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CHAPTER 1

Netmiko Classes

1.1 BaseConnection

class netmiko.base_connection.BaseConnection(ip=u'', host=u'', username=u'', password=u'', secret=u'', port=None, device_type=u'', verbose=False, global_delay_factor=1, use_keys=False, key_file=None, pkey=None, passphrase=None, allow_agent=False, ssh_strict=False, system_host_keys=False, alt_host_keys=False, alt_key_file=u'', ssh_config_file=None, timeout=100, session_timeout=60, auth_timeout=None, blocking_timeout=8, keepalive=0, default_enter=None, response_return=None, serial_settings=None, fast_cli=False, session_log=None, session_log_record_writes=False, session_log_file_mode=u'write', allow_auto_change=False, encoding=u'ascii')

Defines vendor independent methods.
Otherwise method left as a stub method.

___enter___()
Establish a session using a Context Manager.

___exit___(exc_type, exc_value, traceback)
Gracefully close connection on Context Manager exit.
__init__(ip=u"", host=u"", username=u"", password=u"", secret=u"", port=None, device_type=u"",
verbose=False, global_delay_factor=1, use_keys=False, key_file=None, pkey=None,
passphrase=None, allow_agent=False, ssh_strict=False, system_host_keys=False,
alt_host_keys=False, alt_key_file=u"", ssh_config_file=None, timeout=100, ses-
sion_timeout=60, auth_timeout=None, blocking_timeout=8, keepalive=0, de-
fault_enter=None, response_return=None, serial_settings=None, fast_cli=False, ses-
ion_log=None, session_log_record_writes=False, session_log_file_mode=u’write’,
allow_auto_change=False, encoding=u’ascii’)

Initialize attributes for establishing connection to target device.

param ip  IP address of target device. Not required if host is provided.

type ip  str

param host  Hostname of target device. Not required if ip is provided.

type host  str

param username  Username to authenticate against target device if required.

type username  str

param password  Password to authenticate against target device if required.

type password  str

param secret  The enable password if target device requires one.

type secret  str

param port  The destination port used to connect to the target device.

type port  int or None

param device_type  Class selection based on device type.

type device_type  str

param verbose  Enable additional messages to standard output.

type verbose  bool

param global_delay_factor  Multiplication factor affecting Netmiko delays (default: 1).

type global_delay_factor  int

param use_keys  Connect to target device using SSH keys.

type use_keys  bool

param key_file  Filename path of the SSH key file to use.

type key_file  str

param pkey  SSH key object to use.

type pkey  paramiko.PKey

param passphrase  Passphrase to use for encrypted key; password will be used for key
decryption if not specified.

type passphrase  str

param allow_agent  Enable use of SSH key-agent.

type allow_agent  bool
param ssh_strict  Automatically reject unknown SSH host keys (default: False, which means unknown SSH host keys will be accepted).

type ssh_strict  bool

param system_host_keys  Load host keys from the user’s ‘known_hosts’ file.

type system_host_keys  bool

param alt_host_keys  If True host keys will be loaded from the file specified in ‘alt_key_file’.

type alt_host_keys  bool

param alt_key_file  SSH host key file to use (if alt_host_keys=True).

type alt_key_file  str

param ssh_config_file  File name of OpenSSH configuration file.

type ssh_config_file  str

param timeout  Connection timeout.

type timeout  float

param session_timeout  Set a timeout for parallel requests.

type session_timeout  float

param auth_timeout  Set a timeout (in seconds) to wait for an authentication response.

type auth_timeout  float

param keepalive  Send SSH keepalive packets at a specific interval, in seconds. Currently defaults to 0, for backwards compatibility (it will not attempt to keep the connection alive).

type keepalive  int

param default_enter  Character(s) to send to correspond to enter key (default: ‘

’re).  

type default_enter  str

param response_return  Character(s) to use in normalized return data to represent enter key (default: ‘

‘).  

type response_return  str

param fast_cli  Provide a way to optimize for performance. Converts select_delay_factor to select smallest of global and specific. Sets default global_delay_factor to .1 (default: False)

type fast_cli  boolean

param session_log  File path or BufferedIOBase subclass object to write the session log to.

