

intel® Technical Advisory

TA-0588-2

5200 NE Elam Young Parkway
Hillsboro, OR 97124

Mar 5, 2003

SSH4, SPSH4, SRS4 Failure to Expand Adapter Option ROM

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Products Affected

Product Name	Product Code
Intel® server board SSH4	BSHBASE
Intel® server platform SPSH4	SSHCBPBE, SSHCBPBK, SSHCBBRK
Intel® server platform SRS4	SSHDVRBK

Description

When configuring an SSH4 based system with adapters containing option ROMs an error message may be displayed during the boot process similar to the following:

```
ERROR
Expansion ROM not initialized - PCI Mass Storage Controller in slot 3
```

This issue can be observed with as few as one adapter card installed in the system.

Root Cause

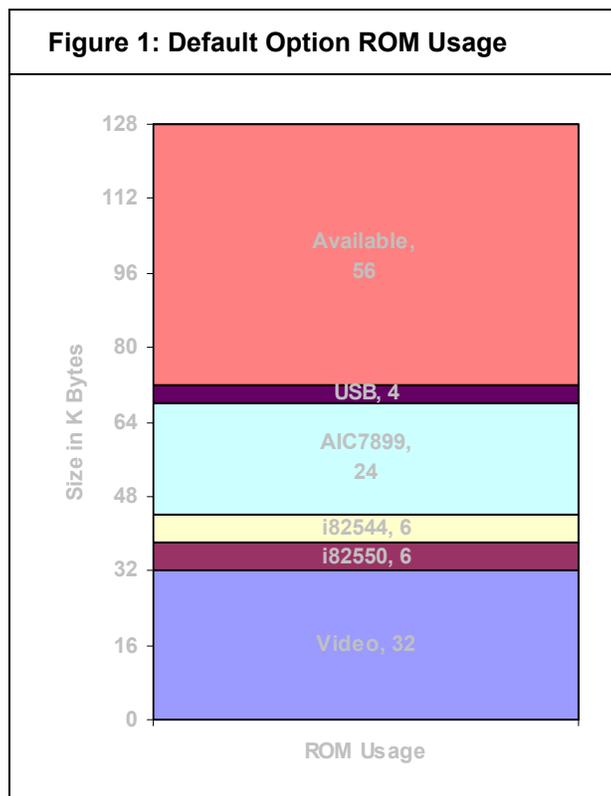
The amount of space reserved by the system for Option ROMs is limited to 128K on SSH4 based systems. This space is shared by the on-board device option ROMs and any add-in adapter option ROMs. The on-board devices are: video, gigabit NIC, 10/100 NIC, SCSI controller, and USB. All of the on-board option ROMs are enabled by default with the exception of USB.

When all of the on-board option ROMs are loaded at boot time, there is a reduced amount of reserved space left for add-in adapter card option ROMs to expand and load (see *Figure 1*). If enough space does not exist for a particular adapter, that adapter's option ROM will fail to expand and will post an error message during system boot.

It is important to note that option ROM expansion typically requires two different amounts of memory. There is an initial memory request for memory and there is a final memory consumed. The initial memory request is almost always more than the final amount of memory required.

For example, assume *Adapter A's* (a SCSI adapter) option ROM requests 64K of initial memory and then reduces the final amount

Figure 1: Default Option ROM Usage



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of memory used to 32K. In the example in *Figure 1*, the *Adapter A's* option ROM expansion would fail because the initial request for memory was 64K while 56K is available.

In order to enable *Adapter A's* option ROM to load, adjustments need to be made to the option ROM usage area. Since *Adapter A* is a SCSI adapter, in this example it is determined that the on-board 7899 SCSI controller option ROM can be disabled because it is not going to be utilized as a boot device. By disabling the on-board 7899 option ROM, 24KB of space is release giving a total of 80KB. In this configuration *Adapter A* will pass the initial request of 64KB space, reduce to 32KB, and will successfully load leaving a memory usage map similar to that shown in *Figure 2*.

Option ROMs, although enabled by default, are not required in many situations. Typically, the only time option ROMs are required is if the option ROM is supporting a boot device or the option ROM is supporting a RAID configuration. Most other configurations do not require the option ROM to be enabled to provide device functionality.

SCSI devices (such as the on-board 7899) do not need to have the option ROM enabled in order to function. The only time SCSI devices require the option ROM is when it is required to boot from drives attached to the SCSI controller. Likewise, NIC controllers such as the i82544 do not require the option ROM for functionality such as *adapter teaming*; the option ROM is only required to support PXE booting from the network.

Workarounds

Intel recommends that option ROM scanning be disabled for any device or PCI slot that does not require the option ROM for a boot device, or other functionality such as RAID management.

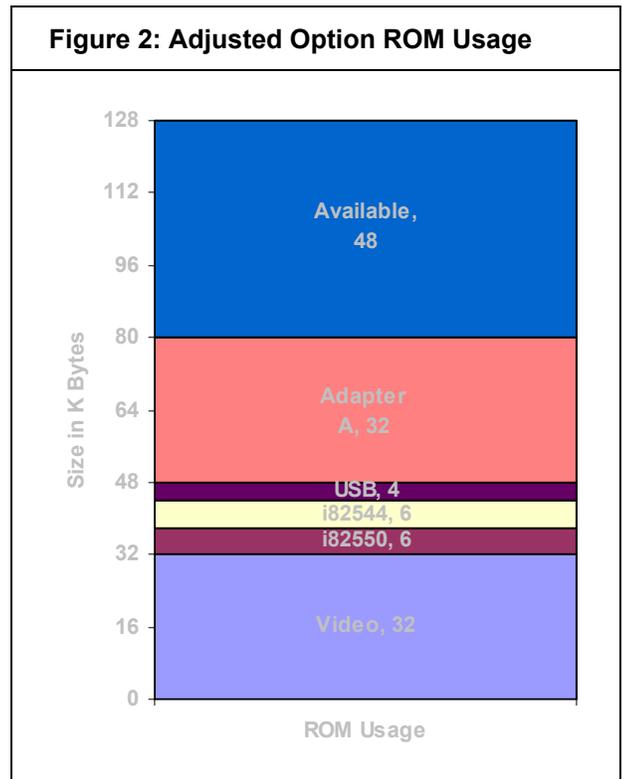
The option ROMs for each on-board device and for each PCI slot can be enabled or disabled through BIOS Setup. Option ROM scanning is enabled by default for all on-board devices and for all PCI slots. To enter BIOS Setup press *F2* during system boot.

To disable option ROM scanning for any device, enter BIOS Setup and go to the *Advanced > PCI Configuration* menu. This menu will display selections for the four embedded devices (SCSI, NIC 1, NIC 2, Video) and each of the eight PCI slots. Select the device for which the option ROM scan should be disabled and select "disable" from the "Option ROM Scan" field.

Resolution

SSH4 BIOS P06 fixes this issue by moving legacy USB into the EBDA area of the BIOS this returns the 16k assigned to Legacy USB to the available space as illustrated above. In addition by optimizing the BIOS code another 59k has been added to the space available for the expansion of adapter option roms. This is an increase of 59 k bringing the total space for add-in adapter option roms to 107 k

A modification was also made to BIOS P06 to query the adapter for the amount of space needed for its option rom to expand during post. BIO now reports the amount of option rom space requested by the adapter and the amount available to the adapter. It is still prudent to disable the option rom scan for devices not needed in the boot process. There are some adapters that need 48 K or more to expand their option rom



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