
DoTH-DNS

Release 7.0.2.dev2+g6926517

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Mar 29, 2021

CONTENTS:

1	Description	3
2	Project name origin	5
3	Acknowledgements	7
3.1	Installation	7
3.2	Usage	8
3.3	API	10
3.4	Get Help	13
3.5	DoTH-DNS Change Log	13
3.6	License	18
	Index	31

Your server doth DNS the safe way if you use DoTH-DNS.

Utilizes the power of the DNS sinkhole [pi-hole](#) and [unbound](#) to create a DNS server under your own authority but with the ability to connect via Do53 (default, unencrypted), DoH ([DNS over HTTPS](#)) and DoT ([DNS over TLS](#)).

<p>Warning: This project was created for use in a local network. If you want to use it on a VPS or in an cloud environment be sure to properly secure your environment and know what you do.</p>

DESCRIPTION

This project's goal is setup a recursive DNS server inside docker with the option to also connect via DoH or DoT. Therefore [pi-hole](#), [unbound](#), [traefik](#) and a [DoH-server](#) are utilized.

You may ask 'Why use DoH or DoT for an local DNS server?'. Good question! I set this up because firefox needs you to use DoH if you want to use [ESNI](#). The DoT support was just some lines of code more so I did it also.

You could also run the stack in a cloud (not tested) and connect there via DoH/DoT.

Query forwarding:

- Do53 query: port 53 -> pihole -> unbound
- DoT query: port 853 -> traefik -> pihole -> unbound
- DoH query: port 443 -> traefik -> DoH-server -> pihole -> unbound

PROJECT NAME ORIGIN

Firstly the name `DOTH-DNS` is a word construct resulting from the ability to use *DoT* and *DoH* for *DNS* queries. Secondly *doth* is an [archaic word for third person singular present tense of do](#), which matches the name perfectly well, because it *does DNS* (see slogan at top).

ACKNOWLEDGEMENTS

Thanks to the creators, maintainers and developers of the software used in this project.

Special thanks to:

- the [dns-over-https](#) project and its [docker version](#) as a base for my Dockerfile.
- the [docker-pihole-unbound](#) project for the inspiration.
- this [blog post](#) and this [blog post](#) being the first foundation of this project.

3.1 Installation

3.1.1 Prerequisites

Your machine needs to match the following conditions:

- Have a static IP
- Have python ≥ 3.6 + pip and docker installed
- Have valid SSL certificate (cert.crt) and matching key (key.key)

3.1.2 Installation from PyPI

DoTH-DNS is published on PyPI so you can simply install it with

```
$ pip install doth-dns
```

But it is recommended to install it in a virtual environment.

3.1.3 Installation from source

DoTH-DNS can be install directly from a clone of the [Git repository](#). You can either clone the repo and install the local clone:

```
$ git clone https://github.com/Cielquan/DoTH-DNS.git
$ cd DoTH-DNS
$ pip install .
```

or install it directly via **git**:

```
$ pip install git+https://github.com/Cielquan/DoTH-DNS.git
```

You can also grab the repo in either [tar.gz](#) or [zip](#) format. After downloading and extracting you can install it with **pip** like above.

3.2 Usage

3.2.1 Very Quick setup

DoTH-DNS can be setup very quick by just running one command

```
$ dothdns run
```

How ever it is not recommended. Because the important encryption part will not work properly. Better is to take some time and configure your local copy a bit.

3.2.2 Quick Setup

A quick but secure setup.

1. Initialize config directory

Create a local copy of the configuration files. The directory will be created in your home directory.

```
$ dothdns config
```

2. Add TLS certificate

To use proper encryption you need to add a certificate and corresponding key to ‘~/DoTH-DNS/certificates/’. The certificate needs to be named `cert.crt` and the key `key.key` unless you modify the configs.

Alternatively you can setup [Let’s Encrypt](#) with traefik.

3. Add `.htpasswd` file [optional/recommended]

To secure your traefik dashboard add a `.htpasswd` file to ‘~/DoTH-DNS/traefik-docker/shared/’ containing a user-password-string following htpasswd standard.

```
$ htpasswd -c ~/DoTH-DNS/traefik-docker/shared/.htpasswd <YOUR USERNAME>
```

4. Start DoTH-DNS

Now you are ready to start the stack and call

```
$ dothdns run
```

5. Secure your pihole dashboard

If you have not set the `WEBPASSWORD` environment variable for the pi-hole docker it will generate a random password for you which will be shown in the output of `dothdns run`. You should now set a secure password for your pihole dashboard (or deactivate it).

```
$ docker exec pihole pihole -a -p <PASSWORD>
```

6. Activate DNSSEC [optional/recommended]

Now you can log into your pihole dashboard and activate DNSSEC to validate DNS results. If DNSSEC runs you can check [here](#) or more verbose [here](#).

