
py-cidr

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1.1 Overview

py-cidr : python module providing network / CIDR tools

1.2 Key features

- Built on python's native ipaddress module
- 3 Classes : Cidr, CidrMap, CidrFile
- Cidr provides for many common operations for example:
 - Support for IPv4 and IPv6
 - compact lists of CIDRs to smallest set of CIDR blocks
 - convert an IP range to a list of CIDRs
 - Identify and validate
 - many more
- CidrFile offers common operations on files with lists of cidrs.
 - Includes atomic file writes
- CidrMap provides a class that maps CIDRs to values.
 - File cache employs locking to ensure multiple processes handle cache correctly.

See API reference documentation for more details.

1.3 New / Interesting

- Rename *py-cidr-cache-print* (without the .py extension)
- PEP-8, PEP-257 and PEP-484 style changes
- PEP 561 type hints (improves module use for type checkers e.g. *mypy*)
- CidrMap now uses separate CidrCache for “private cache data” instead of just the “data” part. CidrCache class no longer needs it's own “private data” functionality.
- Add some tests (via pytest)
- Reorganize CidrMap and simplify/improve way we do private_cache supporting multiprocess/multithreading use-case. This is now all done in CidrMap.

- Change cache file storage to pickle format as its more flexible than json Provide simple app to show contents of cache:

```
py-cidr-cache-print <cache_directory>
```

1.4 Documentation:

We include pre-built versions of both html and PDF documentation, including the API reference.

The PDF file is *Docs/py-cidr.pdf* and after the package is installed it will be available:

[PDF Documentation.](#)

and a browser can be used to view:

[HTML Documentation.](#)

GETTING STARTED

All git tags are signed with arch@sapience.com key which is available via WKD or download from <https://www.sapience.com/tech>. Add the key to your package builder gpg keyring. The key is included in the Arch package and the `source=` line with `?signed` at the end can be used to verify the git tag. You can also manually verify the signature

2.1 py-cidr module

2.1.1 module functions

The library provides the following tools:

CidrMap Class

CidrMap provides a reasonably optimized tool to cache (cidr, value) pairs. i.e. it maps a CIDR address to some value (string). These are cached to file if a cache directory is provided when instantiating the class.

This will create an IPv4 and an IPv6 cache file in the given directory. The code is careful about reading and writing the cache files and uses locking as well as atomic writes. For example if application starts, reads cache, updates with new items and some time later saves the cache - the module will detect if the cache changed (by another process using same cache directory) since it was read in, and merge its own changes with the changes in the cache file before writing out the updated cache. So nothing should be lost.

This was built originally for our firewall tool, where part of the data gathering component creates maps of CIDR blocks to geolocated country codes for all CIDRs as listed by each of registries. This process can take several minutes. Run time was cut roughly in half using CidrMap() to provide a mapping of CIDR to location.

Since parallelizing can provide significant speedups, the CidrMap::add_cidr() method has a mechanism to allow that by avoiding multiple threads/processes updating the in memory data at the same time. It offers the ability for each thread/subprocess to add cidr blocks to thread local data. After all the threads/processes complete, then the private data maps of each of the processes can be merged together using CidrMap::merge() method.

Additional details are available in the API reference documentation.

Methods provided:

- CidrMap.lookup
- CidrMap.add_cidr
- CidrMap.merge

Static functions:

- create_private_cache

Cidr Class

See the API reference in the documentation for details. This class provides a suite of tools we found ourselves using often, so we encapsulated them in this class. All methods in the class are *@staticmethod* and thus no instance of the class is needed. Just use them as functions (*Cidr.xxx()*)

- *Cidr.is_valid_ip4*
- *Cidr.is_valid_ip6*
- *Cidr.is_valid_cidr*
- *Cidr.cidr_iptype*
- *Cidr.cidr_type_network*
- *Cidr.cidr_to_net*
- *Cidr.cidrs_to_nets*
- *Cidr.nets_to_cidrs*
- *Cidr.compact_cidrs*
- *Cidr.ip_to_address*
- *Cidr.ips_to_addresses*
- *Cidr.addresses_to_ips*
- *Cidr.cidr_set_prefix*
- *Cidr.ipaddr_cidr_from_string*
- *Cidr.cidr_is_subnet*
- *Cidr.address_iptype*
- *Cidr.compact_nets*
- *Cidr.net_exclude*
- *Cidr.nets_exclude*
- *Cidr.cidrs_exclude*
- *Cidr.cidrs2_minus_cidrs1*
- *Cidr.cidr_exclude*
- *Cidr.sort_cidrs*
- *Cidr.sort_ips*
- *Cidr.get_host_bits*
- *Cidr.clean_cidr*
- *Cidr.clean_cidrs*
- *Cidr.range_to_cidrs*
- *Cidr.cidr_to_range*
- *Cidr.fix_cidr_host_bits*
- *Cidr.fix_cidrs_host_bits*

CidrFile Class

This class provides a few reader/writer tools for files with lists of CIDR strings. Readers ignores comments. All methods are *@staticmethod* and thus no instance of the class is required. Simply use them as functions (*Cidr.xxx()*)

- `Cidr.read_cidr_file(file:str, verb:bool=False) -> [str]:`
- `Cidr.read_cidr_files(targ_dir:str, file_list:[str]) -> [str]`
- `Cidr.write_cidr_file(cidrs:[str], pathname:str) -> bool`
- `Cidr.read_cidrs(fname:str|None, verb:bool=False) -> (ipv4:[str], ipv6:[str]):`
- `Cidr.copy_cidr_file(src_file:str, dst_file:str) -> None`

3.1 Installation

Available on * [Github](#) * [Archlinux AUR](#)

On Arch you can build using the provided PKGBUILD in the packaging directory or from the AUR. To build manually, clone the repo and :

```
rm -f dist/*  
/usr/bin/python -m build --wheel --no-isolation  
root_dest="/"   
./scripts/do-install $root_dest
```

When running as non-root then set root_dest a user writable directory

3.2 Dependencies

Run Time :

- python (3.13 or later)
- lockmgr

Building Package :

- git
- hatch (aka python-hatch)
- wheel (aka python-wheel)
- build (aka python-build)
- installer (aka python-installer)
- rsync

Optional for building docs :

- sphinx
- python-myst-parser
- python-sphinx-autoapi
- texlive-latexextra (archlinux packaguing of texlive tools)

Building docs is not really needed since pre-built docs are provided in the git repo.

