WAAS SIGGEN
Command-Line Interface (CLI) Specification

D24894

Limited Rights Notice

These data are submitted with limited rights under Contract No. 693KA8-18-C-00013. These data may be reproduced and used by the Customer with the express limitation that they will not, without written permission of the Contractor, be used for purposes of manufacture nor disclosed outside; except that the Customer may disclose these data outside for the following purposes, if any; provided that the Customer makes such disclosure subject to prohibition against further use and disclosure:

The information provided herein may be disclosed by the Customer for any purpose related to the use and operation of related NovAtel supplied equipment, including without limitation, maintenance, revision of equipment, design upgrades, testing, and any other required Customer activity.

This Notice must be marked on any reproduction of these data, in whole or in part.

The information contained in this document is subject to change without notice and should not be construed as a commitment by NovAtel Inc. unless such commitment is expressly given in a covering document.

TABLE OF CONTENTS

LIST OF TABLES

1 Scope

This document describes the Command-Line Interface (CLI) to the WAAS GUS SIGGGEN Control Software.

2 Overview

The CLI is intended for low-level control of the WAAS GUS SIGGGEN. It provides a command-driven means to utilize the SIGGEN WMP Serial Interface protocol. It assumes detailed technical knowledge on the part of the user.

Note that this software is not intended to be backward-compatible with previous SIGGEN units.

3 Installation

Installation of the CLI is part of the GUI installation. Refer to WAAS SIGGEN GUI User Guide (NovAtel Document D25548) for details.

The installation includes a shortcut to the CLI available from the Start Programs button (under folder NovAtel Inc). This should open a command shell where the CLI can be invoked manually (see the next section).

Note: for some installations using this shortcut will fail. In this case, the CLI can be run from its install directory (typically C:\Program Files (x86)\NovAtel Inc\SIGGEN-GUI), or the directory can be added to the system PATH.

4 Running the CLI

The CLI runs using standard input/output (stdio), so it can be invoked from a Windows command prompt, Telnet, etc. Each invocation of the CLI controls a single generator (L1 or L5). Two instances can be running simultaneously. Once started, the CLI opens the specified COM port, then waits for a SIGGEN status message to arrive (or times out). The status is reported and then the CLI provides its own command prompt:

```
L1>
```
Or
```
L5>
```

The CLI cannot be used simultaneously with the SIGGEN GUI unless they are controlling different generators (that is, they are using different COM ports).

4.1 Command Line Arguments

The Windows command line is as follows:

```
SIGGENCLI [L1|L5] <port> <baud> {<config file>}
```

Arguments are as follows:

Table 4-1: Startup Command-Line Arguments

Generator	"L1" or "L5", specifying which SIGGEN generator is to be controlled.
Serial port parameters	<port>: specific to the PC running the CLI e.g. "1" or "COM1" <baud>: to match the Dipswitch setting in the SIGGEN: 9600; 19200 (default); 38400; or 57600.
(optional) Initialization file path/name	`<config file>` The path to a text file that provides initialization of configuration parameters (see section below). If a filename without a path is specified, it is assumed to be located in the same directory as the CLI executable file. Spaces in the file path are allowed, but the path must be surrounded by quotation characters.

Examples:

Table 4-2: Startup Examples

`SIGGENCLI L1 COM1 19200`	Connects to L1 using the port and baud specified with default configuration parameters (note this does not configure the SIGGEN in any way).
`SIGGENCLI L1 1 19200 C:\Temp\L1cfg.txt`	As previous example but uses parameters from the given parameter file.
`SIGGENCLI L1 1 19200 "C:\Temp\L1 cfg.txt"`	File path has spaces

4.2 Configuration Parameter Files

Configuration parameter files are in plain ANSI text format, consisting of parameter key-value pairs, one per line, with a '=' character delimiter (similar to Wikipedia's "INI file" format, but without sections). They may consist of all or a subset of the configuration parameters listed in Appendix A. Any missing parameters are left unchanged (all are initially given default values when the CLI is run).

Parameter keys and values consist only of alphanumeric characters. If there are characters other than end-of-line after a value, there must be at least one space character after the value; any following characters are ignored.

All lines must be limited to 120 characters maximum. Lines that consist of anything other than a valid parameter-value pair are ignored.

Note that Configuration parameters are divided into Initialization, Control, and Rate parameters (see Appendix A). However, they can appear in a parameter file in any order.