3.2.3 After setup

After setting DoTH-DNS up you need to setup your clients to use the new DNS server. If you use self-signed certificates you should install the root CA certificate on your devices.

3.2.4 Configuration

Configuration is guessed by DoTH-DNS if not set by the user. For setting configuration parameters you have three options. The shown order is also their ranking:

1. commandline options / flags
2. environment variables
3. configuration file (dothdns.ini)

1. Commandline options / flags

There are several options and flag you can set when interacting with DoTH-DNS on the commandline. See [API](#) for more information.

2. Environment variables

The following configuration you can set via EnvVars:

- TRAEFIK_AUTH [true|false]
- TRAEFIK_NETWORK <CUSTOM NETWORK>
- ARCHITECTURE [x86|arm]
- HOST_IP <IP ADDRESS>
- HOST_NAME <HOST NAME>
- TIMEZONE <TZ IN OLSON FORMAT>
- DOMAIN <CUSTOM DOMAIN>
- PROXY [true|false]

See [API](#) for more information to single options.

3. Configuration file

You can also write the EnvVars to a 'dothdns.ini' or '.dothdns.ini' file. The file must be either in your home directory or inside the 'DoTH-DNS' directory.

3.2.5 Additional Configuration

You are free to change configuration files in the DoTH-DNS directory. But beware that this can mess up the whole configuration. To reset the configs you can use the `dothdns init` command (see [API](#)).

3.2.6 Logging

All containers are logging by default. Pihole's logs are accessible via the dashboard. For the logs of the other containers call

```
$ docker logs <CONTAINER>
```

But there are some handicaps with logging. The DoH-Server only shows Traefik as client because traefik terminates the TLS connection. Pihole has a similar problem. It shows the DoH-Server as client for all DNS queries incoming via DoH.

3.3 API

This part of the documentation covers the CLI interface and is autogenerated by sphinx-click extension.

3.3.1 dothdns

Handle your DoTH-DNS system

```
dothdns [OPTIONS] COMMAND [ARGS]...
```

Options

--version

Show the version and exit.

-h, --help

Show this message and exit.

config

Edit or create DoTH-DNS configuration

```
dothdns config [OPTIONS]
```

Options

--fresh

Discard current *.env* file and write new file.

-n, --traefik-auth, -N, --traefik-no-auth

Activate authentication for traefik dashboard when *.htpasswd* file is present. [default: True]

--traefik-network <traefik_network>

Docker network to use for internal communication. Defaults to predefined network. Only change if you know what you do.

-a, --architecture <architecture>

ARCHITECTURE of the system's processor. [case-insensitive]

Options x86 | arm

-i, --host-ip <host_ip>

HOST_IP address used by the system by default.

-H, --hostname <hostname>

The system's HOST_NAME.

-t, --timezone <timezone>

TIMEZONE of the system in 'olson' format. See docs for more info.

-d, --domain <domain>

DOMAIN for dashboards, DoH and DoT (SNI). Defaults to [HOSTNAME.dns] and falls back to [doth.dns] if not HOST_NAME is found or given.

-h, --help

Show this message and exit.

Environment variables

TRAEFIK_AUTH

Provide a default for *-n*

TRAEFIK_NETWORK

Provide a default for *--traefik-network*

ARCHITECTURE

Provide a default for *-a*

HOST_IP

Provide a default for *-i*

HOST_NAME

Provide a default for *-H*

TIMEZONE

Provide a default for *-t*

DOMAIN

Provide a default for *-d*

down

Shut down DoTH-DNS container

```
dothdns down [OPTIONS]
```

Options

- c, --container-name** <container_name>
Shut down given container. Can be set multiple times. [case-sensitive]
Options traefik | doh_server | pihole | unbound
- r, --remove**
Remove container after shutdown.
- f, --force**
Force container shutdown and removal if ‘-r’ flag is set.
- h, --help**
Show this message and exit.

images

Handle DoTH-DNS docker images

```
dothdns images [OPTIONS]
```

Options

- c, --recompile**
Force recompiling ‘cielquan/doh_server’ docker image.
- u, --update** <update>
Update given image. Can be set multiple times. [case-sensitive]
Options traefik | doh_server | pihole | unbound
- U, --update-all**
Update all images if updates are available.
- h, --help**
Show this message and exit.

init

Create DoTH-DNS configuration directory

```
dothdns init [OPTIONS]
```

Options

-c, --only-create

Only create config dir if not already existing.