3.3 Philosophy

We follow the *live at head commit* philosophy. This means we recommend using the latest commit on git master branch. We also provide git tags.

This approach is also taken by Google¹².

3.4 License

Created by Gene C. and licensed under the terms of the MIT license.

- SPDX-License-Identifier: MIT
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¹ <https://github.com/google/googletest>

² <https://abseil.io/about/philosophy#upgrade-support>

CHANGELOG

4.1 Tags

2.6.0 (2025-01-18) -> 3.2.0 (2025-05-04)
19 commits.

4.2 Commits

- 2025-05-04 : 3.2.0

Improve API reference documentation.
install: rename cache `print` to `/usr/bin/py-cidr-cache-print`
update Docs/Changelogs Docs/_build/html Docs/py-cidr.pdf

- 2025-05-04 : 3.1.1

2025-05-03 Buglet: CidrMap::add_cidr() make private_cache optional argument again
update Docs/Changelogs Docs/_build/html Docs/py-cidr.pdf

- 2025-05-03 : 3.0.1

Add tests to repo
update Docs/Changelogs Docs/_build/html Docs/py-cidr.pdf

- 2025-05-03 : 3.0.0

PEP-8, PEP-257 and PEP-484 style changes
PEP 561 type hints (improves module use for type checkers e.g. *mypy*)
CidrMap now uses separate CidrCache for "private cache data" instead of just the "data" part.
CidrCache class no longer needs its own "private data" functionality.
Add some tests (via pytest)
Reorganize CidrMap and simplify/improve way we do private_cache supporting multiprocessing/multithreading usecase. This is now all done in CidrMap.
Change cache file storage to pickle format as its more flexible than json
Provide simple app to show contents of cache:
`py-cidr-cache-print <cache_directory>`

- 2025-04-02 : 2.8.0

```
update Docs/Changelogs Docs/_build/html Docs/py-cidr.pdf
Add RFC 1918 tools:
    Cidr.is_rfc_1918()
    Cidr.rfc_1918_nets()
    Cidr.rfc_1918_cidrs()
    Cidr.remove_rfc_1918()
Reorganize code and separate into more files for better maintainability
2025-03-10 update Docs/Changelog.rst Docs/_build/html Docs/py-cidr.pdf
```

- 2025-03-10 : 2.7.0

```
Bugfix: sorting mixed list of IPv4 and IPv6
2025-01-18 update Docs/Changelog.rst Docs/_build/html Docs/py-cidr.pdf
```

- 2025-01-18 : 2.6.3

```
Readme - removed unused (template) sections
update Docs/Changelog.rst Docs/_build/html Docs/py-cidr.pdf
```

- 2025-01-18 : 2.6.2

```
fix readme rst syntax
update Docs/Changelog.rst Docs/_build/html Docs/py-cidr.pdf
```

- 2025-01-18 : 2.6.1

```
Small change to readme
update Docs/Changelog.rst Docs/_build/html Docs/py-cidr.pdf
```

- 2025-01-18 : 2.6.0

```
Initial release
```

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HOW TO HELP WITH THIS PROJECT

Thank you for your interest in improving this project. This project is open-source under the MIT license.

6.1 Important resources

- [Git Repo](#)

6.2 Reporting Bugs or feature requests

Please report bugs on the issue tracker in the git repo. To make the report as useful as possible, please include

- operating system used
- version of python
- explanation of the problem or enhancement request.

6.3 Code Changes

If you make code changes, please update the documentation if it's appropriate.

CONTRIBUTOR COVENANT CODE OF CONDUCT

7.1 Our Pledge

In the interest of fostering an open and welcoming environment, we as contributors and maintainers pledge to making participation in our project and our community a harassment-free experience for everyone, regardless of age, body size, disability, ethnicity, sex characteristics, gender identity and expression, level of experience, education, socio-economic status, nationality, personal appearance, race, religion, or sexual identity and orientation.

7.2 Our Standards

Examples of behavior that contributes to creating a positive environment include:

- Using welcoming and inclusive language
- Being respectful of differing viewpoints and experiences
- Gracefully accepting constructive criticism
- Focusing on what is best for the community
- Showing empathy towards other community members

Examples of unacceptable behavior by participants include:

- The use of sexualized language or imagery and unwelcome sexual attention or advances
- Trolling, insulting/derogatory comments, and personal or political attacks
- Public or private harassment
- Publishing others' private information, such as a physical or electronic address, without explicit permission
- Other conduct which could reasonably be considered inappropriate in a professional setting

7.3 Our Responsibilities

Maintainers are responsible for clarifying the standards of acceptable behavior and are expected to take appropriate and fair corrective action in response to any instances of unacceptable behavior.

Maintainers have the right and responsibility to remove, edit, or reject comments, commits, code, wiki edits, issues, and other contributions that are not aligned to this Code of Conduct, or to ban temporarily or permanently any contributor for other behaviors that they deem inappropriate, threatening, offensive, or harmful.

