GNU FreeIPMI User's Guide

Free Intelligent Platform Management System
Version 0.3.0 updated on 13 November 2006

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Short Contents

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1 Introduction to the GNU FreeIPMI system

GNU FreeIPMI is a Free Intelligent Platform Management System Software. It provides "Remote-Console" (out-of-band), "System Management Software" (in-band) and a development library confirming to Intelligent Platform Management Interface (IPMI v1.5 and v2.0) standards.

GNU FreeIPMI User's Guide concentrates installation, usage, troubleshooting and bug reporting. It corresponds to 0.3.0 release.

1.1 Who should read this guide?

If you want to use the *Intelligent Platform Management Interface* functionalities available on modern motherboards running GNU or any POSIX compliant operating systems, this guide is right for you.

1.2 IPMI - Platform Management Standard

The IPMI specifications define standardized, abstracted interfaces to the platform management subsystem. IPMI includes the definition of interfaces for extending platform management between board within the main chassis, and between multiple chassis.

The term platform management is used to refer to the monitoring and control functions that are built in to the platform hardware and primarily used for the purpose of monitoring the health of the system hardware. This typically includes monitoring elements such as system temperatures, voltages, fans, power supplies, bus errors, system physical security, etc. It includes automatic and manually driven recovery capabilities such as local or remote system resets and power on/off operations. It includes the logging of abnormal or out-of-range conditions for later examination and alerting where the platform issues the alert without aid of run-time software. Lastly it includes inventory information that can help identify a failed hardware unit.

2 Installing GNU FreeIPMI

You can obtain copies of source, binary, documentation and other useful information from the GNU FreeIPMI Home Page.

2.1 Dependencies

GNU FreeIPMI is designed to have minimum dependencies on other libraries and tools. Only the libfreeipmi library depends on libgcrypt for encryption use with IPMI 2.0.

List of dependencies under GNU/Linux:

- GNU libgcrypt

List of dependencies under FreeBSD:

- FreeBSD (tested on FreeBSD 5.3-BETA7) -
  You will need "options SYSVSEM" in your kernel config or sysvsem.ko module loaded.
  On FreeBSD > 5.2.1 You will also need "device io" in kernel or loaded as module unless
  You specify USE_IOPERM compilation option (see note on i386_set_ioperm below).
- argp library (tested with argp-standalone-1.3) - ports/devel/argp-standalone.
- gmake

2.2 Building the source package.

To compile the program, you must first run the `configure` script included with the source tar ball. It works just like any other standard GNU `autoconf` created script. See the more generic configure related installation instructions below.

For complete list of options, try `configure --help`.

Note: Please run `./autogen.sh` script before `./configure`, if you are compiling FreeIPMI source from CVS.

Note2: Under some x86-64 platforms such as SUSE GNU/Linux, native 64 bit libraries reside under lib64 and 32 bit libs under lib. Autotools by default installs libfreeipmi.so under /usr/lib, instead of /usr/lib64 causing dynamic linking errors. Pass libdir appropriately to configure script to workaround this problem. (i.e. –libdir=/usr/lib64)

```
# ./configure --prefix=/usr
# make
# make install
```

2.2.1 Installing under FreeBSD:

Example:

```
tar xzvf freeipmi-0.3.0.tar.gz
cd freeipmi-0.3.0
env CFLAGS="-I/usr/local/include" \
  LDFLAGS="-L/usr/local/lib -largp" \
  ./configure
gmake all
# su to root
gmake install
```

```
mkdir -p /var/lib/freeipmi
chmod 0700 /var/lib/freeipmi
touch /var/lib/freeipmi/ipckey
```

2.2.1.1 Using i386_set_ioperm(2) instead of io(4) under FreeBSD:

i386_set_ioperm has known issues on FreeBSD 5.x (bus errors on io port access), so this patch uses io(4) to access io ports by default. To enable using i386_set_ioperm instead of io(4) specify USE_IOPERM copmilation option at configure time:

Example:

```
env CFLAGS="-DUSE_IOPERM -I/usr/local/include" \
  LDFLAGS="-L/usr/local/lib -largp" \
  ./configure
```

2.3 Test Fire

GNU FreeIPMI works both in-band (with-in the system) and out-of-band (over the network). Easiest way to test if your system has IPMI support or if the installation is OK is through bmc-info command.

Test if IPMI works:

```
ipmitest:~# bmc-info
Device ID:        20
Device Revision:  1
                  [SDR Support]
Firmware Revision: 1.32
                  [Device Available (normal operation)]
IPMI Version:     1.5
Additional Device Support:
                  [Sensor Device]
                  [SDR Repository Device]
                  [SEL Device]
                  [FRU Inventory Device]
                  [IPMB Event Receiver]
                  [Chassis Device]
Manufacturer ID:  B000157h
Product ID:       1Bh
Aux Firmware Revision Info: 10011500h
Channel Information:
      Channel No: 0
    Medium Type: IPMB (I2C)
   Protocol Type: IPMB-1.0
      Channel No: 1
    Medium Type: Asynch. Serial/Modem (RS-232)
   Protocol Type: IPMB-1.0
      Channel No: 3
    Medium Type: PCI SMBus
   Protocol Type: IPMI-SMBus
```

```
          Channel No: 4
        Medium Type: System Interface (KCS, SMIC, or BT)
      Protocol Type: KCS
          Channel No: 6
        Medium Type: 802.3 LAN
      Protocol Type: IPMB-1.0
          Channel No: 7
        Medium Type: 802.3 LAN
      Protocol Type: IPMB-1.0
   ipmitest:~#
```

If you don't get the expected response from `bmc-info` command, please refer to Chapter 16 [Trouble-shooting], page 51.

3 IPMI C library (libfreeipmi)

The Core of the GNU FreeIPMI system consists of LAN, OpenIPMI, KCS, and SSIF interface drivers, all packaged in a single portable C library. Management applications can access the BMC at various levels using higher level IPMI command APIs or raw read/write interfaces to the drivers.

The library internally uses DMI, SMBIOS, PCI, and ACPI drivers to locate the system interfaces.

4 ipmi-locate IPMI device probing tool

The `ipmi-locate` tool tries to probe and display KCS/SMIC/BT/SSIF IPMI device interface informations by using various probing techniques. The tool also displays default values of IPMI device interfaces of most commonly used in BMC manufacturers. This tool may not probe on some machines, but FreeIPMI tools work on them with default values.

4.1 Command-line options

- –brief
  Shorten output.
- –quiet, –silent
  Inhibit usual output.
- -v, –verbose
  Print more information.
- -?, —help
  Give this help list.
- —usage
  Give a short usage message.
- -V, —version
  Print program version.

4.2 Example

```
www:~# ipmi-locate
Probing KCS device using SMBIOS... done
IPMI Version: 1.5
IPMI locate driver: SMBIOS
IPMI locate driver: 0
IPMI interface: KCS
BMC I2C device: (null)
BMC I/O base address: CA2
Register space: 1

Probing SMIC device using SMBIOS... FAILED

Probing BT device using SMBIOS... FAILED

Probing SSIF device using SMBIOS... FAILED

Probing KCS device using ACPI... FAILED

Probing SMIC device using ACPI... FAILED

Probing BT device using ACPI... FAILED

Probing SSIF device using ACPI... FAILED
```

```
Probing KCS device using PCI... FAILED

Probing SMIC device using PCI... FAILED

Probing BT device using PCI... FAILED

Probing SSIF device using PCI... FAILED

KCS device default values:
IPMI Version: 1.5
IPMI locate driver: DEFAULT
IPMI locate driver: 0
IPMI interface: KCS
BMC I2C device: (null)
BMC I/O base address: CA2
Register space: 1

SMIC device default values:
IPMI Version: 1.5
IPMI locate driver: DEFAULT
IPMI locate driver: 0
IPMI interface: SMIC
BMC I2C device: (null)
BMC I/O base address: CA9
Register space: 1

BT device default values:

SSIF device default values:
IPMI Version: 1.5
IPMI locate driver: DEFAULT
IPMI locate driver: 0
IPMI interface: SSIF
BMC I2C device: /dev/i2c-0
BMC SMBUS slave address: 20
Register space: 1

www:~#
```

5 bmc-config

A command line BMC configuration utility. You can view, set and replicate the configuration.

5.1 Command-line arguments to bmc-config

- —no-probing
  Do not probe IPMI devices.
- -D, —driver-type=*IPMIDRIVER*
  Use this *IPMIDRIVER* instead of auto selection. Allowed values are KCS, SMIC, SSIF and LAN.
- —driver-address=*DRIVERADDR*
  Use this *DRIVERADDR* address instead of probed one.
- —driver-device=*DEVICE*
  Use this *DEVICE* for IPMI driver.
- —register-spacing=*REGISTERSPACING*
  Use this *REGISTERSPACING* instead of the probed one.
- -h, —hostname=*IPMIHOST*
  Connect to *IPMIHOST*.
- -u, —username=*USERNAME*
  Use *USERNAME* instead of NULL. Maximum USERNAME length is 16.
- -p, —password=*PASSWORD*
  Use *PASSWORD* instead of NULL. Maximum PASSWORD length is 16.
- -a, —auth-type=*AUTHTYPE*
  Use *AUTHTYPE* instead of MD5. Allowed values are NONE, MD2, MD5, and PLAIN.
- -l, —priv-level=*PRIVILEGE-LEVEL*
  Use this *PRIVILEGE-LEVEL* instead of ADMIN. Allowed values are CALLBACK, USER, OPERATOR, ADMIN and OEM.
- -?, —help
  Give this help list.
- —usage
  Give a short usage message.
- -V, —version
  Print program version.
- -o, —checkout
  Fetch configuration information from BMC.
- -i, —commit
  Update configuration information to BMC.
- -d, —diff
  Show differences between BMC and config file or key pairs.
- -f, —filename=*FILENAME*
  Use this file for BMC get/set.

- -k, —key-pair=*KEY-PAIR*
  Update configuration information to BMC. This option can be used multiple times.
- -S, —section=*SECTION*
  Use SECTION for checkout. This option can be used multiple times.
- -L, —listsections
  List available sections for checkout.
- -v, —verbose
  Print detailed information.

5.2 Sample Configuration File

`bmc-config` emits current BMC configuration settings to stdout in the same format as that of configuration file, when no file argument is specified.