When there are errors in a configuration file to be loaded, they will be listed and pasted to the Windows clipboard so they can be opened in the same text editor that is used to edit the configuration file.

4.3 Debug Log Output

The CLI (actually the DLL that the CLI uses) by default writes a debug log to a file called 'stdout.log' (in the default logging directory, see the SETPATH command section). This is used for software debug purposes only.

5 Command Descriptions

The available commands are described in this section. Note that all commands apply only to the generator chosen on the command line (L1 or L5). Control of both generators can be done by running separate instances of the CLI.

5.1 Command Description Conventions

Commands and parameter names are case-insensitive. Conventions used in the command descriptions are as follows:

Straight text must be entered exactly as shown (although case-insensitive)
<PARM> means to substitute a parameter e.g. <FILENAME> = temp.txt
{} surrounds an optional part of the command
X|Y means either X or Y are acceptable

5.2 Command Response

All commands will be responded to, after the information specific to the command, with either

```
OK 0 {<information>}
```

or

```
ERR <error number> {<error description>}
```

If error number is -1, the error description will appear in the lines before that response.

5.3 System Commands

5.3.1 EXIT

Terminate the command shell. This also closes the connected COM port and any open log files.

5.3.2 HELP

Prints a list of all available commands, except the configuration and status parameter-specific

ones (referred to in this document as <CFGPARMNAME> and <PARMNAME>).

5.3.3 SETPATH

Sets the file system directory for the LOAD/SAVE/LOG commands. If this command has not been used, the directory is set to the default logging directory (not where the command shell was run from, nor where the executable is located).

If no path is provided, the current configuration / logging path is reported.

NOTES:

The maximum length of a full filename path (path + filename) is 260 characters. If this is exceeded for the LOADCFG, SAVECFG, or LOG commands, it will be reported as an invalid filename.

For the SETPATH, LOADCFG, and SAVECFG commands, the file path **cannot** be surrounded by quotes, but spaces within the file path are acceptable. This is different than the optional configuration file path on the command line used to run the CLI.

5.4 Configuration Parameter Commands

NOTE: Parameters set individually with the <CFGPARMNAME> command, or collectively via the LOADCFG commands, are reported as they were set *even if they have not been sent* to the SIGGEN. The SIGGEN protocol does not provide a means to read back configuration parameters.

5.4.1 LOADCFG <FILENAME>

Load all Configuration parameters from the specified file (see previous section on Parameter Files). <FILENAME> is within the current (SETPATH) directory, or can be an absolute path.

See the notes under SETPATH regarding the file path format.

Note that this command has no direct effect on the SIGGEN. Parameters are stored for use when one of the SEND commands is used.

Errors in the configuration file are listed and copied to the Windows clipboard.

5.4.2 SAVECFG <FILENAME>

Save all parameters to the specified filename. See notes under LOADCFG regarding the filename. This will replace an existing file without any warning.

See the notes under SETPATH regarding the file path format.

5.4.3 <CFGPARMNAME> {=<PARMVALUE>}

Get or Set an individual configuration (Initialization, Control, or Rate) parameter. The parameter value is numeric; unsigned values may use an 0xXX format to express the value in hexadecimal.

Refer to Appendix A for parameter names.

5.4.4 CFGPARMS

Prints all configuration parameter names and corresponding descriptions.

5.4.5 PRN

This command sets the CODERINITI and CODERINITQ configuration parameters from an input PRN. Note that the range of valid PRNs is much greater than the conventional settings (i.e. what the GUI software supports). This is to allow for test flexibility. Table 5-1 shows valid PRN ranges for the GUI and CLI software.

This command does not allow reading back the set PRN value, as the PRN to Coder Initialization conversion is a one-way conversion. The Coder Initialization values can be read directly as Configuration Parameters (as described in section 5.4.3).

NOTE: This command is NOT recommended for L1 (the CODERINITQ value will always be set to the same as the CODERINITI value). Use the PRNI and PRNQ commands instead.

Table 5-1: Valid PRN Ranges

Generator	GUI range	CLI PRN command range
L1	120 to 158	38 to 210
L5	120 to 158	1 to 210

5.4.6 PRNI

This is the same as the PRN command, except only the CODERINITI value is set. This command cannot be used to read back a PRN value.

5.4.7 PRNQ

This is the same as the PRN command, except only the CODERINITQ value is set. For L1, this is the only direct command to set the coder initialization value for the Q channel from a PRN. This command cannot be used to read back a PRN value.