7.4 Scope

This Code of Conduct applies both within project spaces and in public spaces when an individual is representing the project or its community. Examples of representing a project or community include using an official project e-mail address, posting via an official social media account, or acting as an appointed representative at an online or offline event. Representation of a project may be further defined and clarified by project maintainers.

7.5 Enforcement

Instances of abusive, harassing, or otherwise unacceptable behavior may be reported by contacting the project team at <arch@sapience.com>. All complaints will be reviewed and investigated and will result in a response that is deemed necessary and appropriate to the circumstances. The Code of Conduct Committee is obligated to maintain confidentiality with regard to the reporter of an incident. Further details of specific enforcement policies may be posted separately.

7.6 Attribution

This Code of Conduct is adapted from the Contributor Covenant, version 1.4, available at <https://www.contributor-covenant.org/version/1/4/code-of-conduct.html>

7.7 Interpretation

The interpretation of this document is at the discretion of the project team.

API REFERENCE

This page contains auto-generated API reference documentation¹.

8.1 py_cidr

Public Methods. py_cidr.

8.1.1 Submodules

py_cidr.cache_files

Read write cache file

NB caller should implement locking as appropriate

Module Contents

cache_file_extension(ftype: str = 'json')

File extension to use based on ftype

read_cache_file(file, ftype: str = 'json')

Read cache

read_cache_file_json(cache_file: str)

Read cache file : ipt is 'ipv4' or 'ipv6' Returns cache or None if no cache

read_cache_file_pickle(cache_file: str)

Read cache file : ipt is 'ipv4' or 'ipv6' Returns cache or None if no cache

write_cache_file(cache, file, ftype: str = 'json')

Read cache

write_cache_file_json(cache, cache_file)

Write json cache file

write_cache_file_pickle(cache, cache_file)

Write pickled cache file

py_cidr.cidr_address

Class support functions for cidr addresses

¹ Created with sphinx-autoapi

Module Contents

addresses_to_ips(addresses: [py_cidr.cidr_types.IPvxAddress]) → [str]

Address to IP strings

For list of IPs in ipaddress format, return list of ip strings

Parameters

addresses – List of IP addresses in ipaddress format

Returns

List of IP strings

ip_to_address(ip: str) → py_cidr.cidr_types.IPvxAddress | None

IP to Address

Return ipaddress of given ip. If IP has prefix or host bits set, we strip the prefix first and keep host bits

Parameters

ip – The IP string to convert

Returns

IPvxAddress derived from IP or None if not an IP address

ipaddr_cidr_from_string(addr: str, strict: bool = False) → ipaddress.IPv4Network | ipaddress.IPv6Network | None

IP/CIDR to IPvxNetwork

Convert string of IP address or cidr net to IPvxNetwork

Parameters

- **address** – String of IP or CIDR network.
- **strict** – If true, host bits disallowed for cidr block.

Returns

An IPvXNetwork or None if not valid.

ips_to_addresses(ips: [str]) → [py_cidr.cidr_types.IPvxAddress]

IPs to Addresses

Convert list of IP strings to a list of ip addresses

Parameters

ips – List of IP strings to convert

Returns

List of IPvxAddress derived from input IPs.

py_cidr.cidr_cache

Cached (network, value) pairs: value is string. network is any ipaddress network (ipv4 or ipv6) lookup of a cidr returns its associated value. cidr matches cache.cidr if cidr is subnet of cidr. Cache is an ordered list by net.

See Also:

CidrMap which uses CidrCache and with a separate cache for ipv4 and ipv6

Requires:

ipaddress: for cidr/network manipulations lockmgr: for ensuring cache can be safely read/written

Module Contents

class CidrCache(*ipt: str, cache_dir: str | None = None*)

Provides a cache that maps cidrs to values.

Implemented as an ordered list of networks. All networks must be either ipv4 or ipv6 as these are kept separate for performance. Each network has an associated value. Each elem in ordered list is a tuple of (cidr_net, value)

Note that data list *must* be kept sorted and compressed. Compressing ensures that no elem can be subnet of any other element. Sorting allows search to work (efficiently).

We use ipaddress network as the key rather than a string as this provides superior performance. This also minimizes conversion between network and string representations.

Args:

ipt (str): One of 'ipv4' or 'ipv6'

cache_dir (str | None): Optional directory where cache files are saved.

add(*net: py_cidr.cidr_types.IPvxNetwork, value: Any*)

Add (net, value) to cache.

Note that if add a (cidr, value) pair exists in cache but is different, then this new added version will replace the existing one.

Better name might be add_or_replace()

Args:

net (IPvxNetwork): ipaddress network to add to cache

value (Any): The value associated with net to be cached as (net, value) pair.

When present, all additions are made to private data instead of instance data and our own data is read only until all threads/processes finish.

add_cidr(*cidr: str, value: Any*)

Same as add() but with input a cidr string instead of network.

combine_cache(*new_cache: Self*)

Merge another CidrCache into self.

Args:

new_cache (CidrCache) Data must be installed .add() to ensure the cache data is network sorted. Data from new_cache is combined / merged into the instance data.

NB the network types must match or will be ignored.

load_cache()

Read cache from file

lookup(*net: py_cidr.cidr_types.IPvxNetwork*) → Tuple[py_cidr.cidr_types.IPvxNetwork, Any] | Tuple[None, None]

Lookup value associated with network.

If network in cache then return the pair [cache_net, value]. with net either equal to cache_net or a subnet of it. If not found then [None, None] is returned.

Args:

net (IPvxNetwork): The network to lookup.

