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Technical Service Bulletin TSB-2025-001

VP2440 ASPM Network Interface Performance Degradation

Issue Date:	November 21, 2025
Severity:	**MEDIUM**
Affected Product:	Protectli VP2440
Affected Firmware:	coreboot v0.9.0
Affected Components:	Intel i226-V Network Interfaces (both ports)
Status:	Workaround Available | Firmware Fix In Development

Executive Summary

Under certain conditions, VP2440 units running coreboot firmware v0.9.0 may experience intermittent network performance degradation on the Intel i226-V Ethernet ports. This issue is related to Active State Power Management (ASPM) states and can cause network throughput to drop significantly below the expected 2.5 Gbps link speed. This issue does not occur with the default AMI BIOS firmware.

A software workaround is available that resolves the issue by disabling ASPM at the operating system level. A permanent firmware fix is currently in development and will be released as soon as comprehensive testing is completed.

Affected Systems

Hardware

- **Model:** Protectli VP2440
- **Firmware Version:** coreboot v0.9.0
- **Network Controllers:** Intel i226-V revision 4 (both Ethernet ports)

- **Scope:** All VP2440 units with coreboot firmware are believed to be affected

Operating Systems

This issue affects any operating system that implements ASPM power management, including but not limited to:

- Linux distributions (Ubuntu, Debian, CentOS, etc.)
- FreeBSD-based systems (OPNsense, pfSense)
- Windows
- Other Unix-like operating systems with ASPM support

Problem Description

Technical Background

Active State Power Management (ASPM) is a PCI Express power management feature that allows devices to enter low-power states during periods of inactivity. The VP2440's coreboot firmware enables ASPM by default across all devices, and this setting cannot be toggled in the BIOS.

When the operating system detects that ASPM is available, it typically enables the feature automatically. However, in the affected firmware version, an unknown issue with ASPM state transitions causes the Intel i226-V network interfaces to experience issues resulting in degraded performance.

Symptoms

Users experiencing this issue may observe one or more of the following symptoms:

- **Inconsistent network throughput:** Performance varies unpredictably between tests, even under identical conditions
- **Significant speed degradation:** Throughput drops from the expected 2.5 Gbps to anywhere between 150 Mbps and 600 Mbps, with highly inconsistent results between tests
- **Port-specific impact:** Only the two Intel i226-V Ethernet ports are affected

Detection Method

To verify if your system is experiencing this issue:

1. Perform network throughput testing using tools such as iPerf3 or similar network benchmarking utilities
2. Test traffic passing through one or both i226-V Ethernet ports
3. Run multiple tests to observe inconsistent performance patterns

4. Compare results against the expected 2.5 Gbps link speed

```
# Example iPerf3 test command iperf3 -c [destination_ip] -t 30 -i 5
```

Workaround / Mitigation

The following workarounds may help with improving the performance issue by disabling ASPM at the operating system level. An effect that may be unwanted is an increase in power consumption, depending on the use case or operating system.

Linux-Based Systems

For most Linux distributions using GRUB bootloader:

1. Edit the GRUB configuration file:

   ```
   sudo nano /etc/default/grub
   ```

2. Locate the line beginning with `GRUB_CMDLINE_LINUX_DEFAULT` or `GRUB_CMDLINE_LINUX`
3. Add `pcie_aspm=off` to the kernel parameters. For example:

   ```
   GRUB_CMDLINE_LINUX_DEFAULT="quiet splash pcie_aspm=off"
   ```

4. Save the file and update GRUB:

   ```
   sudo update-grub
   ```

   Note: On some distributions (CentOS, RHEL, Fedora), use:

   ```
   sudo grub2-mkconfig -o /boot/grub2/grub.cfg
   ```

5. Reboot the system for changes to take effect

OPNsense / pfSense Systems

1. Log into the web interface
2. Navigate to **System** → **Settings** → **Tunables**
3. Click the **+** button to add a new tunable
4. Configure the tunable:

- **Name:** `hw.pci.enable_aspm`
- **Value:** `0`

5. Click **Save**
6. Reboot the system for changes to take effect

> **Note:** The effectiveness of this tunable has not been confirmed to work 100% of the time, or confirmed to fully solve the issue. While this setting should generally improve performance, your results may vary. We recommend monitoring network performance after applying this change.

Permanent Resolution

Protectli is actively developing a firmware update to permanently resolve this issue at the coreboot level. This fix will eliminate the need for operating system-level workarounds.

Firmware Update Timeline

- **Priority:** This issue is currently our highest development priority
- **Expected Release:** We are working to release the updated firmware as quickly as possible while ensuring comprehensive testing to prevent introducing new issues
- **Notification:** Customers will be notified through multiple channels when the update is available:
  - Email notification to registered customers
  - Announcement on the Protectli website
  - Updates via the Flashli GitHub repository

Update Process

When the firmware fix is released, it will be distributed through Flashli, Protectli's firmware update utility:

1. Download the latest Flashli script from: https://github.com/protectli-root/protectli-firmware-updater
2. Follow the instructions provided in the repository to update your VP2440 firmware
3. The update process will include detailed step-by-step guidance

> **Recommendation:** Monitor the Flashli GitHub repository linked above to stay informed about the firmware update release and any additional information.

Additional Information

Root Cause Analysis

Initial investigation indicates that the issue stems from ASPM state transitions in the current coreboot firmware causing inconsistent power delivery to the Intel i226-V network controllers. The problem manifests most clearly during idle-to-active transitions when the system experiences sudden high network load.

This issue is specific to the coreboot firmware implementation and does not occur with AMI firmware when ASPM is enabled, suggesting the root cause is related to how coreboot manages ASPM states for these particular network interfaces.

Impact on System Operation

- **Functionality:** All other system functions operate normally; only network throughput on i226-V ports is affected
- **Data Integrity:** No data corruption or packet loss beyond what would be expected from reduced bandwidth
- **System Stability:** No system crashes, freezes, or instability observed

Frequently Asked Questions

Q: Does this affect all network ports on the VP2440?

A: No. Only the two Intel i226-V Ethernet ports are affected. The SFP+ interfaces seem to be unaffected.

Q: Will disabling ASPM cause any problems?

A: No significant negative effects are expected. The primary trade-off is an increase in power consumption. Network performance and system stability will improve.

Q: Can I continue using my VP2440 while waiting for the firmware fix?

A: Yes. The software workarounds provided in this bulletin fully resolve the performance issue. Your system will operate at full 2.5 Gbps speeds on the affected ports once the workaround is applied.

Q: Do I need to remove the workaround after the firmware update?

A: While the firmware fix will resolve the underlying issue, keeping the ASPM disabled setting will not cause problems. However, you may remove the workaround after updating if you wish to re-enable ASPM for potential minor power savings.

Support and Contact Information

If you have questions about this issue, need assistance applying the workaround, or wish to report related symptoms:

- **Email Support:** support@protectli.com
- **Support Portal:** Open a ticket through your Protectli account
- **Additional Contact Options:** https://protectli.com/contact/

> **Please Report Your Experience:** Even if the workaround successfully resolves your issue, we encourage you to contact support to help us track the scope of this issue and ensure you receive notification when the firmware fix is available.

Document Information

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Changelog:

-Reworded section regarding FreeBSD fix to clarify that the tunable may not completely work as expected.

-Clarified that the increase in power usage when disabling ASPM was more substantial than previously thought.