Example: Extracting BMC configuration to stdout.

```
debian-ia64:~# bmc-config --checkout
Section User1
        ## Give Username
        Username                                NULL
        ## Possible values: Yes/No or blank to not set
        ## Enable_User
        ## Give password or blank to clear. MAX 16 chars.
        ## Password
        ## Possible values: Yes/No
        Lan_Enable_IPMI_Msgs                    No
        ## Possible values: Yes/No
        Lan_Enable_Link_Auth                    No
        ## Possible values: Yes/No
        Lan_Enable_Restricted_to_Callback       No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Lan_Privilege_Limit                     No_Access
        ## Possible values: Yes/No
        Serial_Enable_IPMI_Msgs                 No
        ## Possible values: Yes/No
        Serial_Enable_Link_Auth                 No
        ## Possible values: Yes/No
        Serial_Enable_Restricted_to_Callback    No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Serial_Privilege_Limit                  Administrator
EndSection
Section User2
        ## Give Username
        Username                                USER
        ## Possible values: Yes/No or blank to not set
        ## Enable_User
        ## Give password or blank to clear. MAX 16 chars.
        ## Password
```

```
        ## Possible values: Yes/No
        Lan_Enable_IPMI_Msgs                            Yes
        ## Possible values: Yes/No
        Lan_Enable_Link_Auth                            No
        ## Possible values: Yes/No
        Lan_Enable_Restricted_to_Callback         No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Lan_Privilege_Limit                           User
        ## Possible values: 0-255, 0 is unlimited
        Serial_Enable_IPMI_Msgs                       No
        ## Possible values: Yes/No
        Serial_Enable_Link_Auth                       No
        ## Possible values: Yes/No
        Serial_Enable_Restricted_to_Callback      No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Serial_Privilege_Limit                        No_Access
EndSection
Section User3
        ## Give Username
        Username                                      OPERATOR
        ## Possible values: Yes/No or blank to not set
        ## Enable_User
        ## Give password or blank to clear. MAX 16 chars.
        ## Password
        ## Possible values: Yes/No
        Lan_Enable_IPMI_Msgs                          Yes
        ## Possible values: Yes/No
        Lan_Enable_Link_Auth                          No
        ## Possible values: Yes/No
        Lan_Enable_Restricted_to_Callback         No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Lan_Privilege_Limit                           Operator
        ## Possible values: Yes/No
        Serial_Enable_IPMI_Msgs                       No
        ## Possible values: Yes/No
        Serial_Enable_Link_Auth                       No
        ## Possible values: Yes/No
        Serial_Enable_Restricted_to_Callback      No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Serial_Privilege_Limit                        No_Access
EndSection
Section User4
        ## Give Username
        Username                                      ADMIN
        ## Possible values: Yes/No or blank to not set
        ## Enable_User
        ## Give password or blank to clear. MAX 16 chars.
```

```
        ## Password
        ## Possible values: Yes/No
        Lan_Enable_IPMI_Msgs                         Yes
        ## Possible values: Yes/No
        Lan_Enable_Link_Auth                         No
        ## Possible values: Yes/No
        Lan_Enable_Restricted_to_Callback       No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Lan_Privilege_Limit                          Administrator
        ## Possible values: Yes/No
        Serial_Enable_IPMI_Msgs                      No
        ## Possible values: Yes/No
        Serial_Enable_Link_Auth                      No
        ## Possible values: Yes/No
        Serial_Enable_Restricted_to_Callback     No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Serial_Privilege_Limit                       No_Access
EndSection
Section Lan_Channel
        ## Possible values: Disabled/Pre_Boot_Only/Always_Available/Shared
        Volatile_Access_Mode                         Always_Available
        ## Possible values: Yes/No
        Volatile_Enable_User_Level_Auth          Yes
        ## Possible values: Yes/No
        Volatile_Enable_Per_Message_Auth         Yes
        ## Possible values: Yes/No
        Volatile_Enable_Pef_Alerting             No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Volatile_Channel_Privilege_Limit         Administrator
        ## Possible values: Disabled/Pre_Boot_Only/Always_Available/Shared
        Non_Volatile_Access_Mode                     Always_Available
        ## Possible values: Yes/No
        Non_Volatile_Enable_User_Level_Auth      Yes
        ## Possible values: Yes/No
        Non_Volatile_Enable_Per_Message_Auth     Yes
        ## Possible values: Yes/No
        Non_Volatile_Enable_Pef_Alerting         No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Non_Volatile_Channel_Privilege_Limit     Administrator
EndSection
Section Lan_Conf
        ## Possible values: Unspecified/Static/Use_DHCP/Use_BIOS/Use_Others
        IP_Address_Source                            Static
        ## Give valid IP address
        IP_Address                                   192.168.1.60
        ## Give valid MAC address
        MAC_Address                                  00:0E:0C:21:81:B4
```

```
        ## Give valid Subnet Mask
        Subnet_Mask                                 255.255.255.0
        ## Give valid IP address
        Default_Gateway_IP_Address                  0.0.0.0
        ## Give valid MAC address
        Default_Gateway_MAC_Address                 00:00:00:00:00:00
        ## Give valid IP address
        Backup_Gateway_IP_Address                   0.0.0.0
        ## Give valid MAC address
        Backup_Gateway_MAC_Address                  00:00:00:00:00:00
EndSection
Section Lan_Conf_Auth
        ## Possible values: Yes/No
        Callback_Enable_Auth_Type_None              No
        ## Possible values: Yes/No
        Callback_Enable_Auth_Type_MD2              No
        ## Possible values: Yes/No
        Callback_Enable_Auth_Type_MD5              No
        ## Possible values: Yes/No
        Callback_Enable_Auth_Type_Straight_Password  No
        ## Possible values: Yes/No
        Callback_Enable_Auth_Type_OEM_Proprietary   No
        ## Possible values: Yes/No
        User_Enable_Auth_Type_None                  No
        ## Possible values: Yes/No
        User_Enable_Auth_Type_MD2                  No
        ## Possible values: Yes/No
        User_Enable_Auth_Type_MD5                  Yes
        ## Possible values: Yes/No
        User_Enable_Auth_Type_Straight_Password     No
        ## Possible values: Yes/No
        User_Enable_Auth_Type_OEM_Proprietary       No
        ## Possible values: Yes/No
        Operator_Enable_Auth_Type_None              No
        ## Possible values: Yes/No
        Operator_Enable_Auth_Type_MD2              No
        ## Possible values: Yes/No
        Operator_Enable_Auth_Type_MD5              Yes
        ## Possible values: Yes/No
        Operator_Enable_Auth_Type_Straight_Password  No
        ## Possible values: Yes/No
        Operator_Enable_Auth_Type_OEM_Proprietary   No
        ## Possible values: Yes/No
        Admin_Enable_Auth_Type_None                 No
        ## Possible values: Yes/No
        Admin_Enable_Auth_Type_MD2                 No
        ## Possible values: Yes/No
```

```
        Admin_Enable_Auth_Type_MD5                      Yes
        ## Possible values: Yes/No
        Admin_Enable_Auth_Type_Straight_Password    No
        ## Possible values: Yes/No
        Admin_Enable_Auth_Type_OEM_Proprietary      No
        ## Possible values: Yes/No
        OEM_Enable_Auth_Type_None                   No
        ## Possible values: Yes/No
        OEM_Enable_Auth_Type_MD2                    No
        ## Possible values: Yes/No
        OEM_Enable_Auth_Type_MD5                    No
        ## Possible values: Yes/No
        OEM_Enable_Auth_Type_Straight_Password      No
        ## Possible values: Yes/No
        OEM_Enable_Auth_Type_OEM_Proprietary        No
EndSection
Section Lan_Conf_Security_Keys
        ## Give string or blank to clear. Max 20 chars
        ## K_R
        ## Give string or blank to clear. Max 20 chars
        ## K_G
EndSection
Section Lan_Conf_Misc
        ## Possible values: Yes/No
        Enable_Gratuitous_ARPs                      No
        ## Possible values: Yes/No
        Enable_ARP_Response                         No
        ## Give a number (x 500ms)
        Gratuitous_ARP_Interval                     10
EndSection
Section Rmcpplus_Conf_Privilege
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_0         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_1         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_2         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_3         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_4         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_5         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_6         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_7         Administrator
```

```
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_8          Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_9          Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_10         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_11         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_12         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_13         Administrator
        ## Possible values: Unused/User/Operator/Administrator/OEM_Proprietary
        Maximum_Privilege_Cipher_Suite_Id_14         Administrator
EndSection
Section Serial_Channel
        ## Possible values: Disabled/Pre_Boot_Only/Always_Available/Shared
        Volatile_Access_Mode                         Always_Available
        ## Possible values: Yes/No
        Volatile_Enable_User_Level_Auth              Yes
        ## Possible values: Yes/No
        Volatile_Enable_Per_Message_Auth             No
        ## Possible values: Yes/No
        Volatile_Enable_Pef_Alerting                 No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Volatile_Channel_Privilege_Limit             Administrator
        ## Possible values: Disabled/Pre_Boot_Only/Always_Available/Shared
        Non_Volatile_Access_Mode                     Always_Available
        ## Possible values: Yes/No
        Non_Volatile_Enable_User_Level_Auth          Yes
        ## Possible values: Yes/No
        Non_Volatile_Enable_Per_Message_Auth         No
        ## Possible values: Yes/No
        Non_Volatile_Enable_Pef_Alerting             No
        ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary/No_Ac
        Non_Volatile_Channel_Privilege_Limit         Administrator
EndSection
Section Serial_Conf
        ## Possible values: Yes/No
        Enable_Basic_Mode                            Yes
        ## Possible values: Yes/No
        Enable_PPP_Mode                              Yes
        ## Possible values: Yes/No
        Enable_Terminal_Mode                         Yes
        ## Possible values: Modem_Connect/Direct_Mode
        Connect_Mode                                 Direct_Connect
        ## Give a valid number
```

```
                Page_Blackout_Interval                          0
                ## Give a valid number
                Call_Retry_Interval                             60
                ## Possible values: Yes/No
                Enable_DTR_Hangup                               No
                ## Possible values: No_Flow_Control/RTS_CTS/XON_XOFF
                Flow_Control                                    No_Flow_Control
                ## Possible values: 9600/19200/38400/57600/115200
                Bit_Rate                                        115200
        EndSection
        Section PEF_Conf
                ## Possible values: Yes/No
                Enable_PEF                                      No
                ## Possible values: Yes/No
                Enable_PEF_Event_Messages                       No
                ## Possible values: Yes/No
                Enable_PEF_Startup_Delay                        No
                ## Possible values: Yes/No
                Enable_PEF_Alert_Startup_Delay                  No
                ## Possible values: Yes/No
                Enable_Alert_Action                             Yes
                ## Possible values: Yes/No
                Enable_Power_Down_Action                        Yes
                ## Possible values: Yes/No
                Enable_Reset_Action                             Yes
                ## Possible values: Yes/No
                Enable_Power_Cycle_Action                       Yes
                ## Possible values: Yes/No
                Enable_OEM_Action                               No
                ## Possible values: Yes/No
                Enable_Diagnostic_Interrupt                     Yes
                ## Give value in seconds
                PEF_Startup_Delay                               255
                ## Give value in seconds
                PEF_Alert_Startup_Delay                         60
        EndSection
        Section SOL_Conf
                ## Possible values: Yes/No
                Enable_SOL                                      Yes
                ## Possible values: Callback/User/Operator/Administrator/OEM_Proprietary
                SOL_Privilege_Level                             Administrator
                ## Possible values: Yes/No
                Force_SOL_Payload_Authentication                Yes
                ## Possible values: Yes/No
                Force_SOL_Payload_Encryption                    Yes
                ## Give a valid integer. Each unit is 5ms
                Character_Accumulate_Interval                   50
```

```
            ## Give a valid number
            Character_Send_Threshold                       100
            ## Give a valid integer
            SOL_Retry_Count                                5
            ## Give a valid integer. Interval unit is 10ms
            SOL_Retry_Interval                             50
            ## Possible values: Serial/9600/19200/38400/57600/115200
            Non_Volatile_Bit_Rate                          115200
            ## Possible values: Serial/9600/19200/38400/57600/115200
            Volatile_Bit_Rate                              115200
            ## Give a valid port number
            ## SOL_Payload_Port_Number                     623
    EndSection
    Section Misc
            ## Possible values: Off_State_AC_Apply/Restore_State_AC_Apply/On_State_AC_Appl
            Power_Restore_Policy                           Off_State_AC_Apply
    EndSection
    debian-ia64:~#
```

5.3 Extracting current BMC configuration

'checkout" option generates a configuration file containing the current BMC settings. Configuration file is in plain text format with sections enclosing key-value pairs. Comments will guide you to choose appropriate values. Use your favorite editor (like GNU Emacs) to edit these fields. Comment character is '#'.

