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Rocky Enterprise Linux 9.2 Manual Pages on command 'sg_inq.8'

$ man sg_inq.8

SG_INQ(8) SG3_UTILS SG_INQ(8)

NAME

sg_inq - issue SCSI INQUIRY command and/or decode its response

SYNOPSIS

sg_inq [--ata] [--block=0|1] [--cmddt] [--descriptors] [--export] [--extended] [--force]

[--help] [--hex] [--id] [--inhex=FN] [--len=LEN] [--long] [--maxlen=LEN] [--only]

[--page=PG] [--raw] [--vendor] [--verbose] [--version] [--vpd] DEVICE

sg_inq [-36] [-a] [-A] [-b] [--B=0|1] [-c] [-cl] [-d] [-e] [-f] [-h] [-H] [-i] [-I=FN]

[-l=LEN] [-L] [-m] [-M] [-o] [-p=VPD_PG] [-P] [-r] [-s] [-u] [-v] [-V] [-x] [-36] [-?] DE?

VICE

DESCRIPTION

This utility, when DEVICE is given, sends a SCSI INQUIRY command to it then outputs the response. All SCSI devices are meant to respond to a "standard" INQUIRY command with at least a 36 byte response (in SCSI 2 and higher). An INQUIRY is termed as "standard" when both the EVPD and CmdDt (now obsolete) bits are clear.

Alternatively the --inhex=FN option can be given. In this case FN is assumed to be a file name ('-' for stdin) containing ASCII hexadecimal representing an INQUIRY response.

This utility supports two command line syntaxes. The preferred one is shown first in the synopsis and is described in the main OPTIONS section. A later section titled OLDER COM? MAND LINE OPTIONS describes the second group of options.

An important "non-standard" INQUIRY page is the Device Identification Vital Product Data (VPD) page [0x83]. Since SPC-3, support for this page is mandatory. The --id option de? codes this page. New VPD page information is no longer being added to this utility. To get information on new VPD pages see the sg_vpd(8) or sdparm(8) utilities.

In Linux, if the DEVICE exists and the SCSI INQUIRY fails (e.g. because the SG_IO ioctl is not supported) then an ATA IDENTIFY (PACKET) DEVICE is tried. If it succeeds then device identification strings are output. The --raw and --hex options can be used to manipulate the output. If the --ata option is given then the SCSI INQUIRY is not performed and the DEVICE is assumed to be ATA (or ATAPI). For more information see the ATA DEVICES section below.

In some operating systems a NVMe device (e.g. SSD) may be given as the DEVICE. For more information see the NVME DEVICES section below.

The reference document used for interpreting an INQUIRY is T10/BSR INCITS 502 Revision 19 which is draft SPC-5 revision 19, 14 February 2018). It can be found at http://www.t10.org . Obsolete and reserved items in the standard INQUIRY response output are displayed in square brackets.

OPTIONS

Arguments to long options are mandatory for short options as well. The options are ar? ranged in alphabetical order based on the long option name.

-a, --ata

Assume given DEVICE is an ATA or ATAPI device which can receive ATA commands from the host operating system. Skip the SCSI INQUIRY command and use either the ATA IDENTIFY DEVICE command (for non-packet devices) or the ATA IDENTIFY PACKET DEVICE command. To show the response in hex, add a '--verbose' option. This option is only available in Linux.

-B, --block=0|1

this option controls how the file handle to the DEVICE is opened. If this argument is 0 then the open is non-blocking. If the argument is 1 then the open is blocking.

In Unix a non-blocking open is indicated by a O_NONBLOCK flag while a blocking open is indicated by the absence of that flag. The default value depends on the operat? ing system and the type of DEVICE node. For Linux pass-throughs (i.e. the sg and bsg drivers) the default is 0.

-c, --cmddt

set the Command Support Data (CmdDt) bit (defaults to clear(0)). Used in conjunc? tion with the --page=PG option where PG specifies the SCSI command opcode to query. When used twice (e.g. '-cc') this utility forms a list by looping over all 256 op?

codes (0 to 255 inclusive) only outputting a line for commands that are found. The CmdDt bit is now obsolete; it has been replaced by the REPORT SUPPORTED OPERATION CODES command, see the sg_opcodes(8) utility.