-f, --overwrite

Overwrite existing config dir, additional files are not touched. Only supported with python >= 3.8.

-F, --fresh

Overwrite existing config dir totally. No files will be kept.

-h, --help

Show this message and exit.

run

Start DoTH-DNS docker container

```
dothdns run [OPTIONS]
```

Options

--proxy, --no-proxy

If predefined instance of traefik should be used as reverse proxy. [default: True]

-h, --help

Show this message and exit.

Environment variables

PROXY

Provide a default for *--proxy*

update

Update DoTH-DNS container

```
dothdns update [OPTIONS]
```

Options

-c, --container-name <container_name>

Shut down given container. Can be set multiple times. [case-sensitive]

Options traefik | doh_server | pi-hole | unbound

--proxy, --no-proxy

If predefined instance of traefik should be used as reverse proxy. [default: True]

-h, --help

Show this message and exit.

Environment variables

PROXY

Provide a default for `--proxy`

3.4 Get Help

Here are some external links for further help:

- Pi-hole [documentation](#)
- Pi-hole image [documentation](#)
- Unbound [documentation](#)
- Unbound image [documentation](#)
- traefik [documentation](#)
- dns-over-https [documentation](#)
- dns-over-https image [documentation](#)
- Docker [documentation](#)
- Similar project - [link](#)
- Pi-hole blog post about slow loading sides and blocking QUIC protocol - [link](#)
- Pi-hole guide about pi-hole+unbound - [link](#)
- Blog post realizing a similar construct - [link](#)
- Another blog post realizing a similar construct - [link](#)

3.5 DoTH-DNS Change Log

Note: These changes are listed in decreasing version number order and not necessarily chronological. Version numbers follow the [SemVer](#) principle. See the [tags on this repository](#) for all available versions.

Note: Not all commits are linked. Commits are only linked when they match the specific note.

3.5.1 Release 7.0.1

Released: 16.02.2020

- Added PyPI & TravisCI badges ([commit](#))

3.5.2 Release 7.0.0

Released: 16.02.2020

This release is also published on PyPI.

- Added CLI written in python with click
- Revised container configs:
 - Custom start script for unbound adding additional config files (access protection and PTR entries) ([commit](#))
 - Removed unused log file stuff from unbound ([commit](#))
 - Added s6 script to pihole to grab unbound's IP and write to config ([commit](#))
 - Improved s6 script for pihole adding host wildcard entry ([commit](#))
 - Activated logging for doh_server by default ([commit](#))
- Added Dockerfile for doh_server based on [goofball's Dockerfile](#) ([commit](#))
- Updated traefik to v2.1 (incl. config) ([commit](#))
- Removed Bash scripts ([commit](#))
- Removed docker-compose files ([commit](#))
- Updated documentation ([commit](#))

3.5.3 Release 6.0.3

Released: 01.02.2020

- Fixed LICENSE.rst to be detectable by Github again ([commit](#))
- Updated Changelog reST syntax stuff ([commit](#))
- Added basic Github Issue template ([commit](#))

3.5.4 Release 6.0.2

Released: 01.02.2020

- Changed LICENSE to rst because of parsing errors in docs ([commit](#))
- Updated README ([commit](#))

3.5.5 Release 6.0.1

Released: 01.02.2020

- Added missing release note for 6.0.0 ([commit](#))

3.5.6 Release 6.0.0

Released: 30.01.2020

- Changed License from MIT to GPLv3 ([commit](#))

3.5.7 Release 5.4.0

Released: 25.01.2020

- Added sphinx documentation ([commit](#))
- Changed README, LICENSE, CHANGELOG from MD to reST ([commit](#))
- Added .gitattributes ([commit](#))
- Minor additions and fixes to documentation.

3.5.8 Release 5.3.0

Released: 11.12.2019

- Reworked config gathering in script and added fallback mechanism ([commit](#))
- Added `-F` flag for fallback option ([commit](#))
- Minor code improvements in script
- Updated README ([commit](#))

3.5.9 Release 5.2.1

Released: 30.11.2019

- Added missing hint for `whiptail` in README ([commit](#))

3.5.10 Release 5.2.0

Released: 29.11.2019

- Added very basic menu script based on `whiptail` ([commit](#))
- Added support for setting config environment variables in shell context ([commit](#))

3.5.11 Release 5.1.0

Released: 27.11.2019

- Added shut down function to script (-D flag) ([commit](#))