Returns:

[IPvxNetwork, Any]: A list of with 2 items: [cache_network, value]. where net is either equal to cache_network or a subnet of it. If net is not found then [None, None]

lookup_cidr(cidr: str) → Any

Look up the value associated with cidr string:

- cache(cidr) -> value

Args (str):

Cidr to lookup

Returns:

str | None: Value associated with the cidr string or None if not found

lookup_elem(net: py_cidr.cidr_types.IPvxNetwork) → py_cidr._cache_data.CidrCacheElem | None

Lookup value associated with network.

If network in cache then return the pair [cache_net, value]. with net either equal to cache_net or a subnet of it. If not found then [None, None] is returned.

Args:

net (IPvxNetwork): The network to lookup.

Returns:

[IPvxNetwork, Any]: A list of with 2 items: [cache_network, value]. where net is either equal to cache_network or a subnet of it. If net is not found then [None, None]

print()

Print all the data.

sort()

Sort the cached data in network order.

write()

Write cache to file if cache_dir was set up.

Use locking to ensure no file contention.

py_cidr.cidr_class

Class providing some common CIDR utilities

Module Contents

class Cidr

Provides suite of CIDR tools.

All methods are (static) and are thus called without need to instantiate the class. For example:

```
net = Cidr.cidr_to_net(cidr_string)
```

Notation:

- cidr means a string
- net means ipaddress network (IPv4Network or IPv6Network)
- ip means an IP address string
- addr means an ip address (IPv4Address or IPv6Address)

- address means either a IP address or a cidr network as a string

static address_iptype(*addr: py_cidr.cidr_types.IPv4Address | py_cidr.cidr_types.IPv6Network*) → str | None

Identify address or net (IPv4Network) as ipv4, ipv6 or neither.

Args:

addr (str): ipaddress IP or network .

Returns:

str | None: 'ip4', 'ip6' or None

static addresses_to_ips(*addresses: List[py_cidr.cidr_types.IPv4Address]*) → List[str]

From list of IPs in ipaddress format, get list of ip strings.

Args:

addresses (List[IPv4Address]): List of IP addresses in ipaddress format

Returns:

List[str]: List of IP strings

static cidr_exclude(*cidr1: str, cidrs2: List[str]*) → List[str]

Exclude cidr1 from any of networks in cidrs2.

Args:

cidr1 (str): cidr to be excluded.

cidrs2 (List[str]): List fo cidrs from which cidr1 will be excluded.

Returns:

List[str]: Resulting list of cidrs ("cidrs2" - "cidr1")

static cidr_iptype(*address: Any*) → str | None

Determines if address string is valid ipv4 or ipv6 or not.

Args:

address (Any): address or cidr string

Returns:

str | None: 'ip4' or 'ip6' or None if not a valid address

static cidr_is_subnet(*cidr: str, ipa_nets: List[py_cidr.cidr_types.IPv4Network]*) → bool

Check if cidr is a subnet of any of the list of IPv4Networks .

Args:

cidr (str): Cidr string to check.

ipa_nets (List[IPv4Network]): List of IPv4Networks to check.

Returns:

bool: True if cidr is subnet of any of the ipa_nets, else False.

static cidr_list_compact(*cidrs: List[str], string: bool = True*) → List[str] | List[py_cidr.cidr_types.IPv4Network]

Compact list of cidr networks to smallest list possible. Deprecated - use compact_cidrs(cidrs, return_nets)) instead, it is the same with the boolean flag reversed.

Args:

cidrs (List[str]): List of cidr strings to compact.

string (bool):

- If True (default), then return is a list of strings.
- If False, a list of IPvxNetworks.

Returns:

List[str] | List[IPvxNetwork]: Compressed list of cidrs as ipaddress networks (string=False) or list of strings when string=True

static cidr_set_prefix(cidr: str, prefix: int) → str

Set new prefix for cidr and return new cidr string.

Args:

cidr (str): Cidr string to use

prefix (int): The new prefix to use

Returns:

str: Cidr string using the specified prefix

static cidr_to_net(cidr: str, strict: bool = False) → py_cidr.cidr_types.IPvxNetwork | None

Convert cidr string to ipaddress network.

Args:

cidr (str): Input cidr string

strict (bool): If true then cidr is considered invalid if host bits are set. Defaults to False. (see ipaddress docs).

Returns:

IPvxNetwork | None: The ipaddress network derived from cidr string as IPvxNetwork = IPv4Network or IPv6Network or None if invalid.

static cidr_to_range(cidr: str, string: bool = False) → Tuple[py_cidr.cidr_types.IPvxAddress | str | None, py_cidr.cidr_types.IPvxAddress | str | None]

Cidr string to an IP Range.

Args:

cidr (str): The cidr string to examine.

string (bool): If True then returns cidr strings instead of IPvxAddress

Returns:

Tuple[IPAddress, IPAddress]: Tuple (ip0, ip1) of first and last IP address in net (ip0, ip1) are IPvxAddress or str when string is True

static cidr_type_network(cidr: str) → Tuple[str, Type[py_cidr.cidr_types.IPvxNetwork]]

Cidr Network Type.

Args:

cidr (str): Cidr string to examine

Returns:

Tuple[str, IPvxNetwork]: Tuple(ip-type, net-type). ip-type is a string ('ip4', 'ip6') while network type is IPv4Network or IPv6Network

static cidrs2_minus_cidrs1(cidrs1: List[str], cidrs2: List[str]) → List[str]

Exclude all of cidrs1 from cidrs2.

i.e. return "cidrs2" - "cidrs1".

Args:

cidrs1 (List[str]): List of cidr strings to be excluded.

cidrs2 (List[str]): List of cidr strings from which cidrs1 are excluded.

