Installation manual of K5/VSI System

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1.   PC Components for the K5/VSI System

   The minimum requirement for PC to install VSI2000DIM (PC-VSI) board is PCI-X socket on a motherboard is capture VSI signal in built-in memory with VSI2000DIM board. High-speed record devices such as RAID or SSD are recomended additionally for local recording the VSI signal. Using a riser card to insert a PCI board to fulfill the above condition in the limited space of a rack mount server is not recommended, because the timing margin of the PCI signal becomes critical. Table 1 list the system constitution and the OS recommended in NICT.

Table 1: Recommended Components of K5/VSI System

Components	メーカ等	型番等
Mother Board	Super Micro	X9SRE-3F/X9SRE/X8SAX/X7DBE
	ASUS	P5WDG2 Pro/P5E WS
Memory		4GB
RAID Card	Areca	ARC-1882-ix-16/ARC-1680D-ix-16
OS		CentOS 5.2 for x86-64

2.   Setup
2.1.   Motherboard's BIOS Setting

   For using motherboard X9SRE/S9SRE-3F provided by the Super Micro Inc., following change of the BIOS setting is necessary. Oterwise you can skip his section and proceed to 2.2 2.2.   Installation of CentOS 5.x.

   As described in the section 2.4 "installation of the device driver for VSI2000DIM boards", buffer offset addresses have to be set for exclusive use of memory by VSI2000DIM. That address may be 0x80000000, however this address might be assigned to the other device in the motherboard by default, sometimes. Error on the VSI2000DIM caused by this address setting has been reported. To fix the address setting manually on motherboard X9SRE/S9SRE-3F, the BIOS setting may be changed by following procedure.

1.   Entering to BIOS setting page with holding 'Del' Key after power on the PC.
   ↓
2.   "Advanced"
   ↓
3.   "Chipset Configuration"
   ↓
4.   "North Bridge"
   ↓
5.   "Integrated Io Configuration"
   ↓
6.   "MMCFG BASE"
   ↓
7.   Change "0x80000000" to "0xE0000000".
   ↓
8.   "Save and Exit"

2.2.   Installation of CentOS 5.x

There is nothing special in the Installation procedure of CentOS. You should install the OS by following the instruction manual of CentOS.

2.3   Editing /etc/grub.conf

It is necessary for the VSI2000DIM board to preserve a consecutive physical memory space on the PC before the OS starts.

By setting start option "mem=" in Linux, limiting the memory size used by the kernel becomes possible. For example, memory area of 2GB size at 0x80000000-0xFFFFFFFF is not used by kernel when 4BG memory is available by setting optional "mem=2048M". And that memory area is used by the VSI2000DIM board as a internal buffer[1]. Following shows an example of "/etc/grub.conf", where the second boot-up entry of the kernel with "mem=1920M"[2] option is added and it is set to the default boot-up sequence by the entry of "default=1"[3]. In addition, in late years (as of 2013), the IRQ number of other devices may conflict with VSI2000DIM board by the characteristic of the motherboard, and it can cause a error. In this case we can avoid the conflict of the IRQ number by adding "irqpoll" option like "mem=1920M irqpoll". This setting here becomes effective by rebooting the OS.

****************** /etc/grub.conf ******************

```
# grub.conf generated  by anaconda
#
# Note that you do not  have to rerun  grub  after making changes to  this file
# NOTICE:      You do not  have a /boot partition.                 This  means  that
#              all  kernel and initrd paths  are  relative to  /, eg.
#              root (hd0,0)
#              kernel /boot/vmlinuz-version  ro  root=/dev/hde1
#              initrd /boot/initrd-version.img
#boot=/dev/sda
default=1            # Changed from "0" to "1" so that the second entry is used for automatic boot.
timeout=5 splashimage=(hd0,0)/boot/grub/splash.xpm.gz
hiddenmenu
title CentOS  (2.6.18-92.el5)
        root (hd0,0)
        kernel /boot/vmlinuz-2.6.18-92.el5  ro  root=LABEL=/ rhgb  quiet

        initrd /boot/initrd-2.6.18-92.el5.img
#   Option "mem=1920M" is added.
# When there is conflict of IRQ, "irqpoll" is added after "mem=1920M".
title CentOS  (K5VSI)
        root (hd0,0)
        kernel /boot/vmlinuz-2.6.18-92.el5  ro  root=LABEL=/ rhgb  quiet **mem=1920M irqpoll**
        initrd /boot/initrd-2.6.18-92.el5.img
```

This part was added

**************** /etc/grub.conf ****************
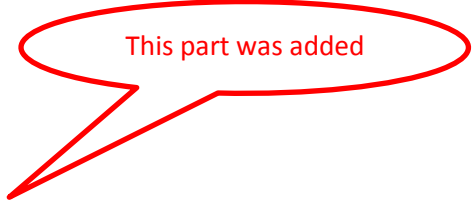
2.4 Installation of driver of VSI2000DIM board

The latest device driver for K5/VSI is provided by the rpm file from URL:
http://www2.nict.go.jp/aeri/sts/stmg/K5/VSI/K5VSI/index-e.html.
It can be installed by rpm command as follows:

rpm -ivh --force k5vsi_driver-2.4.x-x.x86_64.rpm

After the driver is normally installed, device file "/dev/k5vsi" is created by mknod command as follows:

/bin/mknod -m 666 /dev/k5vsi c 250 0

---

[1] Since kernel may map the memory space at higher address for PCI, memory address is not fully available till to 0xFFFF# /bin/mknod -m 666 /dev/k5vsi c 250 0 ,in practice.