5.5 Status Commands

5.5.1 STATUS

Prints the SIGGEN connection status and parameters; if connected, prints the SIGGEN status (e.g. OPERATIONAL) and the number of seconds since last reset.

5.5.2 RANGE

Prints the last "range" parameters received from the SIGGEN in LOGRANGE format but without the date/time stamp (see below). Reports an error if SIGGEN is not in a Connected state.

5.5.3 <PARMNAME>

Prints the most recent value of any status parameter (see Appendix A for parameter names).

Note that the most recent status parameters received are reported, even if the SIGGEN is no longer connected. If the status parameter has never been received, it will show as blank space.

5.5.4 STATUSPARMS

Prints all status parameter names and corresponding descriptions.

5.6 Control Commands

5.6.1 RESET

Resets the SIGGEN Generator. Sends the Reset command immediately after the next status message is received. This will place the SIGGEN into a RESET state, regardless of its previous state.

The CLI will - after sending this command (or the following SEND commands) - wait for an acknowledgement from the SIGGEN in its next Status message. A "lost connection" error is reported if no status message is received after the command is sent.

5.6.2 SENDINIT

Sends the Initialization command with the current set of Initialization parameters to the SIGGEN. If this is successful, the SIGGEN places itself into its INITIALIZATION state.

Note this will be ignored by the SIGGEN unless it is in a RESET state.

5.6.3 SENDCTRL

Sends the Control command with current parameters to the SIGGEN. If this is successful, the SIGGEN will be placed into its CALIBRATION state, and then into its OPERATIONAL state.

Note this will be ignored by the SIGGEN unless it is in INITIALIZATION state.

5.6.4 SENDRATE

Sends the Update Rate/Frequency command with current parameters to the SIGGEN. This will be ignored by the SIGGEN unless it is in OPERATIONAL state.

5.7 Logging Commands

5.7.1 LOGRAW <filesuffix>

Logs messages to (TX) and from (RX) the SIGGEN to a log file, in a timestamped HEX ASCII format. The file is created in the directory specified by the SETPATH command; filenames are of the form

```
<Path>\L{1|5}-RAW-<filesuffix>.log
```

where L{1|5} is L1 or L5; {TX|RX} is TX or RX; <filesuffix> is specified by the LOGRAW command.

For example, opening an L1 raw log with the filesuffix "test" creates the file

```
L1-RAW-test.log
```

in the SETPATH directory.

Each line in a log file has the format:

```
YYYY-MM-DD,HH:MM:SS,<Hex ASCII>
```

The Hex ASCII bytes are separated by a space character.

Example LOGRAW lines (note each line is wrapped due to document width restrictions):

```
RX,2019-04-17,14:55:05,AA 55 55 AA 05 80 44 02 11 42 80 00 00 00 C8 00 E3 2C 00 00 80 61 00 00 70
01 50 01 04 00 00 00 00 00 2A 7A
TX,2019-04-17,14:55:06,AA 55 55 AA 05 10 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 D2 57
```

5.7.2 LOGRANGE <filesuffix>

Logs interpreted status messages from the SIGGEN in an ASCII comma-delimited format. The log file is created in the directory specified by the SETPATH command; file names are similar to those of the LOGRAW command and have the form

```
<Path>\L{1|5}-RANGE-<filesuffix>.log
```

A LOGRANGE output can be active at the same time as a LOGRAW output.

5.7.3 Range Log Data Format

Each line has the format:

```
YYYY-MM-DD,HH:MM:SS,<timeup>,<ms>,<symcnt>,<chip>,<sub>,<m>,<m/s>
```

where:

Table 5-2: LOGRANGE Format Fields

Field	CLI Status Parameter Name	Description
<timeup>	TIMEUP	Time since reset, in seconds
<ms>	RANGEMSEC	Range in milliseconds
<symcnt>	RANGESYM	Symbol Advance
<chip>	RANGECHIP	Range: Chip

<sub>	RANGESUBCHIP	Range: Subchip
<m>	RANGEM	Range: m
<m/s>	RANGEVEL	Velocity: m/s

For example (spaces added for clarity):

```
2018-11-15,12:42:16,  93547, 694,  1245, 20720,  208092460.1230,      50965.6830
2018-11-15,12:42:17,  93548, 694,  2984, 29414,  208143425.7980,      50965.6749
2018-11-15,12:42:18,  93549, 694,  4723, 37839,  208194391.3527,      50965.5546
```

5.7.4 LOGSTOP

Stops the logging from the LOGRAW and/or LOGRANGE commands and closes the file(s).