Example: Creating a BMC configuration file.

```
debian-ia64:~# bmc-config --checkout --filename=/tmp/bmc.conf
```

Alternatively you can redirect stdout to the configuration file too.

```
debian-ia64:~# bmc-config --checkout > /tmp/bmc.conf
```

5.4 Update BMC configuration

After customizing the BMC configuration file, you can update the BMC configuration using "commit" option.

Example using configuration file:

```
debian-ia64:~# bmc-config --commit -f /tmp/bmc.conf
```

Example using a specific key:

```
debian-ia64:~# bmc-config --commit -k "Lan_conf:Ip_Address=192.168.1.60"
```

Note: At this point of time, configuration settings can only be fed through a file or key-value pairs and not stdin.

5.5 Compare BMC configuration

To compare the differences between current active BMC settings and the configuration file, use "diff" option

Example: Comparing the configuration file and BMC settings.

```
debian-ia64:~# bmc-config --diff -f /tmp/bmc.conf
Lan_Conf:IP_Address - input='192.168.10.160':actual='192.168.1.60'
debian-ia64:~# bmc-config --diff -k "User2:Username=guest"
User2:Username - input='guest':actual='usertest'
debian-ia64:~#
```

6 bmc-info

`bmc-info` command displays BMC/IPMI version information and the list of additional devices supported. This command is mostly used for checking if IPMI is supported or if BMC/FRU/SDR firmware upgrade completed successfully.

6.1 Command-line options

- —no-probing
  Do not probe IPMI devices.

- -D, —driver-type=*IPMIDRIVER*
  Use this *IPMIDRIVER* instead of auto selection. Allowed values are KCS, SMIC, SSIF and LAN.

- —driver-address=*DRIVERADDR*
  Use this *DRIVERADDR* address instead of probed one.

- —driver-device=*DEVICE*
  Use this *DEVICE* for IPMI driver.

- —register-spacing=*REGISTERSPACING*
  Use this *REGISTERSPACING* instead of the probed one.

- -h, —hostname=*IPMIHOST*
  Connect to *IPMIHOST*.

- -u, —username=*USERNAME*
  Use *USERNAME* instead of NULL. Maximum USERNAME length is 16.

- -p, —password=*PASSWORD*
  Use *PASSWORD* instead of NULL. Maximum PASSWORD length is 16.

- -a, —auth-type=*AUTHTYPE*
  Use *AUTHTYPE* instead of MD5. Allowed values are NONE, MD2, MD5, and PLAIN.

- -l, —priv-level=*PRIVILEGE-LEVEL*
  Use this *PRIVILEGE-LEVEL* instead of USER. Allowed values are CALLBACK, USER, OPERATOR, ADMIN and OEM.

- -?, —help
  Give this help list.

- —usage
  Give a short usage message.

- -V, —version
  Print program version.

6.2 Example

```
ipmitest:~# bmc-info
Device ID:       20
Device Revision: 1
                 [SDR Support]
Firmware Revision: 1.32
                 [Device Available (normal operation)]
```

```
IPMI Version:       1.5
Additional Device Support:
                    [Sensor Device]
                    [SDR Repository Device]
                    [SEL Device]
                    [FRU Inventory Device]
                    [IPMB Event Receiver]
                    [Chassis Device]
Manufacturer ID:    B000157h
Product ID:         1Bh
Aux Firmware Revision Info: 10011500h
Channel Information:
        Channel No: 0
      Medium Type: IPMB (I2C)
    Protocol Type: IPMB-1.0
        Channel No: 1
      Medium Type: Asynch. Serial/Modem (RS-232)
    Protocol Type: IPMB-1.0
        Channel No: 3
      Medium Type: PCI SMBus
    Protocol Type: IPMI-SMBus
        Channel No: 4
      Medium Type: System Interface (KCS, SMIC, or BT)
    Protocol Type: KCS
        Channel No: 6
      Medium Type: 802.3 LAN
    Protocol Type: IPMB-1.0
        Channel No: 7
      Medium Type: 802.3 LAN
    Protocol Type: IPMB-1.0
ipmitest:~#
```

7 bmc-autoconfig

`bmc-autoconfig` utility is a wizard-like high-level frontend to the `bmc-config` command, which has a curses/text user interface prompting for IP/Netmask/Gateway.

7.1 Command-line options

`bmc-autoconfig` command-line options are as same as `bmc-config` utility. If no arguments are passed, wizard interface is shown. For a complete list of options, refer here See [bmc-config Command-line options], page 8.

8 ipmi-raw

`ipmi-raw` tool reads hex values of IPMI command request data from standard input, executes it and displays hex values of IPMI command response data. This tool works on in-band and out-of-band.

8.1 Command-line options

- —no-probing
  Do not probe IPMI devices.
- -D, —driver-type=*IPMIDRIVER*
  Use this *IPMIDRIVER* instead of auto selection. Allowed values are KCS, SMIC, SSIF and LAN.
- —driver-address=*DRIVERADDR*
  Use this *DRIVERADDR* address instead of probed one.
- —driver-device=*DEVICE*
  Use this *DEVICE* for IPMI driver.
- —register-spacing=*REGISTERSPACING*
  Use this *REGISTERSPACING* instead of the probed one.
- -h, —hostname=*IPMIHOST*
  Connect to *IPMIHOST*.
- -u, —username=*USERNAME*
  Use *USERNAME* instead of NULL. Maximum USERNAME length is 16.
- -p, —password=*PASSWORD*
  Use *PASSWORD* instead of NULL. Maximum PASSWORD length is 16.
- -a, —auth-type=*AUTHTYPE*
  Use *AUTHTYPE* instead of NONE. Allowed values are NONE, MD2, MD5, and PLAIN.
- -l, —priv-level=*PRIVILEGE-LEVEL*
  Use this *PRIVILEGE-LEVEL* instead of USER. Allowed values are CALLBACK, USER, OPERATOR, ADMIN and OEM.
- -?, —help
  Give this help list.
- —usage
  Give a short usage message.
- -V, —version
  Print program version.

8.2 Example

```
www:~# ipmi-raw
0 6 01
rcvd: 1C 01 00 20 81 01 20 51 9F 57 01 00 1B 00 00 15 01 10
www:~#
```

9 ipmi-sensors

`ipmi-sensors` utility reports the monitored system health information, such as temperatures and voltages, fan status, etc with nominal, threshold max/min readings and status descriptions.

9.1 command-line arguments

- —no-probing
  Do not probe IPMI devices.

- -D, —driver-type=*IPMIDRIVER*
  Use this *IPMIDRIVER* instead of auto selection. Allowed values are KCS, SMIC, SSIF and LAN.

- —driver-address=*DRIVERADDR*
  Use this *DRIVERADDR* address instead of probed one.

- —driver-device=*DEVICE*
  Use this *DEVICE* for IPMI driver.

- —register-spacing=*REGISTERSPACING*
  Use this *REGISTERSPACING* instead of the probed one.

- -h, —hostname=*IPMIHOST*
  Connect to *IPMIHOST*.

- -u, —username=*USERNAME*
  Use *USERNAME* instead of NULL. Maximum USERNAME length is 16.

- -p, —password=*PASSWORD*
  Use *PASSWORD* instead of NULL. Maximum PASSWORD length is 16.

- -a, —auth-type=*AUTHTYPE*
  Use *AUTHTYPE* instead of MD5. Allowed values are NONE, MD2, MD5, and PLAIN.

- -l, —priv-level=*PRIVILEGE-LEVEL*
  Use this *PRIVILEGE-LEVEL* instead of USER. Allowed values are CALLBACK, USER, OPERATOR, ADMIN and OEM.

- -v, —verbose
  Verbose sensor output.

- -vv
  Very verbose sensor output.

- -i, —sdr-info
  Show SDR Information.

- -f, —flush-cache
  Flush sensor cache.

- -L, —list-groups
  List sensor groups.

- -g, —group=*GROUP-NAME*
  Show sensors belongs to this GROUP.

- -s, —sensors=*SENSORS-LIST*
  Show listed sensors.

- —sdr-cache-directory=*DIRECTORY*
  Use DIRECTORY for sensor cache.
- -?, —help
  Give this help list.
- —usage
  Give a short usage message.
- -V, —version
  Print program version.