type session_log  str

param session_log_record_writes  The session log generally only records channel reads due to eliminate command duplication due to command echo. You can enable this if you want to record both channel reads and channel writes in the log (default: False).

type session_log_record_writes  boolean
**param session_log_file_mode**  "write" or "append" for session_log file mode (default: "write")

**type session_log_file_mode**  str

**param allow_auto_change**  Allow automatic configuration changes for terminal settings.  (default: False)

**type allow_auto_change**  bool

**param encoding**  Encoding to be used when writing bytes to the output channel.  (default: ‘ascii’)

**type encoding**  str

__weakref__

list of weak references to the object (if defined)

**check_config_mode**(check_string=u"", pattern=u")

Checks if the device is in configuration mode or not.

**Parameters**

- **check_string**(str) – Identification of configuration mode from the device
- **pattern**(str) – Pattern to terminate reading of channel

**check_enable_mode**(check_string=u")

Check if in enable mode.  Return boolean.

**Parameters**

- **check_string**(str) – Identification of privilege mode from device

**cleanup**()

Any needed cleanup before closing connection.

**clear_buffer**()

Read any data available in the channel.

**close_session_log**()

Close the session_log file (if it is a file that we opened).

**commit**()

Commit method for platforms that support this.

**config_mode**(config_command=u"", pattern=u")

Enter into config_mode.

**Parameters**

- **config_command**(str) – Configuration command to send to the device
- **pattern**(str) – Pattern to terminate reading of channel

**disable_paging**(command=u"terminal length 0", delay_factor=1)

Disable paging default to a Cisco CLI method.

**Parameters**

- **command**(str) – Device command to disable pagination of output
- **delay_factor**(int) – See __init__: global_delay_factor

**disconnect**()

Try to gracefully close the SSH connection.
**enable** (cmd=u"", pattern=u"sword", re_flags=2)

Enter enable mode.

**Parameters**

- **cmd** (str) – Device command to enter enable mode
- **pattern** (str) – Pattern to search for indicating device is waiting for password
- **re_flags** (int) – Regular expression flags used in conjunction with pattern

**establish_connection** (width=None, height=None)

Establish SSH connection to the network device

Timeout will generate a NetMikoTimeoutException Authentication failure will generate a NetMikoAuthenticationException

width and height are needed for Fortinet paging setting.

**Parameters**

- **width** (int) – Specified width of the VT100 terminal window
- **height** (int) – Specified height of the VT100 terminal window

**exit_config_mode** (exit_config=u"", pattern=u"")

Exit from configuration mode.

**Parameters**

- **exit_config** (str) – Command to exit configuration mode
- **pattern** (str) – Pattern to terminate reading of channel

**exit_enable_mode** (exit_command=u"")

Exit enable mode.

**Parameters**

- **exit_command** (str) – Command that exits the session from privileged mode

**find_prompt** (delay_factor=1)

Finds the current network device prompt, last line only.

**Parameters**

- **delay_factor** (int) – See __init__: global_delay_factor

**is_alive**()

Returns a boolean flag with the state of the connection.

**normalize_cmd** (command)

Normalize CLI commands to have a single trailing newline.

**Parameters**

- **command** (str) – Command that may require line feed to be normalized

**normalize_linefeeds** (a_string)

Convert ‘

\n','

‘ to ‘.‘

**Parameters**

- **a_string** A string that may have non-normalized line feeds i.e. output returned from device, or a device prompt

**open_session_log** (filename, mode=u’write’)

Open the session_log file.
paramiko_cleanup()
Cleanup Paramiko to try to gracefully handle SSH session ending.

read_channel()
Generic handler that will read all the data from an SSH or telnet channel.

read_until_pattern(*args, **kwargs)
Read channel until pattern detected. Return ALL data available.

read_until_prompt(*args, **kwargs)
Read channel until self.base_prompt detected. Return ALL data available.

read_until_prompt_or_pattern(pattern=u"", re_flags=0)
Read until either self.base_prompt or pattern is detected.