5.7.5 MONITOR

Continually prints status values in LOGRANGE format to the command console each time a new status message is received. Stopped by pressing the Enter key.

Appendix A: Configuration and Status Parameters

Appendix A.1: Configuration Parameters

Table A.1 - 1: Initialization Parameters

CLI Name	Full Name	Validity
INITSYMADVANCE	Initial Symbol Advance	0-499
INITSYMPHASE	Symbol Phase	0=ODD/1=EVEN
INITCHIPADVANCE	Initial Code Chip Advance	L1: 0-1022 L5: 0-10229
INITSUBCHIP	Initial Subchip	0-255
INITRFFREQ	RF Centre Frequency	L1: 0=1227.6 1=1575.42 L5: 0=1176.45 1=1227.6
CODERINITI	I Coder Init G2 [L1] I Coder Init XB(I) [L5]	**Must be hexadecimal;** can begin with a leading "0x". 0 - 0x3FF 0 - 0x1FFF For test purposes, coder init values do not need to correspond to a given PRN.
CODERINITQ	Q Coder Init G2 [L1] Q Coder Init XB(I) [L5]	**Must be hexadecimal;** can begin with a leading "0x". 0 - 0x3FF 0 - 0x1FFF

Table A.1 - 2: Control Parameters

CLI Name	Full Name	Validity
CTRLINITRANGE	Init range on next PPS	1=Init range on next PPS (normal) 0 = disabled (test use only)
CTRLMODCODE	Custom Control Command	**Must be hexadecimal;** can begin with a leading "0x". 0 – 0xFF (bit D0 duplicates the CTRLINITRANGE setting) From SIGGEN spec, the standard settings are (note these all also have the Init range on PPS bit set): 0x01: 500 SPS I Channel only - BPSK 0x49: 500 SPS I Channel and Q Channel with no data - QPSK 0x19(L1) or 0x09(L5): 500 SPS I Channel, And 500 SPS Q Channel – QPSK

Table A.1 - 3: Rate/Freq Parameters

CLI Name	Full Name	Validity	Notes
CHIPRATEOFFSET	Code Chip Rate Offset	+/-0.25	
CHIPRATERAMP	Code Chip Rate Ramp	+/-8.525	
FREQCOHERENT	Coherent Carrier checkbox	0=FALSE, else TRUE	When enabled, calculates and sets 70 MHz Carrier Frequency Offset from the code chip rate/ramp.
FREQOFFSET	70 MHz Carrier Freq Offset	+/- 25000	Ignored as a configuration parameter if Coherent Carrier.

FREQRAMP	Carrier Freq Ramp	+/- 0.025	Ignored as a configuration parameter if Coherent Carrier.
RATEAUTOUPDATE	Auto Update	0=FALSE, else TRUE	Sends a Rate/Freq Update command every second with the current Rate parameter values.
ACCUMRAMPS	Accumulate Ramps	0=FALSE, else TRUE	Ramp parameters (both code chip and frequency) are constantly being overwritten with the appropriate value to keep the 250ms ramp going every PPS.

Appendix A.2: Status Parameters

Table A.2 - 1: Status Parameters

CLI Name	Description
STATUSRAW	Last Raw Received Message
SGSTATE	SIGGEN State
TIMEUP	Time from Reset
HWSTATUS	Hardware Status word
ERRSTATUS	Error Status word
SWSTATUS	Switch Status word
RANGECHIP	Uplink Range Code Chip Counter
RANGESUBCHIP	Uplink Range Code Chip Sub-Phase
RANGESYM	Uplink Range Symbol Counter
RANGEM	Range (m)
RANGEMSEC	Range Time (ms)
RANGEVEL	Range Velocity (m/s)
RAMPFREQOFFSET	Calculated Carrier Freq Offset
RAMPCHIPRATEOFFSET	Carrier Freq Ramp
CHIPRATEVEL	Code Chip Rate [m/s]
L1L5IND	L1 or L5
FWVERSION	Firmware Version
FPGAVERSION	FPGA Version
SWVERSION	SW Version
COMPORT	COM Port
COMBAUD	Baud Rate
TXMSG	Time of Last STATUS Message
COMCTS	COM CTS line
DLLVERSION	DLL software version