9.2 ipmi-sensors output

```
www:~# ipmi-sensors
1: MB Bd +1.25V (Voltage): 1.27 V (1.15/1.34): [OK]
2: MB Bd +1.5V (Voltage): 1.57 V (1.38/1.61): [OK]
3: MB Bd +1.8V (Voltage): 1.80 V (1.66/1.93): [OK]
4: MB Bd +3.3V (Voltage): 3.33 V (3.04/3.53): [OK]
5: MB Bd +3.3V SB (Voltage): 3.40 V (2.93/3.58): [OK]
6: MB Bd +5V (Voltage): 4.91 V (4.60/5.36): [OK]
7: MB Bd +12V (Voltage): 11.97 V (10.97/12.77): [OK]
8: MB Bd -12V (Voltage): -12.13 V (-13.00/-11.20): [OK]
9: MB Bd +1.2V (Voltage): 1.22 V (1.08/1.31): [OK]
10: MB Bd +1.3V (Voltage): 1.31 V (1.17/1.42): [OK]
11: MB Bd +1.5V SB (Voltage): 1.50 V (1.38/1.61): [OK]
12: MB Bd +2.5V (Voltage): 2.49 V (2.28/2.69): [OK]
13: MB Bd +2.5V SB (Voltage): 2.52 V (2.28/2.69): [OK]
14: MB Bd +5V SB (Voltage): 5.10 V (4.50/5.34): [OK]
15: MB Bd Temp (Temperature): 33.00 C (5.00/55.00): [OK]
16: MB Bd SNC Temp (Temperature): 46.00 C (5.00/105.00): [OK]
17: MB Bd SIOH Temp (Temperature): 38.00 C (5.00/95.00): [OK]
18: FPBD AMB Temp (Temperature): 20.00 C (5.00/50.00): [OK]
19: PCI Rsr Temp (Temperature): 23.00 C (5.00/60.00): [OK]
20: CPU AREA Temp (Temperature): 20.00 C (5.00/60.00): [OK]
21: MEM AREA Temp (Temperature): 35.00 C (5.00/80.00): [OK]
22: Bnk1 Tach Fan 6 (Fan): 6174.00 RPM (5040.00/NA): [OK]
23: Bnk1 Tach Fan 5 (Fan): 6636.00 RPM (5040.00/NA): [OK]
24: Bnk1 Tach Fan 4 (Fan): 6594.00 RPM (5040.00/NA): [OK]
25: Bnk2 Tach Fan 3 (Fan): 7009.00 RPM (5676.00/NA): [OK]
26: Bnk2 Tach Fan 2 (Fan): 6579.00 RPM (5676.00/NA): [OK]
27: Bnk2 Tach Fan 1 (Fan): 6762.00 RPM (5544.00/NA): [OK]
28: MB FanBst (OEM Reserved): 33.00 C (NA/NA): [OK]
29: MB SNC FanBst (OEM Reserved): 46.00 C (NA/NA): [OK]
30: MB SIOH FanBst (OEM Reserved): 38.00 C (NA/NA): [OK]
31: FPBD AMB FanBst (OEM Reserved): 20.00 C (NA/NA): [OK]
32: PCI RSR FanBst (OEM Reserved): 23.00 C (NA/NA): [OK]
33: CPU Area FanBst (OEM Reserved): 20.00 C (NA/NA): [OK]
34: MEM Area FanBst (OEM Reserved): 35.00 C (NA/NA): [OK]
35: Proc 1 Temp (Temperature): 39.00 C (2.00/112.00): [OK]
```

```
36: Proc 2 Temp (Temperature): 39.00 C (2.00/112.00): [OK]
37: Proc 1 FanBst (OEM Reserved): 39.00 C (NA/NA): [OK]
38: Proc 2 FanBst (OEM Reserved): 39.00 C (NA/NA): [OK]
39: HSC SCSI BP Temp (Temperature): NA(NA/NA): [Unknown]
40: Pwr Unit Status (Power Unit): [OK]
41: Pwr Unit Redund (Power Unit): [Redundancy Lost]
42: Watchdog  (Watchdog 2): [OK]
43: Scrty Violation (Platform Security Violation): [OK]
44: Physical Scrty (Platform Chassis Intrusion): [OK]
45: POST Error (System Firmware): [OK]
46: Crit Int Status (Critical Interrupt): [OK]
47: EVT Log Disabled (Event Logging Disabled): [OK]
48: System Event (System Event): [OK]
49: Int SCSI TERMV0 (Voltage): [Performance Met]
50: Int SCSI TERMV1 (Voltage): [Performance Met]
51: Int SCSI TERMV2 (Voltage): [Performance Met]
52: Ext SCSI TERMV0 (Voltage): [Performance Met]
53: Ext SCSI TERMV1 (Voltage): [Performance Met]
54: Ext SCSI TERMV2 (Voltage): [Performance Met]
55: Pwr Supply 1 (Power Supply): [Presence detected]
56: Pwr Supply 2 (Power Supply): [Presence detected]
57: Pwr Supply 3 (Power Supply): [OK]
58: Fan 6 Present (Fan): [Device Inserted/Device Present]
59: Fan 5 Present (Fan): [Device Inserted/Device Present]
60: Fan 4 Present (Fan): [Device Inserted/Device Present]
61: Fan 3 Present (Fan): [Device Inserted/Device Present]
62: Fan 2 Present (Fan): [Device Inserted/Device Present]
63: Fan 1 Present (Fan): [Device Inserted/Device Present]
64: SYS Bd Intrlock (Board): [Device Inserted/Device Present]
65: INIT State (OEM Reserved): [OK]
66: Proc 1 Status (Processor): [Processor Presence detected]
67: Proc 2 Status (Processor): [Processor Presence detected]
68: Proc 1 PpodGd (Voltage): [Performance Met]
69: Proc 2 PpodGd (Voltage): [Performance Met]
70: HSC Drv 1 Status (Drive Slot): [Unknown]
71: HSC Drv 2 Status (Drive Slot): [Unknown]
72: HSC Drv 1 Pres (Drive Slot): [Unknown]
73: HSC Drv 2 Pres (Drive Slot): [Unknown]
www:~#
```

10 ipmi-sel

BMC provides a centralized, non-volatile System Event Log and logs system events and certain system configuration information to this device. You can perform a postmortem analysis on a system even when a the processor(s) are disabled because of a failure. ipmi-sel utility helps you view and manage system event log.

10.1 command-line arguments

- —no-probing
  Do not probe IPMI devices.

- -D, —driver-type=*IPMIDRIVER*
  Use this *IPMIDRIVER* instead of auto selection. Allowed values are KCS, SMIC, SSIF and LAN.

- —driver-address=*DRIVERADDR*
  Use this *DRIVERADDR* address instead of probed one.

- —driver-device=*DEVICE*
  Use this *DEVICE* for IPMI driver.

- —register-spacing=*REGISTERSPACING*
  Use this *REGISTERSPACING* instead of the probed one.

- -h, —hostname=*IPMIHOST*
  Connect to *IPMIHOST*.

- -u, —username=*USERNAME*
  Use *USERNAME* instead of NULL. Maximum USERNAME length is 16.

- -p, —password=*PASSWORD*
  Use *PASSWORD* instead of NULL. Maximum PASSWORD length is 16.

- -a, —auth-type=*AUTHTYPE*
  Use *AUTHTYPE* instead of MD5. Allowed values are NONE, MD2, MD5, and PLAIN.

- -l, —priv-level=*PRIVILEGE-LEVEL*
  Use this *PRIVILEGE-LEVEL* instead of USER. Allowed values are CALLBACK, USER, OPERATOR, ADMIN and OEM.

- -?, —help
  Give this help list.

- —usage
  Give a short usage message.

- -V, —version
  Print program version.

- -i, —info
  Show SEL info

- -x, —hex-dump=*FILE*
  Output a hexadecimal dump of the SEL

- -c, —delete-all
  Delete all records in SEL

- -d, —delete=*REC-LIST*
  Delete REC-LIST in SEL

- –delete-range=*START-END*
  Delete records from START to END in SEL

- -f, —flush-cache
  Flush SDR cache.

- —sdr-cache-directory=*DIRECTORY*
  Use DIRECTORY for sensor cache.

10.2 ipmi-sel sample output

```
www:~# ipmi-sel
3044:02-May-2005 16:00:30:Power Unit #1:Power Unit Failure detected
3064:31-Dec-1969 16:00:02:Power Unit #1:AC lost
3084:31-Dec-1969 16:00:02:Power Unit #1:AC lost
3104:31-Dec-1969 16:00:42:Platform Chassis Intrusion #5:LAN Leash Lost (system is unpl
3124:31-Dec-1969 16:00:49:Platform Chassis Intrusion #5:LAN Leash Lost (system is unpl
3144:04-May-2005 16:56:00:System Firmware #6:System Firmware Error (POST Error):OEM co
3164:04-May-2005 16:56:02:System Event #8:OEM System Boot Event
3184:04-May-2005 17:07:58:Platform Chassis Intrusion #5:LAN Leash Lost (system is unpl
3204:04-May-2005 17:08:05:Platform Chassis Intrusion #5:LAN Leash Lost (system is unpl
3224:18-May-2005 08:55:38:System Firmware #6:System Firmware Error (POST Error):OEM co
3244:18-May-2005 08:55:40:System Event #8:OEM System Boot Event
3264:16-Jun-2005 10:49:27:System Firmware #6:System Firmware Error (POST Error):OEM co
3284:16-Jun-2005 10:49:29:System Event #8:OEM System Boot Event
3304:05-Jul-2005 10:10:56:System Firmware #6:System Firmware Error (POST Error):OEM co
3324:05-Jul-2005 10:10:58:System Event #8:OEM System Boot Event
3344:25-Oct-2005 14:55:39:System Event #8:OEM System Boot Event
3364:25-Oct-2005 15:16:58:System Event #8:OEM System Boot Event
3384:25-Oct-2005 15:58:58:System Event #8:OEM System Boot Event
3404:02-Nov-2005 16:07:13:System Firmware #6:System Firmware Error (POST Error):OEM co
```

11 bmc-watchdog

`bmc-watchdog` is a daemon and configuration utility for BMC watchdog timer. When run as a daemon, it periodically resets the timer so that, should the system lock up, the BMC can perform an appropriate emergency recovery action.

The bmc-watchdog tool typically executes as a cronjob or daemon to manage the watchdog timer. A user must be root in order to run bmc-watchdog.

11.1 BMC Watchdog Theory

A BMC watchdog timer is part of the Intelligent Platform Management Interface (IPMI) specification and is only available to BMCs that are compliant with IPMI. When a BMC watchdog timer is started, it begins counting down to zero from some positive number of seconds. When the timer hits zero, the timer will execute a pre-configured pre-timeout interrupt and/or timeout action.

In order to stop the pre-timeout interrupt or timeout action from being generated, the watchdog timer must be periodically reset back to its initial beginning value.

The BMC watchdog timer automatically stops itself when the machine is rebooted. Therefore, when a machine is brought up, the BMC watchdog timer must be setup again before it can be used.

Typically, a BMC watchdog timer is used to automatically reset a machine that has crashed. When the operating system first starts up, the BMC timer is set to its initial countdown value. At periodic intervals, when the operating system is functioning properly, the watchdog timer can be reset by the OS or a userspace program. Thus, the timer never counts down to zero. When the system crashes, the timer cannot be reset by the OS or userspace program. Eventually, the timer will countdown to zero and reset the machine.

11.2 command-line arguments

11.2.1 bmc-watchdog general options

The following commands are available to bmc-watchdog.

The following options can be used by any command.

- -h, —help
  Display the help menu. If a specific command (‘`--set`’, ‘`--get`’, ‘`--reset`’, ‘`--start`’, ‘`--stop`’, ‘`--clear`’, or ‘`--daemon`’) is listed on the command line, only the specific options for that command will be listed.

- -v, —version
  Display the version information.

- -I *string*, —driver-type=*string*
  Identify the IPMI driver type to use. The available driver types are KCS and SSIF. If not specified, `bmc-watchdog` will attempt both.

- -o *int*, —driver-address=*int*
  Identify the System Base Address for the IPMI Driver. If not specified, `bmc-watchdog` will attempt to probe for the system's default address. If the probe fails, the IPMI

defined default will be used. If the io-port number is prefixed with a "0x", it is assumed to be a base 16 integer. Otherwise, it is assumed to be a base 10 integer.

- -R *int*, –reg-space=*int*
  Specify base address register spacing. If not specified, `bmc-watchdog` will attempt to probe for the system's default register spacing. If the probe fails, the IPMI defined default will be used.

- -E *string*, –driver-device=*string*
  Identify the driver device path the IPMI driver should use. It not specified, a default path will be assumed.

- -f *string*, —logfile=*string*
  Specify an alternate logfile from the default of '`/var/log/freeipmi/bmc-watchdog.log`'.

- -n, —no-logging Turns off all logging done by bmc-watchdog.