Parameters

- **pattern** *(regular expression string)* – the pattern used to identify that the output is complete (i.e. stop reading when pattern is detected). pattern will be combined with self.base_prompt to terminate output reading when the first of self.base_prompt or pattern is detected.

- **re_flags** *(int)* – regex flags used in conjunction with pattern to search for prompt (defaults to no flags)

save_config(cmd=u"", confirm=True, confirm_response=u")
Not Implemented

select_delay_factor(delay_factor)
Choose the greater of delay_factor or self.global_delay_factor (default). In fast_cli choose the lesser of delay_factor of self.global_delay_factor.

Parameters

- **delay_factor** *(int)* – See __init__: global_delay_factor

send_command(command_string, expect_string=None, delay_factor=1, max_loops=500, auto_find_prompt=True, strip_prompt=True, strip_command=True, normalize=True, use_textfsm=False)
Execute command_string on the SSH channel using a pattern-based mechanism. Generally used for show commands. By default this method will keep waiting to receive data until the network device prompt is detected. The current network device prompt will be determined automatically.

Parameters

- **command_string** *(str)* – The command to be executed on the remote device.

- **expect_string** *(str)* – Regular expression pattern to use for determining end of output. If left blank will default to being based on router prompt.

- **delay_factor** *(int)* – Multiplying factor used to adjust delays (default: 1).

- **max_loops** *(int)* – Controls wait time in conjunction with delay_factor. Will default to be based upon self.timeout.

- **strip_prompt** *(bool)* – Remove the trailing router prompt from the output (default: True).

- **strip_command** *(bool)* – Remove the echo of the command from the output (default: True).

- **normalize** *(bool)* – Ensure the proper enter is sent at end of command (default: True).

- **use_textfsm** – Process command output through TextFSM template (default: False).

send_command_expect(*args, **kwargs)
Support previous name of send_command method.
Parameters

- **args** (*list*) – Positional arguments to send to `send_command()`
- **kwargs** (*dict*) – Keyword arguments to send to `send_command()`

**send_command_timing** *(command_string, delay_factor=1, max_loops=150, strip_prompt=True, strip_command=True, normalize=True, use_textfsm=False)*

Execute command_string on the SSH channel using a delay-based mechanism. Generally used for show commands.

Parameters

- **command_string** (*str*) – The command to be executed on the remote device.
- **delay_factor** (*int or float*) – Multiplying factor used to adjust delays (default: 1).
- **max_loops** (*int*) – Controls wait time in conjunction with delay_factor. Will default to be based upon self.timeout.
- **strip_prompt** (*bool*) – Remove the trailing router prompt from the output (default: True).
- **strip_command** (*bool*) – Remove the echo of the command from the output (default: True).
- **normalize** (*bool*) – Ensure the proper enter is sent at end of command (default: True).
- **use_textfsm** – Process command output through TextFSM template (default: False).

**send_config_from_file** *(config_file=None, **kwargs)*

Send configuration commands down the SSH channel from a file.

The file is processed line-by-line and each command is sent down the SSH channel.

**kwargs** are passed to `send_config_set` method.

Parameters

- **config_file** (*str*) – Path to configuration file to be sent to the device
- **kwargs** (*dict*) – params to be sent to `send_config_set` method

**send_config_set** *(config_commands=None, exit_config_mode=True, delay_factor=1, max_loops=150, strip_prompt=False, strip_command=False, config_mode_command=None)*

Send configuration commands down the SSH channel.

config_commands is an iterable containing all of the configuration commands. The commands will be executed one after the other.

Automatically exits/enters configuration mode.

