affected version of firmware:

nShield Solo XC 12.80.2

Example of misleading message:

```
Module #n:
  enquiry reply flags   Failed
  enquiry reply level   Zero
  hardware status       unsupported firmware
```

Possible Resolution:

Replace the battery on-board the HSM. See the *Solo Install Guide* for installation details.

4.4.2. Battery drain

A battery drain issue has been observed on some released versions of the Solo XC firmware. For further details on this issue, see the separate *Solo XC Battery Drain* document.

Affected version of firmware:

nShield Solo XC 12.72.0, 12.80.2

The issue was fixed in:

nShield Solo XC 12.72.1, 12.80.5

5. Information for nShield 5s

5.1. OS compatibility

This compatibility list is provided for 5s units running with Security World version 13.2 or later appropriate versions. No guarantees of compatibility are provided for previous versions of the software. Refer to the *Security World Release Notes* to verify compatibility with the selected OS version.

Windows		
Server Editions	**Architecture**	**Compatible Firmware**
Windows Server 2016	x64	13.2, 13.3, 13.4
Windows Server 2019	x64	13.2, 13.3, 13.4, 13.5, 13.6
Windows Server 2019 Core	x64	13.2, 13.3, 13.4, 13.5, 13.6
Windows Server 2022	x64	13.2, 13.3, 13.4, 13.5, 13.6
Windows Server 2022 Core	x64	13.2, 13.3, 13.4, 13.5, 13.6
Desktop Editions	**Architecture**	**Compatible Firmware**
Windows 10	x64	13.2, 13.3, 13.4, 13.5, 13.6
Windows 11	x64	13.3, 13.4, 13.5, 13.6

Linux		
Red Hat Edition	**Architecture**	**Compatible Firmware**
RHEL7	x64	13.2, 13.3, 13.4
RHEL8	x64	13.2, 13.3, 13.4, 13.5, 13.6
RHEL9	x64	13.3, 13.4, 13.5, 13.6
SUSE Edition	**Architecture**	**Compatible Firmware**
SUSE 12	x64	13.2, 13.3, 13.4, 13.5, 13.6
SUSE 15	x64	13.2, 13.3, 13.4, 13.5, 13.6
Oracle Enterprise Edition	**Architecture**	**Compatible Firmware**
Oracle Linux 7	x64	13.2, 13.3, 13.4

Linux		
Oracle Linux 8	x64	13.2, 13.3, 13.4, 13.5, 13.6
Oracle Linux 9	x64	13.5, 13.6

5.2. Examples of known compatible servers

Dell servers	
Model	**CPU**
PowerEdge R440	Intel® Xeon® Silver 4210R CPU @ 2.40GHz
PowerEdge R450	Intel® Xeon® Silver 4310 CPU @ 2.10GHz
PowerEdge R640	Intel® Xeon® Silver 5218 CPU @ 2.30GHz
PowerEdge R650	Intel® Xeon® Silver 4310 CPU @ 2.10GHz
PowerEdge R750	Intel® Xeon® Silver 4310 CPU @ 2.10GHz

HP servers	
Model	**CPU**
ProLiant DL325 Gen10 Plus v2	AMD EPYC™ 7443P 24-Core Processor
ProLiant DL360 Gen10 Plus	Intel® Xeon® Silver 4314 CPU @ 2.40GHz
ProLiant DL385 Gen10	AMD EPYC™ 7262 @ 3.20GHz
ProLiant DL380 Gen10	Intel® Xeon® Gold 6130 CPU @ 2.10GHz
ProLiant DL380 Gen10 Plus	Intel® Xeon® Silver 4310 CPU @ 2.10GHz
ProLiant DL380 Gen9	Intel® Xeon® E5-2650 v4 CPU @ 2.20GHz

5.3. List of currently incompatible servers

Dell servers		
Model	**CPU**	**Notes**

*Where marked typical, a known example of an incompatible processor is not provided.

HP servers		
Model	**CPU**	**Notes**

5.4. Known configuration issues

5.4.1. Driver issues with more than 10 devices

When 10 or more nShield 5s HSMs are installed in a server running a Linux-based operating system, the host driver fails. This issue is not observed on Windows-based servers.

No current solution exists for this issue.