3.5.12 Release 5.0.2

Released: 25.11.2019

- Fixed update function to not pull doh_server's image when architecture is arm ([commit](#))
- Made .env file import messages more clear ([commit](#))
- Fixed .env file import error when no file is there ([commit](#))

3.5.13 Release 5.0.1

Released: 25.11.2019

- Added "fix-attrs" file for s6 overlay for pihole container to fix config file ownerships ([commit](#))
- Added ro flag to cert.crt, key.key and docker.sock ([commit](#))
- Added TZ EnvVar and /etc/localtime to all containers missing it ([commit](#))
- Minor fixes

3.5.14 Release 5.0.0

Released: 24.11.2019

- Removed nginx support ([commit](#))
- Removed second docker network ([commit](#))

3.5.15 Release 4.0.0

Released: 17.11.2019

- Added detection for .htpasswd file and auto setting traefik dashboard authZ on or off & added -N flag to deactivate ([commit](#))
- Moved dnsmasq's conf setup from script to container via script for s6 ([commit](#))
- Merged setup.sh and run.sh into new simplified start_doth_dns.bash script ([commit](#))
- Restructured certificates directory ([commit](#))
- Changed cert and key file from being dynamic to being static & renamed cert.toml to tls.toml ([commit](#))
- Moved nginx conf setup from script into docker command ([commit](#))
- Renamed some Env Vars in compose files to match script Vars & moved pihole Env Vars from conf files to compose ([commit](#))
- Made nginx HTTPS redirect a global static setting ([commit](#))
- Updated README ([commit](#))
- Smaller code and file cleanups
- Smaller fixes

3.5.16 Release 3.0.2

Released: 12.11.2019

- Fixed catchall rule for global HTTPS redirect ([commit](#))

3.5.17 Release 3.0.1

Released: 12.11.2019

- Changed urls in `run.sh` script output from IP address to 'pi.hole' ([commit](#)) ([commit](#))
- Fixed issue with `run.sh` script output while checking for pihole blocklist setup ([commit](#))
- Minor code clean up

3.5.18 Release 3.0.0

Released: 11.11.2019

- Renamed project to DoTH-DNS
- Added `CHANGELOG.md` ([commit](#))
- Dropped TLSv1.2 in nginx stream config ([commit](#))
- Added global https redirect config ([commit](#))
- Deleted old configs from `cert.toml` ([commit](#))
- Changed middleware für adding `/admin` for pihole urls ([commit](#))
- Changed traefik custom name format to `xxx_XxxxXxx` (3 letters of category, underscore, name in camelcase) ([commit](#))
- Updated traefik config for v2.0
- Updated DoH server config to version 2.2.1 ([commit](#))
- Fixed error for `-p` flag in `run.sh` script ([commit](#))

3.5.19 Release 2.6.1

Released: 25.08.2019

- Fixed `dnsmasq.conf` setup ([commit](#))

3.5.20 Release 2.6.0

Released: 25.08.2019

- Split Docker-Compose file ([commit](#))
- Fixed password message ([commit](#))
- Added Traefik as new and default reverse proxy ([commit](#))
- Added colors to script outputs ([commit](#))
- Added `DOMAIN` env var ([commit](#))

3.5.21 Release 2.5.0

Released: 07.08.2019

- Reduced amount of certificates to domain ([commit](#))
- Fixed checks on nginx conf creations ([commit](#))

3.5.22 Release 2.4.0

Released: 07.08.2019

- Added flags to `run.sh` script ([commit](#))

3.5.23 Release 2.3.0

Released: 06.08.2019

- Added flags to `setup.sh` script ([commit](#))
- Fixed `nginx` conf file creation ([commit](#))
- Fixed `roots.hint` downloader ([commit](#))

3.5.24 Release 2.2.0

Released: 06.08.2019

- `roots.hint` file will updated when older than 1h ([commit](#))
- Added option for fresh setup ([commit](#))
- `Nginx` conf file are no longer overwritten ([commit](#))
- Moved `*.template` files to own directory ([commit](#))
- Added `.conf` to DoT conf and put upstream to own file ([commit](#))
- Fixed issue with warnings for stapling ([commit](#))
- The script now exits if `docker-compose` fails ([commit](#))
- Fixed missing declaration of `$HOST_IP` ([commit](#))
- Added 'change password' reminder ([commit](#))

3.5.25 Release 2.1.0

Released: 05.08.2019

- Removed `WEBPASSWORD` functionality because it did not work like intended ([commit](#))

3.5.26 Release 2.0.2

Released: 05.08.2019

- Fixed bash command in `README.md` ([commit](#))