-d, --descriptors

decodes and prints the version descriptors found in a standard INQUIRY response. There are up to 8 of them. Version descriptors indicate which versions of standards and/or drafts the DEVICE complies with. The normal components of a standard INQUIRY are output (typically from the first 36 bytes of the response) followed by the ver?sion descriptors if any.

-e see entry below for --vpd.

-f, --force

As a sanity check, the normal action when fetching VPD pages other than page 0x0 (the "Supported VPD pages" VPD page), is to first fetch page 0x0 and only if the requested page is one of the supported pages, to go ahead and fetch the requested page.

When this option is given, skip checking of VPD page 0x0 before accessing the re?quested VPD page. The prior check of VPD page 0x0 is known to crash certain USB de?vices, so use with care.

-u, --export

prints out information obtained from the device. The output can be modified by se?lecting a VPD page with PG (from --page=PG). If the device identification VPD page 0x83 is given it prints out information in the form: "SCSI_IDENT_<as?soc>_<type>=<ident>" to stdout. If the device serial number VPD page 0x80 is given it prints out information in the form: "SCSI_SERIAL=<ident>". Other VPD pages are not supported. If no VPD page is given it prints out information in the form: "SCSI_VENDOR=<vendor>", "SCSI_MODEL=<model>", and "SCSI_REVISION=<rev>", taken from the standard inquiry. This may be useful for tools like udev(7) in Linux.

-E, -x, --extended

prints the extended INQUIRY VPD page [0x86].

-h, --help

print out the usage message then exit. When used twice, after the usage message, there is a list of available abbreviations than can be given to the --page=PG op?tion.

-H, --hex

rather than decode a standard INQUIRY response, a VPD page or command support data; print out the response in hex and send the output to stdout. Error messages and warnings are typically output to stderr. When used twice with the ATA Information VPD page [0x89] decodes the start of the response then outputs the ATA IDENTIFY (PACKET) DEVICE response in hexadecimal bytes (not 16 bit words). When used three times with the ATA Information VPD page [0x89] or the --ata option, this utility outputs the ATA IDENTIFY (PACKET) DEVICE response in hexadecimal words suitable for input to 'hdparm --Istdin'. See note below.

To generate output suitable for placing in a file that can be used by a later invo? cation with the --inhex=FN option, use the '-HHHH' option (e.g. 'sg_inq -p di -HHHH /dev/sg3 > dev_id.hex').

-i, --id

prints the device identification VPD page [0x83].

-I, --inhex=FN

FN is expected to be a file name (or '-' for stdin) which contains ASCII hexadeci? mal or binary representing an INQUIRY (including VPD page) response. This utility will then decode that response. It is preferable to also supply the --page=PG op? tion, if not this utility will attempt to guess which VPD page (or standard IN? QUIRY) that the response is associated with. The hexadecimal should be arranged as 1 or 2 digits representing a byte each of which is whitespace or comma separated. Anything from and including a hash mark to the end of a line is ignored. If the --raw option is also given then FN is treated as binary.

-l, --len=LEN

the number LEN is the "allocation length" field in the INQUIRY cdb. This is the (maximum) length of the response returned by the device. The default value of LEN is 0 which is interpreted as: first request is for 36 bytes and if necessary exe? cute another INQUIRY if the "additional length" field in the response indicates that more than 36 bytes is available.

If LEN is greater than 0 then only one INQUIRY command is performed. This means that the Serial Number (obtained from the Serial Number VPD pgae (0x80)) is not fetched and therefore not printed. See the NOTES section below about "36 byte IN? QUIRYs".

-L, --long

this option causes more information to be decoded from the Identify command sent to a NVMe DEVICE.

-m, --maxlen=LEN

this option has the same action as the --len=LEN option above. It has been added for compatibility with the sg_vpd, sg_modes and sg_logs utilities.

-O, --old

Switch to older style options. Please use as first option on the command line.

-o, --only

Do not attempt to additionally retrieve the serial number VPD page (0x80) to en? hance the output of a standard INQUIRY. So with this option given and no others, this utility will send a standard INQUIRY SCSI command and decode its response. No other SCSI commands will be sent to the DEVICE. Without this option an additional SCSI command is sent: a (non-standard) SCSI INQUIRY to fetch the Serial Number VPD page. However the Serial Number VPD page is not mandatory (while the Device Identi? fication page is mandatory but a billion USB keys ignore that) and may cause nui? sance error reports.