[2] Smaller memory size than 2048MB is assigned because of keeping a buffer zone.

[3] number start from 0.

When the device driver is loaded to the kernel, kernel parameters can be specified such as: buffer length corresponding to one second of data, number of buffers, and offset addresses of the buffers. Because the kernel does not use the memory address after the 0x80000000 due to the option "mem=1920M", here we employ the offset address 0x80000000, and use four buffers with 2048Mbit(0x10000000) size each.

/sbin/insmod /lib/modules/2.6.18-92.el5/kernel/drivers/misc/k5vsi.ko Offset=0x80000000 Length=0x10000000 Number=4

When we inputs VSI signal into the VSI2000DIM board, in which the driver is normally loaded by the kernel, a LED on the VSI2000DIM board flashes on and off regularly, and that can confirm that a board works normally. So that these setting are loaded automatically at the booting of PC, /etc/rc.local should be changed as follows:

***************** /etc/grub.conf ******************

```
#!/bin/sh
#
# This  script will be executed  *after* all the  other init scripts.
# You can put  your  own initialization stuff in here  if you don't
# want to do the  full Sys V  style init stuff. touch  /var/lock/subsys/local
/bin/mknod -m 666 /dev/k5vsi c  250 0
/sbin/insmod   /lib/modules/2.6.18-92.el5/kernel/drivers/misc/k5vsi.ko Offset=0x80000000  Length=0x10000000
Number=4
```

***************** /etc/grub.conf ******************

Because buffer length is 0x10000000 bytes in the setting described above, VSI signal of 1024Mbps and of 2048Mbps can be handled. When only a signal of 1024Mbps is required, by setting the buffer length of 0x08000000 and setting offset at higher address, the memory space used by the OS can be expanded. Here we showed only the example of using memory between 0x80000000-0xBFFFFFFF. However, in case of using more higher memory area, memory space have to carefully be confirmed by command such as '/sbin/lspci -vvv' for avoiding memory-space conflict with other PCI devices.

2.5 Installation of application tools.

K5/VSI application tools are installed by using rpm command as follows:
    rpm -ivh --force monitor2000-2.4.x-x.x86_64.rpm
    rpm -ivh --force capture2000-2.4.x-x.x86_64.rpm
    rpm -ivh --force pcal2000-2.4.x-x.x86_64.rpm
    rpm -ivh --force apps2000-2.4.x-x.x86_64.rpm
    rpm -ivh --force gico3-2.4.x-x.x86_64.rpm
    rpm -ivh --force mtkfx-1.0.x-x.x86_64.rpm

monitor2000, pcal2000, capture2000 are single application tools for control, monitoring, and recording of the VSI signal by using graphical user interface (GUI). In addition, apps2000, gico3, mtkfs are comprised of the following multiple applications. Because the application tools in the 'apps2000' access to VSI2000DIM through the device driver of K5/VSI, thus be careful to use those of the same version with the device driver[4].

Table 2: Software Tool for Observation

Name	Package file Name	Explanation
K5_VSI driver	k5vsi_driver-2.4.2-1.x86_64.rpm	Device driver
Time2000	time2000-2.4.1-1.x86_64.rpm	Time setting&Monitor
Rec2000	rec2000-2.4.6-1.x86_64.rpm	Recording
Monitor2000	monitor2000-2.4.1-1.x86_64.rpm	Signal Monitor
Capture2000	capture2000-2.4.4-1.x86_64.rpm	Schedule Recording
Pcal2000	pcal2000-2.4.2-1.x86_64.rpm	PCAL & Spectrum Monitor

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[4] Current latest version is Ver.2.4.x.

	Skd2xml	skd2xml-0.1.0-1.x86_64.rpm	Schedule conversion

Table 3. Software Tool for Correlation Processing

Name	Package file Name	Explanation
Gico3	gico3-2.6.8-1.x86_64.rpm	Correlation Software: gico3、 fringe、 skd2xml、 shrink、 revise、 cor2out
Mtkfx	mtkfx-1.0.3-1.x86_64.rpm	Conversion for Software correlator at NAOJ: log2xml、 tau2geo、 bunch、 join、 cor2dat、 dat2cor

The packages are available from
Web page:
http://www2.nict.go.jp/aeri/sts/stmg/K5/VSI/K5VSI/index-j.html (Japanese)
http://www2.nict.go.jp/aeri/sts/stmg/K5/VSI/K5VSI/index-e.html (English)

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