Returns:

List[str]: Resulting list of cidr strings = “cidrs2” - “cidrs1”.

static cidrs_exclude(cidrs1: List[str], cidrs2: List[str]) → List[str]

Deprecated: replaced by cidrs2_minus_cidrs1()

static cidrs_to_nets(cidrs: List[str], strict: bool = False) → List[py_cidr.cidr_types.IPvxNetwork]

Convert list of cidr strings to list of IPvxNetwork.

Args:

cidrs (List[str]): List of cidr strings

strict (bool): If true, cidr with host bits set is invalid. Defaults to false.

Returns:

List[IPvxNetwork]: List of IPvxNetworks generated from cidrs.

static clean_cidr(cidr: str) → str | None

Clean up a cidr address.

Does:

- fix up host bits to match the prefix
- convert old class A,B,C style IPv4 addresses to cidr.

e.g.

a.b.c -> a.b.c.0/24 a.b.c.23/24 -> a.b.c.0/24

Args:

cidr (str): Cidr string to clean up.

Returns:

str | None:

- cidr string if valid
- None if cidr is invalid.

static clean_cidrs(cidrs: List[str]) → List[str]

Clean list of cidrs.

Similar to clean_cidr() but for a list.

Args:

cidrs (List[str]): List of cidr strings to clean up.

Returns:

List[str]: List of cleaned cidrs. If input cidr is invalid then its returned as None

static compact_cidrs(cidrs: List[str], nets: bool = False) → List[str] |
List[py_cidr.cidr_types.IPvxNetwork]

Compact a list of cidr networks as strings.

Args:

cidrs (List[str]): List of cidrs to compact.

nets (bool): If False, the default, the result will be list of strings else a list of IPvxNetwork's.

Returns:

List[str | IPvxNetwork]: A list of compacted networks whose elements are strings if return_nets is False or IPvxNetworks if True.

static compact_nets(nets: List[py_cidr.cidr_types.IPvxNetwork]) → List[py_cidr.cidr_types.IPvxNetwork]

Compact list of IPvxNetwork.

Args:

nets (List[IPvxNetwork]): Input list of networks to compact.

Returns:

List[IPvxNetwork]: Compacted list of IPvxNetworks.

static fix_cidr_host_bits(cidr: str, verb: bool = False) → str

zero out any host bits.

A strictly valid cidr address must have host bits set to zero.

Args:

cidr (str): The cidr to “fix” if needed.

verb (bool): Some info on stdout when set True. Defaults to False.

Returns:

str: The cidr with any non-zero host bits now zeroed out.

static fix_cidrs_host_bits(cidrs: List[str], verb: bool = False) → List[str]

zero any host bits for a list of cidrs.

Similar to fix_cidr_host_bits() but for a list of cidrs.

Args:

cidrs (List[str]): List of cidrs to fix up.

verb (bool): Some info on stdout when set True. Defaults to False.

Returns:

List[str]: The list of cidrs each with any non-zero host bits now zeroed out.

static get_host_bits(ip: str, pfx: int = 24) → int

Gets the host bits from an IP address given the netmask.

Args:

ip (str): The IP to examine.

pfx (int): The cidr prefix.

Returns:

int: The host bits from the IP.

static ip_to_address(ip: str) → py_cidr.cidr_types.IPvxAddress | None

Return ipaddress of given ip.

If IP has prefix or host bits set, strip the prefix and keep host bits.

Args:

ip (str): The IP string to convert

Returns (IPvxAddress | None): IPvxAddress derived from IP or None if not an IP address.

static ipaddr_cidr_from_string(*address: str, strict: bool = False*) → *py_cidr.cidr_types.IPvxNetwork* | *None*

Convert string of IP address or cidr net to IPvxNetwork

Args:

address: IP or CIDR network as a string.

strict (bool): If true, host bits are disallowed for cidr block.

Returns:

IPvxNetwork | *None*: An *IPvxNetwork* or *None* if invalid.

static ips_to_addresses(*ips: List[str]*) → *List[py_cidr.cidr_types.IPvxAddress]*

Convert list of IP strings to a list of ip addresses

Args:

ips (*List[str]*): List of IP strings to convert

Returns:

List[IPvxAddress]: List of *IPvxAddress* derived from input IPs.

static is_rfc_1918(*cidr: str*) → *bool*

Check if cidr is any RFC 1918.

Args:

cidr (*str*): IP or Cidr to check if RFC 1918.

Returns:

bool: True if cidr is an RFC 1918 address. False if not.

static is_valid_cidr(*address: Any*) → *bool*

Check if address is a valid ip or cidr network.

Args:

address (*Any*): Address to check. Host bits set is permitted for a cidr network.

Returns:

bool: True/False if address is valid IPv4 or IPv6 address or network.

static is_valid_ip4(*address: Any*) → *bool*

check if valid IPv4 address or cidr.

Args:

address (*Any*): Check if this is a valid IPv4 address or cidr.

Returns:

bool: True if valid IPv4 else False

static is_valid_ip6(*address: Any*) → *bool*

check if valid IPv6 address or cidr.

Args:

address (*Any*): Check if this is a valid IPv6 address or cidr.

Returns:

bool: True if valid IPv6 else False

static net_exclude(*net1: py_cidr.cidr_types.IPvxNetwork, nets2: List[py_cidr.cidr_types.IPvxNetwork]*) → *List[py_cidr.cidr_types.IPvxNetwork]*

Exclude *net1* from any of networks in *net2* and return resulting list of nets (without *net1*).

Args:

net1 (IPvxNetwork): Network to be excluded.

nets2 (List[IPvxNetwork]): List of networks from which net1 will be excluded from.