3.5.27 Release 2.0.1

Released: 05.08.2019

- Minor improvements to `README.md` ([commit](#))

3.5.28 Release 2.0.0

Released: 04.08.2019

- Changed Subnet ([commit](#))
- Moved certificates directory ([commit](#))
- Cut setup part from `start_script.sh` ([commit](#))
- Reworked setup part in new `setup.sh` script for more automation ([commit](#))
- Renamed `start_script.sh` to `run.sh` ([commit](#))
- Removed `sudo` from scripts ([commit](#))
- Renamed conf file for unbound ([commit](#))
- Changed some ENV Var stuff ([commit](#))

3.5.29 Release 1.1.0

Released: 03.08.2019

- Fixed problem with overwriting default upstream DNS server ([commit](#))
- Minor Improvements

3.5.30 Release 1.0.0

Released: 03.08.2019

- Initial release

3.6 License

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Version 3, 29 June 2007

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INDEX

Symbols

	dothdns-update command line option, 12
-F	--recompile
dothdns-init command line option, 12	dothdns-images command line option, 11
-H	--remove
dothdns-config command line option, 10	dothdns-down command line option, 11
-N	--timezone <timezone>
dothdns-config command line option, 10	dothdns-config command line option, 10
-U	--traefik-auth
dothdns-images command line option, 11	dothdns-config command line option, 10
--architecture <architecture>	--traefik-network <traefik_network>
dothdns-config command line option, 10	dothdns-config command line option, 10
--container-name <container_name>	--traefik-no-auth
dothdns-down command line option, 11	dothdns-config command line option, 10
dothdns-update command line option, 12	--update <update>
--domain <domain>	dothdns-images command line option, 11
dothdns-config command line option, 10	--update-all
--force	dothdns-images command line option, 11
dothdns-down command line option, 11	--version
--fresh	dothdns command line option, 10
dothdns-config command line option, 10	-a
dothdns-init command line option, 12	dothdns-config command line option, 10
--help	-c
dothdns command line option, 10	dothdns-down command line option, 11
dothdns-config command line option, 10	dothdns-images command line option, 11
dothdns-down command line option, 11	dothdns-init command line option, 12
dothdns-images command line option, 11	dothdns-update command line option, 12
dothdns-init command line option, 12	-d
dothdns-run command line option, 12	dothdns-config command line option, 10
dothdns-update command line option, 12	-f
--host-ip <host_ip>	dothdns-down command line option, 11
dothdns-config command line option, 10	dothdns-init command line option, 12
--hostname <hostname>	-h
dothdns-config command line option, 10	dothdns command line option, 10
--no-proxy	dothdns-config command line option, 10
dothdns-run command line option, 12	dothdns-down command line option, 11
dothdns-update command line option, 12	dothdns-images command line option, 11
--only-create	dothdns-init command line option, 12
dothdns-init command line option, 12	dothdns-run command line option, 12
--overwrite	dothdns-update command line option, 12
dothdns-init command line option, 12	-i
--proxy	dothdns-config command line option, 10
dothdns-run command line option, 12	-n

```
dothdns-config command line option, 10    --only-create, 12
-r                                          --overwrite, 12
dothdns-down command line option, 11      -c, 12
-t                                          -f, 12
dothdns-config command line option, 10    -h, 12
-u                                          dothdns-run command line option
dothdns-images command line option, 11    --help, 12
                                          --no-proxy, 12
                                          --proxy, 12
                                          -h, 12
D
dothdns command line option
  --help, 10
  --version, 10
  -h, 10
dothdns-config command line option
  -H, 10
  -N, 10
  --architecture <architecture>, 10
  --domain <domain>, 10
  --fresh, 10
  --help, 10
  --host-ip <host_ip>, 10
  --hostname <hostname>, 10
  --timezone <timezone>, 10
  --traefik-auth, 10
  --traefik-network <traefik_network>, 10
  --traefik-no-auth, 10
  -a, 10
  -d, 10
  -h, 10
  -i, 10
  -n, 10
  -t, 10
dothdns-down command line option
  --container-name <container_name>, 11
  --force, 11
  --help, 11
  --remove, 11
  -c, 11
  -f, 11
  -h, 11
  -r, 11
dothdns-images command line option
  -U, 11
  --help, 11
  --recompile, 11
  --update <update>, 11
  --update-all, 11
  -c, 11
  -h, 11
  -u, 11
dothdns-init command line option
  -F, 12
  --fresh, 12
  --help, 12
dothdns-update command line option
  --container-name <container_name>, 12
  --help, 12
  --no-proxy, 12
  --proxy, 12
  -c, 12
  -h, 12
```