



# Server and Workstation Overclocking Risks

Intel® Xeon® Processor family

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## Executive Summary

This whitepaper is intended to inform customers evaluating system offerings with the Intel® Xeon® processor operating at frequencies beyond their official Intel specification, also known as “overclocking”, and the risks associated with this approach. While Intel encourages innovation, Intel does not recommend any enterprise class use of overclocked Intel® Xeon® processors. Running these processors beyond their validated frequency increases the risk of data errors and unpredictable system failures plus voids the system warranty.

## Introduction

Intel offers a range of Intel® Xeon® processors to address diverse market needs, usage conditions and workloads. These processors are specifically manufactured and tested to ensure they meet Intel's quality guidelines in specific usage conditions and system requirements.

## Overclocking

Some system integrators may choose to increase the processor voltage above the Intel specified limit to “overclock” the frequency with the intent of getting incremental performance.

While overclocking may be interesting from a PC gaming perspective, its use in enterprise and professional workstations is not recommended. For enterprise or professional workloads dealing with engineering, financial, or sensitive

customer data, overclocking could be catastrophic.

## Customer Risks

The risks of overclocking can manifest themselves in three ways – warranty invalidation, hard failures and frequency degradation.

### Warranty Invalidation:

The Intel® Xeon® processor, like all other Intel processors, is thoroughly tested to ensure that it will operate at the listed frequency for the warranted life, including testing of all known speed paths. In contrast, when processors are overclocked, they are run at voltage levels that are outside the limits of the Intel manufacturing screening and testing process. Overclocking the Intel® Xeon® processor invalidates the processor warranty.

### Hard Failures:

System manufacturers that select standard Intel® Xeon® processors with the intent of overclocking will attempt to run at higher frequencies by increasing the processor voltage (VID). As the processor VID is increased, the potential for hard failures and frequency degradation failures over the life of the product increases. A hard failure is when the processor encounters hard errors, which may result in visible errors including system failing to boot, resets, or halts. Hard failures may cause permanent damage to the processor.

### Frequency Degradation:

Overclocking can alter the normal operating characteristics of silicon transistors, resulting in high transistor degradation. This may cause certain

speed paths within the processor to operate at a slower frequency, which could result in visible errors such as system reset or non-visible system data errors. Non-visible system data errors not only create the potential for unpredictable system behavior, but potentially allow the system to continue running with incorrect data.

In addition to voiding the Intel processor warranty and the risk that is associated with running non-validated and unpredictable parts in an enterprise environment, the accelerated breakdown of the processor at the transistor level will lead to a reduction in the reliable life of the processor. Intel cannot forecast what this decrease will be as this will depend on the specific use of the system, the thermal environment, and other factors.

### Summary

Due to the risks outlined Intel does not recommend, and in fact, cautions against overclocking in the enterprise environment. For more information or questions please contact your account representative.

**Note:** Intel has not tested and does not warranty the operation beyond its specifications. Intel assumes no responsibility that an overclocked processor will be fit for a particular purpose. Processor overclocking may increase the risk of failure, risk system data integrity and may cause unpredictable system behavior.

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