Returns:

List[IPvxNetwork]: Resultant list of networks “nets2 - net1”.

static net_to_range(*net: py_cidr.cidr_types.IPvxNetwork, string: bool = False*) →
Tuple[py_cidr.cidr_types.IPvxAddress | str | None, py_cidr.cidr_types.IPvxAddress | str | None]

Convert network to IP Range.

Args:

net (IPvxNetwork): The network (IPvxNetwork) to examine.

string (bool): If True then returns cidr strings instead of IPvxAddress

Returns:

Tuple[IPAddress, IPAddress]: Tuple (ip0, ip1) of first and last IP address in net Each (ip0, ip1) is IPvxAddress or a string if “string” == True

static nets_exclude(*nets1: List[py_cidr.cidr_types.IPvxNetwork], nets2: List[py_cidr.cidr_types.IPvxNetwork]*) → List[py_cidr.cidr_types.IPvxNetwork]

Exclude every nets1 network from from any networks in nets2.

Similar to net_exclude() except this version has a list to be excluded instead of a single network.

Args:

nets1 (List[IPvxNetwork]): List of nets to be excluded.

nets2: (List[IPvxNetwork]): List of nets from which will exclude any of nets1.

Returns:

List[IPvxNetwork]: List of resultant networks (“nets2” - “nets1”)

static nets_to_cidrs(*nets: List[py_cidr.cidr_types.IPvxNetwork]*) → List[str]

Convert list of ipaddress networks to list of cidr strings.

Args:

nets (List[IPvxNetwork]): List of nets to convert.

Returns:

List[str]: List of cidr strings.

static range_to_cidrs(*addr_start: py_cidr.cidr_types.IPAddress, addr_end: py_cidr.cidr_types.IPAddress, string: bool = False*) →
List[py_cidr.cidr_types.IPvxNetwork] | List[str]

Generate a list of cidr/nets from an IP range.

Args:

addr_start (IPAddress): Start of IP range

addr_end (IPAddress): End of IP range

string (bool): If True then returns list of cidr strings otherwise IPvxNetwork

Returns:

List[IPvxNetwork] | List[str] List of cidr network blocks representing the IP range. List elements are IPvxAddress or str if parameter string=True

static remove_rfc_1918(*cidrs_in: str | List[str]*) → Tuple[str | List[str], str | List[str]]

Given list of cidrs, return list without any rfc 1918

Args:

cidrs_in (str | List[str]): Cidr string or list of cidr strings.

Returns:

Tuple[str | List[str], str | List[str]]: Returns (Tuple[cidrs_cleaned, rfc_1918_cidrs_found]):

- *cidrs_cleaned*: List of cidrs with all rfc_1918 removed.
- *rfc_1918_cidrs_found*: List of any rfc 1918 found in the input.

If input cidr(s) is a list, then items in output are a (possibly empty) list. If not a list then returned items will be string or None.

static rfc_1918_cidrs() → List[str]

Return list of rfc 1918 networks cidr strings

Returns (List[str]):

List of RFC 1918 networks as cidr strings

static rfc_1918_nets() → List[py_cidr.cidr_types.IPvXNetwork]

Return list of rfc 1918 networks

Returns:

List[IPv4Network]: List of RFC 1918 networks.

static sort_cidrs(*cidrs: List[str]*) → List[str]

Sort the list of cidr strings.

Args:

cidrs (List[str]): List of cidrs.

Returns:

List[str]: Sorted copy of cidr list

static sort_ips(*ips: List[str]*) → List[str]

Sort a list of IP addresses.

Args:

ips (List[str]): List of ips to be sorted.

Returns:

List[str]: Sorted copy of ips.

static version() → str

Returns

Version of py-cidr

py_cidr.cidr_clean

Class support functions to clean/tidy cidrs

Module Contents

clean_cidr(*cidr: str*) → str

returns None if not valid

- we to fix class C : a.b.c -> a.b.c.0/24

clean_cidrs(cidrs: [str]) → [str]

clean cidr array

fix_cidr_host_bits(cidr: str, verb: bool = False)

zero any host bits

fix_cidrs_host_bits(cidrs: [str], verb: bool = False)

zero any host bits

py_cidr.cidr_compact

Class support functions to compact lists of cidrs/nets

Module Contents

cidr_list_compact(cidrs_in: [str], string=True) → [str | py_cidr.cidr_types.IPvNetwork]

Cidr Compact:

Compact list of cidr networks to smallest list possible.

Parameters

- **cidrs_in** – List of cidr strings to compact.
- **string** – If true (default) returns list of strings, else a list of IPvNetworks

Returns

Compressed list of cidrs as ipaddress networks (string=False) or list of strings when string=True

compact_cidrs(cidrs: [str], nets=False) → [str | py_cidr.cidr_types.IPvNetwork]

combine em

compact_nets(nets: [py_cidr.cidr_types.IPvNetwork]) → [py_cidr.cidr_types.IPvNetwork]

combine em

py_cidr.cidr_file_class

CidrFile class: Read/write a file with list of cidr blocks as strings For reading

- comments ignored
- pname = is path to the file.
- cidr are all in column 1

Module Contents

class CidrFile

Provides common CIDR string file reader/writer tools.

All methods are static so no class instance variable needed.

static copy_cidr_file(src_file: str, dst_file: str) → bool

Copy one file to another.

Args:

- src_file (str): Source file to copy.
- dst_file (str): Where to save copy

Returns:

bool: True if all okay else False

static read_cidr_file(*fname: str, verb: bool = False*) → List[str]

Read file of cidrs and return list of all IPv4 and IPv6.

See read_cidrs() which this uses.

Args:

fname (str): Path to file of cidrs to read.

verb (bool): More verbose output

Returns:

List[str]: List of all cidrs (ip4 and ip6 combined)

static read_cidr_files(*targ_dir: str, file_list: List[str]*) → List[str]

Read files in a directory and return merged list of cidr strings.