11.2.2 bmc-watchdog command options

The following commands are available to bmc-watchdog.

- -s, —set
  Set BMC Watchdog Configuration. BMC watchdog timer configuration values can be set using the set command options listed below under Section 11.2.3 [bmc-watchdog set options], page 29. If a particular configuration parameter is not specified on the command line, the current configuration of that parameter will not be changed.

- -g, —get
  Get BMC watchdog configuration and state. The current configuration and state is printed to standard output.

- -r, —reset
  Reset BMC watchdog timer.

- -t, —start
  Start BMC watchdog timer identical to —reset command when the timer is stopped. Does nothing if the timer is currently running.

- -y, —stop
  Stop BMC watchdog timer. Stops the current timer.

- -c, —clear
  Clear BMC watchdog configuration. Clears all configuration values for the watchdog timer, except for timer use, which is kept at its current value.

- -d, —daemon
  Run `bmc-watchdog` as a daemon. Configurable BMC watchdog timer options are listed below under Section 11.2.5 [bmc-watchdog daemon options], page 30. The configuration values are set once, then the daemon will reset the timer at specified periodic intervals. Every time the BMC watchdog timer is reset, a log entry will be generated in the '`bmc-watchdog`' log. The default log is stored at '`/var/log/freeipmi/bmc-watchdog.log`'. The daemon can be stopped using the '`--stop`' command, '`--clear`' command, or by setting the '`stop_timer`' flag on the '`--set`' command.

11.2.3 bmc-watchdog set options

The following options can be used by the set command to set or clear various BMC watchdog configuration parameters.

- -u *int*, —timer-use=*int*
  Set timer use. The timer use value can be set to one of the following:

  ```
  ‘1’ = BIOS FRB2
  ‘2’ = BIOS POST
  ‘3’ = OS_LOAD
  ‘4’ = SMS OS
  ‘5’ = OEM
  ```

- -m *int*, —stop-timer=*int*
  Set stop timer flag. A flag value of ‘0’ stops the current BMC watchdog timer. A value of ‘1’ doesn't turn off the current watchdog timer.

- -l *int*, —log=*int*
  Set log flag. A flag value of ‘0’ turns logging on. A value of ‘1’ turns logging off.

- -a *int*, —timeout-action=*int*
  Set timeout action. The timeout action can be set to one of the following:

  ```
  ‘0’ = No action
  ‘1’ = Hard Reset
  ‘2’ = Power Down
  ‘3’ = Power Cycle
  ```

- -p *int*, —pre-timeout-interrupt=*int*
  Set pre-timeout interrupt. The pre timeout interrupt can be set to one of the following:

  ```
  ‘0’ = None
  ‘1’ = SMI
  ‘2’ = NMI
  ‘3’ = Messaging Interrupt
  ```

- -z *secs*, —pre-timeout-interval=*secs*
  Set pre-timeout interval in seconds.

- -F, —clear-bios-frb2
  Clear BIOS FRB2 Timer Use flag.

- -P, —clear-bios-post
  Clear BIOS POST Timer Use flag.

- -L, —clear-os-load
  Clear OS Load Timer Use flag.

- -S, —clear-sms-os
  Clear SMS/OS Timer Use flag.

- -O, —clear-oem
  Clear OEM Timer Use Flag.

- -i *secs*, —initial-countdown=*secs*
  Set initial countdown in seconds.

- -w, —start-after-set
  Start timer after set command if timer is stopped. This is typically used when bmc-

watchdog is used as a cronjob. This can be used to automatically start the timer after it has been set the first time.

- -x, —reset-after-set
  Reset timer after set command if timer is running.

- -j, —start-if-stopped
  Don't execute set command if timer is stopped, just start timer.

- -k, —reset-if-running
  Don't execute set command if timer is running, just reset timer. This is typically used when bmc-watchdog is used as a cronjob. This can be used to reset the timer after it has been initially started.

11.2.4 bmc-watchdog start options

The following options can be used by the start command.

- -G *int*, —gratuitous-arp=*int*
  Suspend or don't suspend gratuitous ARPs while the BMC timer is running. A flag value of '1' suspends gratuitous ARPs. A value of '0' will not suspend gratuitous ARPs. If this option is not specified, gratuitous ARPs will not be suspended.

- -A *int*, —arp-response=*int*
  Suspend or don't suspend BMC-generated ARP responses while the BMC timer is running. A flag value of '1' suspends ARP responses. A value of '0' will not suspend ARP responses. If this option is not specified, ARP responses will not be suspended.

11.2.5 bmc-watchdog daemon options

The following options can be used by the daemon command to set the initial BMC watchdog configuration parameters.

- -u *int*, —timer-use=*int*
  Set timer use. The timer use value can be set to one of the following:

  ```
  '1' = BIOS FRB2
  '2' = BIOS POST
  '3' = OS_LOAD
  '4' = SMS OS
  '5' = OEM
  ```

- -l *int*, —log=*int*
  Set Log Flag. A flag value of '0' turns logging on. A value of '1' turns logging off.

- -a *int*, —timeout-action=*int*
  Set timeout action. The timeout action can be set to one of the following:

  ```
  '0' = No action
  '1' = Hard Reset
  '2' = Power Down
  '3' = Power Cycle
  ```

- -p *int*, —pre-timeout-interrupt=*int*
  Set pre-timeout interrupt. The pre timeout interrupt can be set to one of the following:

  ```
  '0' = None
  '1' = SMI
  ```

```
                         '2' = NMI
                         '3' = Messaging Interrupt
```

- -z *secs*, —pre-timeout-interval=*secs*
  Set pre-timeout interval in seconds.

- -F, —clear-bios-frb2
  Clear BIOS FRB2 Timer Use flag.

- -P, —clear-bios-post
  Clear BIOS POST Timer Use flag.

- -L, —clear-os-load
  Clear OS Load Timer Use flag.

- -S, —clear-sms-os
  Clear SMS/OS Timer Use flag.

- -O, —clear-oem
  Clear OEM Timer Use flag.

- -i *secs*, —initial-countdown=*secs*
  Set initial countdown in seconds.

- -G *int*, —gratuitous-arp=*int*
  Suspend or don't suspend gratuitous ARPs while the BMC timer is running. A flag value of '1' suspends gratuitous ARPs. A value of '0' will not suspend gratuitous ARPs. If this option is not specified, gratuitous ARPs will not be suspended.

- -A *int*, —arp-response=*int*
  Suspend or don't suspend BMC-generated ARP responses while the BMC timer is running. A flag value of '1' suspends ARP responses. A value of '0' will not suspend ARP responses. If this option is not specified, ARP responses will not be suspended.

- -e, —reset-period Time interval to wait before resetting timer. The default is '60' seconds.

11.3 bmc-watchdog example

Setup a bmc-watchdog daemon that resets the machine after '15 minutes' (900 seconds) if the OS has crashed.[1]

```
    debian-ia64:~# bmc-watchdog -d -u 4 -p 0 -a 1 -i 900
    debian-ia64:~# ps -C bmc-watchdog
      PID TTY          TIME CMD
     1035 ?        00:00:00 bmc-watchdog
    debian-ia64:~#
```

11.4 bmc-watchdog known issues

`bmc-watchdog` may fail to reset the watchdog timer if it is not scheduled properly. It is always recommended that bmc-watchdog be executed with a high scheduling priority.

On some machines, the hardware based SMI Handler may disable a processor after a watchdog timer timeout if the timer use is set to something other than SMS/OS.

---

[1] see default `bmc-watchdog` rc script '`/etc/init.d/bmc-watchdog`' a more complete example.

12 IPMI power control utility

Remote out-of-band chassis control utility to perform power-up, power-down, power-cycle, hard-reset, pulse-diagnostics-interrupt and OS soft shutdown operations.

PowerMan http://www.llnl.gov/linux/powerman/ now supports `ipmipower` as a remote power control device.

Whenever a power command ('`--on`', '`--off`', '`--cycle`', '`--reset`', '`--stat`', '`--pulse`', or '`--soft`') is specified on the command-line, `ipmipower` will run in non-interactive mode. `ipmipower` will attempt to run the power command on all hostnames listed on the command line then exit.

If no power commands are specified on the command line, `ipmipower` will run in interactive mode. Interactive mode gives the user a command-line interface to enter various commands. Details of the interactive command line interface can be found under Section 12.3 [ipmipower interactive commands], page 39 section.

12.1 Command-line arguments

12.1.1 ipmipower basic options

The following options are basic options for ipmipower.

- -h, —hostnames *host1,host2,*. . .
  The list of hostname addresses to be controlled by `ipmipower`. The hostnames must resolve to the IP address of the NIC connected to the remote host BMC. If hostnames do not resolve to proper BMC IP addresses, RMCP ping messages will not discover the remote host or power commands will time out. This option is required if a power command ('`--on`', '`--off`', '`--cycle`', '`--reset`', or '`--stat`', '`--pulse`', '`--soft`') is specified on the command-line. Hostnames may be specified in a range format; see Section 12.4 [Host ranges], page 41 section.

- -u, —username *name*
  Sets the username to use when authenticating with the BMC. The user must have *operator* or *administrator* privilege to run the '`--on`', '`--off`', '`--reset`', '`--cycle`', '`--pulse`', or '`--soft`' power control commands. The user needs only *user* privileges to determine the status of the machine through '`--stat`'. If not specified, a null username (Anonymous Login '`User ID 1`') is assumed.

- -p, —password *pw*
  Sets the *password* to use when authenticating with the BMC. If not specified, a null password is assumed.

- -k, —k-g *str*
  Sets the K_g BMC Key when authenticating with the BMC for ipmi 2.0. If not specified, a null key is assumed.

- -n, —on
  Power on the target hosts.

- -f, —off
  Power off the target hosts.

- -c, —cycle
  Power cycle the target hosts.

- -r, —reset
  Reset the target hosts.
- -s, —stat
  Get power status of the target hosts.
- -j, —pulse
  Send power diagnostic interrupt to target hosts.
- -m, —soft
  Initiate a soft-shutdown of the OS via ACPI.
- -H, —help
  Display the help menu and exit.
- -V, —version
  Display the version information and exit.
- -C, —config *file*
  Specify alternate configuration file.

12.1.2 ipmipower advanced options

The following advanced options are used to change the behavior of ipmipower.

- -a, —authentication-type *str*
  Sets the authentication type to use with `ipmipower`. The currently available authentication types are:

  ```
  'auto' => (default)
  'none'
  'straight_password_key'
  'md2'
  'md5'
  ```

- -l, —privilege *str*
  Sets the privilege type to use with `ipmipower`.

  ```
  'auto' => (default)
  'user'
  'operator'
  'admin'
  ```

- -R, —ipmi-version *version*
  Sets the IPMI protocol version to use with `ipmipower`.

  ```
  'auto' => (default)
  '1.5'
  '2.0'
  ```

- -T, —cipher-suite-id *id*
  Set the IPMI 2.0 Cipher Suite ID to use. The Cipher Suite ID identifies a set of authentication, integrity, and confidentiality algorithms to use for IPMI 2.0 communication.

  ```
  'auto' => (default)
  '0'
  '1'
  '2'
  '3'
  ```

```
                                  '6'
                                  '7'
                                  '8'
                                  '11'
                                  '12'
```

- -g, —on-if-off
  The IPMI specification does not require the `cycle` or `reset` commands to turn on a machine that is currently powered off. This option will force `ipmipower` to issue a power on command instead of a power cycle or hard reset command if the remote machine's power is currently off.