For NVMe devices only the Identify controller is performed, even if the DEVICE in? cludes a namespace identifier. For example in FreeBSD given a DEVICE named /dev/nvme0ns1 then an Identify controller is sent to /dev/nvme0 and nothing is sent to its "ns1" (first namespace).

-p, --page=PG

the PG argument can be either a number of an abbreviation for a VPD page. To enu? merate the available abbreviations for VPD pages use '-hh' or a bad abbreviation (e.g, '--page=xxx'). When the --cmddt option is given (once) then PG is interpreted as an opcode number (so VPD page abbreviations make little sense).

If PG is a negative number, then a standard INQUIRY is performed. This can be used to override some guessing logic associated with the --inhex=FN option.

If PG is not found in the 'Supported VPD pages' VPD page (0x0) then EDOM is re? turned. To bypass this check use the --force option.

-r, --raw

in the absence of --inhex=FN then the output response is in binary. The output should be piped to a file or another utility when this option is used. The binary is sent to stdout, and errors are sent to stderr.

If used with --inhex=FN then the contents of FN is treated as binary.

-s, --vendor

output a standard INQUIRY response's vendor specific fields from offset 36 to 55 in ASCII. When used twice (i.e. '-ss') also output the vendor specific field from off? set 96 in ASCII. This is only done if the data passes some simple sanity checks.

-v, --verbose

increase level of verbosity. Can be used multiple times.

-V, --version

print out version string then exit.

-e, --vpd

set the Enable Vital Product Data (EVPD) bit (defaults to clear(0)). Used in con? junction with the --page=PG option where PG specifies the VPD page number to query. If the --page=PG is not given then PG defaults to zero which is the "Supported VPD pages" VPD page. A more up to date decoding of VPD pages can be found in the sg_vpd(8) utility.

NOTES

Some devices with weak SCSI command set implementations lock up when they receive commands they don't understand (and some lock up if they receive response lengths that they don't expect). Such devices need to be treated carefully, use the '--len=36' option. Without this option this utility will issue an initial standard INQUIRY requesting 36 bytes of re? sponse data. If the device indicates it could have supplied more data then a second IN? QUIRY is issued to fetch the longer response. That second command may lock up faulty de? vices.

ATA or ATAPI devices that use a SCSI to ATA Translation layer (see SAT at www.t10.org) may support the SCSI ATA INFORMATION VPD page. This returns the IDENTIFY (PACKET) DEVICE re? sponse amongst other things. The ATA Information VPD page can be fetched with '--page=ai'.

In the INQUIRY standard response there is a 'MultiP' flag which is set when the device has 2 or more ports. Some vendors use the preceding vendor specific ('VS') bit to indicate which port is being accessed by the INQUIRY command (0 -> relative port 1 (port "a"), 1 -> relative port 2 (port "b")). When the 'MultiP' flag is set, the preceding vendor specific bit is shown in parentheses. SPC-3 compliant devices should use the device identification

VPD page (0x83) to show which port is being used for access and the SCSI ports VPD page (0x88) to show all available ports on the device.

In the 2.4 series of Linux kernels the DEVICE must be a SCSI generic (sg) device. In the 2.6 series and later block devices (e.g. disks and ATAPI DVDs) can also be specified. For example "sg_inq /dev/sda" will work in the 2.6 series kernels. From lk 2.6.6 other SCSI "char" device names may be used as well (e.g. "/dev/st0m").

The number of bytes output by --hex and --raw is 36 bytes or the number given to --len=LEN (or --maxlen=LEN). That number is reduced if the "resid" returned by the HBA indicates less bytes were sent back from DEVICE.

The DEVICE is opened with a read-only flag (e.g. in Unix with the O_RDONLY flag).

ATA DEVICES

There are two major types of ATA devices: non-packet devices (e.g. ATA disks) and packet devices (ATAPI). The majority of ATAPI devices are CD/DVD/BD drives in which the ATAPI transport carries the MMC set (i.e. a SCSI command set). Further, both types of ATA de?vices can be connected to a host computer via a "SCSI" (or some other) transport. When an ATA disk is controlled via a SCSI (or non-ATA) transport then two approaches are commonly used: tunnelling (e.g. STP in Serial Attached SCSI (SAS)) or by emulating a SCSI device (e.g. with a SCSI to ATA translation layer, see SAT at www.t10.org). Even when the physi?cal transport to the host computer is ATA (especially in the case of SATA) the operating system may choose to put a SAT layer in the driver "stack" (e.g. libata in Linux).