Args:

targ_dir (str): Directory to find each file.

file_list (List[str]): List of files in *targ_dir* to read.

Returns:

List[str]: List of all cidrs found in the files.

static read_cidrs(*fname: str | None, verb: bool = False*) → Tuple[List[str], List[str]]

Read file of cidrs and return tuple of separate lists (ip4, ip6).

- if fname is None or sys.stdin then data is read from stdin.
- only column 1 of file is used.
- comments are ignored

Args:

fname (str | None): File name to read.

verb (bool): More verbose output when True.

Returns:

Tuple[List[str], List[str]]: Tuple of lists of cidrs (ip4, ip6)

static write_cidr_file(*cidrs: List[str], pname: str*) → bool

Write list of cidrs to a file.

Args:

cidrs (List[str]): List of cidr strings to write.

pname (str): Path to file where cidrs are to be written.

Returns:

bool: True if successful otherwise False.

py_cidr.cidr_map

Map cidr/ips to a (str) value. Requires CidrCache

Keep separate caches for ipv4 and ipv6 cidr matches cache.cidr cidr when cidr is subnet of cache.cidr.

Requires CidrCache for the actual cache management

Module Contents

class CidrMap(*cache_dir: str | None = None*)

Class provides map(cidr) -> some value.

- ipv4 and ipv6 are cached separately
- built on CidrCache and Cidr classes

Args:

cache_dir (str): Optional directory to save cache file

add_cidr(*cidr: str, result: str, priv_cache: _NetCache | None = None*)

Add cidr to cache.

Args:

cidr (str): Add this cidr string and its associated result value to the map.

result (str): The result value to be associated with this cidr. i.e. map(cidr) = result

priv_data (private):

If using multiple processes/threads then provide this object where changes are kept instead of in the instance cache. This way the same instance (and its cache) can be used across multiple processes/threads.

Use CidrMap.create_private_cache() to create private_data

static create_private_cache() → *_NetCache*

Create and Return private cache object to use with add_cidr().

This cache has no cache_dir set - memory only. Required if one CidrMap instance is used in multiple processes/threads Give each process/thread a private data cache and they can be merged into the CidrMap instance after they have all completed.

Returns:

(private): private_cache_data object.

lookup(*cidr: str*) → *Any | None*

Check if cidr is in map.

Args:

cidr (str): Cidr value to lookup.

Returns:

Any | None: Result = map(cidr) if found else None.

merge(*priv_cache: _NetCache | None*)

Merge private cache into our internal cache.

Args:

priv_data (_PrivCache): The “private data” to add (cidr, result) to the map, then this merges content of priv_data into the current data. priv_data must be created by CidrMap.create_private_cache()

print()

Print the cache data.

save_cache()

Write cache to files

py_cidr.cidr_nets

Class support functions for networks

Module Contents

cidr_to_net(cidr: str, strict: bool = False) → py_cidr.cidr_types.IPvxNetwork | None

Cidr to Net

Convert cidr string to ipaddress network.

Parameters

- **cidr** – Input cidr string
- **strict** – If true then cidr is considered invalid if host bits are set. Defaults to False. (see ipaddress docs).

Returns

The ipaddress network derived from cidr string as either IPvxNetwork = IPv4Network or IPv6Network.

cidrs_to_nets(cidrs: [str], strict: bool = False) → [py_cidr.cidr_types.IPvxNetwork]

Cidrs to Nets

Convert list of cidr strings to list of IPvxNetwork

Parameters

- **cidrs** – List of cidr strings
- **strict** – If true, then any cidr with host bits is invalid. Defaults to false.

Returns

List of IPvxNetworks.

nets_to_cidrs(nets: [py_cidr.cidr_types.IPvxNetwork]) → [str]

Nets to Strings

Convert list of ipaddress networks to list of cidr strings.

Parameters

nets – List of nets to convert

Returns

List of cidr strings

py_cidr.cidr_range

Class support functions for range of cidrs

Module Contents

cidr_to_range(cidr: str, string: bool = False)

Cidr string to an IP Range

Parameters

- **cidr** – The cidr string to examine

- **string** – If True then returns cidr strings instead of IPvxAddress

Returns

Tuple (ip0, ip1) of first and last IP address in net (ip0, ip1) are IPvxAddress or str when string is True

net_to_range(*net: py_cidr.cidr_types.IPvxNetwork, string: bool = False*)

Network to IP Range

Parameters

- **net** – The ipaddress network (IPvxNetwork) to examine
- **string** – If True then returns cidr strings instead of IPvxAddress

Returns

Tuple (ip0, ip1) of first and last IP address in net (ip0, ip1) are IPvxAddress or str when string is True

range_to_cidrs(*addr_start: py_cidr.cidr_types.IPAddress, addr_end: py_cidr.cidr_types.IPAddress, string=False*) → [py_cidr.cidr_types.IPvxNetwork | str]

Generate a list of cidr/nets from an IP range.

Parameters

- **addr_start** – Start of IP range as IPAddress (IPv4Address, IPv6Address or string)
- **addr_end** – End of IP range as IPAddress (IPv4Address, IPv6Address or string)
- **string** – If True then returns list of cidr strings otherwise IPvxNetwork

Returns

List of cidr network blocks representing the IP range. List elements are IPvxAddress or str if parameter string=True

py_cidr.cidr_sort

Class support functions to sort lists of cidrs/nets

Module Contents

sort_cidrs(*cidrs: [str]*) → [str]

Sort the list of cidr strings

sort_ips(*ips: [str]*) → [str]

Sort the list of cidr strings

py_cidr.cidr_subnet

Class support functions for subnets

Module Contents

cidr_exclude(*cidr1: str, cidrs2: [str]*) → [str]

Exclude cidr1 from any of networks in cidrs2 return resulting list of cidrs (without cidr1)

cidr_is_subnet(*cidr: str, ipa_nets: [ipaddress.IPv4Network | ipaddress.IPv6Network]*) → bool

Is Subnet:

Check if cidr is a subnet of any of the list of IPvxNetworks .