Parameters

- **config_commands** (*list or string*) – Multiple configuration commands to be sent to the device
- **exit_config_mode** (*bool*) – Determines whether or not to exit config mode after complete
- **delay_factor** (*int*) – Factor to adjust delays
- **max_loops** (*int*) – Controls wait time in conjunction with delay_factor (default: 150)
- **strip_prompt** (*bool*) – Determines whether or not to strip the prompt
- `strip_command(bool)` – Determines whether or not to strip the command
- `config_mode_command(str)` – The command to enter into config mode

`session_preparation()`
Prepare the session after the connection has been established
This method handles some differences that occur between various devices early on in the session.
In general, it should include: `self._test_channel_read()` `self.set_base_prompt()` `self.disable_paging()` `self.set_terminal_width()` `self.clear_buffer()`

`set_base_prompt(pri_prompt_terminator=u'#', alt_prompt_terminator=u'>', delay_factor=1)`
Sets `self.base_prompt` Used as delimiter for stripping of trailing prompt in output.
Should be set to something that is general and applies in multiple contexts. For Cisco devices this will be set to router hostname (i.e. prompt without ‘>’ or ‘#’).
This will be set on entering user exec or privileged exec on Cisco, but not when entering/exiting config mode.

**Parameters**
- `pri_prompt_terminator(str)` – Primary trailing delimiter for identifying a device prompt
- `alt_prompt_terminator(str)` – Alternate trailing delimiter for identifying a device prompt
- `delay_factor(int)` – See `__init__`: global_delay_factor

`set_terminal_width(command=u"", delay_factor=1)`
CLI terminals try to automatically adjust the line based on the width of the terminal. This causes the output to get distorted when accessed programmatically.
Set terminal width to 511 which works on a broad set of devices.

**Parameters**
- `command(str)` – Command string to send to the device
- `delay_factor(int)` – See `__init__`: global_delay_factor

`special_login_handler(delay_factor=1)`
Handler for devices like WLC, Extreme ERS that throw up characters prior to login.

`strip_ansi_escape_codes(string_buffer)`
Remove any ANSI (VT100) ESC codes from the output


Note: this does not capture ALL possible ANSI Escape Codes only the ones I have encountered

Current codes that are filtered: ESC = ‘’ or chr(27) ESC = is the escape character [^[ in hex (‘ ‘) ESC[24;27H Position cursor ESC[?25h Show the cursor ESC[E Next line (HP does ESC-E) ESC[K Erase line from cursor to the end of line ESC[2K Erase entire line ESC[1;24r Enable scrolling from start to row end ESC[?6l Reset mode screen with options 640 x 200 monochrome (graphics) ESC[?7l Disable line wrapping ESC[2J Code erase display ESC[00;32m Color Green (30 to 37 are different colors) more general pattern is

ESC[dd;ddm and ESC[dd;dd;ddm
ESC[6n Get cursor position
HP ProCurve and Cisco SG300 require this (possible others).
**Parameters**

`string_buffer (str)` – The string to be processed to remove ANSI escape codes

**static strip_backspaces (output)**
Strip any backspace characters out of the output.

**Parameters**

`output (str)` – Output obtained from a remote network device.

`strip_command (command_string, output)`
Strip command_string from output string

Cisco IOS adds backspaces into output for long commands (i.e. for commands that line wrap)

**Parameters**

- `command_string (str)` – The command string sent to the device
- `output (str)` – The returned output as a result of the command string sent to the device

`strip_prompt (a_string)`
Strip the trailing router prompt from the output.

**Parameters**

`a_string (str)` – Returned string from device

`telnet_login (pri_prompt_terminator=u'\#\s*$', alt_prompt_terminator=u'\>$\s*$', username_pattern=u'(?:(?:username|user name))', pwd_pattern=u'password', delay_factor=1, max_loops=20)`
Telnet login. Can be username/password or just password.

**Parameters**

- `pri_prompt_terminator (str)` – Primary trailing delimiter for identifying a device prompt
- `alt_prompt_terminator (str)` – Alternate trailing delimiter for identifying a device prompt
- `username_pattern (str)` – Pattern used to identify the username prompt
- `delay_factor (int)` – See __init__: global_delay_factor
- `max_loops` – Controls the wait time in conjunction with the delay_factor

(default: 20)

`write_channel (out_data)`
Generic handler that will write to both SSH and telnet channel.

**Parameters**

`out_data (str (can be either unicode/byte string))` – data to be written to the channel
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