The main identifying command for any SCSI device is an INQUIRY. The corresponding command for an ATA non-packet device is IDENTIFY DEVICE while for an ATA packet device it is IDEN?TIFY PACKET DEVICE.

When this utility is invoked for an ATAPI device (e.g. a CD/DVD/BD drive with "sg_inq /dev/hdc") then a SCSI INQUIRY is sent to the device and if it responds then the response to decoded and output and this utility exits. To see the response for an ATA IDENTIFY PACKET DEVICE command add the --ata option (e.g. "sg_inq --ata /dev/hdc).

This utility doesn't decode the response to an ATA IDENTIFY (PACKET) DEVICE command, hd?parm does a good job at that. The '-HHH' option has been added for use with either the '--ata' or '--page=ai' option to produce a format acceptable to "hdparm --Istdin". An ex?ample: 'sg_inq --ata -HHH /dev/hdc | hdparm --Istdin'. See hdparm.

NVME DEVICES

Currently these device are typically SSDs (Solid State Disks) directly connected to a PCIe connector or via a specialized connector such as a M2 connector. Linux and FreeBSD treat NVMe storage devices as separate from SCSI storage with device names like /dev/nvme0n1 (in Linux) and /dev/nvme0ns1 (in FreeBSD). The NVM Express group has a document titled "NVM Express: SCSI Translation Reference" which defines a partial "SCSI to NVMe Translation Layer" often known by its acronym: SNTL.

On operating systems where it is supported by this package, this utility will detect NVMe storage devices directly connected and send an Identify controller NVMe Admin command and decode its response. A NVMe controller is architecturally similar to a SCSI target device.

If the NVMe DEVICE indicates a namespace then an Identify namespace NVMe Admin command is sent to that namespace and its response is decoded. Namespaces are numbered sequentially starting from 1. Namespaces are similar to SCSI Logical Units and their identifiers (nsid_s) can be thought of as SCSI LUNs. In the Linux and FreeBSD example device names above the "n1" and the "ns1" parts indicate nsid 1 . If no namespace is given in the DE? VICE then all namespaces found in the controller are sent Identify namespace commands and the responses are decoded.

To get more details in the response use the --long option. To only get the controller's Identify decoded use the --only option.

It is possible that even though the DEVICE presents as a NVMe device, it has a SNTL and accepts SCSI commands. In this case to send a SCSI INQUIRY command (and fetch its VPD pages) use 'sg_vpd -p sinq <dev>' (or to get VPD pages: 'sg_vpd -p <vpd_page> <dev>').

EXIT STATUS

The exit status of sg_inq is 0 when it is successful. Otherwise see the sg3_utils(8) man page.

OLDER COMMAND LINE OPTIONS

The options in this section were the only ones available prior to sg3_utils version 1.23 . Since then this utility defaults to the newer command line options which can be overridden by using --old (or -O) as the first option. See the ENVIRONMENT VARIABLES section for an? other way to force the use of these older command line options.

-36 only requests 36 bytes of response data for an INQUIRY. Furthermore even if the de? vice indicates in its response it can supply more data, a second (longer) INQUIRY is not performed. This is a paranoid setting. Equivalent to '--len=36' in the OP? TIONS section.

-a fetch the ATA Information VPD page [0x89]. Equivalent to '--page=ai' in the OPTIONS section. This page is defined in SAT (see at www.t10.org).

-A Assume given DEVICE is an ATA or ATAPI device. Equivalent to --ata in the OPTIONS section.

-b decodes the Block Limits VPD page [0xb0]. Equivalent to '--page=bl' in the OPTIONS section. This page is defined in SBC-2 (see www.t10.org) and later.

-B=0|1 equivalent to --block=0|1 in OPTIONS section.

-c set the Command Support Data (CmdDt) bit (defaults to clear(0)). Used in conjunc? tion with the -p=VPD_PG option to specify the SCSI command opcode to query. Equiva? lent to --cmddt in the OPTIONS section.

-cl lists the command data for all supported commands (followed by the command name) by looping through all 256 opcodes. This option uses the CmdDt bit which is now obso? lete. See the sg_opcodes(8) utility. Equivalent to '--cmddt --cmddt' in the OP? TIONS section.

-d decodes depending on context. If -e option is given, or any option that implies -e (e.g. '-i' or '-p=80'), then this utility attempts to decode the indicated VPD page. Otherwise the version descriptors (if any) are listed following a standard INQUIRY response. In the version descriptors sense, equivalent to --descriptors in the OPTIONS section.