Parameters

- **cidr** – Cidr string to check.
- **ipa_nets** – List of IPvxNetworks to check in.

Returns

True if cidr is subnet of any of the ipa_nets, else False.

cidr_set_prefix(cidr: str, prefix: int) → str

Set Prefix

Set new prefix for cidr and return new cidr string

Parameters

- **cidr** – Cidr string to use
- **prefix** – The new prefix to use

Returns

Cidr string using the specified prefix

cidrs2_minus_cidrs1(cidrs1: [str], cidrs2: [str]) → [str]

Exclude all of cidrs1 from cidrs2 i.e. return cidrs2 - cidrs1

cidrs_exclude(cidrs1: [str], cidrs2: [str]) → [str]

old name

get_host_bits(ip: str, pfx: int = 24)

Gets the host bits from an IP address given the netmask

net_exclude(net1: py_cidr.cidr_types.IPvxNetwork, nets2: [py_cidr.cidr_types.IPvxNetwork]) → [py_cidr.cidr_types.IPvxNetwork]

Exclude net1 from any of networks in net2 return resulting list of nets (without net1)

nets_exclude(nets1: [py_cidr.cidr_types.IPvxNetwork], nets2: [py_cidr.cidr_types.IPvxNetwork]) → [py_cidr.cidr_types.IPvxNetwork]

Exclude every nets1 network from from any networks in nets2

py_cidr.cidr_types

Convenience types:

Provides types IPvxNetwork, IPvxAddress and IPAddress which are based on ipaddress types IPv4Network, IPv6Network, IPv4Address and IPv6Address.

Module Contents

type IPAddress = IPvxAddress | str

type IPvxAddress = IPv4Address | IPv6Address

type IPvxNetwork = IPv4Network | IPv6Network

py_cidr.cidr_valid

Support for type checks

Module Contents

address_iptype(*addr: py_cidr.cidr_types.IPvxAddress | py_cidr.cidr_types.IPvxNetwork*) → str | None

Address Type

Identify if IP address (IPvxAddress) or net (IPvxNetwork) is ipv4 or ipv6

Parameters

addr – IP address or cidr network .

Returns

'ip4', 'ip6' or None

cidr_iptype(*address: str*) → str | None

Determines if an IP address or CIDR string is ipv4 or ipv6

Parameters

address –

ip address or cidr string

returns

'ip4' or 'ip6' or None

cidr_type_network(*cidr: str*)

Cidr Network Type:

Parameters

cidr – Cidr string to examine

Returns

Tuple(ip-type, net-type). ip-type is a string ('ip4', 'ip6') while network type is IPv4Network or IPv6Network

is_valid_cidr(*address*) → bool

Valid Address or Network

check if valid ip address or cidr network

Parameters

address – IP or Cidr string to check. Host bits being set is permitted for a cidr network.

Returns

True/False if address is valid

is_valid_ip4(*address*) → bool

check if valid address or cidr

is_valid_ip6(*address*) → bool

check if valid address or cidr

py_cidr.core

Some cidr utilities

Module Contents

cidr_iptype(*address: str*) → str | None

Input:

ip address or cidr string

Output

'ip4' or 'ip6' or None

cidr_type_network(*cidr: str*)

returns ip type (ip4, ip6) along with IPv4Network or IPv6Network

is_valid_cidr(*address: str*) → bool

check if valid ip address

- returns True/False

is_valid_ip4(*address: str*) → bool

check if valid address or cidr

is_valid_ip6(*address: str*) → bool

check if valid address or cidr

py_cidr.files

Atomic write file

- caller responsible for any required locking

Module Contents

open_file(*path, mode, encoding=None*)

Open a file and return file object Useful where file is opened and used over wider part of code than a simple with open() as loop in one spot.

write_file_atomic(*data: str | bytes, fpath: str*)

Write data to fpath - atomic version Input:

data : whatever is to be written fpath: path to file to write to

py_cidr.rfc_1918

Tools interacting with RFC 1918

Module Contents

is_rfc_1918(*cidr: str*) → bool

Check if cidr is any RFC 1918

Parameters

cidr – IP or Cidr to check if RFC 1918

Returns

True if cidr is an RGC 1918 address False if not.

remove_rfc_1918(cidrs_in: str | List[str])

Given list of cidrs, return list without any rfc 1918

Parameters

cidrs_in – Cidr string or list of cidr strings.

Returns

Returns (cidrs_cleaned, rfc_1918_cidrs_found) cidrs_cleaned = list of cidrs with all rfc_1918 removed rfc_1918_cidrs_found = list of any rfc 1918 found in the input cidr(s) If input cidr(s) is a list, then output will be a list (possibly empty). If input cidr not a list then returned items will be string or None.

rfc_1918_cidrs() → [str]

Return list of rfc 1918 networks cidr strings

Returns

List of RFC 1918 networks as cidr strings

rfc_1918_nets() → [ipaddress.IPv4Network]

Return list of rfc 1918 networks

Returns

List of all RFC 1918 networks. Each element is ipaddress.IPv4Network

py_cidr.utils

Dev tools

Module Contents

print_dictionary(dic, indent=0)

simple dictionary printer Used to dump cidr cache

py_cidr.version

Project py-cidr This file is auto updated by git-release

Module Contents

version() → str

report version and release date

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