- -A, —wait-until-on
  The IPMI specification allows power on commands to return prior the power on actually taking place. This option will force `ipmipower` to regularly query the remote BMC and return only after the machine has powered on.

- -B, —wait-until-off
  The IPMI specification allows power off commands to return prior the power off actually taking place. This option will force `ipmipower` to regularly query the remote BMC and return only after the machine has powered off.

- -o, —outputtype *str*
  Sets the output type to use with `ipmipower`. The currently available output types are:

```
                      'none'
                      'newline'    => (default)
                      'hostlist'
```

  Hostlist output can be used to shorten output if the number of nodes in your cluster is quite large. However, hostlist output will only output after the slowest node has completed its power control operation.

- -P, —force-permsg-authentication
  Forces `ipmipower` to use IPMI per message authentication regardless of what is advertised by the remote machine. This option has been specifically implemented to get around a compliance issue.

- -S, —accept-session-id-zero
  Forces `ipmipower` to accept packets with a session id of zero. This option has been specifically implemented to get around a compliance issue.

- -U, —check-unexpected-authcode
  Forces `ipmipower` to check packet authcodes even if no authcode should be received. This option has been specifically implemented to get around a compliance issue.

- -X, —intel-2-0-session
  Modifies the IPMI 2.0 session protocol for non-compliant Intel machines.

- -Y, —supermicro-2-0-session
  Modifies the IPMI 2.0 session protocol for non-compliant Supermicro machines.

12.1.3 ipmipower network options

The following options are used to change the behavior of the actual `ipmipower` network protocol used.

- -t, —timeout *ms*
  Sets the *time-out* in milliseconds. `ipmipower` uses the *time-out* value to determine when to give up on a power command. If not specified, a default *time-out* of 20000 milliseconds (20 seconds) is used.

- -q, —retry-wait-timeout *ms*
  Sets the *retry-wait-timeout* in milliseconds. The *retry-wait-timeout* is similar to the *retry-timeout* above, but is used specifically for power completion verification in the '`--wait-until-on`' and '`--wait-until-off`' options.

- -y, —retry-timeout *ms*
  Sets the *retry-timeout* in milliseconds. The IPMI protocol sends a series of packets back and forth to a remote host BMC in order to perform a power control operation. When a response to any individual packet is not received after *retry-timeout* milliseconds, `ipmipower` will retry sending that packet. If not specified, packet retransmissions will occur after '`400`' milliseconds (0.4 seconds). The value *ms* must be less than the time out length specified with '`--timeout`'. Packet retransmissions can be disabled by setting the *retry-timeout* length to '`0`'.

  Note how this option differs from the '`--timeout`' option above. The '`--timeout`' option refers to the entire amount of time the IPMI protocol has to complete a power control operation. The '`--retry`' option refers to the amount of time any individual packet within the IPMI protocol has to complete.

- -b, —retry-backoff-count *num*
  After every *retry-backoff-count* retransmissions, `ipmipower` will increase the *retry-timeout* length by another factor for the duration of the current power control operation. This is done to reduce network traffic and allow BMC buffers to empty. If not specified, *retry-backoff-count* is '`8`'. Retransmission backoff can be disabled by setting the retry backoff count to '`0`'.

- -i, —ping-interval *ms*

- -z, —ping-timeout *ms*
  `ipmipower` will send RMCP ping discovery messages every *ping-interval* milliseconds to discover all remote hosts and confirm its support of IPMI. Power commands cannot be sent to a host until it is discovered. If a remote host does not respond within *ping-timeout* milliseconds, a host will be considered undiscovered and power commands will not be sent to it. If not specified, *ping-interval* is '`5000`' milliseconds (5 seconds) and *ping-timeout* is '`30000`' milliseconds (30 seconds). Ping discovery requests can be disabled by setting the ping interval to '`0`'. If ping discovery messages are disabled, power commands will be attempted without knowledge of the host's existence or its support of IPMI. The value of *ping-interval* must be less than the *ping-timeout* length. RMCP ping discovery messages are automatically disabled in non-interactive mode.

- -v, —ping-packet-count *num*

- -w, —ping-percent *num*
  It is difficult to distinguish between a missing node and node with a bad connection when using just RMCP pings and timeouts. For example, if a link consistently drops 80% of the packets to a particular node, a power control operation may have difficulty

completing, although a recent pong response makes ipmipower believe the node exists and is functioning properly. The '`--ping-packet-count`' and '`--ping-percent`' options alleviate this problem. `ipmipower` will monitor ping packets in *ping-packet-count* chunks. If `ipmipower` does not receive a response to greater than *ping-percent* of those packets, `ipmipower` will assume the link to this node is bad and will not send power control operations to that node until the connection is determined to be reliable. If not specified, *ping-packet-count* is '`10`' and *ping-percent* is '`50`'. This heuristic can be disabled by setting either *ping-packet-count* or *ping-percent* to '`0`'. This feature is not used if *ping-interval* is set to '`0`'. Note that the '`--ping-percent`' option takes an integer as an argument, not a decimal.

- -x, —ping-consec-count *ping-consec-count*
  ping-consec-count is another measurement used to determine if a node should be considered discovered, undiscovered, or with a bad connection. If a valid response was received from the last *ping-consec-count* RMCP ping packets, a node will be considered discovered, regardless if *ping-packet-count* and *ping-percent* statistically consider the link to be unreliable. If not specified, *ping-consec-count* is '`5`'. This feature can be disabled by setting *ping-consec-count* to '`0`'. This feature is not used if *ping-interval*, '`--ping-packet-count`', or '`--ping-percent`' are set to '`0`'.

12.2 ipmipower configuration file

The `ipmipower` configuration file can be used to set default values to ipmipower when values aren't set on the command line. This allows users to avoid typing in a long list of command line options everytime ipmipower is executed. It can also be used to hide usernames and passwords from the `ps` command. See Section 12.8 [ipmipower known issues], page 43 for details.

By default, the configuration file is stored at '`/etc/ipmipower.conf`'. But users may select a different configuration file at the command line through the '`--config`' option.

The user can still override the configuration file values by specifying the options on the command line. The configuration file does not stop a user from specifying certain options.

12.2.1 Configuration options

The following are a list of configuration options that can be specified in the configuration file. Each configuration option must be listed on a separate line. Arguments for an option are separated by any amount of whitespace. Multiple arguments are also separated by whitespace. Comments can be marked by using the pound sign (`"#"`) character, and lines can be continued on the next using backslash (`"\"`).

Note that it is possible to list the username and password in the configuration file. If this data is stored in a configuration file, system administrators should limit access to this file.

- hostnames *host1 host2 host3* ...

  Specify the default hostnames. Multiple hostnames or hostname ranges can be specified by separating each range by whitespace. See Section 12.4 [Host ranges], page 41 for information on hostname ranges. For example, any of the following configuration listings would be acceptable:

```
hostnames host1 host2 host3 foo1 bar1
hostnames host1,host2,host3,foo1,bar1
hostnames host[1-3] foo1 bar1
hostnames host[1-3] foo1,bar1
```

At most 64 hostnames or hostname ranges can be separted by whitespace.

- username *username*
  Specify the default *username* to use.

- password *password*
  Specify the default *password* to use.

- k_g *k_g_str*
  Specify the BMC key K_g to use.

- authentication-type *authtype*
  Specify the default authentication type to use. `ipmipower` currently supports the following authentication types:

  > `'auto'`
  > `'straight_password_key'`
  > `'md2'`
  > `'md5'`

- privilege *privilege*
  Specify the default privilege type to use. `ipmipower` currently supports the following privilege types:

  > `'auto'`
  > `'user'`
  > `'operator'`
  > `'admin'`

- ipmi_version *ipmi_version*
  Specify the default IPMI protocol version to use. `ipmipower` currently supports the following version types:

  > `'auto'`
  > `'1.5'`
  > `'2.0'`

- cipher_suite_id *cipher_suite_id*
  Specify the default Cipher Suite ID to use. `ipmipower` currently supports the following Cipher Suite IDs:

  > `'auto'`
  > `'0'`
  > `'1'`
  > `'2'`
  > `'3'`
  > `'6'`
  > `'7'`
  > `'8'`
  > `'11'`
  > `'12'`

- on-if-off enable|disable

- wait-until-on enable|disable

- wait-until-off enable|disable

- outputtype *outputtype*
  Specify the default outputtype type to use. `ipmipower` currently supports the following
  output types:

  ```
          'none'
          'newline'    => (default)
          'hostlist'
  ```
- force_permsg_authentication enable|disable

- accept_session_id_zero enable|disable

- accept_unexpected_authcode enable|disable

- intel_2_0_session enable|disable

- supermicro_2_0_session enable|disable

- timeout *timeout*
  Specify the *timeout* in ms.
- retry_wait_timeout *timeout*
  Specify the retry wait *timeout* in ms.
- retry-timeout *timeout*
  Specify the retry *timeout* in ms. See Chapter 12 [ipmipower], page 32 for an explanation
  on the difference between this is the *timeout* option.
- retry-backoff-count *num*
  Specify the retry backoff count.
- ping-interval *interval-length*
  Specify the ping *interval-length* in ms.
- ping-timeout *timeout*
  Specify the ping *timeout* length in ms.
- ping-packet-count *count*
  Specify a new ping packet *count*.
- ping-percent *num*
  Specify a new ping percent.
- ping-consec-count *count*
  Specify a new ping consec *count*.

12.3 ipmipower interactive commands

`ipmipower` provides the following interactive commands at the '`ipmipower>`' prompt. Before any `power` commands ('`on`', '`off`', '`cycle`', '`reset`', '`stat`', '`pulse`', or '`soft`') can be used, hostnames must be configured into `ipmipower`, either through the command prompt or the `hostnames` command below.

