AMD

Audio “Popping” Noise with USB Speakers and Dynamic Power State Transitions

Application Note

Publication #	Revision	Date
26076	**0.07**	**4/17/02**

1 Overview

Audience

This document is intended for use by mobile system designers.

Intent of Document

The intention of this document is to describe an issue with isochronous USB devices when used concurrently with AMD PowerNow!™ technology.

Additional Documents

- *Mobile AMD Athlon™ XP Processor Model 8 Data Sheet*, order# 24940
- *Mobile AMD Athlon™ 4 Processor Model 6 Data Sheet*, order# 24319
- *Mobile AMD Duron™ Processor Model 7 Data Sheet*, order# 24068

Life of Document

This application note is intended as supplemental information for the life of the mobile AMD Athlon™ processor family.

2 Technical Content

Abstract

AMD PowerNow! technology allows a notebook computer to dynamically switch between different processor performance states depending on the processor utilization to achieve the maximum battery life while delivering maximum processor performance on demand. During the performance state transition, the Northbridge is disconnected from the AMD Athlon System Bus, and the PCI arbiter is disabled. While the PCI arbiter is disabled, memory access is blocked. Performance state transitions block memory access for about 100 microseconds. Isochronous USB devices, such as USB speakers, are especially sensitive to memory access latency because the USB data is not buffered and over-runs and under-runs are not retried.

Problem

AMD has identified an issue with USB speakers in a notebook computer with dynamic performance state transitions enabled.

The symptom observed in AMD's validation lab is a subtle “pop” in audio played through USB speakers that coincides with performance state transitions. The severity ranges from barely detectable to mildly annoying. The severity is dependent upon the usage scenario and the level of audio being played. It is barely detectable with music

CDs and DVD movies using USB speakers. Other isochronous USB devices possibly affected by this issue include USB headphones, USB microphones, and some types of USB cameras. Digital Audio Compression (e.g., AC-3) encoders can also experience memory under-runs causing audio distortion at the decoder.

Workaround Solution

If anomalous USB behavior is experienced when using an isochronous USB device with dynamic performance state transitions on their notebook computer, the user may prevent performance state transitions by selecting the “Always ON” power scheme:

1. Go to the Control Panel -> Power Options.
2. Select the “Always ON” power scheme.
3. Click “OK”.

These steps force the operating system to hold the processor in the maximum performance state. If a user is not experiencing anomalous USB behavior when using an isochronous USB device with dynamic performance state transitions, then he or she should leave the power scheme to the AMD recommended setting of *Portable/ Laptop* to optimize the battery life when the notebook is powered by a battery.

Contact your local AMD Field Applications Engineer (FAE) for assistance in determining the best course of action for a particular notebook computer design.