-e enable (i.e. sets) the Vital Product Data (EVPD) bit (defaults to clear(0)). Used in conjunction with the -p=VPD_PG option to specify the VPD page to fetch. If -p=VPD_PG is not given then VPD page 0 (list supported VPD pages) is assumed.

-f Equivalent to --force in the OPTIONS section.

-h outputs INQUIRY response in hex rather than trying to decode it. Equivalent to --hex in the OPTIONS section.

-H same action as -h. Equivalent to --hex in the OPTIONS section.

-i decodes the Device Identification VPD page [0x83]. Equivalent to --id in the OP? TIONS section. This page is made up of several "designation descriptors". If -h is given then each descriptor header is decoded and the identifier itself is output in hex. To see the whole VPD 0x83 page response in hex use '-p=83 -h'.

-I=FN equivalent to --inhex=FN in the OPTIONS section.

-l=LEN equivalent to --len=LEN in the OPTIONS section.

-L equivalent to --long in the OPTIONS section.

-m decodes the Management network addresses VPD page [0x85]. Equivalent to

'--page=mna' in the OPTIONS section.

-M decodes the Mode page policy VPD page [0x87]. Equivalent to '--page=mpp' in the OPTIONS section.

-N, --new

Switch to the newer style options.

-o equivalent to --only in the OPTIONS section.

-p=VPD_PG

used in conjunction with the -e or -c option. If neither given then the -e option assumed. When the -e option is also given (or assumed) then the argument to this option is the VPD page number. The argument is interpreted as hexadecimal and is expected to be in the range 0 to ff inclusive. Only VPD page 0 is decoded and it lists supported VPD pages and their names (if known). To decode the mandatory de?vice identification page (0x83) use the -i option. A now obsolete usage is when the -c option is given in which case the argument to this option is assumed to be a command opcode number. Recent SCSI draft standards have moved this facility to a separate command (see sg_opcodes(8)). Defaults to 0 so if -e is given without this option then VPD page 0 is output.

-P decodes the Unit Path Report VPD page [0xc0] which is EMC specific. Equivalent to '--page=upr' in the OPTIONS section.

-r outputs the response in binary to stdout. Equivalent to --raw in the OPTIONS sec?tion. Can be used twice (i.e. '-rr' (and '-HHH' has same effect)) and if used with the -A or -a option yields output with the same format as "cat /proc/ide/hd<x>/identify" so that it can then be piped to "hdparm --Istdin".

-s decodes the SCSI Ports VPD page [0x88]. Equivalent to '--page=sp' in the OPTIONS section.

-u equivalent to '--export' in the OPTIONS section.

-v increase level of verbosity. Can be used multiple times.

-V print out version string then exit.

-x decodes the Extended INQUIRY data VPD [0x86] page. Equivalent to '--page=ei' in the OPTIONS section.

-? output usage message and exit. Ignore all other parameters.

EXAMPLES

The examples in this page use Linux device names. For suitable device names in other sup?

ported Operating Systems see the sg3_utils(8) man page.

To view the standard inquiry response use without options:

```
  sg_inq /dev/sda
```

Some SCSI devices include version descriptors indicating the various SCSI standards and drafts they support. They can be viewed with:

```
  sg_inq -d /dev/sda
```

Modern SCSI devices include Vital Product Data (VPD)pages which can be viewed with the SCSI INQUIRY command. To list the supported VPD pages (but not their contents) try:

```
  sg_inq -e /dev/sda
```

Some VPD pages can be read with the sg_inq utility but a newer utility called sg_vpd specializes in showing their contents. The sdparm utility can also be used to show the contents of VPD pages.

Further examples of sg_inq together with some typical output can be found on http://sg.danny.cz/sg/sg3_utils.html web page.

ENVIRONMENT VARIABLES

Since sg3_utils version 1.23 the environment variable SG3_UTILS_OLD_OPTS can be given. When it is present this utility will expect the older command line options. So the presence of this environment variable is equivalent to using --old (or -O) as the first command line option.

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REPORTING BUGS

Report bugs to <dgilbert at interlog dot com>.

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SEE ALSO

sg_opcodes(8), sg_vpd(8), sg_logs(8), sg_modes(8), sdparm(8), hdparm(8), sgdiag(scsirastools)

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