- hostnames *str*
  Specify a new set of hosts, no *str* to unconfigure all hosts.
- username *str*
  Specify a new username, no *str* for null username.
- password *str*
  Specify a new password, no *str* for null password.
- k_g *str*
  Specify a new k_g, no *str* for null.
- on *host*
  Turns on all hosts, or only the specified host.
- off *host*
  Turns off all hosts, or only the specified host.
- cycle *host*
  Power cycle all hosts, or specified host.
- reset *host*
  Hard reset all hosts or specified host.
- stat *host*
  Queries power status for all hosts, or only the specified host.
- pulse *host*
  Send pulse diagnostic interrupt to all hosts, or only the specified host.
- soft *host*
  Initiate a soft-shutdown of the OS via ACPI to all hosts, or only the specified host.
- help
  Display the help menu.
- advanced
  Display the advanced help menu.
- network
  Display the network help menu.
- quit
  Quit ipmipower.
- authentication_type *str*
  Specify a new authentication type:

    '`none`'
    '`straight_passwd_key`'
    '`md2`'
    '`md5`'

- privilege_type *str*
  Specify a new privilege type:

> > `'none'`
> > `'user'`
> > `'operator'`
> > `'admin'`

- ipmi_version *str*
  Specify a new IPMI version:

  > > `'auto'`
  > > `'1.5'`
  > > `'2.0'`

- cipher_suite_id *str*
  Specify a new cipher suite id:

  > > `'auto'`
  > > `'0'`
  > > `'1'`
  > > `'2'`
  > > `'3'`
  > > `'6'`
  > > `'7'`
  > > `'8'`
  > > `'11'`
  > > `'12'`

- on-if-off on|off

- wait-until-on on|off

- wait-until-off on|off

- outputtype *str*
  Specify a new output type:

  > > `'none'`
  > > `'newline'`
  > > `'hostlist'`

- force-permsg-authentication on|off

- accept-session-id-zero on|off

- check-unexpected-authcode on|off

- intel-2-0-session on|off

- supermicro-2-0-session on|off

- config
  Output the current configuration.

- timeout *ms*
  Specify a new timeout length.
- retry-timeout *ms*
  Specify a new retry timeout length.
- retry-backoff-count *num*
  Specify a new retry backoff count.
- ping-interval *ms*
  Specify a new ping interval length.
- ping-timeout *ms*
  Specify a new ping timeout length.
- ping-packet-count *num*
  Specify a new ping packet count.
- ping-percent *num*
  Specify a new ping percent.
- ping-consec-count *num*
  Specify a new ping consec count.

12.4 Host ranges

As noted above, ipmipower accepts a range of hostnames in the general form: prefix[n-m,l-k,...], where n < m and l < k, etc., as an alternative to explicit comma separated lists of hosts. This form should not be confused with regular expression character classes (also denoted by []). For example, foo[19] does not represent foo1 or foo9, but rather represents a degenerate range: foo19.

This range syntax is meant only as a convenience on clusters with a prefixNN naming convention and specification of ranges should not be considered necessary – the list foo1,foo9 could be specified as such, or by the range foo[1,9].

Some examples of range usage follow:

```
foo[01-05] instead of foo01,foo02,foo03,foo04,foo05
foo[7,9-10] instead of foo7,foo9,foo10
foo[0-3] instead of foo0,foo1,foo2,foo3
```

As a reminder to the reader, some shells will interpret brackets ([and]) for pattern matching. Depending on your shell, it may be necessary to enclose ranged lists within quotes.

12.5 ipmipower example

Determine the power status of foo[0-2] with null username and password.

```
ipmipower -h foo[0-2] --stat
```

Determine the power status of foo[0-2] with non-null username and password.

```
ipmipower -h foo[0-2] -u foo -p bar --stat
```

Hard reset nodes foo[0-2] with non-null username and password.

```
ipmipower -h foo[0-2] -u foo -p bar --reset
```

Hard reset the nodes configured in a configuration file.

```
        ipmipower -C /etc/powerctrl.conf --reset
```

Example `ipmipower` session:

```
debian-sid:~# ipmipower --hostnames debian-ia64 --password "rea1secret" --stat
debian-ia64: on
debian-sid:~# ipmipower --hostnames debian-ia64 --password "rea1secret" --off
debian-ia64: ok
debian-sid:~# ipmipower --hostnames debian-ia64 --password "rea1secret" --stat
debian-ia64: off
debian-sid:~# ipmipower --hostnames debian-ia64 --password "rea1secret" --on
debian-ia64: ok
debian-sid:~#
```

12.6 Use with powerman

The `powerman` device configuration file '`ipmipower.dev`' supplied with `powerman` 1.0.20 and beyond can be used to control one or more instances of `ipmipower` in coprocess mode.

Due to deficiencies within `powerman`, the power control operations '`--on`', '`--off`', '`--cycle`', '`--reset`' will be reported as successful, despite any errors that may occur. The user should use the '`--query`' option to ensure that all remote hosts were successfully powered on or off.

It is recommend that the '`--on-if-off`' option be used with `ipmipower` when it is used in conjunction with powerman. This will ensure `ipmipower` behaves similarly to other `powerman` devices.

12.7 ipmipower workarounds

As can be expected, with so many different vendors implementing their own IPMI solutions, different vendors may implement their IPMI protocols slightly differently. The following lists the handful of compliance issues discovered and the workarounds currently used in `ipmipower`.

When possible, the workarounds have been implemented so they will be transparent to the user. However, some will require command line options be set due to issues with code logic or security. The workarounds listed below are listed in the order of their implementation. Therefore, workarounds implemented earlier may have solved problems for other vendors.

Note that the following only indicates the hardware that a problem was discovered on. Newer versions of a vendors firmware may fix the problems indicated below. Similar machines from vendors may or may not exhibit the same problems.

Intel SR870BN4: BMCs would not respond to retransmissions of a Get Session Challenge Request if a previous Get Session Challenge response was lost. Resolved by sending retransmitted Get Session Challenge requests from a different source port.

Tyan S2882 with m3289 BMC: After the IPMI session is brought up, packet responses return empty session IDs to the client. In order to work around this issue, the '`-S`' ('`--accept-ses- sion-id-zero`') option must be set. The option will allow empty session IDs to be accepted by the client. This problem is apparently fixed in later firmware releases.

Dell PowerEdge 2850,SC1425: When Per-Message Authentication is disabled, packet responses contain non-null authentication data (when it should in fact be null). In order to work around this issue, the '-U' ('--check-unexpected-authcode') option must be set. The option will allow unexpected non-null authcodes to be checked as though they were expected. Fix con- firmed on upgraded firmware.

Intel SE7520JR2 with National Semiconductor PC87431M mBMC: The activate session response and close session response packets have invalid sequence numbers. Specific workaround no longer required in later revisions of ipmipower.

IBM eServer 325: The remote BMC will advertise that Per Message Authentication is disabled, but actually require it for the protocol. In order to work around this issue, the '-P' ('--force-permsg-authentication') option must be set. The option will force Per Message Authentication to be used no matter what is advertised by the remote BMC.

Intel SE7520AF2 with Intel Server Management Module (Professional Edition): There are a number of Intel IPMI 2.0 bugs which can be worked around using the the '-X' ('--intel-2-0-session') option. The workrarounds include padding of usernames, automatic acceptance of a RAKP 4 response integrity check when using the integrity algorith MD5-128, and password truncation if the authentication algorithm is HMAC-MD5-128.

Supermicro H8QME with SIMSO daughter card: There are several Supermicro IPMI 2.0 bugs on early firmware revisions which can be worked around using the '-Y' ('--supermicro-2-0-session') option.

12.8 Known issues with the ipmipower command

In order to prevent brute force attacks, some BMCs will *lock up* after a number of username, password, or privilege errors. There is no known way to cleanly deal with a *locked up* BMC. The best option is to simply **wait awhile**.

On certain operating systems, if you input your username and password on the command line, the username and password may be discovered by other users when using the ps command or looking in the '/proc' file system. The most secure solution is to enter the username and password while in interactive mode. If administrators do not wish to type in their username and password at the interactive prompt, they can be listed in a configuration file, in which the access to this file can be limited.

IPMI specifications do not require BMCs to perform a power control operation before returning a completion code to the caller. Therefore, it is possible for ipmipower power status queries to initially return information other than what you are expecting. For example, if a 'power off' operation is performed, a BMC may return a successful completion-code to ipmipower before the 'power off' operation is actually performed. Subsequent power status queries may return 'on' for several seconds, until the BMC actually performs the 'power off' operation.

13 IPMI SOL console utility

Serial-over-LAN (SOL) console utility. It can be used to establish console sessions to remote machines using the IPMI 2.0 SOL protocol.

13.1 Command-line arguments

- -h, —hostnames *host*
  Specify the remote host to connect to.

- -u, —username *name*
  Specify the username to use to establish communication. If not specified, the NULL user is assumed. The user must have a high enough privilege to establish an SOL session.

- -p, —password *pw*
  Specify the password to use to establish communication. If not specified, a NULL password is assumed.

- -k, —k-g *str*
  Specify the BMC key to use for authentication. If not specified, a NULL key is assumed.

- -l, —privilege *str*
  Specify the privilege type to use. The privilege must be atleast the minimum required by the remote BMC to establish a SOL session.

  ```
  'user'
  'operator'
  'admin' => (default)
  ```

- -T, —cipher-suite-id *id*
  Specify the IPMI 2.0 Cipher Suite ID to use. The Cipher Suite ID identifies a set of authentication, integrity, and confidentiality algorithms to use for IPMI 2.0 communication. The authentication algorithm identifies the algorithm to use for session setup, the integrity algorithm identifies the algorithm to use for session packet signatures, and the confidentiality algorithm identifies the algorithm to use for payload encryption.

  ```
  '0'
  '1'
  '2'
  '3' => (default)
  '6'
  '7'
  '8'
  '11'
  '12'
  ```

- -H, —help
  Output help menu and exit.

- -V, —version
  Output version and exit.

- -C, —config *file*
  Specify an alternate configuration file.

- -I, —intel-2-0-session
  Modifies the IPMI 2.0 session protocol for non-compliant Intel machines.
- -S, —supermicro-2-0-session
  Modifies the IPMI 2.0 session protocol for non-compliant Supermicro machines.

13.2 ipmiconsole configuration file

The `ipmiconsole` configuration file can be used to set default values to ipmiconsole when values aren't set on the command line. This allows users to avoid typing in a long list of command line options everytime ipmiconsole is executed. It can also be used to hide usernames and passwords from the `ps` command. See Section 13.4 [ipmiconsole known issues], page 46 for details.

By default, the configuration file is stored at '`/etc/ipmiconsole.conf`'. But users may select a different configuration file at the command line through the '`--config`' option.

The user can still override the configuration file values by specifying the options on the command line. The configuration file does not stop a user from specifying certain options.

13.2.1 Configuration options

The following are a list of configuration options that can be specified in the configuration file. Each configuration option must be listed on a separate line. Arguments for an option are separated by any amount of whitespace. Multiple arguments are also separated by whitespace. Comments can be marked by using the pound sign ("`#`") character, and lines can be continued on the next using backslash ("`\`").

Note that it is possible to list the username and password in the configuration file. If this data is stored in a configuration file, system administrators should limit access to this file.

- hostname *host*
  Specify the default hostname.
- username *username*
  Specify the default *username* to use.
- password *password*
  Specify the default *password* to use.
- k_g *k_g_str*
  Specify the BMC key *K_g* to use.
- privilege *privilege*
  Specify the default privilege type to use. `ipmiconsole` currently supports the following privilege types:

  > '`user`'
  > '`operator`'
  > '`admin`'

- cipher_suite_id *cipher_suite_id*
  Specify the default Cipher Suite ID to use. `ipmiconsole` currently supports the following Cipher Suite IDs:

  > '`0`'

```
                                      ‘1’
                                      ‘2’
                                      ‘3’
                                      ‘6’
                                      ‘7’
                                      ‘8’
                                      ‘11’
                                      ‘12’
```

- intel_2_0_session enable|disable

- supermicro_2_0_session enable|disable

13.3 ipmiconsole workarounds

As can be expected, with so many different vendors implementing their own IPMI solutions, different vendors may implement their IPMI protocols slightly differently. The following lists the handful of compliance issues discovered and the workarounds currently used in `ipmiconsole`.

