

System x Hidden UEFI Parameters Planning / Implementation

The Lenovo server Unified Extensible Firmware Interface (UEFI) provides the interface between an operating system and the server firmware. Many UEFI parameters are exposed to server administrators in UEFI menus that can be accessed by pressing F1 when a server is rebooted, through the Lenovo integrated management module (IMM) or through command line utilities such as Lenovo's Advanced Settings Utility (ASU) or OneCLI.

These parameters are exposed because they are commonly changed from their default values to fine tune server performance for a wide variety of customer use cases. Other UEFI settings are more limited in their applicability to customer use cases and are not exposed in UEFI menus but can be accessed using the command line utilities.

In this paper, we describe the following commands that are only accessible via command-line utilities:

- Snoop Response Hold Off
- IO Non-Posted Prefetch

These commands are available for System x servers that use the Intel E5-2600 v3 and v4 processors.

Tip: ThinkSystem servers with Intel Xeon Scalable Family processors also have hidden UEFI parameters as described in the paper [ThinkSystem Hidden UEFI Parameters](#).

Snoop Response Hold Off

This hidden parameter is accessible on Lenovo System x servers that use the Intel E5-2600 v3 and v4 processors, as well as ThinkSystem servers with Intel Xeon Scalable Family processors.

For some workloads in which throughput and latency are critical, it is better to constantly poll the status of an I/O device rather than use an interrupt. Network adapter device drivers commonly use a thread to continuously poll in a fast loop so that incoming requests can be handled as fast as possible.

This can create contention between a processor core running the polling thread and the processor's Integrated I/O feature (IIO) for an I/O-owned line in cache. This contention can cause an I/O operation to lose ownership of the cache line it has just acquired. It must then spend more time reacquiring the cache line to write it back.

When there are a large number of network ports each servicing small packets, the system may not be able to achieve the full throughput required due to excessive I/O and core contentions of cache lines. For this situation, the I/O operation should delay its response to core snoops and hold onto its cache lines until it successfully completes its write.

The Snoop Response Hold Off parameter allows the I/O operation to delay its snoop response by a selected amount to achieve this delay. It is possible to adjust this parameter using Lenovo's Advanced Settings Utility (ASU) or the OneCLI tool as follows.

ASU command:

To show the current setting or to change the setting with ASU, use these commands:

```
asu64 show Processors.SnoopResponseHoldOff --override
asu64 set Processors.SnoopResponseHoldOff value --override
```

Where *value* is a number from 0 to 15 . The default (initial value) is 6. The parameter `--override` is required when viewing or changing the setting.

OneCLI command:

To show the current setting or to change the setting with OneCLI, use these commands:

```
onecli config show Processors.SnoopResponseHoldOff --override
onecli config set Processors.SnoopResponseHoldOff value --override
```

Where *value* is a number from 0 to 15. The default (initial value) is 6. The parameter `--override` is required when viewing or changing the setting.

For both ASU and OneCLI, the parameter *value* can be between 0 and 15, which corresponds to a number cycles as shown in following table. The cycles in the table are IIO clock cycles which are 2 ns per cycle. For Intel Omni-Path network adapter use, we recommend setting this parameter to 9 as a starting point. Network performance tests should be performed to determine the most optimal value for each customer's workload.

Table 1. Possible values of the *value* parameter in the Processors.SnoopResponseHoldOff command

Value	Number of cycles (1 cycle = 2 nanoseconds)
0	Disabled
1	8
2	16
3	32
4	64
5	128
6	256
7	512
8	1K
9	2K
10	4K
11	8K
12	16K
13	32K
14	64K
15	128K

IO Non-Posted Prefetch

This hidden parameter is accessible on Lenovo System x servers that use the Intel E5-2600 v3 and v4 processors.

The E5-2600 v3 and v4 processors provide 40 lanes of PCIe interconnect. It is possible to support up to five x8 PCIe configurations per processor. If these x8 PCIe devices are primarily performing memory reads, improved throughput is possible by turning on non-posted prefetches. This allows more requests to be issued even if internal switch queues are full. This provides better throughput for 100% reads, but may reduce the performance for some PCIe memory writes.

This parameter can be modified using Lenovo's Advanced Settings Utility or the OneCLI tool as follows.

ASU command:

To show the current setting or to change the setting with ASU, use these commands:

```
asu64 show Processors.IouNpPrefetch --override
asu64 set Processors.IouNpPrefetch value --override
```

Where *value* is `Disable` or `Enable`. The default (initial value) is `Disable`. The parameter `--override` is required when viewing or changing the setting.

OneCLI command:

To show the current setting or to change the setting with OneCLI, use these commands:

```
onecli config show Processors.IouNpPrefetch --override
onecli config set Processors.IouNpPrefetch value --override
```

Where *value* is `Disable` or `Enable`. The parameter `--override` is required when viewing or changing the setting.

Related product families

Product families related to this document are the following:

- [Processors](#)

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2024. All rights reserved.

This document, LP0519, was created or updated on May 15, 2018.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<https://lenovopress.lenovo.com/LP0519>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <https://lenovopress.lenovo.com/LP0519>.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®

Advanced Settings Utility

System x®

ThinkSystem®

The following terms are trademarks of other companies:

Intel® and Xeon® are trademarks of Intel Corporation or its subsidiaries.

Other company, product, or service names may be trademarks or service marks of others.