Note that the following only indicates the hardware that a problem was discovered on. Newer versions of a vendors firmware may fix the problems indicated below. Similar machines from vendors may or may not exhibit the same problems.

Intel SE7520AF2 with Intel Server Management Module (Professional Edition): There are a number of Intel IPMI 2.0 bugs which can be worked around using the the '`-I`' ('`--intel-2-0-session`') option. The workrarounds include padding of usernames, automatic acceptance of a RAKP 4 response integrity check when using the integrity algorith MD5-128, and password truncation if the authentication algorithm is HMAC-MD5-128.

Supermicro H8QME with SIMSO daughter card: There are several Supermicro IPMI 2.0 bugs on early firmware revisions which can be worked around using the '`-S`' ('`--supermicro-2-0-session`') option.

13.4 Known issues with the ipmiconsole command

On certain operating systems, if you input your username and password on the command line, the username and password may be discovered by other users when using the `ps` command or looking in the '`/proc`' file system. The most secure solution is to enter the username and password while in interactive mode. If administrators do not wish to type in their username and password at the interactive prompt, they can be listed in a configuration file, in which the access to this file can be limited.

14 ipmiping

IPMI discovery and reachability test tool.

ipmiping uses the IPMI `Get Authentication Capabilities` request datagram to elicit an IPMI `Get Authentication Capabilities` response from a remote host. The utility can be used to verify if a remote host supports IPMI.

Returns '`0`' to the environment if it receives at least '`1`' response from the remote host. Otherwise, it exists with a value of '`1`'.

14.1 command-line arguments

14.1.1 Synopsis

ipmiping [OPTIONS] destination

The following options are available

- -h
  Display the help menu.

- -V
  Display the version information.

- -c *count*
  Stop after sending *count* request packets.

- -i *interval*
  Wait *interval* seconds between sending each packet. The default is to wait for one second between each packet.

- -I *interface-address*
  Set source address to specified *interface-address*. Argument may be numeric IP address or name of device.

- -t *timeout*
  Time to wait for a response, in seconds. Default is five seconds.

- -r *version*
  Specify IPMI protocol version.

  > '`1.5`'
  > '`2.0`'

- -s *num*
  Specify an initial starting sequence number.

- -v
  Verbose Display.

14.2 ipmiping example

Example: Test the BMC reachability of host '`debian-ia64`' using IPMI protocol.

```
debian-sid:~# ipmiping debian-ia64
ipmiping debian-ia64 (192.168.1.60)
response received from 192.168.1.60: rq_seq=6
response received from 192.168.1.60: rq_seq=7
```

```
    response received from 192.168.1.60: rq_seq=8
    response received from 192.168.1.60: rq_seq=9
    response received from 192.168.1.60: rq_seq=10
    response received from 192.168.1.60: rq_seq=11
    --- ipmiping debian-ia64 statistics ---
    6 requests transmitted, 6 responses received in time, 0.0% packet loss
```

Example: Test the BMC reachability of host 'debian-ia64' in verbose mode.

```
    debian-sid:~# ipmiping -v debian-ia64
    ipmiping debian-ia64 (192.168.1.60)
    response received from 192.168.1.60: rq_seq=45, auth: none=clear md2=clear md5=set pas
    response received from 192.168.1.60: rq_seq=46, auth: none=clear md2=clear md5=set pas
    response received from 192.168.1.60: rq_seq=47, auth: none=clear md2=clear md5=set pas
    response received from 192.168.1.60: rq_seq=48, auth: none=clear md2=clear md5=set pas
    response received from 192.168.1.60: rq_seq=49, auth: none=clear md2=clear md5=set pas
    --- ipmiping debian-ia64 statistics ---
    5 requests transmitted, 5 responses received in time, 0.0% packet loss
```

Example: Test the BMC reachability of host 'debian-ia64' by sending exactly 2 packets.

```
    debian-sid:~# ipmiping -c 2 debian-ia64
    ipmiping debian-ia64 (192.168.1.60)
    response received from 192.168.1.60: rq_seq=30
    response received from 192.168.1.60: rq_seq=31
    --- ipmiping debian-ia64 statistics ---
    2 requests transmitted, 2 responses received in time, 0.0% packet loss
    debian-sid:~#
```

14.3 ipmiping known issues

It has been observed that some remote BMCs can get *confused* and delay packet responses
if duplicate packets are sent in succession very quickly. For example, this could happen if
the user repeatedly executes `ipmiping -c 1 -s X destination` very quickly. There is no
known way to cleanly deal with a *confused* BMC. The best option is to simply **wait awhile**.

15 rmcpping

RMCP/IPMI discovery and reachability test tool.

   rmcpping uses the RMCP ping request datagram to elicit an RMCP pong response from a remote host. The utility can be used to verify if a remote host supports RMCP or IPMI.

   Returns 0 to the environment if it receives at least '**1**' response from the remote host. Otherwise, it exits with a value of '**1**'.

15.1 Command-line arguments

15.1.1 Synopsis

rmcpping [OPTIONS] destination

- -h
  Display the help menu.

- -V
  Display the version information.

- -c *count*
  Stop after sending count ping packets.

- -i *interval*
  Wait *interval* seconds between sending each packet. The default is to wait for one second between each packet normally.

- -I *interface-address*
  Set source address to specified *interface-address*. Argument may be numeric IP address or name of device.

- -t *timeout*
  Time to wait for a response, in seconds. Default is '**5**' seconds.

- -v Verbose display.

- -s *num*
  Specify an initial starting sequence number.

15.2 rmcpping example

Example: Test the BMC reachability of host '`debian-ia64`' using RMCP protocol.

```
debian-sid:~# rmcpping debian-ia64
rmcpping debian-ia64 (192.168.1.60)
pong received from 192.168.1.60: msg_tag=0
pong received from 192.168.1.60: msg_tag=1
pong received from 192.168.1.60: msg_tag=2
pong received from 192.168.1.60: msg_tag=3
pong received from 192.168.1.60: msg_tag=4
pong received from 192.168.1.60: msg_tag=5
pong received from 192.168.1.60: msg_tag=6
pong received from 192.168.1.60: msg_tag=7
pong received from 192.168.1.60: msg_tag=8
```

```
--- rmcpping debian-ia64 statistics ---
9 pings transmitted, 9 pongs received in time, 0.0% packet loss
```

Example: Test the BMC reachability of host 'debian-ia64' in verbose mode.

```
debian-sid:~# rmcpping -v debian-ia64
rmcpping debian-ia64 (192.168.1.60)
pong received from 192.168.1.60: msg_tag=0, ipmi supported
pong received from 192.168.1.60: msg_tag=1, ipmi supported
pong received from 192.168.1.60: msg_tag=2, ipmi supported
pong received from 192.168.1.60: msg_tag=3, ipmi supported
pong received from 192.168.1.60: msg_tag=4, ipmi supported
--- rmcpping debian-ia64 statistics ---
5 pings transmitted, 5 pongs received in time, 0.0% packet loss
```

Example: Test the BMC reachability of host 'debian-ia64' by sending exactly 2 packets.

```
debian-sid:~# rmcpping -c 2 debian-ia64
rmcpping debian-ia64 (192.168.1.60)
pong received from 192.168.1.60: msg_tag=0
pong received from 192.168.1.60: msg_tag=1
--- rmcpping debian-ia64 statistics ---
2 pings transmitted, 2 pongs received in time, 0.0% packet loss
debian-sid:~#
```

15.3 rmcpping known issues

It has been observed that some remote BMCs can get *confused* and delay packet responses if duplicate packets are sent in succession very quickly. For example, this could happen if the user repeatedly executes `rmcpping -c 1 -s X destination` very quickly. There is no known way to cleanly deal with a *confused* BMC. The best option is to simply **wait awhile**.

16 Trouble-shooting

16.1 Fencing IPMI IP ports

```
Append the following to /etc/services:
# BMC IPMI/RMCP services
rmcp    623/udp          # Aux Bus Shunt (Primary RMCP Port)
rmcps   664/udp          # Secure Aux Bus (Secondary RMCP Port)
```

BMC internally (at hardware level) uses the above mentioned ports for sending RMCP/IPMI packets . To avoid any conflit with the BMC, Operating System should make sure no other applications or services uses these ports for communication. One easy way to do this is to start a simple daemon at the boot time that opens these ports but never uses them.

Most common victims to this issue are Remote-shell (rsh) and NIS services. You will notice "time out" errors under heavy load, when these services run over the BMC reserved ports.

Secure connections to BMC port 664 is not enabled on most BMC implementations by default.

Thanks to Anand Manian (GE Power Systems) for reporting this problem.

16.2 Non-unique IPC key

Drivers internally use the inode number of '`/var/lib/freeipmi/ipckey`' to obtain a system wide unique IPC key for locking and synchronization through `ftok` call. It is extremely rare (but possible) for more than one application to conflict with this IPC key, because `ftok` doesn't absolutely guarantee system wide uniqueness.

To regenerate a new system wide unique IPC key, you have to recreate '`/var/lib/freeipmi/ipckey`' with a new inode number.

Example: Recreating '`/var/lib/freeipmi/ipckey`' file.

```
debian-ia64:~# touch -f /var/lib/freeipmi/ipckey.new
debian-ia64:~# ls --inode /var/lib/freeipmi/ipckey
2289282 /var/lib/freeipmi/ipckey
debian-ia64:~# ls --inode /var/lib/freeipmi/ipckey.new
2289284 /var/lib/freeipmi/ipckey.new
debian-ia64:~# mv -f /var/lib/freeipmi/ipckey.new
/var/lib/freeipmi/ipckey
debian-ia64:~# ls --inode /var/lib/freeipmi/ipckey
2289284 /var/lib/freeipmi/ipckey
debian-ia64:~#
```

16.3 Kernel Driver conflict

Many of the the device drivers are completely written in user-space. If you already have in-kernel IPMI drivers loaded, they may conflict with FreeIPMI's drivers. You may need unload them before you launch any GNU FreeIPMI utility.

17 Contact us

- Homepage: http://www.gnu.org/software/freeipmi
- Project Main: https://savannah.gnu.org/projects/freeipmi/
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Contact FreeIPMI Core Team <ab(@)gnu.org.in>

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<div align="center">Version 2, June 1991</div>

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```
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```

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```

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```
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signature of Ty Coon, 1 April 1989
Ty Coon, President of Vice
```

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Version 1.2, November 2002

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IP	[I]nternet [P]rotocol.
IPMI	[I]ntelligent [P]latform [M]anagement [I]nterface
NIS	[N]etwork [I]nformation [S]ervice. Also humerously known as [N]etwork [I]ntrusion [S]ervice :) .
RMCP	[R]emote [M]anagement [C]ontrol [P]rotocol.
RSH	[R]emote [SH]ell.

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